AVIATION MAINTENANCE TECHNICIAN TRAINING: TRAINING REQUIREMENTS FOR THE 21ST CENTURY

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May 2000

ACKNOWLEDGEMENT

Charles W. White, Aviation Technical Training & Consulting and Michael J. Kroes, Purdue University, working in cooperation with the Aircraft Maintenance Division of the Flight Standards Service prepared this report. This activity was conducted under guidance of the Office of Aviation Medicine Human Factors in Aviation Maintenance Research Program.

The authors wish to thank Delta Airlines, Purdue University, Metropolitan State College, and San Jose State University for their assistance in hosting workshops. We also wish to thank the Air Transport Association (ATA) Maintenance Training Committee and the Regional Airline Association for their assistance with encouraging member participation in this project.

EXECUTIVE SUMMARY

Throughout history, the United States has been a leader in the efficiency and effectiveness of the delivery of aviation maintenance education. However, this competitive advantage is being lost. Many foreign countries have made significant advances in AMT education programs. The present FAA approved maintenance training curriculum and certification system no longer meets the needs of much of the aviation industry. A substantial change in aviation maintenance technician education is required if the United States is to remain the world leader in aviation.

The current training requirements for aviation maintenance technician certification reflected in 14 CFR Part 147-Aviation Maintenance Technician Schools were developed as part of the 1968 National Study of the Aviation Mechanics Occupation (Allen Study). Except for a revision 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 initiative of the Aviation Rule Making Advisory Committee (ARAC) to upgrade the training and certification requirements for aircraft maintenance technicians. The withdrawal of the proposed 14 CFR Federal Aviation Regulation Part 66- Certification: Aviation Maintenance Personnel, does not indicate that the need for additional technician skills has disappeared. The need for better-trained AMTs still exists while the technology gap continues to widen.

Traditionally, AMT training has been focused on general aviation. Learning has been more reliant on developing tactile skills with the student working individually in the performance of a task to a minimum acceptable level of 70%. In future teaching of AMTs, it is essential that concepts such as maintenance, resource management, communication, teamwork, and continuous quality

improvement be incorporated into the curriculum.

While the present system serves to insure that all persons seeking AMT certification have completed certain minimum standards, it stifles innovation in the education process. It only guarantees that the AMT candidate can answer a series of multiple-choice questions that are available on the open market, complete with the correct answers.

Just as the present curriculum and focus of AMT student training needs to change, it is equally important that the present approach to school certification and operation be modified. The current system of certification and operation places an emphasis on attendance and record keeping. It encourages an adherence to the status quo, discourages innovations, or the incorporation of new technology, and does not allow for the academic needs of a diverse student population.

In a questionnaire conducted in 1998, results clearly show that, from the view of the training provider, the present system is not adequately measuring program quality nor encouraging the upgrading of curriculum content. Program administrators and FAA inspectors are clearly more focused on record-keeping issues than meaningful program evaluation. Under the present system of FAA audit and surveillance, an adversarial relationship may exist between the FAA inspector and Part 147 school personnel. The questionnaire results reveal that the current system of certification and surveillance is not necessarily complementary to the curriculum changes that the aviation industry is requesting.

A successful AMT training program relies on a system of continuous quality improvement. This is an on-going process aimed at understanding and improving program quality and student learning. It involves setting appropriate criteria and high standards for learning quality, systematically gathering, analyzing, and interpreting evidence to determine how well performance matches those expectations and standards, and using the resulting information to document, explain, and improve performance. When integrated into an AMT training program, continuous quality improvement can effectively improve the quality of training on an on-going basis.

The proposed curriculum for training aviation maintenance technicians in this report will require a change in FAA Part 147 certification procedures. It is essential that FAA Airworthiness Safety Inspectors be provided the necessary training and tools to perform their oversight functions within the framework of this curriculum.

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 possess, along with the unique skills required to maintain transport category aircraft, has been identified and defined in the proposed curriculum.

The successful operation of the proposed model curriculum is centered on the following principles:

- To continuously evaluate and modify curriculum effectiveness based on student outcome performance.
- To be responsive to continuing technological changes in industry.
- To be responsive to continuing changes and best practices relative to aircraft maintenance procedures.
- To be responsive to continuing changes and best practices relative to training and evaluation.

The model curriculum outlined in this report is performance-outcome based. 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, and personal health and conditioning are important factors in aviation maintenance. This curriculum addresses these areas and provides for the implementation of human factors skills throughout the training process.

One of the guiding concepts behind this model curriculum is that in most subject areas it is possible and desirable to introduce the material related to small, simple aircraft first and then progress to large and more complex aircraft. This method facilitates student learning and retention of the subject.

Aviation maintenance training is at a critical juncture. Unless a dramatic change is made to the content and structure of AMT training programs, the gap between graduate capabilities and industry requirements will continue to widen. It is clear that safety of flight and airworthiness items are impacted by this situation.

1.0 INTRODUCTION

" The aviation mechanic plays a vital part in the air transportation industry of our nation. The nature of his occupation requires that both initial training and subsequent in-service training provide him with the skills and technical knowledge necessary to perform "return - to - service" work with the highest precision and efficiency possible.

