AAC No. 2 of 2018
Dated: 25th January, 2018

GOVERNMENT OF INDIA
CIVIL AVIATION DEPARTMENT
DIRECTOR GENERAL OF CIVIL AVIATION

AIRWORTHINESS ADVISORY CIRCULAR

Subject: **CAR 147 (Basic) organisations – Procedures for Approval/ Renewal/ Change in the scope of approval**

1. Introduction:

1.1 Rule 133B of the Aircraft Rules, 1937 stipulates that organizations engaged in the aircraft maintenance training shall be approved. Further, CAR-147 (Basic) specifies the requirements to be met by organizations seeking approval under Rule 133B to conduct aircraft maintenance training and examination as specified in CAR 66. The CAR 147 (Basic) also specifies the conditions for issue, renewal, suspension and revocation of certificates attached to the approval and privileges thereof.

1.2 This circular explains the procedures and guidelines to be followed by organisation for seeking approval and DGCA for granting approval to an applicant for issuance/ extension/ renewal of approval under CAR 147 (Basic) for imparting basic aircraft maintenance training.

1.3 Five-phase process shall be followed for grant of approval. The five-phase shall consist of pre-application phase, formal application phase, documentation evaluation phase, inspection and demonstration phase, and certification phase. The process normally takes three to six months which may vary depending on the preparedness and compliance by the applicant.

1.4 It is important to note that this circular is for guidance purpose only and on its own does not change, create, amend or permit deviations from regulatory requirements, nor does it establish minimum standards.

2. Regulatory References :

2.1 Rule 133B of Aircraft Rule, 1937

2.2 Rule 133C of Aircraft Rule, 1937

2.3 CAR 147 (Basic)

2.4 CAR 66

3. Application process:

3.1 Pre-application phase

During this phase, the prospective applicant can make initial enquiry regarding regulatory requirements/ processes to be followed to obtain the approval.

3.2 Formal Application Phase

3.2.1 The applicant shall apply to the DGCA Headquarters (Directorate of Airworthiness) on CAR Form 12a along with Maintenance Training Organisation Exposition (MTOE) prepared in accordance with Appendix I and other documents as mentioned in CAR 147.A.15.

3.2.2 In addition, following documents will be required to be submitted:

a) Interface manual / SOP, in case of existing training institutes, detailing the responsibility/ control procedures of the training institute and the contracted maintenance organisation.
b) Certificate by the proposed Accountable Manager on the number of employees in the organisation for determining the fees to be charged as per Rule 133C of Aircraft Rules, 1937
c) Schedule of Events describing the list of activities, and/or facility acquisitions, which must be accomplished or made ready, including the dates on which they will be ready for the DGCA to inspect. The schedule should be realistic and contains sufficient flexibility to allow for unforeseen contingencies.

Note1: The intended scope of approval should be detailed as much as possible. It should mention class and the ratings sought.

Note 2: Only applications for a full Basic Training Course for Category/ sub-Category of a licence will be considered.

Note 3: Initial approval shall be granted by DGCA Headquarters. Subsequent renewals/ change in scope shall be issued by concerned regional office.

3.2.3 Upon receipt of application, the same will be scrutinised to determine eligibility and completeness of the application according to CAR 147.

3.2.4 Schedule of Events will be scrutinised for realistic timelines which will be mutually agreed. Any change in the timelines may affect the process.

3.2.5 Incorrect or incomplete application will not be processed further and the applicant notified accordingly.

3.2.6 While submitting the application, the applicant should provide evidence of compliance of following requirements:

i) **Personnel Requirements:**

a) The persons nominated in accordance with CAR 147.A.105 (a) and (b) to hold the function as Accountable Manager, Training Manager, Examination Manager and Quality Manager.

b) Knowledge and practical Instructors, knowledge examiners and practical assessors required by 147.A.105 (c) to perform trainings and conduct associated examinations/ practical assessments.

c) Details of personnel necessary to administrate training/ examination activities such as the planning of training/ examinations, the management of the library and of the training materials, the update and maintenance of the training devices, the administration of trainees applications and the issuance/ retention of Certificates of Recognitions, the management of contractors and the Quality Monitoring of the approval holder's training/ examination activities. The declared staff shall cover all sites present on the Approval Certificate and the MTOE related section.

d) Staff not belonging to the approved Maintenance Training Organisation but involved into the CAR 147 training and examination/ assessment activities must be declared (i.e. instructors of a CAR 145 aircraft maintenance organisation)

Note: Existing Institutes should demonstrate to DGCA that the number of available instructors are adequate to smoothly conduct the training programme for the enrolled batches. In general, a training school should have at least two instructors for each range of subjects to ensure continuity of program in the event one instructor being absent.

ii) Facility Requirements:

a) The institute should preferably have its own premises, or premises taken on long term lease (five years). The institute should be established in areas permitted by the local administrative authorities. For this purpose, an NOC from local administration authority is required or documentary evidence in this case is also acceptable.

b) Adequate number of class rooms for theoretical classes should be available. For initial approval, at least three class rooms, each

properly equipped with training aids/instructional equipment in accordance with 147.A.115 (a) must be available. The class rooms should be properly lighted, well ventilated, furnished and free from noise. The size of the rooms should be appropriate to accommodate 30 number of students at a time. As a guideline, each room should be at least of 33 sq. mts. area.

c) The size of accommodation for examination purposes should be such that no student can read the paperwork or computer screen of any other student from his/her position during examinations.

d) The institute should have facilities commensurate with the scope of approval for imparting practical training on each element of the training syllabus to be covered during the course. The basic training workshops and/or aircraft maintenance facilities separate from training classrooms for practical instruction appropriate to the course, should have all tools and equipment necessary to perform the approved scope of training.

e) The institute should have hangar/adequate covered area to park the Aircraft/Helicopter for demonstration and for performing practical exercises on the aircraft.

f) The existing training institute should have viable arrangements with another organization located conveniently to provide such workshops and/ or approved aircraft maintenance facilities in accordance with 147.A.100 (d). The contract in this regard should address at least the following:

   (i) Scope of contract indicating details of the facilities proposed to be provided by the contracted organisation;
   (ii) Maximum number of students that will be permitted for the practical;
   (iii) Responsibilities of both the organisations;
   (iv) Nodal person of both the organisation and their responsibilities;
   (v) Condition of access to relevant areas of the facility including issue of Airport Entry Passes to the students (as applicable)
   (vi) Validity of the contract including conditions for renewal of contract;

Note :- Maximum number of students in a session should to be limited as per the number of students permitted by the AMO for practical training .

g) The institute should maintain a dedicated web portal accessible to the public providing information such as course structure, duration, course fees with break up, syllabus, infrastructure, DGCA approval, practical training details, training facilities owned and contracted, details of instructors employed and contracted, details

of students admitted, terms and conditions, feedback mechanism, contact details of person responsible for providing information, clarification and any other relevant information to the public.

h) The institute should have library with adequate number of reference books, technical materials in accordance with 147.A.100 (i) commensurate to the scope and level of training under-taken.

i) Institute must demonstrate adequacy of infrastructure available/make arrangement with CAR 145 approved aircraft maintenance organisation for imparting practical training for requested no. of students in a batch for a particular course.

j) A general guideline/ recommended facilities, tools and equipment required to accomplish the maintenance skills are given in Appendix II, III & IV.

k) Maintenance training material relevant to the course should be prepared and provided to the students.

Note: Training course material includes the trainee's notes and the instructor's material (slides etc.); in effect it is important for DGCA to assess the information delivered by instructors and to ensure an acceptable ratio with student self-study notes.

