

STANDARD APPRENTICESHIP FOR AIRCRAFT MAINTENANCE ENGINEERS IN CIVIL AVIATION SECTOR

I. BACKGROUND

Aircraft Maintenance Engineer (AME) ensures the airworthiness of an aircraft, whether it is a fixed-wing airplane or a helicopter. They identify problems and repair and overhaul aircraft structural, mechanical and electrical systems.

Recent industry reports suggest that nearly 72,900 jobs for technicians and AMEs will be created in India across Airlines and MRO sector by 2035. The need is to equip the AMEs with skills that make them dynamic stakeholders of India's economic future.

Nearly 3,644 AMEs received Basic Aircraft Maintenance Engineering Certificate (BAMEC) in the last five years; however, only 159 type rating AME licenses were issued. The AME trainees passing out from DGCA approved AME training institutes get no effective practical training during the course and have to undergo practical training with Airlines/MRO Organization/NSOPs as apprentices. Lack of practical training severely affects the employability of AMEs.

II. AMEs APPRENTICESHIP

Ministry of Civil Aviation aims to address this skill gap by streamlining the practical training of the AMEs passing out from the training institutes by putting in place two parallel systems targeted to improve the employability of the existing pool of AMEs and also accelerate the process of becoming a type-rated engineer. The two parallel systems are:

1. One-year Standard Apprenticeship for AMEs with Airlines/MRO Organization/NSOPs
2. One-year AIESL & Boeing AME Accelerated Training Program

The details of the two parallel systems are as follows:

III. STANDARD APPRENTICESHIP FOR AMEs

A. OBJECTIVES:

Presently various airlines/MROs in the country conduct their own Apprenticeship Program for enhancing practical skills of the AMEs. These programs vary in terms of duration and content. There is a need to standardize this AME Apprenticeship Program to achieve the following objectives:

- i. To ensure standardization of AME Apprenticeship Program – from selection to induction – in order to streamline the overall process

- ii. Improve the employability of the students by providing them with needed skills and a Certificate of Competence recognized as a Certificate of Experience after standardized system of assessments.
- iii. Making the one-year Apprenticeship equivalent to one year of employment. (DGCA mandates four years of practical training on an operating Aircraft as eligibility condition for sitting for Category 'A' examination. Relaxation of one year is given to candidates passing out from DGCA-approved AME training institutes). The Apprenticeship training will be counted as a period of employment by DGCA and hence, will be an added advantage for candidates as once the candidate has completed his/her apprenticeship, he/she will be required to take employment for only two years to become eligible to sit for the Category 'A' examination.

The Standard Apprenticeship Modules (Appendix A & B) have been developed by a Technical Committee headed by DDG, DGCA and included representatives from Airlines and Helicopters.

B. SCOPE OF THE TRAINING

The Apprenticeship covers following streams:

1. AME Mechanical Stream (Fixed Wing)
2. AME Mechanical Stream (Helicopters)
3. AME Avionics Stream

The Training will be applicable for all Airlines, MRO Organizations, NSOPs and CAR 145 Aircraft Maintenance Organizations (henceforth, known as employers) with more than 40 employees. The employers are entitled to engage apprentices up to 25% of their manpower.

C. ELIGIBILITY CRITERIA, SELECTION PROCESS, PERIOD OF TRAINING, CONTENT, ASSESSEMENT, INDUCTION & MONITORING

• Eligibility Criteria

Candidates who have passed 3 year AME training Course from DGCA-approved AME training institutes and have passed DGCA paper 1 and paper 2 or equivalent Modules, and have less than one year of experience shall be eligible for the AME Apprenticeship Training.

• Method of Selection

MoCA will develop an AME Apprenticeship Portal that will track and monitor implementation of AME Apprenticeship training apart from the registration of candidates and employers on the portal. Both the candidates and employers will register on the portal. The employers will indicate the number of apprentices they will train in a particular year based on their existing and projected requirements. The number of

apprentices trained should be more (at least half of the total number to be inducted) than the apprentices that the employers will induct after successful completion of the apprenticeship training. For example, if airlines wish to induct 30 apprentices after completion of training then, desirably, they should train at least 45 apprentices, so that the rest 15 will at least have a Certificate of Competence which will be recognized across the industry and help him/her gain employment with other employers.

The AME Apprenticeship Portal will generate a merit list of all registered candidates that will be available to employers, who will conduct their own interviews/assessment tests to select candidates from the master pool.

- **Period of Training**

The Apprenticeship training will be for a period of one year.

- **Content**

The Standard Training Modules for Fixed Wing and Helicopters would be as attached at **Appendix A and B**, respectively.

Classroom training will cover the knowledge requirement in certain areas which are considered prerequisites for the apprentices to work in maintenance environment like: Air Legislation and its application relevant to maintenance, documentation, Ramp and personal safety, Standard Maintenance Practices, Human Factors, Safety Management System, Organization Maintenance Capability and Scope of Approval, Fleet Aircraft and their System Overview, Aircraft Servicing Procedures and Precautions, etc.

The Work Environment/ Field Training will be a guided program under the supervision of permanent staff in the areas, such as, use of general tools and special tools, use of personal safety equipments and items, maintenance precautions, understanding of ramp markings and arrangements, aircraft receiving and dispatching procedures, aircraft inspection and servicing, use of aircraft auxiliary power supply equipment like GPU, A/C cart, hydraulic cart, etc., aircraft component locations, identification, removal and installation procedures, aircraft cleaning, aircraft interior inspection and maintenance, etc.

