# AMT / AMT-T Curriculum

## *An Alternative Method of Compliance with Federal Aviation Regulation Part 66*

*Prepared for the*
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## Executive Summary

The training requirements for aviation maintenance technician certification were developed as part of the 1968 National Study of the Aviation Mechanics Occupation (Allen Study). Except for minor revisions in 1993, these requirements have remained unchanged. During the 30 years since the Allen Study, the technological advances in aircraft, powerplants and their systems have vastly outpaced the training requirements for entry-level aviation maintenance technicians. This ever-widening gap has created problems for the aviation industry in finding adequately trained technicians. It is this concern that brought about the new requirements for aviation maintenance technician certification in the proposed 14 CFR Federal Aviation Regulation Part 66- Certification: Aviation Maintenance Personnel.

Proposed FAR Part 66 provide for two separate certifications for aviation maintenance technicians based on aircraft certification. The Aviation Maintenance Technician (AMT) holds the authority to maintain and return to service aircraft certified under FAR 23 and 27. The Aviation Maintenance Technician-Transport (AMT-T) holds the authority to maintain and return to service aircraft certified under FAR 25 and 29.

During the development of FAR Part 66, the following concerns from FAR Part 147 aviation maintenance training programs were raised:

- Low enrollments in aviation maintenance technician training programs were a serious impediment to AMT training providers in implementing an additional training program for the AMT-T certificate.

- Some state regulations and policies may prevent public schools from exceeding 2100 hours of program training, therefore would restrict many AMT training providers from implementing the AMT-T training program.

- The training requirements for the AMT-T certificate as provided in FAR Part 66 were not clear as to the desired performance outcome.

The diversity of aviation maintenance activities varies dramatically, from small single engine aircraft to large multi engine turbine powered transports with sophisticated electronics. Within this broad arena, a core of common knowledge and skills that every aviation maintenance technician must posses along with the unique skills required to maintain transport category aircraft has been identified and defined.

AMT certificate training requirements are detailed in FAR 147. The AMT-T certificate training requirements are integrated into FAR 66.

The AMT/AMT-T integrated curriculum outlined in this report is performance-outcome based. The 631 student performance objectives provide the knowledge, skills and abilities required in both FAR 147 and FAR 66 AMT-T training requirements. The elimination of the Airframe and Powerplant ratings for the AMT certification and the inception of a single rating of Aircraft for both the AMT and AMT-T in FAR Part 66 is reflected in the presentation of the AMT/AMT-T curriculum.

This curriculum also addresses the area of human factors. Research has found that safe aviation maintenance is dependent upon a number of factors beyond technical competency. The effects of working conditions, environment, fellow workers, personal health and conditioning are important factors in aviation maintenance. This curriculum addresses these areas and provides for there implementation through the training process.

The AMT/AMT-T curriculum as presented in this report provides for 2100 instructional hours. This curriculum is divided into nine (9) instructional units. Each instructional unit contains student performance objectives related to the subject content of the instructional unit. The student performance objectives in certain instructional units are further divided into modules based on subject content. Student performance levels are set for each student performance objective.

Student performance levels provide the minimum standards of acceptable achievement that must be obtained by the student for each student performance objective. Student performance levels are divided into three elements: knowledge, manipulative skills, and application. Each element is further divided into three measures of performance.

One of the guiding concepts behind this AMT/AMT-T integrated curriculum outline herein is that in most subject areas it is possible and desirable to introduce the material related to small, simple aircraft and then progress to large and more complex aircraft. This method facilitates student learning and retention of the subject. However, it must be remembered that the primary purpose of this curriculum is to prepare technicians for employment in the airline industry. For this reason, throughout this curriculum, an emphasis must be placed on the maintenance principles and practices as they relate to transport category aircraft (FAR Part 25) and airline operations (FAR Part 121 and 135).

Given that this curriculum is performance-outcome based, there is no requirement mandating that a student must complete 2100 hours of instruction. If the student can demonstrate the acceptable level of performance and competency for the student performance objective the program may credit the student for completing the SPO.

FAR Part 66 does not require that all AMT training programs comply with or provide AMT-T training. Some AMT training providers will certainly continue to operate under FAR 147. Others will use student performance objectives from the AMT/AMT-T integrated curriculum to enhance their AMT training program. This AMT/AMT-T integrated curriculum is one method suggested for compliance with the AMT-T training requirements of FAR Part 66.

# 1.0 INTRODUCTION

## 1.1 Background

The Federal Aviation Administration (FAA) through its Aviation Rule Making Advisory Committee (ARAC) process has proposed the restructuring of the airframe and powerplant mechanics certificate into the Aviation Maintenance Technician (AMT) certificate with an additional Transport Category certificate. This additional certificate was proposed because the airlines believe that many of the technicians entering the workforce are not adequately prepared to perform maintenance on large complex aircraft. This may be particularly true in the area of electronics where technological advances have dramatically increased knowledge requirements for technicians. While these concerns have been expressed through the Air Transport Association (ATA) Maintenance Training Committee, airlines are not alone in being troubled over the increasing aircraft complexity and the resulting maintenance training requirements. Many of the topics listed in the AMT-T curriculum are also of vital importance to general aviation since it lacks the structure to provide additional training opportunities for the technician.

While the proposal to transition from the A&P certificate appears to have gained widespread support, the proposed AMT-T certificate is raising concerns on several premises. These include:

- A substantial amount of subject matter in the proposed AMT-T curriculum is not exclusive to Part 25 and 29 aircraft but is also relevant to Part 23 aircraft.

- The proposed additional 573 hours of training will present financial hardship for existing AMT schools and students. This is a significant addition to current training requirements and comes at a time when starting salaries in aviation maintenance are not competitive with employment opportunities in other disciplines with similar training periods. It is feared that student recruitment could suffer further at a time when AMT program enrollments are already seriously low.

- Initially it was believed that only a few existing AMT schools or new entrant training providers would be interested in offering the AMT-T. However in recent surveys it appears that almost all AMT schools believe that it is vital to their continued existence and they must offer the AMT-T certificate training program.

- Some AMT schools are already teaching most of the AMT-T material within their present FAR 147 curriculums. They believe this proposal will only increase the recordkeeping and paperwork requirements in attempting to comply with two different programs.

These concerns raise several important issues that unless addressed have the potential of creating an inability to smoothly transition to both the AMT and AMT-T training requirements. The question arises of how these concerns may be addressed and still meet industry and FAA regulatory demands for increased training. One solution may exist in not developing a separate add-on AMT-T training program, but instead, in integrating the proposed AMT-T subject matter and existing Part 147 subject items into a single training program.

## 1.2 Project Objectives and Parameters

The objective of this project is to integrate the AMT training requirements specified in FAR 147 appendix B, C, D and the training requirements for the AMT-T specified in the proposed FAR Part 66 and develop a single training curriculum to certificate AMT-T's. This project was given the following parameters:

- The curriculum should not be less than 2100 (+/-) hours in length

- Primary focus on the skills needed for transport category (FAR Part 25 and Air Carrier (FAR Part 121, 135) maintenance activities

- Present the curriculum requirements in a manner that is acceptable to aviation maintenance educators

- Present the curriculum requirements as measurable objectives

- Seek, evaluate and utilize, as appropriate, input from aviation maintenance educators, air carrier maintenance training personnel, and other interested parties

### 1.3 Methodology

Following a strategic planning approach, a detailed comparison of the FAR Part 147 subject items (appendix B, C, and D) and the proposed AMT-T subjects was performed. This comparison focused on similarities, duplication and areas where best to integrate the two sets of training requirements. During this period additional amplification of the AMT-T training requirements were sought and obtained from members of the ATA Maintenance Training Committee. Additional information related to these requirements was gathered from members of the aviation maintenance community and aviation maintenance educators. The result was a comprehensive listing of the subject items. The listing of subject items was divided into groups based on common knowledge, skills and abilities required to meet the objective(s) for the subject item. A new curriculum flow path was developed. The new flow is based on learning hierarchies.

Concurrently, a review of the current relevant information from studies, such as National Transportation Safety Board Accident Reports, the Pilot and Aviation Maintenance Technicians Blue Ribbon Panel Report, draft reports from the Aviation Maintenance Technician Job Task Analysis, aging aircraft studies, and the Canadian Aviation Maintenance Council's Aviation Maintenance Occupational Analyses Series. This review identified additional knowledge, skills and abilities needed by the AMT and AMT-T.

Based on the data from the comparison and the review of the studies, student performance objectives were developed. Competency levels were developed and set for each student performance objective.

Workshops were held for aviation educators and airline maintenance training personnel. During these workshops the participants were asked to provide feedback on the proposed curriculum. The responses from participants were collated and reviewed. The responses are located in Section 5.2 of this document. Some changes were made to the final curriculum based on the workshops.

## 2.0 TERMINOLOGY

### 2.1 Definitions

The following definitions apply to the terms as used in this document.

Terminology

| | |
|---|---|
| Application | the measure of the students ability to identify and apply knowledge to solve a problem or complete a task |
| Apply | to put to use or to put into operation |
| Basic functions of a PC | operating word processing programs; perform typical desk top applications; turn on, turn off, save data, retrieve data from memory |
| Explain | to describe in a manner that demonstrates an understanding |
| Fabricate | to build or assemble |

| | |
|---|---|
| Identify | to physically establish as being a specific type or item using proper nomenclature |
| Knowledge | the measure of the students understanding of the principles, practices and operational concepts of the subject or task |
| Locate | to find in the appropriate technical manual, technical material, aircraft, engine or component |
| Manipulative Skills | the measure of the students ability to perform a physical task or process with accuracy and to accepted industry standards |
| Overhaul | the maintenance procedure in which the component is disassembled, to the extent necessary to determine the condition of its parts, inspected and reassembled |
| Student Performance Level | defines the minimum level of student performance in three areas: Knowledge, Application, Manipulative Skills |
| Student Performance Objective | a statement of desired learning outcomes in terms of student behavior |
| Troubleshoot | the systematic analysis of a malfunction in a system or component to determine the cause |
| Typical / Routine Maintenance task(s) | a process or action that is typical of the an AMT/AMT-T while involved in the maintenance, inspection, and or repair of an aircraft, engine or component in a line or scheduled maintenance activity |

# 3.0 CURRICULUM OVERVIEW

The elimination of the Airframe and Powerplant ratings for AMT certification and the inception of a single rating of Aircraft for both the AMT and AMT-T in FAR Part 66 is reflected in the presentation of the AMT/AMT-T curriculum.

The AMT/AMT-T curriculum is divided into nine (9) instructional units. Each instructional unit contains student performance objectives related to the subject content of the instructional unit. The student performance objectives (SPO) in certain instructional units are further divided into modules based on subject content.

Where certain skills reflected in an SPO may be applicable to more than one instructional unit the authors have placed the SPO in the instruction unit that will provide for the best instructional impact to be achieved. An example is the study of Engine Indicating and Crew Alerting Systems (EICAS) and Centralized Aircraft Monitoring System (ECAM). These systems overlap a number of aircraft and engine systems. To facilitate student learning and increase retention these systems are placed in the Flight Management Systems module of the Aircraft Electronics and Integrated Systems instructional unit instead of multiply instructional units.

## 3.1 Instructional Philosophy

The successful delivery of this curriculum is based on the following principles and guidelines:

Sequencing – The instructional units in this curriculum have been developed in a building block sequence that introduces basic information early in the program so that this knowledge may be utilized in helping the student to learn progressively advanced and diverse subject matter. For this reason it is important that the hierarchical order be followed. Instructional units on the same level may be taught concurrently or in sequence. In some instances, in order to maintain a full-time student and a full-student instructional load, it is allowable to begin teaching the next higher instructional level prior to the completion of the previous level. At no time should more than two levels be taught concurrently.

Student performance objectives may be rearranged within the instructional unit, and in some instances, moved to a different unit if the program can demonstrate a comparable level of coverage and curriculum flow.

Focus – One of the guiding concepts behind the AMT/AMT-T integrated curriculum is that in most subject areas it is possible and desirable to introduce the material related to small, simple aircraft and then progress to large and more complex aircraft. However, it must be remembered that the primary purpose of this curriculum is to prepare technicians for employment in the airline industry. For this reason, throughout the curriculum, an emphasis must be placed in the maintenance principles and practices as they relate to transport category aircraft and airline operations.

Integration – It is important that general concepts such as safety, team building, human factors, error analysis, computer and technical material usage be emphasized throughout the curriculum and integrated into laboratory situations.

Methods – This curriculum includes new subject areas and topical content not previously included in FAR Part 147. The successful teaching of some of this material will require the utilization of modern educational methods and technology. Where appropriate, educators are encouraged to utilize accepted educational methods and technology to provide for more effective and efficient training.

Evaluation – There are several different types of evaluation methods in use today including objective tests, short answer, essay exams, oral tests, and practical laboratory exams. It is recognized that there is not one form of testing that is suitable for all types of instruction. For that reason, multiple forms of testing should be included in a comprehensive evaluation system.

## 3.2 Instructional Hours

The AMT/AMT-T curriculum is a performance–outcome based curriculum and as presented in this report provides for 2100 instructional hours.

Given the varying factors at each aviation maintenance training program, it is expected that the allocation of instructional hours may vary up to 20%. Regardless of how the individual program allocates the instructional hours, the program must present a minimum of 2100 instructional hours.

There is no requirement mandating that a student must complete 2100 hours of instruction. If the student can demonstrate the acceptable level of performance and competency for the student performance objective the program may credit the student for completing the SPO. In some instances, additional hours may be required for remedial work if entering student lacks sufficient educational fundamentals or has not mastered the acceptable level of performance and competency.

### *3.2.1 Instructional Hour Allocation*

Each instructional unit and module has been allocated instructional time based on a review of the required level of student performance for the student performance objectives and the complexity of the subject. The hour breakdown assigned to the instructional units is designed as a guide. The emphasis in the curriculum should be in meeting the student performance objectives, not the hour requirements.

Instructional hour allocation is shown in Table 1.

**Table 1. Instructional Hour Allocation**

| Instructional Unit | Module Hours | Instructional Hours |
|---|---|---|
| General Knowledge | | 65 hours |
| Basic Maintenance Knowledge and Skills | | 65 hours |
| Aircraft Documentation and Administrative Skills | | 75 hours |
| Ground Operations and Safety | | 60 hours |
| Aircraft Powerplant | | 550 hours |
| Gas Turbine Engine module | 264 hours | |
| Reciprocating Engine module | 209 hours | |
| Propeller module | 77 hours | |
| Aircraft Electronics and Integrated Systems | | 450 hours |
| Electrical Theory module | 121 hours | |
| Maintenance Practices for Electrical Systems module | 54 hours | |
| Electrical Power Generation Systems module | 54 hours | |
| Communication, Navigation and Warning Systems module | 140 hours | |
| Flight Management Systems module | 81 hours | |
| Aircraft Systems | | 300 hours |
| Aircraft Structures | | 375 hours |
| Aircraft Inspections and Capstone Objectives | | 150 hours |
| Total Instructional Hours | | 2100 hours |

## 3.3 Student Performance Objectives

The student performance objective is a statement of desired learning outcomes in terms of student behavior. In addition, the student performance objective serves as a guide to the selection of strategies and methods of instruction, and provides criteria for evaluation of learning.

The student performance objective number is an alphanumeric system that allows for the tracking of the student performance objective. The sequence of the student performance objective is not an indication of the order of instruction.

## 3.4 Student Performance Levels

Student performance levels provide the minimum standards of acceptable achievement that must be obtained by the student for each student performance objective. Due to the unique nature of each student performance objective the standards of performance required will be different for each student performance objective.

Student performance levels are divided into three elements: knowledge, application and manipulative skills. Each element is further divided into three measures of performance.