3.3 **Document Evaluation Phase**

3.3.1 The application and the documents will be evaluated in accordance with procedures documented in APM, Part II, Chapter 3G. The evaluation and assessment shall consist of following items:

a) Post holders,
b) Instructors, examiners, practical assessors;
c) Para wise CAR compliance of CAR 147 and internal audit report;
d) MTOE and associated procedures;
e) Contracts and associated interface manual;

3.3.2 Evaluation and acceptance of Post holders and other personnel

a) The Accountable Manger should demonstrate to DGCA Headquarters that he has a reasonable understanding of applicable regulations and of his role within the approved organisation, but also that he has all necessary means, in particular financial, to fulfil the Accountable Manager's duties as detailed in the MTOE. The Accountable Manager is accepted via approval

of the MTOE containing the Accountable Manager's commitment statement.

b) The proposed post holders are required to demonstrate to DGCA appropriate essential requirements of qualification, experience in accordance with 147.A.105 and are competent to perform the function. If satisfied, the formal acceptance of the post holders is granted through the corresponding CA Form 4 by DGCA. Once the post holders have been accepted by the DGCA, the names of the post holders shall be included in the MTOE.

c) Assessment and acceptance of Instructors, examiners and assessors should be performed by the approved training organization in accordance with the dedicated procedure described in the MTOE (as approved by the DGCA). The list of those staffs should be included into the MTOE or cross referred document. CA Form 4 is not required to be submitted for these personnel.

d) Once satisfactorily completed, the detailed result of this assessment must be provided with the list of concerned staff and supporting documents to DGCA.

Note: DGCA will assess that the training organization has an acceptable system in place to ensure that each proposed instructor, examiner and assessor is competent, but also that the organization can demonstrate that it has enough qualified instructors, examiners and assessors to cover, without any gap, the integrality of the approved courses.

e) Whenever possible, a review of the proposed instructor's file, followed by an interview of the person and the partial attendance to an event led by the person (lesson, exam, assessment) should be prioritized by DGCA.

f) Whenever the direct interview of the proposed instructor is not possible or not appropriate, the background of the person (education/ experience etc.) should be carefully reviewed in order to determine that the details provided are adequate to demonstrate the qualities of the person.

Note 1: In order to assist with the completion of this task, a number of generic acceptable means of demonstration (i.e. qualification, experience requirements etc.) have been summarized included into the MTOE User Guide.

Note 2: In any case, samplings including interviews and event witnessing must be performed by the DGCA when approving a new organization, or when significantly extending the scope of an existing approval and repeated as part of the continued surveillance carried out within the organization.

Note 3: Instructors, examiners and assessors accepted and exercising their privileges, or part thereof, at the entry into force of CAR 147 (Basic), are considered as fulfilling the knowledge and experience requirements. However an assessment of the gap between actual qualifications and this standard should be performed and provided to the DGCA.

3.4 Inspection and Demonstration Phase

a) Prior to inspection by DGCA, the Applicant's Quality Department should audit the Organisation in full for compliance with CAR 147 (Basic) and subsequent amendments.

b) For an initial approval application, a statement signed by the Organisation's Quality Manager should be provided before the audit takes place, confirming that documents, procedures, training/exam material, facilities and personnel subject to the application have been reviewed and audited showing compliance with all applicable requirements.

c) Detailed procedures as documented in APM, PART II, Chapter 3G for approval of CAR 147 (Basic) Organisation should be followed to assess the capability of the organisation to undertake the function.

d) Once compliance of the applicant with CAR 147 (Basic) has been established, the audit team will recommend for CAR 147 (Basic) approval of the organisation as per Airworthiness Procedure Manual. This includes the recommendation for the MTOE approval and the acceptance of management personnel.

3.5 Certification Phase

3.5.1 The recommendation package (Document review and the on-site audit report including closure of findings) will be reviewed for compliance and accuracy. Once satisfied, following documents will be issued to the applicant:

a) the approval certificate CA Form 11A;
b) the approval letter of the MTOE together with its associated document;
c) the nominated personnel CA Form 4s;

4. Change to CAR 147 (Basic) approval

4.1 An application for change of CAR 147 (Basic) Maintenance Training Organisation approval should be made to the concerned RAO/ SRAO by using the CA Form 12a along with the following documents:

a) Soft and hard copy of amended MTOE and associated procedure manuals;
b) Amendment to Interface manual / SOP as applicable;
c) Para wise CAR 147 compliance report along with relevant supporting documents.
d) Details of personnel including post holders, Instructors, examiners, assessors etc.
e) No. of employees certified by the Accountable Manager;
f) Applicable fees as per Rule 133C of Aircraft Rules, 1937.

4.2 The guidelines for initial approval process will be followed by the concerned RAO/ SRAO for change in scope of approval.

5. Renewal of an approval (147.A.155)

5.1 An application for renewal of CAR 147 (Basic) Maintenance Training Organisation approval should be made to the concerned RAO/ SRAO by using the CA Form 12a along with the following documents;

a) Internal audit report and status of closure of findings of the organisation;
b) Copy of contractual arrangements;
c) Validity and scope of approval of contracted organisation, as relevant;
a) No. of employees certified by the Accountable Manager;
b) Applicable fees as per Rule 133C of Aircraft Rules, 1937.

5.2 Each organization must be completely reviewed (audited) by RAOs for compliance with CAR-147 (Basic) at periods not exceeding 12 months. RAO/ SRAO should use complete the CA Form 22a for the purpose. It should be ensured by the concerned RAO/ SRAO that no finding is open at the time of renewal of approval.

6. Institute Records

6.1 The following records shall be maintained for a period of ten years after the completion of course.

a) The records of the employment of the instructor subject wise;

b) Question papers and answer sheets of each student;
c) List of the computer numbers allotted to the students by CEO batch wise;
d) List of organizations having tie up with the institute to provide some elements of practical training as permitted by CAR;
e) Module wise performance of the students in DGCA licence examination.

7. Surveillance/ Audit

7.1 Internal Audits by the Organisation:

7.1.1 The Quality Manager of the approved organisation should develop procedure to carry out periodical planned and unplanned audits to ensure proper compliance of the documented procedures for conduction of training.

7.1.2 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.

7.1.3 If any finding of serious nature (Level-1) is detected during the audits, the same should be intimated to the concerned RAO/ SRAO immediately. The responsible manager should take appropriate action to mitigate the finding. The root cause analysis along with the measures taken to prevent such finding in future should be intimated in writing by Quality Manager to RAO/ SRAO.

7.1.4 In case there is any violation of the approved procedures, the Quality Manager is required to investigate the same and take necessary action under intimation to RAO/ SRAO.

7.2 Surveillance by DGCA:

7.2.1 The respective Regional/ Sub-regional Airworthiness office will carry out planned and unplanned surveillance inspection of organisation as per procedures detailed in APM Chapter 9.

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

7.2.3 In case there is any violation of the approved procedures, the RAO/SRAO should investigate the same and take necessary action

as per the procedure detailed in the Enforcement Policy and Procedure manual against the organisation.

Sd/-
(K P Srivastava)
Deputy Director General of Civil Aviation
For Director General of Civil Aviation

Appendix I

Guideline for framing of Maintenance Training Organisation Exposition CAR 147 (Basic)

1. Scope

This user guide is compiled with a view to provide guidance to applicant for organisation seeking approval for CAR 147 (Basic) for the purpose of compilation of Maintenance Training Organisation Exposition (MTOE). This document is complementary to the requirements of CAR 147 (Basic) and does not supersede or replace the requirements/ instructions issued by DGCA from time to time.

Note: The MTOE should be customized as per the scope and complexity of the organisation.

2. Important Instruction

This user guide is designed to be used by CAR 147 (Basic) Maintenance training Organisations - To assist them in the preparation of their own MTOE.

The user guide is provided for guidance only and should be customised by each organisation to demonstrate how they comply with CAR 147 (Basic). The organisation may choose to use another format as long as all the applicable regulations are addressed and cross-referenced.

For each detailed procedure described within the MTOE, the organisation should address the following questions:

What must be done? Who should do it? When must be done? Where must it be done? How must it be done? Which procedure(s)/form(s) should be used?

3. Exposition format

The MTOE should be submitted in hardcopy and electronic format;

- Hardcopy: DGCA does recommend using white paper (format A4); The MTOE should be provided in a binder with section dividers.

- Electronic Format: The Exposition should be in Portable Document Format (PDF) but a printed copy should be delivered to the DGCA/RAO/ SRAO to facilitate the document study.

4. Structure of the Maintenance Training Organisation Exposition (MTOE)

The MTOE may be produced in the form of a single document or may consist of several separate documents.

