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# BHUTAN CIVIL AVIATION REQUIREMENTS



BCAR-145

Approved Maintenance Organisations

Issue 02, Rev. 00

18 April 2022

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## Foreword

The South Asian Regional Initiative (SARI) has developed harmonized regulation SARI Part-145 for 'Approved Maintenance Organisations' to be adopted by its Member States.

Bhutan Civil Aviation Authority (BCAA) has published this regulation as BCAR-145 'Approved Maintenance Organisations'.

This issue supersedes the existing in BCAR-145 'Approved Maintenance Organisations' dated 30 April 2020 and becomes effective from **11 May 2022**.

Future amendments to BCAR-145 will be as per the Notice of Proposed Amendment (NPA) issued by the SARI. This procedure will allow for the amendment of SARI Part-145 to be proposed by the Civil Aviation Authority of any of the SARI Member States and will, also, include provision for changes to be made with amendments to ICAO SARPS and EASA Part-145.

New, amended and corrected text will be enclosed with a vertical line on the left-hand side of the page until a subsequent 'amendment' is issued. However, correction of typographical mistakes and reformatting of paragraphs are not indicated.

'Acceptable Means of Compliance' (AMC) illustrate a means, or several alternative means, but not necessarily the possible means by which a requirement can be met.

'Guidance Material' (GM) helps to illustrate the meaning of a requirement. This amendment incorporates SARI Part 145 issue 2 dated 1 April 2016.



(Kinley Wangchuk)  
**Director**

**List of Amendments**

<b>Amendment</b>	<b>Issue date</b>	<b>Remark</b>
Initial Issue	01 October 2010	Initial
Issue 01, Rev. 01	01 October 2017	Change of DCA to BCAA
Issue 01, Rev. 02	30 April 2020	Incorporation of SARI requirements
Issue 02, Rev. 00	18 April 2022	Formatted as per SARI Part 145 Issue 2, Incorporated NPA 145-03-G

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## Section A - Technical Requirements

### BCAR-145.A.1 General

For the purpose of BCAR-145, the Competent Authority shall be Bhutan Civil Aviation Authority.

Within the scope of this BCAR, the following definition 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 a component after maintenance;
- (c) 'Component' means any engine, propeller, part or appliance;
- (d) 'large aircraft' means an aircraft, classified as an aeroplane with a maximum take-off mass of more than 5,700 kg (12,500 pounds), or a multi-engine helicopter;
- (e) 'large aeroplane' means an aeroplane of more than 5,700 kg (12,500 pounds) maximum certificated take-off weight. The category 'Large Aeroplane' does not include the commuter aeroplane category.
- (f) 'Commuter category aeroplane' means a propeller-driven twin-engine aeroplane that has a seating configuration, excluding the pilot seat(s) of nineteen or fewer and a maximum certified take-off weight of 8,618 kg (19,000 lb).
- (g) '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;
- (h) 'Organization' means a natural person, a legal person or part of a legal person. Such an organization may hold more than one BCAR-145 approval;
- (i) 'Pre-flight inspection' means the inspection carried out before flight to ensure that the aircraft is fit for the intended flight.
- (j) 'Complex Motor Power Aircraft' or CMPA means:
  - i. An aeroplane:
    - with a maximum certificated take-off mass exceeding 5700 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
  - ii. A helicopter certificated:
    - for a maximum take-off mass exceeding 3175 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
- iii. A tilt rotor aircraft;
- (k) 'LA1 aircraft' means the following Light Aircraft:
- i. an aeroplane, sailplane or powered sailplane with a Maximum Take-off Mass (MTOM) less than 1000 kg that is not classified as complex motor-powered aircraft;
  - ii. a balloon with a maximum design lifting gas or hot air volume of not more than 3400 m<sup>3</sup> for hot-air balloons, 1050 m<sup>3</sup> for gas balloons, 300 m<sup>3</sup> for tethered gas balloons;
  - iii. an airship designed for not more than two occupants and a maximum design lifting gas or hot-air volume of not more than 2500 m<sup>3</sup> for hot-air airships and 1000 m<sup>3</sup> for gas airships;
- (l) 'LSA aircraft' means a light sport aeroplane, which has all of the following characteristics:
- i. a Maximum Take-off Mass (MTOM) of not more than 600 kg;
  - ii. a maximum stalling speed in the landing configuration (VS0) of not more than 45 knots Calibrated Airspeed (CAS) at the aircraft's maximum certificated takeoff mass and most critical centre of gravity;
  - iii. a maximum seating capacity of no more than two persons, including the pilot;
  - iv. a single, non-turbine engine fitted with a propeller;
  - v. a non-pressurised cabin;
- (m) 'LA2' means:
- i. An aeroplane with a Maximum Take-off Mass (MTOM) of 2000 kg or less that is not classified as complex motor-powered aircraft;
  - ii. A sailplane or powered sailplane of 2000 kg MTOM or less;
  - iii. A balloon;
  - iv. A hot air ship;
  - v. A gas airship complying with all of the following characteristics:
    - 3 % maximum static heaviness,
    - non-vectored thrust (except reverse thrust),
    - conventional and simple design of structure, control system and ballonet system, and

- non-power assisted controls;
- vi. A Very Light Rotorcraft.
- (n) ‘Critical maintenance task’ means: a maintenance task that involves the assembly or any disturbance of a system or any part of an aircraft, engine or propeller that if an error occurred during its performance, could directly endanger the flight safety.
- (o) ‘Principle place of business’ means the head office or the registered office of the undertaking within which the principle financial functions and operational control of the activities referred to in this Regulation are exercised.

### **BCAR-145.A.5 Applicability**

Organizations involved in the maintenance of large aircraft or aircraft used for commercial air transport and components intended for fitment thereto, shall be approved in accordance with the provision of this BCAR.

### **BCAR-145.A.10 Scope**

This Section establishes the requirements to be met by an organization to qualify for the issue or continuation of approval for the maintenance of aircraft and components.

### 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 the use of external test equipment if required. The component replacement may include components such as engines and propellers.
    - Scheduled maintenance and/or checks including visual inspections that will detect obvious unsatisfactory conditions/discrepancies but do not require extensive in depth inspection. It may also include internal structure, systems and power plant items which are visible through quick opening access panels/doors.
    - Minor repairs and modifications which do not require extensive disassembly and can be accomplished by simple means.
  - (b) For temporary or occasional cases (ADs, SBs) the Quality Manager may accept base maintenance tasks to be performed by a line maintenance organization provided all requirements are fulfilled as defined by BCAA.
  - (c) Maintenance tasks falling outside there criteria are considered to be Base Maintenance.
  - (d) Aircraft maintained in accordance with ‘progressive’ type programmes should be individually assessed in relation to this paragraph. In principle, the decision to allow some ‘progressive’ checks to be carried out should be determined by the assessment that all tasks within the particular check can be carried out safely to the required standards at the designated line maintenance station.
2. Where the organization uses facilities both inside and outside Bhutan such as satellite facilities, sub-contractors, line stations etc., and such facilities may be included in the approval without being identified on the approval certificate subject to the maintenance organization exposition identifying the facilities and containing procedures to control such facilities and BCAA being satisfied that they form an integral part of the approved maintenance organization.

### GM 145.A.10 Scope

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

1. By inference, the smallest maintenance organization would only be involved with a limited number of light aircraft, or aircraft components, used for commercial air transport. It is therefore a matter of scale; light aircraft do not demand the same level of resources, facilities or complex maintenance procedures as the large organization.
2. It is recognized that a BCAR-145 approval may be required by two quite different types of small organizations, the first being the light aircraft maintenance hangar, the second being the component maintenance workshop, e.g. small piston engines, radio equipment etc.
3. Where only one person is employed (in fact having the certifying function and others), this organizations approved under BCAR-145 may use the alternatives provided in point 3.1 limited to the following:

Class A2 Base and Line maintenance of aeroplanes of 5700 kg and below (piston engines only).

Class A3 Base and Line maintenance of single engine helicopters of less than 3175 kg.

Class A4 Aircraft other than A1, A2 and A3

Class B2 Piston engines with maximum output of less than 450 HP.

Class C Components.

Class D1 Non-destructive Testing.

3.1 BCAR-145.A.30(b): The minimum requirement is for one full-time person who meets the BCAR-66 requirements for certifying staff and holds the position of ‘accountable manager, maintenance engineer and is also certifying staff’. No other person may issue a certificate of release to service and therefore if absent, no maintenance may be released during such absence.

3.1.1 The quality monitoring function of BCAR-145.A.65(c) may be contracted to an appropriate organization approved under BCAR-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 BCAA.

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

3.1.2 BCAR-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 BCAA of the BCAA Form 4. With only one person the requirement for a separate record of authorization is unnecessary because

the BCAA Form 3 approval schedule defines the authorization. An appropriate statement, to reflect this situation, should be included in the exposition.

- 3.1.3 BCRA-145.A.65(c). It is the responsibility of the contracted quality monitoring organization or person to make a minimum of 2 visits per 12 months and it is the responsibility of this organization or person to carry out such monitoring on the basis of 1 visit pre-announced and 1 visit not announced to the organization. It is the responsibility of the organization to comply with the findings of the contracted quality monitoring organization or the person.

CAUTION: it should be understood that if the contracted organization or the above mentioned person loses or gives up its approval, then the organization's approval will be suspended.

4. Recommended operating procedure for a BCAR-145 approved maintenance organization based upon up to 10 persons involved in maintenance.

- 4.1 BCAR-145.A.30(b): The normal minimum requirement is for the employment on a full-time basis of two persons who meet BCAA 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 BCAR-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 BCAA agrees that it is not practical for the organization to nominate a post holder for the quality monitoring function; this function may be contracted in accordance to paragraph 3.1.1.

### **BCAR-145.A.15 Application**

An application for the issue or change of approval shall be made to the BCAA in a form and manner established by the BCAA.

### **AMC 145.A.15 Applications**

In a form and in a manner established by the BCAA means that the application should be made on a BCAA Form 2 (refer to Appendix III to AMC to BCAR-145).

### **BCAR-145.A.20 Terms of Approval**

The organization shall specify the scope of work deemed to constitute approval in its exposition (Appendix II to this BCAR contains a table of all classes and ratings).

**AMC 145.A.20 Terms of approval**

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.

<b>CLASS</b>	<b>RATING</b>	<b>ATA CHAPTERS</b>
COMPONENTS OTHER THAN COMPLETE ENGINES OR APUs	C1 Air Cond & Press	21
	C2 Auto Flight	22
	C3 Comms and Nav	23 - 34
	C4 Doors - Hatches	52
	C5 Electrical Power & Lights	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 Helicopter - Rotors	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 Ox ygen	35
	C16 Propellers	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

### BCAR-145.A.25 Facility requirements

The organization shall ensure that:

- (a) Facilities are provided appropriate for all planned work, ensuring in particular, protection from the weather elements. Specialized 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 paragraph (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 is appropriate for the task carried out and 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 to prevent deterioration and damage of stored items. Access to storage facilities is restricted to authorized personnel.

#### **AMC 145.A.25(a) Facility requirements**

1. Where the hangar is not owned by the organization, 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 minimize dust generation.
3. For line maintenance of aircraft, hangars are not essential but it is recommended that access to hangar accommodation is demonstrated for usage during inclement weather for minor scheduled work and lengthy defect rectification.
4. 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(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 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 minimize 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 minimize damage and corrosion during storage.