### 3.4.1 Knowledge

Knowledge is the measurement of the students understanding of the principles, practices, and operational concepts of the subject or task. The three levels of performance are:

| Level | Description |
|---|---|
| A | Basic knowledge of general principles or practices |
| B | Knowledge of general principles, practices and operational concepts |
| C | High level of knowledge of principles, practices and operational concepts |

### 3.4.2 Application

Application is the measurement of the students' ability to identify and apply rules or principles to solve a problem or complete a task with an element of difficulty. The three levels of performance are:

| Level | Description |
|---|---|
| A | No practical application |
| B | Limited practical application |
| C | High degree of practical application |

### 3.4.3 Manipulative Skill

Manipulative Skills is the measurement of the students' ability to perform a task or process with speed, accuracy, and to accepted industry standards. The three levels of performance are:

| Level | Description |
|---|---|
| A | No development of manipulative skills |
| B | Development of sufficient manipulative skills to perform basic operations |
| C | Development of manipulative skills required to simulate "return to service" |

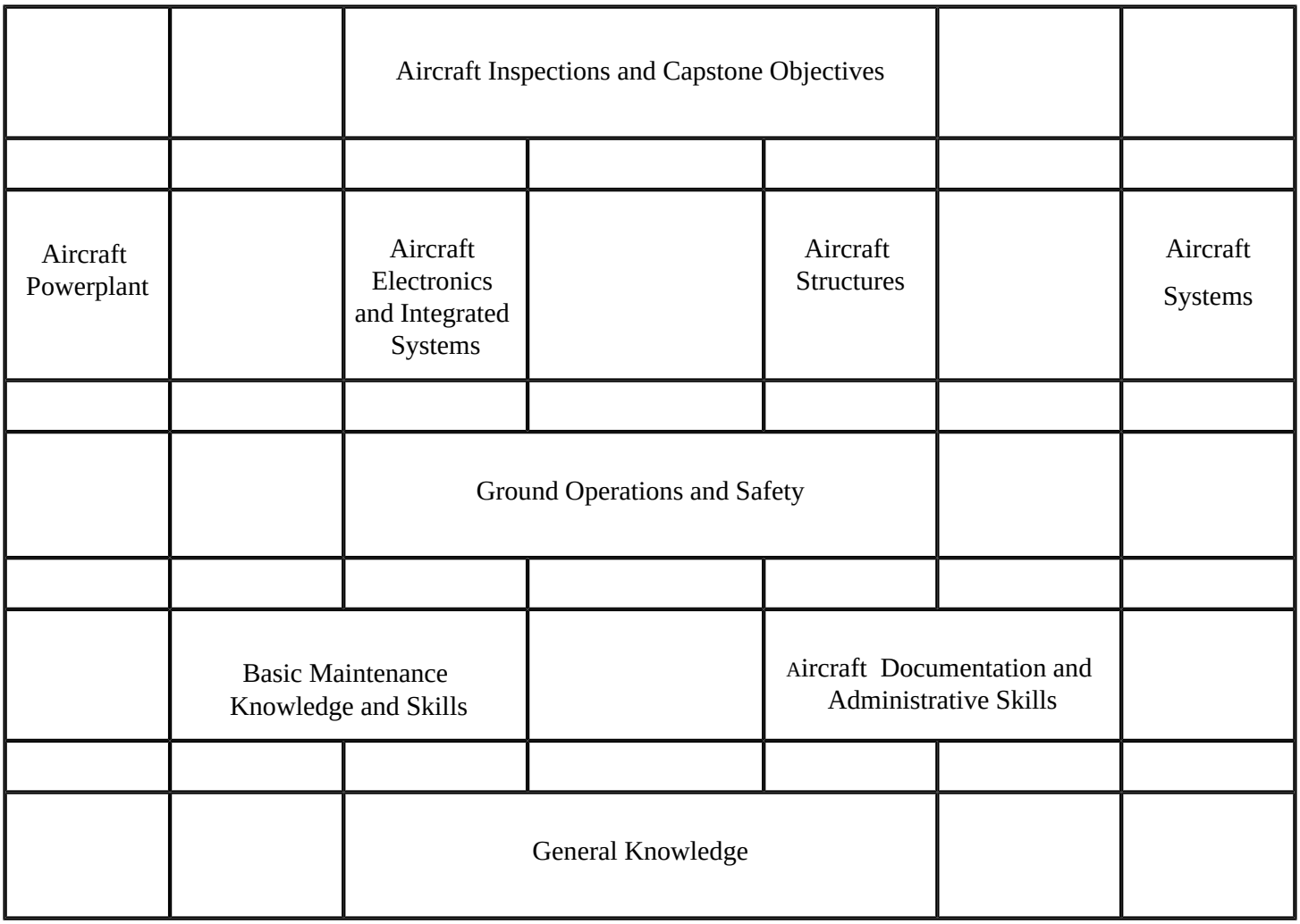
## 4.0 CURRICULUM

## 4.1 Curriculum Structure

The curriculum is divided into nine (9) instructional units. These units are General Knowledge, Basic Maintenance Knowledge and Skills, Aircraft Documentation and Administrative Skills, Ground Operations and Safety, Aircraft Powerplant, Aircraft Electronics and Integrated Systems, Aircraft Structures, Aircraft Systems and Aircraft Inspections and Capstone Objectives.

Instructional units contain student performance objectives related to the subject content of the instructional unit. The student performance objectives may be further divided into modules based on subject content. The instructional units are in hierarchical order. This order presents the subordinate knowledge and skills prior to the introduction of complex systems and concepts. Figure 1 shows the instructional units in their hierarchical order.

**Figure 1. Instructional Unit Hierarchic**




## 4.2 Instructional Units

### *4.2.1 General Knowledge Instructional Unit*

The material in this instructional unit provides the AMT/AMT-T student with the knowledge, skills, and abilities necessary to matriculate through the aviation maintenance curriculum.

Content areas in this instructional unit include math, physics, aerodynamics, and theory of flight, aircraft identification, computer skills, human factors, and maintenance resource management, reading comprehension, English language and writing skills. Mastery of the student performance objectives in this instructional unit is considered prerequisite for all other AMT/AMT-T instructional units.

Given the nature of the requirements in this instructional unit some schools may make a determination of student competency in specific student performance objectives by testing in-lu-of-providing formal instruction.

Sixty-five (65) instructional hours are allocated for this instructional unit.

### 4.2.2 Basic Maintenance Knowledge and Skills Instructional Unit

The material in this instructional unit provides the student with an introduction to the common skills that all AMT's must possess.

Content areas in this instructional unit include drawings, blueprint reading, weight and balance, fluid lines and fittings, aircraft cleaning, corrosion control (theory), non-destructive inspections, hand tool usage, precision measuring, lettering, safety wiring, tapping, threading, and heli-coils.

Seventy-five (75) instructional hours are allocated for this instructional unit.

### 4.2.3 Aircraft Documentation and Administrative Skills

The material within this instructional unit provides the AMT/AMT-T student with the knowledge, skills, and abilities to use and understand the technical support material and emphases the importance of the record keeping requirements for aircraft and aircraft operators. The emphasis of the instructional unit is on FAR 121 and 135 operational requirements.

Content areas in this instructional unit include technical writing skills, maintenance record entries, inspection records, minimum equipment lists (MEL), configuration deviation lists (CDL), Type Certificate Data Sheets, Airworthiness Directives, Advisory Circulars, technical reading skills, manufacturer and operator manuals, approved parts recognition, ETOPS, and maintenance release requirements.

Seventy-five (75) instructional hours are allocated for this instructional unit

### 4.2.4 Ground Operations and Safety

This instructional unit provides the AMT/AMT-T student with the Knowledge, skills, and abilities needed to safely perform aircraft maintenance functions.

Content areas in this instructional unit include flight line and hangar safety, aircraft moving and security, OSHA and EPA regulations, aircraft fueling and defueling, Material Safety Data Sheets (MSDS), hazardous material identification and handling procedures, aircraft cleaning, fuels, lubricants and oils.

Sixty (60) instructional hours are allocated for this instructional unit.

### 4.2.5 Aircraft Powerplant Instructional Unit

The Aircraft Powerplant instructional unit contains three modules: Aircraft Gas Turbine Engines, Reciprocating Engines, and Propellers.

The Gas Turbine Engine module contains all related engine systems and auxiliary power units (APU). Emphasis is on understanding current engines and systems operation, performance of typical maintenance tasks, inspect and trouble-shooting operational malfunctions.

The Reciprocating Engine module contains all related engine systems. Emphasis is on understanding current engines and systems operation, performance of typical maintenance tasks, inspect and troubleshooting operational malfunctions.

The Propeller module includes both reciprocating engine and turbine engine propellers. Emphasis is on the operation of the propeller, performance of typical routine maintenance tasks, inspect and troubleshooting operational malfunctions.

Five hundred and fifty (550) instructional hours are allocated for this instructional unit. The recommended instructional hours for each module is as follows:

Gas Turbine Engine module – 264 instructional hours
Reciprocating Engine module – 209 instructional hours
Propeller module – 77 instructional hours

### *4.2.6 Aircraft Electronics and Integrated Systems Instructional Unit*

The Aircraft Electronics and Integrated Systems instructional unit contains five modules. These modules are Electrical Theory, Maintenance Practices for Electrical Systems, Electrical Power Generation Systems, Communication, Navigation and Warning Systems, and Flight Management Systems.

The Electrical Theory module content includes the fundamental elements of electronic theory from direct current analog systems through digital electronics.

The Maintenance Practices for Electrical Systems module content includes schematic reading, test equipment usage, basic wiring procedures, troubleshooting and electronic equipment rack maintenance.

The Electrical Power Generation module content includes batteries, generators (AC & DC), inverters, rectifiers, and electrical power distribution.

Communication, Navigation and Warning Systems module provides for the study of these systems with an emphasis on principles of operation, system components, ground testing and troubleshooting.

The Flight Management Systems module content includes the flight management computer system (FMC) and autoflight systems with emphasis on the principles of operation, system components, ground testing, troubleshooting and identification of Line Replacement Units.

Four hundred and fifty (450) instructional hours is allocated for this instructional unit. The recommended instructional hours for each module is as follows:

Electrical Theory module – 121 instructional hours
Maintenance Practices for Electrical Systems module – 54 instructional hours
Electrical Power Generation Systems module – 54 instructional hours
Communication, Navigation and Warning Systems module – 140 instructional hours
Flight Management Systems module – 81 instructional hours

### *4.2.7 Aircraft Systems Instructional Unit*

The Aircraft Systems instructional unit provides the AMT/AMT-T student with a detailed knowledge of aircraft systems with a focus on transport aircraft (Part 25) systems emphasizing system operation, routine maintenance and trouble-shooting.

Content areas in this instructional unit include hydraulic systems, landing gear, tires and wheels, brake systems, fuel systems, fuel quantity systems, heating systems, air conditioning systems, pressurization systems, pneumatic systems, oxygen systems, ice and rain control, fire detection and extinguishing systems, and instruments.

Three hundred (300) instructional hours are allocated for this instructional unit.

### *4.2.8 Aircraft Structures Instructional Unit*

This instructional unit provides the AMT/AMT-T student with the knowledge, skills and abilities to inspect, maintain and repair aircraft structures. Emphasis is on hand-on learning. This instructional unit brings in previously learned knowledge and applies it to “real world” situations (e.g. corrosion control, NDT). It should be noted that this curriculum provides for the elimination of all practical study of Wood Structures, Fabric and Welding.

Content areas in this instructional unit include sheet metal structures, composite structures, and aircraft rigging (flight controls and doors).

Three hundred and seventy-five (375) instructional hours are allocated for this instructional unit.

### *4.2.9 Aircraft Inspections and Capstone Objectives Instructional Unit*

This instructional unit requires the student to use the knowledge; skills and experiences learned during AMT-T education. In addition, programs have the flexibility to provide unique capstone student performance objectives or advanced technical courses to complete the student’s education. Programs should focus capstone objectives to best fulfill the student’s career objectives. Examples of acceptable capstone objectives would include advanced non-destructive training to ASNT standards, advanced composites (manufacturing focus), regional aircraft familiarization courses, specific aircraft gas turbine engine training, aviation industry co-ops and internships. The capstone objective may be tailored to an individual student or a class of students.

One hundred and fifty (150) instructional hours are allocated for this instructional unit.

## 4.3 Curriculum Presentation

To facilitate the understanding of the curriculum, it is presented in the following format:

| SPO **Item #** | Student Performance Levels<br>Knowledge Application Manipulative Skills | Student Performance Objectives |
|---|---|---|

The student performance objective number (SPO Item #) is an alphanumeric system that allows for the tracking of the student performance objective. The sequence of the student performance objective is not an indication of the order of instruction.

| SPO Item # | **Student Performance Levels**<br>**Knowledge Application Manipulative Skills** | Student Performance Objectives |
|---|---|---|

Student performance levels provide the minimum standards of acceptable achievement that must be obtained by the student for each student performance objective.

| SPO Item # | Student Performance Levels<br>Knowledge Application Manipulative Skills | **Student Performance Objectives** |
|---|---|---|

The student performance objective is a statement of desired learning outcomes in terms of student behavior.

## 4.4 General Knowledge

| SPO **Item #** | **Student Performance Levels** | | | **Student Performance Objectives** |
|---|---|---|---|---|
| | **Knowledge** | **Application** | **Manipulative Skills** | |
| GK 1 | C | C | A | Demonstrate the ability to perform mathematical computations to extract roots and raise numbers to a given power |
| GK 2 | C | C | A | Demonstrate the ability to perform mathematical computations to determine areas and volumes of various geometrical shapes |
| GK 3 | C | C | A | Demonstrate the ability to perform mathematical computations to solve ratio, proportion, and percentage problems |
| GK 4 | C | C | A | Demonstrate the ability to perform algebraic operations involving addition, subtraction, multiplication, and division of positive and negative numbers |
| GK 5 | B | B | A | Demonstrate the ability to identify and explain the principles of simple machines |
| GK 6 | B | B | A | Demonstrate the ability to identify and explain the principles of sound |
| GK 7 | B | B | A | Demonstrate the ability to identify and explain the principles of heat dynamics |
| GK 8 | C | C | A | Demonstrate the ability to identify and explain the function of primary and secondary structural and flight control components of typical aircraft certified under FAR Part 23, 25, 27 and 29 |

| | | | | |
|---|---|---|---|---|
| GK 9 | C | B | A | Demonstrate the ability to identify and explain the principles of aerodynamics as they relate to aircraft certified under FAR Part 23,25,27,and 29 |
| GK 10 | C | B | A | Demonstrate the ability to state and explain the principles of the theory of flight for fixed and rotary wing aircraft |
| GK 11 | B | C | A | Demonstrate the ability to identify FAA type certified aircraft |
| GK 12 | C | C | B | Demonstrate the ability to perform basic functions on a PC type computer using typical desktop application programs |
| GK 13 | C | C | B | Demonstrate the ability to input data to a computer at a rate of 25 words per minute |
| GK 14 | B | B | A | Demonstrate the ability to state and explain the basic principles and procedures used in troubleshooting |
| GK 15 | B | B | A | Demonstrate the ability to state and explain the concepts used in Maintenance Resource Management – Human Factors |
| GK 16 | B | B | A | Demonstrate the ability to state and explain the concepts used in Team Building |
| GK 17 | B | B | A | Demonstrate the ability to state and explain the concepts used in Situational Awareness and fatigue |
| GK 18 | B | B | A | Demonstrate the ability to state and explain the concepts used in Error Analysis and shift turnover |
| GK 19 | C | C | A | Demonstrate the ability to read and comprehend aircraft technical manuals and related materials |
| GK 20 | C | C | A | Demonstrate the ability to write in the English language by writing aircraft defect and repair statements |
| GK 21 | C | C | A | Demonstrate the ability to speak the English language by reading and explaining aircraft technical material |