- Single document: The standard MTOE produced i.a.w. 147.A.140 is a unique and complete document. It must contain all the information required to show compliance with the regulation including detailed procedures including quality system procedures.

- Several documents: The MTOE must contain at least the information as detailed in 147.A.140 and Appendix I to AMC of CAR 147 (Basic). The additional material may be published in separate documents which must be referenced from the MTOE. In this case:

  - The MTOE should cross refer to the associated procedures, documents, appendices, forms and all other lists which are managed separately (e.g. the list of instructional or examination staffs, the list of contracted organisations etc.).

  - These associated documents must meet the same rules as described for the MTOE.

  - The associated document(s), procedure(s) and form(s) etc. should be provided to and approved by the DGCA (as part of the MTOE).

For some organisations certain sections of the headings defined within 147.A.140 and CAR 147 Appendix I may be 'not applicable'. In this case they should be annotated as such within the MTOE.

5. Exposition pages presentation

Each page of the MTOE should be identified as follows (this information may be added in the header)

- the name of the organisation (official name as defined on the CA Form 11a approval certificate);
- the issue number of the MTOE;
- the amendment/revision number of the MTOE;
- the date of the revision (amendment or issue depending on the way the organisation has chosen to revise the MTOE);
- the chapter of the MTOE;
- the page number; and

- the name of the document "Maintenance Training Organisation Exposition”

At the beginning of the volume, the first page should specify:

- CAR 147 (Basic) Maintenance Training Organisation Exposition;
- The name of the organisation (the official one defined on the CA Form 11a approval certificate);
- The address, telephone, fax numbers and e-mail address of the Head Office;
- The copy number from the distribution list, and
- The approval reference of the CAR 147 organisation.

6. Corporate Commitment by Accountable Manager

Prior to submission of the ‘draft’ MTOE to the DGCA for approval the Accountable Manager must sign and date the Corporate Commitment statement (Management 1.1). This confirms that they have read the document and understand their responsibilities under the approval. In the case of change of Accountable Manager, the new incumbent should sign the document and submit a suitable amendment to DGCA for approval.

Format of Maintenance Training Organisation Exposition

CAR 147 (Basic)

This Exposition supports the DGCA CAR 147 (Basic) Maintenance Training Organisation Approval of:

Name of Institute

Address

Tel: +91 (XXX) XXXXXXXXXX

Fax: +91 (XXX) XXXXXXXXX

E-mail: training@school.com

CAR 147 APPROVAL

REFERENCE

CAR147.xxxx

Exposition Reference No: XXXX

Copy No: **Held By:**

PART 0 - INTRODUCTION

0.1 Table of Contents

For standardisation purposes and to facilitate the production of the MTOE by the CAR 147 (Basic) maintenance training organisation, the following format for the MTOE as per CAR 147 (Basic) Appendix I to AMC should be followed. The organisation should customise the document to suit their organisation and may add pages/ paragraphs as necessary.

CONTENTS

2.10 Security and preparation of examination material

2.11 Preparation of examination rooms

2.12 Conduct of examinations

2.13 Conduct of Basic practical assessments

2.14 Marking and record of examinations

2.15 Storage of examination records

2.16 Preparation, control & issue of course certificates

2.17 Reserved

PART 3 – TRAINING SYSTEM QUALITY PROCEDURES

3.1 Audit of training

3.2 Audit of examinations

3.3 Analysis of examination results

3.4 Audit and analysis remedial action

3.5 Accountable Managers annual review

3.6 Qualifying the Instructors

3.7 Qualifying the Examiners/Assessors

3.8 Records of qualified Instructors/Examiners and Assessors

PART 4 – APPENDICES

4.1 Example of documents and forms used

4.2 Syllabus of each training course

4.3 Cross reference index, if applicable

Note: Where a part is not used it should be shown in the Exposition as Not Applicable.

0.2 List of Effective Page

(Example)

Page Number	Date of Issue Revision	Revision	Page Number	Date of Issue	Revision
001	20 January, 2018	Rev. 0	122	25 April, 2018	Rev. 1

This list of issue/ amendments should allow traceability from the previously approved version.

The name of the organisation, the date of approval and the name of the person who has approved the MTOE should be included.

0.3 List of issues / amendments

(Example)

Amendment / issue Number	Amendment / issue Date	Amendment / issue Type
Initial	25 April, 2018	major

Amendment number **Revision 1** dated **25 April, 2018**

This issue/ amendment has been internally reviewed by: **(name & position)**

Date of review: **25 April, 2018**

0.4 Distribution List

This document should include a Distribution List to ensure proper distribution of the manual and to demonstrate to the DGCA that all personnel involved in maintenance training have access to the relevant information. This does not mean that all personnel have to be in receipt of a manual but that a reasonable amount of manuals are distributed within the organisation so that the relevant personnel have quick and easy access to this manual.

Alternatively, the manual may be made available on organisation intranet system with a hard copy retained by the CAR 147 organisations Quality department and DGCA. The MTOE may be produced on CD format as long as the disc is suitably annotated.

Accordingly, the maintenance training organisation exposition should be distributed to:

1. Management personnel and any person at a lower level as necessary,

2. The DGCA.

The following is for guidance only.

MOE COPY NUMBER	MOE HOLDER	FORMAT
Copy No. 1	Accountable Manager	CD-ROM
Copy No. 2	Training Manager	PAPER
Copy No 3	Examination Manager	CD-ROM
Copy No. 5	Quality Manager	CD-ROM
Copy No. 5	RAO/SRAO	PAPER
Copy No. 6	library	PAPER
Copy No. 7	Reserved	
Copy No. 8	Reserved	

FOREWORD

It may be preferable to include a foreword that explains the intent of the manual that it is a manual established to comply and to demonstrate compliance with CAR 147 (Basic) requirements. The following is an example of possible foreword:

This manual has been prepared in order to support the (Name Organisation) CAR 147 (Basic) Maintenance Training Organisation Approval. The body of this Exposition is divided into four parts.

PART 1 **MANAGEMENT**

PART 2 **TRAINING AND EXAMINATION PROCEDURES**

PART 3 **TRAINING SYSTEM QUALITY PROCEDURES**

PART 4 **APPENDICES**

NOTE:

This document is intended as guidance only. The headings and the numbering system should be used but the contents have to be customised to include the applicant procedures and working documents.

Should a different numbering system be used for the Exposition, the applicant will be asked to provide a cross reference document to ensure compliance.

CONTENTS

PART 1 – MANAGEMENT

CONTENTS

PART 1: MANAGEMENT

1.1 CORPORATE COMMITMENT BY THE ACCOUNTABLE MANAGER

CAR 147 (Basic) Maintenance Training Exposition

This exposition defines the organisation and procedures upon which the DGCA, CAR 147 (Basic) Organisation approval is based.

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

It is understood that the DGCA will approve this organisation whilst the DGCA is satisfied that the procedures are being followed. It is understood that the DGCA reserves the right to suspend, vary or revoke the CAR 147 (Basic) training system approval of the organisation, as applicable, if the DGCA has evidence that the procedures are not followed and the standards not upheld.

These procedures are approved by the undersigned and must be complied with, as applicable, whenever knowledge or practical training is being progressed under the terms of the CAR 147 (basic) approval.

The undersigned fully accepts the duties and responsibilities of Accountable Manager as defined in paragraph 1.3.1 of this exposition.

Signed …….

Accountable Manager …….

For and on behalf of …….

Note: The Accountable Manager's exposition statement should embrace the intent of the above paragraphs and in fact this statement may be used without amendment. Any modification to the statement should not alter the intent.

1.1 CORPORATE COMMITMENT (continued):

The duties of the Accountable Manager, as defined in the exposition for the purposes of the CAR 147 (Basic) approval, are delegated by the Accountable Manager to the:

State position in Organisation

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in accordance with CAR 147.A.105 (b).