### **BCAR-145.A.30 Personnel requirements**

- (a) The organization shall appoint an accountable manager who has corporate authority for ensuring that all maintenance required by the customer can be financed and carried out to the standard required by BCAR-145. The accountable manager shall:
1. Ensure that all necessary resources are available to accomplish maintenance in accordance with BCAR-145.A.65(b) to support the organization approval.
  2. Establish and promote the safety and quality policy specified in BCAR-145.A.65(a).
  3. Demonstrate a basic understanding of BCAR-145.
- (b) The organization shall nominate a person or group of persons, whose responsibilities include ensuring that the organization complies with BCAR-145. 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 organization and be responsible for all functions specified in BCAR-145.
  2. The person or persons nominated shall be identified and their credentials submitted in a form and manner established by BCAA.
  3. 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 BCAR-145.
  4. Procedures shall make clear who deputizes for any particular person in the case of lengthy absence of the said person.
- (c) The accountable manager under paragraph (a) shall appoint a person with responsibility for monitoring the quality system, including the associated feedback system as required by BCAR-145.A.65(c). The appointed 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 organization shall have a maintenance man-hour plan showing that the organization has sufficient staff to plan, perform, supervise, inspect and quality monitor the organization in accordance with the approval. In addition the organization 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 organization 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 BCAA. In addition to the necessary expertise related to the job function, competence must include an understanding of the application of human factors and human performance issues appropriate to that person's function in the organization.

‘Human factors’ 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.

‘Human performance’ means human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

- (f) The organization shall ensure that personnel who carry out and/or control a continued airworthiness non-destructive test of aircraft structures and/or components are appropriately qualified for the particular non-destructive test in accordance with the European or equivalent standard recognized by the BCAA. Personnel who carry out any other specialized task shall be appropriately qualified in accordance with officially recognized standards. By derogation to this paragraph those personnel specified in paragraphs (g) and (h)(1) and (h)(2), qualified in category B1 or B3 in accordance with BCAR-66 may carry out and/or control colour contrast dye penetrates tests.
- (g) Any organization maintaining aircraft, except where stated otherwise in point (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 BCAR-66 and point BCAR-145.A.35.

In addition such organizations may also use appropriately task trained certifying staff holding the privileges described in points BCAR-66.A.20(a)(1) and BCAR-66.A.20(a)(3)(ii) and qualified in accordance with BCAR-66 and point BCRA-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 category B1, B2, B3 certifying staff, as appropriate.

- (h) Any organization maintaining aircraft, except where stated otherwise in paragraph (j) shall:
1. in the case of base maintenance of complex motor-power aircraft, have appropriate aircraft type rated certifying staff qualified as category C in accordance with BCAR-66 and BCAR-145.A.35. In addition the organization shall have sufficient aircraft type rated, staff qualified as category B1, B2 as appropriate, in accordance with BCAR-66 and BCAR-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 organization 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 BCAR-66 and point BCAR-145.A.35 or,
  - (ii) appropriate aircraft rated certifying staff qualified in category C assisted by support staff as specified in point BCAR-145.A.35(a)(i).
- (i) Component certifying staff shall comply with BCAR-66.
- (j) By derogation to paragraphs (g) and (h), in relation to the obligation to comply with BCAR-66, the organization may use certifying staff qualified in accordance with the following provisions:
  1. For organization facilities located outside the Bhutan certifying staff may be qualified in accordance with the national aviation regulations of the State in which the organization facility is registered subject to the conditions specified in Appendix IV to this BCAR.
  2. For line maintenance carried out at a line station of an organization which is located outside the Bhutan, the certifying staff may be qualified in accordance with the national aviation regulations of the State in which the line station is based, subject to the conditions specified in Appendix IV to this BCAR.
  3. For a repetitive pre-flight airworthiness directive which specifically states that the flight crew may carry out such airworthiness directive, the organization may issue a limited certification authorization to the aircraft commander and/or the flight engineer on the basis of the flight crew license held. However, the organization shall ensure that sufficient practical training has been carried out to ensure that such aircraft commander or flight engineer can accomplish the airworthiness directive to the required standard.
  4. In the case of aircraft operating away from a supported location the organization may issue a limited certification authorization to the commander and/or the flight engineer on the basis of the flight crew license held subject to being satisfied that sufficient practical training has been carried out to ensure that the commander or flight engineer can accomplish the specified task to the required standard. The provisions of this paragraph shall be detailed in an exposition procedure.
  5. In the following unforeseen cases, where an aircraft is grounded at a location other than the main base where no appropriate certifying staffs are available, the organization contracted to provide maintenance support may issue a one-off certification authorization:
    - (i) to one of its employees holding equivalent type authorizations 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 organization appropriately approved under this BCAR at that

location and the contracted organization obtains and holds on file evidence of the experience and the license of that person.

All such cases as specified in this subparagraph shall be reported to the BCAA within seven days after issuing such certification authorization. The organization issuing the one-off authorization shall ensure that any such maintenance that could affect flight safety is re-checked by an appropriately approved organization.

### **AMC 145.A.30(a) Personnel requirements**

With regard to the accountable manager, it is normally intended to mean the chief executive officer of the approved maintenance organization, who by virtue of position has overall (including in particular financial) responsibility for running the organization. The accountable manager may be the accountable manager for more than one organization and is not required to be necessarily knowledgeable on technical matters as the maintenance organization exposition defines the maintenance standards. When the accountable manager is not the chief executive officer BCAA will need to be assured that such an accountable manager has direct access to the chief executive officer and has a sufficiency of ‘maintenance funding’ allocation.

### **AMC 145.A.30(b) Personnel requirements**

1. Dependent upon the size of the organization, the BCAR-145 functions may be subdivided under individual managers or combined in any number of ways.
2. The organization should have, dependent upon the extent of approval, a base maintenance manager, a line maintenance manager, a workshop manager and a quality manager, all of whom should report to the accountable manager except in small the BCAR-145 organization where anyone manager may also be the accountable manager, as determined by the BCAA, 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 BCAR-145.A.65(b). The base maintenance manager is also responsible for any corrective action resulting from the quality compliance monitoring of BCAR-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 BCAR-145.A.65(b) and also responsible for any corrective action resulting from the quality compliance monitoring of BCAR-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 BCAR-145.A.65(b) and also responsible for any corrective action resulting from the quality compliance monitoring of BCAR-145.A.65(c).
6. The quality manager’s responsibility is specified in BCAR-145.A.30(c).
7. Notwithstanding the example sub-paragraphs 2 - 6 titles, the organization may adopt any title for the foregoing managerial positions but should identify to BCAA the titles and persons chosen to carry out these functions.
8. Where an organization chooses to appoint managers for all or any combination of the identified BCAR-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.

NOTE: Certifying staff may report to any of the managers specified depending upon which type of control the approved maintenance organization uses (for example licensed engineers/independent inspection/dual function supervisors etc.) so long as the quality compliance monitoring staff specified in BCAR-145.A.65(c)(1) remain independent.

#### **AMC 145.A.30(c) Personnel requirements**

Monitoring the quality system includes requesting remedial action as necessary by the accountable manager and the nominated persons referred to in BCAR-145.A.30(b).

#### **AMC 145.A.30(d) Personnel requirements**

1. Has sufficient staff means that the organization 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 organization by the BCAA, in accordance with an approved procedure which should describe the extent, specific duties, and responsibilities for ensuring adequate organization stability. For the purpose of this sub-paragraph, employed means the person is directly employed as an individual by the maintenance organization approved under BCAR-145, whereas contracted means the person is employed by another organization and contracted by that organization to the maintenance organization approved under BCAR-145.
2. The maintenance man-hour plan should take into account all maintenance activities carried out outside the scope of the BCAR-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 organization 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 BCAR-145.A.25(a)(2).
6. The quality monitoring compliance function man-hours should be sufficient to meet the requirement of BCAR-145.A.65(c) which means taking into account AMC 145.A.65(c). Where

quality monitoring staff performs 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 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 BCAR-145.A.30(d).

### **AMC 1 145.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, specialized 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, organizational, and/or product type and differences training, and
- experience records.

Validation of the above could include a confirmation check with the organization(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 GM 3 to BCAR-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 authorization held, as applicable.

For a proper competence assessment of its personnel, the organization 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 organization 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 AMC 2 145.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 organization. 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 organization):
  - 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 organization 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 BCAR-145.30(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.
  - Specialized services staff are able to carry out specialized maintenance tasks to the standard specified in the maintenance data. They should be able to communicate with supervisors and report accurately when necessary.
  - Support staffs 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 audit staffs are able to monitor compliance with BCAR-145 identifying noncompliance in an effective and timely manner so that the organization may remain in compliance with BCAR-145.

Competence assessment should be based upon the procedure specified in GM 2 to BCAR-145.A.30(e).

### **AMC 2 145.A.30(e) Personnel requirements**

In respect to the understanding of the application of human factors and human performance issues, all maintenance organization 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 control/assurance staff;
  - Specialized 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 GM 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 organization. The syllabus may also be adjusted to meet the particular nature of work for each function within the organization. For example:
- o small organizations not working in shifts may cover in less depth subjects related to teamwork and communication;
  - o 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 organization should receive initial human factors training compliant with the organization'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 organization.
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 organization.

3. Human factors training may be conducted by the maintenance organization itself, or independent trainers, or any training organizations acceptable to the BCAA.
4. The human factors training procedures should be specified in the maintenance organization exposition.

#### **AMC 3 145.A.30(e) Personnel requirements**

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

Guidance is provided for training to maintenance organization personnel in Appendix IV to AMC to BCAR-145.A.30(e).

#### **AMC 4 145.A.30(e) Personnel requirements**

Competence assessment should include the verification for the need of additional EWIS training when relevant. In the absence of specific BCAA guidance, guidance of EASA AMC 20-22 may be used for EWIS training programme to maintenance organisation personnel.

#### **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 BCAR-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 or any equivalent standard acceptable to the BCAA.
3. Notwithstanding the fact that Level 3 personnel may be qualified via EN 4179 to establish and authorize 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. All examinations should be conducted by personnel or organizations under the control of an organization (NDT board for example) as recognised by the BCAA.
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 such time as an 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 with the process.
7. Any maintenance organization approved under BCAR-145 that carries out NDT should establish NDT specialist qualification procedures detailed in the exposition and accepted by the BCAA.
8. Boroscopy and other techniques such as delamination coin tapping are non-destructive inspections rather than non-destructive testing. Notwithstanding such differentiation, the maintenance organization should establish an exposition procedure accepted by the BCAA to ensure that personnel who carry out and interpret such inspections are properly trained and assessed for their competence with the process. Non-destructive inspections, not being considered as NDT by BCAR-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 organization 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 BCAR-145 should qualify for such non-destructive test in accordance with EN 4179 or a standard recognized as equivalent or acceptable to the BCAA.
11. In this context officially recognized standard means those standards established or published by an official body whether having legal personality or not, which are widely recognized by the air transport sector as constituting good practice.

#### **AMC 145.A.30(g) Personnel requirements**

1. For the purpose of BCAR-66.A.20(a)(1) and BCAR-66.A.20(a)(3)(ii) 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, BCAA 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 BCAR-66.A.20(a)(1) and the BCAR-66.A.20(a)(3)(ii) personnel for the purpose of these personnel issuing an aircraft certificate of release to service as specified in BCAR-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 simple 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 BCAA 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 BCAA 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 BCAA 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, as appropriate, in the case of aircraft line maintenance does not imply that the organisation must have B1 and B2 personnel at every line station. The MOE should have a procedure on how to deal with defects requiring B1 or B2 certifying staff.
4. The BCAA may accept that in the case of aircraft line maintenance an organisation has only B1 or B2 certifying staff, as appropriate, provided that the BCAA is satisfied that the scope of work, as defined in the Maintenance Organisation Exposition, does not need the availability of all B1 and B2 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 BCAR-145.A.30(h) and BCAR-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 authorization the commander or flight engineer should hold either a valid air transport pilots license (ATPL), commercial pilots license (CPL) or flight engineer (F/EL) license in accordance with the BCAA flight crew licensing system, or a national equivalent acceptable to the BCAA on the aircraft type. In addition, the limited certification authorization is subject to the maintenance organization exposition containing procedures to address the personnel requirements of BCAR-145.A.30(e) and associated AMC and guidance material.

