هيئة الطيران المدني
CIVIL AVIATION AUTHORITY

CAR-145

Civil Aviation Regulation

Approved Maintenance Organisation

Effective 3rd September 2023

Approved by: HE Eng. Naif Ali Hamed Al Abri

President of CAA

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Corrigendum of Amendments

Rev.	Date	Description
00	**1 Apr 2011**	Initial Issue (the very first issue).
01	**01 Oct 2019**	The complete CAR has been reissued and Second Issue of this regulation has been published. The revised CAR labelled as Issue 2 Revision 1 that time. (according to CAR-11 procedure read, Rev. 01)
02	**03 Sep 2023**	• Cover regulation has been amended • Equivalent documents to CAA Form 1 have been changed • Component Certifying staff requirement has been incorporated • Section B requirement has been amended to be aligned with APM • Nominated person qualification has been incorporated • Distributor requirement has been removed • Airworthiness review staff requirement has been removed. • Correction of some typo-error and change PACA to CAA • Control of Unserviceable components combined with component provisions

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FOREWORD

(a) The Civil Aviation Regulation Maintenance Organisation Requirement (CAR-145) has been issued by the Civil Aviation Authority of Oman (CAA) under the provisions of the Civil Aviation Law of the Sultanate of Oman.

b) The CAR-145 contains requirements for "Maintenance Organisation" in accordance with relevant standards and recommended practices (SARPs) of ICAO Annexes 8 and 6 and its amendments.

(c) CAA has established a designated Safety Regulations Department (SRD) to control the rulemaking process. Civil Aviation Industry of the Sultanate may contact this department in case of having any query on the CAA regulations or to submit their feedbacks, with the objective of improving CAA Regulations. Note: Please find more information on rulemaking process as described within CAR-11.

(d) The editing practices used in this document are as follows:

(1) 'Shall' is used to indicate a mandatory requirement and may appear in CARs.

(2) 'Should' is used to indicate a recommendation and normally appears in AMCs and GM.

(3) 'May' is used to indicate discretion by the Authority, or the industry as appropriate.

(4) 'Will' indicates a mandatory requirement and is used to advise of action incumbent on the Authority.

Note: The use of the male gender implies the female gender and vice versa.

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COVER REGULATION

The Civil Aviation Authority, based on:

(a) Civil Aviation Law (Royal Decree 76/2019), and in particular Article 7 (c), empowering CAA to issue Civil Aviation Regulations;

(b) Civil Aviation Regulation Rulemaking Procedures (CAR-11); and

(c) For the continuing airworthiness of aircraft, aeronautical products, parts and appliances, and on the approval of maintenance organisation and personnel involved in these tasks,

the CAA has issued the regulation here under.

Article 1: Subject matter and Scope

This Regulation establishes technical requirements and administrative procedures to ensure:

(a) the continuing airworthiness of aircraft, including any component for installation thereto, which are:

  (i) registered in the Sultanate of Oman, unless its regulatory safety oversight has been delegated to a foreign country and they are not used by an Omani operator; or

  (ii) registered in a foreign country and used by Omani operator, where their regulatory safety oversight has been delegated to the Sultanate of Oman;

(b) Organizations involved in the maintenance of Complex Motor-Powered Aircraft or of aircraft used for commercial air transport, and components intended for fitment thereto, shall be approved in accordance with the requirement of this regulation.

(c) Organisations involved in the maintenance of aircraft and components not listed in point (b), shall be approved in accordance with the requirement of CAR-M Subpart F or this regulation.

Article 2: Definitions

Notwithstanding of CAR-1 publication for the purpose of incorporation of all definitions, the following definitions shall apply:

(a) 'Aircraft' means any machine that can derive support in the atmosphere from the reactions of the air other than reactions of the air against the earth's surface;

(b) 'Certifying staff' means personnel responsible for the release of an aircraft or aircraft component after maintenance;

(c) 'Component' means any engine, propeller, part or appliance;

(d) 'Continuing airworthiness' means all of the processes ensuring that, at any time in its operating life, the aircraft complies with the airworthiness requirements in force and is in a condition for safe operation;

(e) 'Maintenance' means any one or combination of overhaul, repair, inspection, replacement, modification or defect rectification of an aircraft or component, with the exception of pre-flight inspection;

(f) 'Organisation' means a natural person, a legal person or part of a legal person.

(g) 'Pre-flight inspection' means the inspection carried out before each flight or consistent series of consecutive flights to ensure that the aircraft is fit for the intended flight;

(h) "Critical maintenance task" means a maintenance task that involves the assembly or any disturbance of a system or any part on an aircraft, engine or propeller that, if an error occurred during its performance, could directly endanger the flight safety;

(i) 'Complex Motor-Powered Aircraft' shall mean:
  (1) an aeroplane:
    — with a maximum certificated take-off mass exceeding 5 700 kg, or
    — certificated for a maximum passenger seating configuration of more than nineteen, or
    — certificated for operation with a minimum crew of at least two pilots, or
    — equipped with (a) turbojet engine(s) or more than one turboprop engine, or
  (2) a helicopter certificated:
    — for a maximum take-off mass exceeding 3 175 kg, or
    — for a maximum passenger seating configuration of more than nine, or
    — for operation with a minimum crew of at least two pilots, or
  (3) a tilt rotor aircraft;

(j) "Commercial air transport (CAT) operation" means an aircraft operation to transport passengers, cargo or mail for remuneration or other valuable consideration;

(k) "Continuing Airworthiness records" Records which are related to the continuing airworthiness status of an aircraft, engine, propeller or associated part.

Article 3: Certifying Staff

(a) Certifying staff shall be qualified in accordance with the provisions of CAR-66, except as provided for in CAR-145.A.30(j) and CAR-145.A.30(i).

(b) By 01 January 2024 or first the CAA surveillance scheduled audit, whichever occurs later, all maintenance organisation for which approved for component class rating may maintain and release aircraft component in accordance with approved term of reference by the CAA.

Article 4: Safety management

All maintenance organisation approved in accordance with this regulation shall establish safety management in accordance with relevant requirement of CAR-100.

Article 5: Oversight Capabilities

(a) The CAA shall be the competent authority with the necessary powers and responsibilities for the certification and oversight of persons and organisations subject to this Regulation.

(b) The Authority shall ensure that its personnel do not perform oversight activities when there is evidence that this could result directly or indirectly in a conflict of interest, in particular when relating to family or financial interest.

(c) Personnel authorised by the CAA to carry out certification and/or oversight tasks shall be empowered to perform, at least, the following tasks:
  (i) examine the records, data, procedures, and any other material relevant to the execution of the certification and/or oversight task;
  (ii) take copies of, or extracts from such records, data, procedures, and other material;
  (iii) ask for an oral explanation on site;
  (iv) enter relevant premises, operating sites, or means of transport;
  (v) perform audits, investigations, assessments, inspections, including unannounced inspections; and
  (vi) take or initiate enforcement measures as appropriate.

Article 6: Access and Fees

The organization shall grant access to CAA responsible inspector all required facilities, documents to ensure the organisation capability or compliance with this regulation.

The organisation shall pay all fees, charges and costs that is prescribed by the CAA for conducting audit and issuance/renewal/extension of the certificate to ensure the capability, compliance and completeness of those works.

Article 7: Repeals

The below list of regulation(s) shall be repealed from the time this regulation enters into force:

— CANs 3-20, 3-22, 3-29 and 3-30.

— Any other requirements in the current Regulations that are contrary to this regulation

Article 8: Transition time

(a) This Regulation shall enter into force on 03 September 2023.

(b) This Regulation shall be binding in its entirety and directly applicable in all related parties.

SECTION A

TECHNICAL REGULATION

CAR 145.A.1 General

For the purpose of this CAR, the Civil Aviation Authority (CAA) exercises oversight over approved maintenance organisation having their principal place of business located:

1. in the sultanate of Oman territory; or
2. outside the Sultanate of Oman.

CAR 145.A.10 Scope

This CAR-145 establishes the requirements to be met by an organisation to qualify for the issue or continuation of an approval for the maintenance of aircraft, engine, propeller and associated parts.

AMC 145.A.10 Scope

1. Line Maintenance should be understood as any maintenance that is carried out before flight to ensure that the aircraft is fit for the intended flight.

(a) Line Maintenance may include:

- Trouble shooting.
- Defect rectification.
- Component replacement with use of external test equipment if required.
- Component replacement may include components such as engines and propellers.
- maintenance that will detect obvious unsatisfactory conditions/discrepancies/malfunctions, but does not require extensive in-depth inspection. It may also include internal structure, systems and powerplant items which are visible through quick opening access panels/doors/ports;
- Minor repairs and modifications which do not require extensive disassembly and can be accomplished by simple means.

(b) Maintenance tasks falling outside these criteria are considered to be Base Maintenance.

(c) Organisations maintaining aircraft should have a procedure to determine whether the tasks or groups of tasks to be carried out fall under the line maintenance or base maintenance scope of the organisation, with due regard to the expected duration of the maintenance, number and type of tasks, shifts and disciplines involved, work environment, etc.

For temporary or occasional cases, the organisation may also have a procedure which allows, subject to a task assessment (including all relevant aspects and conditions), to conduct a base maintenance task under line maintenance environment.

(d) In particular, maintenance tasks of aircraft subject to ‘progressive’ or ‘equalised’ maintenance programmes should be individually assessed in respect of such procedure to ensure that all the tasks within the particular check can be carried out safely and to the required standards at the designated line maintenance station

GM 145.A.10 Scope

This Guidance Material (GM) provides guidance on how the smallest organisations satisfy the intent of CAR-145:

(a) Organisations that only employ one person, who carries out the certification function and other functions, and that are approved under CAR-145 may use the alternatives provided below limited to the following terms of approval:
− Class A2 Base and line maintenance of aeroplanes of 5 700 kg maximum take-off mass (MTOM) or less (with piston engines only)
− Class A3 Base and line maintenance of single-engine helicopters of 3 175 kg MTOM or less − Class A4 Aircraft other than A1, A2 and A3 aircraft
− Class B2 Piston engines with maximum output of less than 450 HP
− Class C Components
− Class D1 Non-destructive testing

1) 145.A.30(b): The minimum requirement is for one full-time person who meets the CAR-66 requirements for certifying staff and holds the position of 'accountable manager, safety manager, maintenance engineer and is also certifying staff. No other person may issue a certificate of release to service and therefore if that person is absent, no maintenance may be released during such absence.
2) The quality system function of 145.A.65(c) may be contracted to an appropriate organisation approved under CAR-145 or to a person with appropriate technical knowledge and extensive experience of quality audits employed on a part-time basis, with the agreement of the CAA.

   Note: Full-time for the purpose of CAR-145 means not less than 35 hours per week except during vacation periods.

3) 145.A.35. In the case of an approval based on one person using a subcontracted quality monitoring arrangement, the requirement for a record of certifying staff is satisfied by the submission to and acceptance by the CAA. With only one person the requirement for a separate record of authorisation is unnecessary because the CAA approval schedule defines the authorisation. An appropriate statement, to reflect this situation, should be included in the exposition.
4) 145.A.65(c). It is the responsibility of the contracted quality monitoring organisation or person to make a minimum of 2 visits per 12 months and it is the responsibility of this organisation or person to carry out such monitoring on the basis of 1 pre-announced visit and 1 not announced visit to the organisation.
5) It is the responsibility of the organisation to comply with the findings of the contracted quality monitoring organisation or the person.

(b) Recommended operating procedure for a CAR-145 approved maintenance organisation based upon up to 10 persons involved in maintenance.
   1) 145.A.30(b): The normal minimum requirement is for the employment on a full-time basis of two persons who meet the applicable requirements for certifying staff, whereby one holds the position of 'maintenance engineer' and the other holds the position of 'quality audit engineer'.

   Either person can assume the responsibilities of the accountable manager providing that they can comply in full with the applicable elements of 145.A.30(a), but the 'maintenance engineer' should be the certifying person to retain the independence of

the 'quality audit engineer' to carry out audits. Nothing prevents either engineer from undertaking maintenance tasks providing that the 'maintenance engineer' issues the certificate of release to service.

The 'quality audit engineer' should have similar qualifications and status to the 'maintenance engineer' for reasons of credibility, unless he/she has a proven track-record in aircraft quality assurance, in which case some reduction in the extent of maintenance qualifications may be permitted.

In cases where the CAA agrees that it is not practical for the organisation to nominate a post holder for the quality monitoring function, this function may be contracted in accordance to paragraph (a)(2)

CAR 145.A.15 Application

An application for maintenance organisation approval or for the amendment of an existing maintenance organisation approval shall be made in a form and manner prescribed by the CAA.

AMC 145.A.15 Application

In a form and in a manner established by CAA means that the application should be made on CAA form AWR 030.

CAR 145.A.20 Terms of approval and scope of work

(a) The organisation's scope of work shall be specified in the maintenance organisation exposition (MOE) in accordance with point 145.A.70.

(b) The organisation shall comply with the terms of approval attached to the organisation certificate issued by the CAA, and with the scope of work specified in the MOE.

AMC1 145.A.20 Terms of approval and scope of work

The following table identifies the ATA specification 2200 chapter for the category C component rating. If the maintenance manual (or equivalent document) does not follow the ATA Chapters, the corresponding subjects still apply to the applicable C rating.

CLASS	RATING	ATA CHAPTERS
COMPONENTS OTHER THAN COMPLETE ENGINES OR APU	C1 Air Condition & Press	21
	C2 Auto Flight	22
	C3 Comms and Nav	23 - 34
	C4 Doors - Hatches	52
	C5 Electrical Power & Light	24 – 33 - 85
	C6 Equipment	25 - 38 - 44 – 45 - 50
	C7 Engine – APU	49 - 71 - 72 - 73 - 74 - 75 - 76- 77 - 78 - 79 - 80 - 81 - 82 - 83
	C8 Flight Controls	27 - 55 - 57.40 - 57.50 -57.60 - 57.70
	C9 Fuel	28 - 47
	C10 Helicopters - Rotor	62 - 64 - 66 - 67
	C11 Helicopter - Trans	63 - 65
	C12 Hydraulic Power	29
	C13 Indicating/Recording Systems	31 – 42 - 46
	C14 Landing Gear	32
	C15 Oxygen	35
	C16 Propeller	61
	C17 Pneumatic & Vacuum	36-37

	C18 Protection ice/rain/fire	26-30
	C19 Windows	56
	C20 Structural	53 - 54 - 57.10 - 57.20 - 57.30
	C21 Water Ballast	41
	C22 Propulsion Augmentation	84

AMC2 145.A.20 Terms of approval and scope of work

Facilities such as stores, line stations, component or subcontractor's workshops that are not located together with the main facilities of the organisation may be covered by the organisation approval without being identified on the organisation certificate, provided that the MOE identifies these facilities and contains procedures to control such facilities, and the CAA is satisfied that they form an integral part of the approved maintenance organisation.

CAR 145.A.25 Facility requirements

The organisation shall ensure that:

(a) Facilities are provided appropriate for all planned work, ensuring in particular, protection from the weather elements. Specialised workshops and bays are segregated as appropriate, to ensure that environmental and work area contamination is unlikely to occur.

1. For base maintenance of aircraft, aircraft hangars are both available and large enough to accommodate aircraft on planned base maintenance;

2. For component maintenance, component workshops are large enough to accommodate the components on planned maintenance.

(b) Office accommodation is provided for the management of the planned work referred to in point (a), and certifying staff so that they can carry out their designated tasks in a manner that contributes to good aircraft maintenance standards.

(c) The working environment including aircraft hangars, component workshops and office accommodation shall be appropriate for the task to be performed in particular special requirements observed. Unless otherwise dictated by the particular task environment, the working environment must be such that the effectiveness of personnel is not impaired:

1. temperatures must be maintained such that personnel can carry out required tasks without undue discomfort.

2. dust and any other airborne contamination are kept to a minimum and not be permitted to reach a level in the work task area where visible aircraft/component surface contamination is evident. Where dust/other airborne contamination results in visible surface contamination, all susceptible systems are sealed until acceptable conditions are re-established.

3. lighting is such as to ensure each inspection and maintenance task can be carried out in an effective manner.

4. noise shall not distract personnel from carrying out inspection tasks. Where it is impractical to control the noise source, such personnel are provided with the necessary personal equipment to stop excessive noise causing distraction during inspection tasks.

5. where a particular maintenance task requires the application of specific environmental conditions different to the foregoing, then such conditions are observed. Specific conditions are identified in the maintenance data.

6. the working environment for line maintenance is such that the particular maintenance or inspection task can be carried out without undue distraction. Therefore, where the working

environment deteriorates to an unacceptable level in respect of temperature, moisture, hail, ice, snow, wind, light, dust/other airborne contamination, the particular maintenance or inspection tasks must be suspended until satisfactory conditions are re-established.

(d) Secure storage facilities are provided for components, equipment, tools and material. Storage conditions ensure segregation of serviceable components and material from unserviceable aircraft components, material, equipment and tools. The conditions of storage are in accordance with the manufacturer's instructions, provide adequate security and prevent deterioration of, and damage to, stored items such as parts, equipment, tools and material. Access to storage facilities is restricted to authorised personnel.

AMC 145.A.25(a) Facility requirements

1. Where the hangar is not owned by the organisation, it may be necessary to establish proof of tenancy. In addition, sufficiency of hangar space to carry out planned base maintenance should be demonstrated by the preparation of a projected aircraft hangar visit plan relative to the maintenance programme. The aircraft hangar visit plan should be updated on a regular basis.

2. Protection from the weather elements relates to the normal prevailing local weather elements that are expected throughout any twelve-month period. Aircraft hangar and component workshop structures should prevent the ingress of rain, hail, ice, snow, wind and dust etc. Aircraft hangar and component workshop floors should be sealed to minimise dust generation.

3. For line maintenance of aircraft, hangars are not essential but it is recommended that access to hangar accommodation be demonstrated for usage during inclement weather for minor scheduled work and lengthy defect rectification.

4. Subject to a risk assessment and agreement by the CAA, the organisation may use facilities at the approved location other than a base maintenance hangar for certain aircraft base maintenance tasks, provided that those facilities offer levels of weather and environmental protection that are equivalent to those of a base maintenance hangar, as well as a suitable working environment for the particular work package. This does not exempt an organisation from the requirement to have a base maintenance hangar in order to be approved to conduct base maintenance at a given location.

AMC 145.A.25(b) Facility requirements

It is acceptable to combine any or all of the office accommodation requirements into one office subject to the staff having sufficient room to carry out the assigned tasks.

In addition, as part of the office accommodation, aircraft maintenance staff should be provided with an area where they may study maintenance instructions and complete maintenance records in a proper manner.

AMC 145.A.25(d) Facility requirements

1.Storage facilities for serviceable aircraft components should be clean, well-ventilated and maintained at a constant dry temperature to minimise the effects of condensation. Manufacturer’s storage recommendations should be followed for those aircraft components identified in such published recommendations.

2. Storage racks should be strong enough to hold aircraft components and provide sufficient support for large aircraft components such that the component is not distorted during storage.

3. All aircraft components, wherever practicable, should remain packaged in protective material to minimise damage and corrosion during storage.

CAR 145.A.30 Personnel requirements

(a) The maintenance organisation shall nominate an accountable manager that has corporate authority for ensuring that all maintenance activities can be financed and carried out to the standard required by this CAR. The accountable manager shall:

1. ensure that all necessary resources are available to accomplish maintenance in accordance with this regulation and to support the organisation certificate.

2. establish and promote the safety and quality policy specified in this regulation and CAR-100.

3. demonstrate a basic understanding of this regulation.

(b) The organization's accountable manager shall nominate a person or group of persons whose responsibilities include ensuring that the maintenance organization is in compliance with this regulation and the MOE and approved procedures. Such person(s) shall ultimately be responsible to the accountable manager.

1. The person or persons nominated shall represent the maintenance management structure of the organisation and be responsible for all functions specified in this regulation.

2. The person or persons nominated shall be able to demonstrate relevant knowledge, background and satisfactory experience related to aircraft or component maintenance and demonstrate a working knowledge of this regulation.

4. Procedures shall make clear who deputises for any particular person in the case of lengthy absence of the said person.

(c) The accountable manager shall nominate a person with responsibility for monitoring and checking compliance with the quality system, including the associated feedback system as required by requirement 145.A.65(c). The nominated person shall have direct access to the accountable manager to ensure that the accountable manager is kept properly informed on quality and compliance matters.

(d) The organisation shall employ the necessary personnel to plan, perform, supervise, inspect and release the maintenance work to be performed. The organization shall have a maintenance man-hour plan showing that the organisation has sufficient staff; monitored by the quality and safety management. In addition, the organisation shall have a procedure to reassess work intended to be carried out when actual staff availability is less than the planned staffing level for any particular work shift or period.

(e) The organisation shall establish and control the competence of personnel involved in any maintenance, ,management and/or quality audits in accordance with a procedure and to a standard agreed by the CAA. In addition to the necessary expertise related to the job function, the competency of the personnel must include an understanding of the application of safety management principles, including human factors and human performance issues, which is appropriate to their function and responsibilities in the organisation.

(f) The organisation shall ensure that personnel who carry out and/or control a continued airworthiness non-destructive test of aircraft structures or components or both are appropriately qualified for the particular non-destructive test in accordance with the European (EN 4179) or equivalent Standard recognised by the CAA. Personnel who carry out any other specialised task shall be appropriately qualified in accordance with officially recognised Standards. By derogation to this point those personnel specified in requirements (g) and (h)(1) and (h)(2), qualified in category B1 or B3 in accordance with CAR-66 may carry out and/or control colour contrast dye penetrant tests.

(g) Any organisation maintaining aircraft, except where stated otherwise in requirement (j), shall in the case of aircraft line maintenance, have appropriate aircraft rated certifying staff qualified as category B1, B2, B3, as appropriate, in accordance with CAR-66 and requirement 145.A.35.

In addition, such organisations may also use appropriately task trained certifying staff holding the privileges described in requirements CAR-66.20 and qualified in accordance with CAR-66 and requirement 145.A.35 to carry out minor scheduled line maintenance and simple defect rectification. The availability of such certifying staff shall not replace the need for category B1, B2, B3 certifying staff, as appropriate.

(h) Any organisation maintaining aircraft, except where stated otherwise in requirement (j) shall:

1. in the case of base maintenance of complex motor-powered aircraft, have appropriate aircraft type rated certifying staff qualified as category C in accordance with CAR-66 and 145.A.35. In addition, the organisation shall have sufficient aircraft type rated staff qualified as category B1 and B2 as appropriate in accordance with CAR-66 and 145.A.35 to support the category C certifying staff.

    (i) B1 and B2 support staff shall ensure that all relevant tasks or inspections have been carried out to the required standard before the category C certifying staff issues the certificate of release to service.

    (ii) The organisation shall maintain a register of any such B1 and B2 support staff.

    (iii) The category C certifying staff shall ensure that compliance with paragraph (i) has been met and that all work required by the customer has been accomplished during the particular base maintenance check or work package, and shall also assess the impact of any work not carried out with a view to either requiring its accomplishment or agreeing with the operator to defer such work to another specified check or time limit.

2. in the case of base maintenance of aircraft other than complex motor-powered aircraft have either:

    (i) appropriate aircraft rated certifying staff qualified as category B1, B2, B3, as appropriate, in accordance with CAR-66 and requirement 145.A.35 or,

    (ii) appropriate aircraft rated certifying staff qualified in category C assisted by support staff as specified in requirement 145.A.35(a)(i).

(i) Component certifying staff shall comply with Appendix V and CAR-145.A.35.

(j) By derogation to requirements (g) and (h), the organisation may use certifying staff qualified in accordance with the following provisions:

1. For base maintenance carried out at a location outside a territory, the certifying staff and support staff may be qualified in accordance with the national aviation regulations of the State in which the base maintenance facility is located, subject to the conditions specified in Appendix IV to this regulation.

2. For line maintenance carried out at a line station of an organisation which is located outside the Sultanate of Oman territory, the certifying staff may be qualified in accordance with conditions specified in Appendix IV to this regulation, in accordance with the following alternative conditions:

    - national aviation regulations of the State in which the line station is located,
    - national aviation regulations of the State in which the organisation's principal place of business is located, or

- Foreign license which is equivalent to CAR-66 at minimum and acceptable by Oman CAA (i.e. EASA).

3. For a repetitive pre-flight airworthiness directive which specifically states that the flight crew may carry out such airworthiness directive, the organisation may issue a limited certification authorisation to the pilot on the basis of the flight crew licence held. In that case, the organisation shall ensure that the pilot has carried out sufficient practical training ensuring that the pilot can accomplish the airworthiness directive.
4. If an aircraft is operated away from a supported location, the organisation may issue a limited certification authorisation to the pilot on the basis of the flight crew licence held, subject to being satisfied that the pilot has carried out sufficient practical training ensuring that the pilot can accomplish the specified task.
5. In the following unforeseen cases, where an aircraft is grounded at a location other than the main base where no appropriate certifying staff are available, the organisation contracted to provide maintenance support may issue a one-off certification authorisation:

   (i) to one of its employees holding equivalent type authorisations on aircraft of similar technology, construction and systems; or

   (ii) to any person with not less than five years maintenance experience and holding a valid ICAO aircraft maintenance license rated for the aircraft type requiring certification provided there is no organisation appropriately approved under this regulation at that location and the contracted organisation obtains and holds on file evidence of the experience and the license of that person.

All such cases as specified in this point must be reported to the CAA within seven days after issuing such certification authorisation. The organisation issuing the one-off authorisation shall ensure that any such maintenance that could affect flight safety is rechecked by an appropriately approved organisation.

(k) The maintenance organization shall ensure that all maintenance personnel receive initial and continuation training appropriate to their assigned tasks and responsibilities. The training programme established by the maintenance organization shall include training in knowledge and skills related to human performance, including coordination with other maintenance personnel and flight crew.

AMC 145.A.30(a) Personnel requirements

ACCOUNTABLE MANAGER

Accountable manager is normally intended to mean the chief executive officer of the approved maintenance organisation, who by virtue of his or her position has overall (including in particular financial) responsibility for running the organisation. The accountable manager may be the accountable manager for more than one organisation and is not necessarily required to be knowledgeable on technical matters, as the MOE defines the maintenance standards. When the accountable manager is not the chief executive officer, the organisation should demonstrate to the CAA that the accountable manager has direct access to the chief executive officer and has the necessary funding allocation for the intended maintenance activities.

AMC 145.A.30(b) Personnel requirements

1. Dependent upon the size of the organisation, the CAR-145 functions may be subdivided under individual managers or combined in any number of ways.
2. The organisation should have, dependent upon the extent of approval, a base maintenance manager, a line maintenance manager, a workshop manager, a quality manager and a safety

manager, all of whom should report to the accountable manager except in small CAR-145 organisation where any one manager may also be the accountable manager, as determined by the CAA, he/she may also be the line maintenance manager or the workshop manager.

3. The base maintenance manager is responsible for ensuring that all maintenance required to be carried out in the hangar, plus any defect rectification carried out during base maintenance, is carried out to the design and quality standards specified in 145.A.65(b). The base maintenance manager is also responsible for any corrective action resulting from the quality compliance monitoring of 145.A.65(c).
4. The line maintenance manager is responsible for ensuring that all maintenance required to be carried out on the line including line defect rectification is carried out to the standards specified in 145.A.65(b) and also responsible for any corrective action resulting from the quality compliance monitoring of 145.A.65(c).
5. The workshop manager is responsible for ensuring that all work on aircraft components is carried out to the standards specified in 145.A.65(b) and also responsible for any corrective action resulting from the quality compliance monitoring of 145.A.65(c).
6. The quality manager's and safety manager responsibilities are specified respectively in 145.A.30(c) and AMC 145.A.30(c)5.
7. Notwithstanding the example sub-paragraphs 2 - 6 titles, the organisation may adopt any title for the foregoing managerial positions but should identify to the CAA , the titles and persons chosen to carry out these functions.
8. Where an organisation chooses to appoint managers for all or any combination of the identified CAR-145 functions because of the size of the undertaking, it is necessary that these managers' report ultimately through either the base maintenance manager or line maintenance manager or workshop manager or quality manager, as appropriate, to the accountable manager.

AMC 145.A.30(c) Personnel requirements

1. Monitoring the quality system includes requesting remedial action as necessary by the accountable manager and the nominated persons referred to in 145.A.30(b).
2. The role of the quality manager is to ensure that the activities of the organisation are monitored for compliance with the applicable regulatory requirements, and any additional requirements as established by the organisation, and that these activities are being carried out properly under the supervision of the nominated persons referred to in 145.A.30 (b).
3. The quality manager should be responsible for ensuring that the quality programme is properly implemented, maintained, and continually reviewed and improved.

   The quality manager should:

   (a) have direct access to the accountable manager;

   (b) not be one of the nominated persons referred to in 145.A.30(b);

   (c) qualified in accordance with AMC 145.A.30 (b) and (c); and

   (d) have access to all parts of the organisation, and as necessary, any subcontracted organisation.
4. In the case of a small organisation, this task may be exercised by the accountable manager provided he/she has demonstrated having the related competence as defined in point 3(c).

5. The safety manager is responsible for the development, administration, and maintenance of effective safety management processes as part of the management system in accordance with 145.A.65 and CAR-100.

6. In the case the same person acts as quality manager and as safety manager, the accountable manager, with regard to his/her direct accountability for safety, should ensure that sufficient resources are allocated to both functions, taking into account the size of the organisation, and the nature and complexity of its activities.

AMC 145.A.30(b) and (c) Personnel requirements

KNOWLEDGE, BACKGROUND AND EXPERIENCE OF NOMINATED PERSON(S)

(a) The person or persons to be nominated in accordance with points (b) and (c) of point 145.A.30 should have:

1. practical experience and expertise in the application of aviation safety standards and safe operating practices;

2. knowledge of:

   i. Human factors principles;
   ii. Quality System; and
   iii. Safety management systems

3. Five years of relevant work experience, of which at least 2 years should be from the aeronautical industry in an appropriate position;

4. A relevant engineering or technical degree, or an aircraft technician or maintenance engineer qualification with additional education that is acceptable to the CAA.

'Relevant engineering or technical degree' means a degree from aeronautical, mechanical, electrical, electronic, avionics or other studies that are relevant to the maintenance and/or continuing airworthiness of aircraft/aircraft components.

The provision set out in the first paragraph of point (d) may be replaced by 2 years of experience in addition to those already recommended by paragraph (c) above. These 2 years should cover an appropriate combination of experience in tasks/activities related to maintenance and/or continuing airworthiness management and/or the surveillance of such tasks. For the person to be nominated in accordance with point (c) of 145.A.30, in the case where the organisation holds one or more additional organisation certificates within the scope of CAA regulation and that person has already an equivalent position (i.e. compliance monitoring manager, safety manager) under the additional certificate(s) held, the provisions set out in the first two paragraphs of point (d) may be replaced by the completion of a specific training programme acceptable to the CAA to gain an adequate understanding of maintenance standards and continuing airworthiness concepts and principles;

5. thorough knowledge of the organisation's MOE and safety policy;

6. knowledge of a relevant sample of the type(s) of aircraft or components gained through a formalised training course. These courses could be provided by a CAR-147 organisation or by the manufacturer or by the CAR-145 organisation or by any other organisation accepted by the CAA.

   Aircraft/engine type training courses should be at least at a level equivalent to the CAR-66 Appendix C Level 1 General Familiarisation.

   'Relevant sample' means that these courses should cover typical aircraft or components that are within the scope of work of the organisation.

For all balloons and any other aircraft of 2 730 kg MTOM or less, the formalised training courses may be replaced by a demonstration of the required knowledge by providing documented evidence, or by an assessment acceptable to the CAA. This assessment should be recorded;

7. knowledge of the relevant maintenance methods (and how they are applied in the organisation) and/or specific knowledge relevant to the area for which the person will be nominated;

8. knowledge of the applicable regulations (i.e. CAR-145, CAR-66 and Safety Management);

(b) By derogation of requirements in point (a), Any person accepted by CAA prior to 03 September 2023 consider to be accepted in accordance with this regulation.

AMC 145.A.30(d) Personnel requirements

1. Has sufficient staff means that the organisation employs or contracts competent staff, as detailed in the man-hour plan, of which at least half the staff that perform maintenance in each workshop, hangar or flight line on any shift should be employed to ensure organizational stability. For the purpose of meeting a specific operational necessity, a temporary increase of the proportion of contracted staff may be permitted to the organisation by the CAA, in accordance with an approved procedure which should describe the extent, specific duties, and responsibilities for ensuring adequate organisation stability.

   For the purpose of this subparagraph, employed means the person is directly employed as an individual by the maintenance organisation approved under CAR-145, whereas contracted means the person is employed by another organisation and contracted by that organisation to the maintenance organisation approved under CAR-145.

2. The maintenance man-hour plan should take into account all maintenance activities carried out outside the scope of the CAR-145 approval. The planned absence (for training, vacations, etc.) should be considered when developing the man-hour plan.

3. The maintenance man-hour plan should relate to the anticipated maintenance work load except that when the organisation cannot predict such workload, due to the short-term nature of its contracts, then such plan should be based upon the minimum maintenance workload needed for commercial viability. Maintenance work load includes all necessary work such as, but not limited to, planning, maintenance record checks, production of worksheets/cards in paper or electronic form, accomplishment of maintenance, inspection and the completion of maintenance records.

4. In the case of aircraft base maintenance, the maintenance man-hour plan should relate to the aircraft hangar visit plan as specified in AMC 145.A.25(a).

5. In the case of aircraft component maintenance, the maintenance man-hour plan should relate to the aircraft component planned maintenance as specified in 145.A.25(a)(2).

6. The quality monitoring compliance function man-hours should be sufficient to meet the requirement of 145.A.65(c) which means taking into account AMC 145.A.65(c). Where quality monitoring staff perform other functions, the time allocated to such functions needs to be taken into account in determining quality monitoring staff numbers.

7. The maintenance man-hour plan should be reviewed at least every 3 months and updated when necessary.

8. Significant deviation from the maintenance man-hour plan should be reported through the departmental manager to the quality manager, the safety manager and the accountable manager for review. Significant deviation means more than a 25% shortfall in available man-hours during a calendar month for any one of the functions specified in 145.A.30(d).

9. the organisation should have a procedure to assess and mitigate the risks:

(1) if the actual number of staff available is less than the planned staffing level for any particular work shift or period;

(2) if there is a temporary increase in the proportion of contracted staff in order to meet specific operational needs.

AMC1 145.A.30(e) Personnel requirements

Competence should be defined as a measurable skill or standard of performance, knowledge and understanding, taking into consideration attitude and behaviour.

The referenced procedure requires amongst others that planners, mechanics, specialised services staff, supervisors, certifying staff and support staff, whether employed or contracted, are assessed for competence before unsupervised work commences and competence is controlled on a continuous basis.

Competence should be assessed by evaluation of:

– on-the-job performance and/or testing of knowledge by appropriately qualified personnel, and

– records for basic, organisational, and/or product type and differences training, and

– experience records.

Validation of the above could include a confirmation check with the organisation(s) that issued such document(s). For that purpose, experience/training may be recorded in a document such as a log book or based on the suggested template in GM6 145.A.30(e).

As a result of this assessment, an individual's qualification should determine:

– which level of ongoing supervision would be required or whether unsupervised work could be permitted.

– whether there is a need for additional training.

A record of such qualification and competence assessment should be kept.

This should include copies of all documents that attest to qualification, such as the license and/or any authorisation held, as applicable.

For a proper competence assessment of its personnel, the organisation should consider that:

1. In accordance with the job function, adequate initial and recurrent training should be provided and recorded to ensure continued competence so that it is maintained throughout the duration of employment/contract.

2. All staff should be able to demonstrate knowledge of and compliance with the maintenance organisation procedures, as applicable to their duties.

3. All staff should be able to demonstrate an understanding of human factors and human performance issues in relation with their job function and be trained as per AMC2 145.A.30(e).

4. To assist in the assessment of competence and to establish the training needs analysis, job descriptions are recommended for each job function in the organisation. Job descriptions should contain sufficient criteria to enable the required competence assessment.

5. Criteria should allow the assessment to establish that, among others (titles might be different in each organisation):

– Managers are able to properly manage the work output, processes, resources and priorities described in their assigned duties and responsibilities in a safe compliant manner in accordance with regulations and organisation procedures.

– Planners are able to interpret maintenance requirements into maintenance tasks, and have an understanding that they have no authority to deviate from the maintenance data.

– Supervisors are able to ensure that all required maintenance tasks are carried out and, where not completed or where it is evident that a particular maintenance task cannot be carried out to the maintenance data, then such problems will be reported to the 145.A.30(c) person for appropriate action. In addition, for those supervisors, who also carry out maintenance tasks, that they understand such tasks should not be undertaken when incompatible with their management responsibilities.

– Mechanics are able to carry out maintenance tasks to any standard specified in the maintenance data and will notify supervisors of defects or mistakes requiring rectification to re-establish required maintenance standards.

– Specialised services staff are able to carry out specialised maintenance tasks to the standard specified in the maintenance data. They should be able to communicate with supervisors and report accurately when necessary.

– Support staff are able to determine that relevant tasks or inspections have been carried out to the required standard.

– Certifying staff are able to determine when the aircraft or aircraft component is ready to release to service and when it should not be released to service.