Field Training will be delivered by experienced staff functioning in Line and Base Maintenance Departments. **The Field Training will constitute 75% of the Apprenticeship training.**

- **Assessment & Certification**

After undergoing the one-year Apprenticeship, candidates will be assessed by the respective employers as per Chapter 5 of the Standard Apprenticeship Module. Basis this assessment, employers will certify the selected candidates and employ those who meet the mark. The others may seek employment with other Airlines/MRO with the certificate issued after successful completion of the Apprenticeship.

- **Induction of trained Apprentices**

The employers will induct the Apprentices successfully completing Apprenticeship as per their performance and as per the number of vacancies posted by them on the website.

D. STIPEND

The employers should pay a minimum stipend of Rs. 3542 to apprentices during the period of apprenticeship training. The minimum stipend to be paid under this apprenticeship will be deemed to be revised as and when the minimum stipend for technicians is revised under the Apprenticeship Act, 1961. Employers are however; free to pay stipends higher than the minimum rate.

E. INDEMNITY

All employers will indemnify the Apprentices selected in their organization through a suitable insurance policy.

IV. AME TRACKING & MONITORING PORTAL

- i. MoCA will develop a Web Portal where the candidates will register by filling in their details through a registration form. They would also be required to upload the necessary certificates/mark sheets.
- ii. The list of registered candidates ranked on the basis of merit will be available on the website for information of employers.
- iii. Employers will register and post their requirement for technicians at least 2 months prior to selection of apprentices. The system will generate a merit wise list of the registered candidates which will be available to them. The employers will then select the Apprentices from the master pool through an interview/assessment for the apprenticeship.
- iv. The number of trained apprentices inducted by different employers along with apprentices not inducted after successful completion of training but awarded with Certificate of Competence would also be tracked.
- v. Overall, the Portal will track the performance of the AMEs registered on the website and also monitor the implementation of the Standard Apprenticeship for AMEs.

V. AIESL & BOEING AME ACCELERATED APPRENTICESHIP PROGRAM

Considering the importance of skilled aircraft maintenance engineers (AME) in a fast-growing aviation market like India, Boeing has taken the initiative to support Air India Engineering Services Ltd. (AIESL) in developing the AME Accelerated Apprenticeship Program.

The key objectives of the program are to improve the employability of AME college graduates through training and hands-on experience with actual aircraft. Students completing AME course from Directorate General of Civil Aviation (DGCA) approved AME institutes will be eligible to apply to the program. To be admitted, applicants must first perform well on an entrance examination. The AME Accelerated Apprenticeship Program will consist of one year of theory and practical learning in a smart-classroom environment, including select CAR66 modules.

Students will also receive advanced training aids to help strengthen the theoretical concepts learned in the classroom. These will be supplemented by performing specific tasks on Boeing aircraft. The first class will commence at the AIESL Mumbai facility in November 2017. At the end of the program, successful candidates will receive a certificate from AIESL. They will also receive coaching on job interview skills to prepare them to find a job.

Additional details about the program, such as scope, fees, and entrance examination, will be available soon.

VI. RAJIV GANDHI NATIONAL AVIATION UNIVERSITY

MoCA along with Rajiv Gandhi National Aviation University (RGNAU) is also proactively working towards starting the affiliation of AME training institutes and other colleges for the UGC Approved B.Sc. (H) in Aircraft Maintenance Engineering degree course from the next academic session (2018-19). RGNAU will also develop Conversion Courses with skill testing mechanism that will enable conversion of Certificate of Completion from AME training institutes to a degree.

Appendix-A

AME Apprenticeship Training
Guidelines
(Fixed Wing)

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APPRENTICE TRAINING PROGRAM SYLLABUS

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Chapter 1: Preamble

- 1.1 This document has been prepared to comply with the On Job Training requirements i.e structured Apprenticeship program to comply with Govt. of India initiative on skill development.
- 1.2 The document covers the various areas/ departments of an aviation maintenance organization about which an Aircraft Maintenance Engineer is expected to have reasonable knowledge to work in an airline organization. This booklet should serve as a compact and portable reference document, which would reflect the completion of the candidate's apprenticeship training.
- 1.3 The tasks has been identified for B1 & B2 categories. However, this is generic guideline. The AMO may vary it during customization for their applicable aircraft.
- 1.4 Maintenance tasks which are considered as A/B1/B2/B3 are:
- a. Maintenance tasks performed on aircraft structure, power plant and mechanical and electrical systems.
 - b. Work on avionics systems requiring **only** simple tests to prove their serviceability and **not** requiring troubleshooting.
 - c. Maintenance tasks which are considered as B2 are:
 - d. Maintenance tasks performed on avionic and electrical systems
 - e. Electrical and avionics tasks within power plant and mechanical systems, requiring **only** simple tests to prove their serviceability.

Chapter 2: Apprenticeship Training Process

- 2.1 The objective of this training to gain the required competence and experience in performing safe maintenance.
- 2.2 It should be conducted at and under the control of a maintenance organization appropriately approved for the maintenance of the particular aircraft type.
- 2.3 The candidate participated in the task should be able to:
- 2.4 Be aware of the safety aspects during aircraft maintenance Read and understand maintenance manual instructions
 - a. Use tools and equipment as required in maintenance manual instructions
 - b. Use and have knowledge of various material, both raw and consumable, and standard parts
 - c. Use his knowledge in a practical manner and use manufacturer instructions
 - d. Interpret results from various sources and measurements and apply corrective action where appropriate
 - e. Demonstrate knowledge of good maintenance standards and human factor limitation.

Completion of the booklet

All entries in this booklet shall be made in ink. It should be signed by the trainee and the designated representative of the organization. Any correction, shall be done in manner by striking with a single line, such that deleted entry remains legible.