Such procedures 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.

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

The above procedures should be specified in the maintenance organization exposition and be accepted by the BCAA.

- 2.(i) Typical tasks that may be certified and/or carried out by the commander holding an ATPL or CPL is minor maintenance or simple checks included in the following list:
- a) Replacement of internal lights, filaments and flash tubes.
  - b) Closing of cowlings and refitment 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 BCAA.
- 2.(ii) Holders of a valid Flight engineers license, or a national equivalent acceptable to the BCAA, on the aircraft type may only exercise this limited certification authorization 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 BCAA as a simple task.
  - k) Re-setting of tripped circuit breakers under the guidance of maintenance control.
  - l) Any other simple task as agreed by the BCAA as a simple task for a particular aircraft type.
3. The authorization should have a finite life of twelve months subject to satisfactory re-current training on the applicable aircraft type.

#### **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 authorization should only be considered for issue by the quality department of the contracted organization 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 organization's quality department will need to assess each situation individually prior to the issuance of a one-off authorization.
3. A one-off authorization 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 authorization to issue a CRS for a task on an aircraft type for which certifying staff does not hold a type-rated authorization has been identified, the following procedure is recommended:

1. Flight crew should communicate full details of the defect to the operator's supporting maintenance organization. If necessary the supporting maintenance organization will then request the use of a one-off authorization from the quality department.
2. When issuing a one-off authorization, the quality department of the organization should verify that:
  - (a) Full technical details relating to the work required to be carried out have been established and passed to the certifying staff.

- (b) The organization 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 authorization.
  - (c) The person to whom a one-off Authorization is issued has been provided 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 organization, communicated to the one-off authorization holder.
  - (d) The person holds authorizations of equivalent level and scope on other aircraft types of similar technology, construction and systems.
3. The one off authorization 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 BCAR-145 maintenance facility.

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

This paragraph addresses staff not employed by the maintenance organization who meets the requirements of BCAR-145.A.30(j)(5). In addition to the items listed in AMC 145.30(j)(5)(i), paragraph 1, 2(a), (b) and (c) and 3 the quality department of the organization may issue such one-off authorization providing full qualification details relating to the proposed certifying personnel are verified by the quality department and made available at the location.

### **GM 1 145.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 organization may combine, divide, and change the order of any subject of the syllabus to suit its own needs, so long as all subjects are covered to a level of detail appropriate to the organization 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
  - 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, re-inspection, 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 behavior
  - 9.3 Assertiveness
10. Organisation's HF program
  - 10.1 Reporting errors
  - 10.2 Disciplinary policy
  - 10.3 Error investigation
  - 10.4 Action to address problems
  - 10.5 Feedback

**GM 2 145.A.30(e) 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 audit staff
Knowledge of applicable officially recognised standards						X	X
Knowledge of auditing techniques: planning, conducting and reporting							X
Knowledge of human factors, human performance and limitations	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
Knowledge of BCAR-M, BCAR-145 and any other relevant regulations	X	X	X	X			X

	Managers	Planners	Supervisor	Certifying staff and support staff	Mechanics	Specialised service staff	Quality audit staff
Knowledge of relevant parts of the maintenance organisation exposition and procedures	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	
Knowledge of safety risks linked to the working environment	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
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 maintenance task(s)		X	X	X	X		X
Ability to compile and control completed work cards		X	X	X			
Ability to consider human performance and limitations	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
Ability to manage third parties involved in maintenance activity		X	X				
Ability to confirm proper accomplishment of maintenance tasks			X	X	X	X	

	Managers	Planners	Supervisor	Certifying staff and support staff	Mechanics	Specialised service staff	Quality audit staff
Ability to identify and properly plan performance of a critical maintenance task(s)		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				
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
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
Analytical and proven auditing skills (for example, objectivity, fairness, open-mindedness, determination, ...)							X
Maintenance error investigation skills							X
Resources management and production planning skills	X	X	X				
Teamwork, decision-making and leadership skills	X		X				

**GM 3 145.A.30(e) 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		
First Name:		Surname:
Address:		
Telephone:		Email:
Independent worker <input type="checkbox"/>		
Trade Group: airframe <input type="checkbox"/> engine <input type="checkbox"/> electric <input type="checkbox"/> avionics <input type="checkbox"/> other (specify) <input type="checkbox"/> .....		
Employer's details (when applicable)		
Name:		
Address:		
Telephone:		
Maintenance organisation details:		
Name:		
Address:		
Telephone:		
Approval Number:		
Period of employment	From:	To:
Domain of employment		
<input type="checkbox"/> Planning	<input type="checkbox"/> Engineering	<input type="checkbox"/> Technical records
<input type="checkbox"/> Store department	<input type="checkbox"/> Purchasing	
Mechanics/Technician		
<input type="checkbox"/> Line Maintenance	<input type="checkbox"/> Base Maintenance	<input type="checkbox"/> Component Maintenance
<input type="checkbox"/> Servicing	<input type="checkbox"/> Removal/installation	<input type="checkbox"/> Testing/inspection

<input type="checkbox"/> Scheduled Maintenance	<input type="checkbox"/> Inspection	<input type="checkbox"/> Repair
<input type="checkbox"/> Troubleshooting	<input type="checkbox"/> Troubleshooting	<input type="checkbox"/> Overhaul
	<input type="checkbox"/> Repair	<input type="checkbox"/> Re-treatment
		<input type="checkbox"/> Reassembly
A/C type:	A/C type:	Component type:
Certifying Staff and support staff		
<input type="checkbox"/> Cat. A <input type="checkbox"/> Cat. B1 <input type="checkbox"/> Cat. B2 <input type="checkbox"/> Cat. C <input type="checkbox"/> Component Type <input type="checkbox"/> Other (e.g. NDT) A/C Type   A/C Type   A/C Type   A/C Type   Component Type   Specify		
Certification Privileges: Yes <input type="checkbox"/> / No <input type="checkbox"/>		
<input type="checkbox"/> Specialised Services	Speciality (NDT, composites, welding, etc.):	
<input type="checkbox"/> Skilled personnel	Speciality (sheet metal, structures, wireman, upholstery, etc.):	
<input type="checkbox"/> Ground equipment operation		
<input type="checkbox"/> Quality control	<input type="checkbox"/> Quality assurance	<input type="checkbox"/> Training
<i>Total number of check boxes ticked:</i> <input type="checkbox"/>		
Details of employment:		

Training received from the contracting organisation	
Date:	Nature of training:
Certified by:	
Name:	Date:
Position:	Signature:
Contact details:	
<i>Advisory note: A copy of the present credential will be kept for at least 3 years from its issuance by the maintenance organisation</i>	

**GM 145.A.30(j)(4) Personnel requirements (Flight crew)**

Refer to applicable BCAA flight crew licensing requirements.

### **BCAR-145.A.35 Certifying staff and support staff**

- (a) In addition to the appropriate requirements of BCAR-145.A.30(g) and (h), the organization shall ensure that certifying staff and support staff have an adequate understanding of the relevant aircraft or components, or both, to be maintained and of the associated organisation procedures. In the case of certifying staff, this must be accomplished before the issue or re-issue of the certification authorization.
- (i) ‘Support staff’ means those staff holding a BCAR-66 aircraft maintenance licence 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 organization 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 organization.
- (b) Excepting those cases listed in points BCAR-145.A.30(j) and BCAR-66.A.20(a)3(ii), the organisation may only issue a certification authorisation to certifying staff in relation to the basic categories or subcategories and, except for the category A licence, any type rating listed on the aircraft maintenance license as required by BCAR-66, subject to the license remaining valid throughout the validity period of the authorization and the certifying staff remaining in compliance with BCAR-66.
- (c) The organization shall ensure that all certifying staff and support staff are involved in at least six months of actual relevant aircraft or component maintenance experience in any consecutive two year period.
- For the purpose of this paragraph ‘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 authorization and/or has actually carried out maintenance on at least some of the aircraft type or aircraft group systems specified in the particular certification authorization.
- (d) The organization shall ensure that all certifying staff and support staff receive sufficient continuation training in each two year period to ensure that such staffs have up-to-date knowledge of relevant technology, organization procedures and human factor issues.
- (e) The organization shall establish a programme for continuation training for certifying staff and support staff, including a procedure to ensure compliance with the relevant paragraphs of BCAR-145.A.35 as the basis for issuing certification authorizations under BCAR-145 to certifying staff, and a procedure to ensure compliance with BCAR-66.
- (f) Except where any of the unforeseen cases of BCAR-145.A.30(j)(5) apply, the organization 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 authorization under this BCAR.

- (g) When the conditions of paragraphs (a), (b), (d), (f) and, where applicable, paragraph (c) have been fulfilled by the certifying staff, the organization shall issue a certification authorization that clearly specifies the scope and limits of such authorization. Continued validity of the certification authorization is dependent upon continued compliance with paragraphs (a), (b), (d), and where applicable, paragraph (c).
- (h) The certification authorization must be in a style that makes its scope clear to the certifying staff and any authorized person who may require examining the authorization. Where codes are used to define scope, the organization shall make a code translation readily available. ‘Authorized person’ means the officials of the BCAA who have responsibility for oversight of the maintained aircraft or component.
- (i) The person responsible for the quality system shall also remain responsible on behalf of the organization for issuing certification authorizations to certifying staff. Such a person may nominate other persons to actually issue or revoke the certification authorizations in accordance with a procedure as specified in the exposition.
- (j) The organization shall maintain a record of all certifying staff and support staff, which shall contain:
  - 1. the details of any aircraft maintenance license held under BCAR-66; and
  - 2. all relevant training completed; and
  - 3. the scope of the certification authorizations issued, where relevant, and
  - 4. Particulars of staff with limited or one-off certification authorizations.

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

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

- (k) The organization shall provide certifying staff with a copy of their certification authorization in either a documented or electronic format.
- (l) Certifying staff shall produce their certification authorization to any authorized 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 licence 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 organization appropriately approved in accordance with BCAR-145 or BCAR-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 organization.

- (o) The holder of a category B2 aircraft maintenance licence may only exercise the certification privileges described in point BCAR-66.A.20(a)(3)(ii) of BCAR-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 organization issuing the certifying staff authorisation. Practical experience shall be also obtained within such maintenance organization.

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

1. Holding a BCAR-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 authorized as certifying staff and/or support staff. The organization is responsible to assess the competence of the holder for the scope of maintenance to be authorized.
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 procedures’ 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 BCAA (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 competence and recent experience for the period described in BCAR-145.A.35(j).

Additional information is provided in AMC 66.A.20(b)3.

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

The organization issues the certification authorization when satisfied that compliance has been established with the appropriate paragraphs of BCAR-145 and BCAR-66. In granting the certification authorization the maintenance organization approved under BCAR-145 needs to be satisfied that the person holds a valid BCAR-66 aircraft maintenance license.

#### **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 66.A.20(b)2 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 organization 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 department 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 department to initiate action.
2. Continuation training should cover changes in relevant requirements such as BCAR-145, changes in organization 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 a quality audit of such procedures.
3. Continuation training should be of sufficient duration in each 2 year period to meet the intent of BCAR-145.A.35(d) and may be split into a number of separate elements. BCAR-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 organization on human errors in maintenance. This means that in the case of an organization that maintains aircraft with few relevant quality audit findings, continuation training could be limited to days rather than weeks, whereas a similar organization with a number of relevant quality audit findings, such training may take several weeks. For an organization 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 BCAR-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 organization exposition unless such training is undertaken by an organization approved under BCAR-147 when such details may be specified under the approval and cross-referenced in the maintenance organization 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 BCAR-145.A.35(j).