Accountable Managers name and signature

For the delegated Accountable Manager:

Delegated Accountable Managers name and signature

State position in Organisation

Notes: *(not for inclusion in the exposition)*

1. *This is an alternative available to any organisation where the person who would normally be the Accountable Manager, by virtue of his/her position in the company/organisation, wishes to delegate some of the duties and responsibilities to another Manager.*

2. *Where such duties are delegated, the corporate responsibilities as defined in the corporate commitment must remain with the Accountable Manager.*

1.2 Management personnel

Accountable Manager **----------***(Insert Name)*

Training Manager **----------***(Insert Name)*

Quality Manager **----------***(Insert Name)*

Examiner **----------***(Insert Name)*

Other (*as required*) **----------.***(Insert Name)*

The Managers specified above are identified and their credentials apart from the Accountable Manager have been submitted on CA Form 4 to the DGCA.

Any changes to the above personnel shall be advised to the DGCA. Failure to do so may affect the status of the CAR 147 (basic) approval.

1.3 DUTIES AND RESPONSIBILITIES OF MANAGEMENT PERSONNEL

1.3.1 Accountable Manager: (CAR 147.A.105)

The Accountable Manager is responsible for:

- Ensuring that all instruction and examinations carried out by the organisation meets the standards required by DGCA.

- Ensuring that the necessary finance, manpower resources and facilities are available to enable the organisation to perform the knowledge and/or practical instruction and examinations to which it is committed under the requirements CAR 147 (Basic).

- Chairing the annual meeting of senior staff to review the overall performance of the organisation.

- Ensuring that any charges are paid, as prescribed by DGCA.

- Ensuring that during periods of absence, control will be maintained for administration purposes by (*Insert name/position in organisation)*, who will accept full responsibility for all training issues and related decisions.

- The operation of *(insert name of organisation)* is efficiently managed and conforms to the requirements of CAR 147 (Basic) as stipulated by DGCA.

Notes :- (not for inclusion in the Exposition)

- *Any additional duties and responsibilities within the organisation may be added or delegated provided they do not conflict with those above, which constitute the Accountable Managers responsibilities under CAR 147 (Basic).*

- *The organisation should decide who will be responsible for liaison with the DGCA and show this in his/ her terms of reference. If more than one person is nominated, it must be clearly shown what each person is responsible for with, as a general rule, no overlapping of responsibility*.

1.3.2 The Training Manager: (AMC CAR 147.A.105)

The Training Manager will undertake:

- The responsibilities of the DGCA nominated person at *(insert name of CAR 147(Basic) organisation)*.

- The duties and responsibilities of the CAR 147 (Basic) approved examiner during any absence of the nominated person(s).

- The delegated duties and responsibilities of the Accountable Manager during prolonged absence.

The Training Manager will ensure that:

- The Accountable Manager is kept informed as to the state of compliance of the organisation with CAR 147 (Basic).

- The operation of *(insert name of organisation)* is efficiently managed and conforms to the requirements of CAR 147 (Basic) as stipulated by DGCA.

- Sufficient staff with appropriate qualifications are selected, trained and developed, to plan, perform, supervise, examine and assess students as required.

- All necessary Airworthiness data published by DGCA and Aircraft manufacturers (where applicable) as appropriate, is made available.

- All changes to the Exposition and associated manuals are notified immediately to DGCA.

- The Exposition and associated manuals are amended as required.

- Knowledge examiners, instructors and assessors are fully trained and assessed regularly for competence and that all records pertaining to these personnel are kept up to date.

- Sub-contract staff including any part time staff conform to the requirements of CAR 147 (Basic) and the training procedures.

- Office accommodation and facilities are available appropriate to the management of the planned training and for the use of training staff.

- Staff development and update training is undertaken and recorded.

- That all approved courses and examinations are delivered to the standard and content at the required level of knowledge, as specified in CAR 147 (Basic).

- A working environment is provided appropriate to the tasks being undertaken.

- There are sufficient storage facilities, tools, equipment, materials and publications available to perform the planned practical tasks.

- Secure facilities are available for the storage of examination papers prior to the examination and for the storage of completed students answer papers.

- The interviewing of students prior to, during and on completion of the course is effective and without bias.

- Student and staff records are produced and stored in secure conditions.

- Any person to whom any of these responsibilities may be delegated is aware of current regulations.

- Corrective action is carried out for the findings of quality audits.

- The follow up and rectification of findings required to re-establish the required standards of training, examination or maintenance standards.

- That sufficient questions are available to produce the examination papers required to cover the syllabus in accordance with CAR 66 Appendix II. Questions utilised for progress examinations (phase tests) should not be used in the final examination

- The security and validity of all examinations are in accordance with the requirements of CAR 66 and CAR 147 (Basic).

- All examinations and assessment time-tables are co-ordinated.

- Compliance with the examination question review procedures is as required by CAR 66 and/or CAR 147 (Basic).

Notes:

This paragraph should emphasise that the nominated post holder for training is responsible to ensure that all training is carried out to an approved standard and describes the extent of his authority as regards to his CAR 147 (Basic) responsibility.

These duties may be adjusted to suit the requirements of the CAR 147 (Basic) approved organisation but should not detract from the particular requirements of CAR 147 (Basic) or CAR 66.

1.3.3 Quality Manager: (AMC CAR 147.A.105)

The Quality Manager has direct access to the Accountable Manager in the event of any reported discrepancy not being adequately attended to by the relevant person, or in respect of any disagreement over the nature of the discrepancy.

The Quality Manager is responsible for:

- Establishing an independent quality system to monitor compliance with CAR 147 (Basic) requirements.

- Implementing a quality audit programme in which compliance with all training procedures is reviewed at regular intervals, and any observed non-compliances or poor standards are brought to the attention of the person concerned via his/ her Manager.

- Proposing all corrective action necessary for eliminating non-compliance, and ensuring that these corrective actions are initiated and when completed are efficient and meet their intended purpose.

- Requiring remedial action, as necessary, by the Training Manager or the Accountable Manager.

- The Exposition and associated manuals are amended as required.

Notes:

These duties may be adjusted to suit the requirements of the CAR 147(basic) approved organisation but should not detract from the particular requirements of CAR 147 (Basic) or CAR 66.

It must be remembered that the quality audit system is required to be independent and where possible the Quality Manager and quality audit personnel should not be directly involved in the training process. Where for reasons of expediency, it is necessary to utilise training staff (in accordance with AMC 147. A.105 for smaller training organisation), it would then become necessary for a second member of staff to be nominated to audit those functions performed by the Quality Manager.

1.3.4 Examiner: (AMC CAR 147.A.105)

The Examiner is responsible for:

- The selection of examination questions/papers to be set, appropriate to the particular phase of the training course.

- The invigilation of examinations, ensuring that the conditions for examination comply with Appendix II of CAR 66 (*for basic training)*.

- The allocation of examination papers at the beginning of the examination and retrieve them on completion.

- Marking of the examination papers using acceptable marking standards.

1.3.5 Instructor: (AMC CAR 147.A.105)

The Instructor will:

- Carry out instructional duties for which he/she is qualified.
- Compile questions for examination banks for which he/she is qualified.
- Undertake duties of invigilator where he/she is not involved in the instruction of that particular phase examination.

1.3.6 Practical assessor: (AMC CAR 147.A.210)

The Practical assessor will:

- Be responsible for monitoring and assessing students during pre-set practical tasks and/or hand-skills. This will include handling of tools and calibrated equipment.

Note:

The above paragraphs should emphasise that the nominated post holders for examiner and/or assessor are responsible for ensuring that all examinations and assessments are carried out to an approved standard and describes the extent of his/her authority with regard to his/her CAR 147 (Basic) responsibility. These duties may be adjusted to suit the requirements of the CAR 147(Basic) approved organisation but should not detract from the particular requirements of CAR 147 (Basic) or CAR 66.

1.4 Management personnel organisation chart : (CAR 147.A.105)

A flow chart should provide a comprehensive understanding of the whole training organisation. It should give further details on the management system, and should clearly show the independence of the quality monitoring system, including the links between the Quality assurance department and the other departments. This flow chart may be combined or subdivided as necessary, depending on the size and the complexity of the organisation.

NOTE: The MTOE must also define who deputises for any senior person in case of lengthy absence

1.5 List of Instructional and Examination staff: (CAR 147.A.105)

This paragraph should give broad figures to show that the number of people dedicated to the performance of the approved training activity is adequate. It is not necessary to give the detailed number of employees of the whole company but only the number of those involved in training.