Chapter 3: Trainee Details

Trainee Details	
Name in Full:	
Personal Address:	
Details of DGCA papers /Modules passed	
AME/BAMEL Licence No. (If available):	
Name of Organisation & Address:	
Signature:	

Chapter 4: Training Syllabus

4.1 The following are the topics of knowledge and skill coverage proposed for personnel who will be coming under AME Apprenticeship Program for development in typical Schedule Operator.

SN	TOPICS	DURATION IN DAYS	REMARKS
1.	Review of international and Indian Air Legislation structure and applicable legislation for scheduled airlines	1	
2.	Ramp and personal safety	1	
3.	Standard practices and aircraft marshalling , headset procedures , Aircraft documentation	2	
4.	Safety management system/ EHS/MSDS	1/2	
5.	Human factors and Good Maintenance Practices in aircraft maintenance	1	
6.	Electrical wiring interconnection system	1/2	
7.	Fuel tank safety	1/2	
8.	Type aircraft system familiarisation , inspection and servicing	3	
9.	Workshop Practices & Tools	2	
10.	Special tools & Equipment procedures	1	
11.	Engine Monitoring and Ground Operations	1	
12.	Concept of Special Operations such as EDTO , Auto Land , RVSM, etc.	1	
13.	Aviation Security Training	1/2	

Total

15 days

4.2 Aircraft Specific: - Proposed duration 11 months

Below mentioned ATA & areas to be covered during Apprentice program covering the system in following area:

1. ATA 07 Lifting and Shoring precautions and practices
2. ATA 08 Leveling and Weighing procedures
3. ATA 09 Towing and Taxi procedures
4. ATA 10 Parking, Mooring, Storage and Return to Service procedures
5. ATA 11 Placards and Markings Identification and Importance
6. ATA 20 Standard Practices - Airframe
7. ATA 21 Air Conditioning and Pressurization system
8. ATA 22 Auto Flight
9. ATA 23 Communications
10. ATA 24 Electrical Power
11. ATA 25 Equipment/Furnishings
12. ATA 26 Fire Protection and extinguishing
13. ATA 27 Flight Controls
14. ATA 28 Fuel
15. ATA 29 Hydraulic Power
16. ATA 30 Ice And Rain Protection including ATA 12 Cold Weather Maintenance
17. ATA 31 Indicating / Recording System
18. ATA 32 Landing Gear
19. ATA 33 Lights
20. ATA 34 Navigation
21. ATA 35 Oxygen
22. ATA 36 Pneumatic
23. ATA 38 Water/Waste
24. ATA 45 Central Diagnostic System
25. ATA 47 Nitrogen Generation System
26. ATA 49 Airborne Auxiliary Power
27. ATA 51 Standard Practices and Structures – General
28. ATA 52 Doors
29. ATA 53 Fuselage introduction
30. ATA 54 Nacelles/Pylons
31. ATA 55 Stabilizers
32. ATA 56 Windows
33. ATA 57 Wings structure
34. ATA 61 Propeller
35. ATA 71 Power Plant introduction and component highlight
36. ATA 72 Engine
37. ATA 73 Engine - Fuel And Control
38. ATA 74 Ignition
39. ATA 77 Engine Indicating system
40. ATA 78 Exhaust/ Thrust Reverser

- 41. ATA 79 Oil
- 42. ATA 80 Starting

ATA	SYSTEM/SUBJECT
00	Technical Documentation & MEL/CDL including de-activation only of sub-system and aircraft components as permitted by the approved MEL <ol style="list-style-type: none"> 1. Organization AMP, Inspection Schedules, FRB, CDLB and Work Orders 2. MEL and its Parts 3. CDL 4. Introduction to De-activation of different components/sub-components as per MEL 5. Any task recommended by DGCA
00	MCC Functioning <ol style="list-style-type: none"> 1. Introduction to MCC 2. Function 3. Technical Delay Handling 4. Technical Support 5. Control of Repeated Defects
00 thru' 12	A/C General <ol style="list-style-type: none"> 1. Aircraft Dimensions 2. Structure Breakdown & Zoning 3. Cockpit Panels/ Pushbutton Philosophy 4. Servicing Points such as opening & re-fitment of quick access inspection panels 5. Replace Placards & Markings
20	Standard Practices – Airframe <ol style="list-style-type: none"> 1. Personal Protective Equipment's 2. Ramp Hazards 3. Foreign Object Debris 4. Marshalling 5. Anti-collision Beacon 6. Dangerous Areas Around Engines 7. Placement of Chocks 8. Placement of Safety Cones 9. Alignment of Vehicles/ Equipment's 10. Speed Restrictions <p>Safety practices and Safety equipment-</p> <ol style="list-style-type: none"> 1. Use of safety jackets, gloves, safety shoes, Ear Protection 2. Use of warning notices, circuit breaker clips in the cockpit.