## 4.5 Basic Maintenance Knowledge & Skills

| SPO Item # | Student Performance Levels | | | Student Performance Objectives |
|---|---|---|---|---|

| | Knowledge | Application | Manipulative Skills | |
|---|---|---|---|---|
| MKS 1 | B | A | A | Demonstrate the ability to use aircraft drawings, symbols, and system schematics to perform aircraft maintenance activities |
| MKS 2 | B | B | B | Demonstrate the ability to draw sketches of aircraft repairs and alterations |
| MKS 3 | C | C | A | Demonstrate the ability to locate and identify information found on blueprints and technical drawings |
| MKS 4 | C | C | A | Demonstrate the ability to locate, calculate and compare information found on charts and graphs |
| MKS 5 | C | C | B | Demonstrate the ability to weigh aircraft certified under FAR Part 23 |
| MKS 6 | C | C | A | Demonstrate the ability to identify and perform the calculations needed to complete weight-and-balance checks and record data for aircraft operated under FAR Part 91, 121 and 135 |
| MKS 7 | C | C | C | Demonstrate the ability to fabricate, proof test and install rigid and flexible fluid lines and fittings |
| MKS 8 | B | A | A | Demonstrate the ability to identify cleaning materials to be used on aircraft exterior structures |
| MKS 9 | B | A | A | Demonstrate the ability to identify aircraft corrosion and the proper corrective and preventive treatment |
| MKS 10 | B | A | A | Demonstrate the ability to identify appropriate nondestructive testing methods for various aircraft and engine applications |
| MKS 11 | B | B | B | Demonstrate the ability to perform basic dye penetrant, eddy current, ultrasonic, and magnetic particle Inspections |
| MKS 12 | B | A | A | Demonstrate the ability to identify basic heat-treating<br>Processes for various aircraft and engine applications |

| | | | | |
|---|---|---|---|---|
| MKS 13 | C | A | A | Demonstrate the ability to identify and determine the specifications<br>Required for aircraft material and hardware on various applications |
| MKS 14 | C | C | A | Demonstrate the ability to inspect welds to determine airworthiness |
| MKS 15 | C | C | C | Demonstrate the ability to operate precision measuring tools |
| MKS 16 | C | A | A | Demonstrate the ability to identify and select the proper fasteners and determine acceptable fastener substitution for various aircraft and engine applications |
| MKS 17 | A | A | A | Demonstrate the ability to identify common hand tools and common specialty tools |
| MKS 18 | A | A | A | Demonstrate the ability to identify and select proper aircraft finishing Materials |
| MKS 19 | B | B | A | Demonstrate the ability to inspect aircraft exterior finishes and Identify defects in the finish and their cause |
| MKS 20 | C | C | C | Demonstrate the ability to correctly safety aircraft bolts, nuts, turnbuckles and connectors |
| MKS 21 | C | C | C | Demonstrate the ability to remove and install aircraft studs and heli-coil Inserts |
| MKS 22 | C | C | C | Demonstrate the ability to install and repair threads in/on aluminum and steel |

## 4.6 Aircraft Documentation and Administrative Skills

| SPO Item # | Student Performance Levels | | | Student Performance Objectives |
|---|---|---|---|---|
| | Knowledge | Application | Manipulative Skills | |
| ADAS 1 | C | C | A | Demonstrate the ability to write descriptions of work performed including aircraft discrepancies and corrective actions using typical aircraft maintenance records for aircraft operating under FAR Part 91, 121 and 135 |

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| ADAS 2 | C | C | A | Demonstrate the ability to properly complete required maintenance forms, records, and inspection reports for aircraft operating under FAR Part 91, 121 and 135 |
| ADAS 3 | C | C | A | Demonstrate the ability to read, comprehend, locate and apply the information contained in Minimum Equipment lists (MEL), Configuration Deviation List (CDL), and Dispatch Deviation Program guide (DDPG) |
| ADAS 4 | C | C | A | Demonstrate the ability to read, comprehend, locate and apply information contained in FAA Type Certificate Data Sheets, Airworthiness Directives, advisory circulars, and related Federal Aviation Regulations |
| ADAS 5 | C | C | A | Demonstrate the ability to read, comprehend, locate and apply information contained in manufacturer's Illustrated Parts Catalogs for aircraft and engines |
| ADAS 6 | C | C | A | Demonstrate the ability to read, comprehend, locate and apply information contained in manufacturer's Engine Maintenance Manuals |
| ADAS 7 | C | C | A | Demonstrate the ability to read, comprehend, locate and apply information contained in manufacturer's Fault Reporting and Isolation Manual (FRM & FIM) |
| ADAS 8 | C | C | A | Demonstrate the ability to read, comprehend, locate and apply information contained in manufacturer's Structural Repair Manuals for aircraft certified under Part 23 and 25 |
| ADAS 9 | C | C | A | Demonstrate the ability to read, comprehend, locate and apply information contained in manufacturer's General Maintenance Manuals for aircraft certified under Part 23 and 25 |
| ADAS 10 | C | C | A | Demonstrate the ability to read, comprehend, locate and apply information contained in manufacturer's Cold Weather Operation Manual |
| ADAS 11 | C | C | A | Demonstrate the ability to read, comprehend, locate and apply information contained in manufacturer's Component Overhaul Manuals |

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| ADAS 12 | C | C | A | Demonstrate the ability to read, comprehend, and apply information contained in Air Carrier (Pt. 121 and 135) Engineering Orders and work cards |
| ADAS 13 | C | C | A | Demonstrate the ability to state and explain the Aviation Maintenance Technician and Aviation Maintenance Technician-Transport privileges within the limitations prescribed by Part 66 |
| ADAS 14 | C | B | A | Demonstrate the ability to identify parts acceptable for installation on aircraft utilizing manufactures, repair station, and air carrier component (part) certification paperwork |
| ADAS 15 | C | B | A | Demonstrate the ability to state and explain the maintenance and maintenance release requirements for aircraft operating under FAR Part 121 and ETOPS |
| ADAS 16 | C | B | A | Demonstrate the ability to state and explain tool and test equipment calibration requirements |
| ADAS 17 | C | B | A | Demonstrate the ability to locate and explain aircraft Category 2 and Category 3 inspection and release for flight requirements |

## 4.7 Ground Operations and Safety

| SPO Item # | Student Performance Levels | | | Student Performance Objectives |
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| | Knowledge | Application | Manipulative Skills | |
| GOS 1 | C | C | B | Demonstrate the ability to start, ground operate, tow (including pushback ant gates), taxi, and secure aircraft |
| GOS 2 | B | A | A | Demonstrate the ability to explain the procedures and precautions for fueling and defueling aircraft certified under FAR Part 23, and 25 |
| GOS 3 | C | C | A | Demonstrate the ability to select the appropriate MSDS sheet for an item and identify the various information and warnings contained on the MSDS sheet |

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| GOS 4 | C | C | A | Demonstrate the ability to explain the EPA, OSHA, and ICAO procedures for handling hazardous materials on and around aircraft |
| GOS 5 | C | C | A | Demonstrate the ability to identify typical hazards found on aircraft ramp and hangar areas |
| GOS 6 | C | C | A | Demonstrate the ability to explain standard safety practices and procedures for working on and around aircraft located on airport ramps |
| GOS 7 | C | C | A | Demonstrate the ability to locate and explain OSHA standard safety practices and procedures for confined space entry |
| GOS 8 | B | B | A | Demonstrate the ability to locate and explain OSHA Regulations related to aircraft maintenance activities |
| GOS 9 | C | C | A | Demonstrate the ability to explain standard safety practices and procedures for working around jet blast hazard areas |
| GOS 10 | B | B | B | Demonstrate the ability to perform aircraft interior, exterior and powerplant cleaning |
| GOS 11 | B | A | A | Demonstrate the ability to explain the general properties and purposes of aircraft fuels, lubricants and greases |
| GOS 12 | C | C | B | Demonstrate the ability to identify and select aircraft fuels |
| GOS 13 | C | C | B | Demonstrate the ability to identify and select powerplant lubricants |
| GOS 14 | C | C | B | Demonstrate the ability to identify and select hydraulic fluids |
| GOS 15 | C | C | B | Demonstrate the ability to identify and select aircraft lubricants and greases |
| GOS 16 | C | C | B | Demonstrate the ability to identify and select propeller lubricants |
| GOS 17 | B | A | A | Demonstrate the ability to explain the procedures and precautions for deicing aircraft operating under FAR Part 121 and 135 |
| GOS 18 | C | C | C | Demonstrate the ability to use proper hand signals for taxiing and ground movement of aircraft |

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| GOS 19 | C | C | C | Demonstrate the ability to use proper voice procedures for aircraft radio transmissions |

## 4.8 Aircraft Powerplant

### *4.8.1 Turbine Engines*

| SPO Item # | Student Performance Levels | | | Student Performance Objectives |
|---|---|---|---|---|
| | Knowledge | Application | Manipulative Skills | |
| PPT 1 | C | A | A | Demonstrate the ability to explain the operation of typical aircraft gas turbine engines and related systems: turbojet, turbofan, turboprop and turboshaft |
| PPT 2 | C | A | A | Demonstrate the ability to explain the airflow through aircraft gas turbine engines including bleed and surge recovery systems |
| PPT 3 | C | A | A | Demonstrate the ability to explain variable stator vane geometry and vector analysis of airflow in aircraft gas turbine engine compressors |
| PPT 4 | C | A | A | Demonstrate the ability to identify typical aircraft gas turbine engines |
| PPT 5 | C | A | A | Demonstrate the ability to locate and identify typical aircraft gas turbine engine components by proper nomenclature |
| PPT 6 | C | A | A | Demonstrate the ability to identify the materials used in the manufacture of aircraft gas turbine engines |
| PPT 7 | B | B | B | Demonstrate the ability to overhaul an aircraft gas turbine engine |
| PPT 8 | C | C | C | Demonstrate the ability to perform routine maintenance tasks on aircraft gas turbine engines |
| PPT 9 | C | C | C | Demonstrate the ability to inspect aircraft gas turbine engine installations |
| PPT 10 | C | B | B | Demonstrate the ability to troubleshoot operational malfunctions on an aircraft gas turbine engine |
| PPT 11 | C | C | C | Demonstrate the ability to remove and install aircraft gas turbine engines |

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| PPT 12 | C | C | C | Demonstrate the ability to adjust and rig aircraft gas turbine engine controls |
| PPT 13 | C | C | B | Demonstrate the ability to identify and assess damage on aircraft gas turbine engine fan blades and vanes, compressor blades and vanes, turbine blades and vanes, and combustion chambers using visual and NDI methods |
| PPT 14 | C | B | A | Demonstrate the ability to explain the concepts and parameters used in aircraft gas turbine engine trend monitoring |
| PPT 15 | C | B | A | Demonstrate the ability explain the following aircraft gas turbine engine maintenance concepts: Hard Time, Soft Time, On Condition |
| PPT 16 | C | A | A | Demonstrate the ability to state and explain the special inspections that are required on aircraft gas turbine engines |
| PPT 17 | C | C | B | Demonstrate the ability to perform routine borescope inspections of aircraft gas turbine engines |
| PPT 18 | C | C | C | Demonstrate the ability to start, ground run, perform ground run checks, and shutdown an aircraft gas turbine engine |
| PPT 19 | C | C | C | Demonstrate the ability to identify and select lubricants acceptable for use in aircraft gas turbine engines and on engine installations |
| PPT 20 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of the components in aircraft gas turbine engine lubrication systems; regulated and unregulated |
| PPT 21 | C | C | C | Demonstrate the ability to service an aircraft gas turbine engine lubrication systems |
| PPT 22 | C | B | C | Demonstrate the ability to perform routine maintenance tasks on aircraft gas turbine engine lubrication systems and systems components |
| PPT 23 | C | B | B | Demonstrate the ability to troubleshoot operational malfunctions on aircraft gas turbine engine lubrication systems and system components |
| PPT 24 | C | C | C | Demonstrate the ability to inspect aircraft gas turbine engine lubrication systems |

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| PPT 25 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of the components in aircraft gas turbine engine ignition system |
| PPT 26 | C | C | C | Demonstrate the ability to inspect aircraft gas turbine engine ignition systems |
| PPT 27 | C | B | B | Demonstrate the ability to troubleshoot operational malfunctions on aircraft gas turbine engine ignition system and system components |
| PPT 28 | C | B | C | Demonstrate the ability to perform routine maintenance tasks on aircraft gas turbine engine ignition systems and system components |
| PPT 29 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of the components in aircraft gas turbine engine starting systems |
| PPT 30 | C | C | C | Demonstrate the ability to inspect aircraft gas turbine engine starting systems |
| PPT 31 | C | B | B | Demonstrate the ability to troubleshoot operational malfunctions on aircraft gas turbine engine starting systems and system components |
| PPT 32 | C | B | C | Demonstrate the ability to perform routine maintenance tasks on aircraft gas turbine engine starting systems and system components |
| PPT 33 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of the components in aircraft gas turbine engine fuel systems |
| PPT 34 | C | C | C | Demonstrate the ability to inspect aircraft gas turbine engine fuel systems and control systems |
| PPT 35 | C | B | C | Demonstrate the ability to perform routine maintenance tasks on aircraft gas turbine engine fuel systems, fuel controls and system components |
| PPT 36 | B | B | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft gas turbine engine fuel systems, fuel controls and system components |

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| PPT 37 | B | A | A | Demonstrate the ability to state and explain the operation of typical aircraft gas turbine engine electronic engine controls and thrust management systems (FADEC) & (EEC) |
| PPT 38 | B | A | A | Demonstrate the ability to locate and identify typical aircraft gas turbine engine electronic control and thrust management components by proper nomenclature |
| PPT 39 | C | C | C | Demonstrate the ability to inspect aircraft gas turbine engine ice control systems |
| PPT 40 | C | B | C | Demonstrate the ability to perform routine maintenance tasks on aircraft gas turbine engine ice control system and system components |
| PPT 41 | C | B | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft gas turbine engine ice control systems and system components |
| PPT 42 | C | C | C | Demonstrate the ability to inspect aircraft gas turbine engine exhaust systems and system components |
| PPT 43 | C | B | C | Demonstrate the ability to perform routine maintenance tasks on aircraft gas turbine engine exhaust systems and system components |
| PPT 44 | C | B | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft gas turbine engine exhaust systems and system components |
| PPT 45 | C | C | C | Demonstrate the ability to inspect aircraft gas turbine engine thrust reverser systems and system components |
| PPT 46 | C | B | C | Demonstrate the ability to perform routine maintenance tasks on aircraft gas turbine engine thrust reverser systems and system components |
| PPT 47 | C | B | B | Demonstrate the ability to troubleshoot operational malfunctions on aircraft gas turbine engine thrust reverser systems and system components |
| PPT 48 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of the components in aircraft gas turbine engine electrical systems |

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| PPT 49 | C | C | C | Demonstrate the ability to inspect aircraft gas turbine engine electrical systems and system components |
| PPT 50 | C | B | C | Demonstrate the ability to perform routine maintenance tasks on aircraft gas turbine engine electrical systems and system components |
| PPT 51 | C | B | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft gas turbine engine electrical systems and system components |
| PPT 52 | C | A | A | Demonstrate the ability to service aircraft gas turbine engine gearboxes and accessory drive units (CSD & IGD) |
| PPT 53 | C | A | A | Demonstrate the ability to explain the operation of typical aircraft Auxiliary Power Units and APU system interface |
| PPT 54 | C | A | A | Demonstrate the ability to identify typical aircraft Auxiliary Power Units |
| PPT 55 | C | A | A | Demonstrate the ability to locate and identify typical aircraft Auxiliary Power Unit components by proper nomenclature |
| PPT 56 | B | A | A | Demonstrate the ability to perform routine maintenance tasks on aircraft Auxiliary Power Units |
| PPT 57 | C | A | A | Demonstrate the ability to troubleshoot operational malfunctions on aircraft Auxiliary Power Units |

### *4.8.2 Reciprocating Engines*

| SPO Item # | Student Performance Levels | | | Student Performance Objectives |
|---|---|---|---|---|
| | Knowledge | Application | Manipulative Skills | |
| PPR 1 | C | A | A | Demonstrate the ability to explain the operation of typical aircraft reciprocating engines and related systems |
| PPR 2 | C | A | A | Demonstrate the ability to identify typical aircraft reciprocating engines |
| PPR 3 | C | A | A | Demonstrate the ability to locate and identify typical aircraft reciprocating engine components by proper nomenclature |

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| PPR 4 | B | B | B | Demonstrate the ability to overhaul an aircraft reciprocating engine |
| PPR 5 | C | C | C | Demonstrate the ability to perform routine maintenance tasks and repairs on reciprocating engines |
| PPR 6 | C | C | C | Demonstrate the ability to inspect reciprocating engine installations. |
| PPR 7 | C | C | C | Demonstrate the ability to remove and install aircraft reciprocating engines |
| PPR 8 | C | C | C | Demonstrate the ability to adjust and rig aircraft reciprocating engine controls |
| PPR 9 | C | B | C | Demonstrate the ability to troubleshoot operational malfunctions on an aircraft reciprocating engine |
| PPR 10 | C | C | C | Demonstrate the ability to start, perform typical ground operations checks, and shutdown an aircraft reciprocating engine |
| PPR 11 | C | C | A | Demonstrate the ability to identify and select lubricants for use in aircraft reciprocating engines and on engine installations |
| PPR 12 | C | C | C | Demonstrate the ability to service aircraft reciprocating engine lubrication systems |
| PPR 13 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of the components in aircraft reciprocating engine lubrication systems |
| PPR 14 | C | C | C | Demonstrate the ability to inspect aircraft reciprocating engine lubrication systems and system components. |
| PPR 15 | C | B | C | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft reciprocating engine lubrication systems and system components |
| PPR 16 | C | B | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft reciprocating engine lubrication systems and system components |
| PPR 17 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of the components in aircraft reciprocating engine ignition systems |
| PPR 18 | C | C | C | Demonstrate the ability to inspect aircraft reciprocating engine ignition systems and system components. |