This could be presented as follows:

Appointment	Name	Competencies
Training Manager		*enter here those areas each person is qualified to instruct using CAR 66 module/sub-modules*
Deputy Training Manager		
Quality Manager		
Examiner		
Examiner/Instructor		
Instructor		
Instructor		
Instructor		
Instructor/Invigilator		
Invigilator		
Practical assessor		

Notes:

1. According to the size and complexity of the organisation, this table may be further developed.

2. The CAR 147(Basic) examiners are the only persons allowed to produce/ select examination papers. They may nominate other persons to mark completed examinations. The examiners and these persons should be other than the knowledge instructors involved in the instruction of that particular module/ sub-module.

1.6 List of approved address(s)

This paragraph should list those address(s) at which instruction and/ or practical training are to be carried out for the duration of the CAR 147(Basic) course.

The names, address(s) and approval numbers of any proposed Aircraft Maintenance CAR 145 Organisation at which it is proposed to carry out student practical training in order to fulfil the requirements of CAR 147 (basic) may be kept in another document or procedure and cross referenced here.

1.7 List of Sub-contractors: (CAR 147.A.100/AMC CAR 147.A.145)

Reserved

1.8 General description of facilities at paragraph 1.6 address(s): (AMC CAR 147.A.100)

Include here the facilities such as desks, chairs, lockers, overhead projectors, other teaching aids etc. for each of the offices, classrooms, practical training workshops and examination rooms provided.

1.9 Specific list of courses approved by the DGCA.

This paragraph must contain a list of the CAR 147 (Basic) course(s) for which approval is held.

1.10 Notification procedures regarding changes to organisation: (CAR 147.A.150)

Include here any cross references to the intended procedures for continued validity of the approval in compliance with the requirements of CAR 147.A.155.

The organisations 'nominated person' is responsible for informing the DGCA of any proposed changes. (Ref Part 1-Management, paragraph 1.3.2 of this user guide as example)

1.11 Exposition and associated manuals amendment procedure

Detail here or cross refer to the procedures to be followed for the amendment of the exposition and any associated procedures and or documents.

PART 2 TRAINING AND EXAMINATION PROCEDURES

CONTENTS

2.1 Organisation of courses: (CAR 147.A.200)

In this paragraph, the organisation should detail the procedures in place in order to organise the courses and to ensure that all necessary means are available to deliver in good conditions and by appropriately qualified staff all the course elements as required by the CAR 66 syllabus. Such procedures may include a formalised review of the availability of required appropriate training rooms, materials, STDs, specialists… and resulting in tuition programme.

2.2 Preparation of course material: (CAR 147.A.120)

Training material should meet the requirements of CAR 66. Once completed, this should be sent to the DGCA for review for approval of the course. This list must be given a unique reference number and revision status. In order to get the course approved a set of multi-choice questions and a copy of the course notes used by the student must also be submitted.

The course notes must reflect the training programme and be given the same reference number and revision status.

This may cross refer to a separate procedure in which details of how the standard course lecture notes are produced which would include content, indexing, chapter and page numbering, font etc.

This same procedure should also be utilised to list the responsibilities by CAR-66 module for the production, review & amendment of lecture notes.

Include cross references to any procedures used for the inclusion of other course material, e.g. Aircraft Manuals, DGCA publications, and/or Standard Text Books used for note preparation and available to students as reference material.

2.3 Preparation of classrooms and equipment: (CAR 147.A.115)

Cross reference to any procedures for the preparation of class rooms and reporting of faults to any class room equipment, general maintenance procedures and the control of the teaching environment.

2.4 Preparation of workshop/ maintenance facilities and equipment: (CAR 147.A.100)

Cross reference to any procedures for the reporting of faults to any workshop equipment, general maintenance procedures and the control of the teaching environment.

Cross reference to procedures for practical tasks, and for the ordering and acquisition of any equipment required to complete the tasks.

Cross reference to the procedures for ensuring that all test equipment and/or tooling requiring calibration are correctly forecast and expedited. Also cross reference to the procedure for ensuring that all electrical equipment power supply

feeder cables (from wall socket to equipment) throughout the organisation are tested as required.

2.5 Conduct of Basic theoretical and practical training: (AMC CAR 147.A.200)

Describe the method utilised in teaching the Basic/ knowledge and practical training courses for which the organisation is approved.

Cross refer to the low level document referred to in 2.1 above.

2.6 Records of training carried out: (CAR 147.A.125)

Cross refer to procedures for the production, maintenance and security of student files.

These should include details of all student attendance's, final knowledge examinations, practical assessments and any re-examination carried out and their results by CAR-66 complete module for CAR 147 (Basic) courses information of those courses completed, their content and at which levels at which they were instructed and examined.

There should also be reference to the Basic work experience' records required to be kept by the student whilst he is undergoing his live operating aircraft experience.

The use of an "Aircraft Maintenance Engineers Log Book" is a good example.

2.7 Storage of Records: (CAR 147.A.100)

Cross refer to procedures for the storage of staff and students records. These may be electronically based provided that adequate safeguards are in place to prevent unauthorised access and alteration.

2.8 Training at locations not listed in paragraph 1.6: (AMC CAR 147.A.145)

Should the Management wish to contract out part of the practical training (not including live operating aircraft experience), control procedures must be in place. These procedures should effectively reflect those of the DGCA in auditing the CAR 147 (Basic) Organisation.

Any training carried out at address not listed at 1.6 above must be approved by the DGCA and control procedures must be in place to ensure that the proposed contract organisation is in compliance with the requirements of CAR -66 and CAR 147 (Basic).

A contract must be in place with the proposed organisation in which it is agreed that access is granted to the DGCA for the purpose of Audit.

***2.9* Organisation of examinations: (AMC CAR 147.A.135/AMC CAR 147.A.205)**

For Aircraft Maintenance Engineer Licence (AMEL) course a High level document detailing the course examinations, when each CAR-66 module is to be examined and to what CAR -66 level. This should include the knowledge and practical

training elements and how the number of hours of each comply with the percentage requirements of AMC 147.A.200.

2.10 Security and preparation of examination material: (CAR 147.A.100/135)

For AMEL courses, detail the preparation and security of Examination papers. Number of Questions and Timing must be in accordance with CAR 66 Appendix II.

Cross reference to procedures for the production of examination questions, their validation and security of the data bank.

2.11 Preparation of examination rooms: (CAR 147.A.100b)

Cross refer to procedure to be followed by the Examiner and Invigilator in preparing the examination room for examinations.

An invigilator's ready reference sheet for briefing the candidates prior to the examination should be available in procedures and cross referenced here.

2.12 Conduct of examinations: (CAR 147.A.135/205)

Any student found during a knowledge examination to be cheating or in possession of material pertaining to the subject of the examination, other than that supplied for the examination, will be disqualified from passing the examination and may not then retake the examination for at least 12 months.

Any examiner/invigilator found to be providing answers to examination questions to any student will be immediately disqualified from acting as an examiner/invigilator, and the DGCA will be informed within 1 calendar month.

Candidates should only be identified by a numbering system, the only identifying document being held by the nominated Examiner.

Examination paper security should be assured by a numbering system, e.g. "1 of 15" etc.

A procedure should be in place for checking that all the pages of each examination paper are complete at examination completion and that all examination papers are accounted for.

Nothing other than the actual examination/answer paper is permitted to be on the candidate's desk.

All wall charts and/ or other visual teaching aids should be removed from the examination room.

2.13 Conduct of Basic practical assessments: (CAR 147.A.210)

Cross refer to procedures used for assessment of student hand skills, and the standard tasks set throughout the course. A set number of mandatory tasks should be assessed to have been completed to a satisfactory standard.

2.14 Marking and records of examinations: (CAR 147.A.100/125)

Cross refer to procedures for the marking of completed examination papers and the recording of results.

Cross refer to a procedure for practical assessments and recording of results.

2.15 Storage of examination results: (CAR 147.A.100/125)

A copy of each examination paper, the student number/identification list, a practical task results list, an examination results list and all examination papers for each complete module must be stored for a period of ten years.