– Quality staff are able to monitor compliance with CAR-145 identifying noncompliance in an effective and timely manner so that the organisation may remain in compliance with CAR-145.

– Staff having designated safety management responsibilities are familiar with the relevant processes in terms of hazard identification, risk management, and monitoring of safety performance.

– All staff are familiar with the safety policy and the procedures and tools that can be used for internal safety reporting.

Competence assessment should be based upon the procedure specified in GM5 145.A.30(e).

AMC2 145.A.30(e) Personnel requirements

Human factors with respect to the understanding of the application of human factors and human performance issues, all maintenance organisation personnel should have received an initial and continuation human factors training. This should concern to a minimum:

– Post-holders, managers, supervisors;

– Certifying staff, support staff and mechanics;

– Technical support personnel such as planners, engineers, technical record staff;

– Quality & Safety staff;

– Specialised services staff;

– Human factors staff/human factors trainers;

– Store department staff, purchasing department staff;

– Ground equipment operators.

1. Initial human factors training should cover all the topics of the training syllabus specified in GM1 145.A.30(e) either as a dedicated course or else integrated within other training. The syllabus may be adjusted to reflect the particular nature of the organisation. The syllabus may also be adjusted to meet the particular nature of work for each function within the organisation. For example:

   – small organisations not working in shifts may cover in less depth subjects related to teamwork and communication;

   – planners may cover in more depth the scheduling and planning objective of the syllabus and in less depth the objective of developing skills for shift working.

   All personnel, including personnel being recruited from any other organisation should receive initial human factors training compliant with the organisation's training standards prior to commencing actual job function, unless their competence assessment justifies that there is no need for such training. Newly directly employed personnel working under direct supervision may receive training within 6 months after joining the maintenance organisation.

2. The purpose of human factors continuation training is primarily to ensure that staff remain current in terms of human factors and also to collect feedback on human factors issues. Consideration should be given to the possibility that such training has the involvement of the quality department. There should be a procedure to ensure that feedback is formally passed from the trainers to the quality department to initiate action where necessary.

   Human factors continuation training should be of an appropriate duration in each two-year period in relation to relevant quality audit findings and other internal/external sources of information on human errors in maintenance available to the organisation.

3. Human factors training may be conducted by the maintenance organisation itself, or independent trainers, or any training organisations acceptable to the CAA.

4. The human factors training procedures should be specified in the maintenance organisation exposition.

AMC3 145.A.30(e) Personnel requirements

CDCCL Training

Additional training in fuel tank safety as well as associated inspection standards and maintenance procedures should be required for maintenance organisation's technical personnel, especially technical personnel involved in the compliance of CDCCL tasks.

The CAA guidance is provided for training to maintenance organisation personnel in Appendix I to AMC 145.A.30(e) and 145.B.10(3).

AMC4 145.A.30(e) Personnel requirements

EWIS Training

Competence assessment should include the verification for the need of additional EWIS training when relevant.

The appendix II to this AMC uses as guidance for EWIS training programme to maintenance organisation personnel .

AMC5 145.A.30(e) Personnel requirements

TRAINING — PERSONNEL INVOLVED IN QUALITY SYSTEM / COMPLIANCE MONITORING

1. Correct and thorough training is essential to optimise compliance in every organisation. In order to achieve significant outcomes of such training, the organisation should ensure that all personnel understand the objectives as laid down in the organisation's management system documentation.
2. Those responsible for managing the compliance monitoring function should receive training on this task. Such training should cover the requirements of compliance monitoring, manuals and procedures related to the task, audit techniques, reporting, and recording.
3. Time should be provided to train all personnel involved in compliance management and for briefing the remainder of the personnel. The allocation of time and resources should be governed by the volume and complexity of the activities concerned.

AMC6 145.A.30(e) Personnel requirements

SAFETY TRAINING

(a) All personnel should receive safety training as appropriate for their safety management related responsibilities. Such training could be classroom-based or computer-based training. Adequate records of all safety training provided should be kept.

(b) Safety training should be delivered by the safety manager or a competent trainer and may be conducted by the maintenance organisation itself, or independent trainers, or any training organisations acceptable to the CAA.

GM1 145.A.30(e) Personnel requirements

TRAINING SYLLABUS FOR INITIAL HUMAN FACTORS TRAINING

The training syllabus below identifies the topics and subtopics to be addressed during the human factors training.

The maintenance organisation may combine, divide, change the order of any subject of the syllabus to suit its own needs, as long as all subjects are covered to a level of detail appropriate to the organisation and its personnel.

Some of the topics may be covered in separate training (health and safety, management, supervisory skills, etc.) in which case duplication of training is not necessary.

Where possible, practical illustrations and examples should be used, especially accident and incident reports.

Topics should be related to existing legislation, where relevant. Topics should be related to existing guidance/advisory material, where relevant (e.g. ICAO HF Digests and Training Manual). Topics should be related to maintenance engineering where possible; too much unrelated theory should be avoided.

1. General/Introduction to human factors
   - 1.1. Need to address human factors
   - 1.2. Statistics
   - 1.3. Incidents
2. Safety Culture/Organisational factors
3. Human Error
   - 3.1. Error models and theories
   - 3.2. Types of errors in maintenance tasks

3.3. Violations
3.4. Implications of errors
3.5. Avoiding and managing errors
3.6. Human reliability

4. Human performance & limitations
4.1. Vision
4.2. Hearing
4.3. Information-processing
4.4. Attention and perception
4.5. Situational awareness
4.6. Memory
4.7. Claustrophobia and physical access
4.8. Motivation
4.9. Fitness/Health
4.10. Stress
4.11. Workload management
4.12. Fatigue
4.13. Alcohol, medication, drugs
4.14. Physical work
4.15. Repetitive tasks/complacency

5. Environment
5.1. Peer pressure
5.2. Stressors
5.3. Time pressure and deadlines
5.4. Workload
5.5. Shift Work
5.6. Noise and fumes
5.7. Illumination
5.8. Climate and temperature
5.9. Motion and vibration
5.10. Complex systems
5.11. Hazards in the workplace
5.12. Lack of manpower
5.13. Distractions and interruptions

6. Procedures, information, tools and practices
6.1. Visual Inspection
6.2. Work logging and recording
6.3. Procedure - practice/mismatch/norms
6.4. Technical documentation - access and quality
6.5. Critical maintenance tasks and error-capturing methods (independent inspection, reinspection, etc.)

7. Communication
7.1. Shift/Task handover
7.2. Dissemination of information
7.3. Cultural differences

8. Teamwork
8.1. Responsibility

8.2. Management, supervision and leadership
8.3. Decision making

9. Professionalism and integrity
9.1. Keeping up to date; currency
9.2. Error provoking behaviour
9.3. Assertiveness

10. Organisation's HF program
10.1 Safety risk assessment
10.2 Confidential internal reporting scheme
10.3 Reporting of errors and hazards
10.4 Safety policy as related to non-punitive reporting and just culture
10.5 Occurrence investigation process
10.6 Action to address problems
10.7 Feedback

GM2 145.A.30(e) Personnel requirements

HUMAN FACTORS TRAINER

A competent Human Factors trainer should meet the following criteria:

1. attended training that is at least equivalent to the CAR-145 Maintenance Human Factors Initial training syllabus defined in GM1 145.A.30(e);
2. received instruction in training techniques, and training development compatible with the skills to influence attitudes and behaviours;
3. has worked for a minimum of three years within the aviation industry, or possesses a suitable academic background;
4. has an appropriate level of understanding of Human Factors in the maintenance environment in relation to the organisation's HF programme (module 10 of GM 1 145.A.30(e)).

GM3 145.A.30(e) Personnel requirements

DEFINTIONS

1. 'Human factors' is anything that affects human performance which means principles which apply to aeronautical design, certification, training, operations, and maintenance and which seek safe interface between the human and other system components by proper consideration of human performance.
2. 'Human performance' means human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

GM4 145.A.30(e) Personnel requirements

SAFETY TRAINING

1. The scope of safety training and related training programme will differ significantly depending on the size and complexity of the organisation. Safety training should reflect the evolving management system, and the changing roles of the personnel who make it work.
2. In recognition of this, training should be provided to management and staff at least:
   (a) during the initial implementation of safety management processes;

(b) for all new staff or personnel recently appointed for any safety management related task;

(c) on a regular basis to refresh their knowledge and to understand changes to the management system;

(d) when changing roles which affects their safety management roles and responsibilities; and

(e) when performing specialist safety roles, such as: safety manager, safety investigator, focal point for Emergency Response Planning, and Safety Auditor.

GM5 145.A.30(e) Personnel requirements

COMPETENCE ASSESSMENT PROCEDURE

The organisation should develop a procedure describing the process of competence assessment of personnel. The procedure should specify:

- persons responsible for this process,
- when the assessment should take place,
- credits from previous assessments,
- validation of qualification records,
- means and methods for the initial assessment,
- means and methods for the continuous control of competence including feedback on personnel performance,
- competences to be observed during the assessment in relation with each job function,
- actions to be taken when assessment is not satisfactory,
- recording of assessment results.

For example, according to the job functions and the scope, size and complexity of the organisation, the assessment may consider the following (the table is not exhaustive):

	Managers	Planners	Supervisor	Certifying Staff and Support Staff	Mechanics	Specialised service Staff	Quality Staff	Safety Staff
Knowledge of applicable officially recognised standards						X	X	X
Ability to understand and perform Root Causes Analysis and Safety Risk Assessment	X		X				X	X

Knowledge of auditing techniques: planning, conducting and reporting							X	X
Knowledge of human factors, human performance , limitations and fatigue	X	X	X	X	X	X	X	X
Knowledge of logistics processes	X	X	X					
Knowledge of organisation capabilities, privileges and limitations	X	X	X	X		X	X	X
Knowledge of CAR-M, CAR-145 and any other relevant regulations	X	X	X	X			X	X
Knowledge of relevant parts of the maintenance organisation exposition and procedures	X	X	X	X	X	X	X	X
Knowledge of occurrence reporting system and understanding of the importance of reporting occurrences, incorrect maintenance data and existing or potential defects		X	X	X	X	X		X
Knowledge of safety risks linked to the working environment	X	X	X	X	X	X	X	X
Knowledge of Safety Management Systems and Just Culture	X	X	X	X	X	X	X	X
Knowledge on CDCCL when relevant	X	X	X	X	X	X	X	
Knowledge on EWIS when relevant	X	X	X	X	X	X	X	
Understanding of professional integrity, behaviour and attitude towards safety	X	X	X	X	X	X	X	X
Understanding of conditions for ensuring continuing airworthiness of aircraft and components				X			X	

Understanding of his/her own human performance and limitations	X	X	X	X	X	X	X	
Understanding of personnel authorisations and limitations	X	X	X	X	X	X	X	
Understanding critical task		X	X	X	X		X	X
Ability to compile and control completed work cards		X	X	X				
Ability to consider human factor, human performance, limitation and fatigue.	X	X	X	X			X	X
Ability to determine required qualifications for task performance		X	X	X				
Ability to identify and rectify existing and potential unsafe conditions			X	X	X	X	X	X
Ability to manage third parties involved in maintenance activity		X	X					
Ability to confirm proper accomplishment of maintenance tasks			X	X	X	X		
Ability to identify and properly plan performance of critical task		X	X	X				
Ability to prioritise tasks and report discrepancies		X	X	X	X			
Ability to process the work requested by the operator		X	X	X				
Ability to promote the safety and quality policy	X		X				X	X
Ability to properly process removed, uninstalled and rejected parts			X	X	X	X		
Ability to properly record and sign for work accomplished			X	X	X	X		

Ability to recognise the acceptability of parts to be installed prior to fitment				X	X			
Ability to split complex maintenance tasks into clear stages		X						
Ability to understand work orders, work cards and refer to and use applicable maintenance data		X	X	X	X	X	X	
Ability to use information systems	X	X	X	X	X	X	X	X
Ability to use, control and be familiar with required tooling and/or equipment			X	X	X	X		
Adequate communication and literacy skills	X	X	X	X	X	X	X	X
Analytical and proven auditing skills (for example, objectivity, fairness, open-mindedness, determination, …)							X	X
Maintenance error investigation skills							X	X
Resources management and production planning skills	X	X	X					
Teamwork, decision-making and leadership skills	X		X				X	X
Ability to encourage a positive safety culture and apply a just culture	X		X				X	X
Knowledge of Emergency Response Plan	X	X	X	X	X	X	X	X
Ability to participate and assist in activated Emergency Response Plan	X		X	X			X	X

GM6 145.A.30(e) Personnel requirements

TEMPLATE FOR RECORDING EXPERIENCE/TRAINING

The following template may be used to record the professional experience gained in an organisation and the training received and be considered during the competence assessment of the individual in another organisation.

Aviation Maintenance personnel experience credential		
Name Given name Address Telephone E-mail		
Independent worker Trade Group: airframe engine electric avionics other (specify) ……		
Employer's details (when applicable) Name Address Telephone		
Maintenance organisation details Name Address Telephone Approval Number Period of employment From: To:		
Domain of employment		
☐ Planning	☐ Engineering	☐ Technical records
☐ Store department	☐ Purchasing	
Mechanics/Technician ☐ Line Maintenance ☐ Servicing ☐ Scheduled Maintenance ☐ Trouble-shooting A/C type	☐ Base Maintenance ☐ Removal/installation ☐ Inspection ☐ Troubleshooting ☐ Repair A/C type	☐ Component Maintenance ☐ Testing/inspection ☐ Repair ☐ Reassembly ☐ Re-treatment ☐ Overhaul Component type
Certifying Staff and support staff ☐ Cat. A ☐ Cat. B1 ☐ Cat. B2 ☐ Cat. C ☐ Component type ☐ Other (e.g. NDT) A/C Type A/C Type A/C Type A/C Type Component Type Specify Certification privileges: Yes ☐ ☐		
☐ Specialised services Speciality (NDT, composites, welding, etc.):		
☐ Skilled personnel Speciality (sheet metal, structures, wireman, upholstery, etc.): ☐ Ground equipment operation ☐ Quality control ☐ Quality assurance ☐ Training Total number of check boxes ticked ☐		

Details of employment

Training received from the contracting organisation Date Nature of training

Certified by: Name: Date: Position: Signature: Contact details: Advisory note: A copy of the present credential will be kept for at least 3 years from its issuance by the maintenance organisation.

AMC 145.A.30(f) Personnel requirements

1. Continued airworthiness non-destructive testing means such testing specified by the type certificate holder /aircraft or engine or propeller manufacturer in accordance with the maintenance data as specified in 145.A.45 for in service aircraft/aircraft components for the purpose of determining the continued fitness of the product to operate safely.
2. Appropriately qualified means to Level 1, 2 or 3 as defined by the European Standard EN 4179 dependent upon the non-destructive testing function to be carried out.
3. Notwithstanding the fact that Level 3 personnel may be qualified via EN 4179 to establish and authorise methods, techniques, etc., this does not permit such personnel to deviate from methods and techniques published by the type certificate holder/manufacturer in the form of continued airworthiness data, such as in non-destructive test manuals or service bulletins, unless the manual or service bulletin expressly permits such deviation.
4. Notwithstanding the general references in EN 4179 to a national aerospace non-destructive testing (NDT) board, all examinations should be conducted by personnel or organisations under the general control of such a board. In the absence of a national aerospace NDT board, the aerospace NDT board of another ICAO Contracting State may be used, as defined by the CAA.
5. Particular non-destructive test means any one or more of the following; Dye penetrant, magnetic particle, eddy current, ultrasonic and radiographic methods including X ray and gamma ray.
6. It should be noted that new methods are and will be developed, such as, but not limited to thermography and shearography, which are not specifically addressed by EN 4179. Until the time this agreed standard is established, such methods should be carried out in accordance with the particular equipment manufacturer's recommendations including any training and examination process to ensure competence of the personnel in the process.
7. Any maintenance organisation approved under CAR-145 that carries out NDT should establish NDT specialist qualification procedures detailed in the exposition and accepted by the CAA.
8. Boroscoping and other techniques such as delamination coin tapping are non-destructive inspections rather than non-destructive testing. Notwithstanding such differentiation, the maintenance organisation should establish an exposition procedure accepted by the CAA to ensure that personnel who carry out and interpret such inspections are properly trained and assessed for their competence in the process. Non-destructive inspections, not being considered as NDT by CAR-145 are not listed in Appendix II under class rating D1.
9. The referenced standards, methods, training and procedures should be specified in the maintenance organisation exposition.

10. Any such personnel who intend to carry out and/or control a non-destructive test for which they were not qualified prior to the effective date of CAR-145 should qualify for such non-destructive test in accordance with EN 4179, MIL-STD-410E, ATA Specification 105, or any other standard acceptable to the CAA.

11. In this context officially recognised standard means those standards established or published by an official body whether having legal personality or not, which are widely recognised by the air transport sector as constituting good practice.

AMC 145.A.30(g) Personnel requirements

1.For the purposes of CAR-66.20 Category A and Category B2 personnel, minor scheduled line maintenance means any minor scheduled inspection/check up to and including a weekly check specified in the aircraft maintenance programme. For aircraft maintenance programmes that do not specify a weekly check, the CAA will determine the most significant check that is considered equivalent to a weekly check.

2. Typical tasks permitted after appropriate task training to be carried out by the CAR-66.20 Category A and Category B2 personnel for the purpose of these personnel issuing an aircraft certificate of release to service as specified in 145.A.50 as part of minor scheduled line maintenance or simple defect rectification are contained in the following list:

(a) Replacement of wheel assemblies.

(b) Replacement of wheel brake units.

(c) Replacement of emergency equipment.

(d) Replacement of ovens, boilers and beverage makers.

(e) Replacement of internal and external lights, filaments and flash tubes.

(f) Replacement of windscreen wiper blades.

(g) Replacement of passenger and cabin crew seats, seat belts and harnesses.

(h) Closing of cowlings and refitment of quick access inspection panels.

(i) Replacement of toilet system components but excluding gate valves.

(j) Simple repairs and replacement of internal compartment doors and placards but excluding doors forming part of a pressure structure.

(k) Simple repairs and replacement of overhead storage compartment doors and cabin furnishing items.

(l) Replacement of static wicks.

(m) Replacement of aircraft main and APU aircraft batteries.

(n) Replacement of in-flight entertainment system components other than public address.

(o) Routine lubrication and replenishment of all system fluids and gases.

(p) The de-activation only of sub-systems and aircraft components as permitted by the operator's minimum equipment list where such de-activation is agreed by the CAA as a simple task.

(q) Inspection for and removal of de-icing/anti-icing fluid residues, including removal/closure of

panels, cowls or covers or the use of special tools.

(r) Any other task agreed by the CAA as a simple task for a particular aircraft type. This may include defect deferment when all the following conditions are met:

– There is no need for troubleshooting; and

– The task is in the MEL; and

– The maintenance action required by the MEL is agreed by the CAA to be simple. In the particular case of helicopters, and in addition to the items above, the following: (s) removal and installation of Helicopter Emergency Medical Service (HEMS) simple internal medical equipment.

(t) removal and installation of external cargo provisions (i.e., external hook, mirrors) other than

the hoist.

(u) removal and installation of quick release external cameras and search lights.

(v) removal and installation of emergency float bags, not including the bottles.

(w) removal and installation of external doors fitted with quick release attachments.

(x) removal and installation of snow pads/skid wear shoes/slump protection pads.

No task which requires troubleshooting should be part of the authorised maintenance actions. Release to service after rectification of deferred defects should be permitted as long as the task is listed above.

3. The requirement of having appropriate aircraft rated certifying staff qualified as category B1, B2, B3, as appropriate, in the case of aircraft line maintenance does not imply that the organisation must have B1, B2 and B3 personnel at every line station. The MOE should have a procedure on how to deal with defects requiring B1, B2 or B3 certifying staff.

4. The CAA may accept that in the case of aircraft line maintenance an organisation has only B1, B2 or B3 certifying staff, as appropriate, provided that the CAA is satisfied that the scope of work, as defined in the Maintenance Organisation Exposition, does not need the availability of all B1, B2 and B3 certifying staff. Special attention should be taken to clearly limit the scope of scheduled and non-scheduled line maintenance (defect rectification) to only those tasks that can be certified by the available certifying staff category.

AMC 145.A.30(h) Personnel requirements

In accordance with 145.A.30(h) and 145.A.35, the qualification requirements (basic license, aircraft ratings, recent experience and continuation training) are identical for certifying staff and for support staff. The only difference is that support staff cannot hold certification privileges when performing this role since during base maintenance the release to service will be issued by category C certifying staff.

Nevertheless, the organisation may use as support staff (for base maintenance) persons who already hold certification privileges for line maintenance.

AMC 145.A.30(j)(4) Personnel requirements

1. For the issue of a limited certification authorisation:

(a) the commander should hold either an air transport pilots license (ATPL), or a commercial

pilots license (CPL).

(b) The flight engineer should hold either an ATPL, CPL or a CAA flight engineer license

on the aircraft type.

In addition, the limited certification authorisation is subject to the maintenance organisation exposition containing procedures to address the personnel requirements of 145.A.30(e) and associated AMC and guidance material.

The procedures should be accepted by the CAA and should include as a minimum:

(a) Completion of adequate maintenance airworthiness regulation training.

(b) Completion of adequate task training for the specific task on the aircraft. The task training

should be of sufficient duration to ensure that the individual has a thorough understanding of the task to be completed and will involve training in the use of associated maintenance data and data entry of applicable maintenance records.

(c) Completion of the procedural training as specified in CAR-145.

2.(i) Typical tasks that may be certified and/or carried out by the commander holding an ATPL or CPL are minor maintenance or simple checks included in the following list:

(a) Replacement of internal lights, filaments and flash tubes.

(b) Closing of cowlings and re-fitment of quick access inspection panels.

(c) Role changes e.g. stretcher fit, dual controls, FLIR, doors, photographic equipment etc.

(d) Inspection for and removal of de-icing/anti-icing fluid residues, including removal/closure of

panels, cowls or covers that are easily accessible but not requiring the use of special tools.

(e) Any check/replacement involving simple techniques consistent with this AMC and as agreed

by the CAA.

(f) The De-activation permitted by operator's minimum equipment list where as such de-activation is agreed by the CAA as simple task.

2.(ii) Holders of CAA flight engineer license on the aircraft type, may only exercise this limited certification authorisation privilege when performing the duties of a flight engineer.

In addition to paragraph 2(i)(a) to (e) other typical minor maintenance or simple defect rectification tasks that may be carried out are included in the following list:

(a) Replacement of wheel assemblies.

(b) Replacement of simple emergency equipment that is easily accessible.

(c) Replacement of ovens, boilers and beverage makers.

(d) Replacement of external lights.

(e) Replacement of passenger and cabin crew seats, seat belts and harnesses.

(f) Simple replacement of overhead storage compartment doors and cabin furnishing items.

(g) Replacement of static wicks.

(h) Replacement of aircraft main and APU aircraft batteries.

(i) Replacement of in-flight entertainment system components other than public address.

(j) The de-activation only of sub-systems and aircraft components as permitted by the operator's minimum equipment list where such de-activation is agreed by the CAA as a simple task.

(k) Re-setting of tripped circuit breakers under the guidance of maintenance control.

(l) Any other task agreed by the CAA as a simple task for a particular aircraft type.

3. The validity of the authorisation should have a finite life of twelve month's subject to satisfactory recurrent training on the applicable aircraft type.

GM 145.A.30(j)(4) Personnel requirements

For the holder of a CAA flight engineer license details the following subjects:

Familiarisation with basic maintenance procedures, to give additional technical background knowledge, especially with respect to the implication of systems malfunctions, and to train the applicant in maintenance related to the Minimum equipment list (MEL).

The theoretical knowledge instruction consists of 100 hours and includes the following elements:

1. Airframe and systems
2. Electrics
3. Powerplant and emergency equipment.
4. Flight instruments and automatic flight control systems

Practical skills training provided by an organisation approved under CAR-145 is given which includes 35 hours practical experience in the following subjects:

- Fuselage and flight controls,
- Engines,
- Instruments,
- Landing gear and brakes,
- Cabin/cockpit/emergency equipment,
- De-icing/anti-icing related maintenance activities;
- Ground handling and servicing,
- Certificate of completion.

Following successful completion of the technical training, the training organisation carrying out the theoretical knowledge instruction and/or the practical skill training should provide the applicant with a certificate of satisfactory completion of the course, or part thereof.

AMC 145.A.30(j)(5) Personnel requirements

1. For the purposes of this sub-paragraph 'unforeseen' means that the aircraft grounding could not reasonably have been predicted by the operator because the defect was unexpected due to being part of a hitherto reliable system.
2. A one-off authorisation should only be considered for issue by the quality department of the contracted organisation after it has made a reasoned judgment that such a requirement is appropriate under the circumstances and at the same time maintaining the required airworthiness standards. The organisation's quality department will need to assess each situation individually prior to the issuance of a one-off authorisation.

3. A one-off authorisation should not be issued where the level of certification required could exceed the knowledge and experience level of the person it is issued to. In all cases, due consideration should be given to the complexity of the work involved and the availability of required tooling and/or test equipment needed to complete the work.

AMC 145.A.30(j)(5)(i) Personnel requirements

In those situations where the requirement for a one-off authorisation to issue a CRS for a task on an aircraft type for which certifying staff does not hold a type-rated authorisation has been identified, the following procedure is recommended:

1. Flight crew should communicate full details of the defect to the operator's supporting maintenance organisation. If necessary, the supporting maintenance organisation will then request the use of a one-off authorisation from the quality department.

2. When issuing a one-off authorisation, the quality department of the organisation should verify that:

    (a) Full technical details relating to the work required to be carried out have been established and passed on to the certifying staff.

    (b) The organisation has an approved procedure in place for coordinating and controlling the total maintenance activity undertaken at the location under the authority of the one-off authorisation.

    (c) The person to whom a one-off authorisation is issued has been provided with all the necessary information and guidance relating to maintenance data and any special technical instructions associated with the specific task undertaken. A detailed step by step worksheet has been defined by the organisation, communicated to the one-off authorisation holder.

    (d) The person holds authorisations of equivalent level and scope on other aircraft type of similar technology, construction and systems.

3. The one-off authorisation holder should sign off the detailed step by step worksheet when completing the work steps. The completed tasks should be verified by visual examination and/or normal system operation upon return to an appropriately approved CAR-145 maintenance facility.

AMC 145.A.30(j)(5)(ii) Personnel requirements

This paragraph addresses staff not employed by the maintenance organisation who meet the requirements of 145.A.30(j)(5). In addition to the items listed in AMC 145.A.30(j)(5)(i), paragraph 1, 2(a), (b) and (c) and 3 the quality department of the organisation may issue such one-off authorisation providing full qualification details relating to the proposed certifying personnel are verified by the quality department and made available at the location.

CAR 145.A.35 Certifying staff and support staff

(a) In addition to the appropriate requirements of requirements 145.A.30(g) and (h), the organisation shall ensure that certifying staff and support staff have an adequate understanding of the relevant aircraft and/or components to be maintained together with the associated organisation procedures. In the case of certifying staff, this shall be accomplished before the issue or re-issue of the certification authorisation.

    (i) 'Support staff' means those staff holding an aircraft maintenance license under CAR-66 in category B1, B2 and/or B3 with the appropriate aircraft ratings, working in a base maintenance environment while not necessarily holding certification privileges.

    (ii) 'Relevant aircraft and/or components', means those aircraft or components specified in the particular certification authorisation.

(iii) 'Certification authorisation' means the authorisation issued to certifying staff by the organisation and which specifies the fact that they may sign certificates of release to service within the limitations stated in such authorisation on behalf of the approved organisation.

(b) Excepting those cases listed in requirements 145.A.30(j) and CAR-66.20 the organisation may only issue a certification authorisation to certifying staff in relation to the basic categories or subcategories and any type rating listed on the aircraft maintenance license as required by CAR-66, subject to the license remaining valid throughout the validity period of the authorisation and the certifying staff remaining in compliance with CAR-66.

(c) The organisation shall ensure that all certifying staff and support staff are involved in at least 6 months of actual relevant aircraft or component maintenance experience in any consecutive two years period.

For the purpose of this point 'involved in actual relevant aircraft or component maintenance' means that the person has worked in an aircraft or component maintenance environment and has either exercised the privileges of the certification authorisation and/or has actually carried out maintenance on at least some of the aircraft type or aircraft group systems specified in the particular certification authorisation.

(d) The organisation shall ensure that all certifying staff and support staff receive sufficient continuation training in each two years period to ensure that such staff have up-to-date knowledge of relevant technology, organisation procedures and human factor issues.

(e) The organisation shall establish a programme for initial and continuation training for certifying staff and support staff, including a procedure to ensure compliance with the relevant requirements of 145.A.35 as the basis for issuing certification authorisations under this CAR to certifying staff, and a procedure to ensure compliance with CAR-66.

(f) Except where any of the unforeseen cases of requirement 145.A.30(j)(5) apply, the organisation shall assess all prospective certifying staff for their competence, qualification and capability to carry out their intended certifying duties in accordance with a procedure as specified in the exposition prior to the issue or re-issue of a certification authorisation under this regulation.

(g) When the conditions of requirements (a), (b), (d), (f) and, where applicable, requirement (c) have been fulfilled by the certifying staff, the organisation shall issue a certification authorisation that clearly specifies the scope and limits of such authorisation. Continued validity of the certification authorisation is dependent upon continued compliance with requirements (a), (b), (d), and where applicable, (c).

(h) The certification authorisation must be in a style that makes its scope clear to the certifying staff and any authorised person who may require to examine the authorisation. Where codes are used to define scope, the organisation shall make a code translation readily available. 'Authorised person' means the officials of the CAA who has responsibility for the oversight of the maintained aircraft or component.

(i) The person responsible for the quality system shall also remain responsible on behalf of the organisation for issuing certification authorisations to certifying staff. Such person may nominate other persons to actually issue or revoke the certification authorisations in accordance with a procedure as specified in the exposition.

(j) The organisation shall maintain a record of all certifying staff and support staff, which shall contain:

1. the details of any aircraft maintenance license held under CAR-66; and

2. all relevant training completed; and

3. the scope of the certification authorisations issued, where relevant; and

4. particulars of staff with limited or one-off certification authorisations.

The organisation shall retain the record for at least three years after the staff referred to in this requirement have ceased employment with the organisation or as soon as the authorisation has been withdrawn. In addition, upon request, the maintenance organisation shall furnish the staff referred to in this point with a copy of their personal record on leaving the organisation.

The staff referred to in this point shall be given access on request to their personal records as detailed above.

(k) The organisation shall provide certifying staff with a copy of their certification authorisation in either a documented or electronic format.

(l) Certifying staff shall produce their certification authorisation to any authorised person within 24 hours.

(m) The minimum age for certifying staff and support staff is 21 years.

(n) The holder of a category A aircraft maintenance license may only exercise certification privileges on a specific aircraft type following the satisfactory completion of the relevant category A aircraft task training carried out by an organisation appropriately approved in accordance with CAR-145 or CAR-147. This training shall include practical hands on training and theoretical training as appropriate for each task authorised. Satisfactory completion of training shall be demonstrated by an examination or by workplace assessment carried out by the organisation.

(o) The holder of a category B2 aircraft maintenance license may only exercise the certification privileges described in requirement 66.20 of CAR-66 following the satisfactory completion of

(i) the relevant category A aircraft task training and

(ii) 6 months of documented practical experience covering the scope of the authorisation that will be issued.

The task training shall include practical hands on training and theoretical training as appropriate for each task authorised. Satisfactory completion of training shall be demonstrated by an examination or by workplace assessment. Task training and examination/assessment shall be carried out by the maintenance organisation issuing the certifying staff authorisation. The practical experience shall be also obtained within such maintenance organisation.

AMC 145.A.35(a) Certifying staff and support staff

1. Holding a CAR-66 license with the relevant type/group rating, or a national qualification in the case of components, does not mean by itself that the holder is qualified to be authorised as certifying staff and/or support staff. The organisation is responsible to assess the competence of the holder for the scope of maintenance to be authorised.

2. The sentence 'the organisation shall ensure that certifying staff and support staff have an adequate understanding of the relevant aircraft and/or components to be maintained together with the associated organisation procedure's means that the person has received training and has been successfully assessed on:

- the type of aircraft or component;
- the differences on:
  - the particular model/variant;

– the particular configuration.

The organisation should specifically ensure that the individual competencies have been established with regard to:

– relevant knowledge, skills and experience in the product type and configuration to be maintained, taking into account the differences between the generic aircraft type rating training that the person received and the specific configuration of the aircraft to be maintained.

– appropriate attitude towards safety and observance of procedures.

– knowledge of the associated organisation and operator procedures (i.e. handling and identification of components, MEL use, Technical Log use, independent checks, etc.).

3. Some special maintenance tasks may require additional specific training and experience, including but not limited to:

– in-depth troubleshooting;

– very specific adjustment or test procedures;

– rigging;

– engine run-up, starting and operating the engines, checking engine performance characteristics, normal and emergency engine operation, associated safety precautions and procedures;

– extensive structural/system inspection and repair;

– other specialised maintenance required by the maintenance programme.

For engine run-up training, simulators and/or real aircraft should be used.

4. The satisfactory assessment of the competence should be conducted in accordance with a procedure approved by the CAA (item 3.4 of the MOE, as described in AMC 145.A.70(a)).

5. The organisation should hold copies of all documents that attest the competence and recent experience for the period described in 145.A.35(j).

Additional information is provided in AMC CAR-66.20.

AMC 145.A.35(b) Certifying staff and support staff

The organisation issues the certification authorisation when satisfied that compliance has been established with the appropriate paragraphs of CAR-145 and CAR-66. In granting the certification authorisation the maintenance organisation approved under CAR-145 needs to be satisfied that the person holds a valid CAR-66 aircraft maintenance license and may need to confirm such fact with the CAA.

AMC 145.A.35(c) Certifying staff and support staff

For the interpretation of '6 months of actual relevant aircraft maintenance experience in any consecutive 2-year period', the provisions of AMC CAR-66.20 are applicable.

AMC 145.A.35(d) Certifying staff and support staff

1. Continuation training is a two-way process to ensure that certifying staff remain current in terms of procedures, human factors and technical knowledge and that the organisation receives feedback on the adequacy of its procedures and maintenance instructions. Due to the interactive nature of this training, consideration should be given to the possibility that such training has the involvement of the quality system and safety management key personnel to ensure that feedback is actioned.

Alternatively, there should be a procedure to ensure that feedback is formally passed from the training department to the quality system and safety management key personnel to initiate action.

2. Continuation training should cover changes in relevant requirements such as CAR-145, changes in organisation procedures and the modification standard of the products being maintained plus human factor issues identified from any internal or external analysis of incidents. It should also address instances where staff failed to follow procedures and the reasons why particular procedures are not always followed.

   In many cases the continuation training will reinforce the need to follow procedures and ensure that incomplete or incorrect procedures are identified to the company in order that they can be corrected. This does not preclude the possible need to carry out an audit of such procedures.

3. Continuation training should be of sufficient duration in each two years period to meet the intent of 145.A.35(d) and may be split into a number of separate elements. 145.A.35(d) requires such training to keep certifying staff updated in terms of relevant technology, procedures and human factors issues which means it is one part of ensuring quality. Therefore, sufficient duration should be related to relevant quality audit findings and other internal / external sources of information available to the organisation on human errors in maintenance. This means that in the case of an organisation that maintains aircraft with few relevant quality audit findings, continuation training could be limited to days rather than weeks, whereas a similar organisation with a number of relevant quality audit findings, such training may take several weeks. For an organisation that maintains aircraft components, the duration of continuation training would follow the same philosophy but should be scaled down to reflect the more limited nature of the activity. For example, certifying staff who release hydraulic pumps may only require a few hours of continuation training whereas those who release turbine engine may only require a few days of such training. The content of continuation training should be related to relevant quality audit findings and it is recommended that such training is reviewed at least once in every 24-month period.

4. The method of training is intended to be a flexible process and could, for example, include a CAR-147 continuation training course, aeronautical college courses, internal short duration courses, seminars, etc. The elements, general content and length of such training should be specified in the maintenance organisation exposition unless such training is undertaken by an organisation approved under CAR-147 when such details may be specified under the approval and cross referenced in the maintenance organisation exposition.

AMC 145.A.35(e) Certifying staff and support staff

The programme for continuation training should list all certifying staff and support staff and when training will take place, the elements of such training and an indication that it was carried out reasonably on time as planned. Such information should subsequently be transferred to the certifying staff and support staff record as required by 145.A.35(j).

AMC 145.A.35(f) Certifying staff and support staff

As stated in 145.A.35(f), except where any of the unforeseen cases of 145.A.30(j)(5) applies, all prospective certifying staff and support staff should be assessed for competence related to their intended duties in accordance with AMCs 1, 2, 3 and 4 to 145.A.30(e), as applicable.

AMC 145.A.35(j) Certifying staff and support staff

1. The following minimum information as applicable should be kept on record in respect of each certifying

staff and support staff:

(a) Name

(b) Date of Birth

(c) Basic Training

(d) Type Training

(e) Continuation Training

(f) Experience

(g) Qualifications relevant to the authorisation

(h) Scope of the authorisation

(i) Date of first issue of the authorisation

(j) If appropriate - expiry date of the authorisation

(k) Identification Number of the authorisation

2. The record may be kept in any format but should be controlled by the organisation's quality system. This does not mean that the quality department should run the record system.