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

As stated in BCAR-145.A.35(f), except where any of the unforeseen cases of BCAR-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 BCAR-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 or support staff:
  - a) Name
  - b) Date of Birth
  - c) Basic Training
  - d) Type Training
  - e) Continuation Training

- f) Experience
  - g) Qualifications relevant to the approval
  - h) Scope of the authorization
  - i) Date of the first issue of the authorization
  - j) If appropriate - the expiry date of the authorization
  - k) Identification Number of the authorization
2. The record may be kept in any format but should be controlled by the organization's quality department. This does not mean that the quality department should run the record system.
  3. Persons authorized to access the system should be maintained at a minimum to ensure that records cannot be altered in an unauthorized manner or that such confidential records become accessible to unauthorized persons.
  4. BCAA is an authorized person when investigating of a particular person. the records system for initial and continued approval or when BCAA has cause to doubt the competence.

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

1. It is the responsibility of the BCAR-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 BCAR-147 organisation or by a BCAR-145 organisation different from the one issuing the authorisation.
2. 'Appropriately approved in accordance with BCAR-147' means an organisation holding an approval to provide category A task training for the corresponding aircraft type.
3. 'Appropriately approved in accordance with BCAR-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 BCAR-66.A.20(a)(3)(ii) can only be granted by the BCAR-145 approved organisation where the license holder is employed/contracted after meeting all the requirements specified in BCAR-145.A.35(o). This privilege cannot be transferred to another BCAR-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 are 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.

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 66.A.20(b)2 to the one already held.

4. 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.

#### **BCAR-145.A.40 Equipment and tools**

- (a) The organization shall have available and use the necessary equipment and tools to perform the approved scope of work.
  - (i) Where the manufacturer specifies a particular tool or equipment, the organization shall use that tool or equipment, unless the use of alternative tooling or equipment is agreed by the BCAA via procedures specified in the exposition.
  - (ii) 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.
  - (iii) An organisation approved for base maintenance shall have sufficient aircraft access equipment and inspection platforms/docking as required for the proper inspection of the aircraft.
- (b) The organisation shall ensure that all tools, equipment and particularly test equipment, as appropriate, are controlled and calibrated according to an officially recognized 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 and tools**

Once the application for approval has determined the intended scope of work for consideration by the BCAA, 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 organization agrees can be used.

#### **AMC 145.A.40(b) Equipment and tools**

1. The control of these tools and equipment requires that the organization 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 organization can show by results that a different time period is appropriate in a particular case.
3. In this context officially recognized standard means those standards established or published by an official body whether having legal personality or not, which are widely recognized by the air transport sector as constituting good practice and by the BCAA.

### BCAR-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 a BCAA Form 1 or equivalent and marked in accordance with subpart Q of the BCAR-21 unless otherwise in BCAR-21 or in this BACR-145.
  - (ii) Unserviceable components, which shall be maintained in accordance with this BCAR.
  - (iii) Components categorized as unsalvageable because they have reached their certified life limit 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 must 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 the components, standard parts and materials are in satisfactory condition and meet the applicable requirements of point (a).
  - (ii) the organisation shall establish procedure 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 date 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 referred to in point BCAR-21.A.307(c) of BCAR-21 to regulation shall only be installed if considered eligible for installation by the aircraft owner on its own aircraft.
- (c) Segregation of components
- (i) Unserviceable and unsalvageable components shall be segregated from serviceable components, standard parts and materials.
  - (ii) Unsalvageable components shall not be permitted to re-enter the component supply system, unless certified life limits have been extended or repair solution has been approved in accordance with BCAR-21.

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

**BCAA FORM 1 OR EQUIVALENT**

A document equivalent to a BCAA Form 1 may be:

- (a) a release document issued by an organisation under the terms of a bilateral agreement signed by the relevant SARI member state; or
- (b) a release document issued by an organisation under the terms of a Memorandum of Understanding or an agreement signed by the CAA of the relevant SARI member state.

### GM1 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 Agency;
  - (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, Competent Authority or other government specification that 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 competent authority of the 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 Competent Authority Form 1 or equivalent is not normally issued and, therefore, none should be expected.

### **AMC2 145.A.42(a)(iv) Components**

#### **STANDARD PARTS**

For sailplanes and powered sailplanes, non-required instruments and/or equipment that are certified under the provision of CS 22.1301(b), if those instruments or equipment, when installed, functioning, functioning improperly or not functioning at all, do not in themselves, or by their effect upon the sailplane and its operation, constitute a safety hazard.

‘Required’ in the term ‘non-required’, as used above, means required by the applicable airworthiness code (CS 22.1303, 22.1305 and 22.1307 or equivalent recognised by the BCAA) or required by the relevant regulations for air operations and the applicable Rules of the Air or as required by air traffic management (e.g. a transponder in certain controlled airspace). Examples of non-required equipment which can be considered to be standard parts may be electrical variometers, bank/slip indicators ball-type, total energy probes, capacity bottles (for variometers), final glide calculators, navigation computers, data logger/barograph/turnpoint camera, bug-wipers and anti-collision systems. Equipment which must be approved in accordance with the airworthiness code shall comply with the applicable STSO or equivalent and it is not considered to be a standard part (e.g. oxygen equipment).

### **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 BCAA 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 BCAA 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 BCAR-145.A.42(a).
- (b) For the acceptance of components, standard parts and materials from suppliers, the above.

### **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**

#### **SUPPLIERS**

A supplier could be any source that provides components, standard parts or materials to be used for maintenance. Possible sources could be: BCAR-145 organisations, BCAR-21 Subpart G 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) procedure for shelf-life control;
  - (4) procedures for identifying the source from which the components and materials were received;
  - (5) purchasing procedures that identify documentation to accompany components and materials for subsequent use by approved BCARt-145 maintenance organisations;
  - (6) procedures for incoming inspection of components and materials;
  - (7) procedures for control of measuring equipment that provide for appropriate storage, usage, and for calibration when such equipment is required;
  - (8) 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;
  - (9) 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);
  - (10) procedures for detecting and reporting suspected unapproved components;
  - (11) procedures for handling unsalvageable components in accordance with applicable regulations and standards;
  - (12) procedures for batch splitting or redistribution of lots and handling of the relevant documents;
  - (13) 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;
  - (14) procedures for recall control to ensure that components and materials shipped can be traced and recalled if necessary;
  - (15) procedures for monitoring the effectiveness of the quality system; for detecting and reporting of suspected unapproved components;
- (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 BCAR-145.A.42 to ensure that supplied components and materials are in satisfactory condition and meet the applicable criteria of BCAR-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 BCAR-145 organisation to its suppliers, a desktop evaluation of the supplier's procedures or an on-site audit, if deemed necessary.

### **GM3 145.A.42(b)(ii) 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 BCAA 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 Agency or the type certificate (TC) holder, or BCAR-21 design organisation approval holder, or supplemental type certificate (STC) holder.
- (d) Items that are fabricated by an organisation approved under BCAR-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 BCAA 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 BCAR-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 BCAR-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 BCAR-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 BCAA.

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 BCAA.

- (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 BCAA 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 of 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 replating, shortening and rethreading 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 BCAA.
- (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.

#### **BCAR-145.A.45 Maintenance data**

- (a) The organization 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 organization’s approval class rating schedule and in any associated capability list.

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

- (b) For the purposes of BCAR-145, applicable maintenance data shall be any of the following:
1. Any applicable requirement, procedure, operational directive or information issued by the authority responsible for the oversight of the aircraft or component;
  2. Any applicable airworthiness directive issued by the authority 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 organization required to publish such data by BCAR-21 and in the case of aircraft or components from third countries the airworthiness data mandated by the authority responsible for the oversight of the aircraft or component;
  4. Any applicable standard, such as but not limited to, maintenance standard practices recognized by the BCAA as a good standard for maintenance;
  5. Any applicable data issued in accordance with paragraph (d).
- (c) The organization 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 organization may only modify maintenance instructions in accordance with a procedure specified in the maintenance organization’s exposition. With respect to those changes, the organization 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 paragraph means instructions on how to carry out the particular maintenance task: they exclude the engineering design of repairs and modifications.
- (e) The organization shall provide a common work card or worksheet system to be used throughout relevant parts of the organization. In addition, the organization shall either transcribe accurately the maintenance data contained in paragraphs (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 unauthorized 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 organization provides a maintenance service to an aircraft operator who requires their work card or work sheet system to be used then such work card or worksheet system may be used. In this case, the organization shall establish a procedure to ensure correct completion of the aircraft operators' work cards or worksheets.

- (f) The organization shall ensure that all applicable maintenance data is readily available for use when required by maintenance personnel.
- (g) The organization 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 organization 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 organization approved under BCAR-145 should hold and use the following minimum maintenance data relevant to the organization's approval class rating. All maintenance related Requirements and associated AMCs, approval specifications and Guidance Material, all applicable national maintenance requirements and notices and all applicable state of design and CAA airworthiness directives.
2. In addition to sub-paragraph 1, an organization 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 sub-paragraph 1, an organization 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 inspection (NDI) 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 organization 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 organization only approved in class rating category D – Specialized services, should hold and use all applicable specialized 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 BCAR-145 approved maintenance organization 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 BCAR-145 approved organization 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 organization 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 holders 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) is airworthiness limitations. Any modification of the maintenance instructions linked to CDCCL constitutes an aircraft modification that should be approved in accordance with a standard acceptable to the BCAA.

#### **AMC 145.A.45(e) Maintenance data**

1. The maintenance organization 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, which already identifies the tasks as a CDCCL where applicable.
2. Relevant parts of the organization 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**

1. 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.

**BCAR-145.A.47 Production planning**

- (a) The organization 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 organizing 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, the 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 organization, the planning system may range from a very simple procedure to a complex organizational set-up including a dedicated planning function in support of the production function.
2. For the purpose of BCAR-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, organizing maintenance teams and shifts and provides 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 of safety-critical maintenance tasks during periods when staff are likely to be most alert.

### **AMC145.A.47(b) Production planning**

Limitations of human performance, in the context of planning safety related tasks, refer 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.

### **AMC145.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 formalized process for exchanging information between outgoing and incoming persons and a planned shift overlap and a place for such exchanges to take place.

### **BCAR-145.A.48 Performance of maintenance**

The organisation shall establish procedures to ensure that:

- (a) after completion of 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 removed have been refitted;
- (b) an error capturing method is implemented after the performance of any critical maintenance task;
- (c) the risk of multiple errors during maintenance and the risk of errors being repeated in identical maintenance tasks are minimised; and,
- (d) damage is assessed and modifications and repairs are carried out using data specified in point BCAR-M.A.304.

### **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 stop in the maintenance process and is therefore different to a certificate of released to service.

### **AMC1 145.A.48(b) Performance of maintenance**

The procedure should identify the error-capturing methods, the critical maintenance tasks, the training and qualification 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(b) 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, 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;
  - (6) results of audits;
  - (7) normal operations monitoring schemes; and
  - (8) feedback from training.

### **AMC3 145.A.48(b) Performance of maintenance**

#### **ERROR CAPTURING METHODS**

- (a) Error capturing methods are those actions defined by the organisation to detect maintenance errors made when 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 (visual inspection, operational check, functional test, rigging check) may be necessary in some cases.

#### **AMC 4 145.A.48(b) 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 BCAR-145.A.30(j)(4) and having received adequate practical training and having enough experience in the specific.
- (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 tension;
  - (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.

**AMC 145.A.48(c) Performance of maintenance**

The procedures should be aimed at:

- (a) minimising multiple 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 re-inspection as described in point (d) of AMC 4 145.A.48(b).