Electronic means of storage may be utilised as required, provided the usual computer security systems are in place.

2.16 Preparation, control and issue of Basic training course certificates: (CAR 147.A.145)

The certificates should be prepared to reflect that illustrated in Appendix IV of CAR 147 (Basic) and appropriately controlled prior to issue, with a system in place to ensure that each copy is numbered as part of a sequence and recorded as issued to a candidate by name.

2.17 Control of sub-contractors: (CAR 147.A.100 and 147.A.145)

Reserved

CAR 66 Examination Module Record

The Categories numbers shown in the Category column is for a sample illustration of a typical Category B2 course only. As noted below the module may be satisfied at a higher level than the category requires.

CAR-66 Module						
Number	**Title**	**Category**	**Examination**	**% Mark Achieved**	**Signature**	**Date Passed**
3	Electrical Fundamentals	*B2*	MCQ			
4	Electronic Fundamentals	*B2*	MCQ			
5	Digital Techniques/ Electronic Instrument Systems	*B2*	MCQ			
6	Materials & Hardware	*B2*	MCQ			
7	Maintenance Practices	*B1*	MCQ			
8	Basic Aerodynamics	*B2*	MCQ			
9	Human factors	*B2*	MCQ			
10	Aviation Legislation	*B2*	MCQ			
11a	Turbine aeroplane Aerodynamics, Structures and Systems	*N/A*	MCQ			

11b	Piston aeroplane Aerodynamics, Structures and Systems	*N/A*	MCQ			
12	Helicopter Aerodynamics, Structures and Systems	*N/A*	MCQ			
13	Aeroplane Aerodynamics, Structures and Systems	*B2*	MCQ			
14	Propulsion	*B2*	MCQ			
15	Gas Turbine Engine	*N/A*	MCQ			
16	Piston Engine	*N/A*	MCQ			
17	Propeller	*N/A*	MCQ			

Practical Training		Assessment	Date of Competence	Signature
Basic Practical Skills	*B1*	Competent		
Basic Maintenance Skills	*B2*	Competent		

Note: When the Category shown in the "Category" column is different to the course category approved for, it indicates that the Training and Examination in that Module has been carried out to a higher knowledge level.

PART 3 TRAINING SYSTEM QUALITY PROCEDURES

CONTENTS

3.1 Audit of training: (AMC CAR 147.A.130)

As per the AMC CAR 147.A.130 (2), an external auditor may be contracted by the smaller organisation for the purposes of the quality audit.

The purpose of the audit plan is to meet part of the needs of the CAR 147(Basic) approval.

The Approved Organisation should develop a form/ audit checklist to be used by the auditor that would demonstrate that all the requirements of CAR 147(Basic) have been reviewed during the audit process. The audit plan should indicate applicability of the various activities to be monitored and more than one list may be necessary (rolling audit). Each list should be shown against a timetable to indicate when the particular item is scheduled for audit and when the audit was completed. A complete audit of the CAR 147 (Basic) organisation must be completed every 12 months.

Cross refer to the various procedures required for quality auditing, reporting findings and levels with any corrective actions required.

A management control and follow up system must also be in place and cannot not be contracted out.

Cross reference to any quality procedures manual if available is permitted, but this system must relate to and make reference to the relevant CAR 147(Basic) paragraphs.

3.2 Audit of examinations: (AMC 147.A.130)

Must be audited annually, but may be part of the rolling audit procedure.

3.3 Analysis of examination results: (GM to CAR 147.A.130)

Examination results should be analysed on completion of each examination and any questions amended as necessary. Cross refer to procedures detailing responsibilities.

3.4 Audit and analysis remedial action: (GM to CAR 147.A.130)

Cross refer to procedures for the reporting of findings and for corrective actions.

3.5 Accountable Manager annual review: (GM to CAR 147.A.130)

Points discussed on a set date should include:

- *Projects requiring financial support*
- *Sufficient staff employed to meet foreseen training program.*
- *CAR 147 (Basic) organisation review.*
- *Examinations and assessments.*
- *Student achievements.*
- *Student support.*

- *Quality Assurance review.*

3.6 Qualifying the Instructors: (AMC CAR 147.A.105)

List acceptable staff qualifications.

Include procedures for the induction of inexperienced instructors as required.

Where relevant include procedures for the employment of part time or contract instructors.

All staff should be knowledgeable on the contents of CAR-66 and CAR 147 (Basic).

Cross refer to the list of present staff/ qualification.

Note: staff employed prior to CAR 147application whose qualifications were previously acceptable, will continue to be accepted.

Cross refer to procedures for staff development.

3.7 Qualifying the Examiners/Assessors: (CAR 147.A.105)

Examiners should have a full understanding of all the requirements of CAR-66 and CAR 147(Basic).

Cross refer to procedures for staff development.

Cross refer to the list of staff/ qualifications.

Practical work assessors should be assessed as being competent in accordance with an approved process.

3.8 Records of qualified Instructors, Examiners and Assessors: (147.A.110)

The organisation must maintain a record of all training staff which must include details of the scope of their authorisation.

Training staff must be provided with evidence of the scope of their authorisation.

The following minimum information should be kept on record in respect of each instructor:

- *Name*
- *Date of Birth*
- *Personnel Number*
- *Experience*
- *Qualifications relevant to the approval*
- *Training History (before entry)*
- *Training (Basic Training, Type Training, Continuation Training)*
- *Scope of activity*
- *Date of first issue of the authorisation*
- *If appropriate – expiry date of the authorisation*
- *Starting date of employment*

The records may be kept in any format (hard copy or computer based) subject to the usual security requirements.

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

The instructor should be given reasonable access on request to his/ her own records.

The authorisation document should be in a style that makes its scope clear to instructors and any authorised person that may be required to examine the document. Where codes are used to define scope, an interpretation document should be readily available.

Instructional staff are not required to carry the authorisation document at all times but should produce it within a reasonable time of a request from an authorised person. Authorised persons, apart from the organisation's quality department must include DGCA.

Any officer of the DGCA is classed as an authorised person when investigating the records system for initial and continued approval or when the DGCA has cause to doubt the competence of a particular instructor.

PART 4 – APPENDICES

CONTENTS

4.1 Examples of documents and forms used

This section should include examples of all documents and forms used by the organisation in the conduct of its CAR 147(Basic) functions.

Some examples are listed below:

- *Student attendance record*
- *Course certificate(s)*
- *Certificate(s) of training*
- *Classroom plan (exam purposes)*
- *Course critique*
- *Course results*
- *Course design/change plan*
- *Exam answer sheet*
- *Exam results*
- *Internal audit procedure*
- *Internal audit schedule*
- *Internal audit report*
- *Interview report form*
- *MTOE amendment request*
- *MTOE amendment request log*
- *Staff training record.(to include qualifications, history and subjects taught).*
- *Staff terms of reference*
- *Student training/examination and assessment form*
- *Training course review*
- *Quality system*
- *Aircraft visit form*

4.2 Syllabus of each training course

Self explanatory.

4.3 Cross reference Index - if applicable

Self explanatory.

APPENDIX II

PRACTICAL MAINTANCE SKILLS:

AIRFRAME --- FACILITIES, TOOLS AND EQUIPMENT

This appendix provides guidance for the kind of facilities, tools and equipment that are likely to be needed to meet the Training Objective. This facility is general in nature however, need of each item should be determined depending upon scope and level of the courses to be undertaken.