ATA	SYSTEM/SUBJECT
	<ol style="list-style-type: none"> 3. Safety when handling fuel, hydraulic, deicing and other cleaning fluids 4. Safety related to ESDS components and practices. 5. Safety pins/safety sleeves for landing gears, doors etc. 6. Wheel Charging with Nitrogen precautions 7. Safe handling of oxygen system related tools and equipment 8. Safety while working around radar equipment (radiation) 9. CDCCL items (SFAR 88) 10. Safety related to Inerting system (ATA 47)- Fuel tank safety, 11. Safety precautions during Engine Run Up (Idle/high power) <p>Standard Practices :- Ground Equipment Familiarization</p> <ol style="list-style-type: none"> 1. Familiarization, safety precautions and use of Ground Power Unit 2. Familiarization, safety precautions and use of Ground Hydraulic cart (pressurization unit) 3. Familiarization, safety precautions and use of Ground Air-conditioning unit/duct 4. Familiarization, safety precautions and use of Ground pneumatic Cart /duct 5. Use of different types of trestles. <p>Standard Practices :- General Tools / Special Tools Familiarization</p> <ol style="list-style-type: none"> 1. Familiarization of each tool content of General tool kit (set Spanners/ Combination spanners/ Off set Ring spanners/ Ring Ratchet/ Deep sockets/ shallow sockets/universal joint drives/expander/ reducer/universal drive sockets/ crowfoot spanners/ ratchet/ drive breaker bar/ drive extensions/ speed handle/ Diagonal cutters/ nose pliers/twisters/ vice grip pliers/ soft jaw monkey plier/screw drivers (plain, Philips, heavy duty)/ mallets/ feeler gauge/hacksaw/ strap wrench/ bottle key / Allen keys/magnifying glass/nose grip plier/ needle files etc.) 2. Uses of Dial Gauge/ Push pull gauge/ Micrometer/ Vernier Caliper etc. 3. Familiarization on use of Torque adapter / Torque wrench, Setting Torque value on dial type and sleeve type torque wrench. <p>Standard Practices :- Aircraft Servicing / Equipment Familiarization</p> <ol style="list-style-type: none"> 1. Familiarization on use Nitrogen HP Regulator / LP Regulation, Bottle Key and hose./ TP Gauge. 2. IDG Rig / Hydraulic servicing unit/ Engine Oil Charging unit./ Fuel Drain Tool

ATA	SYSTEM/SUBJECT
	<ol style="list-style-type: none"> 3. Wheel Change tool (MLG , NLG Adapter / Thread protector / Wheel Change Dolly etc.) 4. Brake Change tools (Brake Tool Adapter / Axle Protector/ Brake fan tool /driving adapter for Tachometer etc.). 5. Use of various types of Grease Gun (Hand Grease Gun / Power Grease Gun/Pressure Grease unit /Grease Rig) and respective adapter / nozzle kit. 6. Use of TR Cowl / Core cowl opening Pump. 7. Windshield Removal tool kit /Suction Kit for window removal Installation./ Special tool for sliding window 8. Familiarization on use of Nose wheel / Main wheel Jacks, Aircraft Jacks / jacking Adapters etc. 9. MLG & NLG Door Locking Sleeve, Cargo Door safety locking Sleeve/ NLG & NLG Door Locking pin 10. Familiarization on use of Tensiometer for cable tension measurement 11. Familiarization on Compressor wash/ ECO wash unit. 12. Familiarization and practical use of Bleed tester kit. 13. Familiarization on use of Boroscope Kit (flexi scope / rigid boro kit), adapter etc. 14. Flight control Rig pin kit / Flap Zero locking tool/ spoiler maintenance key etc. <p>Standard Practices :- Aircraft Avionics Equipment Familiarization</p> <ol style="list-style-type: none"> 1. Familiarization on use of each tool content of General Avionics tool kit, Electrician service tool kit. 2. Familiarization on use of Digital Multimeter / milliohm meter 3. Familiarization on use of Manual Insulation tester (megger) / insulation and continuity tester/ bonding tester. 4. Familiarization on use of Crimping tool splice/ terminal lugs , Crimping tool ferrule/ crimping tool Turrets/ Crimping too (12 positioner and Go No Go Gauge) 5. Familiarization on use of splicing tool kit, wire Insertors /extractors etc. 6. Familiarization on use of Pitot Flushing tool 7. Familiarization on use of Pitot Static Leak tester 8. Familiarization on use of Air Data Test kit / Air data accessory kit 9. Familiarization on use of DMC Kit.

ATA	SYSTEM/SUBJECT
21	Air Conditioning <ol style="list-style-type: none"> 1. Overview 2. PACK Presentation 3. Zone Temperature Regulation 4. Control & Indication 5. Component Location 6. Avionics Ventilation 7. Pressurization 8. LAV/Galley Ventilation 9. Maintenance/Test Facilities & Servicing
22	Auto Flight <ol style="list-style-type: none"> 1. Introduction 2. Flight Management/Flight Guidance 3. Auto Pilot/Flight Director 4. Auto Thrust 5. Flight Augmentation 6. Maintenance/Test Facilities & Servicing
23	Communications <ol style="list-style-type: none"> 1. Introduction 2. Cabin/In-flight/Service Interphone 3. Radio Communication 4. Onboard Communication 5. SSFDR 6. CIDS 7. Component Location 8. Maintenance/Test Facilities & Servicing
24	Electrical Power including operational check of AC EMERGENCY GENERATION (CMR) <ol style="list-style-type: none"> 1. Introduction 2. Normal/Abnormal/Emergency/Battery Only Configuration 3. Control & Indication 4. Component Location 5. Maintenance/Test Facilities & Servicing including replacement of aircraft batteries
25	Equipment & Furnishings including emergency equipment replacement and passenger/crew seat replacement task <ol style="list-style-type: none"> 1. General 2. Cockpit/Cabin Crew Seats & their replacement including seat belts & harnesses. 3. LAV/Galleys 4. Cabin Panel Layout 5. PAX/Emergency Doors & Escape Slide 6. Cargo Compartment 7. Emergency Equipment & their replacement