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| PPR 19 | C | B | B | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft reciprocating engine ignition systems and system components |
| PPR 20 | C | B | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft reciprocating engine ignition systems and system components |
| PPR 21 | C | B | C | Demonstrate the ability to overhaul an aircraft magneto |
| PPR 22 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of the components in aircraft reciprocating engine fuel systems |
| PPR 22 | C | C | C | Demonstrate the ability to inspect aircraft reciprocating engine fuel systems, fuel metering systems and system components. |
| PPR 23 | C | B | B | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft reciprocating engine fuel systems, fuel metering systems and system components |
| PPR 24 | C | B | B | Demonstrate the ability to troubleshoot operational malfunctions on aircraft reciprocating engine fuel systems, fuel metering systems and system components |
| PPR 25 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of the components in aircraft reciprocating engine fuel and air induction systems |
| PPR 26 | C | C | C | Demonstrate the ability to inspect aircraft reciprocating engine fuel and air induction systems and system components. |
| PPR 27 | C | B | C | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft reciprocating engine fuel and air induction systems and system components |
| PPR 28 | C | B | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft reciprocating engine fuel and air induction systems and system components |
| PPR 29 | C | C | C | Demonstrate the ability to inspect aircraft reciprocating engine temperature control systems and system components. |

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| PPR 30 | C | B | C | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft reciprocating engine temperature control systems and system components |
| PPR 31 | C | B | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft reciprocating engine temperature control systems and system components |
| PPR 32 | C | C | C | Demonstrate the ability to inspect aircraft reciprocating engine exhaust systems and system components. |
| PPR 33 | C | B | C | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft reciprocating engine exhaust systems and system components |
| PPR 34 | C | B | B | Demonstrate the ability to troubleshoot operational malfunctions on aircraft reciprocating engine exhaust systems and system components |
| PPR 35 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of the components in aircraft reciprocating engine turbo-charging systems |
| PPR 36 | C | B | B | Demonstrate the ability to inspect aircraft reciprocating engine turbo-supercharging systems and system components. |
| PPR 37 | B | B | B | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft reciprocating engine turbo-supercharging systems and system components |
| PPR 38 | C | B | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft reciprocating engine turbo-supercharging systems and system components |
| PPR 39 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of the components in aircraft reciprocating engine starting systems |
| PPR 40 | C | C | C | Demonstrate the ability to inspect aircraft reciprocating engine starting systems and system components. |
| PPR 41 | B | B | B | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft reciprocating engine starting systems and system components |

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| PPR 42 | C | B | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft reciprocating engine starting systems and system components |
| PPR 43 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of the components in aircraft reciprocating engine electrical systems |
| PPR 44 | C | C | C | Demonstrate the ability to inspect aircraft reciprocating engine electrical systems and system components. |
| PPR 45 | C | B | C | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft reciprocating engine electrical systems and system components |
| PPR 46 | C | B | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft reciprocating engine electrical systems and system components |

### *4.8.3 Propellers*

| SPO Item # | Student Performance Levels | | | Student Performance Objectives |
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| | Knowledge | Application | Manipulative Skills | |
| PPP 1 | C | A | A | Demonstrate the ability to identify and explain the principles of aerodynamics as they relate to the operation of aircraft propellers |
| PPP 2 | C | A | A | Demonstrate the ability to explain the operation of a constant speed propeller on a reciprocating engine |
| PPP 3 | C | A | A | Demonstrate the ability to explain the operation of a constant speed propeller on a turboprop engine |
| PPP 4 | C | A | A | Demonstrate the ability to identify typical aircraft propellers |
| PPP 5 | C | A | A | Demonstrate the ability to locate and identify aircraft propeller parts by proper nomenclature |
| PPP 6 | C | C | C | Demonstrate the ability to remove and install aircraft propellers |
| PPP 7 | C | C | C | Demonstrate the ability to adjust and rig aircraft propeller controls |

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| PPP 8 | C | C | C | Demonstrate the ability to inspect aircraft propeller and propeller control system installations |
| PPP 9 | C | B | B | Demonstrate the ability perform routine maintenance tasks on aircraft propellers and propeller control systems |
| PPP 10 | C | B | B | Demonstrate the ability to troubleshoot operational malfunctions on aircraft propeller systems |
| PPP 11 | C | C | C | Demonstrate the ability to lubricate an aircraft propeller |
| PPP 12 | B | B | B | Demonstrate the ability to explain the principles of propeller dynamic balancing and blade tracking |
| PPP 13 | C | A | A | Demonstrate the ability to explain the principles of aircraft propeller ice control systems |
| PPP 14 | C | C | C | Demonstrate the ability to inspect aircraft propeller ice control systems |
| PPP 15 | C | B | B | Demonstrate the ability to perform routine maintenance tasks on aircraft propellers ice control systems |
| PPP 16 | C | B | B | Demonstrate the ability to perform routine repairs on aluminum alloy propeller blades |
| PPP 17 | C | B | B | Demonstrate the ability to inspect composite propeller blades for damage and lighting strikes |

## 4.9 Aircraft Electronics and Integrated Systems

### *4.9.1 Electrical Theory*

| SPO Item # | Student Performance Levels | | | Student Performance Objectives |
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| | Knowledge | Application | Manipulative Skills | |
| AEIS – ET 1 | C | C | A | Demonstrate the ability to define and explain common prefixes; kilo, mega, milli, micro, pico |
| AEIS – ET 2 | B | A | A | Demonstrate the ability to define atom, electron, proton, nucleus, and ion |

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| AEIS – ET 3 | B | A | A | Demonstrate the ability to define insulator, conductor, current flow, and ampere |
| AEIS – ET 4 | B | B | A | Demonstrate the ability to identify schematic symbols of basic electronic components |
| AEIS – ET 5 | B | A | A | Demonstrate the ability to define electromotive force, potential difference, voltage and volt |
| AEIS – ET 6 | B | A | A | Demonstrate the ability to explain the effects of connecting batteries in series, parallel, and series-parallel |
| AEIS – ET 7 | B | A | A | Demonstrate the ability to explain the difference between a voltage rise and voltage drop |
| AEIS – ET 8 | B | A | A | Demonstrate the ability to define resistance, ohm and conductance |
| AEIS – ET 9 | B | A | A | Demonstrate the ability to explain resistor construction |
| AEIS – ET 10 | B | A | A | Demonstrate the ability to explain the operation of a potentiometer and rheostat |
| AEIS – ET 11 | C | C | A | Demonstrate the ability to write and apply Ohm’s Law in series, parallel and series-parallel dc circuits |
| AEIS – ET 12 | B | A | A | Demonstrate the ability to define and explain power and wattage |
| AEIS – ET 13 | B | B | A | Demonstrate the ability to state and apply basic power formulas |
| AEIS – ET 14 | B | A | A | Demonstrate the ability to state and explain the basic law of magnetism |
| AEIS – ET 15 | B | A | A | Demonstrate the ability to define and explain magentomotive force and permeability |
| AEIS – ET 16 | B | A | A | Demonstrate the ability to identify the instruments used to measure current, voltage and resistance |
| AEIS – ET 17 | C | B | C | Demonstrate the ability to properly use a ammeter, voltmeter and ohmmeter |
| AEIS – ET 18 | C | B | A | Demonstrate the ability to define and explain AC and DC electrical flow |

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| AEIS – ET 19 | B | A | A | Demonstrate the ability to identify a sine wave |
| AEIS – ET 20 | B | B | A | Demonstrate the ability to determine the peak value, peak-to-peak value, and effective value of a sine wave |
| AEIS – ET 21 | B | B | A | Demonstrate the ability to compute peak value when given the rms value |
| AEIS – ET 22 | B | A | A | Demonstrate the ability to define and explain hertz, kilohertz and megahertz |
| AEIS – ET 23 | B | B | A | Demonstrate the ability to compute wavelength when given frequency |
| AEIS – ET 24 | C | B | B | Demonstrate the ability to identify and explain the usage of an oscilloscope |
| AEIS – ET 25 | B | B | B | Demonstrate the ability to measure amplitude, period and frequency using an oscilloscope |
| AEIS – ET 26 | B | A | A | Demonstrate the ability to define and explain inductance, henry and mutual inductance |
| AEIS – ET 27 | B | A | A | Demonstrate the ability to explain loss in a transformer |
| AEIS – ET 28 | B | A | A | Demonstrate the ability to define and explain reactance and impedance |
| AEIS – ET 29 | B | B | A | Demonstrate the ability to calculate inductive reactance, total inductance and impedance |
| AEIS – ET 30 | B | B | A | Demonstrate the ability to state and apply the formula for inductive reactance |
| AEIS – ET 31 | B | A | A | Demonstrate the ability to define and explain capacitance, farad and capacitive reactance |
| AEIS – ET 32 | B | A | A | Demonstrate the ability to explain impedance matching |
| AEIS – ET 33 | B | A | A | Demonstrate the ability to identify and explain the factors that determine capacitance |
| AEIS – ET 34 | B | B | A | Demonstrate the ability to calculate total capacitance of capacitors connected in series and parallel |

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| AEIS – ET 35 | B | B | A | Demonstrate the ability to calculate capacitive reactance |
| AEIS – ET 36 | B | B | A | Demonstrate the ability to calculate total inductance of inductors connected in series and parallel |
| AEIS – ET 37 | B | B | A | Demonstrate the ability to calculate the impedance of series RC and RLC circuits and parallel RLC circuits |
| AEIS – ET 38 | B | A | A | Demonstrate the ability to define and explain resonance |
| AEIS – ET 39 | B | A | A | Demonstrate the ability to explain the characteristics of series and parallel resonant circuits |
| AEIS – ET 40 | B | A | A | Demonstrate the ability to explain the difference between P-type and N-type semiconductor materials |
| AEIS – ET 41 | B | A | A | Demonstrate the ability to identify forward and reverse-biased diodes |
| AEIS – ET 42 | B | A | A | Demonstrate the ability to name and explain solid-state diode ratings |
| AEIS – ET 43 | B | A | A | Demonstrate the ability to identify and explain the characteristics of zener and varactor diodes |
| AEIS – ET 44 | B | B | A | Demonstrate the ability to identify the schematic symbols of a solid-state diode, a zener diode and a varactor diode |
| AEIS – ET 45 | B | B | A | Demonstrate the ability to identify the schematic symbols for NPN and PNP transistors |
| AEIS – ET 46 | B | B | A | Demonstrate the ability to identify the correct bias for the emitter-base and collector-base junctions of a transistor |
| AEIS – ET 47 | B | A | A | Demonstrate the ability to identify and explain the characteristics of the common-emitter, common-base and common-collector amplifier configurations |
| AEIS – ET 48 | B | A | A | Demonstrate the ability to name and explain the three basic FET circuit configurations |
| AEIS – ET 49 | B | A | A | Demonstrate the ability to define and explain light, infrared rays, ultraviolet rays and photon |

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| AEIS – ET 50 | B | A | A | Demonstrate the ability to identify and explain the light spectrum's frequency range |
| AEIS – ET 51 | B | A | A | Demonstrate the ability to name and explain the characteristics of four light sensitive devices |
| AEIS – ET 52 | B | B | A | Demonstrate the ability to identify the schematic symbol for light sensitive devices |
| AEIS – ET 53 | B | A | A | Demonstrate the ability to explain the operating principles of light emitting diode (LED) |
| AEIS – ET 54 | B | A | A | Demonstrate the ability to explain the operating characteristics and modes of a liquid crystal display |
| AEIS – ET 55 | B | A | A | Demonstrate the ability to identify and explain the characteristics of two basic types of integrated circuits |
| AEIS – ET 56 | B | A | A | Demonstrate the ability to identify and explain the characteristics of digital integrated circuits |
| AEIS – ET 57 | B | A | A | Demonstrate the ability to identify and explain the characteristics of linear integrated circuits |
| AEIS – ET 58 | B | A | A | Demonstrate the ability to identify and explain the characteristics of the binary number system |
| AEIS – ET 59 | B | A | A | Demonstrate the ability to identify and explain the six basic logic gate symbols, their truth tables, and their logic expressions |
| AEIS – ET 60 | B | A | A | Demonstrate the ability to identify and explain the term "flip-flop" as it relates to digital circuits |
| AEIS – ET 61 | B | A | A | Demonstrate the ability to identify the logic diagrams and symbols for the three basic types of "flip-flops" |
| AEIS – ET 62 | B | A | A | Demonstrate the ability to identify and explain the characteristics of the two most common types of sequential logic circuits |
| AEIS – ET 63 | B | A | A | Demonstrate the ability to identify and explain the characteristics of simple microprocessors |
| AEIS – ET 64 | B | A | A | Demonstrate the ability to locate, identify ARINC specifications |

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| AEIS – ET 65 | B | B | A | Demonstrate the ability to explain ARINC specifications: ARINC 429 and ARINC 629 |
| AEIS – ET 66 | B | B | A | Demonstrate the ability to decode ARINC 429 Data Words for binary and binary coded decimal word formats |
| AEIS – ET 67 | B | B | A | Demonstrate the ability to explain data transmission specifications : CSDB, ASCB, and MANCHESTER |

### *4.9.2 Maintenance Practices for Electrical Systems*

| SPO Item # | Student Performance Levels | | | Student Performance Objectives |
|---|---|---|---|---|
| | Knowledge | Application | Manipulative Skills | |
| AEIS – MP 1 | C | B | A | Demonstrate the ability to locate and explain the ATA 20 Specification |
| AEIS – MP 2 | C | C | A | Demonstrate the ability to read and interpret aircraft electrical schematic diagrams for single engine aircraft (Pt. 23) starting circuits |
| AEIS – MP 3 | C | C | A | Demonstrate the ability to read and interpret aircraft electrical schematic diagrams for single engine aircraft (Pt. 23) power supply circuits |
| AEIS – MP 4 | C | C | A | Demonstrate the ability to read and interpret aircraft electrical schematic diagrams for twin engine aircraft (Pt. 23) starting circuits |
| AEIS – MP 5 | C | C | A | Demonstrate the ability to read and interpret aircraft electrical schematic diagrams for twin engine turboprop aircraft (Pt. 23) power supply circuits |
| AEIS – MP 6 | C | C | A | Demonstrate the ability to read and interpret aircraft electrical schematic diagrams for twin engine turboprop aircraft (Pt. 23) lighting circuits |
| AEIS – MP 7 | C | C | A | Demonstrate the ability to read and interpret aircraft electrical schematic diagrams for twin engine turboprop aircraft (Pt. 23) landing gear control and indicating circuits |

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| AEIS – MP 8 | C | C | A | Demonstrate the ability to read and interpret aircraft electrical schematic diagrams for aircraft (Pt. 25) starting circuits |
| AEIS – MP 9 | C | C | A | Demonstrate the ability to read and interpret aircraft electrical schematic diagrams for aircraft (Pt. 25) single and split bus power distribution circuits |
| AEIS – MP 10 | C | C | A | Demonstrate the ability to read and interpret aircraft electrical schematic diagrams for aircraft (Pt. 25) interior cabin lighting |
| AEIS – MP 11 | C | C | A | Demonstrate the ability to read and interpret aircraft electrical schematic diagrams for aircraft (Pt. 25) ground and APU power circuits |
| AEIS – MP 12 | C | C | A | Demonstrate the ability to read and interpret aircraft electrical schematic diagrams for aircraft (Pt. 25) landing gear control and indicating circuits |
| AEIS – MP 13 | C | C | C | Demonstrate the ability identify and use electrical circuit test equipment: digital and analog multi-meters, time delay reflectometer, meg-ohmeter and data bus analyzer |
| AEIS – MP 14 | B | B | A | Demonstrate the ability to locate and explain the procedures for using Built-In-Test-Equipment and Central Maintenance Computers to ground test and troubleshoot aircraft operational malfunctions for aircraft certified under Part 25 |
| AEIS – MP 15 | C | C | C | Demonstrate the ability to troubleshoot electrical circuits faults: Opens, Short–to–Ground, By-Pass Shorts, and Added Resistance |
| AEIS – MP 16 | B | B | A | Demonstrate the ability to locate and explain manufacturer's and FAA practices for repairing aircraft (Pt. 23) electrical systems |
| AEIS – MP 17 | C | B | A | Demonstrate the ability to locate and explain manufacture's, air carrier (Pt. 121 and 135) and FAA practices for repairing aircraft (Pt. 25) electrical systems |
| AEIS – MP 18 | C | C | C | Demonstrate the ability to inspect aircraft wiring, coax, connector plugs, switches and protective devices |