3. Persons authorised to access the system should be maintained at a minimum to ensure that records cannot be altered in an unauthorised manner or that such confidential records become accessible to unauthorised persons.

4. The CAA is an authorised person when investigating the records system for initial and continued approval or when the CAA has cause to doubt the competence of a particular person.

AMC 145.A.35(n) Certifying staff and support staff

1. It is the responsibility of the CAR-145 organisation issuing the category A certifying staff authorisation to ensure that the task training received by this person covers all the tasks to be authorised. This is particularly important in those cases where the task training has been provided by a CAR-147 organisation or by a CAR-145 organisation different from the one issuing the authorisation.

2. Appropriately approved in accordance with CAR-147 means an organisation holding an approval to provide category A task training for the corresponding aircraft type.

3. Appropriately approved in accordance with CAR-145 means an organisation holding a maintenance organisation approval for the corresponding aircraft type.

AMC 145.A.35(o) Certifying staff and support staff

1. The privilege for a B2 license holder to release minor scheduled line maintenance and simple defect rectification in accordance with CAR-66.20 can only be granted by the CAR-145 approved organisation where the license holder is employed/contracted after meeting all the requirements specified in 145.A.35(o). This privilege cannot be transferred to another CAR-145 approved organisation.

2. When a B2 license holder already holds a certifying staff authorisation containing minor scheduled line maintenance and simple defect rectification for a particular aircraft type, new tasks relevant to category A can be added to that type without requiring another 6 months of experience. However, task training (theoretical plus practical hands-on) and examination/assessment for these additional tasks is still required.

3. When the certifying staff authorisation intends to cover several aircraft types, the experience may be combined within a single 6-month period.

4. For the addition of new types to the certifying staff authorisation, another 6 months should be required unless the aircraft is considered similar per AMC CAR-66.20 to the one already held.
5. The term '6 months of experience' may include full-time employment or part-time employment. The important aspect is that the person has been involved during a period of 6 months (not necessarily every day) in those tasks which are going to be part of the authorisation.

CAR 145.A.40 Equipment, tools and material

(a) The organisation shall have available and use the necessary technical data, equipment, tools and material to perform the approved scope of work.

1. Where the manufacturer specifies a particular tool or equipment, the organisation shall use that tool or equipment, unless the use of alternative tooling or equipment is agreed by the CAA via procedures specified in the exposition.
2. Equipment and tools must be permanently available, except in the case of any tool or equipment that is so infrequently used that its permanent availability is not necessary. Such cases shall be detailed in an exposition procedure.
3. An organisation approved for base maintenance shall have sufficient aircraft access equipment and inspection platforms/docking such that the aircraft can be properly inspected.

(b) The organisation shall ensure that all tools, equipment and particularly test equipment, as appropriate, are controlled and calibrated according to an officially recognised standard at a frequency to ensure serviceability and accuracy. Records of such calibrations and traceability to the standard used shall be kept by the organisation.

AMC 145.A.40(a) Equipment, tools and material

Once the applicant for approval has determined the intended scope of approval for consideration by the CAA, it will be necessary to show that all tools and equipment as specified in the maintenance data can be made available when needed. All such tools and equipment that require to be controlled in terms of servicing or calibration by virtue of being necessary to measure specified dimensions and torque figures etc, should be clearly identified and listed in a control register including any personal tools and equipment that the organisation agrees can be used.

AMC 145.A.40(b) Equipment, tools and material

1. The control of these tools and equipment requires that the organisation has a procedure to inspect/service and, where appropriate, calibrate such items on a regular basis and indicate to users that the item is within any inspection or service or calibration time-limit. A clear system of labelling all tooling, equipment and test equipment is therefore necessary giving information on when the next inspection or service or calibration is due and if the item is unserviceable for any other reason where it may not be obvious. A register should be maintained for all precision tooling and equipment together with a record of calibrations and standards used.
2. Inspection, service or calibration on a regular basis should be in accordance with the equipment manufacturers' instructions except where the organisation can show by results that a different time period is appropriate in a particular case.
3. In this context officially recognised standard means those standards established or published by an official body whether having legal personality or not, which are widely recognised by the air transport sector as constituting good practice (e.g. The organisation certified in accordance to ISO 17025 standard).

CAR 145.A.42 Components

(a) Classification of components. All components shall be classified into the following categories:

(i) Components which are in a satisfactory condition, released on an CAA Form 1 or equivalent and marked in accordance with Subpart Q of CAR-21, unless otherwise specified in Subpart K of CAR-21, in point M.A.502 of CAR-M or in this regulation.

(ii) Unserviceable components which shall be maintained in accordance with this Regulation.

(iii) Components categorised as unsalvageable because they have reached their mandatory life limitation or contain a non-repairable defect.

(iv) Standard parts used on an aircraft, engine, propeller or other aircraft component when specified in the maintenance data and accompanied by evidence of conformity traceable to the applicable standard.

(v) Material, both raw and consumable, used in the course of maintenance when the organisation is satisfied that the material meets the required specification and has appropriate traceability. All material shall be accompanied by documentation clearly relating to the particular material and containing a conformity to specification statement as well as the manufacturing and supplier source.

(b) Components, standard parts and materials for installation

(i) The organisation shall establish procedures for the acceptance of components, standard parts and materials for installation to ensure that components, standard parts and materials are in satisfactory condition and meet the applicable requirements of point (a).

(ii) The organisation shall establish procedures to ensure that components, standard parts and materials shall only be installed on an aircraft or a component when they are in satisfactory condition, meet the applicable requirements of point (a) and the applicable maintenance data specifies the particular component, standard part or material.

(iii) The organisation may fabricate a restricted range of parts to be used in the course of undergoing work within its own facilities, provided procedures are identified in the exposition.

(iv) Components which are referred to in Subpart K of CAR-21 shall only be installed if considered eligible for installation by the aircraft owner on their own aircraft.

(c) Segregation of components

(i) Unserviceable and unsalvageable components shall be segregated from serviceable components, standards parts and materials.

(ii) Unsalvageable components shall not be permitted to re-enter the component supply system, unless mandatory life limitation have been extended or a repair solution has been accepted in accordance with CAR-21.

AMC 145.A.42(a)(i) Components

ACCEPTABLE AIRWORTHINESS RELEASE CERTIFICATE EQUIVALENT TO THE CAA FORM 1

(a) A document equivalent to a CAA Form 1 may be as following, except for Complex component in point (b):

1) EASA Form 1;

2) US FAA Form 8130-3;

3) TCAA Form 1 (Previously Form 24-0078);

4) Brazil ANAC Form F-100-01 (Also refereed as Form SEGVO 003); or

5) UK CAA Form 1;

(b) For Complex component released due to repair, overhaul, modification or inspection by a maintenance organisation, the CAA should not accept the Authorised Release Certificate issued by maintenance organisation unless the CAA approves the organisation in accordance with this regulation. The Complex component includes as following:

1) Aircraft Engine,
2) APU,
3) Propeller,
4) Gearbox,
5) Aeroplane Landing Gear
6) Helicopter Transmission
7) Rotor Blades (main, tail);

(c) An airworthiness released certificate issued for Complex component by a maintenance organisation as listed in point (a) is acceptable for the CAA prior to 01 January 2024.

AMC1 145.A.42(a)(ii) Components

UNSERVICEABLE COMPONENTS

(a) The organisation should ensure the proper identification of any unserviceable components. The unserviceable status of the component should be clearly declared on a tag together with the component identification data and any information that is useful to define actions that are necessary to be taken. Such information should state, as applicable, in-service times, maintenance status, preservation status, failures, defects or malfunctions reported or detected, exposure to adverse environmental conditions, and whether the component is installed on an aircraft that was involved in an accident or incident. Means should be provided to prevent unintentional separation of this tag from the component.

(b) Unserviceable components should typically undergo maintenance due to:

(1) expiry of the service life limit as defined in the aircraft maintenance programme;
(2) non-compliance with the applicable airworthiness directives and other continuing airworthiness requirements mandated by the CAA;
(3) absence of the necessary information to determine the airworthiness status or eligibility for installation;
(4) evidence of defects or malfunctions; or
(5) being installed on an aircraft that was involved in an incident or accident likely to affect the component's serviceability.

AMC1 145.A.42(a)(iii) Components

UNSALVAGEABLE COMPONENTS

The following types of components should typically be classified as unsalvageable:

(a) components with non-repairable defects, whether visible or not to the naked eye;

(b) components that do not meet design specifications, and cannot be brought into conformity with such specifications;

(c) components subjected to unacceptable modification or rework that is irreversible;

(d) certified life-limited parts that have reached or exceeded their certified life limits, or have missing or incomplete records;

(e) components whose airworthy condition cannot be restored due to exposure to extreme forces, heat or adverse environmental conditions;

(f) components for which conformity with an applicable airworthiness directive cannot be accomplished;

(g) components for which maintenance records and/or traceability to the manufacturer cannot be retrieved.

AMC1 145.A.42(a)(iv) Components

STANDARD PARTS

(a) Standard parts are parts that are manufactured in complete compliance with an established industry, state of design or other government specification which includes design, manufacturing, test and acceptance criteria, and uniform identification requirements. The specification should include all the information that is necessary to produce and verify conformity of the part. It should be published so that any party may manufacture the part. Examples of specifications are National Aerospace Standards (NAS), Army-Navy Aeronautical Standard (AN), Society of Automotive Engineers (SAE), SAE Sematec, Joint Electron Device Engineering Council, Joint Electron Tube Engineering Council, and American National Standards Institute (ANSI), EN Specifications, etc.

(b) To designate a part as a standard part, the TC holder may issue a standard parts manual accepted by the state of design of original TC holder or may make reference in the parts catalogue to the specification to be met by the standard part. Documentation that accompanies standard parts should clearly relate to the particular parts and contain a conformity statement plus both the manufacturing and supplier source. Some materials are subject to special conditions, such as storage conditions or life limitation, etc., and this should be included in the documentation and/or the material's packaging.

(c) A CAA Form 1 or equivalent is not normally issued and, therefore, none should be expected.

AMC1 145.A.42(a)(v) Components

MATERIAL

(a) Consumable material is any material which is only used once, such as lubricants, cements, compounds, paints, chemical dyes and sealants, etc.

(b) Raw material is any material that requires further work to make it into a component part of the aircraft, such as metal, plastic, wood, fabric, etc.

(c) Material both raw and consumable should only be accepted when satisfied that it is to the required specification. To be satisfied, the material and/or its packaging should be marked with the applicable specification and, where appropriate, the batch number.

(d) Documentation that accompanies all materials should clearly relate to the particular material and contain a conformity statement plus both the manufacturing and supplier source. Some materials are subject to special conditions, such as storage conditions or life limitation, etc., and this should be included in the documentation and/or the material's packaging.

(e) A CAA Form 1 or equivalent should not be issued for such materials and, therefore, none should be expected. The material specification is normally identified in the (S)TC holder's data except in the case where the CAA has agreed otherwise.

AMC1 145.A.42(b)(i) Components

ACCEPTANCE OF COMPONENTS FOR INSTALLATION

(a) The procedures for the acceptance of components, standard parts and materials should have the objective of ensuring that the components, standard parts and materials are in satisfactory condition and meet the organisation's requirements. These procedures should be based upon incoming inspections which include:

(1) physical inspection of the components, standard parts and materials;

(2) review of the accompanying documentation and data, which should be acceptable in accordance with 145.A.42(a).

(b) For the acceptance of components, standard parts and materials from suppliers, the above procedures should include supplier evaluation procedures.

GM1 145.A.42(b)(i) Components

INCOMING PHYSICAL INSPECTION

(a) To ensure that components, standard parts and materials are in satisfactory condition, the organisation should perform incoming physical inspections.

(b) The incoming physical inspection should be performed before the component is installed on the aircraft. (c) The following list, although not exhaustive, contains typical checks to be performed:

(1) verify the general condition of the components and their packaging in relation to damages that could affect their integrity;

(2) verify that the shelf life of the component has not expired;

(3) verify that items are received in the appropriate package in respect of the type of the component: e.g. correct ATA 300 or electrostatic sensitive devices packaging, when necessary;

(4) verify that the component has all plugs and caps appropriately installed to prevent damage or internal contamination. Care should be taken when tape is used to cover electrical connections or fluid fittings/openings because adhesive residues can insulate electrical connections and contaminate hydraulic or fuel units.

(d) Items (fasteners, etc.) purchased in batches should be supplied in a package. The packaging should state the applicable specification/standard, part number, batch number, and the quantity of the items. The documentation that accompanies the material should contain the applicable specification/standard, part number, batch number, supplied quantity, and the manufacturing sources. If the material is acquired from different batches, acceptance documentation for each batch should be provided.

GM2 145.A.42(b)(i) Components

EXAMPLES OF SUPPLIERS

A supplier could be any source that provides components, standard parts or materials to be used for maintenance. Possible sources could be: CAR-145 organisations, production organisations, operators, stockist, distributors, brokers, aircraft owners/lessees, etc.

GM3 145.A.42(b)(i) Components

SUPPLIER EVALUATION

(a) The following elements should be considered for the initial and recurrent evaluation of a supplier's quality system to ensure that the component and/or material is supplied in satisfactory condition:

(1) availability of appropriate up-to-date regulations, specifications (such as component handling/storage data) and standards;

(2) standards and procedures for the training of personnel and competency assessment;

(3) procedures for shelf-life control;

(4) procedures for handling of electrostatic sensitive devices;

(5) procedures for identifying the source from which components and materials were received;

(6) purchasing procedures that identify documentation to accompany components and materials for subsequent use by approved CAR-145 maintenance organisations;

(7) procedures for incoming inspection of components and materials;

(8) procedures for control of measuring equipment that provide for appropriate storage, usage, and for calibration when such equipment is required;

(9) procedures to ensure appropriate storage conditions for components and materials that are adequate to protect the components and materials from damage and/or deterioration. Such procedures should comply with the manufacturers' recommendations and relevant standards;

(10) procedures for adequate packing and shipping of components and materials to protect them from damage and deterioration, including procedures for proper shipping of dangerous goods (e.g. ICAO and ATA specifications);

(11) procedures for detecting and reporting of suspected unapproved components;

(12) procedures for handling unsalvageable components in accordance with applicable regulations and standards;

(13) procedures for batch splitting or redistribution of lots and handling of the related documents;

(14) procedures for notifying purchasers of any components that have been shipped and have later been identified as not conforming to the applicable technical data or standard;

(15) procedures for recall control to ensure that components and materials shipped can be traced and recalled if necessary;

(16) procedures for monitoring the effectiveness of the quality system

(b) Suppliers which are certified to officially recognised standards that have a quality system that includes the elements specified in (a) may be acceptable; such standards include:

(1) EN/AS9120;

(2) ASA-100;

(3) EASO 2012;

(4) FAA AC 00-56.

The use of such suppliers does not exempt the organisation from its obligations under 145.A.42 to ensure that supplied components and materials are in satisfactory condition and meet the applicable criteria of 145.A.42.

(c) Supplier evaluation may depend on different factors, such as the type of component, whether or not the supplier is the manufacturer of the component, the TC holder or a maintenance organisation, or even specific circumstances such as aircraft on ground. This evaluation may be limited to a questionnaire from the CAR-145 organisation to its suppliers, a desktop evaluation of the supplier's procedures or an on-site audit, if deemed necessary.

GM2 145.A.42(c) Components

INSTALLATION OF COMPONENTS

Components, standard parts and materials should only be installed when they are specified in the applicable maintenance data. This could include parts catalogue (IPC), service bulletins (SBs), aircraft maintenance manual (AMM), component maintenance manual (CMM) etc. So, the installation of a component, standard part or material can only be done after checking the applicable maintenance data.

This check should ensure that the part number, modification status, limitations, etc., of the component, standard part or material are the ones specified in the applicable maintenance data of the particular aircraft or component (i.e. IPC, SB, AMM, CMM, etc.) where the component, standard part or material is going to be installed. The organisation should establish procedures to ensure that this check is performed before installation.

AMC1 145.A.42(b)(iii) Components

FABRICATION OF PARTS FOR INSTALLATION

(a) The agreement of the CAA on the fabrication of parts by the approved maintenance organisation should be formalised through the approval of a detailed procedure in the Maintenance Organisation Exposition (MOE). This AMC contains principles and conditions to be taken into account for the preparation of an acceptable procedure.

(b) Fabrication, inspection, assembly and test should be clearly within the technical and procedural capability of the organisation.

(c) All necessary data to fabricate the part should be approved either by the type certificate (TC) holder, or acceptable design organisation approval holder in accordance to CAR-M, or supplemental type certificate (STC) holder.

(d) Items that are fabricated by an organisation approved under CAR-145 may only be used by that organisation in the course of overhaul, maintenance, modifications, or repair of aircraft or components, performing work at its own facilities. The permission to fabricate does not constitute approval for manufacture, or to supply externally, and the parts do not qualify for CAA Form 1 certification. This prohibition also applies to the bulk transfer of surplus inventory, in that locally fabricated parts are physically segregated and excluded from any delivery certification.

(e) Fabrication of parts, modification kits, etc., for onward supply and/or sale may not be conducted by an organisation that is approved under CAR-145.

(f) The data specified in (c) may include repair procedures that involve the fabrication of parts. Where the data on such parts is sufficient to facilitate fabrication, the parts may be fabricated by an organisation that is approved under CAR-145. Care should be taken to ensure that the data include details of part numbering, dimensions, materials, processes, and any special manufacturing techniques, special raw material specification and/or incoming inspection requirement, and that the approved organisation has the necessary capability to fabricate those parts. That capability should be defined by way of exposition content. Where special processes or inspection procedures are defined in the approved data which are not available at the

organisation, the organisation cannot fabricate the part unless the TC/STC holder gives an approved alternative.

(g) Examples of fabrication within the scope of a CAR-145 approval may include but are not limited to the following:

(1) fabrication of bushes, sleeves and shims;

(2) fabrication of secondary structural elements and skin panels;

(3) fabrication of control cables;

(4) fabrication of flexible and rigid pipes;

(5) fabrication of electrical cable looms and assemblies;

(6) formed or machined sheet metal panels for repairs.

All the above-mentioned fabricated parts should be in accordance with the data provided in the overhaul or repair manuals, modification schemes and service bulletins, drawings, or should be otherwise approved by the CAA.

Note: It is not acceptable to fabricate any item to pattern unless an engineering drawing of the item is produced which includes any necessary fabrication process and which is acceptable to the CAA.

(h) Where a TC holder or an approved production organisation is prepared to make available complete data which is not referred to in the aircraft manuals or service bulletins but provides manufacturing drawings for items specified in parts lists, the fabrication of these items is not considered to be within the scope of an approval unless agreed otherwise by the CAA in accordance with a procedure specified in the exposition.

(i) Inspection and identification

Any locally fabricated part should be subject to inspection before, separately, and preferably independently from any inspection of its installation. The inspection should establish full compliance with the relevant manufacturing data, and the part should be unambiguously identified as fit for use by stating conformity to the approved data. Adequate records should be maintained of all such fabrication processes including heat treatment and final inspections. All parts, except those that do not have enough space, should carry a part number which clearly relates it to the manufacturing/inspection data. In addition to the part's number, the organisation's identity should be marked on the part for traceability purposes.

AMC1 145.A.42(c) Components

SEGREGATION OF COMPONENTS

(a) Unserviceable components should be identified and stored in a secure location that is under the control of the maintenance organisation until a decision is made on the future status of such components. The organisation that declared the component to be unserviceable may transfer its custody after identifying it as unserviceable to the aircraft owner provided that such transfer is reflected in the aircraft logbook, or engine logbook, or component logbook.

(b) 'Secure location under the control of an approved maintenance organisation' refers to a secure location whose security is the responsibility of the approved maintenance organisation. This may include facilities that are established by the organisation at locations different from the main maintenance facilities. These locations should be identified in the relevant procedures of the organisation.

(c) In the case of unsalvageable components, the organisation should:

(1) retain such component in the secure location referred to in paragraph (b);

(2) arrange for the component to be mutilated in a manner that ensures that they are beyond economic salvage or repair before disposing it; or

(3) mark the component indicating that it is unsalvageable, when in agreement with the component owner, the component is disposed for legitimate non-flight uses (such as training and education aids, research and development), or for non-aviation applications, mutilation is often not appropriate. Alternatively, to marking, the original part number or data plate information can be removed or a record kept of the disposal of the components.

GM1 145.A.42(c)(i) Components

MUTILATION OF COMPONENTS

(a) Mutilation should be accomplished in such a manner that the components become permanently unusable for their originally intended use. Mutilated components should not be able to be reworked or camouflaged to provide the appearance of being serviceable, such as by re-plating, shortening and re-threading long bolts, welding, straightening, machining, cleaning, polishing, or repainting.

(b) Mutilation may be accomplished by one or a combination of the following procedures:

(1) grinding;

(2) burning;

(3) removal of a major lug or other integral feature;

(4) permanent distortion of parts;

(5) cutting a hole with cutting torch or saw;

(6) melting;

(7) sawing into many small pieces; and

(8) any other method accepted by the CAA.

(c) The following procedures are examples of mutilation that are often less successful because they may not be consistently effective:

(1) stamping or vibro-etching;

(2) spraying with paint;

(3) small distortions, incisions, or hammer marks;

(4) identification by tags or markings;

(5) drilling small holes; and

(6) sawing in two pieces only.

CAR 145.A.45 Maintenance data

(a) The organisation shall hold and use applicable current maintenance data in the performance of maintenance, including modifications and repairs.

'Applicable' means relevant to any aircraft, component or process specified in the organisation's approval class rating schedule and in any associated capability list.

In the case of maintenance data provided by an operator or customer, the organisation shall hold such data when the work is in progress, with the exception of the need to comply with requirement 145.A.55(c).

(b) For the purposes of this CAR, applicable maintenance data shall be any of the following:

1. Any applicable requirement, procedure, operational directive or information issued by the CAA for which responsible for the oversight of the aircraft or component;
2. Any applicable airworthiness directive issued by state of design and the CAA for which responsible for the oversight of the aircraft or component;
3. Instructions for continuing airworthiness, issued by type certificate holders, supplementary type certificate holders, any other organisation required to publish such data by CAR-21and in the case of aircraft or components from third countries the airworthiness data mandated by the CAA;
4. Any applicable standard, such as but not limited to, maintenance standard practices recognised by the CAA as a good standard for maintenance;
5. Any applicable data issued in accordance with requirement (d).

(c) The organisation shall establish procedures to ensure that if found, any inaccurate, incomplete or ambiguous procedure, practice, information or maintenance instruction contained in the maintenance data used by maintenance personnel is recorded and notified to the author of the maintenance data.

(d) The organisation may only modify maintenance instructions in accordance with a procedure specified in the maintenance organisation's exposition. With respect to those changes, the organisation shall demonstrate that they result in equivalent or improved maintenance standards and shall inform the type-certificate holder of such changes. Maintenance instructions for the purposes of this point means instructions on how to carry out the particular maintenance task: they exclude the engineering design of repairs and modifications.

(e) The organisation shall provide a common work card or worksheet system to be used throughout relevant parts of the organisation. In addition, the organisation shall either transcribe accurately the maintenance data contained in points (b) and (d) onto such work cards or worksheets or make precise reference to the particular maintenance task or tasks contained in such maintenance data. Work cards and worksheets may be computer generated and held on an electronic database subject to both adequate safeguards against unauthorised alteration and a back-up electronic database which shall be updated within 24 hours of any entry made to the main electronic database. Complex maintenance tasks shall be transcribed onto the work cards or worksheets and subdivided into clear stages to ensure a record of the accomplishment of the complete maintenance task.

Where the organisation provides a maintenance service to an aircraft operator who requires their work card or worksheet system to be used then such work card or worksheet system may be used. In this case, the organisation shall establish a procedure to ensure correct completion of the aircraft operators' work cards or worksheets.

(f) The organisation shall ensure that all applicable maintenance data is readily available for use when required by maintenance personnel.

(g) The organisation shall establish a procedure to ensure that maintenance data it controls is kept up to date. In the case of operator/customer controlled and provided maintenance data, the organisation shall be able to show that either it has written confirmation from the operator/customer that all such maintenance data is up to date or it has work orders specifying the amendment status of the maintenance data to be used or it can show that it is on the operator/customer maintenance data amendment list.

AMC 145.A.45(b) Maintenance data

1. Except as specified in sub-paragraph 5, each maintenance organisation approved under CAR-145 should hold and use the following minimum maintenance data relevant to the organisation's approval class rating. All maintenance related Civil Aviation Regulation and associated AMCs, approval specifications and Guidance Material, all applicable national maintenance requirements and notices which have not been superseded by any requirement, procedure or directive and all applicable airworthiness directives plus any airworthiness directive supplied by a contracted operator or customer as well as Critical Design Configuration Control Limitations.

2. In addition to sub-paragraph 1, an organisation with an approval class rating in category A - Aircraft, should hold and use the following maintenance data where published. The appropriate sections of the operator's aircraft maintenance programme, aircraft maintenance manual, repair manual, supplementary structural inspection document, corrosion control document, service bulletins, service letters, service instructions, modification leaflets, NDT manual, parts catalogue, type certificate data sheet and any other specific document issued by the type certificate or supplementary type certificate holder as maintenance data.

3. In addition to subparagraph 1, an organisation with an approval class rating in category B — Engines/APUs, should hold and use the following maintenance data where published. The appropriate sections of the engine/APU maintenance and repair manual, service bulletins, service letters, modification leaflets, non-destructive testing (NDT) manual, parts catalogue, type certificate data sheet and any other specific document issued by the type certificate holder as maintenance data.

4. In addition to sub-paragraph 1, an organisation with an approval class rating in category C - Components other than complete engines/APUs, should hold and use the following maintenance data where published. The appropriate sections of the vendor maintenance and repair manual, service bulletins and service letters plus any document issued by the type certificate holder as maintenance data on whose product the component may be fitted when applicable.

5. Appropriate sections of the sub-paragraphs 2 to 4 additional maintenance data means in relation to the maintenance work scope at each particular maintenance facility. For example, a base maintenance facility should have almost complete set(s) of the maintenance data whereas a line maintenance facility may need only the maintenance manual and the parts catalogue.

6. An organisation only approved in class rating category D – Specialised services, should hold and use all applicable specialised service(s) process specifications.

AMC 145.A.45(c) Maintenance data

1. The referenced procedure should ensure that when maintenance personnel discover inaccurate, incomplete or ambiguous information in the maintenance data they should record the details. The procedure should then ensure that the CAR-145 approved maintenance organisation notifies the problem to the author of the maintenance data in a timely manner. A record of such communications to the author of the maintenance data should be retained by the CAR-145 approved organisation until such time as the type certificate holder has clarified the issue by e.g., amending the maintenance data.

2. The referenced procedure should be specified in the maintenance organisation exposition.

AMC 145.A.45(d) Maintenance data

The referenced procedure should address the need for a practical demonstration by the mechanic to the quality personnel of the proposed modified maintenance instruction. When satisfied the quality personnel should approve the modified maintenance instruction and ensure that the type certificate or supplementary type certificate holder is informed of the modified maintenance instruction. The procedure should include a paper/electronic traceability of the complete process from start to finish and ensure that the relevant maintenance instruction clearly identifies the modification. Modified maintenance instructions should only be used in the following circumstances:

(a) Where the type certificate / supplementary type certificate holders' original intent can be carried out in a more practical or more efficient manner.

(b) Where the type certificate / supplementary type certificate holder's original intent cannot be achieved by following the maintenance instructions. For example, where a component cannot be replaced following the original maintenance instructions.

(c) For the use of alternative tools / equipment.

Important Note: Critical Design Configuration Control Limitations (CDCCL) are airworthiness limitations. Any modification of the maintenance instructions linked to CDCCL constitutes an aircraft modification that should be approved in accordance with state of design regulation.

AMC 145.A.45(e) Maintenance data

1. The maintenance organisation should:

   – transcribe accurately the maintenance data onto such work cards or worksheets, or

   – make precise reference to the particular maintenance task(s) contained in such maintenance data, which already identifies the task as a CDCCL where applicable.

2. Relevant parts of the organisation means with regard to aircraft base maintenance, aircraft line maintenance, engine workshops, mechanical workshops and avionic workshops. Therefore, engine workshops for example should have a common system throughout such engine workshops that may be different to that in the aircraft base maintenance.

3. The work cards should differentiate and specify, when relevant, disassembly, accomplishment of task, reassembly and testing. In the case of a lengthy maintenance task involving a succession of personnel to complete such a task, it may be necessary to use supplementary work cards or worksheets to indicate what was actually accomplished by each individual person.

AMC 145.A.45(f) Maintenance data

1. Data being made available to personnel maintaining aircraft means that the data should be available in close proximity to the aircraft being maintained for supervisors, mechanics and certifying staff to study.

2. Where computer systems are used, the number of computer terminals should be sufficient in relation to the size of the work programme to enable easy access, unless the computer system can produce paper copies. Where microfilm or microfiche readers/printers are used, a similar requirement is applicable.

AMC 145.A.45(g) Maintenance data

To keep data up-to-date, a procedure should be set up to monitor the amendment status of all data and maintain a check that all amendments are being received by being a subscriber to any document amendment scheme. Special attention should be given to TC related data such as certification life limited parts, airworthiness limitations and Airworthiness Limitation Items (ALI), etc.

CAR 145.A.47 Production planning

(a) The organisation shall have a system appropriate to the amount and complexity of work to plan the availability of all necessary personnel, tools, equipment, material, maintenance data and facilities in order to ensure the safe completion of the maintenance work.

(b) The planning of maintenance tasks, and the organising of shifts, shall take into account human performance limitations.

(c) When it is required to hand over the continuation or completion of maintenance tasks for reasons of a shift or personnel changeover, relevant information shall be adequately communicated between outgoing and incoming personnel.

AMC 145.A.47(a) Production planning

1. Depending on the amount and complexity of work generally performed by the maintenance organisation, the planning system may range from a very simple procedure to a complex organisational set-up including a dedicated planning function in support of the production function.

2. For the purpose of CAR-145, the production planning function includes two complementary elements:

– scheduling the maintenance work ahead, to ensure that it will not adversely interfere with other work as regards the availability of all necessary personnel, tools, equipment, material, maintenance data and facilities.

– during maintenance work, organising maintenance teams and shifts and provide all necessary support to ensure the completion of maintenance without undue time pressure.

3. When establishing the production planning procedure, consideration should be given to the following:

– logistics,

– inventory control,

– square meters of accommodation,

– man-hours estimation,

– man-hours availability,

– preparation of work,

– hangar availability,

– environmental conditions (access, lighting standards and cleanliness),

– co-ordination with internal and external suppliers, etc.

– scheduling critical maintenance tasks during periods when staff are likely to be most alert.

AMC1 145.A.47(b) Production planning

FATIGUE RISK MANAGEMENT

(a) In order to manage the fatigue related risk of personnel, as an aviation hazard, the organisation should:

(1) as part of its safety policy develop and maintain a policy for the management of fatigue related risk and define the related procedures;

(2) define and use a work schedule scheme with maximum work and minimum rest hours not exceeding the limitations laid down in the prevailing Labour Law.

Where temporary derogations and opt-outs to the prevailing Labour Law are agreed between the organisation and its personnel, the organisation should conduct and document a risk assessment, and take the necessary actions to mitigate the applicable risks;

(3) ensure existing reporting systems enable the identification of fatigue related hazards;

(4) assess and manage the risks of such fatigue related hazard reports in accordance with the organisation's safety risk management procedures, and monitor the effectiveness of related risk mitigation actions implemented; and

(5) provide training on the management of fatigue.

(b) By derogation from point (a)(2) above, when the organisation does not apply the maximum work and minimum rest hours laid down in the Labour Law, it should establish as part of its management system a fatigue risk management scheme acceptable to the CAA.

AMC2 145.A.47(b) Production planning

DUTY TIME SCHEDULE

(a) The duty time schedule should address, at a minimum, the following topics:

(1) Maximum scheduled hours/day;

(2) Maximum hours with overtime;

(3) Maximum hours/month;

(4) Minimum rest between shifts (based on shift length); and

(5) Minimum uninterrupted rest hours per week.

All of the above must consider time of day work shift.

(b) Reasonable work hour limits should not be exceeded merely for management convenience even when staff is willing to work extended hours. When maximum work hours are exceeded, the organisation and the individual staff member should have a written plan on how the fatigue risk will be mitigated. This may include:

(1) additional supervision and independent inspection;

(2) limitation of tasks to non-safety critical;

(3) use of additional rest breaks; and

(4) permission to nap in accordance with guidelines approved by the organisation.

GM1 145.A.47(b) Production planning

Limitations of human performance, in the context of planning safety related tasks, refers to the upper and lower limits, and variations, of certain aspects of human performance (Circadian rhythm / 24 hours body cycle) which personnel should be aware of when planning work and shifts.

AMC1 145.A.47(c) Production planning

The primary objective of the changeover / handover information is to ensure effective communication at the point of handing over the continuation or completion of maintenance actions. Effective task and shift handover depend on three basic elements:

– The outgoing person's ability to understand and communicate the important elements of the job or task being passed over to the incoming person.

– The incoming person's ability to understand and assimilate the information being provided by the outgoing person.

– A formalised process for exchanging information between outgoing and incoming persons and a planned shift overlaps and a place for such exchanges to take place.

CAR 145.A.48 Performance of maintenance

(a) The organisation may only carry out maintenance on an aircraft or component for which it is approved when all the necessary facilities, equipment, tooling, material, maintenance data and personnel are available.
(b) The organisation shall be responsible for the maintenance that is performed within the scope of its approval.
(c) The organisation shall ensure that:

(1) after the completion of the maintenance, a general verification is carried out to ensure that the aircraft or component is clear of all tools, equipment and any extraneous parts or material, and that all access panels that were removed have been refitted;
(2) an error-capturing method is implemented after the performance of any critical maintenance task;
(3) the risk of errors during maintenance and the risk of errors being repeated in identical maintenance tasks are minimised;
(4) damage is assessed, and modifications and repairs are carried out using the data specified in point M.A.304 of CAR-M;

(5) the assessment of aircraft defects is carried out in accordance with point M.A.403(b) of CAR-M;

GM 145.A.48 Performance of maintenance

AUTHORISED PERSON
An 'authorised person' is a person formally authorised by the maintenance organisation to perform or supervise a maintenance task. An 'authorised person' is not necessarily 'certifying staff'.
SIGN-OFF

A 'sign-off' is a statement issued by the 'authorised person' which indicates that the task or group of tasks has been correctly performed. A 'sign-off' relates to one step in the maintenance process and is, therefore, different to a certificate of release to service.

AMC1 145.A.48(a) Performance of maintenance

Point (a) of 145.A.48 is intended to cover the situation where the organisation may temporarily not hold all the necessary tools, equipment, material, maintenance data, etc. for an aircraft type or variant, or component specified in the organisation's scope of work. This point means that the CAA need not amend the approval to delete the aircraft type or variants, or component on the basis that it is a temporary situation and there is a commitment from the organisation to re-acquire tools, equipment etc. before maintenance on the related aircraft or component may recommence.

GM1 145.A.48(c) Performance of maintenance

CRITICAL DESIGN CONFIGURATION CONTROL LIMITATIONS (CDCCL)

The organisation should ensure that when performing maintenance, the CDCCL are not compromised. The organisation should pay particular attention to possible adverse effects of any change to the wiring of the aircraft, even of a change not specifically associated with the fuel tank system. For example, it should be common practice to identify the segregation of fuel gauging system wiring as a CDCCL. The organisation can prevent adverse effects associated with changes to the wiring by

standardising maintenance practices through training, and not through periodic inspections. Training should be provided to avoid indiscriminate routing and splicing of wires and to provide comprehensive knowledge of critical design features of fuel tank systems that would be controlled by a CDCCL. Guidance on the training of maintenance organisation personnel is provided in Appendix I to AMC5 145.A.30(e).

AMC1 145.A.48(c)(2) Performance of maintenance

The organisation should have a procedure to identify the error-capturing methods, the critical maintenance tasks, the training and the qualifications of staff applying error-capturing methods, and how the organisation ensures that its staff is familiar with critical maintenance tasks and error-capturing methods.

AMC2 145.A.48(c)(2) Performance of maintenance

CRITICAL MAINTENANCE TASKS

(a) The procedure should ensure that the following maintenance tasks are reviewed to assess their impact on flight safety:

(1) tasks that may affect the control of the aircraft flight path and attitude, such as installation, rigging and adjustments of flight controls;
(2) aircraft stability control systems (autopilot, fuel transfer);
(3) tasks that may affect the propulsive force of the aircraft, including installation of aircraft engines, propellers and rotors; and
(4) overhaul, calibration or rigging of engines, propellers, transmissions and gearboxes.

(b) The procedure should describe which data sources are used to identify critical maintenance tasks.

Several data sources may be used, such as:

(1) information from the design approval holder;
(2) accident reports;
(3) investigation and follow-up of incidents;
(4) occurrence reporting;
(5) flight data analysis, where this is available from the person or organisation responsible for the aircraft continuing airworthiness;
(6) results of audits and independent inspections;
(7) monitoring schemes for normal operations, where these are available from the person or organisation responsible for the aircraft continuing airworthiness;

(8) feedback from training.

