

Annex III

Guidance Material to Part-145

SECTION A TECHNICAL REQUIREMENTS

GM 145.A.10 Scope

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

1. By inference, the smallest maintenance organisation 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 organisation.
2. It is recognised that an Part-145 approval may be required by two quite different types of small organisations, 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 organisations approved under Part-145 may use the alternatives provided in this Guidance Material 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 engined 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 Inspections.

Please note that the following sections only include the relevant paragraphs of Part-145 for which the alternative applies. When paragraphs of Part-145 not listed means full compliance needs to be demonstrated.

4. Organisations maintaining the class of aeroplanes, helicopters, engines or components within the limitations of AMC 145.A.20 paragraph 5.

5. 145.A.30(b): The minimum requirement is for one full time person who meets the Part-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.

5.1. The quality monitoring function of 145.A.65(c) may be contracted to an appropriate organisation approved under Part-145 or to a person with appropriate technical knowledge and extensive experience of quality audits employed on a part-time basis, with the agreement of the competent authority.

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

5.2. 145.A.35. In the case of an approval based on one person using a subcontracted quality monitoring arrangement, the requirement for a record of certifying staff is satisfied by the submission to and acceptance by the competent

authority of the EASA Form 4. With only one person the requirement for a separate record of authorisation is unnecessary because the EASA Form 3 approval schedule defines the authorisation. An appropriate statement, to reflect this situation, should be included in the exposition.

5.3. 145.A.65(c). It is the responsibility of the contracted quality monitoring organisation or person to make a minimum of 2 visits per 12 months and it is the responsibility of this organisation or person to carry out such monitoring on the basis of 1 visit pre-announced and 1 visit unannounced to the organisation.

It is the responsibility of the organisation to comply with the findings of the contracted quality monitoring organisation or the person.

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

6. Recommended operating procedure for an Part-145 approved maintenance organisation based upon up to 10 persons involved in maintenance.

6.1. 145.A.30(b): The normal minimum requirement is for the employment on a full-time basis of two persons who meet the competent authorities requirements for certifying staff, whereby one holds the position of "maintenance engineer" and the other holds the position of "quality audit engineer".

Either person can assume the responsibilities of the accountable manager providing that they can comply in full with the applicable elements of 145.A.30(a), but the "maintenance engineer" should be the certifying person to retain the independence of the "quality audit engineer" to carry out audits. Nothing prevents either engineer from undertaking maintenance tasks providing that the "maintenance engineer" issues the certificate of release to service.

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

In cases where the competent authority agrees that it is not practical for the organisation to nominate a postholder for the quality monitoring function, this function may be contracted in accordance to paragraph 5.1.

GM 145.A.30 (e) Personnel requirements (Training syllabus for initial human factors training)

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

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

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

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

Topics should be related to existing legislation, where relevant. Topics should be related to existing guidance/ advisory material, where relevant (eg. ICAO HF Digests and Training Manual).

Topics should be related to maintenance engineering where possible; too much unrelated theory should be avoided.

- 1 General / Introduction to human factors
 - 1.1 Need to address human factors
 - 1.2 Statistics
 - 1.3 Incidents
- 2 Safety Culture / Organisational factors
- 3 Human Error
 - 3.1 Error models and theories
 - 3.2 Types of errors in maintenance tasks
 - 3.3 Violations
 - 3.4 Implications of errors
 - 3.5 Avoiding and managing errors
 - 3.6 Human reliability
- 4 Human performance & limitations
 - 4.1 Vision
 - 4.2 Hearing
 - 4.3 Information-processing
 - 4.4 Attention and perception
 - 4.5 Situational awareness
 - 4.6 Memory
 - 4.7 Claustrophobia and physical access
 - 4.8 Motivation
 - 4.9 Fitness/Health
 - 4.10 Stress
 - 4.11 Workload management
 - 4.12 Fatigue
 - 4.13 Alcohol, medication, drugs
 - 4.14 Physical work
 - 4.15 Repetitive tasks / complacency
- 5 Environment
 - 5.1 Peer pressure
 - 5.2 Stressors
 - 5.3 Time pressure and deadlines
 - 5.4 Workload
 - 5.5 Shift Work
 - 5.6 Noise and fumes
 - 5.7 Illumination
 - 5.8 Climate and temperature