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| AEIS – MP 19 | C | C | C | Demonstrate the ability to install aircraft wiring, coax, switches and protective devices |
| AEIS – MP 20 | C | C | C | Demonstrate the ability to repair aircraft wiring and coax using splices and terminations |
| AEIS – MP 21 | C | C | C | Demonstrate the ability to remove, install and torque aircraft electrical connector plugs; solder and pin replacement types |
| AEIS – MP 22 | C | C | C | Demonstrate the ability to select the proper size pins and sockets for connector plugs both solder and pin replacement types |
| AEIS – MP 23 | C | C | C | Demonstrate the ability to remove and install various size pins and sockets on connector plugs both solder and pin replacement types |
| AEIS – MP 24 | B | B | B | Demonstrate the ability to inspect aircraft antennas |
| AEIS – MP 25 | B | B | B | Demonstrate the ability to perform routine maintenance tasks on aircraft antennas |
| AEIS – MP 26 | C | C | B | Demonstrate the ability to inspect aircraft electronics equipment installations and electronic equipment racks |
| AEIS – MP 27 | B | B | B | Demonstrate the ability to perform routine maintenance tasks on aircraft electronic equipment installations and electronic equipment racks |
| AEIS – MP 28 | B | B | A | Demonstrate the ability to identify electro-static-discharge-sensitive parts |
| AEIS – MP 29 | C | B | A | Demonstrate the ability to locate and explain the information on the proper handling and maintenance practices for electro-static-discharge-sensitive parts |

### *4.9.3 Electrical Power Generation Systems*

| SPO Item # | Student Performance Levels | | | Student Performance Objectives |
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| | Knowledge | Application | Manipulative Skills | |

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| AEIS – EP 1 | B | B | A | Demonstrate the ability to identify and explain the principles of electrical power generation within aircraft lead-acid batteries |
| AEIS – EP 2 | C | C | C | Demonstrate the ability to service and charge aircraft lead-acid batteries |
| AEIS – EP 3 | C | C | C | Demonstrate the ability to inspect aircraft lead-acid batteries and battery installations |
| AEIS – EP 4 | C | C | C | Demonstrate the ability to perform routine maintenance tasks on lead acid batteries, batteries circuits, and battery installations |
| AEIS – EP 5 | C | C | B | Demonstrate the ability to troubleshoot operational malfunctions in aircraft lead-acid battery circuits |
| AEIS – EP 6 | C | C | A | Demonstrate the ability to identify and explain the principles of electrical power generation within aircraft Ni-Cad batteries |
| AEIS – EP 7 | C | C | C | Demonstrate the ability to service and charge aircraft Ni-Cad batteries |
| AEIS – EP 8 | C | C | C | Demonstrate the ability to inspect aircraft Ni-Cad batteries and battery installations |
| AEIS – EP 9 | C | C | C | Demonstrate the ability to perform routine maintenance tasks on Ni-Cad batteries, batteries circuits, and battery installations |
| AEIS – EP 10 | C | C | B | Demonstrate the ability to troubleshoot operational malfunctions in aircraft Ni-Cad battery circuits |
| AEIS – EP 11 | B | A | A | Demonstrate the ability to identify and explain the function of the components in an aircraft ground power circuit on aircraft certified under Part 25 |
| AEIS – EP 12 | B | A | A | Demonstrate the ability to locate and explain the requirements and procedures for ground power hook-up on aircraft certified under Part 25 |
| AEIS – EP 13 | B | B | A | Demonstrate the ability to troubleshoot operational malfunctions in aircraft ground power circuits on aircraft certified under Part 25 |
| AEIS – EP 14 | B | A | A | Demonstrate the ability to identify and explain the operating principles of aircraft DC generators, starter-generators and alternators |

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| AEIS – EP 15 | B | B | B | Demonstrate the ability to inspect aircraft DC generators, starter-generators and alternators installations and circuits |
| AEIS – EP 16 | B | B | B | Demonstrate the ability to perform routine maintenance tasks on aircraft DC generators, starter-generators and alternators installations and circuits |
| AEIS – EP 17 | B | B | B | Demonstrate the ability to troubleshoot operational malfunctions in aircraft DC generators, starter-generators and alternators and their circuits |
| AEIS – EP 18 | B | A | A | Demonstrate the ability to identify and explain the operating principles of aircraft AC generators |
| AEIS – EP 19 | B | B | B | Demonstrate the ability to inspect aircraft AC generators, generator installations and generator circuits |
| AEIS – EP 20 | B | B | B | Demonstrate the ability to perform routine maintenance tasks on aircraft AC generators, generator installations and generator circuits |
| AEIS – EP 21 | B | B | B | Demonstrate the ability to troubleshoot operational malfunctions in aircraft AC generators and generator circuits |
| AEIS – EP 22 | B | B | A | Demonstrate the ability to identify and explain the operating principles of aircraft inverters, current transformers and rectifiers |
| AEIS – EP 23 | B | B | B | Demonstrate the ability to inspect aircraft inverters, current transformers and rectifiers, their installation and circuits |
| AEIS – EP 24 | B | B | B | Demonstrate the ability to perform routine maintenance tasks on aircraft inverters and rectifiers, their installation and circuits |
| AEIS – EP 25 | B | A | A | Demonstrate the ability to identify and explain the operating principles of aircraft starters and motors |
| AEIS – EP 26 | B | B | B | Demonstrate the ability to inspect aircraft electrical motors, their installation and circuits |
| AEIS – EP 27 | B | B | B | Demonstrate the ability to perform routine maintenance tasks on aircraft electrical motors, their installation and circuits |

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| AEIS – EP 28 | C | B | A | Demonstrate the ability to explain the principles of electrical power distribution and load requirements for aircraft certified under Part 23 and 25 |
| AEIS – EP 29 | C | A | A | Demonstrate the ability to explain the operation of electrical power distribution circuits for aircraft certified under part 23 and 25 |
| AEIS – EP 30 | C | B | B | Demonstrate the ability to troubleshoot operational malfunctions in the electrical power distribution system for aircraft certified under Part 23 and 25 |
| AEIS – EP 31 | C | C | A | Demonstrate the ability to perform an electrical load analysis |

### *4.9.4 Communication, Navigation and Warning Systems*

| SPO Item # | Student Performance Levels | | | Student Performance Objectives |
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| | Knowledge | Application | Manipulative Skills | |
| AEIS – CNW 1 | C | A | A | Demonstrate the ability to explain radio transmitter and receiver principles of operation |
| AEIS – CNW 2 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft VHF communication system |
| AEIS – CNW 3 | B | B | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft VHF communication system |
| AEIS – CNW 4 | B | B | B | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft VHF communication system |
| AEIS – CNW 5 | B | B | B | Demonstrate the ability to perform routine maintenance tasks and installation on aircraft VHF communication systems |
| AEIS – CNW 6 | B | B | B | Demonstrate the ability to troubleshoot operational malfunctions on aircraft VHF communication systems |
| AEIS – CNW 7 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft HF communication system |

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| AEIS – CNW 8 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft HF communication system |
| AEIS – CNW 9 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft HF communication system |
| AEIS – CNW 10 | B | A | A | Demonstrate the ability to troubleshoot operational malfunctions on aircraft HF communication systems |
| AEIS – CNW 11 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft SELCAL (Selective Calling) communication system |
| AEIS – CNW 12 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft SECAL (Selective Calling) communication system |
| AEIS – CNW 13 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft SECAL (Selective Calling) communication system |
| AEIS – CNW 14 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft ACARS (ARINC Communication Addressing and Reporting System) communication system |
| AEIS – CNW 15 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft ACARS (ARINC Communication Addressing and Reporting System) communication system |
| AEIS – CNW 16 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft ACARS (ARINC Communication Addressing and Reporting System) communication system |
| AEIS – CNW 17 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft Satellite communication system |
| AEIS – CNW 18 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Satellite communication system |

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| AEIS – CNW 19 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft interphones and passenger communication and entertainment systems |
| AEIS – CNW 20 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft interphone and passenger communication and entertainment systems |
| AEIS – CNW 21 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft interphone and passenger communication systems |
| AEIS – CNW 22 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft compass and attitude sensing systems found in aircraft certified under Part 25 |
| AEIS – CNW 23 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft compass and attitude sensing systems found in aircraft certified under Part 25 |
| AEIS – CNW 24 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft compass and attitude sensing systems found in aircraft certified under Part 25 |
| AEIS – CNW 25 | B | A | A | Demonstrate the ability to locate the technical information and procedures for performing routine maintenance tasks and repairs on aircraft compass and attitude sensing systems found in aircraft certified under Part 25 |
| AEIS – CNW 26 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft Inertial Navigation system |
| AEIS – CNW 27 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Inertial Navigation system |
| AEIS – CNW 28 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft Inertial Navigation system |
| AEIS – CNW 29 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft laser and conventional gyros |

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| AEIS – CNW 30 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft laser and conventional gyros |
| AEIS – CNW 31 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft laser and conventional gyros |
| AEIS – CNW 32 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft Automatic Direction Finder (ADF) system found in aircraft certified under Part 25 |
| AEIS – CNW 33 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Automatic Direction Finder (ADF) system found in aircraft certified under Part 25 |
| AEIS – CNW 34 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft Automatic Direction Finder (ADF) system found in aircraft certified under Part 25 |
| AEIS – CNW 35 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft LORAN system found in aircraft |
| AEIS – CNW 36 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft LORAN system found in aircraft |
| AEIS – CNW 37 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft LORAN system found in aircraft |
| AEIS – CNW 38 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft VHF Navigation (VOR/ILS) system found in aircraft certified under Part 25 |
| AEIS – CNW 39 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft VHF Navigation (VOR/ILS) system found in aircraft certified under Part 25 |
| AEIS – CNW 40 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft VHF Navigation (VOR/ILS) system found in aircraft certified under Part 25 |

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| AEIS – CNW 41 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft Marker Beacon system found in aircraft certified under Part 25 |
| AEIS – CNW 42 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Marker Beacon system found in aircraft certified under Part 25 |
| AEIS – CNW 43 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft Marker Beacon system found in aircraft certified under Part 25 |
| AEIS – CNW 44 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft Distance Measuring Equipment (DME) system found in aircraft certified under Part 25 |
| AEIS – CNW 45 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Distance Measuring Equipment (DME) system found in aircraft certified under Part 25 |
| AEIS – CNW 46 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft Distance Measuring Equipment (DME) system found in aircraft certified under Part 25 |
| AEIS – CNW 47 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft Radio Altimeter system found in aircraft certified under Part 25 |
| AEIS – CNW 48 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Radio Altimeter system found in aircraft certified under Part 25 |
| AEIS – CNW 49 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft Radio Altimeter system found in aircraft certified under Part 25 |
| AEIS – CNW 50 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft Global Positioning System (GPS) found in aircraft certified under Part 25 |

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| AEIS – CNW 51 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Global Positioning System (GPS) found in aircraft certified under Part 25 |
| AEIS – CNW 52 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft Global Positioning System (GPS) found in aircraft certified under Part 25 |
| AEIS – CNW 53 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft ATC Transponder system found in aircraft certified under Part 25 |
| AEIS – CNW 54 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft ATC Transponder system found in aircraft certified under Part 25 |
| AEIS – CNW 55 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft ATC Transponder system found in aircraft certified under Part 25 |
| AEIS – CNW 56 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft Weather Radar systems found in aircraft certified under Part 25 |
| AEIS – CNW 57 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Weather Radar systems found in aircraft certified under Part 25 |
| AEIS – CNW 58 | B | A | A | Demonstrate the ability to locate and explain the safety precautions to be followed when working on and around radar systems |
| AEIS – CNW 59 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft Weather Radar systems found in aircraft certified under Part 25 |
| AEIS – CNW 60 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft Traffic Alert and Collision Avoidance System (TCAS) found in aircraft certified under Part 25 |

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| AEIS – CNW 61 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Traffic Alert and Collision Avoidance System (TCAS) found in aircraft certified under Part 25 |
| AEIS – CNW 62 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft Traffic Alert and Collision Avoidance System (TCAS) found in aircraft certified under Part 25 |
| AEIS – CNW 63 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft Windshear Warning Systems found in aircraft certified under Part 25 |
| AEIS – CNW 64 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Windshear Warning Systems found in aircraft certified under Part 25 |
| AEIS – CNW 65 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft Windshear Warning Systems found in aircraft certified under Part 25 |
| AEIS – CNW 66 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft Ground Proximity Warning Systems (GPWS) found in aircraft certified under Part 25 |
| AEIS – CNW 67 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Ground Proximity Warning Systems (GPWS) found in aircraft certified under Part 25 |
| AEIS – CNW 68 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft Ground Proximity Warning Systems (GPWS) found in aircraft certified under Part 25 |
| AEIS – CNW 69 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft Stall Warning Systems found in aircraft certified under Part 25 |
| AEIS – CNW 70 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Stall Warning Systems found in aircraft certified under Part 25 |

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| AEIS – CNW 71 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft Stall Warning Systems found in aircraft certified under Part 25 |
| AEIS – CNW 72 | B | A | A | Demonstrate the ability to explain the operating principles of an aircraft Flight Data and Cockpit Voice Recorder systems found in aircraft certified under Part 25 |
| AEIS – CNW 73 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Flight Data and Cockpit Voice Recorder systems found in aircraft certified under Part 25 |
| AEIS – CNW 74 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an aircraft Flight Data and Cockpit Voice Recorder systems found in aircraft certified under Part 25 |
| AEIS – CNW 75 | B | A | A | Demonstrate the ability to explain the operating principles of an Emergency Locator Transmitter (ELT) system found in aircraft certified under Part 25 |
| AEIS – CNW 76 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an Emergency Locator Transmitter (ELT) system found in aircraft certified under Part 25 |
| AEIS – CNW 77 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing an Emergency Locator Transmitter (ELT) system found in aircraft certified under Part 25 |

### *4.9.5 Flight Management Systems*

| SPO Item # | Student Performance Levels | | | Student Performance Objectives |
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| | Knowledge | Application | Manipulative Skills | |
| AEIS – FMS 1 | C | B | A | Demonstrate the ability to explain the principles of operation of a flight management system |
| AEIS – FMS 2 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft flight management system |

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| AEIS – FMS 3 | B | A | A | Demonstrate the ability to identify and explain the system interface (inputs and outputs) in a flight management system |
| AEIS – FMS 4 | B | A | A | Demonstrate the ability to identify and explain the levels of messages available from the aircraft flight management system |
| AEIS – FMS 5 | B | A | A | Demonstrate the ability to identify and explain the maintenance page (message) function in the flight management system |
| AEIS – FMS 6 | B | A | A | Demonstrate the ability to identify and explain the controls for the flight management computer system |
| AEIS – FMS 7 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing the flight management computer system |
| AEIS – FMS 8 | B | A | A | Demonstrate the ability to explain the principles of operation of a flight management computer system |
| AEIS – FMS 9 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the components in an air data computer system |
| AEIS – FMS 10 | B | A | A | Demonstrate the ability to identify and explain the system interface (inputs and outputs) in a air data computer system |
| AEIS – FMS 11 | B | A | A | Demonstrate the ability to identify and explain the controls for the air data computer system |
| AEIS – FMS 12 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing the air data computer system |
| AEIS – FMS 13 | B | A | A | Demonstrate the ability to explain the operating principles of electronic display systems (EFIS, EIS, IDS ) used in aircraft certified under Part 25 |
| AEIS – FMS 14 | B | A | A | Demonstrate the ability to locate and identify line replaceable units (LRU) in electronic display systems (EFIS, EIS, IDS) used in aircraft certified under Part 25 |