### **GM 145.A.48(c) Performance of maintenance**

To minimise the risk of multiple errors or errors being repeated, 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.

### **GM 145.A.48(d) 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 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 wire and to provide comprehensive systems that would be controlled by a CDCCL. Guidance on the training of maintenance organisation personnel is provided in Appendix IV to AMC 134.A35.

### **BCAR-145.A.50 Certification of maintenance**

- (a) A certificate of release to service shall be issued by appropriately authorized certifying staff on behalf of the organization when it has been verified that all maintenance ordered has been properly carried out by the organization in accordance with the procedures specified in point BCAR-145.A.70, taking into account the availability and use of the maintenance data specified in point BCAR-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.
- (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 paragraph, paragraph (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 authorized release certificate 'BCAA Form 1' referred to in appendix II of BCAR-M constitutes the component certificate of release to service except if otherwise specified in point BCAR-M.A502(b) or BCAR-M.A.502(e). When an organization maintains a component for its own use, a BCAA Form 1 may not be necessary depending upon the organization's internal release procedures defined in the exposition.
- (e) By derogation to paragraph (a), when the organization is unable to complete all maintenance ordered, it may issue a certificate of release to service within the approved aircraft limitations. The organization shall enter such fact in the aircraft certificate of release to service before the issue of such certificate.
- (f) By derogation to paragraph (a) and BCAR-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 paragraph (a) and BCAR-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 BCAR-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 BCAR-145 approval number.

2. It is acceptable to use an alternate abbreviated certificate of release to service consisting of the following statement ‘BCAR-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 program 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 summarize the maintenance so 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.

### **AMC No 1 to 145.A.50(d) Certification of maintenance**

The purpose of the certificate 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 BCAA 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 organization to users.

It can only be issued by organizations approved by the BCAA within the scope of the approval.

The certificate may be used as a rotatable tag by utilizing 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 organization. The alternative solution is to use existing rotatable 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 organizations approved under BCAR-145 and the item needs a certificate for the previous maintenance process carried out for the next maintenance organization approved under BCAR-145 to accept the item for subsequent maintenance processes. In such a case, a clear statement of limitation should be endorsed in Block 12.

#### **AMC No 2 to 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.

When an organization maintains a component for use by the organization, a BCAA Form 1 may not be necessary depending upon the organizations' internal release procedures defined in the maintenance organization exposition.

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

2.1 A BCAA Form 1 may be issued for an aircraft component which has been:

- Maintained before BCAR-145 became effective or manufactured before BCAR-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 organization.

2.2 An appropriately rated maintenance organization approved under BCAR-145 may issue a BCAA Form 1 as detailed in this AMC sub-paragraph 2.5 to 2.9, as appropriate, in accordance with procedures detailed in the exposition as approved by the BCAA. The

appropriately rated organization is responsible for ensuring that all reasonable measures have been taken to ensure that only approved and serviceable aircraft components are issued a BCAA Form 1 under this paragraph.

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

2.4 A BCAA Form 1 issued in accordance with this paragraph 2 should be issued by signing in block 14b and stating 'Inspected' 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 BCAA Form 1.

2.5 New / unused aircraft components

2.5.1 Any unused aircraft component in storage without a BCAA Form 1 up to the effective date(s) for BCAR-21 that was manufactured by an organization acceptable to the BCAA at the time may be issued a BCAA Form 1 by an appropriately rated maintenance organization approved under BCAR-145. The BCAA Form 1 should be issued in accordance with the following subparagraphs which should be included in a procedure within the maintenance organization 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 BCAR-145 and not a production release under BCAR-21. It is not intended to bypass the production release procedure agreed by the BCAA for parts and subassemblies intended for fitment on the manufacturers own production line.

(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 organization 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 replaced. On satisfactory completion after reassembly, BCAA 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 a Bhutanese registered aircraft may be issued a BCAA Form 1 by an appropriately rated organization subject to compliance with this subparagraph.

(a) The organization 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 BCAA 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 serialized 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 BCAA 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 non-Bhutanese registered aircraft may only be issued a BCAA Form 1 if the components are leased or loaned from the maintenance organization approved under BCAR-145 who retains control of the airworthiness status of the components. A BCAA 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 a Bhutanese registered aircraft withdrawn from service may be issued a BCAA Form 1 by a maintenance organization approved under BCAR-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 organization approved under BCAR-145, employing procedures approved by the BCAA.
- (b) To be eligible for installation, components removed from such aircraft may be issued with a BCAA Form 1 by an appropriately rated organization 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 organization 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 BCAR-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 organization 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 BCAR-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 organizations not approved in accordance with BCAR-145. For used components maintained by a maintenance organization not approved under BCAR-145, due care should be taken before acceptance of such components. In such cases an appropriately rated maintenance organization approved under BCAR-145 should establish satisfactory conditions by:

- (a) dismantling the component for sufficient inspection in accordance with the appropriate maintenance data;
- (b) replacing of 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 BCAR-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 BCAA 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 BCAR-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 BCAR-145.A.50(e) requires such operator to be informed in the case where full compliance with BCAR-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 of the State of Registry or State of operator, as appropriate. In case of doubt concerning such a decision of the operator, the approved maintenance organization should inform BCAA of such doubt, before issue of the certificate of release to service. This will allow BCAA to investigate the matter with the competent authority of the State of Registry or the State of the operator as appropriate.

3. The procedure should draw attention to the fact that BCAR-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 BCAR-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 organization releasing said component together with details of the authority under whose approval the organization works including the approval or authorization reference.
2. Compliance with all other BCAR-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) BCAA 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.

### **BCAR-145.A.55 Maintenance records**

- (a) The organization shall record all details of maintenance work carried out. As a minimum, the organization shall retain records necessary to prove that all requirements have been met for issuance of the certificate of release to service, including subcontractor's release documents.
- (b) The organization 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 organization shall retain a copy of all detailed maintenance records and any associated maintenance data for three years from the date the aircraft or component to which the work relates was released from the organization.
  - 1. Records under this paragraph shall be stored in a manner that ensures protection from damage, alteration and theft.
  - 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 organization approved under this BCAR 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 BCAA.

**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.

### GM 145.A.55(a) Maintenance records

1. Properly executed and retained records provides owners, operators and personnel with information essential in controlling unscheduled and scheduled maintenance, and troubleshooting to eliminate the need for re-inspection and rework to establish airworthiness.

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 serialized 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 BCAR-145.A.45.

2. 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.
3. 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 BCAA for acceptance.

*Note:* Additional maintenance may be required.

4. The maintenance record can be either a paper or computer system or any combination of both.
5. Paper systems should use robust material which can withstand normal handling and filing. The record should remain legible throughout the required retention period.
6. Computer systems may be used to control maintenance and/or record details of maintenance work carried out. Computer systems used for maintenance should have at least one backup system which should be updated at least within 24 hours of any maintenance. Each terminal is required to contain programme safeguards against the ability of unauthorized personnel to alter the database.

**BCAR-145.A.60 Occurrence reporting**

- (a) The organization shall report to the BCAA, the state of registry and the organization responsible for the design of the aircraft or component any condition of the aircraft or component identified by the organization that has resulted or may result in an unsafe condition that hazards seriously the flight safety.
- (b) The organization 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 paragraph (a). This procedure shall identify adverse trends, corrective actions taken or to be taken by the organization 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 organization shall make such reports in a form and manner established by the BCAA and ensures that they contain all pertinent information about the condition and evaluation results known to the organization.
- (d) Where the organization is contracted by a commercial operator to carry out maintenance, the organization shall also report to the operator any such condition affecting the operator's aircraft or component.
- (e) The organization shall produce and submit such reports as soon as practicable but in any case within 72 hours of the organization identifying the condition to which the report relates.

### **AMC 145.A.60(a) Occurrence reporting**

GM on occurrence reporting document issue 01, rev 00 dated March 2021, provides further guidance on occurrence reporting.

### **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 organization 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(a) Occurrence reporting**

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

### **GM 145.A.60(b) Occurrence reporting**

The following examples can be considered occurrence reporting in a BCAR-145 environment but should not be considered as the only case of occurrence reporting:

- a) A defect detected on the aircraft during a maintenance inspection (scheduled or non-scheduled) which may have its origin in a maintenance or design error.
  - During routine inspection: Damage found to number 4 engine inlet cowl acoustic lining
  - During routine inspection: Rivets found loose on the vertical stabilizer
  - Found during after flight inspection: Excessive play in tail rotor blade pitch link bearing at the attachment to the tail rotor blade horn due to bearing migration.
- b) A deviation of maintenance procedure (company manual or manufacturer documentation)
  - Safety pin being left installed in a component, such as an escape slide
  - Alleged inappropriate repair carried out with damage outside of SRM limits.
  - Torch left in intake causing damage to inlet cowl during engine start.
  - Part Number of a replaced part not properly recorded.

### **GM 145.A.60(c) Occurrence reporting**

Each report should contain at least the following information:

- (i) Organization 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 BCAR-145.A.60(b).
- (v) Any other relevant information found during the evaluation or rectification of the condition.

**BCAR-145.A.65 Safety and quality policy, maintenance procedures and quality system**

- (a) The organization shall establish a safety and quality policy for the organization to be included in the exposition under BCAR-145.A.70.
- (b) The organisation shall establish procedures agreed by the BCAA taking into account human factors and human performance to ensure good maintenance practices and compliance with the applicable requirements established in BCAR-145.A.25 to BCAR-145.A.95. 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 BCAR-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 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 organizations the independent audit part of the quality system may be contracted to another organization approved under this BCAR 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 BCAR-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 organization shall establish a Safety Management System (SMS) that:
- (1) Shall achieve the following objectives as a minimum:
    - (i) Identifies safety hazards;
    - (ii) Assesses the impact of these safety hazards and mitigates risks;
    - (iii) Ensures that remedial action necessary to maintain an acceptable level of safety is implemented;
    - (iv) Provides for continuous monitoring and regular assessment of the safety level achieved; and
    - (v) Aims to make continuous improvement to the overall level of safety.
  - (2) Shall meet the requirements contained in Appendix V to this BCAR; and

- (3) Shall be approved by the BCAA.

**GM145.A.65(b)(1) Safety and quality policy, maintenance procedures and quality system**

Appendix XI to AMC M.A.708(c) provides guidance on the elements that need to be considered for the maintenance contract between the CAMO and the maintenance organisation. The BCAR-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(a) Safety and quality policy, maintenance procedures and quality system**

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

- Recognize safety as a prime consideration at all times
- Apply Human factors principles
- Encourage personnel to report maintenance related errors/incidents
- Recognize that compliance with procedures, quality standards, safety standards and regulations is the duty of all personnel
- Recognize 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 practices within the organization. It is the responsibility of all organization's employees to report any differences via their organization's internal occurrence reporting mechanisms.
2. All procedures, and changes to those procedures, should be verified and validated before use where practicable.
3. All technical procedures should be designed and presented in accordance with good human factors principles.

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

Specialized services include any specialized activity, such as, but not limited to non-destructive testing requiring particular skills and/or qualifications. BCAR-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 specialized 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 organization to ensure that it can deliver a safe product and that organization 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 BCAR-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 organizations that work at night.

4. Except as specified in sub-paragraphs 7 and 9, the independent audit should ensure that all aspects of BCAR-145 compliance are checked every 12 months and may be carried out as a complete single exercise or subdivided over the 12 month 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 sub-paragraphs 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 organization.