AMC3 145.A.48(c)(2) Performance of maintenance

ERROR-CAPTURING METHODS

(a) Error-capturing methods are those actions defined by the organisation to detect maintenance errors that are made while performing maintenance.

(b) The organisation should ensure that the error-capturing methods are adequate for the work and the disturbance of the system. A combination of several actions (e.g., visual inspection, operational check, functional test, rigging check) may be necessary in some cases.

AMC4 145.A.48(c)(2) Performance of maintenance

INDEPENDENT INSPECTION

Independent inspection is one possible error-capturing method.

(a) What is an independent inspection

An independent inspection is an inspection performed by an 'independent qualified person' of a task carried out by an 'authorised person', taking into account that:

(1) the 'authorised person' is the person who performs the task or supervises the task and they assume the full responsibility for the completion of the task in accordance with the applicable maintenance data;
(2) the 'independent qualified person' is the person who performs the independent inspection and attests the satisfactory completion of the task and that no deficiencies have been found. The 'independent qualified person' does not issue a certificate of release to service, therefore they are not required to hold certification privileges;
(3) the 'authorised person' issues the certificate of release to service or signs off the completion of the task after the independent inspection has been carried out satisfactorily;

(4) the work card system used by the organisation should record the identification of both persons and the details of the independent inspection as necessary before the certificate of release to service or sign-off for the completion of the task is issued.

(b) Qualifications of persons performing independent inspections
The organisation should have procedures to demonstrate that the 'independent qualified person' has been trained and has gained experience in the specific inspection to be performed. The organisation could consider making use of, for example:

(1) staff holding a certifying staff or support staff or sign-off authorisation or equivalent necessary to release or sign-off the critical maintenance task;
(2) staff holding a certifying staff or support staff or sign-off authorisation or equivalent necessary to release or sign-off similar task in a product of similar category and having received specific practical training in the task to be inspected; or
(3) a commander holding a limited certification authorisation in accordance with 145.A.30(j)(4) and having received adequate practical training and having enough experience in the specific task to be inspected and on how to perform independent inspection.

(c) How to perform an independent inspection

An independent inspection should ensure correct assembly, locking and sense of operation. When inspecting control systems that have undergone maintenance, the independent qualified person should consider the following points independently:

(1) all those parts of the system that have actually been disconnected or disturbed should be inspected for correct assembly and locking;
(2) the system as a whole should be inspected for full and free movement over the complete range;
(3) cables should be tensioned correctly with adequate clearance at secondary stops;
(4) the operation of the control system as a whole should be observed to ensure that the controls are operating in the correct sense;
(5) if different control systems are interconnected so that they affect each other, all the interactions should be checked through the full range of the applicable controls; and
(6) software that is part of the critical maintenance task should be checked, for example: version, compatibility with aircraft configuration.

(d) What to do in unforeseen cases when only one person is available

REINSPECTION:

(1) Reinspection is an error-capturing method subject to the same conditions as an independent inspection is, except that the 'authorised person' performing the maintenance task is also acting as 'independent qualified person' and performs the inspection.
(2) Reinspection, as an error-capturing method, should only be performed in unforeseen circumstances when only one person is available to carry out the task and perform the independent inspection. The circumstances cannot be considered unforeseen if the person

or organisation has not assigned a suitable 'independent qualified person' to that particular line station or shift.

(3) The certificate of release to service is issued after the task has been performed by the 'authorised person' and the reinspection has been carried out satisfactorily. The work card system used by the organisation should record the identification and the details of the reinspection before the certificate of release to service for the task is issued.

AMC1 145.A.48(c)(3) Performance of maintenance

The procedures should be aimed at:
(a) minimising errors and preventing omissions. Therefore, the procedures should specify:
(1) that every maintenance task is signed-off only after completion;
(2) how the grouping of tasks for the purpose of sign-off allows critical steps to be clearly identified; and
(3) that work performed by personnel under supervision (i.e. temporary staff, trainees) is checked and signed-off by an authorised person;

(b) minimising the possibility of an error being repeated in identical tasks and, therefore, compromising more than one system or function. Thus, the procedures should ensure that no person is required to perform a maintenance task involving removal/installation or assembly/disassembly of several components of the same type fitted to more than one system, a failure of which could have an impact on safety, on the same aircraft or component during a particular maintenance check. However, in unforeseen circumstances when only one person is available, the organisation may make use of reinspection as described in point (d) of AMC4 145.A.48(c)(2).

GM1 145.A.48(c)(3) Performance of maintenance

To minimise the risk of errors during maintenance and the risk of errors being repeated in identical maintenance tasks, the organisation may implement:
− procedures to plan the performance by different persons of the same task in different systems;

− independent inspection or re-inspection procedures

CAR 145.A.50 Certification of maintenance

(a) A certificate of release to service shall be issued by appropriately authorised certifying staff on behalf of the organisation when it has been verified that all maintenance ordered has been completed satisfactory and properly carried out by the organisation in accordance with the approved data and the procedures described in the maintenance organization exposition specified in requirement 145.A.70, taking into account the availability and use of the maintenance data specified in requirement 145.A.45 and that there are no non-compliances which are known to endanger flight safety.

(b) A certificate of release to service shall be issued before flight at the completion of any maintenance including:

a) basic details of the maintenance carried out including detailed reference of the approved data used;

b) date such maintenance was completed;

c) when applicable, the identity of the approved maintenance organization; and

d) the identity of the person or persons signing the release.

(c) New defects or incomplete maintenance work orders identified during the above maintenance shall be brought to the attention of the aircraft operator for the specific purpose of obtaining agreement to rectify such defects or completing the missing elements of the maintenance work order. In the case where the aircraft operator declines to have such maintenance carried out under this point, point (e) is applicable.

(d) A certificate of release to service shall be issued at the completion of any maintenance on a component whilst off the aircraft. The authorised release certificate 'CAA Form 1' referred to in Appendix II constitutes the component certificate of release to service except if otherwise specified in the requirement. When an organisation maintains a component for its own use, an CAA Form 1 may not be necessary depending upon the organisation's internal release procedures defined in the exposition.

(e) By derogation to requirement (a), when the organisation is unable to complete all maintenance ordered, it may issue a certificate of release to service within the approved aircraft limitations. The organisation shall enter such fact in the aircraft certificate of release to service before the issue of such certificate.

(f) By derogation to requirements (a) and 145.A.42, when an aircraft is grounded at a location other than the main line station or main maintenance base due to the non-availability of a component with the appropriate release certificate, it is permissible to temporarily fit a component without the appropriate release certificate for a maximum of 30 flight hours or until the aircraft first returns to the main line station or main maintenance base, whichever is the sooner, subject to the aircraft operator agreement and said component having a suitable release certificate but otherwise in compliance with all applicable maintenance and operational requirements. Such components shall be removed by the above prescribed time limit unless an appropriate release certificate has been obtained in the meantime under requirements (a) and 145.A.42.

AMC 145.A.50(a) Certification of maintenance

'Endangers the flight safety' means any instances where safe operation could not be assured or which could lead to an unsafe condition. It typically includes, but is not limited to, significant cracking, deformation, corrosion or failure of primary structure, any evidence of burning, electrical arcing, significant hydraulic fluid or fuel leakage and any emergency system or total system failure. An airworthiness directive overdue for compliance is also considered a hazard to flight safety.

AMC 145.A.50(b) Certification of maintenance

1. The certificate of release to service should contain the following statement: 'Certifies that the work specified, except as otherwise specified, was carried out in accordance with CAR-145 and in respect to that work the aircraft/aircraft component is considered ready for release to service'. Reference should also be made to the CAA Approved Maintenance Organisation Certificate number.

2. It is acceptable to use an alternate abbreviated certificate of release to service consisting of the following statement 'CAR-145 release to service' instead of the full certification statement specified in paragraph 1. When the alternate abbreviated certificate of release to service is used, the introductory section of the technical log should include an example of the full certification statement from paragraph 1.

3. The certificate of release to service should relate to the task specified in the (S) TC holder's or operator's instructions or the aircraft maintenance programme which itself may cross-refer to maintenance data.

4. The date such maintenance was carried out should include when the maintenance took place relative to any life or overhaul limitation in terms of date/flying hours/cycles/landings etc., as appropriate.

5. When extensive maintenance has been carried out, it is acceptable for the certificate of release to service to summarise the maintenance as long as there is a unique cross-reference to the work package containing full details of maintenance carried out. Dimensional information should be retained in the work-pack record.

AMC1 145.A.50(d) Certification of maintenance

The purpose of the certificate (CAA Form 1) is to release assemblies/items/components/parts (hereafter referred to as 'item(s)') after maintenance and to release maintenance work carried out on such items under the approval of the CAA and to allow items removed from one aircraft/aircraft component to be fitted to another aircraft/aircraft component.

The certificate is to be used for export/import purposes, as well as for domestic purposes, and serves as an official certificate for items from the manufacturer/maintenance organisation to users.

It can only be issued by organisations approved by the CAA within the scope of the approval.

The certificate may be used as a rotable tag by utilising the available space on the reverse side of the certificate for any additional information and dispatching the item with two copies of the certificate so that one copy may be eventually returned with the item to the maintenance organisation. The alternative solution is to use existing rotable tags and also supply a copy of the certificate.

A certificate should not be issued for any item when it is known that the item is unserviceable except in the case of an item undergoing a series of maintenance processes at several maintenance organisations approved under CAR-145 and the item needs a certificate for the previous maintenance process carried out for the next maintenance organisation approved under CAR-145 to accept the item for subsequent maintenance processes. In such a case, a clear statement of limitation should be endorsed in Block 12.

AMC2 145.A.50(d) Certification of maintenance

1. A component which has been maintained off the aircraft needs the issuance of a certificate of release to service for such maintenance and another certificate of release to service in regard to being installed properly on the aircraft when such action occurs. This requirement also applies to engine completely restored and engine modules.

   When an organisation maintains a component for use by the same organisation, a CAA Form 1 may not be necessary depending upon the organisation's internal release procedures defined in the maintenance organisation exposition.

2. In the case of the issue of CAA Form 1 for components in storage before initial issue of CAR-145 and CAR-21 became effective and not released on an CAA Form 1 or equivalent in accordance with 145.A.42(a) or removed serviceable from a serviceable aircraft or an aircraft which has been withdrawn from service the following applies:

   2.1. An CAA Form 1 may be issued for an aircraft component which has been:

   - Maintained before initial issue of CAR-145 became effective or manufactured before initial issue of CAR-21 became effective.
   - Used on an aircraft and removed in a serviceable condition. Examples include leased and loaned aircraft components.

- Removed from aircraft which have been withdrawn from service, or from aircraft which have been involved in abnormal occurrences such as accidents, incidents, heavy landings or lightning strikes.
- Maintained by an unapproved organisation.

2.2. An appropriately rated maintenance organisation approved under CAR-145 may issue an CAA Form 1 as detailed in this AMC subparagraph 2.5 to 2.9, as appropriate, in accordance with procedures detailed in the exposition as approved by the CAA. The appropriately rated organisation is responsible for ensuring that all reasonable measures have been taken to ensure that only approved and serviceable aircraft components are issued an CAA Form 1 under this paragraph.

2.3. For the purposes of this AMC No 2 only, appropriately rated means an organisation with an approval class rating for the type of component or for the product in which it may be installed.

2.4. An CAA Form 1 issued in accordance with this paragraph 2 should be issued by signing in block 14b and stating 'Inspected/Tested' in block 11. In addition, block 12 should specify:

2.4.1. When the last maintenance was carried out and by whom.

2.4.2. If the component is unused, when the component was manufactured and by whom with a cross-reference to any original documentation which should be included with the Form.

2.4.3. A list of all airworthiness directives, repairs and modifications known to have been incorporated. If no airworthiness directives or repairs or modifications are known to be incorporated, then this should be so stated.

2.4.4. Detail of life used for service life-limited parts being any combination of fatigue, overhaul or storage life.

2.4.5. For any aircraft component having its own maintenance history record, reference to the particular maintenance history record as long as the record contains the details that would otherwise be required in block 12. The maintenance history record and acceptance test report or statement, if applicable, should be attached to the CAA Form 1.

2.5. New/unused aircraft components

2.5.1. Any unused aircraft component in storage without a CAA Form 1 up to the effective date(s) for CAR-21 that was manufactured by an organisation acceptable to the state of design at that time may be issued with a CAA Form 1 by an appropriately rated maintenance organisation approved under CAR-145. The CAA Form 1 should be issued in accordance with the following subparagraphs which should be included in a procedure within the maintenance organisation manual.

Note 1: It should be understood that the release of a stored but unused aircraft component in accordance with this paragraph represents a maintenance release under CAR-145 and not a production release.

(a) An acceptance test report or statement should be available for all used and unused aircraft components that are subjected to acceptance testing after manufacturing or maintenance as appropriate.

(b) The aircraft component should be inspected for compliance with the manufacturer's instructions and limitations for storage and condition including any requirement for limited storage life, inhibitors, controlled climate and special storage containers. In addition, or in the absence of specific storage instructions the aircraft component should be inspected for damage, corrosion and leakage to ensure good condition.

(c) The storage life used of any storage life-limited parts should be established.

2.5.2. If it is not possible to establish satisfactory compliance with all applicable conditions specified in subparagraph 2.5.1(a) to (c) inclusive, the aircraft component should be disassembled by an appropriately rated organisation and subjected to a check for incorporated airworthiness directives, repairs and modifications and inspected/tested in accordance with the maintenance data to establish satisfactory condition and, if relevant, all seals, lubricants and life-limited parts should be replaced. Upon satisfactory completion after reassembly, a CAA Form 1 may be issued stating what was carried out and the reference of the maintenance data included.

2.6. Used aircraft components removed from a serviceable aircraft

2.6.1. Serviceable aircraft components removed from Omani registered aircraft may be issued with a CAA Form 1 by an appropriately rated organisation subject to compliance with this subparagraph.

(a) The organisation should ensure that the component was removed from the aircraft by an appropriately qualified person.

(b) The aircraft component may only be deemed serviceable if the last flight operation with the component fitted revealed no faults on that component/related system.

(c) The aircraft component should be inspected for satisfactory condition including in particular damage, corrosion or leakage and compliance with any additional maintenance data.

(d) The aircraft record should be researched for any unusual events that could affect the serviceability of the aircraft component such as involvement in accidents, incidents, heavy landings or lightning strikes. Under no circumstances may a CAA Form 1 be issued in accordance with this paragraph 2.6 if it is suspected that the aircraft component has been subjected to extremes of stress, temperatures or immersion which could affect its operation.

(e) A maintenance history record should be available for all used serialised aircraft components.

(f) Compliance with known modifications and repairs should be established.

(g) The flight hours/cycles/landings as applicable of any service life-limited parts including time since overhaul should be established.

(h) Compliance with known applicable airworthiness directives should be established.

(i) Subject to satisfactory compliance with this subparagraph 2.6.1, a CAA Form 1 may be issued and should contain the information as specified in paragraph 2.4 including the aircraft from which the aircraft component was removed.

2.6.2. Serviceable aircraft components removed from a foreign registered aircraft may only be issued with a CAA Form 1 if the components are leased or loaned from the maintenance organisation approved under CAR-145 who retains control of the airworthiness status of the components. A CAA Form 1 may be issued and should contain the information as specified in paragraph 2.4 including the aircraft from which the aircraft component was removed.

2.7. Used aircraft components removed from an aircraft withdrawn from service.

Serviceable aircraft components removed from an Omani registered aircraft withdrawn from service may be issued with a CAA Form 1 by a maintenance organisation approved under CAR-145 subject to compliance with this subparagraph.

(a) Aircraft withdrawn from service are sometimes dismantled for spares. This is considered to be a maintenance activity and should be accomplished under the control of an organisation approved under CAR-145, employing procedures approved by the CAA.

(b) To be eligible for installation, components removed from such aircraft may be issued with an CAA Form 1 by an appropriately rated organisation following a satisfactory assessment.

(c) As a minimum, the assessment will need to satisfy the standards set out in paragraphs 2.5 and 2.6 as appropriate. This should, where known, include the possible need for the alignment of scheduled maintenance that may be necessary to comply with the maintenance programme applicable to the aircraft on which the component is to be installed.

(d) Irrespective of whether the aircraft holds a certificate of airworthiness or not, the organisation responsible for certifying any removed component should ensure that the manner in which the components were removed and stored are compatible with the standards required by CAR-145.

(e) A structured plan should be formulated to control the aircraft disassembly process. The disassembly is to be carried out by an appropriately rated organisation under the supervision of certifying staff who will ensure that the aircraft components are removed and documented in a structured manner in accordance with the appropriate maintenance data and disassembly plan.

(f) All recorded aircraft defects should be reviewed and the possible effects these may have on both normal and standby functions of removed components are to be considered.

(g) Dedicated control documentation is to be used as detailed by the disassembly plan, to facilitate the recording of all maintenance actions and component removals performed during the disassembly process. Components found to be unserviceable are to be identified as such and quarantined pending a decision on the actions to be taken. Records of the maintenance accomplished to establish serviceability are to form part of the component maintenance history.

(h) Suitable CAR-145 facilities for the removal and storage of removed components are to be used which include suitable environmental conditions, lighting, access equipment, aircraft tooling and storage facilities for the work to be undertaken. While it may be acceptable for components to be removed, given local environmental conditions, without the benefit of an enclosed facility, subsequent disassembly (if required) and storage of the components should be in accordance with the manufacturer's recommendations.

2.8. Used aircraft components maintained by organisations not approved in accordance with CAR-145. For used components maintained by a maintenance organisation not approved under CAR-145, due care should be taken before acceptance of such components. In such cases an appropriately rated maintenance organisation approved under CAR-145 should establish satisfactory conditions by:

(a) dismantling the component for sufficient inspection in accordance with the appropriate maintenance data;

(b) replacing all service life-limit components when no satisfactory evidence of life used is available and/or the components are in an unsatisfactory condition;

(c) reassembling and testing as necessary the component;

(d) completing all certification requirements as specified in 145.A.50.

2.9. Used aircraft components removed from an aircraft involved in an accident or incident.

Such components should only be issued with a CAA Form 1 when processed in accordance with paragraph 2.7 and a specific work order including all additional necessary tests and inspections deemed necessary by the accident or incident. Such a work order may require input from the TC holder or original manufacturer as appropriate. This work order should be referenced in block 12.

AMC 145.A.50(e) Certification of maintenance

1. Being unable to establish full compliance with sub-paragraph 145.A.50(a) means that the maintenance required by the aircraft operator could not be completed due either to running out of available aircraft maintenance downtime for the scheduled check or by virtue of the condition of the aircraft requiring additional maintenance downtime.

2. The aircraft operator is responsible for ensuring that all required maintenance has been carried out before flight and therefore 145.A.50(e) requires such operator to be informed in the case where full compliance with 145.A.50(a) cannot be achieved within the operator's limitations. If the operator agrees to the deferment of full compliance, then the certificate of release to service may be issued subject to details of the deferment, including the operator's authority, being endorsed on the certificate.

   Note: Whether or not the aircraft operator does have the authority to defer maintenance is an issue between the aircraft operator and the CAA. In case of doubt concerning such a decision of the operator, the approved maintenance organisation should inform its CAA on such doubt, before issuing the certificate of release to service. This will allow the CAA to investigate the matter with the operator.

3. The procedure should draw attention to the fact that 145.A.50(a) does not normally permit the issue of a certificate of release to service in the case of non-compliance and should state what action the mechanic, supervisor and certifying staff should take to bring the matter to the attention of the relevant department or person responsible for technical co-ordination with the aircraft operator so that the issue may be discussed and resolved with the aircraft operator. In addition, the appropriate person(s) as specified in 145.A.30(b) should be kept informed in writing of such possible non-compliance situations and this should be included in the procedure.

AMC 145.A.50(f) Certification of maintenance

1. Suitable release certificate means a certificate which clearly states that the aircraft component is serviceable; that clearly specifies the organisation releasing said component together with details of the authority under whose approval the organisation works including the approval or authorisation reference.

2. Compliance with all other CAR-145 and operator requirements means making an appropriate entry in the aircraft technical log, checking for compliance with type design standards, modifications, repairs, airworthiness directives, life limitations and condition of the aircraft component plus information on where, when and why the aircraft was grounded.

GM 145.A.50(d) *CAA Form* 1 Block 12 'Remarks'

Examples of data to be entered in this block as appropriate:

– Maintenance documentation used, including the revision status, for all work performed and not limited to the entry made in block 11.

– A statement such as 'in accordance with the CMM' is not acceptable.

– NDT methods with appropriate documentation used when relevant.

– Compliance with airworthiness directives or service bulletins.

- Repairs carried out.
- Modifications carried out.
- Replacement parts installed.
- Life-limited parts status.
- Shelf-life limitations.
- Deviations from the customer work order.
- Release statements to satisfy a foreign Civil Aviation Authority maintenance requirement.
- Information needed to support shipment with shortages or re-assembly after delivery.
- References to aid traceability, such as batch numbers.

CAR 145.A.55 Maintenance records

(a) The organisation shall retain all detailed maintenance record and work carried out. As a minimum, the organisation shall retain records necessary to prove that all requirements have been met for the issue of the certificate of release to service, including subcontractor's release documents.

(b) The organisation shall provide a copy of each certificate of release to service to the aircraft operator, together with a copy of any specific repair/modification data used for repairs/modifications carried out.

(c) The organisation shall retain a copy of all detailed maintenance records and any associated maintenance data to show that all requirements for the signing of a maintenance release have been met for three years from the date the aircraft or component to which the work relates was released from the organisation.

1. The records under this point shall be maintained in a form and format that ensures readability, protection from damage, alteration, theft, security and integrity of the records at all times.

2. Computer backup discs, tapes etc. shall be stored in a different location from that containing the working discs, tapes etc., in an environment that ensures they remain in good condition.

3. Where an organisation approved under this CAR-145 terminates its operation, all retained maintenance records covering the last three years shall be distributed to the last owner or customer of the respective aircraft or component or shall be stored as specified by the CAA.

Note 1.— The form and format of the records may include, for example, paper records, film records, electronic records or any combination thereof.

Note 2.— Guidance material regarding electronic aircraft maintenance records is contained in ICAO Doc 9760.

AMC 145.A.55 Maintenance records

GENERAL

(a) The record keeping system should ensure that all records are accessible whenever needed within a reasonable time. These records should be organised in a way that ensures traceability and retrievability throughout the required retention period.

(b) Records should be kept in paper form, or in electronic format, or a combination of both. Records stored on microfilm or optical disc format are also acceptable. The records should remain legible throughout the required retention period. The retention period starts when the record has been created or last amended.

(c) Paper systems should use robust material which can withstand normal handling and filing. Computer systems should have, at least, one backup system which should be updated within 24 hours of any new entry. Computer systems should include safeguards against the ability of unauthorised personnel to alter the data.

(d) All computer hardware used to ensure data backup should be stored in a different location from that containing the working data, and in an environment that ensures they remain in good condition. When hardware or software changes take place, special care should be taken that all necessary data continues to be accessible at least through the applicable retention period as defined in this CAR.

AMC 145.A.55(c) Maintenance records

Associated maintenance data is specific information such as repair and modification data. This does not necessarily require the retention of all Aircraft Maintenance Manual, Component Maintenance Manual, IPC etc. issued by the TC holder or STC holder. Maintenance records should refer to the revision status of the data used.

GMC 145.A.55(a) Maintenance records

(a) Properly executed and retained records provide owners, operators and maintenance personnel with information essential in controlling unscheduled and scheduled maintenance, and troubleshooting to eliminate the need for re-inspection and rework to establish airworthiness. As a minimum, records necessary to prove all requirements have been met for issuance of the certificate of release to service including sub-contractor's release documents should be retained. The prime objective is to have secure and easily retrievable records with comprehensive and legible contents. The aircraft record should contain basic details of all serialised aircraft components and all other significant aircraft components installed, to ensure traceability to such installed aircraft component documentation and associated maintenance data as specified in 145.A.45.

(b) Some gas turbine engines are assembled from modules and a true total time in service for a total engine is not kept. When owners and operators wish to take advantage of the modular design, then total time in service and maintenance records for each module is to be maintained. The maintenance records as specified are to be kept with the module and should show compliance with any mandatory requirements pertaining to that module.

(c) Reconstruction of lost or destroyed records can be done by reference to other records which reflect the time in service, research of records maintained by repair facilities and reference to records maintained by individual mechanics etc. When these things have been done and the record is still incomplete, the owner/operator may make a statement in the new record describing the loss and establishing the time in service based on the research and the best estimate of time in service. The reconstructed records should be submitted to the CAA for acceptance.

CAR 145.A.60 Occurrence reporting

(a) The organisation shall report to the CAA, the state of registry and the organisation responsible for the design of the aircraft or component any condition of the aircraft or component identified by the organisation that has resulted or may result in an unsafe condition that hazards seriously the flight safety.

(b) The organisation shall establish an internal occurrence reporting system as detailed in the exposition to enable the collection and evaluation of such reports, including the assessment and extraction of those occurrences to be reported under requirement (a). This procedure shall identify adverse trends, corrective actions taken or to be taken by the organisation to address

deficiencies and include evaluation of all known relevant information relating to such occurrences and a method to circulate the information as necessary.

(c) The organisation shall make such reports in a form and manner established by the CAA and ensures that they contain all pertinent information about the condition and evaluation results known to the person or organisation and details of the investigation and actions it intends to take to prevent similar occurrences in the future.

(d) Where the organisation is contracted by a commercial operator to carry out maintenance, the organisation shall also report to the operator any such condition affecting the operator's aircraft or component.

(e) The organisation shall produce and submit such reports as soon as practicable but in any case, within 72 hours of the organisation identifying the condition to which the report relates.

AMC 145.A.60(a) Occurrence reporting

Appendix III to this AMC provides further guidance on occurrence reporting.

GM 145.A.60(a) Occurrence reporting

The organisation responsible for the design is normally the TC holder of the aircraft, engine or propeller and/or if known the STC holder.

AMC 145.A.60(b) Occurrence reporting

1. The aim of occurrence reporting is to identify the factors contributing to incidents, and to make the system resistant to similar errors.
2. An occurrence reporting system should enable and encourage free and frank reporting of any (potentially) safety related occurrence. This will be facilitated by the establishment of a just culture. An organisation should ensure that personnel are not inappropriately punished for reporting or co-operating with occurrence investigations.
3. The internal reporting process should be closed-loop, ensuring that actions are taken internally to address safety hazards.
4. Feedback to reportees, both on an individual and more general basis, is important to ensure their continued support for the scheme.

GM 145.A.60(c) Occurrence reporting

Each report should contain at least the following information:

(i) Organisation name and approval reference.

(ii) Information necessary to identify the subject aircraft and / or component.

(iii) Date and time relative to any life or overhaul limitation in terms of flying hours/cycles/landings etc. as appropriate.

(iv) Details of the condition as required by 145.A.60(b).

(v) Any other relevant information found during the evaluation or rectification of the condition.

CAR 145.A.65 Safety and quality policy, maintenance procedures and quality system

(a) The organisation shall establish a safety and quality policy for the organisation to be included in the exposition under 145.A.70.

(b) The organisation shall establish procedures agreed by the CAA taking into account human factors and human performance to ensure good maintenance practices and compliance with the all the relevant requirements prescribed in this CAR-145. The procedures under this point shall:

1. ensure that a clear work order or contract has been agreed between the organisation and the organisation requesting maintenance to clearly establish the maintenance to be carried out so that aircraft and components may be released to service in accordance with 145.A.50; and,
2. cover all aspects of carrying out maintenance, including the provision and control of specialised services and lay down the standards to which the organisation intends to work.

(c) The maintenance organization shall establish a quality system that includes the following:

1. Independent audits in order to monitor compliance with required aircraft/aircraft component standards and adequacy of the procedures to ensure that such procedures invoke good maintenance practices and airworthy aircraft/aircraft components. In the smallest organisations the independent audit part of the quality system may be contracted when authorized by the CAA to another organisation approved under this regulation or a person with appropriate technical knowledge and proven satisfactory audit experience; and
2. A quality feedback reporting system to the person or group of persons specified in requirement 145.A.30(b) and ultimately to the accountable manager that ensures proper and timely corrective action is taken in response to reports resulting from the independent audits established to meet paragraph (1).

(d) The CAR-145 approved maintenance organization (Except distributors organization) must establish a safety management system in accordance with CAR-100, that commensurate with its size and the complexity of its aviation products or services.

(e) A safety management system shall clearly define lines of responsibility and accountability throughout a maintenance organisation, including a direct accountability for safety on the part of senior management.

(f) The framework for the implementation and maintenance of a safety management system must include, as a minimum, the elements as per CAR-100.

AMC 145.A.65(a) Safety and quality policy, maintenance procedures and quality system

The safety and quality policy should as a minimum include a statement committing the organisation to:

- Recognise safety as a prime consideration at all times.
- Apply Human factors principles.
- Encourage personnel to report maintenance related errors/incidents.
- Recognise that compliance with procedures, quality standards, safety standards and regulations, is the duty of all personnel.
- Recognise the need for all personnel to cooperate with the quality auditors.

AMC 145.A.65(b) Safety and quality policy, maintenance procedures and quality system

1. Maintenance procedures should be held current such that they reflect best practice within the organisation. It is the responsibility of all organisation's employees to report any differences via their organisation's internal occurrence reporting mechanisms.

2. All procedures, and changes to those procedures, should be verified and validated before use

3. All technical procedures should be designed and presented in accordance with good human factors principles.

GM 145.A.65(b)(1) Safety and quality policy, maintenance procedures and quality system

Appendix XI to AMC CAR-M provides guidance on the elements that need to be considered for the maintenance contract between the CAMO and the maintenance organisation. The CAR-145 organisation should take into account these elements to ensure that a clear contract or work order has been concluded before providing maintenance services.

AMC 145.A.65(b)(2) Safety and quality policy, maintenance procedures and quality system

Specialised services include any specialised activity, such as, but not limited to non-destructive testing requiring particular skills and/or qualification. 145.A.30(f) covers the qualification of personnel but, in addition, there is a need to establish maintenance procedures that cover the control of any specialised process.

AMC 145.A.65(c)(1) Safety and quality policy, maintenance procedures and quality system

1. The primary objectives of the quality system are to enable the organisation to ensure that it can deliver a safe product and that organisation remains in compliance with the requirements.
2. An essential element of the quality system is the independent audit.
3. The independent audit is an objective process of routine sample checks of all aspects of the organisation's ability to carry out all maintenance to the required standards and includes some product sampling as this is the end result of the maintenance process. It represents an objective overview of the complete maintenance related activities and is intended to complement the 145.A.50(a) requirement for certifying staff to be satisfied that all required maintenance has been properly carried out before issue of the certificate of release to service. Independent audits should include a percentage of random audits carried out on a sample basis when maintenance is being carried out. This means some audits during the night for those organisations that work at night.
4. Except as specified in sub-paragraphs 7 and 9, the independent audit should ensure that all aspects of CAR-145 compliance are checked every 12 months and may be carried out as a complete single exercise or subdivided over the 12 months' period in accordance with a scheduled plan. The independent audit does not require each procedure to be checked against each product line when it can be shown that the particular procedure is common to more than one product line and the procedure has been checked every 12 months without resultant findings. Where findings have been identified, the particular procedure should be rechecked against other product lines until the findings have been rectified after which the independent audit procedure may revert back to 12 monthly for the particular procedure.
5. Except as specified otherwise in subparagraphs 7, the independent audit should sample check one product on each product line every 12 months as a demonstration of the effectiveness of maintenance procedures compliance. It is recommended that procedures and product audits be combined by selecting a specific product example, such as an aircraft or engine or instrument and sample checking all the procedures and requirements associated with the specific product example to ensure that the end result should be an airworthy product.

For the purpose of the independent audit, a product line includes any product under an Appendix II approval class rating as specified in the approval schedule issued to the particular organisation.

It therefore follows for example that a maintenance organisation approved under CAR-145 with a capability to maintain aircraft, repair engines, brakes and autopilots would need to carry out four complete audit sample checks each year except as specified otherwise in subparagraphs 5, 7 or 9.

6. The sample check of a product means to witness any relevant testing and visually inspect the product and associated documentation. The sample check should not involve repeat disassembly or testing unless the sample check identifies findings requiring such action.

7. Except as specified otherwise in sub-paragraph 9, where the smallest organisation, that is an organisation with a maximum of 10 personnel actively engaged in maintenance, chooses to contract the independent audit element of the quality system in accordance with 145.A.65(c)(1) it is conditional on the audit being carried out twice in every 12 months period.

8. Except as specified otherwise in sub-paragraph 9, where the organisation has line stations listed as per 145.A.75(d) the quality system should describe how these are integrated into the system and include a plan to audit each listed line station at a frequency consistent with the extent of flight activity at the particular line station. Except as specified otherwise in sub-paragraph 9 the maximum period between audits of a particular line station should not exceed 24 months.

9. Except as specified otherwise in sub-paragraph 5, the CAA may agree to increase any of the audit time periods specified in this AMC 145.A.65(c)(1) by up to 100% provided that there are no safety related findings and subject to being satisfied that the organisation has a good record of rectifying findings in a timely manner.

10. A report should be raised each time an audit is carried out describing what was checked and the resulting findings against applicable requirements, procedures and products.

11. The independence of the audit should be established by always ensuring that audits are carried out by personnel not responsible for the function, procedure or products being checked. It therefore follows that a large maintenance organisation approved under CAR-145, being an organisation with more than about 500 maintenance staff should have a dedicated quality audit group whose sole function is to conduct audits, raise finding reports and follow up to check that findings are being rectified. For the medium sized maintenance organisation approved under CAR-145, being an organisation with less than about 500 maintenance staff, it is acceptable to use competent personnel from one section/department not responsible for the production function, procedure or product to audit the section/department that is responsible subject to the overall planning and implementation being under the control of the quality manager. Organisations with a maximum of 10 maintenance staff actively engaged in carrying out maintenance may contract the independent audit element of the quality system to another organisation or a qualified and competent person approved by the CAA.

GM 145.A.65(c)(1) Safety and quality policy, maintenance procedures and quality system

1. The purpose of this GM is to give guidance on just one acceptable working audit plan to meet part of the needs of 145.A.65(c)1. There is any number of other acceptable working audit plans.

2. The proposed plan lists the subject matter that should be covered by the audit and attempts to indicate applicability in the various types of workshops and aircraft facilities. The list should therefore be tailored for the particular situation and more than one list may be necessary. Each list should be shown against a timetable to indicate when the particular item is scheduled for audit and when the audit was completed.

PARA	Comment	HANGAR	ENGINE Workshop	MECH Workshop	AVIONIC Workshop
145.A.25		Yes	Yes	Yes	Yes
145.A.30		Yes	Yes	Yes	Yes

145.A.35		Yes	Yes	Yes	Yes
145.A.36		Yes	No	No	No
145.A.40		Yes	Yes	Yes	Yes
145.A.42		Yes	Yes	Yes	Yes
145.A.43		Yes	Yes	Yes	Yes
145.A.45		Yes	Yes	Yes	Yes
145.A.47		Yes	Yes	Yes	Yes
145.A.48		Yes	Yes	If appl	If appl
PARA	**Comment**	**HANGAR**	**ENGINE** Workshop	**MECH** Workshop	**AVIONIC** Workshop
145.A.50		Yes	Yes	Yes	Yes
145.A.55		Yes	Yes	Yes	Yes
145.A.60		Yes	Yes	Yes	Yes
145.A.65		Yes	Yes	Yes	Yes
2.1	MOE	Yes	Yes	Yes	Yes
2.2	MOE	Yes	Yes	Yes	Yes
2.3	MOE	Yes	Yes	Yes	Yes
2.4	MOE	Yes	Yes	Yes	Yes
2.5	MOE	Yes	Yes	Yes	Yes
2.6	MOE	Yes	Yes	Yes	Yes
2.7	MOE	Yes	Yes	Yes	Yes
2.8	MOE	Yes	Yes	Yes	Yes
2.9	MOE	Yes	Yes	Yes	Yes
2.10	MOE	Yes	No	No	No
2.11	MOE	Yes	Yes	Yes	Yes
2.12	MOE	Yes	Yes	Yes	Yes
2.13	MOE	Yes	Yes	Yes	Yes

2.14	MOE	Yes	Yes	Yes	Yes
2.15	MOE	Yes	No	No	No
2.16	MOE	Yes	Yes	Yes	Yes
2.17	MOE	If appl	If appl	If appl	If appl
2.18	MOE	Yes	Yes	Yes	Yes
2.19	MOE	Yes	Yes	Yes	Yes
2.20	MOE	Yes	Yes	Yes	Yes
2.21	MOE	If appl	If appl	If appl	If appl
2.22	MOE	Yes	Yes	No	No
2.23	MOE	Yes	No	No	No
2.24	MOE	Yes	Yes	Yes	Yes
2.25	MOE	Yes	Yes	Yes	Yes
2.26	MOE	Yes	Yes	Yes	Yes
2.27	MOE	Yes	Yes	Yes	Yes
2.28	MOE	Yes	Yes	Yes	Yes
2.29	MOE	Yes	No	No	No
2.30	MOE	Yes	No	No	No
L2.1	MOE	If appl	No	No	No
L2.2	MOE	If appl	No	No	No
L2.3	MOE	If appl	No	No	No
L2.4	MOE	If appl	No	No	No
L2.5	MOE	If appl	No	No	No
L2.6	MOE	If appl	No	No	No
L2.7	MOE	If appl	No	No	No
3.9	MOE	If appl	If appl	If appl	If appl
3.10	MOE	If appl	If appl	If appl	If appl

3.11	MOE	If appl	If appl	If appl	If appl
3.12	MOE	Yes	Yes	Yes	Yes
3.13	MOE	Yes	Yes	Yes	Yes
3.14	MOE	Yes	Yes	Yes	Yes
145.A.70		Yes	Yes	Yes	Yes
145.A.75		Yes	Yes	Yes	Yes
145.A.80		Yes	Yes	Yes	Yes
145.A.85		Yes	Yes	Yes	Yes
145.A.95		If appl	If appl	If appl	If appl

Note 1: "if appl" means if applicable or relevant.