- 5.9 Motion and vibration
- 5.10 Complex systems
- 5.11 Hazards in the workplace
- 5.12 Lack of manpower
- 5.13 Distractions and interruptions
- 6 Procedures, information, tools and practices
 - 6.1 Visual Inspection
 - 6.2 Work logging and recording
 - 6.3 Procedure – practice / mismatch / norms
 - 6.5 Technical documentation – access and quality
- 7 Communication
 - 7.1 Shift / Task handover
 - 7.2 Dissemination of information
 - 7.3 Cultural differences
- 8 Teamwork
 - 8.1 Responsibility
 - 8.2 Management, supervision and leadership
 - 8.3 Decision making
- 9 Professionalism and integrity
 - 9.1 Keeping up to date; currency
 - 9.2 Error provoking behaviour
 - 9.3 Assertiveness
- 10 Organisation's HF program
 - 10.1 Reporting errors
 - 10.2 Disciplinary policy
 - 10.3 Error investigation
 - 10.4 Action to address problems
 - 10.5 Feedback

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

1. For the holder of an ATPL or CPL issued in accordance with JAR FCL 1 or JAR FCL 2 the theoretical knowledge and examination subjects are detailed in appendix 1 to JAR FCL 1.470 and appendix 1 to JAR FCL 2.470 and include the following subjects:

- Air law
- Airframe/systems/powerplant
- Instruments/electronics
- Mass and balance
- Performance

- Flight planning and monitoring
- Human performance and limitations
- Meteorology
- General navigation
- Radio Navigation
- Operational Procedures
- Principles of Flight
- VFR Communications
- IFR Communications

2. For the holder of an JAR FCL F/EL, JAR FCL 4 subpart D gives details on the theoretical and practical knowledge and skill requirements from which appendix 1 to JAR FCL 4.160 Technical Training Course (TTC) details the following subjects:

(See JAR-FCL 4.160(b)(1))

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

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

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

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

- Fuselage and flight controls
- Engines
- Instruments
- Landing gear and brakes
- Cabin/cockpit/emergency equipment
- Ground handling and servicing
- Certificate of completion

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

GM 145.A.55(a) Maintenance records

1. Properly executed and retained records provide owners, operators and maintenance personnel with information essential in controlling unscheduled and scheduled maintenance, and trouble shooting 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 serialised aircraft components and all other significant aircraft components installed, to ensure traceability to such installed aircraft component documentation and associated maintenance data as specified in 145.A.45.

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 competent authority 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 unauthorised personnel to alter the database.

GM 145.A.60(a) Occurrence reporting

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

GM 145.A.60(c) Occurrence reporting

Each report should contain at least the following information:

- i) Organisation name and approval reference.
- ii) Information necessary to identify the subject aircraft and / or component.
- iii) Date and time relative to any life or overhaul limitation in terms of flying hours/cycles/landings etc. as appropriate.
- iv) Details of the condition as required by 145.A.60(b).
- v) Any other relevant information found during the evaluation or rectification of the condition.

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

Appendix 5 (continued)

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

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

PARA	Comment	HANGAR	ENGINE	MECH	AVIONIC
			Workshop	Workshop	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.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
2.6	MOE	yes	Yes	Yes	yes
2.7	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
2.15	MOE	yes	No	No	no
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.65		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

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 by the competent authority within the limits of AMC 145.A.65(b).”

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

1. The purpose of the maintenance organisation exposition (MOE) is to set forth the procedures, means and methods of the organisation.
2. Compliance with its contents will assure compliance with the requirements of Part-145, which is a pre-requisite to obtaining and retaining an approved maintenance organisation certificate.
3. 145.A.70 (a)(1) to (a)(11) constitutes the 'management' part of the MOE and therefore could be produced as one document and made available to the person(s) specified under 145.A.30 (b) who should be reasonably familiar with its contents. 145.A.70(a)(6) list of certifying staff may be produced as a separate document.
4. 145.A.70 (a)(12) constitutes the working procedures of the organisation and therefore as stated in the requirement may be produced as any number of separate procedures manuals. It should be remembered that these documents should be cross-referenced from the management MOE.
5. Personnel are expected to be familiar with those parts of the manuals that are relevant to the maintenance work they carry out.
6. The organisation should specify in the MOE who should amend the manual particularly in the case where there are several parts.
7. The quality manager should be responsible for monitoring the amendment of the MOE, unless otherwise agreed by the competent authority, including associated procedures manuals and submission of the proposed amendments to the competent authority. However the competent authority 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 competent authority.
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 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 organisation and procedures upon which the (competent authority*) Part-145 approval is based as required by -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 Part-145 approval.

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

It is understood that the (competent authority*) will approve this organisation whilst the (competent authority*) is satisfied that the procedures are being followed and work standards maintained. It is further understood that the (competent authority*) reserves the right to suspend, limit or revoke the approval of the organisation if the (competent 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 organisation's name).....',

NOTE:Where it states (competent authority*) please insert the actual name of the competent authority, for example, CAA-NL, LBA, DGAC, CAA, etc., 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 Part-145 approval.

10. When an organisation is approved against any other Part 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.