1. METALWORK AND SHEET METAL WORK WITH HAND TOOLS

1.1 For basic skills training, the training workshop should be equipped with sturdy benches mounted with vices at approximately 2-m intervals, one vice per student. Other items may be required include:

a) powered grinding wheel for tool sharpening
b) powered drilling machine
c) large surface table for precision marking–off
d) Compressor air supply suitable for use with pneumatic hand tools
e) Powered hacksaw for cutting stock material
f) Sheet metal guillotine
g) Chalkboard / whiteboard for workshop instruction and work schedule

1.2 For aeroplane/helicopter skills training, the workshop should ideally include the following:

a) The basic training workshops and/or basic maintenance facilities as specified in point 147.A.100 (d) must have an appropriate selection of aircraft, engines, aircraft parts / equipment's and avionics equipment.
b) A complete pressurized aircraft of all-metal construction with retractable landing gear, complete with engines in running order, and suitable for practicing repair and inspection duties
c) Hydraulic lifting jacks, trestles, fuselage cradles, lifting slings, cables and steering bars, dihedral and incidence boards, and work and tools suitable for aircraft types provided
d) Desk for manuals and notices
e) Display board for inspection worksheets
f) Ground electrical power trolley
g) Apron–type fire extinguisher trolley
h) Hangar access equipment such as benches, trestles, ladders, chocks.
i) Mobile lifting equipment, i.e. small crane or overhead gantry
j) Spray guns for aircraft paint and dope
k) Oil and fuel replenishing browsers
l) Cable swaging machine
m) Mobile hydraulic test trolley
n) Landing gear oleo cylinders and retraction jacks, and wheel and brake units
o) Hydraulic pumps (both fixed and variables delivery)
p) Flying control surface hydraulic actuators
q) Flap / slat drive motors gearboxes and screw jacks

r) Airflow control valves and actuators.
s) Air cycle machines (cold air units)
t) Flying control pulley, lever assemblies, tensioners and spring tab units
u) Seat and safety equipment

1.3 Institutes should have adequate tools. This may be issued on a shop basis, i.e. a kit issued in the basic metalwork shop and be retained by the shop when the students' progress to the next phase. The following items are suggested for basic metalwork.

a) Measuring and marking-off tools
- 30-cm steel rule graduated in fractions of inches and millimeters
- Outside and inside callipers
- Try square
- Set of feeler gauges
- 15-cm dividers
- Scriber

b) Fitter's tools
- Round-nose and side-cutter pliers
- 15-cm long screwdriver
- Hacksaw
- Selection of files of different sections, lengths and cuts
- Hand drill and a set of small diameter drills
- Set of centre and pin punches
- Ball-pen and cross pane hammers
- 20-cm flat chisel and a set of small chisels (including flat , cross cut and round nose)
- plastic or hide- faced hammer
- sheet metal snips
- various sizes and types of screw drivers
- set of double – ended , open ended and ring spanners of appropriate range in sizes and appropriate type (American, BSF, Unified , or Metric) to suit available airframes
- set of sockets wrenches with handles and accessories to suit available airframes

2 METALWORK WITH MACHINE TOOLS

2.1 Workshop equipment: It is not important for AMEs to acquire a high degree of skill as machine tool craftsman but they should understand the principles of turning, screw cutting etc. For this reason, it is generally sufficient to have one or two center lathes while a capstan or turret lathe is not essential. A small machine shop can be incorporated in the basic metal workshop or can be housed separately, according to the premises available. It is suggested that machine tools provided should generally be the simple, robust types suitable for training and might include the following :

a) Sensitive drill machines
b) Surface grinding machine
c) Buffing machine
d) Center lathe
e) Horizontal milling machine

2.2 Trainees will not normally need any specific personal tool kit. Other items may be included to suit local needs.

3 SPECIALIST ACTIVITIES: WOOD AND FABRIC, WELDING, AND COMPOSITES

3.1 Introduction

Equipment in the training areas for these specialist activities depends on the training requirements

3.2 Wood work and fabric workshop

Reserved

3.3 WELDING

3.3.1 The purpose of a short course on welding is to impart enough knowledge of welding techniques to enable students to assess the airworthiness of welded joints and structures. It is not intended to produce skilled welders. The welding shop must be chosen and equipped to comply with the safety regulations for oxyacetylene and other types of welding. Metal–screened working bays with metal work benches should be built according to the number of work stations required

3.3.2 Welding equipment might include the following

a) Set of oxyacetylene welding equipment
b) Electric or arc welder
c) Electric TIG or MIG welder
d) Eye face shield, goggles, leather gloves and aprons
e) Electrodes, welding rods and welding fluxes
f) Electric resistance welder for spot welding (may be stored in sheet metal shop)

3.4 Fiberglass and reinforced plastic workshop

3.4.1 Many aircraft are fitted with secondary structures constructed from fibre or glass materials. (Indeed, some aircraft even have their primary structures made of fibre or glass material) From the training point of view, only secondary structures should be of concern. The repair of structures is a complex and specialized operation that requires expertise often available only from the aircraft manufacture.

3.4.2 As far as space, a dust free, humidity controlled atmosphere, lighting and doors are concerned the workshop should follow the general pattern of the fabric shop. Fire proof storage facilities for highly inflammable and corrosive resins and activators are also required. The correct type of extinguishers must be available. The following tools should be provided for the fiberglass and reinforced plastic workshop

a) Laying up tables
b) brushes and spatulas
c) Scissors and cutters
d) Sanders
e) Measuring Cup
f) Heat lamp
g) Pots and trays

APPENDIX III

PRACTICAL MAINTENANCE SKILLS:

ENGINE AND PROPELLER – FACILITIES, TOOLS AND EQUIPMENT

This appendix provides guidance for the kind of facilities Tools and equipment that are likely to be needed to meet the Training Objectives.

1. For engine skill training, the workshop should ideally the following:

a) Sectioned engines (piston or turbine, according to the needs of the com
b) Solvent washing plant for cleaning parts
c) Mobile lifting gantry for hoisting engines and heavy equipment.
d) Engine slings and work stands for each type of engine in the shop
e) Manufacturer's tool kits for each type of engine (including extractors, assembly jigs, etc.) used for the complete dismantling of engine
f) Electromagnetic (magnetic particle) crack detection equipment.
g) Medium-sized surface table with vee-blocks detection Equipment.
h) Propeller assembly bench with tools for measuring blade torque.
i) Propeller manufacturer's tool kit for each type of propeller used.
j) Example of contemporary propeller controllers.
k) Example of various types of magnetos.
l) Example of various high-energy and other types of gas turbine igniter.
m) Example of various types of carburettor and petrol Injection equipment
n) Example of turbocharger.

2. ENGINE FAMILIARIZATION WORKSHOP

2.1 The supply or provision of engines in the workshop is determined according to the requirements of the students undergoing training (e.g. piston or turbine engines). A complete piston engine and a turbine engine.

a) Mobile lifting equipment (i.e., a small crane or over-head gantry lifting slings) and tools suitable for engine types provided.
b) Desk for manuals and notices.
c) Display board for inspection work sheets.
d) Access and storage equipment such as benches, trestles, shelves, etc.
e) Oil and fuel replenishing bowsers.
f) Test board designed to represent sections of typical aircraft/engine cable, air and fluid system. These should be complete with rigging instructions so that student errors are detected immediately.

APPENDIX IV

PRACTICAL MAINTENANCE SKILLS: AVIONICS —

FACILITIES, TOOLS AND EQUIPMENT

1. Introduction

This appendix provides guidance for the kind of facilities, tools and equipment that are needed to meet the training objectives for institutes seeking approval in Avionics stream.

2. Avionics Workshop: Electrical

2.1 **Shop equipment**:- The electrical shop should be equipped with demonstration mock ups representing typical aircraft circuits. If made realistically, these can be of value for practicing adjustments and troubleshooting as well as for demonstration. All areas of electrical shop should have adequate benches, racks, shelves and storage bins; electric power points and piped compressed air to operate powered hand tools; factory safety precautions with fire warnings and extinguishing provisions. Benches should be smooth topped and have sufficient vices and power points (for soldering irons) to suit the class size planned. The following major equipment items should also be available:

a) workshop test units for testing electrical machines (universal types are available for testing a wide variety of generators and motors)

b) Appropriate special tools and test meters (necessary because of the considerable range and variety of electrical equipment on the modern aircraft)

c) battery charging plant, preferably housed in a separate, well ventilated charging room. For lead acid batteries, the charging plant should be of the series type suitable for charging several batteries at different rates.