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| AEIS – FMS 15 | B | A | A | Demonstrate the ability to locate and explain the procedures for removing, installing line replaceable units (LRU)and ground testing the system for proper operation in electronic display systems (EFIS, EIS, IDS) used in aircraft certified under Part 25 |
| AEIS – FMS 16 | B | A | A | Demonstrate the ability to explain the operating principles of Engine Indicating and Crew Alerting Systems (EICAS) and Electronic Centralized Aircraft Monitoring System (ECAM) used in aircraft certified under Part 25 |
| AEIS – FMS 17 | B | A | A | Demonstrate the ability to locate and identify line replaceable units (LRU) in Engine Indicating and Crew Alerting Systems (EICAS) and Electronic Centralized Aircraft Monitoring System (ECAM) used in aircraft certified under Part 25 |
| AEIS – FMS 18 | B | A | A | Demonstrate the ability to locate and explain the procedures for removing and installing line replaceable units (LRU) and ground testing the system for proper operation in Engine Indicating and Crew Alerting Systems (EICAS) and Electronic Centralized Aircraft Monitoring System (ECAM) used in aircraft certified under Part 25 |
| AEIS – FMS 19 | B | A | A | Demonstrate the ability to explain the operating principles of gyroscopes (conventional and laser) as the relate to aircraft instruments |
| AEIS – FMS 20 | B | A | A | Demonstrate the ability to explain the operating principles of Synchro transmitters and receivers |
| AEIS – FMS 21 | B | A | A | Demonstrate the ability to explain the operating principles of Rotating and Linear Variable Differential Transformers (RVTD & LVTD) |
| AEIS – FMS 22 | B | A | A | Demonstrate the ability to explain the principles of operation for Autoflight Control System in aircraft certified under Pt. 25 |
| AEIS – FMS 23 | B | A | A | Demonstrate the ability to identify the primary and secondary control functions for an Autoflight Control System certified under Pt. 25 |

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| AEIS – FMS 24 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the primary units in an Autoflight Control System for an aircraft certified under Pt. 25 |
| AEIS – FMS 25 | B | A | A | Demonstrate the ability to explain the function and principles of operation for the Yaw Damper System in an Autoflight Control System in aircraft certified under Pt. 25 |
| AEIS – FMS 26 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the primary units in the Yaw Damper System in an Autoflight Control System for an aircraft certified under Pt. 25 |
| AEIS – FMS 27 | B | A | A | Demonstrate the ability to explain the function and principles of operation for the Thrust Management System in an Autoflight Control System in aircraft certified under Pt. 25 |
| AEIS – FMS 28 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the primary units in the Thrust Management System in an Autoflight Control System for an aircraft certified under Pt. 25 |
| AEIS – FMS 29 | B | A | A | Demonstrate the ability to explain the function and principles of operation for the Autopilot Flight Director System in an Autoflight Control System in aircraft certified under Pt. 25 |
| AEIS – FMS 30 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the primary units in the Autopilot Flight Director System in an Autoflight Control System for an aircraft certified under Pt. 25 |
| AEIS – FMS 31 | B | A | A | Demonstrate the ability to explain the function and principles of operation for the Auto Stabilization Trim and Mach/ Speed Stability Systems in an Autoflight Control System in aircraft certified under Pt. 25 |
| AEIS – FMS 32 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the primary units in the Auto Stabilization Trim and Mach/Speed Stability system in an Autoflight Control System for an aircraft certified under Pt. 25 |

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| AEIS – FMS 33 | B | A | A | Demonstrate the ability to explain the function and principles of operation for the Maintenance Monitor Systems in an Autoflight Control System in aircraft certified under Pt. 25 |
| AEIS – FMS 34 | B | A | A | Demonstrate the ability to identify and explain the purpose/function of the primary units in the Maintenance Monitor System in an Autoflight Control System for an aircraft certified under Pt. 25 |
| AEIS – FMS 35 | B | A | A | Demonstrate the ability to identify and explain the function of the controls in an Autoflight Control System in aircraft certified under Pt. 25 |
| AEIS – FMS 36 | B | A | A | Demonstrate the ability to identify and explain the annunciator and warnings used in an Autoflight Control System for an aircraft certified under Pt. 25 |
| AEIS – FMS 37 | B | A | A | Demonstrate the ability to locate and explain the procedures for troubleshooting faults in an Autoflight Control System in aircraft certified under Pt. 25 |
| AEIS – FMS 38 | B | A | A | Demonstrate the ability to locate and explain the procedures for removing and installing line replaceable units (LRU) and ground testing the system for proper operation in an Autoflight Control System for aircraft certified under Pt. 25 |
| AEIS – FMS 39 | B | A | A | Demonstrate the ability to state and explain the control laws and logic for law engagement for fly-by-wire control systems |
| AEIS – FMS 40 | B | A | A | Demonstrate the ability to identify and explain the purpose and function of servos and actuators used in autoflight systems for aircraft certified under Pt. 25 |
| AEIS – FMS 41 | B | A | A | Demonstrate the ability to explain the principles of operation of Built In Test Equipment Systems (BITE) for aircraft certified under Pt. 25 |
| AEIS – FMS 42 | B | A | A | Demonstrate the ability to locate and explain the operation procedures for Built In Test Equipment (BITE) for aircraft certified under Pt. 25 |

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| AEIS – FMS 43 | B | A | A | Demonstrate the ability to explain the principles of operation of Central Maintenance Computer Systems (CMC) for aircraft certified under Pt. 25 |
| AEIS – FMS 44 | B | A | A | Demonstrate the ability to locate and explain the operation procedures for Central Maintenance Computers (CMC) for aircraft certified under Pt. 25 |

## 4.10 Aircraft Systems

| SPO Item # | Student Performance Levels | | | Student Performance Objectives |
|---|---|---|---|---|
| | Knowledge | Application | Manipulative Skills | |
| ASYS 1 | C | A | A | Demonstrate the ability to identify and explain the principles of fluid dynamics as they relate to aircraft hydraulic systems |
| ASYS 2 | C | B | A | Demonstrate the ability to explain the operation of typical hydraulic systems used on aircraft certified under Part 23 and 25 |
| ASYS 3 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of aircraft hydraulic system components used on aircraft certified under Part 23 and 25 |
| ASYS 4 | C | C | A | Demonstrate the ability to identify and select fluids for aircraft hydraulic systems |
| ASYS 5 | C | C | C | Demonstrate the ability to service aircraft hydraulic systems |
| ASYS 6 | C | C | C | Demonstrate the ability to inspect aircraft hydraulic systems and system components |
| ASYS 7 | C | C | B | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft hydraulic systems and system components |
| ASYS 8 | C | C | B | Demonstrate the ability to troubleshoot operational malfunctions on aircraft hydraulic systems and system components |
| ASYS 9 | B | A | A | Demonstrate the ability to explain the operation of typical pneumatic systems found on aircraft certified under Part 25 |
| ASYS 10 | B | A | B | Demonstrate the ability to identify and explain the purpose/function of aircraft pneumatic system components |

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| ASYS 11 | C | B | A | Demonstrate the ability to explain the operation of typical landing gear systems used on aircraft certified under Part 23 and 25 |
| ASYS 12 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of aircraft landing gear system components |
| ASYS 13 | C | C | C | Demonstrate the ability to inspect aircraft landing gear systems and system components |
| ASYS 14 | C | C | C | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft landing gear systems and system components |
| ASYS 15 | C | C | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft landing gear systems and system components |
| ASYS 16 | C | B | A | Demonstrate the ability to explain the operation of typical landing gear indicating systems used on aircraft certified under Part 23 and 25 |
| ASYS 17 | C | C | C | Demonstrate the ability to inspect aircraft landing gear indicating systems |
| ASYS 18 | C | C | C | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft landing gear indicating systems |
| ASYS 19 | C | C | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft landing gear indicating systems |
| ASYS 20 | C | C | A | Demonstrate the ability to locate and explain the procedures and safety precautions for jacking aircraft |
| ASYS 21 | C | B | A | Demonstrate the ability to locate and explain special procedures and safety precautions for jacking aircraft certified under Pt. 25 |
| ASYS 22 | C | C | C | Demonstrate the ability to raise an aircraft using aircraft jacks |
| ASYS 23 | C | B | A | Demonstrate the ability to explain the operation of typical brake and anti-skid systems used on aircraft certified under Part 23 and 25 |
| ASYS 24 | C | A | A | Demonstrate the ability to identify and explain the purpose/function of aircraft brake and anti-skid system components |

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| ASYS 25 | C | C | C | Demonstrate the ability to inspect aircraft brake and anti-skid systems and system components |
| ASYS 26 | C | C | C | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft brake and anti-skid systems and system components |
| ASYS 27 | C | C | B | Demonstrate the ability to troubleshoot operational malfunctions on aircraft brake and anti-skid systems and system components |
| ASYS 28 | C | A | A | Demonstrate the ability to explain the operation of typical steering systems used on aircraft certified under Part 23 and 25 |
| ASYS 29 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of aircraft steering system components |
| ASYS 30 | C | C | C | Demonstrate the ability to inspect aircraft steering systems and system components |
| ASYS 31 | C | C | C | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft steering systems and system components |
| ASYS 32 | C | C | B | Demonstrate the ability to troubleshoot operational malfunctions on aircraft steering systems and system components |
| ASYS 33 | C | C | C | Demonstrate the ability to inspect aircraft wheels and tires |
| ASYS 34 | C | C | C | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft wheels and tires |
| ASYS 35 | C | C | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft tires |
| ASYS 36 | C | A | A | Demonstrate the ability to explain the operation of typical fuel systems used on aircraft certified under Part 23 and 25 |
| ASYS 37 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of aircraft fuel system components used on aircraft certified under Part 23 and 25 |
| ASYS 38 | C | C | C | Demonstrate the ability to inspect aircraft fuel systems and system components |
| ASYS 39 | C | C | C | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft fuel systems and system components |

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| ASYS 40 | C | C | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft fuel systems and system components |
| ASYS 41 | C | A | A | Demonstrate the ability to explain the operation of typical fuel quantity indicating systems used on aircraft certified under Part 23 and 25 |
| ASYS 42 | C | C | C | Demonstrate the ability to inspect aircraft fuel quantity indicating systems |
| ASYS 43 | C | C | C | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft fuel quantity indicating systems |
| ASYS 44 | C | C | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft fuel quantity indicating systems |
| ASYS 45 | C | B | A | Demonstrate the ability locate and explain to procedures for calibrating aircraft fuel quantity indicating systems |
| ASYS 46 | C | A | A | Demonstrate the ability to explain the operation of fuel management systems, including transfer and dump operations, on aircraft certified under Part 25 |
| ASYS 47 | C | A | A | Demonstrate the ability to explain the operation of fuel pressure and temperature indicating systems used on aircraft certified under Part 23 and 25 |
| ASYS 48 | C | C | C | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft fuel pressure and temperature indicating systems |
| ASYS 49 | C | C | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft fuel pressure and temperature indicating systems |
| ASYS 50 | C | A | A | Demonstrate the ability to locate and explain the operation of fuel management systems, including transfer and dump operations, on aircraft certified under Part 25 |
| ASYS 51 | C | A | A | Demonstrate the ability to explain the operation of fuel pressure and temperature indicating systems on aircraft certified under Part 23 and 25 |
| ASYS 52 | C | A | A | Demonstrate the ability to explain the operation of pressure fueling systems on aircraft certified under Part 25 |

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| ASYS 53 | B | A | A | Demonstrate the ability to locate the inspection procedures for pressure fueling systems on aircraft certified under Part 25 |
| ASYS 54 | B | A | A | Demonstrate the ability to locate and explain the procedures for performing routine maintenance tasks and repairs on aircraft pressure fueling systems on aircraft certified under Part 25 |
| ASYS 55 | C | A | A | Demonstrate the ability to explain the operation of typical heating systems found on aircraft certified under Part 23 and 25 |
| ASYS 56 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of aircraft heating system components |
| ASYS 57 | C | C | C | Demonstrate the ability to inspect aircraft heating systems and system components |
| ASYS 58 | C | C | C | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft heating systems and system components |
| ASYS 59 | C | C | C | Demonstrate the ability to troubleshoot operational malfunctions on aircraft heating systems and system components |
| ASYS 60 | C | A | A | Demonstrate the ability to explain the operation of typical air conditioning systems found on aircraft certified under Part 23 and 25 |
| ASYS 61 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of aircraft air conditioning system components |
| ASYS 62 | C | C | C | Demonstrate the ability to inspect aircraft air conditioning systems and system components |
| ASYS 63 | C | B | A | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft air conditioning systems and system components |
| ASYS 64 | C | B | B | Demonstrate the ability to troubleshoot operational malfunctions on aircraft air conditioning systems and system components |
| ASYS 65 | C | A | A | Demonstrate the ability to explain the operation of typical pressurization systems found on aircraft certified under Part 23 and 25 |

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| ASYS 66 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of aircraft pressurization system components |
| ASYS 67 | C | C | C | Demonstrate the ability to inspect aircraft pressurization systems and system components |
| ASYS 68 | C | B | B | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft pressurization systems and system components |
| ASYS 69 | C | B | B | Demonstrate the ability to troubleshoot operational malfunctions on aircraft pressurization systems and system components |
| ASYS 70 | C | A | A | Demonstrate the ability to explain the operation of typical oxygen systems found on aircraft certified under Part 23 and 25 |
| ASYS 71 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of aircraft oxygen system components |
| ASYS 72 | C | C | C | Demonstrate the ability to inspect aircraft oxygen systems and system components |
| ASYS 73 | C | B | B | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft oxygen systems and system components |
| ASYS 74 | C | B | B | Demonstrate the ability to troubleshoot operational malfunctions on aircraft oxygen systems and system components |
| ASYS 75 | C | C | A | Demonstrate the ability to locate the information for and explain the procedures for proper handling and disposal of aircraft chemical oxygen generators |
| ASYS 76 | C | A | A | Demonstrate the ability to explain the operation of typical ice and rain control systems found on aircraft certified under Part 23 and 25 |
| ASYS 77 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of aircraft ice and rain control system components |
| ASYS 78 | C | C | C | Demonstrate the ability to inspect aircraft ice and rain control systems and system components |

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| ASYS 79 | C | B | B | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft ice and rain control systems and system components |
| ASYS 80 | C | B | B | Demonstrate the ability to troubleshoot operational malfunctions on aircraft ice and rain control systems and system components |
| ASYS 81 | C | A | A | Demonstrate the ability to explain the operation of typical fire detection and extinguishing systems(airframe and engine) found on aircraft certified under Part 23 and 25 |
| ASYS 82 | C | B | A | Demonstrate the ability to identify and explain the purpose/function of aircraft and engine fire detection and extinguishing system components |
| ASYS 83 | C | C | C | Demonstrate the ability to inspect aircraft and engine fire detection and extinguishing systems and system components |
| ASYS 84 | C | B | B | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft and engine fire detection and extinguishing systems and system components |
| ASYS 85 | C | B | B | Demonstrate the ability to troubleshoot operational malfunctions on aircraft and engine fire detection and extinguishing systems and system components |
| ASYS 86 | C | A | A | Demonstrate the ability to explain the operation of typical smoke and carbon monoxide systems found on aircraft certified under Part 23 and 25 |
| ASYS 87 | C | C | C | Demonstrate the ability to inspect aircraft smoke and carbon monoxide detection systems |
| ASYS 88 | C | B | B | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft smoke and carbon monoxide systems and system components |
| ASYS 89 | B | A | A | Demonstrate the ability to identify and explain the function of instruments used with aircraft reciprocating engines |
| ASYS 90 | B | A | A | Demonstrate the ability to identify and explain the function of instruments used with aircraft turbine engines |

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| ASYS 91 | B | A | A | Demonstrate the ability to identify and explain the function of aircraft flight instruments used in aircraft certified under Part 23 |
| ASYS 92 | B | A | A | Demonstrate the ability to identify and explain the function of aircraft flight instruments used in aircraft certified under Part 25 |
| ASYS 93 | B | A | A | Demonstrate the ability to identify and explain the function of aircraft navigation instruments used in aircraft certified under Part 23 |
| ASYS 94 | B | A | A | Demonstrate the ability to identify and explain the function of aircraft navigation instruments used in aircraft certified under Part 25 |
| ASYS 95 | B | A | A | Demonstrate the ability to identify and explain the function of aircraft system instruments used in aircraft certified under Part 23 |
| ASYS 96 | B | A | A | Demonstrate the ability to identify and explain the function of aircraft system instruments used in aircraft certified under Part 25 |
| ASYS 97 | B | A | A | Demonstrate the ability to explain the operation of aircraft fluid pressure and temperature measuring instrument systems |
| ASYS 98 | B | A | A | Demonstrate the ability to explain the operation of aircraft engine speed measuring instrument systems |
| ASYS 99 | B | A | A | Demonstrate the ability to explain the operation of aircraft instrument pitot and static system |
| ASYS 100 | C | C | C | Demonstrate the ability to perform pitot and static system tests |
| ASYS 101 | B | B | B | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft and engine instruments and instrument systems |
| ASYS 102 | B | B | A | Demonstrate the ability to locate instrument markings |
| ASYS 103 | C | A | A | Demonstrate the ability to explain the operating principles of an aircraft compass system found in aircraft certified under Part 23 |