ATA	SYSTEM/SUBJECT
	8. Servicing: Replacement of ovens, boilers, beverage makers.
26	Fire Protection <ol style="list-style-type: none"> 1. Introduction 2. Engine/APU Fire Protection 3. Avionics Smoke 4. Cargo/Lavatory Smoke 5. Cabin Fire 6. Maintenance/Test Facilities & Servicing
27	Flight Controls <ol style="list-style-type: none"> 1. Introduction 2. Flight Control Surfaces 3. Cockpit Controls & Indication 4. Fly By Wire/Flight Control Laws 5. Mechanical Backup 6. Component Location 7. Maintenance/Test Facilities & Servicing
28	Fuel System <ol style="list-style-type: none"> 1. Introduction 2. Controls & Indication 3. Component Location 4. Refueling/Defueling 5. Maintenance/Test Facilities & Servicing 6. Fuel Tank Safety (CDCCL)
29	Hydraulic Power including Hydraulic fluid upliftment task <ol style="list-style-type: none"> 1. Introduction 2. Controls & Indication 3. Component Location 4. Maintenance/Test Facilities & Servicing
30	Ice & Rain Protection including wiper blade change task <ol style="list-style-type: none"> 1. Introduction 2. Controls & Indication 3. Component Location 4. Maintenance/Test Facilities & Servicing including replacement of windscreen wiper blades & static wicks, inspection for & removal of de-icing/anti-icing fluid residues
31	Indicating/Recording including cleanliness check of DU Screens (ECAM, PFD & ND) <ol style="list-style-type: none"> 1. Introduction to EIS (EFIS/ECAM) 2. Recording (DFDR/AIDS/CFDIU) 3. Component Location 4. Maintenance/Test Facilities & Servicing

ATA	SYSTEM/SUBJECT
32	Landing Gear including Wheel/Brake Change task <ol style="list-style-type: none"> 1. Introduction 2. L/G , L/G Doors & Wheels 3. L/G Extension & Retraction 4. Brake/Steering 5. Control & Indication 6. Component Location 7. Maintenance/Test Facilities & Servicing : replacement of wheel assemblies & brake units
33	Lights including internal and external lights, filaments replacement task and Operational check of Cabin Emergency Light <ol style="list-style-type: none"> 1. Introduction 2. Cockpit/Cabin/Cargo/Service Compartment/Exterior/Emergency Lights 3. Component Location 4. Maintenance/Test Facilities & Servicing including replacement of internal, external lights, filaments & flash tubes.
34	Navigation <ol style="list-style-type: none"> 1. Introduction 2. Component Location 3. Dependent/Independent Position Determining System 4. Maintenance/Test Facilities & Servicing
35	Oxygen including Portable Oxygen Bottles replacement task <ol style="list-style-type: none"> 1. Introduction 2. Cockpit Crew/ Cabin/Portable Oxygen System 3. Control & Indication 4. Maintenance/Test Facilities & Servicing
36	Pneumatic <ol style="list-style-type: none"> 1. Introduction 2. Engine/APU Bleed 3. Leak Detection 4. Component Location 5. Control & Indication 6. Maintenance/Test Facilities & Servicing
38	Water/Waste including toilet system components replacement task <ol style="list-style-type: none"> 1. Introduction 2. Potable/Waste Water System 3. Vacuum Toilet System 4. Service Panels 5. Component Location 6. Maintenance/Test Facilities & Servicing including replacement of toilet system components excluding gate valves.
46	Information Systems <ol style="list-style-type: none"> 1. Introduction

ATA	SYSTEM/SUBJECT
	2. Architecture/Panels/Component Location 3. Maintenance/Test Facilities & Servicing
47	Inert Gas System 1. Introduction 2. Component Location 3. Maintenance/Test Facilities & Servicing
49	APU 1. Introduction & Description 2. Component Location 3. ECB/Interfaces 4. Maintenance/Test Facilities & Servicing including replacement of APU batteries.
51 thru 57	A/C Structure/Door/Fuselage/Pylons/Windows/Wings 1. PAX & Cargo Doors 2. L/G Doors 3. Fuselage 4. Pylon 5. THS/Elevator 6. Vertical Stabilizer/Rudder 7. Lockpit/Cabin windows 8. Wings 9. Composite Application 10. Servicing including simple repairs & replacement of internal compartment doors & placards, overhead storage compartment doors & cabin refurbishing items, removal/installation of external doors fitted with quick release attachments.
71/72	Power Plant/Engine 1. Introduction & Description
71/72	2. Component Location 3. Maintenance/Test Facilities & Servicing
73	Engine Fuel & Control 1. Introduction & Description 2. Component Location 3. Maintenance/Test Facilities & Servicing
74	Engine Ignition/Starting 1. Introduction & Description 2. Component Location 3. Maintenance/Test Facilities & Servicing
75	Engine Air 1. Introduction & Description 2. Component Location 3. Maintenance/Test Facilities & Servicing

ATA	SYSTEM/SUBJECT
76	Engine Controls <ol style="list-style-type: none"> 1. Introduction & Description 2. Component Location 3. Maintenance/Test Facilities & Servicing
77	Engine Indicating <ol style="list-style-type: none"> 1. Introduction & Description 2. Component Location 3. Maintenance/Test Facilities & Servicing
78	Engine Exhaust <ol style="list-style-type: none"> 1. Introduction & Description 2. Component Location 3. Maintenance/Test Facilities & Servicing
79	Engine Oil <ol style="list-style-type: none"> 1. Introduction & Description 2. Component Location 3. Maintenance/Test Facilities & Servicing

Chapter 5: Assessment Sheet

S. N	Task description	Area	Max marks	Obtained Marks	Remarks
	Behavioral, Airmanship	The trainee scans the environment before starting the task and during the task performance to ensure safety of aircraft and personnel. Communication linked to the task performance within the team members is clear and relevant	5		
	Safety minded	The trainee adheres to the Safety Warnings and Cautions as mentioned in the Aircraft Maintenance Manual.	10		
	Technical skills	The trainee identifies and uses the appropriate tools and equipment (including special tools)	10		
	Technical skills	Performance of Two selected core task (B1/ B2) proficiently.			
		1.	30		
		2.	30		
	Documentation	Use of Aircraft Documentation and completion of records	15		
		Total	100		