It therefore follows for example that a maintenance organization approved BCAR-145 with a capability to maintain aircraft, repair engines, brakes and autopilots would need to carry out 4 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 organization, that is an organization with a maximum of 10 personnel actively engaged in maintenance, chooses to contract the independent audit element of the quality system in accordance with BCAR-145.A.65 (c)(1) it is conditional on the audit being carried out twice in every 12 month period.
8. Except as specified otherwise in sub-paragraph 9, where the organization has line Stations listed as per BCAR-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, BCAA 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 organization 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 organization approved under BCAR-145, being an organization 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 organization approved under BCAR-145, being an organization 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. Organizations 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 organization or a qualified and competent person approved by the BCAA.

#### **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 principle function of the quality feedback system is to ensure that all findings resulting from the independent quality audits of the organization 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 BCAR-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 BCAR-145.A.65(c)(2) to rectify findings and inform the quality department or nominated 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 organizations 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 audits time periods, whichever is the longer.

**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 BCAR-145.A.65(c)1. There are 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.40		Yes	Yes	Yes	Yes
145.A.42		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
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
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	No
3.12	MOE	Yes	Yes	No	No
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
M.A.201(c)		Yes	Yes	Yes	Yes
M.A.403(b)		Yes	No	No	No

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 the BCAA within the limits of AMC 145.A.65(c)(1).

### **BCAR-145.A.70 Maintenance organization exposition**

- (a) ‘Maintenance organization exposition’ means the document or documents that contain the material specifying the scope of work deemed to constitute approval and showing how the organization intends to comply with BCAR-145. The organization shall provide the BCAA with a maintenance organization exposition, containing the following information:
1. A statement signed by the accountable manager confirming that the maintenance organization exposition and any referenced associated manuals define the organization’s compliance with this BCAR and will be complied with at all times. When the accountable manager is not the chief executive officer of the organization then such chief executive officer shall countersign the statement;
  2. the organization’s safety and quality policy as specified by BCAR-145.A.65;
  3. the title(s) and name(s) of the persons nominated under BCAR-145.A.30(b);
  4. the duties and responsibilities of the persons nominated under BCAR-145.A.30(b), including matters on which they may deal directly with BCAA on behalf of the organization;
  5. an organization chart showing associated chains of responsibility between the persons nominated under BCAR-145.A.30(b);
  6. a list of certifying staff and support staff;
  7. a general description of manpower resources;
  8. a general description of the facilities located at each address specified in the organization's approval certificate;
  9. a specification of the organization’s scope of work relevant to the extent of approval;
  10. the notification procedure of BCAR-145.A.85 for organization changes;
  11. the maintenance organization exposition amendment procedure;
  12. the procedures and quality system established by the organization under BCAR-145.A.25 to BCAR-145.A.90;
  13. a list of commercial operators, where applicable, to which the organization provides an aircraft maintenance service;
  14. a list of subcontracted organizations, where applicable, as specified in BCAR-145.A.75(b);
  15. a list of line stations, where applicable, as specified in BCAR-145.A.75(d);
  16. A list of contracted organizations, where applicable.
- (b) The exposition shall be amended as necessary to remain an up-to-date description of the organization. The exposition and any subsequent amendment shall be approved by the BCAA.

- (c) Notwithstanding paragraph (b) minor amendments to the exposition may be approved through an exposition procedure (hereinafter called indirect approval).
- (d) The exposition shall refer to the Safety Management System Manual (SMSM).

### **AMC 145.A.70(a) Maintenance organization exposition**

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

The information specified in BCAR-145.A.70(a) sub-paragraphs (6) and (12) to (16) inclusive, whilst a part of the maintenance organization 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.

The exposition should contain the information, as applicable, specified in this AMC. The information may be presented in any subject order so long as all applicable subjects are covered. Where an organization 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 in the exposition the subject matter can be found in the exposition.

The exposition should contain information as applicable, on how the maintenance Organization complies with Critical Design Configuration Control Limitations (CDCCL) Instructions.

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

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

## **PART 0 GENERAL ORGANIZATIONS**

This section is reserved for those maintenance organizations approved under BCAR-145 who are also operators within the Bhutan.

## **PART 1 MANAGEMENT**

- 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 organization chart.
- 1.6 List of certifying staff and support staff.
- 1.7 Manpower resources.
- 1.8 General description of the facilities at each address intended to be approved.

- 1.9 Organizations intended scope of work.
- 1.10 Notification procedure to the BCAA regarding changes to the organization'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 BCAA/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.

2.5 Procedures to detect and rectify maintenance errors.

2.6 Shift/task handover procedures

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

2.8 Production planning procedures

## PART 2 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 residue, 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 QUALITY SYSTEM PROCEDURES

3.1 Quality audit of organization 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 organizations' procedures.

3.11 Qualification procedure for specialized 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.

#### PART 4

1.1 Contracting operators.

1.2 Operator procedures and paperwork.

1.3 Operator record completion.

#### PART 5

5.1 Sample of documents.

5.2 List of Sub-contractors as per BCAR-145.A.75(b).

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

5.4 List of contracted organizations as per BCAR-145.A.70(a)(16).

#### PART 6 OPERATORS MAINTENANCE PROCEDURES

This section is reserved for those maintenance organizations approved under BCAR-145 who are also operators.

#### PART 7

(Reserved)

#### PART 8

(Reserved)

### **GM 145.A.70(a) Maintenance organization exposition**

1. The purpose of the maintenance organization exposition (MOE) is to set forth the procedures, means and methods of the organization.
2. Compliance with its contents will assure compliance with the requirements of BCAR-145, which is a prerequisite to obtaining and retaining an approved maintenance organization certificate.
3. BCAR-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 BCRA-145.A.30(b) who should be reasonably familiar with its contents. BCRA-145.A.70(a)(6) list of certifying staff and B1 and B2 support staff may be produced as a separate document.
4. BCAR-145.A.70(a)(12) constitutes the working procedures of the organization 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 organization 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 BCAA, including associated procedures manuals and submission of the proposed amendments to the BCAA. However, the BCAA 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 BCAA.
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) Contracted operator procedures and paperwork.
9. The accountable manager's exposition statement as specified under BCAR-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 defines the organization and procedures upon which the Bhutan Civil Aviation Authority BCAR-145 approval is based as required by BCAR-145.A.70. These procedures are approved by the undersigned and should be complied

with, as applicable, when work/orders are being progressed under the terms of the BCAR-145 approval.

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

It is understood that the Bhutan Civil Aviation Authority will approve this organization whilst the Bhutan Civil Aviation Authority is satisfied that the procedures are being followed and work standards maintained. It is further understood that Bhutan Civil Aviation Authority reserves the right to suspend, limit or revoke the approval of the organization if the Bhutan Civil Aviation Authority has evidence that procedures are not followed or standards not upheld.

Signed .....

Dated .....

Accountable Manager and .....(quote position).....

For and on behalf of..... (quote organization'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 BCAR-145 approval.

10. When an organization is approved against any other BCAR containing 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.

**AMC 145.A.70(d) Maintenance organisation exposition**

The Maintenance organization exposition should include a reference to the Safety Management Manual. As the BCAA issue specific approvals for each Safety Management System, the Safety Management Manual should be issued as a specific manual and not be integrated within the Maintenance organization exposition.

### **BCAR-145.A.75 Privileges of the organization**

In accordance with the exposition, the organization 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 organization that is working under the quality system of the organization. This refers to work being carried out by an organization not it appropriately approved to carry out such maintenance under this BCAR and is limited to the work scope permitted under BCAR-145.A.65(b) procedures. 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 organization 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 BCAR-145.A.50.

### AMC 145.A.75(b) Privileges of the organization

1. Working under the quality system of an organization appropriately approved under BCAR-145 (sub-contracting) refers to the case of one organization, not itself appropriately approved to BCAR-145 that carries out aircraft line maintenance or minor engine maintenance or maintenance of other aircraft components or a specialized service as a subcontractor for an organization appropriately approved under BCAR-145. To be appropriately approved to subcontract the organization should have a procedure for the control of such sub-contractors as described below. Any approved maintenance organization within its own approval scope is not considered to be subcontracting for the purpose of this paragraph.
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.
3. FUNDAMENTALS OF SUB-CONTRACTING UNDER BCAR-145
  - 3.1 The fundamental reasons for allowing an organization approved under BCAR-145 to sub-contract certain maintenance tasks are:
    - (a) To permit the acceptance of specialized 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 BCAA in such cases.
    - (b) To permit the acceptance of aircraft maintenance up to but not including a base maintenance check as specified in BCAR-145.A.75(b) by organizations not appropriately approved under BCAR-145 when it is unrealistic to expect direct approval by the BCAA. BCAA will determine when it is unrealistic but in general it is considered unrealistic if only one or two organizations intend to use the sub-contract organization.
    - (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 BCAR-145.A.75(b) by organizations not appropriately approved under BCAR-145 when it is unrealistic to expect direct approval by the BCAA. 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 BCAR-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 organization's products undergoing maintenance should meet BCAR-145 requirements for the duration of that maintenance and it remains the Organizations responsibilities to ensure such requirements are satisfied.

- 3.3 For the criteria specified in sub-paragraph 3.1 the organization 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 organization 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 organization 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 authorize the use of such subcontractors, BCAA will need to be satisfied that the organization has the necessary expertise and procedures to control such sub-contractors.
  - 3.5 An organization working outside the scope of its approval schedule is deemed to be not approved. Such an organization may in this circumstance operate only under the sub-contract control of another organization approved under the BCAR-145.
  - 3.6 Authorization to sub-contract is indicated by the BCAA accepting the maintenance organization exposition containing a specific procedure on the control of sub-contractors.
4. PRINCIPAL BCAR-145 PROCEDURES FOR THE CONTROL OF SUB-CONTRACTORS NOT APPROVED UNDER BCAR-145
- 4.1 A pre-audit procedure should be established whereby the maintenance organization's subcontract control section, which may also be the BCAR-145.A.65(c) quality system independent audit section, should audit a prospective sub-contractor to determine whether those services of the sub-contractor that it wishes to use meets the intent of BCAR-145.
  - 4.2 The organization approved under BCAR-145 needs to assess to what extent it will use the sub-contractor's facilities. As a general rule the organization 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 BCAR-145. In the case of sub-contractors who provide specialized services it may for practical reasons be necessary to use their specialized services personnel, approved data and material subject to acceptance by the organization approved under BCAR-145.
  - 4.3 Unless the sub-contracted maintenance work can be fully inspected on receipt by the organization approved under BCAR-145 it will be necessary for such organization to supervise the inspection and release from the sub-contractor. Such activities should be fully described in the organization procedure. The organization will need to consider whether to use its own staff or authorize the sub-contractor's staff.
  - 4.4 The certificate of release to service may be issued either at the sub-contractor or at the organization facility by staff issued a certification authorization in accordance with BCAR-145.A.30 as appropriate, by the organization approved under BCAR-145. Such staff would normally come from the organization approved under BCAR-145 but may otherwise be a

person from the sub-contractor who meets the approved maintenance organization certifying staff standard which itself is approved by the BCAA via the maintenance organization exposition. The certificate of release to service and the BCAA Form 1 will always be issued under the maintenance organization 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 BCAR-145 approved maintenance organization's requirements.
- 4.6 The BCAR-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 BCAR-145 approved maintenance organization and the sub-contractor should contain a provision for the BCAA staff to have right of access to the sub-contractor.

**BCAR-145.A.80 Limitations on the organization**

The organization shall only maintain an aircraft or component for which it is approved when all the necessary facilities, equipment, tooling, material, maintenance data and certifying staff are available.

### **AMC 145.A.80 Limitations on the organization**

This paragraph is intended to cover the situation where the larger organization may temporarily not hold all the necessary tools, equipment etc., for an aircraft type or variant specified in the organization's approval. This paragraph means that BCAA need not amend the approval to delete the aircraft type or variants on the basis that it is a temporary situation and there is a commitment from the organization to re-acquire tools, equipment etc. before maintenance on the type may recommence.