Note 2: In the line station case all line stations should be audited at the Frequency agreed with CAA within the limits of AMC 145.A.65(c)(1).

AMC 145.A.65(c)(2) Safety and quality policy, maintenance procedures and quality system

1. An essential element of the quality system is the quality feedback system.

2. The quality feedback system may not be contracted to outside persons. The principal function of the quality feedback system is to ensure that all findings resulting from the independent quality audits of the organisation are properly investigated and corrected in a timely manner and to enable the accountable manager to be kept informed of any safety issues and the extent of compliance with CAR-145.

3. The independent quality audit reports referenced in AMC 145.A.65(c)(1) sub-paragraph 10 should be sent to the relevant department(s) for rectification action giving target rectification dates. Rectification dates should be discussed with such department(s) before the quality department or nominated quality auditor confirms such dates in the report. The relevant department(s) are required by 145.A.65(c)(2) to rectify findings and inform the quality department or nominated quality auditor of such rectification.

4. The accountable manager should hold regular meetings with staff to check progress on rectification except that in the large organisations such meetings may be delegated on a day-to-day basis to the quality manager subject to the accountable manager meeting at least twice per year with the senior staff involved to review the overall performance and receiving at least a half yearly summary report on findings of non-compliance.

5. All records pertaining to the independent quality audit and the quality feedback system should be retained for at least 2 years after the date of clearance of the finding to which they refer or for such periods as to support changes to the AMC 145.A.65(c)(1) sub-paragraph 9 audit time periods, whichever is the longer.

CAR 145.A.70 Maintenance organisation exposition

(a) 'Maintenance organisation exposition' means the document or documents that contain the material specifying the scope of work deemed to constitute approval and showing how the organisation intends to comply with CAR-145. The organisation shall provide for the use and

guidance of maintenance personnel concerned a maintenance organisation exposition which may be issued in separate parts containing the following information:

1. A statement signed by the accountable manager confirming that the maintenance organisation exposition and any referenced associated manuals define the organisation's compliance with this CAR-145 and will be complied with at all times. When the accountable manager is not the chief executive officer of the organisation then such chief executive officer shall countersign the statement;
2. A general description of the scope of work authorized under the organization's terms of approval, a description of the organization's procedures, of quality and safety policy as specified by requirement 145.A.65;
3. the title(s) and name(s) of the persons nominated accepted by CAA under requirement 145.A.30;
4. the duties and responsibilities of the persons nominated under requirement 145.A.30 and specified in subparagraph (3), including matters on which they may deal directly with the CAA on behalf of the CAR-145 Approved Maintenance Organisation;
5. An organisation chart showing associated chains of responsibility between the persons nominated under requirement 145.A.30(b) specified in subparagraph (3);
6. a list of certifying staff, support staff (if need it) and, if applicable, airworthiness review staff and staff responsible for the development and processing of the maintenance programme, with their scope of their authorization and of their approval;
7. A general description of manpower resources;
8. A general description of the organization's facilities located at each address specified in the CAR-145 approved maintenance organization`s certificate of approval;

9 A specification of the approved maintenance organisation's scope of work relevant to the extent of approval;

10. The notification procedure of 145.A.85 for CAR-145 Approved maintenance organisation changes and a description of the procedures for implementing changes affecting the approval of the maintenance organization.
11. The maintenance organisation exposition amendment procedure;
12. the procedures specifying how the organisation ensures compliance with this regulation;
13. a list of the commercial operators to which the organisation provides regular aircraft maintenance services, and the associated procedures;
14. where applicable, a list of the subcontracted organisations referred to in point 145.A.75(b);
15. a list of the approved locations including, where applicable, line maintenance locations referred to in point 145.A.75(d);
16. a list of the contracted organisations;

(b) The maintenance organization exposition shall be amended as necessary to keep the information contained therein up-to-date. The exposition and any subsequent amendment shall be approved by the CAA.

(c) Copies of all amendments to the maintenance organisation exposition shall be furnished promptly to all organisations and persons to whom the manual has been issued.

(d) Notwithstanding paragraph (b) minor amendment to the exposition may be approved through an exposition procedure, subject to the criteria of the minor amendment is defined in the exposition.

(e) Notwithstanding paragraphs (a) and (b), the CAA may accept the exposition produced by the organisation supplemented by specific control procedures to address the differences to ensure compliance with CAR-145.

AMC 145.A.70(a) Maintenance organisation exposition

The following information should be included in the maintenance organisation exposition:

1-The information specified in 145.A.70(a) subparagraphs (6) and (12) to (16) inclusive, whilst a part of the maintenance organisation exposition, may be kept as separate documents or on separate electronic data files subject to the management part of said exposition containing a clear cross-reference to such documents or electronic data files.

2-The exposition should contain the information, as applicable, specified in this AMC. The information may be presented in any subject order as long as all applicable subjects are covered. Where an organisation uses a different format, for example, to allow the exposition to serve for more than one approval, then the exposition should contain a cross-reference Annex using this list as an index with an explanation as to where the subject matter can be found in the exposition.

3-The exposition should contain information, as applicable, on how the maintenance organisation complies with Critical Design Configuration Control Limitations' (CDCCL) instructions.

4- Small maintenance organisations may combine the various items to form a simple exposition more relevant to their needs.

5- The operator may use electronic data processing (EDP) for publication of the maintenance organisation exposition. The maintenance organisation exposition should be made available to the CAA in a form acceptable to the CAA. Attention should be paid to the compatibility of EDP publication systems with the necessary dissemination of the maintenance organisation exposition, both internally and externally.

PART 1 General

1.1 Corporate commitment by the accountable manager

1.2 Safety and quality policy

1.3 Management personnel

1.4 Duties and responsibilities of the management personnel

1.5 Management organisation chart

1.6 List of certifying staff, support staff

1.7 Manpower resources

1.8 General description of the facilities at each address intended to be approved

1.9 Organisations intended scope of work

1.10 Notification procedure to the CAA regarding changes to the organisation's activities/approval/location/personnel

1.11 Exposition amendment procedures including, if applicable, delegated procedures

PART 2 MAINTENANCE PROCEDURES

2.1 Supplier evaluation and subcontract control procedure

2.2 Acceptance/inspection of aircraft components and material from outside contractors

2.3 Storage, tagging and release of aircraft components and material to aircraft maintenance

2.4 Acceptance of tools and equipment

2.5 Calibration of tools and equipment

2.6 Use of tooling and equipment by staff (including alternate tools)

2.7 Cleanliness standards of maintenance facilities

2.8 Maintenance instructions and relationship to aircraft/aircraft component manufacturers' instructions including updating and availability to staff

2.9 Repair procedure

2.10 Aircraft maintenance programme compliance

2.11 Airworthiness directives procedure

2.12 Optional modification procedure

2.13 Maintenance documentation in use and its completion

2.14 Technical record control

2.15 Rectification of defects arising during base maintenance

2.16 Release to service procedure

2.17 Records for the operator

2.18 Reporting of defects to the CAA/operator/manufacturer

2.19 Return of defective aircraft components to store

2.20 Defective components to outside contractors

2.21 Control of computer maintenance record systems

2.22 Control of man-hour planning versus scheduled maintenance work

2.23 Critical maintenance tasks and error-capturing methods

2.24 Reference to specific maintenance procedures such as –

- Engine running procedures
- Aircraft pressure run procedures
- Aircraft towing procedures
- Aircraft taxiing procedures

2.25 Procedures to detect and rectify maintenance errors.

2.26 Shift/task handover procedures

2.27 Procedures for notification of maintenance data inaccuracies and ambiguities, to the type certificate holder

2.28 Production planning procedures

PART L2 ADDITIONAL LINE MAINTENANCE PROCEDURES

L2.1 Line maintenance control of aircraft components, tools, equipment, etc.

L2.2 Line maintenance procedures related to servicing/fueling/de-icing, including inspection for/removal of de-icing/anti-icing fluid residues, etc.

L2.3 Line maintenance control of defects and repetitive defects

L2.4 Line procedure for completion of technical log

L2.5 Line procedure for pooled parts and loan parts

L2.6 Line procedure for return of defective parts removed from aircraft

L2.7 Line procedure for critical maintenance tasks and error-capturing methods

PART 3 MANAGEMENTS SYSTEM PROCEDURES

3.1 Quality audit of organisation procedures

3.2 Quality audit of aircraft

3.3 Quality audit remedial action procedure

3.4 Certifying staff and support staff qualification and training procedures

3.5 Certifying staff and support staff records

3.6 Quality audit personnel

3.7 Qualifying inspectors

3.8 Qualifying mechanics

3.9 Aircraft or aircraft component maintenance tasks exemption process control

3.10 Concession control for deviation from organisations' procedures

3.11 Qualification procedure for specialised activities such as NDT welding, etc.

3.12 Control of manufacturers and other maintenance working teams

3.13 Human factors training procedure

3.14 Competence assessment of personnel

3.15 Reserved

3.16 (Reserved).

PART 4 CONTRACTS

4.1 Contracting operators

4.2 Operator procedures and paperwork

4.3 Operator record completion

4.4 Procedure for issuing the one-off authorization as per CAR-145.A.30 (j) (5)

PART 5 APPENDICES

5.1 Sample of documents

5.2 List of Subcontractors as per 145.A.75(b), including a description of the maintenance function contracted to each Sub –contractor.

5.3 List of Line maintenance locations as per 145.A.75(d)

5.4 List of contracted organisations as per 145.A.70(a)(16)

GM 145.A.70(a) Maintenance organisation exposition

1. The purpose of the maintenance organisation exposition (MOE) is to set forth the procedures, means and methods of the organisation.

2. Compliance with its contents will assure compliance with the requirements of CAR-145, which is a prerequisite to obtaining and retaining an approved maintenance organisation certificate.

3. 145.A.70(a)(1) to (a)(11) constitutes the 'management' part of the MOE and therefore could be produced as one document and made available to the person(s) specified under 145.A.30(b) who should be reasonably familiar with its contents. 145.A.70(a)(6) list of certifying staff andB1 and B2 support staff may be produced as a separate document.

Note:145.A.70(a)(9) scope of work (such as a capability list) may be produced as a separate document subject to the agreement of the CAA.

4. 145.A.70(a)(12) constitutes the working procedures of the organisation and therefore as stated in the requirement may be produced as any number of separate procedures manuals. It should be remembered that these documents should be cross-referenced from the management MOE.

5. Personnel are expected to be familiar with those parts of the manuals that are relevant to the maintenance work they carry out.

6. The organisation should specify in the MOE who should amend the manual particularly in the case where there are several parts.

7. The quality manager should be responsible for monitoring the amendment of the MOE, unless otherwise agreed by the CAA, including associated procedures manuals and submission of the proposed amendments to the CAA. However, the CAA may agree via a procedure stated in the amendment section of the MOE that some defined class of amendments may be incorporated without prior approval by the CAA.

8. The MOE should cover four main parts:

   (a) The management MOE covering the parts specified earlier.

   (b) The maintenance procedures covering all aspects of how aircraft components may be accepted from outside sources and how aircraft will be maintained to the required standard.

   (c) The quality system procedures including the methods of qualifying mechanics, inspection, certifying staff and quality audit personnel.

   (d) Contracting operator procedures and paperwork.

9. The accountable manager's exposition statement as specified under 145.A.70(a)(1) should embrace the intent of the following paragraph and in fact this statement may be used without amendment. Any modification to the statement should not alter the intent.

This exposition and any associated referenced manuals define the organisation and procedures upon which the CAR-145 approval is based as required by 145.A.70. These procedures are approved by the undersigned and shall be complied with, as applicable, when work orders are being progressed under the terms of the CAR-145 approval.

It is accepted that these procedures do not override the necessity of complying with any new or amended regulation published by the CAA from time to time where these new or amended regulations are in conflict with these procedures.

It is understood that the CAA will approve this organisation whilst the CAA is satisfied that the procedures are being followed and work standards maintained. It is further understood that the CAA reserves the right to suspend, limit or revoke the approval of the organisation if the CAA has evidence that procedures are not followed or standards not upheld.

Signed ..... Dated .....

Accountable Manager and..... (quote position) .....

For and on behalf of..... (quote organisation's name) .....

Note: Whenever the accountable manager changes, it is important to ensure that the new accountable manager signs the paragraph 9 statement at the earliest opportunity. Failure to carry out this action could invalidate the CAR-145 approval.

10 When an organisation holds other CAA approvals which contains a requirement for an exposition, a supplement covering the differences will suffice to meet the requirements except that the supplement should have an index showing where those parts missing from the supplement are covered.

11. The CAR-145.65(a) quality policy should embrace the intent of the following paragraph:

"Only by providing the standard of quality and service demanded by our customers, and constantly striving to maintain and improve the standard, can we continue to be a respected provider of services.

The basic quality requirements to achieve the standard are laid down in the exposition.

Quality standards are the responsibility of all personnel and it is the duty of all personnel to comply with this policy, to strive to both maintain and improve quality standards at every opportunity."

12. CAR.145 approved maintenance organizations located in the Sultanate of Oman should use the exposition format prescribed in AMC 145.A.70(a), however, additional supplements addressing the requirements of another authority may be permitted to be included in the maintenance organization exposition.

13. However, organizations located outside the Sultanate of Oman approved by another authority against the regulations of that authority (such us the FAA/EASA) may use a common exposition provided that all CAR-145 requirements are met and the ` management ` part of the 145.A.70 maintenance organization exposition be addressed in unique section of the common exposition. Differences between the CAR-145 requirements and the requirements of the other authority should be identified and indicated. The common exposition should have an index showing where those parts pertaining to the CAR-145 are covered.

GM 145.A.70(e) Maintenance Organisation Exposition

The acceptance criteria are:

(a) The maintenance organisation is based outside the Sultanate of Oman.

(b) The maintenance organisation has an approved maintenance organisation exposition by an authority or ICAO member state.

Organisations not meeting these criteria must produce a CAA MOE as per CAR-145.70(a).

CAR145.A.75 Privileges of the organisation

In accordance with the exposition, the organisation shall be entitled to carry out the following tasks:

(a) Maintain any aircraft and/or component for which it is approved at the locations identified in the approval certificate and in the exposition;

(b) Arrange for maintenance of any aircraft or component for which it is approved at another organisation that is working under the quality system of the organisation. This refers to work being carried out by an organisation not itself appropriately approved to carry out such maintenance under this CAR and is limited to the work scope permitted under procedures laid down in requirement 145.A.65(b). This work scope shall not include a base maintenance check of an aircraft or a complete workshop maintenance check or overhaul of an engine or engine module;

(c) Maintain any aircraft or any component for which it is approved at any location subject to the need for such maintenance arising either from the unserviceability of the aircraft or from the necessity of supporting occasional line maintenance, subject to the conditions specified in the exposition;

(d) Maintain any aircraft and/or component for which it is approved at a location identified as a line maintenance location capable of supporting minor maintenance and only if the organisation exposition both permits such activity and lists such locations;

(e) Issue certificates of release to service in respect of completion of maintenance in accordance with requirement 145.A.50;

(f) Issue certificates of Fitness for Flight to release an aircraft for a flight when it is not possible to issue a Certificate of Release to Service when and as required by Appendix VI ;

AMC 145.A.75(b) Privileges of the organisation

1. Working under the quality system of an organisation appropriately approved under CAR-145 (sub-contracting) refers to the case of one organisation, not itself appropriately approved to CAR-145 that carries out aircraft line maintenance or minor engine maintenance or maintenance of other aircraft components or a specialised service as a subcontractor for an organisation appropriately approved under CAR-145. To be appropriately approved to subcontract the organisation should have a procedure for the control of such subcontractors as described below. Any approved maintenance organisation that carries out maintenance for another approved maintenance organisation within its own approval scope is not considered to be subcontracting for the purpose of this paragraph.

Note: For those organisations approved under CAR-145 that are also certificated by the FAA under FAR 145 or any other ICAO contracting State it should be noted that the regulation of those states is more restrictive in respect of maintenance activities that can be contracted or sub-contracted to another maintenance organisation. It is therefore recommended that any listing of contracted or sub-contracted maintenance organisations should identify which meet the CAR-145 criteria and which meet the FAR 145 criteria and the regulation of those states.

2. Maintenance of engines or engine modules other than a complete workshop maintenance check or overhaul is intended to mean any maintenance that can be carried out without disassembly of the core engine or, in the case of modular engines, without disassembly of any core module.

GM 145.A.75(b) Privileges of the organisation

This means that the complete workshop maintenance check of an engine module or overhaul of an engine module can be accepted using the CAA Form 1 or equivalent release form as specified under CAR-145. A.42.

3. FUNDAMENTALS OF SUB-CONTRACTING UNDER CAR-145

3.1. The fundamental reasons for allowing an organisation approved under CAR-145 to subcontract certain maintenance tasks are:

(a) To permit the acceptance of specialised maintenance services, such as, but not limited to, plating, heat treatment, plasma spray, fabrication of specified parts for minor repairs / modifications, etc., without the need for direct approval by the CAA in such cases.

(b) To permit the acceptance of aircraft maintenance up to but not including a base maintenance check as specified in 145.A.75(b) by organisations not appropriately approved under CAR-145 when it is unrealistic to expect direct approval by the CAA. The CAA will determine when it is unrealistic but in general it is considered unrealistic if only one or two organisations intend to use the sub-contract organisation.

(c) To permit the acceptance of component maintenance.

(d) To permit the acceptance of engine maintenance up to but not including a workshop maintenance check or overhaul of an engine or engine module as specified in 145.A.75(b) by organisations not appropriately approved under CAR-145 when it is unrealistic to expect direct approval by the CAA. The determination of unrealistic is as per sub-paragraph (b).

3.2. When maintenance is carried out under the sub-contract control system it means that for the duration of such maintenance, the CAR-145 approval has been temporarily extended to include the sub-contractor. It therefore follows that those parts of the subcontractor`s facilities personnel and procedures involved with the maintenance organisation’s products undergoing maintenance should meet CAR-145 requirements for the duration of that maintenance and it remains the organisation’s responsibility to ensure such requirements are satisfied.

3.3. For the criteria specified in sub-paragraph 3.1 the organisation is not required to have complete facilities for maintenance that it needs to sub-contract but it should have its own expertise to determine that the sub-contractor meets the necessary standards. However, an organisation cannot be approved unless it has the in-house facilities, procedures and expertise to carry out the majority of maintenance for which it wishes to be approved in terms of the number of class ratings.

3.4. The organisation may find it necessary to include several specialist sub-contractors to enable it to be approved to completely certify the release to service of a particular product. Examples could be specialist welding, electro-plating, painting etc. To authorise the use of such subcontractors, the CAA will need to be satisfied that the organisation has the necessary expertise and procedures to control such sub-contractors.

3.5. An organisation working outside the scope of its approval schedule is deemed to be not approved. Such an organisation may in this circumstance operate only under the subcontract control of another organisation approved under CAR-145.

3.6. Authorisation to sub-contract is indicated by the CAA accepting the maintenance organisation exposition containing a specific procedure on the control of sub-contractors.

4. PRINCIPAL CAR-145 PROCEDURES FOR THE CONTROL OF SUB-CONTRACTORS NOT APPROVED UNDER CAR-145

4.1. A pre-audit procedure should be established whereby the maintenance organisations' subcontract control section, which may also be the 145.A.65(c) quality system independent audit section, should audit a prospective subcontractor to determine whether those services of the subcontractor that it wishes to use meets the intent of CAR-145.

4.2. The organisation approved under CAR-145 needs to assess to what extent it will use the sub-contractor`s facilities. As a general rule the organisation should require its own paperwork, approved data and material/spare parts to be used, but it could permit the use of tools, equipment and personnel from the sub-contractor as long as such tools, equipment and personnel meet the requirement of CAR-145. In the case of subcontractors who provide specialised services it may for practical reasons be necessary to use their specialised services personnel, approved data and material subject to acceptance by the organisation approved under CAR-145.

4.3. Unless the sub-contracted maintenance work can be fully inspected on receipt by the organisation approved under CAR-145 it will be necessary for such organisation to supervise the inspection and release from the sub-contractor. Such activities should be fully described in the organisation procedure. The organisation will need to consider whether to use its own staff or authorise the sub-contractor's staff.

4.4. The certificate of release to service may be issued either at the sub-contractor or at the organisation facility by staff issued a certification authorisation in accordance with 145.A.30 as appropriate, by the organisation approved under CAR-145. Such staff would normally come from the organisation approved under CAR-145 but may otherwise be a person from the sub-contractor who meets the approved maintenance organisation certifying staff standard which itself is approved by the CAA via the maintenance organisation exposition. The certificate of release to service and the Form 1 will always be issued under the maintenance organisation approval reference.

4.5. The sub-contract control procedure will need to record audits of the sub-contractor, to have a corrective action follow up plan and to know when sub-contractors are being used. The procedure should include a clear revocation process for sub-contractors who do not meet the CAR-145 approved maintenance organisation's requirements.

4.6. The CAR-145 quality audit staff will need to audit the sub-contract control section and sample audit sub-contractors unless this task is already carried out by the quality audit staff as stated in sub-paragraph 4.1.

4.7. The contract between the CAR-145 approved maintenance organisation and the subcontractor should contain a provision for the CAA to have right of access to the sub-contractor.

GM 145.A.75 Privileges of the organisation

The provisions in this regulation do not prevent the maintenance organization from performing maintenance on an aircraft which is not under the responsibility of the Oman CAA, including aircraft not registered in any Contracting State.

CAR 145.A.85 Changes to the organisation

The organisation shall notify the CAA of any proposal to carry out any of the following changes before such changes take place to enable the CAA to determine continued compliance with this regulation and to amend, if necessary, the approval certificate, except that in the case of proposed changes in personnel not known to the management beforehand, these changes must be notified at the earliest opportunity:

1. the name of the organisation;
2. the main location of the organisation;
3. additional locations of the organisation;
4. the accountable manager;
5. any of the persons nominated under requirement 145.A.30(b) and (c);
6. the facilities, equipment, tools, material, procedures, work scope and certifying staff that could affect the approval.
7. the organisation's documentation as required by this Regulation, safety policy and procedures;

CAR 145.A.90 Continued validity

(a) An approval shall be issued for a duration not exceeding two years. It shall remain valid subject to:

1. the organisation remaining in compliance with CAR-145, in accordance with the provisions related to the handling of findings as specified under requirement 145.B.50; and
2. the CAA being granted access to the organisation to determine continued compliance with the CAR-145; and
3. the certificate not being surrendered or revoked.

(b) Upon surrender or revocation, the approval shall be returned to the CAA.

CAR 145.A.95 Findings

(a) A level 1 finding is any significant non-compliance with requirements laid down in CAR-145 which lowers the safety standard and hazards seriously the flight safety.

(b) A level 2 finding is any non-compliance with requirements laid down in this CAR-145 which could lower the safety standard and possibly hazard the flight safety.

(c) A level 3 finding is observations for any of the following cases not requiring level 1 or level 2 findings.

(d) After receipt of notification of findings from the CAA, the holder of the maintenance organisation approval shall identify the root cause of each finding and define an action plan, including corrective and preventive actions to address the finding(s) and prevent reoccurrence to the satisfaction the CAA. The action plan must be complied with within the period agreed with the CAA. Action may be taken by the CAA to suspend or revoke the credential of the persons nominated or suspend in whole or part the approval or reduce the duration of validity of certificate in case of failure by an organisation to comply within the timescale granted by the CAA.

SECTION B

PROCEDURE FOR THE CAA

CAR 145.B.01 Scope

This section establishes the administrative procedures which the CAA shall follow when exercising its tasks and responsibilities regarding issuance, continuation, change, suspension or revocation of approvals of maintenance organisations under this regulation.

CAR 145.B.10 CAA

1. General
   The CAA has responsibilities for the issuance, continuation, change, suspension or revocation of a maintenance approval. The CAA shall establish documented procedures and an organisational structure.
2. Resources
   The number of staffs must be appropriate to carry out the requirements as detailed in this section.
3. Qualification and training
   All staff involved in approvals under this regulation must be appropriately qualified and have all necessary knowledge, experience and training to perform their allocated tasks in accordance to Airworthiness Procedure Manual chapter 1.
4. Procedures
   The CAA establish procedures detailing how compliance with this section is accomplished.
   The procedures shall be reviewed and amended to ensure continued compliance.
5. CAA shall ensure that sensitive aviation security information is not transmitted when distributing mandatory continuing airworthiness information.
6. CAA shall ensure that sensitive aviation security information is securely transmitted to the appropriate authority in the State of Design in accordance with CAA requirements ICAO Annex 17.

Note: Guidance material on the transmission of sensitive aviation security information is contained in Doc 9760.

AMC 145.B.10(1) CAA - General

1. In deciding upon the required organisational structure, the CAA shall review the number of certificates to be issued, the number and size of potential CAR-145 approved maintenance organisations, as well as the level of civil aviation activity, number and complexity of aircraft and the size of the aviation industry.
2. The CAA shall retain effective control of important surveillance functions and not delegate them in such a way that CAR-145 organisations, in effect, regulate themselves in airworthiness matters.
3. The set-up of the organisational structure shall ensure that the various tasks and obligations of the CAA are not relying on individuals. That means that a continuing and undisturbed fulfilment of these tasks and obligations of the CAA shall also be guaranteed in case of illness, accident or leave of individual employees.

AMC 145.B.10(3) CAA – Qualification and training

1. Inspectors should have a high degree of integrity, be impartial in carrying out their tasks, be tactful, and have a good understanding of human nature in addition to technical competency.

2. A programme for continuation training should be developed ensuring that the inspectors remain competent to perform their allocated tasks.

AMC 145.B.10(4) CAA – Airworthiness Procedure Manual

The documented procedures should contain the following information:

(a) The CAA approval page signed by DGCAR.

(b) The title(s) and name(s) of the manager(s) of the CAA and their duties and responsibilities.

(c) Organisation chart(s) showing associated chains of responsibility.

(d) Qualifications for staff together with a list of staff authorised.

(e) A general description of the facilities.

(f) Procedures specifying how the CAA ensure compliance with this regulation.

CAR 145.B.17 Acceptable means of compliance

CAA shall adopt acceptable means of compliance as a means to establish compliance with this regulation. When the acceptable means of compliance are complied with, the related requirements of this regulation shall be considered as met.

CAR 145.B.20 Initial approval

1. Provided the requirements of requirements 145.A.30 (a), (b) and (c) are complied with, the CAA shall formally indicate its acceptance of the personnel, specified in requirements 145.A.30(a), (b) and (c) to the applicant in writing.

2. The CAA shall verify that the procedures specified in the maintenance organisation exposition comply with this regulation and verify that the accountable manager signs the commitment statement.

3. The CAA shall verify that the organisation is in compliance with the requirements of this regulation.

4. A meeting with the accountable manager shall be convened at least once during the investigation for approval to ensure that he/she fully understands the significance of the approval and the reason for signing the exposition commitment of the organisation to compliance with the procedures specified in the exposition.

5. All findings must be confirmed in writing to the organisation.

6.The CAA shall record all findings, closure actions (actions required to close a finding) and recommendations.

7. For initial approval all the relevant findings shall be corrected or acceptable action plan by CAA before the approval can be issued.

AMC 145.B.20(1) Initial approval

1. Formally indicated by the CAA in writing means issue approval of the Maintenance Organisation Exposition containing the Accountable Managers commitment statement.

2. The CAA may reject an accountable manager where there is clear evidence that they previously held a senior position in any approved Organisation and abused that position by not complying with the particular requirements.

AMC 145.B.20(1) Initial approval

Verification that the organisation complies with the exposition procedures should be established by the CAA.

AMC 145.B.20(2) Initial approval

1. The CAA shall determine by whom, and how the audit shall be conducted. For example, for a large organisation, it will be necessary to determine whether one large team audit or a short series of small team audits or a long series of single man audits are most appropriate for the particular situation. In all cases the CAA shall communicate its plan with the operator, in order for the operator in liaison with the organisation to make all arrangements necessary for the audit, including travel, accommodation, inspector charges and CAA fees.

2. It is recommended that the audit is carried out on a product line type basis in that, for example, in the case of an organisation with Airbus A310 and A320 ratings, the audit be concentrated on one type only for a full compliance check and dependent upon the result, the second type may only require a sample check against those activities seen to be weak on compliance for the first type.

3. The CAA auditing inspector should always ensure that he/she is accompanied throughout the audit by a senior technical member of the organisation. Normally this is the quality manager or staff. The reason for being accompanied is to ensure the organisation is fully aware of any findings during the audit.

4. The auditing inspector should inform the senior technical member of the organisation at the end of the audit visit on all findings made during the audit.

AMC 145.B.20(5) Initial approval

1. The audit report form should be the CAA Form “A-CL-3”.

2. A quality review of the audit report should be carried out by chief of section or independent person nominated by the Director. The review should take into account the relevant paragraphs of CAR-145, the categorisation of finding levels and the closure action taken.

AMC 145.B.20(6) Initial approval

1. The reports should include the date each finding was cleared.

2. There may be occasions when the CAA inspector may find situations in the applicant's organisation on which he/she is unsure about compliance. In this case, the organisation should be informed about possible non-compliance at the time and the fact that the situation will be reviewed within the CAA before a decision is made. If the decision is a finding of being in compliance, then a verbal confirmation to the organisation will suffice.

3. Findings should be recorded on the audit report with a provisional categorisation as a level 1, 2 or 3. Subsequent to the audit visit that identified the particular findings, the CAA should review the provisional finding levels, adjusting them if necessary and change the categorisation from provisional to confirmed.

4. All findings should be confirmed in writing to the applicant organisation within 15 working days of the audit visit.

CAR 145.B.25 Issue of approval

1. The CAA shall formally approve the exposition and issue to the applicant an approval certificate, which includes the approval ratings or schedule. The CAA shall only issue a certificate when the organisation is in compliance with CAR-145.

2. The reference number shall be included on the approval certificate in a manner specified by the CAA.

3. The approval certificate shall contain at least the following information:

a) The name, title and signature of the DGCAR which is issued the certificate;

b) the maintenance organization name and registered address;

c) the maintenance organization approval reference number;

d) the date of original issue and current issue (if different)

e) reference to approval schedule attached to approval certificate

4. The Approval Schedule shall contain at least following information:

a) the scope of approval, in relation to aircraft, component and/or specialized maintenance, and to the type of aircraft and components covered by the approval;

b) the date of original issue and current issue (if different) and validity period of approval

c) the maintenance organization name and registered address

d) the maintenance organization approval reference number

e) Approved Exposition reference and

f) the locations of the maintenance facilities, unless the information is included in a separate document such as Maintenance Organization Exposition referred to in the Certificate.

5. The issuance of a maintenance organization approval Certificate and Schedule by the CAA shall be dependent upon the applicant demonstrating compliance with this regulation.

AMC 145.B.25(1) Issue of approval

1. The approval should be based only upon the organisational capability (including any associated sub-contractors) relative to CAR-145 and not limited by reference type certificated products. For example, if the organisation is capable of maintaining within the limitation of CAR-145 the Boeing 737-200 series aircraft the approval schedule should state A1 Boeing 737-200 series and not Boeing 737-2H6 which is a particular airline designator for one of many -200 series.

2. The CAA should indicate approval of the exposition in the Approval Schedule.

AMC 145.B.25(2) Issue of approval

The validity of the CAR-145 approval shall be of limited duration not exceeding two years.

AMC 145.B.25(3) Issue of approval

The numeric sequence shall be unique to the particular approved maintenance organisation.

CAR 145.B.30 Continuation of an approval

The continued validity of the approval shall depend upon the organisation remaining in compliance with requirement 145.B.20 and 145.B.25.In addition:

1. The CAA shall keep and update a program listing the approved maintenance organisations under its supervision.
2. Each organization must be completely reviewed for compliance with CAR-145 at periods not exceeding 24 months.

3. The CAA planning audit program cycle shall be established for a duration of 24 months.
4. Notwithstanding point (3), the oversight planning cycle may be extended to 36 months if the CAA has established that during the previous 24 months:
   (a) the organisation has continuously demonstrated compliance with point 145.A.85 and it has full control over all changes;
   (b) No level 1 findings have been issued; and
   (c) All corrective actions have been implemented within the time period that was accepted by CAA.
5. The oversight planning cycle may be shortened if there is evidence that the safety performance of the organisation has decreased.
6. At the completion of each oversight planning cycle, the CAA shall issue a recommendation report on the continuation of the approval, reflecting the results of the oversight.
7. A meeting with the accountable manager shall be convened to ensure he/she remains informed of significant issues arising during audits.

AMC 145.B.30(2) Continuation of an approval

1. Where the CAA has decided that a series of audit visits are necessary to arrive at a complete audit of an organisation, the programme should indicate which aspects of the approval will be covered on each visit.
2. It is recommended that part of an audit concentrates on two ongoing aspects of the CAR-145 approval, namely the organisation's internal self-monitoring quality reports produced by the quality monitoring personnel to determine if the organisation is identifying and correcting its problems and secondly the number of concessions granted by the quality manager.
3. At the successful conclusion of the audit including approval of the exposition, an audit report should be completed by the auditing inspector including all recorded findings, closure actions and recommendation. An CAA Form "A-CL-3" should be used for this activity.
4. In the case of line stations, the CAA can adopt a sampling programme based upon number of line stations and complexity.

CAR 145.B.35 Changes

1.The CAA shall receive notification from the organisation of any proposed change as listed in requirement 145.A.85. The CAA shall comply with the applicable elements of the initial process points for any change to the organisation.
2. The CAA may prescribe the conditions under which organisation may operate during such changes unless it determines that the approval should be suspended.

AMC 145.B.35 Changes

The CAA should have adequate control over any changes to the management personnel specified in 145.A.30(a), (b) and (c) and such changes in personnel will require an amendment to the exposition.

AMC 145.B.35(1) Changes

The applicable part(s) of the CAA Form "A-CL-3" should be used for the changes to the CAR-145 approval.

AMC 145.B.35(2) Changes to the organisation

The primary purpose of this paragraph is to enable the organisation to remain approved if agreed by the CAA during negotiations about any of the specified changes. Without this paragraph the approval would automatically be suspended in all cases.

CAR 145.B.40 Changes to the Maintenance Organisation Exposition

For any change to the Maintenance Organisation Exposition (MOE):

1. In the case of direct approval of the changes in accordance with requirement 145.A.70(b), the CAA shall verify that the procedures specified in the exposition are in compliance with CAR-145 before formally notifying the approved organisation of the approval.

2. In the case an indirect approval procedure is used for the approval of the changes in accordance with requirement 145.A.70(c), the CAA shall ensure that:

(i) the changes remain minor and

(ii) it has an adequate control over the approval of the changes to ensure they remain in compliance with the requirements of CAR-145.

AMC 145.B.40 MOE amendments

1. It is recommended that an exposition status sheet is maintained which contains information on when an amendment was received by the CAA and when it was approved.

2. The CAA may define some class of amendments to the exposition which may be incorporated without prior approval. In this case a procedure should be stated in the amendment section of the MOE. The exposition chapter dealing with scope of work/approval should not be subject to this procedure.

3. The organisation should submit each exposition amendment to the CAA whether it is an amendment for approval or a delegated approval amendment. Where the amendment requires approval by the CAA, the CAA when satisfied, should indicate its approval in the Approval Schedule. Where the amendment has been submitted under the delegated approval procedure the CAA should acknowledge receipt in writing.

CAR 145.B.45 Revocation, suspension and limitation of approval

The CAA shall:

(a) suspend an approval on reasonable grounds in the case of potential safety threat; or

(b) suspend, revoke or limit an approval pursuant to requirement 145.B.50.

CAR 145.B.50 Findings

(a) When during audits or by other means evidence is found showing non-compliance with the requirements of this regulation, the CAA shall take the following actions:

    1. For level 1 findings, immediate action shall be taken by the CAA to revoke, limit or suspend in whole or in part, depending upon the extent of the level 1 finding, the maintenance organisation approval, until successful corrective action has been taken by the organisation.

    2. For level 2 findings, the corrective action period granted by the CAA must be appropriate to the nature of the finding but in any case, initially must not be more than six months. In certain circumstances and subject to the nature of the finding the CAA may extend to another six-month period subject to a satisfactory corrective action plan agreed by the CAA.