Result: (Tick as applicable)

PASS	FAIL	Name & Signature of Assessor
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Chapter 6 : Sample Log Book

STRUCTURED ON JOB TRAINING LOGBOOK

NAME OF TRAINEE- _____

FORM NO.
 ISSUE REV. DATED-

ATA	ATA CHAPTER	REFERENCES	ON A/C	COMPETENCY ASSESSED							INITIALS OF TRAINEE	INITIALS OF INSTRUCTOR/ASSESSOR	TRAINING/ASSESSMENT DATE
				JOB CARD/WORK ORDER/TECH. LOG	DOCUMENTATION HANDLING	A/C FINAL CLOSE UP	ENVIRONMENTAL AWARENESS	PERFORM MAINTENANCE ACTION	AIRCRAFT REPORTS	USING REPORTS & INDICATIONS SYSTEM INTEGRATION			
05	Time Limits/Maintenance Checks												

Caution: For all work on aircraft and components all relevant safety precautions must be observed

Appendix-B

AME Apprenticeship Training Guidelines (Helicopters)

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CHAPTER 1

Preamble

1. This document has been prepared to comply with the On Job Training requirements i.e structured Apprenticeship program to comply with Govt. of India initiative on skill development.
2. The document covers the various areas/ departments of an aviation maintenance organization about which an Aircraft Maintenance Engineer is expected to have reasonable knowledge to work in an airline organization. This booklet should serve as a compact and portable reference document, which would reflect the completion of the candidate's apprenticeship training.
3. The tasks has been identified for B1 & B2 categories. However, this is generic guideline. The AMO may vary it during customization for their applicable aircraft.
4. Maintenance tasks which are considered as A/B1/B2/ are:
 1. Maintenance tasks performed on aircraft structure, power plant and mechanical and electrical systems.
 2. Work on avionics systems requiring **only** simple tests to prove their serviceability and **not** requiring troubleshooting.

CHAPTER 2

Apprenticeship Training Process

The objective of this training to gain the required competence and experience in performing safe maintenance.

It should be conducted at and under the control of a maintenance organization appropriately approved for the maintenance of the particular aircraft type.

The candidate participated in the task should be able to:

- Be aware of the safety aspects during aircraft maintenance
- Read and understand maintenance manual instructions
- Use tools and equipment as required in maintenance manual
- Have knowledge of various material, both raw and consumable, and standard parts
- Use his knowledge in a practical manner to apply manufacturer instructions
- Interpret results from various sources /measurements and learn corrective action where appropriate
- Demonstrate knowledge of good maintenance standards and human factor limitation.

Completion of the logbook

All entries in the logbook shall be made in ink. It should be signed by the trainee and the designated representative of the organization. Any correction, shall be done in manner by striking with a single line, such that deleted entry remains legible.

CHAPTER 3

Trainee Details

Trainee Details	
Name in Full:	
Personal Address:	
Details of DGCA papers/Modules passed	
AME/BAMEL Licence No. (If available):	
Name of Organisation & Address:	
Signature:	

CHAPTER 4

TRAINING SYLLABUS

4.1 The following are the topics of knowledge and skill coverage proposed for personnel who will be coming under AME Apprenticeship Program for development in typical Helicopter Operator / MRO organization.

SN	TOPICS	DURATION IN DAYS	REMARKS
1.	Review of Indian Air Legislation structure and applicable legislation for Helicopter operator / MRO	1	
2.	Ramp and personal safety	1/2	
3.	Standard practices and aircraft marshalling . . Aircraft documentation	2	
4.	Safety management system/ Environment Health & Safety	1	
5.	Human factors in aircraft maintenance	1/2	
6.	Type aircraft system familiarisation , inspection and servicing	2	
7.	Workshop Practices & Tools	1/2	
8.	Special tools & Equipment procedures	1/2	
9.	Good Maintenance Practices	1.5	
10.	Aviation Security Training	1/2	

Total

10 days

4.2 Aircraft Specific: - Proposed duration 12 months

Below mentioned ATA & areas to be covered during Apprentices program covering the system in following area:

1. ATA 07 Lifting and Shoring precautions and practices
2. ATA 08 Leveling and Weighing procedures
3. ATA 09 Towing and Taxi procedures
4. ATA 10 Parking, Mooring, Storage and Return to Service procedures
5. ATA 11 Placards and Markings identification and importance
6. ATA 20 Standard Practices - Airframe
7. ATA 21 Air Conditioning and Pressurization system
8. ATA 22 Auto Flight
9. ATA 23 Communications
10. ATA 24 Electrical Power
11. ATA 25 Equipment/Furnishings
12. ATA 26 Fire Protection and extinguishing
13. ATA 28 Fuel
14. ATA 29 Hydraulic Power
15. ATA 30 Ice And Rain Protection including ATA 12 Cold Weather Maintenance
16. ATA 31 Indicating / Recording System
17. ATA 32 Landing Gear
18. ATA 33 Lights
19. ATA 34 Navigation
20. ATA 52 Doors
21. ATA 53 Fuselage
22. ATA 55 Stabilizer
23. ATA 56 Windows and windshield
24. ATA 60 General Mechanics System
25. ATA 62 Main Rotor
26. ATA 63 Main Rotor Drive
27. ATA 64 Tail Rotor
28. ATA 65 Tail Rotor Drive
29. ATA 67 Rotor Flight Controls
30. ATA 71 Power Plant
31. ATA 73 Engine fuel control system
32. ATA 76 Engine controls
33. ATA 77 Engine Indicating system
34. ATA 79 Engine Oil
35. ATA 80 Starting
36. ATA 88 Electrical Harness