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| ASYS 104 | B | A | A | Demonstrate the ability to perform routine maintenance tasks and repairs to aircraft compass systems found in aircraft certified under Part 23 |
| ASYS 105 | C | B | B | Demonstrate the ability to swing an aircraft compass |

## 4.11 Aircraft Structures

| SPO Item # | Student Performance Levels | | | Student Performance Objectives |
|---|---|---|---|---|
| | Knowledge | Application | Manipulative Skills | |
| ASTR 1 | A | A | A | Demonstrate the ability to locate and explain the maintenance procedures and practices for aircraft wood structures |
| ASTR 2 | A | A | A | Demonstrate the ability to locate and explain the maintenance procedures and practices for aircraft fabric covered structures |
| ASTR 3 | A | A | A | Demonstrate the ability to locate and explain the procedures for welding and brazing aluminum and steel aircraft structures |
| ASTR 4 | C | C | A | Demonstrate the ability to identify and select metals for use on aircraft using manufactures and air carrier technical data and material designation symbols |
| ASTR 5 | C | C | C | Demonstrate the ability to identify, properly use and maintain tools and machines used in aircraft sheet metal structures maintenance |
| ASTR 6 | C | C | A | Demonstrate the ability to identify, select and determine acceptable substitute fasteners for aircraft sheet metal repairs |
| ASTR 7 | C | C | C | Demonstrate the ability to identify and install aircraft rivnuts |
| ASTR 8 | C | C | C | Demonstrate the ability to identify and install Dzus, Airloc and Camloc fasteners |
| ASTR 9 | C | C | C | Demonstrate the ability to properly drill holes in aircraft metals for rivet installation |

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| ASTR 10 | B | B | B | Demonstrate the ability to properly inspect holes in aircraft sheet metal structures, where rivets have been removed and with rivets installed, using NDI processes |
| ASTR 11 | C | C | C | Demonstrate the ability to install and remove solid rivets (universal head and flush) in aluminum sheet of thickness from .020 to .090 |
| ASTR 12 | C | C | C | Demonstrate the ability to shave flush head solid rivets to applicable technical specifications |
| ASTR 13 | C | C | C | Demonstrate the ability to install and remove blind rivets |
| ASTR 14 | C | C | C | Demonstrate the ability to machine and hand form aluminum {forming includes the following processes; bending, joggles, shrinking, stretching, bumping, flanging lighting holes, dimpling} |
| ASTR 15 | C | C | C | Demonstrate the ability to layout patterns on aluminum |
| ASTR 16 | C | C | C | Demonstrate the ability to manufacture a part using manufacturer's blueprints or drawings |
| ASTR 17 | C | B | A | Demonstrate the ability to locate and explain the manufactures and air carrier (Pt. 121 and 135) technical data for the classification of aircraft sheet metal structural damage |
| ASTR 18 | C | B | A | Demonstrate the ability to properly identify and classify aircraft sheet metal structural damage |
| ASTR 19 | C | B | A | Demonstrate the ability to locate and explain manufactures and air carrier (Pt. 121 and 135) technical data for approving an aircraft sheet metal structural repair |
| ASTR 20 | C | C | C | Demonstrate the ability to layout a repair for aircraft structural damage |
| ASTR 21 | C | C | C | Demonstrate the ability to repair damaged aircraft metal skin structure |
| ASTR 22 | C | C | C | Demonstrate the ability to repair damaged aircraft metal stringers |
| ASTR 23 | C | C | C | Demonstrate the ability to repair damaged aircraft metal lap joints |

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| ASTR 24 | C | C | C | Demonstrate the ability to repair damaged aircraft metal airfoil leading edges |
| ASTR 25 | C | C | C | Demonstrate the ability to repair damaged aircraft metal airfoil trailing edges |
| ASTR 26 | C | C | C | Demonstrate the ability to repair damaged aircraft metal spars |
| ASTR 27 | C | C | C | Demonstrate the ability to repair damaged aircraft metal bonded sandwich structures |
| ASTR 28 | C | C | C | Demonstrate the ability to properly protect aircraft metal surfaces and structural components from corrosion |
| ASTR 29 | C | C | C | Demonstrate the ability to remove and treat corrosion from aircraft metal surfaces and structural components using mechanical and chemical methods |
| ASTR 30 | B | B | B | Demonstrate the ability to apply paint to aircraft metal surfaces |
| ASTR 31 | B | A | A | Demonstrate the ability to identify and explain the procedures for cold working, shoot peening, roto peening and heat treating aircraft metal |
| ASTR 32 | B | B | A | Demonstrate the ability to identify and select composite materials, sealents, adhesives, and compounds for use on aircraft using manufactures and air carrier (Pt. 121 and 135) technical data and material designation symbols |
| ASTR 33 | C | C | C | Demonstrate the ability to identify, properly use and maintain tools and equipment used in aircraft composite structures maintenance |
| ASTR 34 | C | C | A | Demonstrate the ability to locate and explain the practices and procedures for the use, handling and storing aircraft composite materials, sealents, adhesives, and compounds |
| ASTR 35 | C | B | A | Demonstrate the ability to locate and explain the manufacturer’s and air carrier (Pt. 121 and 135) technical data for the classification of aircraft composite structural damage |
| ASTR 36 | C | B | A | Demonstrate the ability to properly identify and classify aircraft composite structural damage |

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| ASTR 37 | C | B | A | Demonstrate the ability to locate and explain manufacturer’s and air carrier (Pt. 121 and 135) technical data for approving an aircraft composite structural repair |
| ASTR 38 | C | C | C | Demonstrate the ability to layout a repair for aircraft composite structural damage |
| ASTR 39 | B | B | B | Demonstrate the ability to inspect aircraft composite structural components using visual and NDI techniques |
| ASTR 40 | C | C | C | Demonstrate the ability to identify, select and determine acceptable substitute fasteners for aircraft composite structures repair |
| ASTR 41 | C | C | C | Demonstrate the ability to make repairs to aircraft composite structures using hot bonding equipment |
| ASTR 42 | C | C | C | Demonstrate the ability to repair damaged aircraft laminated composite skin structure (access to only one side of the repair) |
| ASTR 43 | C | C | C | Demonstrate the ability to repair damaged aircraft laminated composite skin structure (access to both sides of the repair) |
| ASTR 44 | C | C | C | Demonstrate the ability to repair cosmetic damage to an aircraft composite structure |
| ASTR 45 | C | C | C | Demonstrate the ability to repair damage to an aircraft composite structure requiring honeycomb core material replacement |
| ASTR 46 | C | C | C | Demonstrate the ability to repair damaged aircraft composite airfoil leading edges |
| ASTR 47 | C | C | C | Demonstrate the ability to repair damaged aircraft composite airfoil trailing edges |
| ASTR 48 | C | C | C | Demonstrate the ability to repair delamination damage to an aircraft composite structure |
| ASTR 49 | C | C | C | Demonstrate the ability to repair loose and missing fasteners in composite structures |
| ASTR 50 | C | C | C | Demonstrate the ability to properly drill holes in aircraft composite structures |
| ASTR 51 | C | C | C | Demonstrate the ability to inspect aircraft windows and windshields |

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| ASTR 52 | C | B | A | Demonstrate the ability to locate and explain manufacturer's and air carrier (Pt. 121 and 135) technical data for repairing aircraft windows and windshields |
| ASTR 53 | C | C | C | Demonstrate the ability to remove minor scratches from aircraft plastic windows |
| ASTR 54 | C | C | C | Demonstrate the ability to inspect aircraft interior furnishings |
| ASTR 55 | C | C | C | Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft interior furnishings |
| ASTR 56 | C | B | A | Demonstrate the ability to identify and explain the operation of aircraft primary and secondary flight control on aircraft certified under Part 23 and 25 |
| ASTR 57 | C | A | A | Demonstrate the ability to locate and explain the procedures and practices for rigging an aircraft certified under Pt. 23 and Pt. 25 |
| ASTR 58 | C | C | C | Demonstrate the ability to inspect aircraft primary and secondary flight control systems |
| ASTR 59 | C | C | C | Demonstrate the ability to clean and protect from corrosion aircraft flight control cables |
| ASTR 60 | C | C | C | Demonstrate the ability to lubricate aircraft primary and secondary flight controls |
| ASTR 61 | C | C | C | Demonstrate the ability to rig an aircraft primary and secondary flight controls |
| ASTR 62 | C | C | C | Demonstrate the ability to check the alignment of aircraft primary structures |
| ASTR 63 | C | C | C | Demonstrate the ability to remove, balance and reinstall aircraft moveable primary and secondary control surfaces |
| ASTR 64 | C | A | A | Demonstrate the ability to locate and explain the procedures for balancing primary and secondary control surfaces on aircraft certified under Part 25 |
| ASTR 65 | C | A | A | Demonstrate the ability to locate and explain the procedures for rigging doors on aircraft certified under Part 25 |
| ASTR 66 | C | C | C | Demonstrate the ability to rig aircraft doors for closure and security |

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| ASTR 67 | B | A | A | Demonstrate the ability to locate and explain the procedures for inspecting speed and configuration warning systems on aircraft certified under Pt. 25 |
| ASTR 68 | B | A | A | Demonstrate the ability to locate and explain the procedures for ground testing speed and configuration warning systems on aircraft certified under Pt. 25 |
| ASTR 69 | C | B | B | Demonstrate the ability to locate and explain the procedures for rigging helicopter main and tail rotors |
| ASTR 70 | C | B | A | Demonstrate the ability to locate and explain the procedures for tracking helicopter main and tail rotors |

## 4.12 Aircraft Inspections and Capstone SPO's

| SPO Item # | Student Performance Levels | | | Student Performance Objectives |
|---|---|---|---|---|
| | Knowledge | Application | Manipulative Skills | |
| AIC 1 | C | C | A | Demonstrate the ability to locate and explain the inspection requirements for aircraft operating under Part 91 |
| AIC 2 | C | C | A | Demonstrate the ability to locate and explain the inspection requirements for aircraft operating under Part 121 and 135 |
| AIC 3 | C | C | C | Demonstrate the ability to perform 100 hour airframe and powerplant inspections |
| AIC 4 | C | C | C | Demonstrate the ability to document completed inspections in aircraft records for aircraft operating under Part 91 |
| AIC 5 | C | C | C | Demonstrate the ability to document completed inspections in aircraft records for aircraft operating under Part 121 and 135 |
| AIC 6 | C | C | C | Demonstrate the ability to determine the status of Airworthiness Directives on aircraft and engines |
| AIC 7 | C | C | C | Demonstrate the ability to perform a maintenance task based on the information provided in a typical air carrier (Pt. 121 and 135) Engineering Orders and workcards |

| | | | | CAPSTONE STUDENT PERFORMANCE OBJECTIVES or COURSE(S) |
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# 5.0 WORKSHOPS

## 5.1 Overview

Three workshops were held as part of the curriculum development process. The first workshop was held on September 15, 1997 at the Purdue University Aviation Center in Indianapolis, Indiana. The second workshop was held as part of the ATA (Air Transport Association) Maintenance Training Committee meeting in Houston, Texas on October 8, 1997 and the final workshop was held in Denver, Colorado on October 13, 1997. An invitation to participate in the workshops was sent to all FAR 147 aviation maintenance programs. A total of 63 people participated in the workshops.

The purpose of the workshops was to solicit feedback on the proposed student performance objectives for the AMT/AMT-T curriculum. Participants were given an overview of the curriculum followed by a detailed review of the student performance objectives. Participants were encouraged to ask questions and provide written feedback.

The authors reviewed the comments and written feedback from the workshop participants. A number of changes were made to the curriculum based on this information.

## 5.2 Participant Comments

### *General Comments*

Fantastic job, hold firm – future graduates income will increase as a result of this curriculum. It's needed"

"This is too much to be done in a timely manner. Iowa limits A.A.S. degrees to 18 months; this would most likely increase that. I am leaning to two separate programs with the AMTT add-on"

"This has a possibility to work if the FAA and industry supports it."

"I could utilize this to develop curriculum but would not like to see this go to FAA for adoption as guidelines for Part 147 meeting Part 66"

"Hours or just elapsed time between starting and completing this curriculum has got to be longer"

"Question – Can your students do this?- plain and simple YES"

"Material is good, but you need to push back to industry to support this"

"This seems to be about a 3000 hour curriculum perhaps lower avionics levels"

"I like the entire process that elevates the emphasis on Part 121"

"Industry needs to evaluate: recruitment of future employees for their workforce, helping training facilities offer this material (materials & equipment), pay scales for entry-level AMT-T's, and the schools that they recruit graduates from"

"Fantastic Job! High emphasis on basics will be a godsend to me when I get them in commercial training classes"

“It seems to be on target”

“Overall good job”

“Individual schools can and may wish to raise teaching levels on various SPOs. I feel that an excellent job was done in assigning levels and that they should not be changed. One change to a level 3 might close a school!

### *General Knowledge Instructional Unit Comments*

| SPO # | **Comment** |
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| GK 6 | Why? What the importance to A/C maintenance. |
| GK 7 | Why? What the importance to A/C maintenance. |
| GK 8 | Should they be able to identify servo tabs, boost tabs, spring tabs, etc? |
| GK 8<br><br>GK 9 | At what point in student performance levels would we be required to have a sample of an aircraft type – transport category, rotorcraft. etc. |
| GK 11 | Could be thought to mean all aircraft |
| GK 11 | Students should be able to identify aircraft certified in 23, 25, 27, & 29 or is this implied in the SPO? |
| GK 13 | *Possible relief for people that don’t have all fingers<br><br>*How will disabilities impact this requirement? |
| GK 12 | Almost to vague |
| GK 14 –<br><br>GK 21 | *general objectives should be general not specific in task requirement<br><br>*GK 19(e.g.) should ask for competency to read and write (period) not assuming that student has technical vocabulary prior to training in that area. Boeing tech manuals could be read at the 6th grade level except for the technical vocabulary |
| GK 15<br><br>GK 16 | *Will schools be able to use non-A&P instructors for these type items?<br><br>*Yes- these are major keys to preventing our industry problems<br><br>* New material in our program. Instructor training and curriculum would be needed to be able to put this in our program |

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| GK 19 | should be evaluated throughout curriculum not just at beginning |
| GK 20 | Through out program repetition is important in these areas |
| GK 20 | Why not require writing English in general at this level let them write repair statements later |
| GK 20 | Need sharper definition of what technical language proficiency is acceptable |
| GK 19<br><br>GK 20 | Do we need at this point, to build in an evaluation process?<br><br>Should be evaluated throughout curriculum not at beginning. Repetition is important in these areas |
| GK 19<br><br>GK 20<br><br>GK 21 | *Knowledge level needs to be lowered to a “2” and later in the program, brought up to a “3” level<br><br>* Are these two the same if not can they be combined<br><br>* Do we need at this point, to build in an evaluation process?<br><br>*Specify part 23,25,2,29 aircraft/completion of SPO How written can be done by manuals & AD’s on say a J-3 Cub<br><br>*should be distributed throughout curriculum & at higher levels upon completion of course |
| General Comments | *How about some fluid dynamics in this section?<br><br>*Glad to see “soft skills” like team building, situational awareness, error analysis, etc.<br><br>*What about Quality Assurance(QA), total Quality, TPM etc |

## Basic Maintenance Knowledge and Skills Instructional Unit Comments

| SPO # | **Comment** |
|---|---|
| MKS 1 | Utilize transport category schematics to level 3 on component ID and locations in circuit |
| MKS 1 | Higher level – 2-2-2 at least |
| MKS 2 | We currently use technical drawings-industrial based, not specific aircraft will this count? Or does it need to be aircraft drawings? |
| MKS 5 | manipulative skill should be 3 operator of Part 135 & 121 aircraft are required to weight each aircraft every five years |

| | |
|---|---|
| MKS 7 | Add repair |
| MKS 7 | Knowledge ought to be level 3 |
| MKS 7 | Today's litigious environment doesn't allow AMT's to fabricate hyd. lines |
| MKS 7 | Do we need to fabricate flex lines? |
| MKS 7 | Fabricate, test and install  proof testing of field fabricated lines should be made part of the procedure |
| MKS 10 | NDT needs to be emphasized more-in line with big iron aircraft |
| MKS 14 | Knowledge level of 3 manipulative level 1 looks backward |
| MKS 16 | Hardware ID, special fasteners are req'd in detail by the major airlines |
| MKS 17 | Should be instructed in the proper use of basic hand tools |
| MKS 18 – MKS 20 | App should be aligned with knowledge & manip (sp) skills |
| MKS 22 | Screws |
| MKS 22 – MKS 23 | High level of app & manip (sp) skills questionable for today's AMT in regional / major airlines |