3. For level 3 Observation, the corrective action period granted by the CAA could be appropriate to the nature of the finding but in any case, initially must not be more than one year. In certain circumstances and subject to the nature of the finding the CAA may extend to another one-year period subject to a satisfactory corrective action plan agreed by the CAA.

(b) Action shall be taken by the CAA to suspend in whole or part the approval in case of failure to comply within the timescale granted by the CAA.

AMC 145.B.50(a) Findings

1. In practical terms a level 1 finding is where a CAA finds a significant non-compliance with CAR-145.

   The following are example level 1 findings:

- Failure to gain access to the organisation during normal operating hours of the organisation in accordance with 145.A.90(2) after two written requests.
- If the calibration control of equipment as specified in 145.A.40(b) had previously broken down on a particular type product line such that most 'calibrated' equipment was suspect from that time then that would be a level 1 finding.
- obtaining the organisation certificate or maintaining its validity by falsification of the submitted documentary evidence;
- any evidence of malpractice or fraudulent use of the organisation certificate;
- the lack of an accountable manager.

   Note: A complete product line is defined as all the aircraft, engine or component of a particular type.

   For a level 1 finding it may be necessary for the CAA to ensure that further maintenance and re-certification of all affected products is accomplished, dependent upon the nature of the finding.

2. In practical terms where a CAA inspector finds a non-compliance with CAR-145 against one product, it is deemed to be a level 2 finding.

   The following are example level 2 findings:

   –One time use of a component without any serviceable tag.

   – The training documents of the certifying staff are not completed.

The CAA may issue observations for any of the following cases not requiring level 1 or level 2 findings:

- for any item whose performance has been assessed to be ineffective;
- when it has been identified that an item has the potential to cause a non-compliance under points (1) or (2);
- when suggestions or improvements are of interest for the overall safety performance of the organisation.

The observations issued under this point shall be communicated in writing to the organisation and recorded by the CAA.

AMC 145.B.50(b) Findings

Where the organisation has not implemented the necessary corrective action within that period it may be appropriate to grant a further period of up to six months. In exceptional circumstances and

subject to a realistic action plan being in place, the CAA may specifically vary the maximum corrective action period. However, in granting such a change the past performance of the organisation should be considered.

CAR 145.B.55 Record-keeping

1. The CAA shall establish a system of record-keeping with minimum retention criteria that allows adequate traceability of the process to issue, continue, change, suspend or revoke each individual organisation approval.

2. The records shall include as a minimum:

a) Application
b) Exposition with relevant approval
c) AMO Audit report (Form A-CL-3).
d) Audit Finding Closure document, if required
e) Approval Certificate including Approval Schedule
f) All relevant correspondence
g) Details of any exemption or enforcement action(s) (if any)
h) Dates of last audit were carried out. (if it is not initial)

3. The minimum retention period for the above records shall be five years.

4. The CAA may elect to use either a paper or computer system or any combination of both subject to appropriate controls.

AMC 145.B.55 Record-keeping

1. The record-keeping system should ensure that all records are accessible whenever needed within a reasonable time. These records should be organised in a consistent way throughout the CAA (Numerical order, chronological, etc.).

2. All records containing sensitive data regarding applicants or organisations should be stored in a secure manner with controlled access to ensure confidentiality of this kind of data.

3. All computer hardware used to ensure data backup should be stored in a different location from that containing the working data in an environment that ensures they remain in good condition. When hardware or software changes take place special care should be taken to ensure that all necessary data continues to be accessible at least through the full period specified in 145.B.55.

CAR 145.B.60 Exemptions

(a) In certain case, the CAA may accept application for exemption to requirement of this regulation, provided that appropriate justification provided by applicant.

(b) All exemptions shall be granted in accordance to CAR-10 and shall be recorded and retained by the CAA.

APPENDICIES TO CAR-145

Appendix I — Use of CAA Form 1 for maintenance

These instructions relate only to the use of the CAA Form 1 for maintenance purposes.

1. PURPOSE AND USE

1.1. The primary purpose of the Certificate is to declare the airworthiness of maintenance work undertaken on products, parts and appliances (hereafter referred to as "item(s)").

1.2. Correlation must be established between the Certificate and the item(s). The originator must retain a Certificate in a form that allows verification of the original data.

1.3. The Certificate, based on the CAA Form 1, may be acceptable to other authorities but may be dependent on the existence of agreement with the authority.

1.4. The Certificate is not a delivery or shipping note.

1.5. Aircraft are not to be released using the Certificate.

1.6. The certificate is not permitted to use for manufactured items.

2. GENERAL FORMAT

2.1. The Certificate must comply with the format attached including block numbers and the location of each block. The size of each block may however be varied to suit the individual application, but not to the extent that would make the Certificate unrecognisable.

2.2. The Certificate must be in "landscape" format but the overall size may be significantly increased or decreased so long as the Certificate remains recognisable and legible. If in doubt consult the CAA.

2.3. The User/Installer responsibility statement can be placed on either side of the form.

2.4. All printing must be clear and legible to permit easy reading.

2.5. The Certificate may either be pre-printed or computer generated but in either case the printing of lines and characters must be clear and legible and in accordance with the defined format.

2.6. The Certificate must be in English.

2.7. The details to be entered on the Certificate may be either machine/computer printed or hand-written using block letters and must permit easy reading.

2.8. Limit the use of abbreviations to a minimum, to aid clarity.

2.9. The space remaining on the reverse side of the Certificate may be used by the originator for any additional information but must not include any certification statement. Any use of the reverse side of the Certificate must be referenced in the appropriate block on the front side of the Certificate.

3. COPIES

3.1. There is no restriction in the number of copies of the Certificate sent to the customer or retained by the originator.

4. ERROR(S) ON A CERTIFICATE

4.1. If an end-user finds an error(s) on a Certificate, he must identify it/them in writing to the originator. The originator may issue a new Certificate only if the error(s) can be verified and corrected.

4.2. The new Certificate must have a new tracking number, signature and date.

4.3. The request for a new Certificate may be honoured without re-verification of the item(s) condition.

The new Certificate is not a statement of current condition and should refer to the previous Certificate in block 12 by the following statement; "This Certificate corrects the error(s) in block(s) (enter block(s) corrected) of the Certificate (enter original tracking number) dated (enter original issuance date) and does not cover conformity/condition/release to service". Both Certificates should be retained according to the retention period associated with the first.

5. COMPLETION OF THE CERTIFICATE BY THE ORIGINATOR

Block 1 Approving Competent Authority/Country

"Civil Aviation Authority of the Sultanate of Oman must be stated.

Block 2 CAA Form 1 header

"AUTHORISED RELEASE CERTIFICATE – CAA FORM 1"

Block 3 Form Tracking Number

Enter the unique number established by the numbering system/procedure of the organisation identified in block 4; this may include alpha/numeric characters.

Block 4 Organisation Name and Address

Enter the full name and address of the approved organisation releasing the work covered by this Certificate. Logos, etc., are permitted if the logo can be contained within the block.

Block 5 Work Order/Contract/Invoice

To facilitate customer traceability of the item(s), enter the work order number, contract number, invoice number, or similar reference number.

Block 6 Item

Enter line item numbers when there is more than one-line item. This block permits easy cross-referencing to the Remarks block 12.

Block 7 Description

Enter the name or description of the item. Preference should be given to the term used in the instructions for continued airworthiness or maintenance data (e.g. Illustrated Parts Catalogue, Aircraft Maintenance Manual, Service Bulletin, Component Maintenance Manual).

Block 8 Part Number

Enter the part number as it appears on the item or tag/packaging. In case of an engine or propeller the type designation may be used.

Block 9 Quantity

State the quantity of items.

Block 10 Serial Number

If the item is required by regulations to be identified with a serial number, enter it here. Additionally, any other serial number not required by regulation may also be entered. If there is no serial number identified on the item, enter "N/A".

Block 11 Status/Work

The following describes the permissible entries for block 11. Enter only one of these terms – where more than one may be applicable, use the one that most accurately describes the majority of the work performed and/or the status of the article.

(i) Overhauled. Means a process that ensures the item is in complete conformity with all the applicable service tolerances specified in the type certificate holder's or equipment manufacturer's instructions for continued airworthiness, or in the data which is approved or accepted by the CAA. The item will be at least disassembled, cleaned, inspected, repaired as necessary, reassembled and tested in accordance with the above specified data.

(ii) Repaired. Rectification of defect(s) using an applicable standard (*).

(iii) Inspected/Tested. Examination, measurement, etc. in accordance with an applicable standard (*) (e.g. visual inspection, functional testing, bench testing etc.).

(iv) Modified. Alteration of an item to conform to an applicable standard (*).

(*) Applicable standard means a manufacturing/design/maintenance/quality standard, method, technique or practice approved by or acceptable to the CAA. The applicable standard shall be described in block 12.

Block 12 Remarks

Describe the work identified in Block 11, either directly or by reference to supporting documentation, necessary for the user or installer to determine the airworthiness of item(s) in relation to the work being certified. If necessary, a separate sheet may be used and referenced from the main CAA Form 1. Each statement must clearly identify which item(s) in Block 6 it relates to. Examples of information to be entered in block 12 are:

(i) Maintenance data used, including the revision status and reference.
(ii) Compliance with airworthiness directives or service bulletins.
(iii) Repairs carried out.
(iv) Modifications carried out.
(v) Replacement parts installed.
(vi) Life limited parts status.
(vii) Deviations from the customer work order.
(viii) Release statements to satisfy a foreign Civil Aviation Authority maintenance requirement.
(ix) Information needed to support shipment with shortages or re-assembly after delivery.

If printing the data from an electronic CAA Form 1, any appropriate data not fit for other blocks should be entered in this block.

Block 13a-13e

General Requirements for blocks 13a-13e: Not used for maintenance release.
Shade, darken, or otherwise mark to preclude inadvertent or unauthorised use.

Block 14a

Mark the appropriate box(es) indicating which regulations apply to the completed work. If the box "other regulations specified in block 12" is marked, then the regulations of the other

airworthiness authority(ies) must be identified in block 12. At least one box must be marked, or both boxes may be marked, as appropriate.

For all maintenance carried out by maintenance organisations approved in accordance with CAR-145, the certification statement "unless otherwise specified in block 12" is intended to address the following cases:

(a) Where the maintenance could not be completed.

(b) Where the maintenance deviated from the standard required by CAR-145.

(c) Where the maintenance was carried out in accordance with a requirement other than that specified in CAR-145. In this case block 12 shall specify the particular other regulation.

Block 14b Authorised Signature

This space shall be completed with the signature of the authorised person. Only persons specifically authorised under the rules and policies of the CAA are permitted to sign this block. To aid recognition, a unique number identifying the authorised person may be added.

Block 14c Certificate/Approval Number

Enter the Certificate/Approval number/reference. This is the organisation's approval number which is issued by the CAA.

Block 14d Name

Enter the name of the person signing block 14b in a legible form.

Block 14e Date

Enter the date on which block 14b is signed, the date must be in the format dd = 2-digit day, mmm = first 3 letters of the month, yyyy = 4-digit year

User/Installer Responsibilities

Place the following statement on the Certificate to notify end users that they are not relieved of their responsibilities concerning installation and use of any item accompanied by the form:

"THIS CERTIFICATE DOES NOT AUTOMATICALLY CONSTITUTE AUTHORITY TO INSTALL. WHERE THE USER/INSTALLER PERFORMS WORK IN ACCORDANCE WITH REGULATIONS OF AN AIRWORTHINESS AUTHORITY DIFFERENT THAN THE CAA AS SPECIFIED IN BLOCK 1, IT IS ESSENTIAL THAT THE USER/INSTALLER ENSURES THAT HIS/HER AIRWORTHINESS AUTHORITY ACCEPTS ITEMS FROM THE CAA.

STATEMENTS IN BLOCKS 13A AND 14A DO NOT CONSTITUTE INSTALLATION CERTIFICATION. IN ALL CASES AIRCRAFT MAINTENANCE RECORDS MUST CONTAIN AN INSTALLATION CERTIFICATION ISSUED IN ACCORDANCE WITH CAR-145 BY THE USER/INSTALLER BEFORE THE AIRCRAFT MAY BE FLOWN."

1.Approving Competent Authority / Country CIVIL AVIATION AUTHORITY SULTANATE OF OMAN	2. AUTHORISED RELEASE CERTIFICATE **CAA FORM 1**	3. Form Tracking Number
4. Organisation Name and Address :		5. Work Order/Contract/Invoice

6. Item	7. Description	8. Part No.	9. Qty	10. Serial No.	11. Status/Work

12. Remarks

13a. Certifies that the items identified above were manufactured in conformity to: ☐ approved design data and are in a condition for safe operation ☐ non-approved design data specified in block 12		14a. ☐ CAR-145.A.50 Release to Service ☐ Other regulation specified in block 12 Certifies that unless otherwise specified in block 12, the work identified in block 11 and described in block 12, was accomplished in accordance with CAR-145 and in respect to that work the items are considered ready for release to service.	
13b. Authorised Signature	13c. Approval/Authorisation Number	14b. Authorised Signature	14c. Certificate/Approval Ref. No
13d. Name	13e. Date (dd mmm yyyy)	14d. Name	14e. Date (dd mmm yyyy)

USER/INSTALLER RESPONSIBILITIES

This certificate does not automatically constitute authority to install the item(s). Where the user/installer performs work in accordance with regulations of an airworthiness authority different than the airworthiness authority specified in block 1, it is essential that the user/installer ensures that his/her airworthiness authority accepts items from the airworthiness authority specified in block 1. Statements in blocks 13a and 14a do not constitute installation certification. In all cases aircraft maintenance records must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.

Appendix II — Class and Ratings System used for the Approval of Maintenance Organisations referred to in CAR-M Subpart F and CAR-145

1. Except as stated otherwise for the smallest organisation in paragraph 12, Table 1 outlines the full extent of approval possible under CAR-145 in a standardised form. An organisation must be granted an approval ranging from a single class and rating with limitations to all classes and ratings with limitations.

2. In addition to Table 1 the CAR-145 approved maintenance organisation is required by CAR-145.A.20 to indicate scope of work in the maintenance organisation exposition. See also paragraph 11.

3. Within the approval class(es) and rating(s) granted by the CAA, the scope of work specified in the maintenance organisation exposition defines the exact limits of approval. It is therefore essential that the approval class(es) and rating(s) and the organisation's scope of work are matching.

4. A category A class rating means that the approved maintenance organisation may carry out maintenance on the aircraft and any component (including engines and/or Auxiliary Power Units (APUs), in accordance with aircraft maintenance data or, if agreed by the CAA, in accordance with component maintenance data, only whilst such components are fitted to the aircraft. Nevertheless, such A-rated approved maintenance organisation may temporarily remove a component for maintenance, in order to improve access to that component, except when such removal generates the need for additional maintenance not eligible for the provisions of this paragraph. This will be subject to a control procedure in the maintenance organisation exposition acceptable to the CAA. The limitation section will specify the scope of such maintenance thereby indicating the extent of approval.

5. A category B class rating means that the approved maintenance organisation may carry out maintenance on the uninstalled engine and/or APU and engine and/or APU components, in accordance with engine/APU maintenance data only whilst such components are fitted to the engine and/or APU. Nevertheless, such B-rated approved maintenance organisation may temporarily remove a component for maintenance, in order to improve access to that component, except when such removal generates the need for additional maintenance not eligible for the provisions of this paragraph. The limitation section will specify the scope of such maintenance thereby indicating the extent of approval. A maintenance organisation approved in accordance with CAR-145 with a category B class rating may also carry out maintenance on an installed engine during “base” and “line” maintenance subject to a control procedure in the maintenance organisation exposition. The maintenance organisation exposition scope of work shall reflect such activity where permitted by the CAA.

6. A category C class rating means that the approved maintenance organisation may carry out maintenance on uninstalled components (excluding engines and APUs) intended for fitment to the aircraft or engine/APU. The limitation section will specify the scope of such maintenance thereby indicating the extent of approval. An approved maintenance organisation with a category C class rating may also carry out maintenance on an installed component during base and line maintenance or at an engine/APU maintenance facility subject to a control procedure in the maintenance organisation exposition. The maintenance organisation exposition scope of work shall reflect such activity where permitted by the CAA.

7. A category D class rating is a self-contained class rating not necessarily related to a specific aircraft, engine or other component. The D1 - Non-Destructive Testing (NDT) and D2 – Other Specialised Services ratings are only necessary for a CAR-145 approved maintenance organisation that carries out NDT or other specialised services as a particular task for another organisation.

A maintenance organisation approved with a class rating in A or B or C category may carry out NDT on products it is maintaining subject to the maintenance organisation exposition containing NDT procedures, without the need for a D class rating.

8. In the case of maintenance organisations approved under CAR-145, Category A class ratings are subdivided into 'Base' or 'Line' maintenance. Such an organisation may be approved for either 'Base' or 'Line' maintenance or both. It should be noted that a 'Line' facility located at a main base facility requires a 'Line' maintenance approval.

9. The 'limitation' section is intended to give the CAA maximum flexibility to customise the approval to a particular organisation. Table 1 specifies the types of limitation possible and whilst maintenance is listed last in each class rating it is acceptable to stress the maintenance task rather than the aircraft or engine type or manufacturer, if this is more appropriate to the organisation. An example could be avionic systems installations and maintenance.

   Such mention in the limitation section indicates that the maintenance organisation is approved to carry out maintenance up to and including this particular type/task.

10. When reference is made to series, type and group in the limitation section of class A and B,

series means a specific type series such as Airbus 300 or 310 or 319 or Boeing 737-300 series or RB211-524 series or Cessna 150 or Cessna 172 or Beech 55 series or Continental O-200 etc.;

type means a specific type or model such as Airbus 310-240 type or RB 211-524 B4 type or Cessna 172RG type; any number of series or types may be quoted;

group means for example Cessna single piston engine aircraft or Lycoming non-supercharged piston engines etc.

11. When a lengthy capability list is used which could be subject to frequent amendment, then such amendment shall be in accordance with a procedure acceptable to the CAA and included in the maintenance organisation exposition. The procedure shall address the issues of who is responsible for capability list amendment control and the actions that need to be taken for amendment. Such actions include ensuring compliance with CAR-145 for products or services added to the list.

12. A maintenance organisation which employs only one person to both plan and carry out all maintenance can only hold a limited scope of approval rating. The maximum permissible limits are:

CLASS	RATING	LIMITATION
CLASS AIRCRAFT	A1 AEROPLANES ABOVE 5700 KG	PISTON ENGINE ABOVE 5700 KG
CLASS AIRCRAFT	A2 AEROPLANES 5700 KG AND BELOW	PISTON ENGINE 5700KG AND BELOW
CLASS AIRCRAFT	A3 HELICOPTERS	SINGLE PISTON ENGINE 3175 KG AND BELOW
CLASS AIRCRAFT	A 4 AIRCRAFT OTHER THAN A1,A2 AND A3	NO LIMITATION
CLASS ENGINES	B2 PISTON	LESS THAN 450 HP

CLASS COMPONENET RATING OTHER THAN COMPLETE ENGINES OR APUS	C1 TO C22	AS PER CAPABILITY LIST
SPECIALISED SERVICES	D 1 NON-Destructive Testing	NDT METHOD(S)
	D2 Other specialised services	specialised service(s) (such as welding)

It should be noted that such an organisation may be further limited by the CAA in the scope of approval dependent upon the capability of the particular organisation.

Table 1

CLASS	RATING	LIMITATION	BASE	LINE
AIRCRAFT	A1 Aeroplanes above 5700 Kg	[Rating reserved to maintenance Organisations approved in accordance with CAR-145] [Shall state aeroplane manufacturer / groups or series / type and the maintenance tasks]	[YES/NO]*	[YES/NO]*
	A2 Aeroplanes 5700 Kg and below	[Shall state aeroplane manufacturer / groups or series / type and the maintenance tasks]	[YES/NO]*	[YES/NO]*
	A3 Helicopters	[Shall state helicopter manufacturer / group or series / type and the maintenance task(s)]	[YES/NO]*	[YES/NO]*
	A4 Aircraft other than A1, A2 and A3	[Shall state aircraft series / type and the maintenance task(s)]	[YES/NO]*	[YES/NO]*
Engines	B1 Turbine	[Shall state engine manufacture or group or type and the maintenance task(s)]		
	B2 Piston	[Shall state aircraft series or type and the maintenance task(s)]		
	B3 APU	[Shall state aircraft series or type and the maintenance task(s)]		

COMPONENTS OTHER THAN COMPLETE ENGINES OR APU	C1 Air Condition & Press	[Shall state component manufacturer or the particular component and/or cross refer to a capability list in the exposition and/or the maintenance task (s).] Example PT6A Fuel Control
	C2 Auto Flight	
	C3 Comms and Nav	
	C4 Doors - Hatches	
	C5 Electrical Power & Light	
	C6 Equipment	
	C7 Engine – APU	
	C8 Flight Controls	
	C9 Fuel	
	C10 Helicopters - Rotor	
	C11 Helicopter – Trans	
	C12 Hydraulic Power	
	C13 Indicating/Recording Systems	
	C14 Landing Gear	
	C15 Oxygen	
	C16 Propeller	
	C17 Pneumatic & Vacuum	
	C18 Protection ice/rain/fire	
	C19 Windows	
	C20 Structural	
	C21 Water Ballast	
	C22 Propulsion Augmentation	

SPECIALISED SERVICES	D 1 NON-Destructive Testing	[Shall state particular NDT method(s)]
	D2 Other specialised services (i.e. Welding)	Shall state particular specialised service(s)

Appendix III — Maintenance Organisation Approval referred to CAR-145 (CAA Form 3)

MAINTENANCE ORGANISATION APPROVAL

CERTIFICATE

Reference N: AWR/AMO/FRT-XXX/YY

Pursuant to the Civil Aviation Law and the Civil Aviation rules & regulation of Sultanate of Oman for the time being in force and subject to the condition specified below, the Directorate General of Civil Aviation Regulation of Sultanate of Oman hereby certifies:

NAME OF ORGANISATION

ADDRESS

COUNTRY

As a CAR-145 Maintenance organisation approved to maintain products, parts and appliances listed in the attached approval schedule and issue related certificates of release to service using the above references.

CONDITIONS

1. This approval is limited to that specified in the scope of work section of the latest approved maintenance organization Exposition, and
2. This approval requires compliance with the procedures specified in the latest approved maintenance organization exposition, and
3. This approval is valid whilst the approved maintenance organization remains in compliance with CAR-145.
4. Subject to compliance with the foregoing conditions, this approval shall remain valid till the date of expiry of attached Approval Schedule unless the approval has previously been surrendered, suspended or revoked.

Date of Original issue:

Date of current issue:

Signature:

Name

Director General for Civil Aviation Regulation

MAINTENANCE ORGANISATION APPROVAL SCHEDULE

Approval reference No	Organisation Name: Registered Address: Telephone: Email:	Expiration date

CLASS	RATING	LIMITATION	BASE	LINE
AIRCRAFT	A1 Aeroplanes above 5700 Kg		[YES/NO]*	[YES/NO]*
	A2 Aeroplanes 5700 Kg and below		[YES/NO]*	[YES/NO]*
	A3 Helicopters		[YES/NO]*	[YES/NO]*
	A4 Aircraft other than A1,A2 and A3		[YES/NO]*	[YES/NO]*
Engines	B1 Turbine			
	B2 Piston			
	B3 APU			
COMPONENTS OTHER THAN COMPLETE ENGINES OR APU	C1 Air Condition & Press	Component in accordance with the approved capability list defined in the Company MOE as amended.		
	C2 Auto Flight			
	C3 Comms and Nav			
	C4 Doors - Hatches			
	C5 Electrical Power & Light			
	C6 Equipment			
	C7 Engine – APU			
	C8 Flight Controls			
	C9 Fuel			
	C10 Helicopters - Rotor			
	C11 Helicopter - Trans			
	C12 Hydraulic Power			
	C13 Indicating/Recording Systems			
	C14 Landing Gear			

	C15 Oxygen	
	C16 Propeller	
	C17 Pneumatic & Vacuum	
	C18 Protection ice/rain/fire	
	C19 Windows	
	C20 Structural	
	C21 Water Ballast	
	C22 Propulsion Augmentation	
SPECIALISED SERVICES	D 1 NON-Destructive Testing	[Shall state particular NDT method(s)]
	D2 Other specialised services	Will state particular specialised service(s)
Terms of Approval This certificate certifies that _____ is authorized to engage in activities specified in the Terms of Approval annexed hereto, subject to the compliance with the CAA CAR-145 and the latest maintenance organization's procedures Exposition(MOE). Locations of maintenance facilities: As per _____ of the latest MOE. This certificate shall remain valid during the period of validity specified above unless it is surrendered, superseded, suspended or revoked.		
Maintenance Organization Exposition Reference:		
Date of original issue: Date of current issue:		Authorised Signature:

CAA Form 3

Appendix IV — Conditions for the use of staff not qualified in accordance with CAR-66 referred to in requirements 145.A.30(j)1 and 2

1. Certifying staff in compliance with the following conditions will meet the intent of CAR-145.A.30(j)(1) and (2):

(a) The person shall hold a license or a certifying staff authorisation in compliance with ICAO Annex 1.

(b) The scope of work of the person shall not exceed the scope of work defined by the license/certifying staff authorisation.

(c) The person shall demonstrate he has received training on human factors and airworthiness regulations as detailed in CAR-66.

(d) The person shall demonstrate five years' maintenance experience for line maintenance certifying staff and eight years for base maintenance certifying staff. However, the period for those persons, whose authorised tasks do not exceed those of a CAR-66 category A certifying staff, need to demonstrate three years' maintenance experience only.

(e) Line maintenance certifying staff and base maintenance support staff shall receive type training at a level corresponding to CAR-66 Appendix III level 3 for every aircraft on which they are authorised to make certification. However, those persons whose authorised tasks do not exceed those of a CAR-66 category A certifying staff may receive task training in lieu of complete type training.

(f) Base maintenance certifying staff must receive type training at a level corresponding to at least CAR-66 Appendix III level 1 for every aircraft on which they are authorised to make certification.

Appendix V — Components Certifying Staff requirement

CCS.05 Purpose

This regulation established to define Component Certifying Staff qualification criteria for approved maintenance organisation in accordance to this regulation or CAR-M Subpart F.

CCS.10 Scope and Applicability

(a) This regulation is complementary to CAR-145 and CAR-M Subpart F requirements for component certifying staff and applicable to maintenance organisation with privilege to maintain aircraft component.

(b) This Regulation shall be binding in its entirety and directly applicable in all related Parties in accordance to timeline in Article 3 of cover regulation.

CCS.15 Definition

Definitions used for the purpose of this regulation:

(a) CAA means Civil Aviation Authority of Oman;

(b) Component means any engine, propeller, part or appliance;

(c) Complex Component means engine, propeller, transmission, gearbox, rotor blades (main, tail), landing gear and APU;

(d) Component Certifying Staff (CCS) means personnel responsible for the release of aircraft component after maintenance;

(e) OEM means Original Equipment Manufacturer;

CCS.20 Component Certifying Staff Qualification Criteria

(a) The maintenance organisation shall detail in its exposition (i.e. MOE/MOM), relevant Component Certifying Staff authorisation procedure (including initial and renewal) together with the adequate qualification criteria depending on the complexity of the component and the assessment process.

(b) The maintenance organisation shall detail in its exposition prerequisites to be eligible as Component Certifying Staff:

1) Minimum qualification criteria and prerequisites for initial authorization including:
   A. Education, Basic and technical training requirements;
   B. Aeronautical experience requirements;
   C. Language knowledge;
   D. Human Factor and Aviation Legislation training in accordance with CAR-66;
   E. Training on the Organisation procedures.
2) Component Certifying Staff authorization renewal prerequisites such as following are not necessarily limited to:
   A. The CC/S shall receive recurrent training that covers relevant technologies, safety management including Human Factors, FTS, EWIS, relevant regulation (CAR-145) and organization procedures as applicable to the approval ratings and scope of work;
   B. The CC/S shall demonstrate 6 months of experience during the two-year period preceding the renewal of authorisation;

(c) The maintenance organisation shall explain in exposition, the Assessment procedure for granting Component Certifying Staff authorization which shall at least specify:

(1) The person responsible for this process;
(2) When the assessment shall take place;
(3) The validation of qualification records;

(4) Procedures for the initial assessment (i.e. methods, including actions to be taken when the assessment is not satisfactory);
(5) Recording of assessment results;
(6) Management of the Component Certifying Staff List and individual authorizations;
(7) the C/S records (responsibility, content of the (C/S) files, etc.)

CCS.25 Recent maintenance experience

(a) The maintenance organisation shall ensure that Component Certifying Staff fulfills recent experience on the component area or workshop relevant to the component, which intended to be authorised.

(b) The recent maintenance experience shall fulfill the requirement of 6 month of experience in two years period preceding the intended date of issuance of the certification authorization.

CCS.30 Records

The organisation shall maintain a record of qualification and competence assessment for all component certifying staff and technical staff. In addition, further requirement for keeping records shall comply with relevant parts of CAR-145 or CAR-M Subpart F.

Acceptable Means of Compliance to Appendix V

AMC to CCS.20 (b)(1)

(1) Educational Requirements

The minimum educational level should be a high school diploma evidenced by the appropriate certificate.

(2) Basic Training Requirements

The Component Certifying Staff should demonstrate basic training on the appropriate field:

(a) an aeronautical diploma or certificate or degree;
(b) a technical diploma or certificate or license or;
(c) An aeronautical military diploma or certificate.

(3) Technical Training Requirement

A. Component Training

Depending on the complexity and the technology of the component, the Component Certifying Staff should demonstrate appropriate theoretical and practical component training from:

(1) the OEM or;
(2) the OEM recognized training organization or;
(3) An appropriately rated maintenance organization provided that:
(i) The person nominated to carry out the training can demonstrate he/she has received training to an appropriate level for the subject component;
(ii) The person nominated to carry out the training is appropriately authorized by the maintenance organization and is able to demonstrate a significant experience on the relevant component maintenance;
(iii) The training syllabus has been reviewed by the Engineering Manager and/or the Quality Manager or Nominated person;
(iv) The component is available for practical training purpose;

For Non-Complex component, the organisation may take credit of the Component Certifying Staff experience and/or a previous training on a component from the same family and same technology.

B. Bench Test Training.

Where required to use Bench test (e.g. engine or ATEC bench test, etc.), the Component Certifying Staff should demonstrate to received appropriate training. This training for the use of specific tools required by the OEM maintenance data should receive by:

(1) The OEM or;
(2) The bench test manufacturer or;
(3) An appropriately rated maintenance organization.

C. Specific Equipment Training.

Where required to use specific equipment, the Component Certifying Staff should demonstrate to receive the appropriate training. This training for the use of specific tools required by the OEM maintenance data should receive by:

(1) The OEM or;
(2) The specific tool manufacturer or;

(3) An appropriately rated maintenance organisation.

D. Additional Training.

Where required, the Component Certifying Staff should demonstrate to receive appropriate training on:

(1) Fuel Tank Safety items, CDCCL level 1, or level 2 (refer to Appendix I to AMC to 145.A.30(e) and 145.B.10(3) for further details);
(2) Electrical Wiring Interconnection System (refer to AMC 20-22 for further details);
(3) Any additional training(s) justified during the assessment performed by the Organisation.

(4) Aeronautical Experience Requirements.

The Component Certifying Staff should demonstrate at least:

(1) Two years of Aeronautical experience in the field of aviation maintenance including at least 12 months of practical experience in the specific component maintenance area or Workshop;
(2) Three years in the field of aviation maintenance for complex components including 24 Months of practical experience in the specific component maintenance area / Workshop;
(3) Experience should have been acquired within the ten years preceding for Component Certifying Staff Authorisation.

(5) Language Knowledge.

The Component Certifying Staff should be able to demonstrate a working knowledge of the language in which the maintenance data is published and English.

(6) Human Factor and Aviation Legislation Training.

The Component Certifying Staff should demonstrate to receive training on:

(a) Human factors referred to in module 9A of Appendix A to CAR-66. The organisation should ensure that the Human Factor training syllabus and the training level are compliant to the syllabus and the level (B1/B2) of training of Appendix A to CAR-66.
(b) Training on aviation legislation referred in module 10 of Appendix A to CAR-66. The organisation should ensure that the aviation Legislation training syllabus and the training level are compliant to the syllabus and the level (B1/B2) of training of Appendix A to CAR-66.

(7) Training to the exposition procedures.

The Component Certifying Staff should demonstrate to receive appropriate training on organisation exposition and internal procedures applicable to Component Certifying Staff (including issuance of CAA form 1).

Note: Refer to Attachment 1 to this Appendix for summary table of Component Certifying Staff Qualification Criteria.

AMC to CCS.20 (c)

(1) Assessment

(a) The aim of the assessment is to ensure compliance of the Component Certifying Staff with the relevant maintenance organisation requirements, and the criteria defined in this part. In addition, to ensure that each Component Certifying Staff possesses the expected competence(s) associated to his/her job function (proposed scope of work and level of maintenance), prior to grant an authorisation (initial, renewal or extension) relevant to

scope of issued authorisation. This assessment should take into account attitude and behaviour of staff.

(b) The Organisation should demonstrate through a competence assessment that the Component Certifying Staff:

(1) Meets the qualification criteria addressed above;

(2) Has the relevant knowledge to perform the maintenance tasks related to his/her job function;

(3) Has the relevant skill and ability to perform the maintenance tasks related to His / Her job function including the relevant language knowledge;

(4) Is able to determine when the Component is ready to be released to service and when it shall not be released to service.

(c) The competence needs to be assessed by evaluation of "On the Job Performance" and /or "testing of knowledge" by appropriately qualified personnel.

Appropriately qualified personnel mean qualified personnel designated by maintenance organisation or CAA.

(d) The organisation is responsible to ensure that the Component Certifying Staff remains current in terms of procedures, HF and technical knowledge. This continuation training should be of sufficient duration in each two years period.

(2) Management of the List and Individual Authorization.

The management of the list of Component Certifying Staff and individual authorisation should be detailed within the exposition, which approved by the CAA.

Note: refer to Attachment 2 to this Appendix for typical example of Assessment for Component Certifying staff

Attachment 1: Summary table for Component Certifying Staff Qualification Criteria

		Engine/APU/ Propeller	Hydraulic components (L/G ASSY, actuator, etc.)	Electrical components (Motors, actuators, chargers, power supplies, batteries, etc.)	Electronic components (CARD ASSY, mike, head set, etc.)	Mechanical components (Wheel, Brake unit, structure, etc.)	Electronic Units (Computers, COM/NAV receiver, indicators, power supplies, etc.)	Instruments (PFD/ND/ ECAM/STBY COMPASS, etc.)	Cabin Equipment (BFE, PSU, PAX Entertainment)	Safety equipment (Life raft, life jacket, OXY bottle, OXY Masks, etc.)
Basic requirements	**Educational level**	*high school diploma*								
	Basic training	*Aeronautical & technical school or Aeronautical military school*								
	Aeronautical experience	*2 years of Aeronautical experience in the field of aviation maintenance including at least 12 months of practical experience in the specific component maintenance area / workshop.* *For complex components such as Engine/APU/Propeller and Landing gears including, 3 years of Aeronautical experience is required in the field of aviation maintenance including 24 Months of practical experience in the specific component maintenance area / workshop.*								
Technical training	**Component training**	*OEM or OEM recognized Training Org. or AMO.*								
	Bench test training	*OEM of the bench test or AMO*								
	Tool training	*OEM or AMO*								
	CDCCL / EWIS	*Where needed*								
	Language knowledge	*Working knowledge of the language in which the maintenance data is published AND working knowledge of English for issuing the CRS*								
	HF and Aviation legislation training	*Human Factor and aviation Legislation training as detailed in the CAR-66.*								
	Recent Maintenance experience	*6 months of experience in two years period preceding the intended date of issuance of the certification authorization*								
	MOE procedures	*appropriate training to the exposition (MOE/MOM) and internal procedures applicable to CCS (including issuance of CAA Form 1)*								
Renewal criteria	**Continuing training**	*OEM or OEM recognized Training Org. or AMO*								
	Maintenance experience	*6 months of relevant experience in the last 2-year period*								

Note: The complexity and technology of the component should consider.
For simple component, the organisation may take credit of the CCS experience and/or a previous training on a component from the same family and same technology.