ATA	SYSTEM / SUBJECT
00	Technical Documentation & MEL including de-activation only of sub-system and aircraft components as permitted by the approved MEL <ol style="list-style-type: none"> 1. Organization AMP, Inspection Schedules, FRB, and Work Orders 2. MEL and its Parts 3. Introduction to De-activation of different components/sub-components as per MEL 4. Any task recommended by DGCA
00 thru' 12	A/C General <ol style="list-style-type: none"> 1. Aircraft Dimensions 2. Structure Breakdown & Zoning 3. Cockpit Panels/ Pushbutton Philosophy 4. Servicing Points such as opening & re-fitment of quick access inspection panels 5. Replace Placards & Markings
20	Standard Practices – Airframe <ol style="list-style-type: none"> 1. Personal Protective Equipment's 2. Ramp Hazards 3. Foreign Object Debris 4. Marshalling 5. Anti-collision Beacon 6. Dangerous Areas Around Engines 7. Placement of Chocks 8. Placement of Safety Cones 9. Alignment of Vehicles/ Equipment's 10. Speed Restrictions <p>Safety practices and Safety equipment-</p> <ol style="list-style-type: none"> 1. Use of safety jackets, gloves, safety shoes, Ear Protection 2. Use of warning notices, circuit breaker clips in the cockpit. 3. Safety when handling fuel, hydraulic, deicing and other cleaning fluids 4. Safety related to ESDS components and practices. 5. Safety pins/safety sleeves for landing gears, doors etc. 6. Wheel Charging with Nitrogen precautions 7. Safety while working around radar equipment (radiation) 8. MEL items 9. Safety precautions during Engine Run Up (Idle/high power)

Standard Practices :- Ground Equipment Familiarization

1. Familiarization, safety precautions and use of Ground Power Unit
2. Familiarization, safety precautions and use of Ground Hydraulic cart (pressurization unit)
3. Use of different types of trestles.

Standard Practices :- General Tools / Special Tools Familiarization

1. Familiarization of each tool content of General tool kit (set Spanners/ Combination spanners/ Off set Ring spanners/ Ring Ratchet/ Deep sockets/ shallow sockets/universal joint drives/expander/ reducer/universal drive sockets/ crowfoot spanners/ ratchet/ drive breaker bar/ drive extensions/ speed handle/ Diagonal cutters/ nose pliers/twisters/ vice grip pliers/ soft jaw monkey plier/screw drivers (plain, Philips, heavy duty)/ mallets/ feeler gauge/hacksaw/ strap wrench/ bottle key / Allen keys/magnifying glass/nose grip plier/ needle files etc.)
2. Uses of Dial Gauge/ Push pull gauge/ Micrometer/ Vernier Caliper etc.
3. Familiarization on use of Torque adapter / Torque wrench, Setting Torque value on dial type and sleeve type torque wrench.

Standard Practices :- Aircraft Servicing / Equipment Familiarization

1. Familiarization on use Nitrogen HP Regulator / LP Regulation, Bottle Key and hose./ TP Gauge.
2. / Hydraulic servicing unit./ Fuel Drain Tool
3. Wheel Change tool (MLG , NLG Adapter / Thread protector / etc)
4. Brake Change tool (Brake Tool Adapter / Axle Protector/ Brake fan tool /driving adapter for Tachometer etc.).
5. Use of various types of Grease Gun (Hand Grease Gun /) and respective adapter / nozzle kit.
6. Familiarization on use of Nose wheel / Main wheel Jacks, Aircraft Jacks / jacking Adapters etc.
7. Familiarization on Compressor wash unit.
8. Familiarization on use of Borescope Kit (flexi scope / rigid boro kit), adapter etc.
9. Flight control Rig pin kit.

Standard Practices :- Aircraft Avionics Equipment Familiarization

1. Familiarization on use of each tool content of General Avionics tool kit, Electrician service tool kit.
2. Familiarization on use of Digital Multimeter / milliohm meter
3. Familiarization on use of Manual Insulation tester (megger) / insulation and continuity tester/ bonding tester.

	<ol style="list-style-type: none"> 4. Familiarization on use of Crimping tool splice/ terminal lugs , Crimping tool ferrule/ crimping tool Turrets/ Crimping too (12 positioner and Go No Go Gauge) 5. Familiarization on use of splicing tool kit, wire Insertors /extractors etc. 6. Familiarization on use of Pitot Static Leak tester 7. Familiarization on use of Air Data Test kit / Air data accessory kit 8. Familiarization on use of DMC Kit.
21	<p>Air Conditioning</p> <ol style="list-style-type: none"> 1. Overview 2. Control & Indication 3. Component Location 4. Avionics Ventilation 5. Maintenance & Servicing
22	<p>Auto Flight</p> <ol style="list-style-type: none"> 1. Introduction 2. Auto Pilot system 3. Auto Pilot component locations 4. Maintenance & Servicing
23	<p>Communications</p> <ol style="list-style-type: none"> 1. Introduction 2. Intercom 3. Radio Communication 4. FDR 5. Component Location 6. Maintenance & servicing
24	<p>Electrical Power</p> <ol style="list-style-type: none"> 1. Introduction 2. Normal/Emergency - Battery 3. Control & Indication 4. Component Location 5. Maintenance including replacement of aircraft batteries
25	<p>Equipment & Furnishings</p> <ol style="list-style-type: none"> 1. General 2. Cockpit/Cabin Crew Seats & their replacement including seat belts & harnesses. 3. Cargo Compartment
26	<p>Fire Protection</p> <ol style="list-style-type: none"> 1. Introduction 2. Engine Fire Protection 3. Cabin Fire Extinguisher