## Aircraft Documentation and Administrative Skills Instructional Unit Comments

| SPO # | **Comments** |
|---|---|
| ADAS 1 | Need access to CDL & DDPG |
| ADAS 1 | Add Part 135 to all of this type reference |
| ADAS 1 – ADAS 17 | Basic in beginning but bulk of information and practice should be distributed later capstone info. |
| ADAS 2 | it would be good to get sample forms from airlines |
| ADAS 3 | Please don't use acronyms without explaining them the first time they are used. |
| ADAS 8 – ADAS 11 | Difficult to have them use the info if repairs have not been covered yet perhaps move to later in program |
| ADAS 9 | GMM reference need to be identified as applying to FAR 121 (GMM) |
| ADAS 9 | Add IPM doc for FAR 145 operations |
| ADAS 10 - ADAS 12 | Airlines will need to provide access to cold weather ops & air carrier engineering orders |

| | |
|---|---|
| General Comment | *Add SPO on Demonstrate the ability to use the ATA code system<br>*Add SPO on standards of work Part 43 etc.<br>*Add SPO on Definitions i.e. maintenance, preventative maintenance, major repair, etc.<br>*Simply precede the requirement with A/C terminology familiarization |
| | *Are manuals from manufactures or carriers available to schools? *When stated "manufactures" are you including A/C operators |
| | *Form 337 should be specified |
| | *The SPO's listed need to be enforced throughout the entire curriculum – going more in-depth when students gain more knowledge |

## Ground Operations and Safety Instructional Unit Comments

| SPO # | Comment |
|---|---|
| GOS 1 | Does "move" mean by some method other than the aircraft's own power? |
| GOS 1 | Ground operate implies taxi? – liability issue – let airlines sign off or their type aircraft |
| GOS 1 | ground operate (move) does this mean taxi or run-up, towing of aircraft movement by hand or tractor |
| GOS 1 | Properly or Safely |
| GOS 3 | MSDS applications limited for "all" jobs – certain jobs dealing with MSDS require higher level – let employer apply their specific requirements |
| GOS 4 – GOS 9 | OSHA programs are difficult to include in text materials within the confines of the $. |
| GOS 7<br>GOS 8 | Combine these two items – cover confined space within OSHA std's/reg's |
| GOS 7 | Needs to be level 2 knowledge and application |
| GOS 10 | I am having problems with wording such as "ability to perform" and yet levels are 2 |
| GOS 10 | Recommend level 1 for cleaning |
| GOS 10 | Does this mean that a student must was an aircraft or a Powerplant? |
| GOS 10 | Should be level 1. Maybe industry needs to reevaluate what a mechanic should be required to do. |

## *Aircraft Powerplant Instructional Unit Comments*

## Aircraft Gas Turbine Engine Module

| SPO # | Comments |
|---|---|
| PPT 3<br>PPT 10 | Need help from industry on how we can do this i.e. furnish bad parts or damaged parts to schools for demo purposes |
| PPT 4 | There were many comments related to the term overhaul. Most comments expressed concern as to the meaning of the term as applied to AMT/AMT-T training. |
| PPT 12 | Cost of Borescope – high |
| PPT 12 | Skills requirement will be hardest to perform |
| PPT 17 | How can the instructor induce troubles in lube system without damaging school equipment? |
| PPT 36 | Will require equipment. Lower Man. so equipment not required |
| PPT 36<br>PPT 37<br>PPT 38 | An operational thrust reverser may be a problem. Many schools can get a thrust reverser but an operational one may be more difficult. |
| PPT 42 | Add IDG, integrated drive generator |
| PPT 46<br>PPT 47 | United Airlines has a CBT program that would probably meet this type of SPO |

## Aircraft Reciprocating Engine Module

| SPO # | Comment |
|---|---|
| PPR 4 | There were many comments related to the term overhaul. Most comments expressed concern as to the meaning of the term as applied to AMT/AMT-T training. |
| PPR 18<br>PPR 19 | if the knowledge level isn't there you can't accomplish the manipulative part |
| PPR 30 | Other than welding how do you repair an exhaust – you have dropped welding out |
| PPR 32<br>PPR 33<br>PPR 34 | Turbo-supercharged engines for an AMT should be at least at a higher level. These are complex systems should receive more attention |
| PPR 39 | What does this mean? definition of tasks could be appreciate here – we need to reduce / eliminate nebulas tasks – alts, starters, gens, mags |
| PPR 40 | Problem solving – higher cognitive level – change knowledge/application |

## Aircraft Propellers Module

| SPO # | Comment |
|---|---|
| PPP 6 | Change this to level 3 on skills students need to know how to remove props |
| PPP 8 | May be difficult at level 3. it will be expensive to obtain equipment |
| PPP 12 | insert “dynamic” to keep away from knife edges being enough |
| PPP 17 | There were numerous comments related to this SPO most expressed concern with the ability or cost of obtaining a composite propeller blade. |

## *Aircraft Electronics and Integrated Systems Instructional Unit Comments*

### Electronic Theory Module

| SPO # | Comment |
|---|---|
| ET 17 | I feel this should be level 3on the skill |
| ET 18 | Add importance of grounding properly and identifying problems from high resistance to ground of mixed AC and DC grounds |
| ET 24 | Manipulative skill should be 1 |
| ET 25 | Add oscilloscope to the mounting cost factor |
| General comments | *full blown electronics component theory is not needed to troubleshoot, byte test, R&R or fix cannon plugs<br>*We must place more emphasis on basic electronics |

### Maintenance Practices for Electrical Systems Module

| SPO # | Comment |
|---|---|
| MP 5 | Why turboprop? Could it be a Learjet? Or optional turbine powered twin engine plane? |
| MP 13 | Include use of logic trees and TIC testers |
| MP 13 | TDR? Please don’t use acronyms or abbreviations |
| MP 21 | Include testing of torqueing using ohm meter, megger or alternate measuring devices |
| MP 24<br>MP 25 | Include sheetmetal (ground plane) and sealing techniques peculiar to antennas |
| General Comments | Need textbook support |

### Electrical Power Generation Systems Module

| SPO # | Comment |
|---|---|
| EP 7 –<br>EP 10 | Limited application to battery shop tech's – normally an R&R for AMT |
| EP 11<br>EP 12<br>EP 13<br>EP 28<br>EP 29<br>EP 30 | Add Part 29 |
| EP 14 | No mention in text material about "wild" frequency AC power systems |
| EP 27<br>EP 28 | Combine to principles of operations |
| General Comments | *This section is very complete.<br>*Need textbook support |

## Communication, Navigation and Warning Systems

| SPO # | Comment |
|---|---|
| CNW 22 –<br>CNW 25<br>CNW 32 –<br>CNW 57<br>CNW 59 –<br>CNW 74 | Add Part 29 |
| CNW 35<br>CNW 36<br>CNW 38 | *Are you sure that OMEGA and LORAN are the same thing?<br>*Omega and LORAN are on the way out – Delete<br>*Drop OMEGA – Keep LORAN – projected to 2005 |
| CNW 55 | Must include level 2 with use of test equipment |
| General Comments | * No mention of ELT<br>* It doesn't seem fair that Part 23 is excluded<br>* Need a textbook covering all the systems<br>*Overly optimistic in terms of material<br>* I think that level 2 knowledge requirements are realistic for this equipment |

## Flight Management Systems Module

| SPO # | Comment |
|---|---|
| FMS 12 – FMS 44 | These aren't only slanted toward part 25 they're only Part 25. General aviation is very much computer controlled and should at least be included. |
| FMS 21 | Linear voltage differential transducers? |
| General Comments | * All A/C electronic training is to long, the industry should continue training on their specific systems, we should provide the basics<br>* Again overly optimistic – ridiculous amount of material – reevaluate levels<br>*Textbook, software, additional training needs to support these<br>* Knowledge level 2 should be dropped to level 1<br>* Just because industry wants it doesn't mean it is all for the best |

## Aircraft Systems Instructional Unit Comments

| SPO # | Comment |
|---|---|
| ASYS 21- ASYS 23 | Combine |
| ASYS 25 | Will CBT work for level 3 – it will cost a lot to get a real anti-skid system |
| ASYS 49 | What kinds of repairs can we do to these systems except replace components? |
| ASYS 64 | Each individual performing this work needs individual certification to service and buy freon. Technicians need to understand the operation and inspection eliminate the servicing<br>(NOTE: many similar comments were made) |
| ASY 76 | *Will this require schools to have O2 generators? could there be an alternate method<br>* reduce manipulative skills level to 1 |
| General Comment | Looks do-able most already in FAR 147 |

## Aircraft Structures Instructional Unit Comments

| SPO # | Comment |
|---|---|
| ASTR 5 | Drop manipulative skills and application to level 2 |
| ASTR 11 | Why specify .020" thick Why not say up to .090" |
| ASTR 33 | Drop manipulative skills and application to level 2 |

| | |
|---|---|
| ASTR 54 | Manipulative skills should be lowered |
| ASTR 55 | Drop manipulative skills to level 2 |
| ASTR 66 | Drop manipulative skills to level 2 |
| ASTR 69 | What about tracking? |
| General Comments | *Composites should be level 3 in all areas – this is the way of the future<br>*Majority already in FAR 147 |

### Aircraft Inspections and Capstone Instructional Unit Comments

No comments for this instructional unit

## 5.3 Work Shop Attendees

| | |
|---|---|
| Roger G. Smith | Emily Griffith Opportunity School |
| Stephen S. Genco | American Trans Air Aviation Training Academy |
| Paul D. Van Proyen | University of Illinios- Institute of Aviation |
| Stephen L. Gossett | Middle Tennesse State University |
| R. Scott Langman | Hallmark Institute of Aeronautics |
| James A. Cardell | George T. Baker Aviation School |
| Dean A. Schanz | National Aviation Academy |
| Frank J. Balance | Trans World Technical Academy |
| James W. Fisher | Indian Hills Community College |
| Harry M. Kellam | AVOTEK |
| John A. Wolf | Vincennes University |
| Martin D. Hurst | Jeppesen Sanderson |
| David L. Jones | Maple Woods Community College |
| Ronald E. Prince | Wayne Community College |
| Robert L. Lumley | Broward Community College |
| Melvin L. Crafton | Tennessee Technology Center |
| Tony Mazurek | Michigan Institute of Aeronautics |

| | |
|---|---|
| Laurie L. Johns | Columbus State Community College |
| Fred G. Mirgle | Embry-Riddle University |
| Richard C. MacKellar | Southwestern Michigan College |
| Scott M. Garland | Milwaukee Area Technical College |
| Eugene W. Kearns | Guilford Technical Community College |
| James R. Rardon | Purdue University |
| Robert A. Loogman | San Jaquin Valley College |
| Richard L. Kaping | Andrews University |
| William L. Bowman | Laurel Oaks CDC |
| William Conley | East Coast Aero Tech |
| Spencer L. Bennett | FedEx Maintenance Technical Training Department |
| Larry L. Phillips | Allison Engine Co. Customer Training Department |
| Terryl D. Kelley | Kansas State University – Salina<br>Laurence Staples |
| Laurence Staples | Southern Illinois University |
| Timothy Van Loon | Winona Technical College |
| George M. Hoxie | Minneapolis Community and Technical College |
| Lucas A. Martinez | Colorado Aero Tech |
| David L. Wilkins | Texas State Technical College – Harlingen |
| Jose L. Martinez | Maple Woods Community College |
| David L. Neel | San Jose State University |
| Travis Flippen | Gavilan Community College |
| Charles B. Larsen | Utah State University |
| John S. Shablow | Miramar College |
| Dan W. Daron | Colorado Aero Tech |
| Gary D. May | Maple Woods Community College |

| | |
|---|---|
| Fred L. Ritchey | LeTourneau University |
| David J. Goering | Wichita Area Technical College |
| Tom Regier | Kings River College |
| B. Davis Lange | Minneapolis Aviation Training Center |
| Steven Mendiola | Salt Lake Community College |
| Gerald Garvan | Tulsa Technical Center |
| Bill Ellis | Sierra Academy of Aeronautics |
| John Longo | Air Canada |
| Frank Hana | Airbus Industries |
| Ray Goldsby | Flight Safety International |
| Mike Lee | Flight Safety International |
| Nick Sergi | Flight Safety International |
| Bruce Gindlesperger | Delta Air Lines |
| Richard Dloss | Northwest Airlines |
| William Miller | Northwest Airlines |
| Martin Schaq | Northwest Airlines |
| Richard Wellman | Pratt & Whitney |
| Dale Carlson | United Parcel Service |
| John Spachi | Trans World Airlines |
| C.A. Dittman | Hamilton Standard |
| Richard Yetter | US Airways |

# 6.0 CONCLUSIONS and RECOMMENDATIONS

## 6.1 Conclusions

### *AMT Training Providers*

General economic conditions of AMT training providers will limit the initial number of programs that will implement this curriculum. Based on input from the workshops, it is estimated that approximately 15 - 20% of the present AMT training providers will seek certification using this curriculum. There will additional AMT programs that use the student performance objectives developed for this curriculum to upgrade and enhance portions of their FAR 147 training program.

AMT providers expressed concerns at the lack of an implementation process or standards for this curriculum. A number of AMT training providers stated that until this issue is clarified no decision on curriculum adoption would be made.

Support material for this curriculum was a topic discussed at length during the workshops. Representatives from the major aviation maintenance textbook and training aid suppliers attended the workshops. They have stated that they will be evaluating the AMT/ AMT-T requirements in respect to the present texts.

### *Industry*

The airline maintenance community was the primary force in the development and proposal of the AMT-T certification. During the Aviation Rule Making Advisory Committee (ARAC) meetings and the Part 65/66 working group meetings, the need for enhanced AMT training with greater emphasis on transport aircraft was sited as critical to the continued growth and safety of air transportation. The airline maintenance community input and support for this curriculum was paramount. During the development of the student performance objectives the authors sought and received information and support in determining the necessary scope and detail for the curriculum requirements. As a result, the airline maintenance industry has expressed strong support for this curriculum.

There is continuing concern that AMT training programs are not producing graduates with the knowledge, skills and abilities required to perform the maintenance task of an air carrier. One airline commented that *"We can develop the most comprehensive objectives but to no avail if the integrity of the education process is allowed to deteriorate"*.

## 6.2 Recommendations

The following recommendations present a course of action that will provide for the greatest success in implementing the training requirements for the Aviation Maintenance Technician – Transport certification.

- The FAA fully fund and support the development of guidelines and procedures for the certification of aviation maintenance training programs utilizing the AMT/AMT-T integrated curriculum.

- The FAA fully fund and support a method for the training of FAA field inspectors and AMT training providers on the implementation and certification of the AMT/AMT-T integrated curriculum.

- The FAA encourages and supports the interaction between air carrier maintenance and AMT education activities.

- The FAA fund and support a Center of Excellence for Aviation Maintenance Training.

# APPENDIX A - AMT/AMT-T Curriculum Workshop Presentation

### AMT / AMT-T CURRICULUM WORKSHOP

## Project Goal

- Develop a curriculum that integrates FAR 147 and FAR 66 training requirements into a single seamless educational program

A-1

## Project Parameters

- Curriculum length of 2100 (+/-) Hours
- Primary focus on the skills needed for transport category (FAR 25) and air carrier (FAR 121) maintenance activities
- Present the curriculum requirements as measurable objectives

A-2

## Project Parameters

- Seek, evaluate and utilize, as appropriate, input from educators, air carrier maintenance training personnel and other interested parties
- Utilize information from other related projects
- Consider potential harmonization activities

A-3

## Is This Curriculum For Me?

- Does this replace the present FAR 147?
- Can I use only this curriculum?
- Can I use both the FAR 147 and FAR 66 curriculums?
- Can I continue to use my present FAR 147 curriculum?

A-4

## Curriculum Options

- AMT (FAR 147)
- AMT/ T (FAR 66)
- AMT + AMT/T (Stand alone)
- AMT/AMT-T (Integrated)

A-5

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