Attachment 2. Typical example of Competence Assessment

	Purpose of the Assessment ☐ Initial grant ☐ Extension ☐ Renewal	Assessor Remark
1. QUALIFICATION		
1.1	Refer to the Summary table for Component C.S qualification	
2. KNOWLEDGE		
2.1	Knowledge of human factors, human performance and limitations	
2.2	Knowledge of organisation capabilities, privileges and limitations	
2.3	Knowledge of relevant regulation CAR-M Subpart F, CAR-145 (and any other relevant regulations)	
2.4	Knowledge of relevant parts of the MOE and associated procedures	
2.5	Knowledge of safety risks linked to the working environment	
2.6	Knowledge on CDCCL (when relevant)	
2.7	Knowledge on EWIS (when relevant)	
2.8	Knowledge of occurrence reporting system and understanding of the importance of reporting occurrences, incorrect maintenance data and existing or potential defects	
3. UNDERSTANDING		
3.1	Understanding of professional integrity, behaviour and attitude towards safety	
3.2	Understanding of conditions for ensuring continuing airworthiness of aircraft and components	
3.3	Understanding of his/her own human performance and limitations	
3.4	Understanding of personnel authorisations and limitations	
3.5	Understanding critical task	
	4. ABILITY	
4.1	Ability to supervise the performance of tasks carried out by non-C/S personnel (i.e. mechanics, technician or etc.)	
4.2	Ability to compile and control completed work cards	

4.3	Ability to consider human performance and limitations.	
4.4	Ability to determine required qualifications for task performance	
4.5	Ability to identify and rectify existing and potential unsafe conditions	
4.6	Ability to check and document proper accomplishment of maintenance tasks	
4.7	Ability to identify and properly plan performance of critical task	
4.8	Ability to prioritize tasks and report discrepancies	
4.9	Ability to process the work requested by the customer	
4.10	Ability to properly process removed, uninstalled and rejected parts	
4.11	Ability to properly record and sign for work accomplished	
4.12	Ability to determine the acceptability of parts to be installed prior to fitment	
4.13	Ability to understand work orders, work cards and refer to and use applicable maintenance data	
4.14	Ability to use information systems	
4.15	Ability to use, control and be familiar with required tooling and/or equipment	
4.16	Adequate communication and literacy skills: The Component certifying staff shall be able to demonstrate a working knowledge of the language in which the maintenance data published. In addition, should the language of the maintenance data not be English, then English language working knowledge is required.	

Note: This list shall not be considered as exhaustive. It remains the responsibility of the organisation or applicant to adjust it.

Appendix VI to CAR-145.A.75(f) — Certificate of fitness/permit for flight

1. INTRODUCTION

A Certificate of Fitness /Permit for Flight is required to be issued to release an aircraft for flight when it is not possible to issue a Certificate of Release to Service due to:

a) The need to fly the aircraft under Flight Permit conditions in accordance with CAR-21, or
b) The need to conduct Maintenance Check Flight, as required where a maintenance check is not considered complete (therefore, Certificate of Release could not be signed) without the completion of the check flight as required by the maintenance data or the organisation's procedures.

2. The Certificate for Fitness/permit for Flight shall be issued in accordance with the procedures defined in the Maintenance Organisation Exposition.

3. For the issue of the Certificate of Fitness /Permit for Flight, the organisation shall ensure that:

a) The aircraft is in compliance with the Approved Maintenance Program and with any other mandatory airworthiness requirements, except for the deviations from the mandatory airworthiness requirements that warrant flight conduct under flight permit condition,
b) Details of non-compliance with the airworthiness requirements are recorded,
c) There are no known conditions or defects that can endanger the safe operation of the aircraft,
d) All the necessary placards for the conduct of the flight are installed,
e) Details of any restriction/limitations considered necessary for the safe operations of the aircraft are reviewed and recorded,
f) If applicable to the specific Flight Permit or maintenance check flight, all necessary pre-flight checks are carried out and recorded,
g) Details of the necessary tests required to be carried out by the crew or any other person involved in the flight, are made available,

4. The Certificate of Fitness/Permit for Flight shall be issued only by:

(a) a holder of an aircraft maintenance engineers licence, appropriately type rated for the particular aircraft and authorised as being competent to issue such a certificate under the terms of approval granted to the organisation by the CAA; or
(b) a person whom the CAA has authorised to issue a Certificate of Fitness/Permit for Flight in particular case and in accordance with that authority;

5. The Certificate of Fitness/Permit for Flight shall be issued in accordance with the format acceptable to the CAA as following:

1.Name of AMO			2. AMO Approval Number:	
3. Aircraft Registration:	3.1 Aircraft manufacturer:	3.2 Aircraft model:	3.3 Aircraft Serial number:	3.4 Year of Construction:
4.Engine Type:				APU Type:
ESN#1:	ESN#2:	ESN#3:	ESN#4:	SN:
5.Purpose of Flight:				
6.Flight information: From ::…… (Place) To ::…… Place Period on which the special Flight Permit is requested From :: DD/MM/YYYY To : DD/MM/YYYY Proposed Departure Date :: DD/MM/YYYY				
7.**Statement of Operator/owner :**				
It is hereby certified that the aircraft and the equipment fitted, has been inspected and is fit for safe flight, provided it meet the conditions and limitations (*) listed below: (*) Limitations and Conditions: (a) If the aircraft's airworthiness condition is affected during the period of validity, the certificate shall be reissued, (b) The certificate shall be issued in duplicate; one on board of the aircraft and another copy shall be kept with the aircraft maintenance records, (c) The period of validity shall be stated but shall not exceed 7 days. (d) If this certificate is issued in support of a flight permit, the flight permit conditions shall be respected.				
Name of Authorised person & Signature :…… **Date :** : DD/MM/YYYY			**Authorisation Number: :**……	

6. Administrative requirement:

a) All records and supporting documents referred to during the issue of Certificate of Fitness for Flight should be retained and presented to the CAA, when requested.

b) Copy of the Certificate of Fitness for Flight shall be presented to the CAA to support the application for Flight Permit.

APPENDICES TO AMCs TO CAR-145

Appendix I to AMC 145.A.30(e) and 145.B.10(3) — Fuel Tank Safety Training

This appendix includes general instructions for providing training on Fuel Tank Safety issues.

A) Effectivity

1) Large aeroplanes as with a maximum type certified passenger capacity of 30 or more or a maximum certified payload capacity of 7500 lbs (3402 kg) cargo or more, and

2) Large aeroplanes which contain CS-25 amendment 1 or later in their certification basis.

B) Affected organisations

1) CAR-145 approved maintenance organisations involved in the maintenance of aeroplanes specified in paragraph (A) and fuel system components installed on such aeroplanes when the maintenance data are affected by CDCCL.

2) The personnel of Civil Aviation Authority that are responsible for the oversight of the CAR-145 approved maintenance organisation.

C) Persons from affected organisations who should receive training

1) Phase 1 only:

- The group of persons representing the maintenance management structure of the organisation, the quality manager and the staff required to quality monitor the organisation.
- Personnel of the CAA responsible for the oversight of CAR-145 approved maintenance organisations.

2) Phase 1 + Phase 2 + Continuation training:

Personnel of the CAR-145 approved maintenance organisation required to plan, perform, supervise, inspect and certify the maintenance of aircraft and fuel system components specified in paragraph A).

D) General requirements of the training courses

1) Phase 1 – Awareness

i. The training should be carried out before the person starts to work without supervision but not later than 6 months after joining the organisation.

ii. Type: Should be an awareness course with the principal elements of the subject. It may take the form of a training bulletin, or other self-study or informative session. Signature of the reader is required to ensure that the person has passed the training.

iii. Level: It should be a course at the level of familiarisation with the principal elements of the subject.

iv. Objectives:

The trainee should, after the completion of the training:

1. Be familiar with the basic elements of the fuel tank safety issues.

2. Be able to give a simple description of the historical background and the elements requiring a safety consideration, using common words and showing examples of non-conformities.

3. Be able to use typical terms.

v. Content: The course should include:

a) A short background showing examples of FTS accidents or incidents,

b) The description of concept of fuel tank safety and CDCCL,

c) Some examples of manufacturers documents showing CDCCL items,

d) Typical examples of FTS defects,

e) Some examples of TC holders repair data,

f) Some examples of maintenance instructions for inspection.

2) Phase 2 – Detailed training

i. The persons who have already attended the Level 2 Detailed training course from a CAR-145 maintenance organisation or from a CAR-147 training organisation are already in compliance with Phase 2 with the exception of recurrent training.

ii. Staff who have not received the Phase 2 training are required to attend the training within 12 months of joining the organisation.

iii. Type: Should be a more in-depth internal or external course. It should not take the form of a training bulletin, or other self-study. An examination should be required at the end, which should be in the form of a multi choice question, and the pass mark of the examination should be 75%.

iv. Level: It should be a detailed course on the theoretical and practical elements of the subject.

The training may be made either:

1. In appropriate facilities containing examples of components, systems and parts affected by
   Fuel Tank Safety (FTS) issues. The use of films, pictures and practical examples on FTS is recommended; or
2. By attending a distance course (e-learning or computer-based training) including a film when
   such film meets the intent of the objectives and content here below. An e-learning or computer-based training should meet the following criteria:

a) A continuous evaluation process should ensure the effectiveness of the training and its relevance;

b) Some questions at intermediate steps of the training should be proposed to ensure that the trainee is authorised to move to the next step;

c) The content and results of examinations should be recorded;

d) Access to an instructor in person or at distance should be possible in case support is needed.

3. Duration of 8 hours for phase 2 is an acceptable compliance.

When the course is provided in a classroom, the instructor should be very familiar with the data in Objectives and Guidelines. To be familiar, an instructor should have attended himself a similar course in a classroom and made additionally some lecture of related subjects.

v. Objectives:

The attendant should, after the completion of the training:

1. Have knowledge of the history of events related to fuel tank safety issues and the theoretical and practical elements of the subject, have an overview of the FAA regulations known as SFAR (Special FAR) 88 of the FAA and of JAA Temporary Guidance Leaflet TGL 47, be able to give a detailed description of the concept of fuel tank system ALI (including Critical Design Configuration Control Limitations CDCCL), and using theoretical fundamentals and specific examples;

2. Have the capacity to combine and apply the separate elements of knowledge in a logical and comprehensive manner;

3. Have knowledge on how the above items affect the aircraft;

4. Be able to identify the components or parts or the aircraft subject to FTS from the manufacturer‘s documentation,

5. Be able to plan the action or apply a Service Bulletin and an Airworthiness Directive.

vi. Content:

Following the guidelines described in paragraph E).

vii. Continuation training

1. The organisation should ensure that the recurrent training is required in each two years period. The syllabus of the training programme referred to in 3.4 of the Maintenance Organisation Exposition (MOE) should include the additional syllabus for this recurrent training.
2. The continuation training may be combined with the phase 2 training in a classroom or at distance.
3. The continuation training should be updated when new instruction are issued which are related to the material, tools, documentation and manufacturer‘s or directives.

E) Guidelines for preparing the content of Phase 2 courses

The following guidelines should be taken into consideration when the phase 2 training programme are being established:

1) understanding of the background and the concept of fuel tank safety,

2) how the mechanics can recognise, interpret and handle the improvements in the instruction for continuing airworthiness that have been made or are being made regarding the fuel tank system maintenance,

3) awareness of any hazards especially when working on the fuel system, and when the Flammability Reduction System using nitrogen is installed.

Paragraphs 1) 2) and 3) above should be introduced in the training programme addressing the following issues:

i. The theoretical background behind the risk of fuel tank safety: the explosions of mixtures of fuel and air, the behaviour of those mixtures in an aviation environment, the effects of

temperature and pressure, energy needed for ignition etc., the ‗fire triangle ‘, Explain 2 concepts to prevent explosions:

1. ignition source prevention and;
2. flammability reduction.

ii. The major accidents related to fuel tank systems, the accident investigations and their conclusions,

iii. SFAR 88 of the FAA and JAA Interim Policy INT POL 25/12: ignition prevention program initiatives and goals, to identify unsafe conditions and to correct them, to systematically improve fuel tank maintenance),

iv. Explain briefly the concepts that are being used: the results of SFAR 88 of the FAA and JAA INT/POL 25/12: modifications, airworthiness limitations items and CDCCL,

v. Where relevant information can be found and how to use and interpret this information in the instructions for continuing airworthiness (aircraft maintenance manuals, component maintenance manuals, Service Bulletins…)

vi. Fuel Tank Safety during maintenance: fuel tank entry and exit procedures, clean working environment, what is meant by configuration control, wire separation, bonding of components etc.,

vii. Flammability reduction systems when installed: reason for their presence, their effects, the hazards of an FRS using nitrogen for maintenance, safety precautions in maintenance/working with an FRS,

viii. Recording maintenance actions, recording measures and results of inspections.

The training should include a representative number of examples of defects and the associated repairs as required by the TC/STC holders maintenance data.

F) Approval of training

For CAR-145 approved organisations, the approval of the initial and continuation training programme and the content of the examination can be achieved by the change to the MOE exposition. The necessary changes to the MOE to meet the content of this decision should be made and implemented at the time requested by the CAA.

Appendix II to AMC 4 145.A.30(e) — Aeroplane EWIS training program

1 PURPOSE

This appendix introduces the requirements for aircraft operators, maintenance organization and personnel involved in maintenance, repairs and modification of aeroplane wiring and system.

This appendix provides acceptable means of compliance for developing an enhanced Electrical Wiring Interconnection System (EWIS) training programme. The information in this appendix is derived from EASA AMC 20-22 and the best practices training developed through extensive research. This appendix serves to officially endorse these best practices and to dispense this information industry-wide so that the benefits of this information can be effectively realised and for enhancing the level of awareness of the affected organisations and personnel. Following this requirement will result in a training programme that will improve the awareness and skill level of the aviation personnel in EWIS production, modification, maintenance, inspection, alterations and repair. This appendix promotes a philosophy of training for all personnel who come into contact with aeroplane as part of their job and tailors the training for each workgroup to their particular needs.

2 OBJECTIVE

This appendix has been published to provide the approved organisations with acceptable means of compliance to comply with their training obligations as required in paragraphs145.30 and 145.A.35 of CAR-145 and M.A.706 of CAR-M with respect to EWIS.

To fully realise the objectives of this appendix, operators, maintenance organisations and persons performing modifications or repairs, will need to rethink their current approach to maintaining and modifying aeroplane wiring and systems. This may require more than simply updating maintenance manuals and work cards and enhancing training. Maintenance personnel need to be aware that aeroplane EWIS should be maintained with the same level of intensity as any other system in the aeroplane. They also need to recognise that visual inspection of wiring has inherent limitations. Small defects such as breached or cracked insulation, especially in small gage wire may not always be apparent. Therefore, effective wiring maintenance combines visual inspection techniques with improved wiring maintenance practices and training.

The objective of this EWIS training programme is to give operators, maintenance organisations and persons performing field approval modifications or repairs a model for the development of their own EWIS training programme. This will ensure that proper procedures, methods techniques, and practices are used when performing maintenance, preventive maintenance, inspection, alteration, and cleaning of EWIS.

The training syllabus and curriculum is mandatory for those personnel directly involved in the maintenance and inspection of EWIS, identified as Target Group 1 and 2, are in Attachment A and C to this regulation.

This appendix also provides guidance on the development of EWIS training programmes for personnel who are not directly involved in the maintenance and inspection of EWIS. Although there is no direct regulatory requirement for EWIS training of these personnel, operators shall provide EWIS training for target Groups 3 and 4 and may choose to provide EWIS training for personnel identified as target Groups 5 through 8, as per Appendix B and C to this regulation.

It is believed that training personnel in these groups would greatly enhance awareness of the importance of EWIS safety in the overall safe operation of aeroplanes. Although these groups are not directly involved in the maintenance of EWIS, they have the potential to have an adverse impact on EWIS. This can occur through inadvertent contact with EWIS during aeroplane cleaning or when individuals perform unrelated maintenance that could impact the integrity of EWIS. Mechanics leaving drill shavings on wire bundles is one example of how this could occur. Some people prepare paperwork

that guides mechanics, training this target group in EWIS should help to ensure that proper attention is paid to EWIS issues.

This programme was developed for eight different target groups and may be used for the minimum requirements for initial and recurrent training (see training matrix). Depending on the duties, some may fall into more than one target group and, therefore, must fulfil all objectives of the associated target groups. The target groups are:

a) Qualified staff performing EWIS maintenance.

These staff members are personnel who perform wiring systems maintenance and their training is based on their job description and the work being done by them (e.g., avionics skilled workers or technicians Category B2).

b) Qualified staff performing maintenance inspections on wiring systems.

These staff members are personnel who perform EWIS inspections (but not maintenance), and their training is based on their job description and the work being done by them (e.g., inspectors/technicians category B2).

c) Reserved

d) Qualified staff performing general maintenance/inspections not involving wire maintenance (LRU change is not considered wire maintenance).

These staff members are personnel who perform maintenance on aeroplane that may require removal/reconnection of electrical connective devices (e.g. inspectors/technicians categories A or B1).

e) Reserved

f) Other service staff with duties in proximity to EWIS.

These staff members are personnel whose duties would bring them into contact/view of aeroplane wiring systems. This would include, but not be limited to: Aeroplane cleaners, cargo loaders, fuellers, lavatory servicing personnel, de-icing personnel, push back personnel.

g) Flight Deck Crew (E.g. Pilots, Flight Engineers).

h) Cabin Crew.

3 APPLICABILITY

This appendix describes acceptable means, but not the only means, of compliance with the appropriate maintenance and operations regulations.

The information in EASA AMC 20-22 is based on lessons learned by foreign Aging Transport Systems Rulemaking Advisory Committee (ATSRAC) Harmonised Working Groups, regulatory authorities, manufacturers, airlines and repair stations. This AMC can be applied to any aeroplane training programme.

4 DEFINITIONS

Arc tracking: A phenomenon in which a conductive carbon path is formed across an insulating surface. This carbon path provides a short circuit path through which current can flow. Normally, a result of electrical arcing. Also referred to as "Carbon Arc Tracking", "Wet Arc Tracking", or "Dry Arc Tracking".

Combustible: For the purposes of this appendix, the term combustible refers to the ability of any solid, liquid or gaseous material to cause a fire to be sustained after removal of the ignition source. The term is used in place of inflammable/flammable. It should not be interpreted as identifying material that will burn when subjected to a continuous source of heat as occurs when a fire develops.

Contamination: For the purposes of this appendix, wiring contamination refers to either of the following:

• The presence of a foreign material that is likely to cause degradation of wiring.

• The presence of a foreign material that is capable of sustaining combustion after removal of ignition source.

Detailed Inspection (DET): An intensive examination of a specific item, installation, or assembly to detect damage, failure or irregularity. Available lighting is normally supplemented with a direct source of good lighting at an intensity deemed appropriate. Inspection aids such as mirrors, magnifying lenses or other means may be necessary. Surface cleaning and elaborate access procedures may be required.

Electrical Wiring Interconnection System (EWIS):

Functional Failure: Failure of an item to perform its intended function within specified limits.

General Visual Inspection (GVI): A visual examination of an interior or exterior area, installation, or assembly to detect obvious damage, failure or irregularity. This level of inspection is made from within touching distance unless otherwise specified. A mirror may be necessary to enhance visual access to all exposed surfaces in the inspection area. This level of inspection is made under normally available lighting conditions such as daylight, hangar lighting, flashlight or droplight and may require removal or opening of access panels or doors. Stands, ladders or platforms may be required to gain proximity to the area being checked.

Lightning/High Intensity Radiated Field (L/HIRF) protection: The protection of aeroplane electrical systems and structure from induced voltages or currents by means of shielded wires, raceways, bonding jumpers, connectors, composite fairings with conductive mesh, static dischargers, and the inherent conductivity of the structure; may include aeroplane specific devices, e.g., RF Gaskets.

Maintenance: “maintenance means inspection, overhaul, repair, preservation, and the replacement of parts, and includes preventive maintenance.

Maintenance Significant Item (MSI): Items identified by the manufacturer whose failure:

(1) Could affect safety (on ground or in flight).

(2) Is undetectable during operations.

(3) Could have significant operational impact.

(4) Could have significant economic impact.

Needling: The puncturing of a wire’s insulation to make contact with the core to test the continuity and presence of voltage in the wire segment.

Stand-alone General Visual Inspection (GVI): A GVI which is not performed as part of a zonal inspection. Even in cases where the interval coincides with the zonal inspection, the stand-alone GVI shall remain an independent step within the work card.

Structural Significant Item (SSI): Any detail, element or assembly that contributes significantly to carrying flight, ground, pressure, or control loads and whose failure could affect the structural integrity necessary for the safety of the aeroplane.

Swarf: A term used to describe the metal particles, generated from drilling and machining operations. Such particles may accumulate on and between wires within a wire bundle.

Zonal Inspection: A collective term comprising selected GVI and visual checks that are applied to each zone, defined by access and area, to check system and powerplant installations and structure for security and general condition.

5 BACKGROUND

Over the years there have been a number of in-flight smoke and fire events where contamination sustained and caused the fire to spread. Regulators and Accident Investigators have conducted aircraft inspections and found wiring contaminated with items such as dust, dirt, metal shavings, lavatory waste water, coffee, soft drinks, and napkins. In some cases, dust has been found completely covering wire bundles and the surrounding area.

Research has also demonstrated that wiring can be harmed by collateral damage when maintenance is being performed on other aircraft systems. For example, a person performing an inspection of an electrical power centre or avionics compartment may inadvertently cause damage to wiring in an adjacent area.

Aviation Accident Investigators have specifically cited the need for improved training of personnel to ensure adequate recognition and repair of potentially unsafe wiring conditions.

This appendix addresses only the training programme. It does not attempt to deal with the condition of the fleet's wiring, or develop performance tests for wiring.

This appendix captures, the aeroplane EWIS training programme developed by ATSRAC. This includes a training syllabus, curriculum, training target groups and a matrix outlining training for each training group.

6 ESSENTIAL ELEMENTS FOR A TRAINING PROGRAMME

a) Initial Training.

Initial training should be conducted for each designated work group. The initial training for each designated work group is outlined in EWIS Minimum Initial Training Programme - Attachment A and B. Curriculum and Lesson Plans for each dedicated module are included in Attachment C. The most important criteria are to meet the objectives of the Lesson Plans – Attachment C (using classroom discussion, computer-based training or hands-on practical training).

Assessment or achieving the objectives should be at the discretion of the training organisation (such as written test, oral test or demonstration of skills).

Supporting documentation such as AMC is an integral part of training and should be used to support development of the Curriculum and Lesson Plans.

b) Continuation Training.

Continuation training should be conducted in a period not exceeding two years. It could consist of a review of previously covered material plus any new material or revisions to publications. Continuation training will follow the EWIS Minimum Initial Training Programme - Attachment A or B for that particular target group.

Attachment A – EWIS Minimum Initial Training Programme for Group 1 and 2

Target Group 1: Qualified staff performing EWIS maintenance (mandatory).

Target Group 2: Qualified staff performing maintenance inspections on EWIS (mandatory).

TARGET GROUP		1	2
A	**GENERAL ELECTRICAL WIRING INTERCONNECTION SYSTEM PRACTICES**		
	Know or demonstrate safe handling of aeroplane electrical systems, line replaceable units (LRU), tooling, troubleshooting procedures, and electrical measurement.		
1	Safety practices	X	X
2	Electrostatic discharge sensitive (ESDS) device handling and protection	X	X
3	Tools, special tools, and equipment	X	
4	Verifying calibration/certification of instruments, tools, and equipment	X	
5	Required wiring checks using the troubleshooting procedures and charts	X	
6	Measurement and troubleshooting using meters	X	
7	LRU replacement general practices	X	X
B	**WIRING PRACTICES DOCUMENTATION**		
	Know or demonstrate the construction and navigation of the applicable aeroplane wiring system overhaul or practices manual		
8	Standard wiring practices manual structure/overview	X	X
9	Chapter cross-reference index	X	X
10	Important data and tables	X	X
11	Wiring diagram manuals	X	X
12	Other documentation as applicable	X	X
C	**INSPECTION**		
	Know the different types of inspections, human factors in inspections, zonal areas and typical damages.		
13	General visual inspection (GVI), detailed inspection (DET), special detailed inspection (SDI), and zonal inspection, and their criteria and standards	X	X
14	Human factors in inspection		X
15	Zonal areas of inspection		X
16	Wiring system damage	X	X
D	**HOUSEKEEPING**		
	Know the contamination sources, materials, cleaning and protection procedures		
17	Aeroplane external contamination sources	X	X
18	Aeroplane internal contamination source	X	X
19	Other contamination sources	X	X
20	Contamination protection planning	X	
21	Protection during aeroplane maintenance and repair	X	
22	Cleaning processes	X	
E	**WIRE**		

	Know or demonstrate the correct identification of different wire types, their inspection criteria and damage tolerance, repair and preventative maintenance procedures		
23	Wire identification, type and construction	X	X
24	Insulation qualities and damage limits	X	X
25	Inspection criteria and standards for wire and wire bundles		X
26	Wire bundle installation practice	X	X
27	Typical damage and areas found (aeroplane specific)	X	X
28	Maintenance and repair procedures	X	X
29	Sleeving	X	X
30	Unused wires - termination and storage	X	X
31	Electrical bonding and ground	X	X
F	**CONNECTIVE DEVICES**	-	-
	Know or demonstrate the procedures to identify, inspect, and find the correct repair for typical types of connective devices found on the applicable aeroplane		
32	General connector types and identification	X	X
33	Cautions and protections	X	X
34	Visual inspection procedures	X	X
35	Typical damage found	X	X
36	Repair procedures	X	X
G	**CONNECTIVE DEVICE REPAIR**		
	Demonstrate the procedures for replacement of all parts of typical types of connectors found on the applicable aeroplane.		
37	Circular connectors	X	
38	Rectangular connectors	X	
39	Terminal blocks - modular	X	
40	Terminal blocks - non-modular	X	
41	Grounding modules	X	
42	Pressure seals	X	

Attachment B – EWIS MINIMUM INITIAL TRAINING PROGRAMME FOR GROUP 3 THROUGH 8

Target Group 3: Qualified staff performing electrical/avionic engineering on in-service aeroplane (mandatory). (Reserved)

Target Group 4: Qualified staff performing general maintenance/inspections not involving wire maintenance (LRU change is not considered wire maintenance) (mandatory).

Target Group 5: Qualified staff performing other engineering or planning work on in-service aeroplane (Reserved)

Target Group 6: Other service staff with duties in proximity to electrical wiring interconnection systems
Target Group 7: Flight Deck Crew Target Group

8: Cabin Crew

TARGET GROUPS		3	4	5	6	7	8
A	**GENERAL ELECTRICAL WIRING INTERCONNECTION SYSTEM PRACTICES**						
	Know or demonstrate the safe handling of aeroplane electrical systems, line replaceable units (LRU), tooling, troubleshooting procedures, and electrical measurement.						
1	Safety practices		X		X	X	X
2	Electrostatic discharge sensitive (ESDS) device handling and protection		X				
3	LRU replacement general practices		X				
B	**WIRING PRACTICES DOCUMENTATION**						
	Know or demonstrate the construction and navigation of the applicable aeroplane wiring system overhaul or practices manual.						
8	Standard wiring practices manual structure/overview	X					
9	Chapter cross-reference index	X					
10	Important data and tables	X					
11	Wiring diagram manuals	X					
12	Other documentation as applicable	X					
C	**INSPECTION**						
	Know the different types of inspections, human factors in inspections, zonal areas and typical damages.						
13	General visual inspection (GVI), detailed inspection (DET), special detailed inspection (SDI), and zonal inspection, and their criteria and standards		X	X			
14	Human factors in inspection			X			
15	Zonal areas of inspection			X			
16	Wiring system damage		X	X	Low Level	Low Level	Low Level
D	**HOUSEKEEPING Know the contamination sources, materials, cleaning and protection procedures.**						
17	Aeroplane external contamination sources		X		X	X	X
18	Aeroplane internal contamination sources		X		X	X	X
19	Other contamination sources		X		X	X	X
20	Contamination protection planning	X	X	X			

21	Protection during aeroplane maintenance and repair	X	X	X			
22	Cleaning processes	X	X	X	X		
E	**WIRE**						
	Know or demonstrate the correct identification of different wire types, their inspection criteria and damage tolerance, repair and preventative maintenance procedures.						
23	Wire identification, type and construction	X					
24	Insulation qualities and damage limits	X					
25	Inspection criteria and standards of wire and wire bundles	X					
26	Wire bundle installation practices	X					
27	Typical damage and areas found (aeroplane specific)	X	X	X	Low Level	Low Level	Low Level
28	Maintenance and repair procedures	X					
29	Sleeving	X					
30	Unused wires - termination and storage	X					
31	Electrical bonding and grounds	X	X Bond	X			
F	**CONNECTIVE DEVICES**						
	Know or demonstrate the procedures to identify, inspect, and find the correct repair for typical types of connective devices found on the applicable aeroplane						
32	General connector types and identification	X					
33	Cautions and protections	X					
34	Visual inspection procedures	X					
35	Typical damage found	X					
36	Repair procedures	X					

Attachment C – Curriculum and Lessons Plan

Electrical Wiring Interconnection System Curriculum

1 OVERVIEW

This training is targeted at each person who performs aeroplane maintenance, inspections, alterations or repairs on EWIS and/or structure. After training, the person is able to properly evaluate the EWIS and effectively use the manufacturers Chapter 20 Wiring System overhaul manual for that aeroplane. The training programme must include: wiring system condition, applicable repair schemes, wiring modifications and ancillary repairs to wiring systems and components. All of the training components are integrated to maintain wiring system quality and airworthiness of the aeroplane.

2 OBJECTIVES

Depending on the modules taught, the person shows competency in the following skills:

a) Know or demonstrate the safe handling of aeroplane electrical systems, Line Replaceable Units (LRU), tooling, troubleshooting procedures, and electrical measurement.

b) Know or demonstrate the construction and navigation of the applicable aeroplane wiring system overhaul or wiring practices manual.

c) Know the different types of inspections, human factors in inspections, zonal areas and typical damages.

d) Know the contamination sources, materials, cleaning and protection procedures.

e) Know or demonstrate the correct identification of different wire types, their inspection criteria, and damage tolerance, repair and preventative maintenance procedures.

f) Know or demonstrate the procedures to identify, inspect and find the correct repair for typical types of connective devices found on the applicable aeroplane.

g) Demonstrate the procedures for replacement of all parts of typical types of connective devices found on the applicable aeroplane.

3 SCOPE

The course is to be used by training providers for all maintenance persons at any stage in their careers. The person can be trained to the appropriate level using the applicable modules, depending on the person's experience, work assignment and operator's policy.

MODULE A – GENERAL ELECTRICAL WIRING INTERCONNECTION SYSTEM PRACTICES:

(1) Safety practices

(2) ESDS device handling and protection

(3) Tools, special tools and equipment

(4) Verify calibration/certification of instruments, tools, and equipment

(5) Required wiring checks using the Troubleshooting Procedures and charts

(6) Measurement and troubleshooting using meters

(7) LRU replacement general practices

MODULE B – WIRING PRACTICES DOCUMENTATION:

(1) Chapter 20 structure/overview

(2) Chapter 20 cross-reference index

(3) Chapter 20 important data and tables

(4) Wiring Diagram Manual

(5) Other documentation (as applicable)

MODULE C – INSPECTION:

(1) Special inspections

(2) Criteria and standards

(3) Human factors in inspection

(4) Zonal areas of inspection

(5) Wiring system damage

MODULE D – HOUSEKEEPING:

(1) Aeroplane external contamination sources

(2) Aeroplane internal contamination sources

(3) Other contamination sources

(4) Contamination protection planning

(5) Protection during aeroplane maintenance and repair

(6) Cleaning processes

MODULE E – WIRE:

(1) Identification, type and construction

(2) Insulation qualities

(3) Inspection criteria and standards of wire and wire bundles

(4) Wire bundle installation practices

(5) Typical damage and areas found (aeroplane specific)

(6) Maintenance and repair procedures

(7) Sleeving

(8) Unused wires - termination and storage

(9) Electrical bonding and grounds

MODULE F – CONNECTIVE DEVICES:

(1) General types and identification

(2) Cautions and protections

(3) Visual inspection procedures

(4) Typical damage found

(5) Repair procedures

MODULE G – CONNECTIVE DEVICE REPAIR:

(1) Circular connectors

(2) Rectangular connectors

(3) Terminal blocks - modular

(4) Terminal blocks - non-modular

(5) Grounding modules

(6) Pressure seals

MODULE A: GENERAL ELECTRICAL WIRING INTERCONNECTION SYSTEM PRACTICE

1 OVERVIEW

Through Module A, the instructor lays the groundwork of safe, effective maintenance and repair of the aeroplane EWIS and LRU removal and replacement, including BITE test, without damage to the aeroplane or injury to the student.

The instructor may vary the depth and scope of the topics to be covered, depending on the type of aeroplane to be maintained and skills of the persons.

2 OBJECTIVES

After this module is complete, the student is able to demonstrate the following skills:

a) Know the safety procedures of normal and non-normal maintenance procedures so that the person can protect himself/herself and the aeroplane.

b) Recognise ESDS equipment and demonstrate standard anti-static procedures so that no damage occurs to that equipment.

c) Demonstrate the correct use of hand tools including specialised and automated tools and equipment.

d) Verify the calibration of electrical measuring instruments, tools and equipment so that correct maintenance procedures may be carried out.

e) Demonstrate the process and procedures to successfully use the troubleshooting procedures and charts of current aeroplane faults and know re-occurring problems causing “No Fault Found” on removed LRU.

f) Demonstrate the correct use of electrical meters for measuring voltage, current, resistance, continuity, insulation and short to ground.

g) Know the removal and replacement techniques so that no damage will occur to the LRU or aeroplane connector.

3 STRATEGIES

Normal classroom lecture can be used for the majority of the training. The following strategies can be used to expedite learning and are recommended to the instructor:

ESDS handling and protection	Multimedia/training aids
Calibration/certification of instruments, tools, and equipment	Company policy
Wiring checks using the Troubleshooting Procedures and	Aeroplane manuals charts
Measurement and troubleshooting using meters	Meters and circuits
LRU removal and replacement	Aeroplane manuals

MODULE A – GENERAL ELECTRICAL WIRING INTERCONNECTION SYSTEM PRACTICES:

1 Safety Practices

a) Current is lethal - First aid

b) Applying power to the aeroplane

c) Isolating the circuit

d) Aeroplane warnings

e) Human factors

2 ESDS Device Handling and Protection

a) Sources of electrostatic discharge

b) Soft and hard failures

c) ESDS safety procedures

d) ESDS handling/packing procedures

3 Tools, Special Tools and Equipment

a) General hand tools

b) Specialised tools

c) Automated tools and equipment

4 Verify Calibration/Certification of Instruments, Tools and Equipment

a) Tools requiring certification

b) Determining certification requirements

c) Typical problems

5 Required Wiring Checks Using the Troubleshooting Procedures and charts

a) Troubleshooting procedures manual (all chapters)

b) Aeroplane Maintenance Manual/Illustrated Parts Catalogue

c) Wiring schematics/troubleshooting graphics

d) Wiring diagrams

e) The process of troubleshooting

f) Testing of LRU connectors

g) Troubleshooting exercises

h) Company “No Fault Found” policy and data

6 Measurement and Troubleshooting Using Meters

a) Voltage, current and resistance

b) Continuity

c) Insulation

d) Short to ground

e) Loop impedance

7 LRU Replacement - General Practices

a) Different retention devices

b) Certification considerations (e.g. CAT 2/CAT3 Landing)

c) LRU re-racking procedures

d) “No Fault Found” data (aeroplane specific)

e) Built-in test equipment (BITE)

MODULE B: WIRING PRACTICES DOCUMENTATION

1 OVERVIEW

Through Module B, the instructor lays the groundwork for safe, effective maintenance and repair of aeroplane EWIS. The intent of this module is to teach the person how to locate desired information in the Chapter 20 Wiring System overhaul manual, Wiring Diagram Manual and other applicable documentation. The instructor may vary the depth and scope of the topics to be covered, depending on the type of aeroplane to be maintained and skills of the persons.

2 OBJECTIVES

After this module is complete, the person is able to demonstrate the following skills:

a) Know the applicable Sub-Chapters and Section to follow during normal and non-normal electrical maintenance procedures.

b) Demonstrate the use of the Cross-Reference Index, Chapter Table of Contents, and Subject Tables of Contents so as to find specific material within each Sub-Chapter and Section.

c) Demonstrate the use of the associated tables for replacement of wire, connective devices and contacts, and associated components, including approved replacements.

d) Demonstrate the use of the Wiring Diagram Manual.

e) Demonstrate the use of other documentation (as applicable).

3 STRATEGIES

Normal classroom lecture can be used for the majority of the training. The Chapter 20 Wiring Practices Manual, Wiring Diagram Manual, and other applicable documentation should be made available to the class so that hands-on exploration of the material can be achieved.

MODULE B - WIRING PRACTICES DOCUMENTATION:

1 Chapter 20 Structure/Overview

a) Table of contents

b) Sub-chapter titles

c) Section structure d. General procedures

2 Chapter 20 Cross-Reference Index

a) Cross-reference index – Alphanumeric

b) Cross-reference index – Standard Part number

c) Cross-reference index – Suppliers

d) Equivalence tables – Std Part Numbers EN-ASN-NSA

3 Chapter 20 Important Data and Tables

a) Contact crimp tools, insertion/extraction tools

b) Wire Insulation removal tools

c) Electrical cable binding

d) Wire type codes and part numbers identification

e) Connective devices types and contacts

f) Terminal blocks and terminations

g) Terminal blocks modules, grounding modules and contacts

h) Cleaning procedures

i) Repair procedures

4 Wiring Diagram Manual (WDM)

a) Front matter

b) Diagrams

c) Charts

d) Lists

5 Other documentation (as applicable)

MODULE C: INSPECTION

1 OVERVIEW

Through Module C, the instructor lays the groundwork for safe, effective maintenance and repair of aeroplane wiring systems, by teaching the skills of inspection so as to identify wiring system damage. The instructor may vary the depth and scope of the topics to be covered, depending on the type of aeroplane to be maintained and skills of the persons.