### **BCAR-145.A.85 Changes to the organization**

The organization shall notify the BCAA of any proposal to carry out any of the following changes before such changes take place to enable BCAA to determine continued compliance with BCAR-145 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 organization;
2. The main location of the organization;
3. Additional locations of the organization;
4. The accountable manager;
5. Any of the persons nominated under BCAR-145.A.30(b);
6. The facilities, equipment, tools, material, procedures, work scope or certifying staff that could affect the approval.

**BCAR-145.A.90 Validity**

- (a) An approval shall be issued or renewed for a maximum period of one year. It shall remain valid subject to:
1. the organization remaining in compliance with BCAR-145, in accordance with the provisions related to the handling of findings as specified under by the BCAA; and
  2. BCAA being granted access to the organization to determine continued compliance with BCAR-145; and
  3. The certificate not being surrendered or revoked.
- (b) Upon surrender or revocation, the approval shall be returned to the BCAA.

### **BCAR-145.A.95 Findings**

- (a) A level 1 finding is any significant non-compliance with BCAR-145 requirements which lowers the safety standard and hazards seriously the flight safety.
- (b) A level 2 finding is any non-compliance with the BCAR-145 requirements which could lower the safety standard and possibly hazard the flight safety.
- (c) After receipt of notification of findings, the holder of the maintenance organization approval shall define a corrective action plan and demonstrate corrective action to the satisfaction of the BCAA within a period agreed with the BCAA.

**Section B - Procedure for BCAA**

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**Appendixes to the Implementing rules**

**Appendix I Authorized release certificate - BCAA Form 1**

The provisions of Appendix II to BCAR-M apply.

**Appendix II Class and Rating System used for the Approval of Maintenance Organizations referred to BCAR-145**

The provisions of Appendix IV to BCAR-M apply.

**Appendix III Maintenance Organisation Approval referenced to BCAR-145**



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Bhutan Civil Aviation Authority  
Royal Government Of Bhutan  
Paro : Bhutan



**MAINTENANCE ORGANISATION APPROVAL CERTIFICATE**

Reference: **BCAA.145.XX**

Pursuant to the Bhutan Air Navigation Regulation and BCAR-145 for the time being in force and subject to the conditions specified below, the Bhutan Civil Aviation Authority hereby certifies:

[COMPANY NAME]  
[COMPANY ADDRESS]

as a maintenance organisation in compliance with Section A of BCAR-145, approved to maintain the products, parts and appliances listed in the attached approval schedule and issue related certificates of release to service using the above reference.

**CONDITIONS:**

1. This approval is limited to that specified in the scope of work section of the approved maintenance organisation exposition as referred to in Section A of BCAR-145, and
2. This approval requires compliance with the procedures specified in the BCAR-145 approved maintenance organisation exposition, and
3. This approval is valid whilst the approved maintenance organisation remains in compliance with BCAR-145.
4. Subject to the date of expiry of the certificate and compliance with the foregoing conditions, this approval shall remain valid until the approval has previously been surrendered, superseded, suspended or revoked.

Effective date: XX.XX.XX

Date of expiry: XX.XX.XX

Date of issue: XX.XX.XX

Signature: .....



འབྲུག་གི་བའི་མཁའ་འགྲུལ་དབང་འཛིན། དཔལ་ལྷན་འབྲུག་གཞུང།

Bhutan Civil Aviation Authority  
 Royal Government Of Bhutan  
 Paro : Bhutan



**MAINTENACE ORGANISATION APPROVAL SCHEDULE**

Reference: **BCAA.145.XX**

Organisation name: [COMPANY NAME AND ADDRESS]

CLASS	RATING	LIMITATION	BASE	LINE
AIRCRAFT	XX	YY	[YES/NO]	[YES/NO]
ENGINES	XX	YY		
COMPONENTS OTHER THAN COMPLETE ENGINES OR APUs	XX	YY		
SPECIALISED SERVICES	XX	YY		

This approval schedule is limited to those products, parts and appliances and to the activities specified in the scope of approval section contained in the approved maintenance organisation exposition,

Maintenance Organisation Exposition reference:

Effective date: XX.XX.XX

Date of expiry: XX.XX.XX

Date of issue: XX.XX.XX

Signature: .....

**AMC to Appendix III**

- Reserved

**Appendix IV Conditions for the use of staff not qualified in accordance with BCAR-66 referred to in points BCAR-145.A.30(j) 1 and 2.**

1. Certifying staff in compliance with all the following conditions are deemed to meet the intent of BCAR-145.A.30(j) (1) and (2):
  - a) The person shall hold a license or a certifying staff authorization issued under the national regulations in compliance with ICAO Annex 1.
  - b) The scope of work of the person shall not exceed the scope of work defined by the national license or the certifying staff authorization, whatever is the most restrictive.
  - c) The person shall demonstrate he/she has received training on human factors and aviation legislations referred to in modules 9 and 10 of Appendix I to BCAR-66.
  - d) The person shall demonstrate five years maintenance experience for line maintenance certifying staff and eight years for base maintenance certifying staff. However, those persons whose authorized tasks do not exceed those of a BCAR-66 category A certifying staff, need to demonstrate three years maintenance experience only.
  - e) Line maintenance certifying staff and base maintenance support staff shall demonstrate he/she receive type training and passed examination at the category B1, B2 or B3 level, as applicable, referred to in Appendix III to BCAR-66 for each aircraft type in the scope of work referred to in point (b). Those persons whose scope of work does not exceed those of a category A certifying staff may however receive task training in lieu of complete type training.
  - f) Base maintenance certifying staff shall demonstrate he/she received type training and passed examination at the category C level referred to in Appendix III to BCAR-66 for each aircraft type in the scope of work referred to in point (b), except that for the first aircraft type, training and examination shall be at the category B1, B2 or B3 level of Appendix III.
2. Protected rights
  - a) The personnel having privileges before the entry into force of the relevant requirements of BCAR-66 may continue to exercise them without the need to comply with point 1(c) to 1(f).
  - b) However after that date any certifying staff willing to extend the scope of their authorization to include additional privileges shall comply with point 1.
  - c) Notwithstanding subparagraph 2(b) above, in the case of additional type training, compliance with points 1(c) and 1(d) is not required.

## Appendix V Safety Management System

### 1. Scope

This appendix establishes the minimum requirements Safety Management System of maintenance organization complying with BCAR-145 should meet. The maintenance organization may wish to follow more stringent requirements.

### 2. Definitions

Acceptable level of safety means minimum safety performance that a maintenance organization should achieve while conducting their core business functions, expressed by a number of safety performance indicators and safety performance targets.

Accountability means obligation or willingness to account for one's actions.

Accountable Executive means a single, identifiable person which might be a Chief Executive Officer, a Chairperson Board of Directors, a partner or a proprietor who has full responsibility for the organization's SMS and have full authority for human resources issues, major financial issues, direct responsibility for the conduct of the organization's affairs, final authority over operations under certificate, and final responsibility for all safety issues.

Consequence means potential outcome(s) of the hazard.

Hazard means condition, object or activity with the potential of causing injuries to personnel, damage to equipment or structures, loss of material, or reduction of ability to perform a prescribed function.

Mitigation means measures to address the potential hazard or to reduce the risk probability or severity.

Predictive means a method that captures system performance as it happens in real-time normal operations.

Proactive means the adoption of an approach which emphasizes prevention through the identification of hazards and the introduction of risk mitigation measures before the risk bearing event occurs and adversely affects safety performance.

Probability means the likelihood that an unsafe event or condition might occur.

Reactive means the adoption of an approach where safety measurement is as a responds to the events that already happened, such as incidents and accidents.

Risk means the assessment, expressed in terms of predicted probability and severity, of the consequence(s) of a hazard taking as reference the worst foreseeable situation.

Risk management means the identification, analysis and elimination, and/or mitigation to an acceptable level of risks that threaten the capabilities of an organization.

Safety means the state in which the risk of harm to persons or property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management.

Safety assessment means a systematic analysis of a proposed change to equipment or procedures to identify and mitigate weaknesses before change is implemented.

Safety assurance means what the maintenance organization do with regard to safety performance monitoring and measurement.

Safety audit means what the Civil Aviation Authority performs with regard to its safety programme, and the maintenance organizations perform with regard to the SMS.

Safety Management System (SMS) means a systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

Safety manager means a person who is responsible for providing guidance and direction for the operation of the organization's safety management system.

Safety oversight means the activities of Civil Aviation Authority as part of its safety programme, performed with regard to the maintenance organization SMS, in order to confirm the organization's continuing fulfillment of its corporate safety policy, objectives, goals and standards.

Safety performance indicator means established objectives of a maintenance organization SMS, linked to major components of a services provider SMS, and expressed in numerical terms.

Safety performance monitoring means the activities of a maintenance organization as part of its SMS, in order to confirm the organization's continuing fulfillment of its corporate safety policy, objectives, goals and standards.

Safety performance target means medium or long-term objectives of a maintenance organization SMS, determined weighing what is desirable and what is realistic for an individual services provider, and expressed in numerical terms.

Safety policy means a statement reflecting the organization's philosophy of safety management, and become the foundation on which the organization's SMS is built. The safety policy outlines the methods and processes that the organization will use to achieve desired safety outcomes.

Safety programme means an integrated set of regulations and activities aimed at improving safety.

Safety requirement means the operational procedures, technology, systems and programmes to which measures of reliability, availability, performance and/or accuracy can be specified.

Severity means the possible consequences of an unsafe event or condition, taking as reference the worst foreseeable situation.

System means organized set of processes and procedures.

Systematic means that safety management activities will be conducted in accordance with a pre-determined plan, and applied in a consistent manner throughout the organization.

### 3. General

The maintenance organization shall establish, maintain and adhere to a Safety Management System (SMS) that is appropriate to the size, nature and complexity of its scope of work and the safety hazards and risks related to it.

### 4. Safety policy and objectives

#### 4.1 General requirements

1. A maintenance organization shall define the organization's safety policy.
2. The safety policy shall be signed by the Accountable Executive of the organization.
3. The safety policy shall be in accordance with all applicable legal requirements and international standards, best industry practices and shall reflect organizational commitments regarding safety.
4. The safety policy shall be communicated, with visible endorsement, throughout the organization.
5. The safety policy shall include a clear statement about the provision of the necessary human and financial resources for its implementation.
6. The safety policy shall, among other things, include the following objectives:
  - a) Commitment to implement an SMS;
  - b) Commitment to continual improvement in the level of safety;
  - c) Commitment to the management of safety risks;
  - d) Commitment to encourage employees to report safety issues;
  - e) Establishment of clear standards for acceptable behaviour; and
  - f) Identification of responsibilities of management and employees with respect to safety performance.
7. The safety policy shall be reviewed periodically to ensure it remains relevant and appropriate to the organization.
8. A maintenance organization shall establish safety objectives for the SMS.
9. The safety objectives should be linked to the safety performance indicators, safety performance targets and safety requirements of the maintenance organization SMS.

#### 4.2 Organizational structure and responsibilities

1. A maintenance organization shall identify an Accountable Executive to be responsible and accountable on behalf of the maintenance organization for meeting the requirements of this regulation, and shall notify the competent authority the name of the person.
2. The Accountable Executive shall be a single, identifiable person who, irrespective of other functions, shall have the ultimate responsibility for the implementation and maintenance of the SMS.
3. The Accountable Executive shall have:
  - a) Full control of the human resources required for the work authorized to be conducted under the maintenance organization approval;
  - b) Full control of the financial resources required for the work authorized to be conducted under the maintenance organization approval;
  - c) Final authority over the work authorized to be conducted under the maintenance organization approval;
  - d) Direct responsibility for the conduct of the organization's affairs; and
  - e) Final responsibility for all safety issues.
4. A maintenance organization shall establish the safety structure necessary for the implementation and maintenance of the organization's SMS.
5. A maintenance organization shall identify the safety responsibilities of all members of senior management, irrespective of other responsibilities.
6. Safety-related positions, responsibilities and authorities shall be defined, documented and communicated throughout the organization.
7. A maintenance organization shall identify a Safety Manager to be the member of management who shall be the responsible individual and focal point for the development and maintenance of an effective SMS.
8. The Safety Manager shall:
  - a) Ensure that processes needed for the SMS are established, implemented and maintained;
  - b) Report to the Accountable Executive on the performance of the SMS and on any need for improvement; and
  - c) Ensure safety promotion throughout the organization.