Note- For charging lead acid and nickel cadmium batteries, a separate and totally isolated charging rooms and equipment will be required for each type. For nickel cadmium batteries, a constant current charger and battery analyser must be specified

2.2 Personal tool kit

Students should have their own tools and tool box. This may be issued on a shop basis i.e., a kit in the electrical shop may contain only tools required for training in this shop and be retained by the shop when the students' progress to the next phase, or students may be issued, and retain on permanent basis, a personal basic kit which is their own property until the completion of their training. Some schools may require students to purchase their own tools, their kits becoming more complete as their training advances. The following items are required for basic electrical work:

a) one electric 5-mm point temperature controlled soldering iron (Soldering copper)

b) one wire stripper for removing insulation
c) a selection of small screw drivers (including a Phillips)
d) one adjustable hook wrench (18 to 50 mm)
e) one set of Allen Keys

2.3 The exercises with components should be designed to develop skills in dismantling, inspection, decision making and assembly. The following types of components should be available and used as appropriate according to the potential need of the trainees:

a) Lengths of the aircraft cabling with typical plugs , sockets , bulk head sealing bungs, grommets etc., for practicing wire work and making up looms

b) A selection of switches, fuses, thermal circuit breakers, wire connecting devices, junction boxes and other electrical system elements

c) Specimens of airborne batteries (both lead acid and nickel cadmium): sectioned, serviceable and chargeable.

d) DC generators and AC alternators (constant speed drives)

e) Voltage regulators, generator control units (GCU) and other types of current limiting devices (i e., vibrator types and variable resistance types)

f) Various types of DC and AC motors, including engine starters, continuously rated motors, rotary and linear actuators.

g) Static and rotary inverters and specimens of other types of current conversion devices, such as transformer current rectifier units (TRUs)

h) Specimens of various types of airborne electrical instruments, including instruments embodying principles of the voltmeter, ammeter, ohmmeter, Wheatstone bridge, thermocouple, ratio meter, servos and synchros etc.

i) Specimens of aircraft electrical heating devices, such as pitot heads, thermal deicing shoes etc.

j) Specimens of aircraft lighting appliances, such as cabin fluorescent lamps, landing lamps, navigation lights etc.

3 AVIONIS WORKSHOP: INSTRUMENT

3.1 Workshop equipment.

The shop should be a “clean area” i.e., it should be protected from dust, workshop fumes and industrial contaminants. Ideally, a separate building or room with filtered ventilation is desirable and in a very humid climates air-conditioning is essential. Benches should be topped with smooth hard wood or covered with a Formica top. If air conditioning is not installed, it may be necessary to provide sealed cabinets with silica gel (for air drying) for storage of some of the test equipment and instruments specimens.

3.2 The instrument shop should be equipped with demonstration mock-ups representing typical aircraft circuits. If made realistically, these can be of value for practicing adjustments and troubleshooting as well as for demonstration. Benches should be smooth topped and have sufficient vices and power points (for soldering irons) to suit the class size planned. The following major equipment items should also be available:

a) Dead weight tester for pressure gauges.
b) Altimeter test chamber with sub-standard instrument.
c) Mock-up air speed indicator (ASI) system for leak test practice.
d) Gyroscopic instrument test table.
e) Mock up for compass swinging practice (i.e., an old aircraft or a specially made trolley which can be used on an outdoor site selected as compass base
f) Bridge Megger for insulation testing of electrical items.

3.3 The personal basic tool kits of students should be supplemented by the following items

a) one set of watch makers screw drivers
b) one set of miniature spanners
c) one set of Allen keys (appropriate sized)
d) one set of Bristol spline keys
e) one electric temperature controlled soldering iron with fine point (similar to that issued in electrical shop)

3.4 The exercises with components should be designed to develop skill in dismantling, inspection, decision making and assembly. The following types of components should be available and used as appropriate according to the potential need of the trainees:

a) Boost or manifold pressure gauge
b) Hydraulic pressure gauge
c) Engine oil pressure gauge (Bourdon tube type)
d) Engine oil pressure gauge (electrical type)
e) ASI
f) Pitot static head
g) Altimeter (simple and sensitive type)
h) Rate of climb indicator
i) Turn and slip indicator (air driven and electrical type)
j) Directional gyroscope (air driven and electrical type)
k) Artificial horizon (air driven and electrical type)
l) Engine speed indicator (DC and AC types)
m) Oil thermometer (physical and electrical type)
n) Cylinder head or jet pipe thermo couple
o) Fuel content gauge (float operated and capacitance type)
p) Magnetic compass
q) Simple type autopilot

4 AVIONICS WORKSHOP : AUTOPILOT, NAVIGATION AND RADIO

4.1 The shop should be a “clean area” i.e., it should be protected from dust, workshop fumes and industrial contaminants. The shop could be combined with the instrument shop. Ideally, a separate building or room with filtered ventilation is desirable and in a

very humid climates air-conditioning is essential. Benches should be topped with smooth hard wood or covered with a Formica top. If air conditioning is not installed, it may be necessary to provide sealed cabinets with silica gel (for air drying) for storage of some of the test equipment and instrument specimens.

4.2 The following test equipment items should also be available:

a) Variable stabilized power supply unit
b) Signal generator (high grade)
c) Signal generator for bench
d) Signal generator(UHFNHF)
e) Audio frequency oscillators
f) Spectrum analyzer
g) Cathode ray oscilloscope
h) Frequency meters
i) Moving coil , volt-ohm-milliammeter and multi meters
j) Variac
k) Digital analyzer
l) Valve and transistor characteristic tester
m) Digital voltmeter/ ohmmeter/ammeter
n) Logic probe
o) RLC bridge
p) Voltage standing wave meters
q) Absorption and thermocouple watt meter

4.3 The work shop should be equipped with demonstration mock-ups representing typical aircraft circuits. The following equipment may be of value for practicing adjustments and troubleshooting as well as for demonstration.

a) High frequency transmitter receiver (HF)
b) Very High frequency transmitter receiver (VHF)
c) automatic direction finder system
d) Very High frequency omnidirectional radio range / instrument landing system (VOR/ILS) system (including glide scope and marker receivers)
e) Distance measuring equipment system
f) Air traffic control transponder system (including altitude reporting mode)
g) Radio altimeter
h) Weather radar
i) Very low frequency (VLF) omega navigation system
j) Loran-C-system
k) Doppler navigation system
l) Navigation indicators capable of presenting combined navigation information, typically a radio magnetic indicator (RMI) and horizontal situation indicator (HSI) wired for both compass and various radio navigation inputs.
m) Instrument systems with electronic amplifiers (e.g. capacitance type fuel content gauges, cabin temperature controllers, and automatic pilots)

4.4 The radio section of the work shop needs a screened room or “cage” to prevent undue radiation from equipment undergoing testing and to provide an interference free region for fine measurement. Although it is desirable to have this room adjoining radio work shop, they should not be close to the sources of interference, such as an electric overhaul shop or spark plug testing equipment. As a further safeguard

against interference all power supplies to the radio work shop should be filtered and outgoing interference should be suppressed by adequate screening of aerial cables and artificial aerials. Alternatively, if a screened room is un-available, for certain types of equipment's, it is possible to use a field simulator specified by the manufacturer. (A metal box in which the respective antenna is placed to eliminate unwanted radiations and interference). The following power supply will be required

a) AC main supply for lighting, heating, air conditioning, mains rectifiers, test instruments, soldering irons etc., (This will be at the standard voltage of the locality and the supply should be wired throughout in screened conduit)

b) 30-volt DC supply, surge free and of adequate capacity for the size of the workshop. (A ring main supply from lead acid or alkaline cells, ripple free and filtered is suitable or a main rectifier /regulator can be used)

c) 15-volt DC supply, also surge free

d) 115–volt, 400 cycles, single phase, AC supply (This should be frequency monitored and can be taken from a static inverter)

e) 115–volt, 400 cycles, three phase AC supply, frequency monitored and wired to the working benches by screened cable

f) 26-volt, 400 cycles, single phase, AC supply taken from 115-volt AC supply through a transformer or from the 26-volt AC output from the static inverter

g) Compressed air and vacuum supplies

4.5 The personal basic tool kits of students should be same as specified for instrument workshop but may be supplemented to suit local needs.

4.6 The exercises with components and system demonstration rigs should be designed with a view to developing skills in inspection fault finding and decision making.

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