2 OBJECTIVES

After this module is complete, the person is able to demonstrate the following skills:

a) Know the different types of inspections: General Visual Inspection (GVI), Detailed Inspection (DET), Zonal Inspection and Enhanced Zonal Analysis Procedure (EZAP).

b) Know the criteria and standards of inspection so that the person knows which tools are used to ensure inspection procedures and standards are achieved, which leads to all defects being found.

c) Know the effects of fatigue and complacency during inspection and how to combat these effects (Human Factors).

d) Know the specific zonal inspection requirements related to system affiliation and environmental conditions.

e) Recognise typical wiring system damage, such as hot gas, fluid contamination, external mechanically induced damage, chafing, corrosion, signs of overheating of wire, wire bundles, connective and control device assemblies.

3 STRATEGIES

Normal classroom lecture can be used for the majority of the training. ATA 117 video and colour photos of actual wiring system damage could be used to show typical problems found on the aeroplane. Examples of discrepancies should be made available to the student. EASA AMC 20-21, Programme to Enhance Aeroplane EWIS Maintenance is recommended as a source of typical aeroplane wiring installations and areas of concern.

MODULE C – INSPECTION

1. Special Inspections
    a) General Visual Inspection (GVI)
    b) Detailed Inspection (DET)
    c) Zonal Inspection
    d) Enhanced Zonal Analysis Procedure (EZAP)
2. Criteria and Standards
    a) Tools
    b) Criteria/standards
    c) Procedures of inspection
3. Human Factors in Inspection
    a) Fatigue
    b) Complacency
4. Zonal Areas of Inspection
    a) Zonal areas of inspection
    b) Zonal inspection procedures and standards
5. Wiring System Damage
    a) Swarf/FOD/metal shavings
    b) External mechanically induced damage
    c) Hot gas
    d) Fluid contamination
    e) Vibration/chafing
    f) Corrosion
    g) Signs of overheating

MODULE D: HOUSEKEEPING

1 OVERVIEW

Through Module D, the instructor lays the groundwork for safe, effective maintenance and repair of aeroplane EWIS, by teaching housekeeping strategies, so as to keep the EWIS free of contamination. The instructor may vary the depth and scope of the topics to be covered, depending on the type of aeroplane to be maintained and skills of the persons.

2 OBJECTIVES

After this module is complete, the person is able to demonstrate the following skills:

a) Recognise external contamination and other damage due to external environmental conditions.

b) Know the aeroplane internal contamination sources so that inspection processes can be effectively carried out and contamination damage easily recognised.

c) Recognise other possible contamination sources.

d) Know the planning procedures to be followed, on EWIS areas in different parts of the aeroplane.

e) Know the protection procedures and processes to protect the EWIS during maintenance and repair.

f) Know the process of cleaning wiring systems during maintenance and repair.

3 STRATEGIES

Normal classroom lecture can be used for the majority of the training. ATA 117 video and colour photos of actual EWIS contamination could be used to show typical problems found on the aeroplane. Relevant Aeroplane Maintenance Manual and/or Chapter 20 Wiring Practices procedures should be used. The ATSRAC Task Group 1, Non-Intrusive Inspection Final Report could be used to identify typical housekeeping issues. EASA AMC 20-21, Programme to Enhance Aeroplane EWIS Maintenance is recommended as a source of typical aeroplane wiring installations and areas of concern.

MODULE D – HOUSEKEEPING

1 Aeroplane External Contamination Sources

a) De-ice fluids

b) Water and rain

c) Snow and ice

d) Miscellaneous (e.g. cargo/beverage spillage)

e) Air erosion

2 Aeroplane Internal Contamination Sources

a) Hydraulic oils

b) Engine and APU oils

c) Fuel d) Greases

e) Galleys and toilets

f) Lint/Dust g) Bleed air and hot areas

h) Hazardous materials

3 Other Contamination Sources

a) Paint

b) Corrosion inhibitor

c) Drill shavings/Swarf

d) Foreign objects (screws, washers, rivets, tools, etc.)

e) Animal waste

4 Contamination Protection Planning

a) Have a plan/types of plan/area mapping

b) Protection and Caution Recommendations

c) Procedures

d) Keep cleaning

5 Protection during Aeroplane Maintenance and Repair

a) Recommended general maintenance protection procedures

b) Recommended airframe repair protection procedures

c) Recommended powerplant repair protection procedures

6 Cleaning Processes

a) Fluid contamination

(1) Snow and ice

(2) De-ice fluid

(3) Cargo spillage

(4) Water and rain (5) Galleys

(6) Toilets water waste

(7) Oils and greases

(8) Pressure washing

b) Solid contamination

(1) Drill shavings/Swarf

(2) Foreign objects (screws, washers, rivets, tools, etc.)

c) Environmental contamination

(1) Lint and dust

(2) Paint

(3) Corrosion inhibitor

(4) Animal waste

MODULE E: WIRE

1 OVERVIEW

Through Module E, the instructor lays the groundwork for safe, effective maintenance, alteration and repair of aeroplane EWIS by teaching wire selection and inspection strategies. The instructor may vary the depth and scope of the topics to be covered, depending on the type of aeroplane to be maintained and skills of the persons.

2 OBJECTIVES

After this module is complete, the person is able to demonstrate the following skills:

a) Demonstrate the procedure used to identify specific wire types using the aeroplane manuals.

b) Know from approved data different insulation types and their relative qualities.

c) Know the inspection criteria for wire and wire bundles.

d) Know the standard installation practices for wire and wire bundles (aeroplane specific).

e) Know typical damage that can be found (aeroplane specific).

f) Demonstrate the repair procedures for typical damage found on the student's type of aeroplane.

g) Demonstrate the procedures to fitting differing types of sleeving (aeroplane specific).

h) Know the procedures for termination and storage of unused wires.

i) Know the correct installation practices for electrical bonds and grounds (aeroplane specific).

3 STRATEGIES

Normal classroom lecture can be used for the majority of the training with hands-on practice for Section 6. Chapter 20 Wiring Practices, Wiring Diagram Manual and WDM Lists should be made available to the class to ensure hands-on use of the manual so that wire identification, inspection, installation and repair procedures can be fully explored. Examples of wire discrepancies should be made available to the student. The ATSRAC Task Group 1, Intrusive Inspection Final Report could be used to identify typical wire issues. EASA AMC 20-21, Programme to Enhance Aeroplane EWIS Maintenance is recommended as a source of typical aeroplane wiring installations and areas of concern.

MODULE E – WIRE

1 Identification, Type and Construction

a) Wire type codes – alphanumeric

b) Wire type codes – specification and standard part number

c) Wire type codes – specified wire and alternate

d) Manufacturer identification

2 Insulation Qualities

a) Types of insulation

b) Typical insulation damage and limitations

c) Carbon arcing

3 Inspection Criteria and Standards of Wire and Wire Bundles

a) Inspection of individual wiring

b) Inspection of wire bundles

4 Wire Bundle Installation Practices

a. Routing

b. Segregation rules

c. Clearance

d. Clamp inspection

e. Clamp removal and fitting

f. Conduit types and fitting

g. Raceways

h. Heat shields and drip shields

5 Typical Damage and Areas Found (aeroplane specific)

a. Vibration

b. Heat

c) Corrosion

d) Contamination

e) Personnel traffic passage

6 Maintenance and Repair Procedures a) Wire damage assessment and classification b) Approved repairs - improper repairs c) Shielded wire repair d) Repair techniques e) Terminals and splices f) Preventative maintenance procedures

7 Sleeving

a) Identification sleeves

b) Shrink sleeves

c) Screen braid grounding crimp sleeves

d) Screen braid grounding solder sleeves

8 Unused Wires - Termination and Storage

a) Termination – end caps

b) Storage and attachment

9 Electrical Bonding and Grounds

a) Inspection standards

b) Primary Bonding (HIRF protection)

c) Secondary Bonding (System grounding)

d) Lightning strikes

MODULE F: CONNECTIVE DEVICES

1 OVERVIEW

Through Module F, the instructor lays the groundwork for safe, effective maintenance, alteration and repair of aeroplane EWIS by teaching the identification, inspection and repair of connective devices found on the aeroplane. The instructor may vary the depth and scope of the topics to be covered, depending on the type of aeroplane to be maintained and skills of the persons.

2 OBJECTIVES

After this module is complete, the person is able to demonstrate the following skills:

a) Know the general types and positive identification of connective devices (aeroplane specific).

b) Know the various safety procedures, cautions and warnings prior to inspection.

c) Know the relevant visual inspection procedures for each type of connector so that any internal or external damage can be found.

d) Recognise typical external and internal damage to the connector.

e) Demonstrate where to find the relevant repair schemes from Chapter 20 for connector repair.

3 STRATEGIES

Normal classroom lecture can be used for the majority of the training. The Chapter 20 Wiring Practices manual should be made available to the class so that hands-on use of the manual can be ensured. Connector identification, inspection and repair procedures should be fully explored. Colour photographs of typical external damage and internal damage could be used to show problems on the aeroplane. The ATSRAC Task Group 1, Non-Intrusive Inspection and Intrusive Inspection Final Report, Chapter 7, could be used to identify typical connector issues. EASA AMC 20-21, Programme to Enhance Aeroplane EWIS Maintenance is recommended as a source of typical aeroplane wiring installations and areas of concern.

MODULE F – CONNECTIVE DEVICES

1 General Types and Identification

a) Part number identification

b) Reference tables

c) Specific connective devices chapters

2 Cautions and Protections

a) Safety precautions

b) Maintenance precautions

3 Visual Inspection Procedures

a) Installed inspection criteria

b) Removed inspection criteria

4 Typical Damage Found

a) Exterior damage

b) Internal damage

5 Repair Procedures

a) Finding the correct section

b) Finding the correct part

c) Finding the correct tooling

d) Confirming the correct repair

MODULE G: CONNECTIVE DEVICES REPAIR

1 OVERVIEW

Through Module G, the instructor lays the groundwork for safe, effective maintenance, alteration and repair of aeroplane EWIS. This module is primarily a hands-on class, emphasising the repair and replacement of connective devices found on the aeroplane. This list can be used to cover typical connectors for aeroplanes and can be adjusted to suit training requirements. The instructor may vary the depth and scope of the topics to be covered, depending on the type of aeroplane to be maintained and skills of the persons.

2 OBJECTIVE

After this module is complete, the person will have the following skills:

a) Demonstrate the replacement of components for circular connectors.

b) Demonstrate the replacement of components for rectangular connectors.

c) Demonstrate the replacement of components for terminal blocks - modular.

d) Demonstrate the replacement of components for terminal blocks - non-modular.

e) Demonstrate the replacement of components for grounding modules. f) Demonstrate the replacement of pressure seals.

3 STRATEGIES

This class is primarily a hands-on class to give the student motor skills in the repair of connective devices from their aeroplane. The Chapter 20 Wiring Practices Manual and the appropriate connective devices should be made available to the class so that repair procedures can be fully explored. Photographs of typical internal conditions and external damage could be made available. It is recommended that MODULE F: CONNECTORS should precede this module. EASA AMC 20-21, Programme to Enhance Aeroplane EWIS Maintenance is recommended as a source of typical aeroplane wiring installations and areas of concern.

MODULE G – CONNECTIVE DEVICES REPAIR

1 Circular Connectors

a) Disassembly

b) Back-shell maintenance

c) Contact extraction and insertion

d) Contact crimping

e) Assembly and strain relief

2 Rectangular Connectors

a) Disassembly

b) Back-shell maintenance

c) Contact extraction and insertion

d) Contact Crimping

e) Assembly and strain relief

3 Terminal Blocks - Modular

a) Disassembly

b) Contact extraction and insertion

c) Contact Crimping

d) Assembly and strain relief

4 Terminal Block – Non-modular

a) Disassembly

b) Terminal Lug Crimping

c) Terminal Lug Stacking

d) Assembly, torque and strain relief

5 Grounding Modules

a) Disassembly

b) Contact extraction and insertion

c) Contact Crimping

d) Assembly and strain relief

6 Pressure Seals

a) Disassembly

b) Maintenance

c) Assembly and strain relief

7 RELATED READING MATERIAL

a) EASA AMC-20

- AMC 20-21 Programme to Enhance Aeroplane Electrical Wiring Interconnection System Maintenance

- AMC 20-23 Development of Electrical Standard Wiring Practices Documentation

b) FAA 14 CFR Parts

- Part 21, Certification Procedures for Products and Parts

- Part 25, Airworthiness Standards, Transport Category Aeroplanes

- Part 43, Maintenance, Preventive Maintenance, Rebuilding, and Alteration

- Part 91, General Operating and Flight Rules

- Part 119, Certification: Air Carriers and Commercial Operators

- Part 121, Operating Requirements: Domestic, Flag, and Supplemental Operations

- Part 125, Certification and Operations: Aeroplanes Having a Seating Capacity of 20 or More Passengers or a Maximum Payload Capacity of 6,000 pounds or More

- Part 129, Operations: Foreign Air Carriers and Foreign Operators of U.S.-Registered Aircraft Engaged in Common Carriage

- Part 135, Operating Requirements: Commuter and On-demand Operations

- Part 145, Repair Stations

c) FAA Advisory Circulars (AC)

- AC 20-13, Protection of Aircraft Electrical/Electronic Systems against the Indirect Effects of Lightning

- AC 20-53A, Protection of Aeroplane Fuel Systems against Fuel Vapour Ignition due to Lightning AC 25-16, Electrical Fault and Fire Protection and Prevention
- AC 25.981-1B, Fuel Tank Ignition Source Prevention Guidelines
- AC 25.17YY Development of Standard Wiring Practices Documentation
- AC 43-3, Non-destructive Testing in Aircraft
- AC 43-4A, Corrosion Control for Aircraft
- AC 43-7, Ultrasonic Testing for Aircraft
- AC 43-12A, Preventive Maintenance
- AC 43.13-1A, Acceptable Methods, Techniques and Practices - Aircraft Inspection and Repair
- AC 43.13-1B, Acceptable Methods, Techniques and Practices for Repairs and Alterations to Aircraft
- AC 43-204, Visual Inspection for Aircraft
- AC 43-206, Avionics Cleaning and Corrosion Prevention/Control
- AC 65-15A, Airframe and Powerplant Mechanics Airframe Handbook, Chapter 11. Aircraft Electrical Systems
- AC 120-XX, Programme to enhance aircraft Electrical Wiring Interconnection System maintenance
- AC 120-YY Aircraft Electrical Wiring Interconnection System training programme d. Reports

- Transport Aircraft Intrusive Inspection Project, (An Analysis of the Wire Installations of Six Decommissioned Aircraft), Final Report, the Intrusive Inspection Working Group, December 29, 2000. http://www.mitrecaasd.org/atsrac/intrusive_inspection.html
- FAA Aging Transport Non-Structural Systems Plan, July 1998.
- National Transportation Safety Board, Safety Recommendation, September 19, 2000, A-00105 through -108. http://www.ntsb.gov/recs/letters/2000/A00_105_108.pdf
- Wire System Safety Interagency Working Group, National Science and Technology Council, Review of Federal Programmes for Wire System Safety 46 (2000).
- Aging Transport Systems Rulemaking Advisory Committee, Task 1 and 2, Aging Systems, Final Report. http://www.mitrecaasd.org/atsrac/final_reports/Task_1&2_Final%20_August_2000.pd f
- Aging Transport Systems Rulemaking Advisory Committee, Task 3, Final Report. http://www.mitrecaasd.org/atsrac/final_reports/Task_3_Final.pdf
- Aging Transport Systems Rulemaking Advisory Committee, Task 4, Final Report, Standard Wiring Practices. http://www.mitrecaasd.org/atsrac/final_reports/Task_4_Final_Report_Sept_2000.pdf
- Aging Transport Systems Rulemaking Advisory Committee, Task 5, Final Report, Aircraft Wiring Systems Training Curriculum and Lesson Plans. http://www.mitrecaasd.org/atsrac/final_reports/Task_5_Final_March_2001%20.p df
- ATA Specification 117 (Wiring Maintenance Practices/Guidelines).
- Aging Transport Systems Rulemaking Advisory Committee, Task 6, Task 7 and Task 9 Working Group Final Reports. http://www.mitrecaasd.org/atsrac/final_reports.html
- f. Other Documents
- ATA Operator/Manufacturer Scheduled Maintenance Development as revised, ATA Maintenance Steering Group (MSG-3), may be obtained from the Air Transport Association of America; Suite 1100: 1301 Pennsylvania Ave, NW, Washington, DC 20004-1707.
- FAA Handbook Bulletin 91-15 "Origin and propagation of inaccessible aircraft fire under inflight airflow conditions".

Appendix III to AMC 145.A.60(a) — Occurrence reporting

1. INTENT

This appendix is interpretative material and provides guidance in order to determine which occurrences should be reported to the CAA, and to other organisations, and it provides guidance on the timescale for submission of such reports. It also describes the objective of the overall occurrence reporting system including internal and external functions

2. APPLICABILITY

(a) This appendix only applies to occurrence reporting by persons/organisations regulated by CAA.

(b) In most cases the obligation to report is on the holders of a certificate or approval, which in most cases are organisations, but in some cases can be a single person. In addition, some reporting requirements are directed to persons. However, in order not to complicate the text, only the term 'organisation' is used.

(c) The appendix also does not apply to dangerous goods reporting. The definition of reportable dangerous goods occurrences is different from the other occurrences and the reporting system is also separate. This subject is covered in specific operating requirements and guidance and ICAO Documents namely:

(i) ICAO Annex 18, The safe Transport of Dangerous Goods by Air, Chapter 12

(ii) ICAO Doc 9284-AN/905, Technical Instructions for the Safe Transport of Dangerous Goods by Air

3. OBJECTIVE OF OCCURRENCE REPORTING

(a) The occurrence reporting system is an essential part of the overall monitoring function. The objective of the occurrence reporting, collection, investigation and analysis systems described in the operating rules, and the airworthiness rules is to use the reported information to contribute to the improvement of aviation safety, and not to attribute blame, impose fines or take other enforcement actions.

(b) The detailed objectives of the occurrence reporting systems are:

(i) To enable an assessment of the safety implications of each occurrence to be made, including previous similar occurrences, so that any necessary action can be initiated. This includes determining what and why it had occurred and what might prevent a similar occurrence in the future.

(ii) To ensure that knowledge of occurrences is disseminated so that other persons and organisations may learn from them.

c) The occurrence reporting system is complementary to the normal day to day procedures and 'control' systems and is not intended to duplicate or supersede any of them. The occurrence reporting system is a tool to identify those occasions where routine procedures have failed.

d) Occurrences should remain in the database when judged reportable by the person submitting the report as the significance of such reports may only become obvious at a later date.

4. REPORTING TO THE CAA

(a) Requirements

(i) Occurrences defined as an incident, malfunction, defect, technical defect or exceedance of technical limitations that endangers or could endanger the safe operation of the aircraft must be reported to the CAA.

(ii) The maintenance rules stipulate that occurrences defined as any condition of the aircraft or aircraft component that has resulted or may result in an unsafe condition that could seriously hazard the aircraft must be reported to the CAA.

(iii) Reporting does not remove the reporter's or organisation's responsibility to commence corrective actions to prevent similar occurrences in the future. Known and planned preventive actions should be included within the report.

(b) Paragraph 10(d) of this appendix provides guidance as to what should be reported by an organisation to the CAA. The list of criteria provided may be used as guidance for establishing which occurrences shall be reported by which organisation.

5. NOTIFICATION OF ACCIDENTS AND SERIOUS INCIDENTS

In addition to the requirement to notify the Oman accident investigating authority directly of any accident or serious incident, operators should also report to the CAA in charge of supervising the reporting organisation

6. REPORTING TIME

(a) The period of 72 hours is normally understood to start from when the occurrence took place or from the time when the reporter determined that there was, or could have been, a potentially hazardous or unsafe condition.

(b) For many occurrences there is no evaluation needed; it must be reported. However, there will be occasions when, as part of a Flight Safety and accident prevention programme or quality programme, a previously non-reportable occurrence is determined to be reportable

(c) Within the overall limit of 72 hours for the submission of a report, the degree of urgency should be determined by the level of hazard judged to have resulted from the occurrence:

(i) Where an occurrence is judged to have resulted in an immediate and particularly significant hazard the CAA expects to be advised immediately, and by the fastest possible means (e.g. telephone, fax, telex, e-mail) of whatever details are available at that time. This initial notification should then be followed up by a report within 72 hours.

(ii) Where the occurrence is judged to have resulted in a less immediate and less significant hazard, report submission may be delayed up to the maximum of 72 hours in order to provide more details or more reliable information.

7. CONTENT OF REPORTS

(a) Notwithstanding other required reporting means as promulgated in national requirements, reports may be transmitted in CAA Form CA 015 (SDR). The amount of information in the report should be commensurate with the severity of the occurrence. Each report should at least contain the following elements, as applicable to each organisation:

(i) Organisation name and Approval reference (if relevant)

(ii) Information necessary to identify the aircraft or part affected.

(iii) Date and time if relevant

(iv) A written summary of the occurrence

(v) Any other specific information required

(b) For any occurrence involving a system or component, which is monitored or protected by a warning and/or protection system (for example: fire detection/extinguishing) the occurrence report should always state whether such system(s) functioned properly.

8. NOTIFICATION TO OTHER ENTITIES

(Reserved)

9. REPORTING BETWEEN ORGANISATIONS

(a) Requirements exist that address the reporting of data relating to unsafe or unairworthy conditions. These reporting lines are:

(i) Maintenance organisation to the organisation responsible for the design;

(ii) Maintenance organisation to operator;

(iii) Operator to organisation responsible for the design;

(b) The 'Organisation responsible for the design' is a general term, which can be any one or a combination of the following organisations.

(i) Holder of Type Certificate (TC) of an Aircraft, Engine or Propeller;

(ii) Holder of a Supplemental Type Certificate (STC) on an Aircraft, Engine or Propeller;

(iii) Holder of a Technical Standard Order (TSO) Authorisation; or

(iv) Holder of a Part Approval (PA)

(c) If it can be determined that the occurrence has an impact on or is related to an aircraft component which is covered by a separate design approval (TC, STC, TSO or etc.), then the holders of such approval/authorisation should be informed. If an occurrence happens on a component which is covered by an TC, STC, TSO or etc. (e.g. during maintenance), then only that TC, STC, TSO Authorisation or Part Approval holder needs to be informed.

(d) The form and timescale for reports to be exchanged between organisations is left for individual organisations to determine. What is important is that a relationship exists between the organisations to ensure that there is an exchange of information relating to occurrences.

(e) Paragraph 10(d) of this appendix provides guidance as to what should be reported by an organisation to the CAA. The list of criteria provided may be used as guidance for establishing which occurrences shall be reported to which organisation.

10. REPORTABLE OCCURRENCES

(a) General. There are different reporting requirements for operators (and/or commanders), maintenance organisations. Moreover, as explained in paragraph 4. and 9. above, there are not only requirements for reporting to the CAA, but also for reporting to other (private) entities. The criteria for all these different reporting lines are not the same. For example, the CAA will not receive the same kind of reports from a design organisation as from an operator. This is a reflection of the different perspectives of the organisations based on their activities.

(b) Operations and Maintenance. The list of examples of reportable occurrences offered below under (d) is established from the perspective of primary sources of occurrence information in the operational area (operators and maintenance organisations) to provide guidance for those persons developing criteria for individual organisations on what they need to report to the CAA. The list is neither definitive nor exhaustive and judgement by the reporter of the degree of hazard or potential hazard involved is essential.

(c) Internal reporting. The perception of safety is central to occurrence reporting. It is for each organisation to determine what is safe and what is unsafe and to develop its reporting system on that basis. The organisation should establish an internal reporting system whereby reports are centrally collected and reviewed to establish which reports meet the criteria for occurrence reporting to the CAA and/or other organisations, as required.

(d) List of examples of reportable occurrences

The following is a generic list. Not all examples are applicable to each reporting organisation. Therefore, each organisation should define and agree with the CAA and/or other organisations a specific list of reportable occurrences or a list of more generic criteria, tailored to its activity and scope of work. In establishing that customised list, the organisation should take into account the following considerations:

Reportable occurrences are those where the safety of operation was or could have been endangered or which could have led to an unsafe condition. If in the view of the reporter an occurrence did not hazard the safety of the operation but if repeated in different but likely circumstances would create a hazard, then a report should be made. What is judged to be reportable on one class of product, part or appliance may not be so on another and the absence or presence of a single factor, human or technical, can transform an occurrence into a serious incident or accident.

Specific operational approvals, e.g. RVSM, ETOPS, RNAV, or a design or maintenance programme, may have specific reporting requirements for failures or malfunctions associated with that approval or programme.

A lot of the qualifying adjectives like 'significant' have been deleted from the list. Instead it is expected that all examples are qualified by the reporter using the general criteria that are applicable in his field, and specified in the requirement. (e.g. for operators: 'hazards or could have hazarded the operation').

I. AIRCRAFT TECHNICAL

A. Structural

B. Not all structural failures need to be reported. Engineering judgement is required to decide whether a failure is serious enough to be reported. The following examples can be taken into consideration:

(1) Damage to a Principal Structural Element that has not been qualified as damage tolerant (life limited element). Principal Structural Elements are those which contribute significantly to carrying flight, ground, and pressurisation loads, and whose failure could result in a catastrophic failure of the aircraft. Typical examples of such elements are listed for large aeroplanes in 14 CFR AC 25.571(a) "damage tolerance and fatigue evaluation of structure" and EASA AMC 25.571(a), and in the equivalent AMC material for rotorcraft.

(2) Defect or damage exceeding admissible damages to a Principal Structural Element that has been qualified as damage tolerant.

(3) Damage to or defect exceeding allowed tolerances of a structural element which failure could reduce the structural stiffness to such an extent that the required flutter, divergence or control reversal margins are no longer achieved.

(4) Damage to or defect of a structural element, which could result in the liberation of items of mass that may injure occupants of the aircraft.

(5) Damage to or defect of a structural element, which could jeopardise proper operation of systems. See paragraph (B) below.

(6) Loss of any part of the aircraft structure in flight.

B. Systems

The following generic criteria applicable to all systems are proposed:

(1) Loss, significant malfunction or defect of any system, subsystem or set of equipment when standard operating procedures, drills etc. could not be satisfactorily accomplished.

(2) Inability of the crew to control the system, e.g.:

(a) un-commanded actions;

(b) incorrect and or incomplete response, including limitation of movement or stiffness;
(c) runaway;
(d) mechanical disconnection or failure.
(3) Failure or malfunction of the exclusive function(s) of the system (one system could integrate several functions).
(4) Interference within or between systems.
(5) Failure or malfunction of the protection device or emergency system associated with the system.
(6) Loss of redundancy of the system.
(7) Any occurrence resulting from unforeseen behaviour of a system.
(8) For aircraft types with single main systems, subsystems or sets of equipment: Loss, significant malfunction or defect in any main system, subsystem or set of equipment.
(9) For aircraft types with multiple independent main systems, subsystems or sets of equipment: The loss, significant malfunction or defect of more than one main system, subsystem or set of equipment
(10) Operation of any primary warning system associated with aircraft systems or equipment unless the crew conclusively established that the indication was false provided that the false warning did not result in difficulty or hazard arising from the crew response to the warning.
(11) Leakage of hydraulic fluids, fuel, oil or other fluids which resulted in a fire hazard or possible hazardous contamination of aircraft structure, systems or equipment, or risk to occupants.
(12) Malfunction or defect of any indication system when this results in the possibility of misleading indications to the crew.
(13) Any failure, malfunction or defect if it occurs at a critical phase of flight and relevant to the operation of that system.
(14) Occurrences of significant shortfall of the actual performances compared to the approved performance which resulted in a hazardous situation (taking into account the accuracy of the performance calculation method) including braking action, fuel consumption etc.
(15) Asymmetry of flight controls; e.g. flaps, slats, spoilers etc.
Annex 1 to EASA AMC 20-8 gives a list of examples of reportable occurrences resulting from the application of these generic criteria to specific systems

C. Propulsion (including Engines, Propellers and Rotor Systems) and APUs

(1) Flameout, shutdown or malfunction of any engine.
(2) Overspeed or inability to control the speed of any high-speed rotating component (for example: Auxiliary power unit, air starter, air cycle machine, air turbine motor, propeller or rotor).
(3) Failure or malfunction of any part of an engine or powerplant resulting in any one or more of the following:

(a) non-containment of components/debris;
(b) uncontrolled internal or external fire, or hot gas breakout;
(c) thrust in a different direction from that demanded by the pilot;
(d) thrust reversing system failing to operate or operating inadvertently;
(e) inability to control power, thrust or rpm;
(f) failure of the engine mount structure;
(g) partial or complete loss of a major part of the powerplant;

(h) Dense visible fumes or concentrations of toxic products sufficient to incapacitate crew or passengers;

(i) inability, by use of normal procedures, to shut down an engine;

(j) inability to restart a serviceable engine.

(4) An un-commanded thrust/power loss, change or oscillation which is classified as a loss of thrust or power control (LOTC) as defined in EASA AMC 20-1:

(a) for a single engine aircraft; or

(b) where it is considered excessive for the application, or

(c) where this could affect more than one engine in a multi-engine aircraft, particularly in the case of a twin-engine aircraft; or

(d) for a multi engine aircraft where the same, or similar, engine type is used in an application where the event would be considered hazardous or critical.

(5) Any defect in a life-controlled part causing retirement before completion of its full life.

(6) Defects of common origin which could cause an inflight shut down rate so high that there is the possibility of more than one engine being shut down on the same flight.

(7) An engine limiter or control device failing to operate when required or operating inadvertently.

(8) exceedance of engine parameters.

(9) FOD resulting in damage. Propellers and transmission

(10) Failure or malfunction of any part of a propeller or powerplant resulting in any one or more of the following:

(a) an overspeed of the propeller;

(b) the development of excessive drag;

(c) a thrust in the opposite direction to that commanded by the pilot;

(d) a release of the propeller or any major portion of the propeller;

(e) a failure that results in excessive unbalance;

(f) the unintended movement of the propeller blades below the established minimum in-flight low-pitch position;

(g) an inability to feather the propeller;

(h) an inability to command a change in propeller pitch;

(i) an un-commanded change in pitch;

(j) an uncontrollable torque or speed fluctuation;

(k) The release of low energy parts. Rotors and -transmission

(11) Damage or defect of main rotor gearbox / attachment which could lead to in flight separation of the rotor assembly, and /or malfunctions of the rotor control.

(12) Damage to tail rotor, transmission and equivalent systems.

APUs

(13) Shut down or failure when the APU is required to be available by operational requirements, e.g. ETOPS, MEL.

(14) Inability to shut down the APU.

(15) Overspeed.

(16) Inability to start the APU when needed for operational reasons.

D. Human Factors

(1) Any incident where any feature or inadequacy of the aircraft design could have led to an error of use that could contribute to a hazardous or catastrophic effect.

E. Other Occurrences

(1) Any incident where any feature or inadequacy of the aircraft design could have led to an error of use that could contribute to a hazardous or catastrophic effect.

(2) An occurrence not normally considered as reportable (for example, furnishing and cabin equipment, water systems), where the circumstances resulted in endangering of the aircraft or its occupants.

(3) A fire, explosion, smoke or toxic or noxious fumes.

(4) Any other event which could hazard the aircraft, or affect the safety of the occupants of the aircraft, or people or property in the vicinity of the aircraft or on the ground.

(5) Failure or defect of passenger address system resulting in loss or inaudible passenger address system.

(6) Loss of pilot's seat control during flight.

II. AIRCRAFT MAINTENANCE AND REPAIR

A. Incorrect assembly of parts or components of the aircraft found during an inspection or test procedure not intended for that specific purpose.

B. Hot bleed air leak resulting in structural damage.

C. Any defect in a life-controlled part causing retirement before completion of its full life.

D. Any damage or deterioration (i.e. fractures, cracks, corrosion, delamination, disbonding, etc.) resulting from any cause (such as flutter, loss of stiffness or structural failure) to:

(1) primary structure or a principal structural element (as defined in the manufacturers' Repair Manual) where such damage or deterioration exceeds allowable limits specified in the Repair Manual and requires a repair or complete or partial replacement of the element;

(2) secondary structure which consequently has or may have endangered the aircraft;

(3) the engine, propeller or rotorcraft rotor system.

E. Any failure, malfunction or defect of any system or equipment, or damage or deterioration found as a result of compliance with an Airworthiness Directive or other mandatory instruction issued by state of design or the CAA when:

(1) it is detected for the first time by the reporting organisation implementing compliance;

(2) on any subsequent compliance where it exceeds the permissible limits quoted in the instruction and/or published repair/rectification procedures are not available.

F. Failure of any emergency system or equipment, including all exit doors and lighting, to perform satisfactorily, including when being used for maintenance or test purposes.

G. Non-compliance or significant errors in compliance with required maintenance procedures.

H. Products, parts, appliances and materials of unknown or suspect origin.

I. Misleading, incorrect or insufficient maintenance data or procedures that could lead to maintenance errors.

J. Failure, malfunction or defect of ground equipment used for test or checking of aircraft systems and equipment when the required routine inspection and test procedures did not clearly identify the problem when this results in a hazardous situation.

Reportable occurrences to specific systems

The following subparagraphs give examples of reportable occurrences resulting from the application of the generic criteria to specific systems listed in paragraph 10 (d).I.B of this regulation.

1. Air conditioning/ventilation

(a) complete loss of avionics cooling

(b) depressurisation

2. Auto flight system

(a) failure of the auto flight system to achieve the intended operation while engaged

(b) significant reported crew difficulty to control the aircraft linked to auto flight system functioning

(c) failure of any auto flight system disconnect device

(d) Un-commanded auto flight mode change

3. Communications

(a) failure or defect of passenger address system resulting in loss or inaudible passenger address

(b) total loss of communication in flight

4. Electrical system

(a) loss of one electrical system distribution system (AC or DC)

(b) total loss or loss or more than one electrical generation system

(c) failure of the backup (emergency) electrical generating system

5. Cockpit/Cabin/Cargo

(a) pilot seat control loss during flight

(b) failure of any emergency system or equipment, including emergency evacuation signalling system, all exit doors, emergency lighting, etc.

(c) loss of retention capability of the cargo loading system

6. Fire protection system

(a) fire warnings, except those immediately confirmed as false

(b) undetected failure or defect of fire/smoke detection/protection system, which could lead to loss or reduced fire detection/protection

(c) absence of warning in case of actual fire or smoke

7. Flight controls

(a) Asymmetry of flaps, slats, spoilers etc.

(b) limitation of movement, stiffness or poor or delayed response in the operation of primary flight control systems or their associated tab and lock systems

(c) flight control surface run away

(d) flight control surface vibration felt by the crew

(e) mechanical flight control disconnection or failure

(f) significant interference with normal control of the aircraft or degradation of flying qualities

8. Fuel system

(a) fuel quantity indicating system malfunction resulting in total loss or erroneous indicated fuel quantity on board

(b) leakage of fuel which resulted in major loss, fire hazard, significant contamination

(c) malfunction or defects of the fuel jettisoning system which resulted in inadvertent loss of significant quantity, fire hazard, hazardous contamination of aircraft equipment or inability to jettison fuel

(d) fuel system malfunctions or defects which had a significant effect on fuel supply and/or distribution (e) inability to transfer or use total quantity of usable fuel

9. Hydraulics

(a) loss of one hydraulic system (ETOPS only)

(b) failure of the isolation system to operate

(c) loss of more than one hydraulic circuits

(d) failure of the backup hydraulic system

(e) inadvertent Ram Air Turbine extension

10. Ice detection/protection system

(a) undetected loss or reduced performance of the anti-ice/de-ice system

(b) loss of more than one of the probe heating systems

(c) inability to obtain symmetrical wing de icing

(d) abnormal ice accumulation leading to significant effects on performance or handling qualities

(e) crew vision significantly affected

11. Indicating/warning/recording systems

(a) malfunction or defect of any indicating system when the possibility of significant misleading indications to the crew could result in an inappropriate crew action on an essential system

(b) loss of a red warning function on a system

(c) for glass cockpits: loss or malfunction of more than one display unit or computer involved in the display/warning function

12. Landing gear system /brakes/tyres

(a) brake fire

(b) significant loss of braking action

(c) unsymmetrical braking leading to significant path deviation

(d) failure of the Landing Gear free fall extension system (including during scheduled tests)

(e) unwanted gear or gear doors extension/retraction

(f) multiple tyres burst

13. Navigation systems (including precision approaches system) and air data systems

(a) total loss or multiple navigation equipment failures

(b) total failure or multiple air data system equipment failures

(c) significant misleading indication

(d) Significant navigation errors attributed to incorrect data or a database coding error

(e) Unexpected deviations in lateral or vertical path not caused by pilot input.

(f) Problems with ground navigational facilities leading to significant navigation errors not associated with transitions from inertial navigation mode to radio navigation mode.

14. Oxygen

(a) for pressurised aircraft: loss of oxygen supply in the cockpit

(b) loss of oxygen supply to a significant number of passengers (more than 10%), including when found during maintenance or training or test purposes

15. Bleed air system

(a) hot bleed air leak resulting in fire warning or structural damage

(b) loss of all bleed air systems

(c) failure of bleed air leak detection system.