#### 4.3 SMS implementation plan

1. A maintenance organization shall develop and maintain an SMS implementation plan.
2. The SMS implementation plan shall be the definition of the approach the organization will adopt for managing safety in a manner that will meet the organization's safety needs.
3. The SMS implementation plan shall include the following:
  - a) Safety policy and objectives;
  - b) Safety planning,
  - c) System description;
  - d) Gap analysis;
  - e) SMS components;
  - f) Safety roles and responsibilities;
  - g) Safety reporting policy;
  - h) Means of employee involvement;
  - i) Safety training;
  - j) Safety communication;
  - k) Safety performance measurement; and
  - l) Management review of safety performance.
4. The SMS implementation plan shall be endorsed by senior management of the organization.
5. A maintenance organization shall, as part of the development of the SMS implementation plan, complete a system description.
6. The system description shall include the following:
  - a) The system interactions with other systems in the air transportation system;
  - b) The system functions;
  - c) Required human performance considerations of the system operation;
  - d) Hardware components of the system;
  - e) Software components of the system;
  - f) Related procedures that define guidance for the operation and use of the system;
  - g) Operational environment; and

- h) Contracted and purchased products and services.
7. A maintenance organization shall, as part of the development of the SMS implementation plan, complete a gap analysis, in order to:
    - a) identify the safety arrangements and structures that may be already exist throughout an organization; and
    - b) determine additional safety arrangements required to implement and maintain the organization's SMS.
  8. The SMS implementation plan shall explicitly address the coordination between the SMS of the maintenance organization and the SMS of other organizations the maintenance organization must interface with during the provision of services.

#### 4.4 Coordination of emergency response planning

A maintenance organization shall develop and maintain, or coordinate, as appropriate, an emergency response/contingency plan that shall ensure:

1. Orderly and efficient transition from normal to emergency situation;
2. Designation of emergency authority;
3. Assignment of emergency responsibilities;
4. Coordination of efforts to cope with the emergency; and
5. Safe continuation of its activities, or return to normal activities as soon as possible.

#### 4.5 Documentation

1. A maintenance organization shall develop and maintain SMS documentation, in paper or electronic form, to describe the following:
  - a) Safety policy;
  - b) Safety objectives;
  - c) SMS requirements, procedures and processes;
  - d) Responsibilities and authorities for procedures and processes; and
  - e) SMS outputs.
2. A maintenance organization shall, as part of the SMS documentation, develop and maintain Safety Management System Manual (SMSM), to communicate the organization's approach to safety throughout the organization.
3. The SMSM shall document all aspects of the SMS, and its contents shall include the following:

- a) Scope of the Safety Management System;
- b) Safety policy and objectives;
- c) Safety accountabilities;
- d) Key safety personnel;
- e) Documentation control procedures;
- f) Hazard identification and risk management schemes;
- g) Safety performance monitoring;
- h) Emergency response/contingency planning;
- i) Management of change; and
- j) Safety promotion.

## 5. Safety risk management

### 5.1 General

1. A maintenance organization shall develop and maintain Safety Data Collection and Processing systems (SDCPS) that provide for the identification of hazards and the analysis, assessment and mitigation of safety risks.
2. A maintenance organization's SDCPS shall include reactive, proactive and predictive methods of safety data collection.

### 5.2 Hazard identification

1. A maintenance organization shall develop and maintain formal means for effectively collecting, recording, acting on and generating feedback about hazards in its activities, which combine reactive, proactive and predictive methods of safety data collection. Formal means of safety data collection shall include mandatory, voluntary and confidential reporting systems.
2. The hazard identification process shall include the following steps:
  - a) Reporting of hazards, events or safety concerns;
  - b) Collection and storing the safety data;
  - c) Analysis of the safety data; and
  - d) Distribution of the safety information distilled from the safety data.

### 5.3 Risk management

1. A maintenance organization shall develop and maintain a formal risk management process that ensures the analysis, assessment and mitigation of risks of consequences of hazards to an acceptable level.
2. The risks of the consequences of each hazard identified through the hazard identification processes described in section 7.2 of this regulation shall be analyzed in terms of probability and severity of occurrence, and assessed for their tolerability.
3. The organization shall define the levels of management with authority to make safety risk tolerability decisions.

## 6. Safety assurance

### 6.1 General

1. A maintenance organization shall develop and maintain safety assurance processes to ensure that the safety risks controls developed as a consequence of the hazard identification and risk management activities under paragraph 7 achieve their intended objectives.
2. Safety assurance processes shall apply to an SMS whether the activities are accomplished internally or outsourced.

### 6.2 Safety performance monitoring and measurement

1. A maintenance organization shall, as part of the SMS safety assurance activities, develop and maintain the necessary means to verify safety performance of the organization in comparison with the approved safety policies and objectives, and to validate the effectiveness of implemented safety risk controls.
2. Safety performance monitoring and measurement means shall include the following:
  - a) Safety reporting;
  - b) Safety audits;
  - c) Safety surveys;
  - d) Safety reviews;
  - e) Safety studies; and
  - f) Internal safety investigations.
3. The safety reporting procedure shall set out the conditions to ensure effective safety reporting, including the conditions under protection from disciplinary/administrative action shall apply.

### 6.3 Management of change

1. A maintenance organization shall, as part of the SMS safety assurance activities, develop and maintain a formal process for the management of change.
2. The formal process for the management of change shall:
  - a) Identify changes within the organization which may affect established processes and services;
  - b) Describe the arrangements to ensure safety performance before implementing changes; and
  - c) Eliminate or modify safety risk controls that are no longer needed due to changes in the operational environment.

### 6.4 Continuous improvement of the safety system

1. A maintenance organization shall, as part of the SMS safety assurance activities, develop and maintain formal processes to identify the causes of under-performance of the SMS, determine the implications in its operation, and to rectify situations involving below standard performance in order to ensure the continual improvement of the SMS.
2. Continuous improvement of the maintenance organization SMS shall include:
  - a) Proactive and reactive evaluations of facilities, equipment, documentation and procedures, to verify the effectiveness of strategies for control of safety risks; and
  - b) Proactive evaluation of the individuals' performance, to verify the fulfillment of safety responsibilities.

## 7. Safety promotion

### 7.1 General

A maintenance organization shall develop and maintain formal safety training and safety communication activities to create an environment where the safety objectives of the organization can be achieved.

### 7.2 Safety training

1. A maintenance organization shall, as part of its safety promotion activities, develop and maintain a safety training programme that ensures that personnel are trained and competent to perform the SMS duties.
2. The scope of the safety training shall be appropriate to the individual's involvement in the SMS.
3. The Accountable Executive shall receive safety awareness training regarding:
  - a) Safety policy and objectives;

- b) SMS roles and responsibilities; and
- c) Safety assurance.

### 7.3 Safety communication

1. A maintenance organization shall, as part of its safety promotion activities, develop and maintain formal means for safety communication, to:
  - a) Ensure that all staff is fully aware of the SMS;
  - b) Convey safety critical information;
  - c) Explain why particular safety actions are taken;
  - d) Explain why safety procedures are introduced or changed; and
  - e) Convey generic safety information.
2. Formal means of safety communication shall include:
  - a) Safety policies and procedures;
  - b) Newsletters; and
  - c) Bulletins.

### 7.4 Quality policy

A maintenance organization shall ensure that the organization quality policy is consistent with, and supports the fulfillment of the activities of the SMS.

## Appendices to AMCs

### Appendix I BCAA Form 4

The provisions of Appendix X of BCAR-M, BCAA Form 4 apply.

**Appendix II Reserved**

**Appendix III to AMC 145.A.15 BCAA Form 2**

The provisions of Appendix IX to AMC M.A.602 and AMC M.A.702 of BCAR-M, BCAA Form 2, apply.

## **Appendix IV 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:**

- “Large aeroplanes” as defined in BCAR-145.A.1

### **B. Affected organisations:**

- BCAR-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.
- BCAA responsible for the oversight of the BCAR-145 approved organisation specified in this paragraph B.

### **C. Persons from affected organisations who should receive training:**

#### 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 BCAA when responsible for the oversight of the BCAR-145 approved organisation specified in paragraph B.

#### Phase 1 + Phase 2 + Continuation training:

- Personnel of the BCAR-145 approved maintenance organization 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**

#### Phase 1 – Awareness

The training should be carried out before the person starts to work without supervision but not later than 6 months after joining the organisation. The persons who have already attended the Level 1 Familiarisation course in compliance with Initial Issue of BCAR-145 Appendix IV is already in compliance with Phase 1.

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.

Level: It should be a course at the level of familiarisation with the principal elements of the subject.

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

Content: The course should include:

- a short background showing examples of FTS accidents or incidents,
- the description of concept of fuel tank safety and CDCCL,
- some examples of manufacturers documents showing CDCCL items,
- typical examples of FTS defects,
- some examples of TC holders repair data,
- some examples of maintenance instructions for inspection.

#### Phase 2 - Detailed training

A flexible period may be allowed by the BCAA to allow organisations to set the necessary courses and impart the training to the personnel, taking into account the organisation's training schemes/means/practices. This flexible period should not extend beyond 31 December 2010.

The persons who have already attended the Level 2 Detailed training course in compliance with Initial Issue BCAR-145 Appendix IV either from a BCAR-145 maintenance organisation or from a BCAR-147 training organisation are already in compliance with Phase 2 with the exception of continuation training.

Staff should have received Phase 2 training by 31 December 2010 or within 12 months of joining the organization, whichever comes later.

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%.

Level: It should be a detailed course on the theoretical and practical elements of the subject.

The training may be made either:

- 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

- 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 continuous evaluation process should ensure the effectiveness of the training and its relevance;
  - Some questions at intermediate steps of the training should be proposed to ensure that the trainee is authorized to move to the next step;
  - The content and results of examinations should be recorded;
  - Access to an instructor in person or at distance should be possible in case support is needed.

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.

Objectives:

The attendant should, after the completion of the training:

- 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;
- have the capacity to combine and apply the separate elements of knowledge in a logical and comprehensive manner;
- have knowledge on how the above items affect the aircraft;
- be able to identify the components or parts or the aircraft subject to FTS from the manufacturer's documentation,
- be able to plan the action or apply a Service Bulletin and an Airworthiness Directive.

Content: Following the guidelines described in paragraph E).

Continuation training

The organisation should ensure that the continuation 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 continuation training.

The continuation training may be combined with the phase 2 training in a classroom or at distance.

The continuing training should be updated when new instruction are issued which are related to the material, tools, documentation and manufacturer's or BCAA's directives.

### **E. Guidelines for preparing the content of Phase 2 courses**

The following guidelines should be taken into consideration when the phase 2 training programmes are being established:

- a) understanding of the background and the concept of fuel tank safety,
- b) 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,
- c) awareness of any hazards especially when working on the fuel system, and when the Flammability Reduction System using nitrogen is installed.

Paragraphs a) b) and c) 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 the briefly 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 BCAR-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. The necessary changes to the MOE to meet the content of this AMC should be made and implemented at the time requested by the BCAA.

----- END -----