28	<p>Fuel System</p> <ol style="list-style-type: none"> 1. Introduction 2. Controls & Indication 3. Component Location 4. Refueling/Defueling 5. Maintenance
29	<p>Hydraulic Power including Hydraulic fluid upliftment task</p> <ol style="list-style-type: none"> 1. Introduction 2. Controls & Indication 3. Component Location 4. Maintenance & Servicing
32	<p>Landing Gear including Wheel/Brake Change task</p> <ol style="list-style-type: none"> 1. Introduction 2. L/G , L/G Doors & Wheels 3. L/G Extension & Retraction 4. Brake 5. Control & Indication 6. Component Location 7. Maintenance & Servicing
33	<p>Lights including internal and external lights</p> <ol style="list-style-type: none"> 1. Introduction 2. Cockpit/Cabin/Cargo/Service Compartment/Exterior 3. Component Location 4. Maintenance & Servicing including replacement of internal, external lights, filaments.
34	<p>Navigation</p> <ol style="list-style-type: none"> 1. Introduction 2. Component Location 3. Maintenance & Servicing
51 thru' 57	<p>A/C Structure/Door/Fuselage/Windows</p> <ol style="list-style-type: none"> 1. PAX & Cargo Doors 2. L/G Doors 3. Fuselage 4. Stabilizer 5. Cockpit/Cabin Windows 6. Servicing including simple repairs & replacement of internal compartment doors & placards, removal/installation of external doors fitted with quick release attachments.

60 thru' 67	Main Rotor, Main Rotor Drive, Tail Rotor, Tail Rotor Drive, Rotor Flight Controls 1. Introduction 2. Component Location 3. Maintenance & Servicing
71	Power Plant/Engine 1. Introduction & Description 2. Component Location 3. Maintenance
73	Engine Fuel & Control 1. Introduction & Description 2. Component Location 3. Maintenance
76	Engine Controls 1. Introduction & Description 2. Component Location 3. Maintenance
77	Engine Indicating 1. Introduction & Description 2. Component Location 3. Maintenance
79	Engine Oil 1. Introduction & Description 2. Component Location 3. Maintenance
80	Starting system 1. Introduction & Description 2. Component Location 3. Maintenance

4.3 LEARNING TOPICS

DEPARTMENT	LEARNING TOPICS	DURATION
CAMO	Familiarization with MOE	2 months
	Updating airframe and engine hours	
	Service Life Limited items	
	Tracking of component hours - TSN, TSO, TBO, Cycles	
	Forecasting periodic inspection	
	Call outs for inspection, compliance of ASB, AD, SB	
	Airworthiness review & certification	
	Usage of CAMO software	
	Use and updating of Technical documentation	
QUALITY	Incoming inspection	2 months
	Stage inspection during maintenance activity	
	Failure analysis, MTBF	
	Preparation of inspection schedules	
	Internal audits	
	Audit of sub-contractors	
	Usage of log cards, tags, CA Form 1, EASA Form 1, FAA 8130-3	
	Human factors	
SMS		
LINE MAINTENANCE	Reading of task cards and performing the activities	4 months
	Usage of appropriate tools, GSE, GHE	
	Tools counting and calibration status	
	FOD and prevention	
	Usage of consumable materials to clean Helicopter and parts	
	External inspection before release	
	Usage of blanks and removal before flight	
	Daily inspection, BITE test and preparation for flight	
	Oil and Hydraulic, Wheel & Brake systems maintenance	
	Refuelling and precautions to be taken	
	Procedure to be followed while refuelling from barrels	
	Embarking and dis-embarking of passengers - safety to be observed	
	Baggage loading & C.G. for weight and balance	
	Maintenance ground run procedure	
	Trouble shooting and simple rectification	
	After last flight inspection and Turn around servicing	
	Towing and positioning of Helicopter - safety to be observed	
Preparation of helipad before arrival		
Usage of fire extinguisher		
Following tasks subject to availability of suitably configured helicopters:		

	- Removal and installation of Helicopter Emergency Medical Service (HEMS) simple internal medical equipment	
	- Removal and installation of external cargo provisions (i.e., external hook, mirrors) other than the hoist	
	- Removal and installation of quick release external cameras and search lights	
	- Removal and installation of emergency float bags, not including the bottles	
	- Removal and installation of external doors fitted with quick release attachments	
	- Removal and installation of snow pads/skid wear shoes/slump protection pads	
	Log book entries	
BASE MAINTENANCE	Defuelling, disposal of ATF	3 months
	Inspection of Helicopter as per schedule	
	Safe operation of hangar facilities like overhead crane, compressed air, etc.	
	Removal of assemblies and installation procedure	
	Retrofitment SB, STC	
	Compliance of AD, ASB	
STORES	Tools calibration process to be followed	1 month
	Tool inventory records	
	Bonded Stores documentation - Release notes, Certificate of Conformity	
	Batch no., shelf life, cold store requirements	
	Quarantine stores procedure	
	Identification of spurious parts, disposal of rejected items	

CHAPTER 5

Assessment Sheet

	Task description	Area	Maximum marks	Obtained Marks	Remarks
	Behavioral, Airmanship	The trainee scans the environment before starting the task and during the task performance to ensure safety of aircraft and personnel. Communication linked to the task performance within the team members is clear and relevant	5		
	Safety minded	The trainee adheres to the Safety Warnings and Cautions as mentioned in the Aircraft Maintenance Manual.	10		
	Technical skills	The trainee identifies and uses the appropriate tools and equipment (including special tools)	10		

	Technical skills	Performance of Two selected core task (B1/ B2) proficiently.		
		1.	30	
		2.	30	
	Documentation	Use of Aircraft Documentation and completion of records	15	
		Total	100	

Result: (Tick as applicable)

PASS	FAIL	Name & Signature of Assessor
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