Technological advances within the aviation industry are occurring at an extremely rapid rate. These advances have created a need for additional aviation mechanics to maintain the sophisticated systems of modern aircraft. These technological advances have also made it necessary to update the instructional program currently being used in most aviation maintenance technician schools. "

This statement was written by Dr. David Allen in the Phase III report: A National Study of the Aviation Mechanics Occupation, published in August, 1970. Since this report was published, technological advances in aircraft construction and systems, along with changes in the business of commercial aviation, make Dr. Allen's statement more even more relevant today.

In 1998, the Federal Aviation Administration (FAA), through the Aviation Rule Making Advisory Committee (ARAC) process, proposed the restructuring the current airframe and powerplant mechanics certificate into two certificates, an Aviation Maintenance Technician (AMT) certificate and an Aviation Maintenance Technician Transport (AMTT) certificate resulting in the AMT-T certificate. The AMTT certificate was proposed because the nations air carriers and many people within the aviation maintenance industry believe that the technicians entering the workforce today are not adequately prepared to perform maintenance on large complex aircraft. During the ARAC process, aviation industry participants emphasized that the need was critical in the area of electronics where technological advances have dramatically increased knowledge requirements for technicians and present training requirements are inadequate. While these concerns were primarily expressed through the Air Transport Association (ATA) Maintenance Training Committee, airlines are not alone in being troubled over the increasing aircraft complexity and the lack of appropriately trained AMTs.

During the initial development of the proposed AMT-T certificate it was expected that FAR 147 AMTS programs did not have the resources to provide required AMT-T training and that other entities such as air carriers would become “approved training providers”. FAR 147 AMTS expressed concern that this process would have a serious negative impact on their programs and that they were indeed interested and capable of making the serious curriculum revisions and equipment upgrades necessary to comply with the AMT-T requirements. The FAR 147 AMTS sought and obtained changes to the proposal that would allow FAR 147 certificate holders to be primary providers of AMT and AMT-T training.

The FAA's decision to withdraw the NPRM has lead some FAR 147 AMTS to rethink the need to support the updating of the training requirements for AMT certification. This position maybe based in part on the removal of a threat of competition from non-Part 147 training providers and the inability of many AMTS to commit the necessary funds to implement a technologically advanced curriculum. This situation may pose a hardship to the aviation industry in their requirements for providing a growing pool of adequately trained aviation maintenance technicians.

1.1 Project Objectives and Parameters

The objective of this project is to develop a model-training curriculum for aviation maintenance technician training. This project was given the following parameters:

- The curriculum must address all major segments of the aviation maintenance industry, general aviation, and air carrier.
- The curriculum must insure that all persons successfully completing FAA certificated AMT training possess the skills and technical knowledge necessary to perform "return-to-service" work with the highest precision and efficiency possible.
- The curriculum should ease the integration of U.S. Military personnel involved in aviation career fields into FAA certified AMT training programs.
- The curriculum requirements should be stated as measurable objectives.
- The curriculum requirements should be stated in a manner that allows for consistent and standardized interpretation in all FAA Regions and by all FAA Aviation Safety Inspectors.

1.2 Methodology

In previous FAA funded projects, curriculum requirements were developed following a strategic planning approach and a detailed comparison of the FAR Part 147 subject items (appendix B, C, and D) and the proposed AMT-T subjects were 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 an Ad-Hoc meeting 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 based on learning hierarchies.

Concurrently, a review was conducted 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.

Four regional workshops were held for aviation educators, FAA inspectors with Part 147 AMTS responsibilities and aviation industry personnel. During these workshops, the participants were asked to provide feedback on the proposed curriculum; review and make changes to the student performance objectives; and provide input on FAA certification standards and procedures used to certify aviation maintenance training programs. The responses from participants were reviewed and collated. Particular attention was paid to the retention of items that industry identified as a high priority training need, while also attempting to delete or modify items that schools believed would be a hardship to teach. Changes were made to the final curriculum based on the workshop participants' responses. The changes resulted in the modification of 113 and the deletion of 87 Student Performance Objectives.

2.0 BACKGROUND

2.1 Enrollment

186 Part 147 Aviation Maintenance Technician training programs are currently certified by the Federal Aviation Administration. These programs, although similar from the standpoint of meeting minimum curriculum requirements and certification standards, vary widely based on their student demographics and program structure.

Aviation maintenance programs are taught at the secondary and post-secondary level in both public and private institutions. The following table illustrates the breakdown of Part 147 aviation maintenance training school programs.

AMT Program Breakdown by Institution Type

Type of Institution	Number
High School	16
Post-Secondary Vocational (public)	25
Post-Secondary Vocational (proprietary)	38
Community College (2-year Institution)	78
College / University (4-year Institution)	29

A study conducted during the 4th quarter of 1998 by the Aviation Technician Education Council (ATEC) obtained responses form 143 member schools. ATEC represents the Part 147 AMTS with issues relating to industry needs. FAA regulations and student education and training. Enrollment in these programs for the 1998 academic year was 11,699. These programs produced 3,338 graduates in 1998. Schools not represented in these numbers tend to be extremely small programs that would have minimal impact on the stated totals.

After several years of declining enrollments, the survey indicates that, for the past two years, AMT program enrollment has been growing annually at an average of 10 –15%. Close to 70% of the programs are experiencing enrollment growth with expectations that this will continue for the next few years. This continued enrollment growth rate would be necessary for schools to return to their late 1980's enrollment levels.

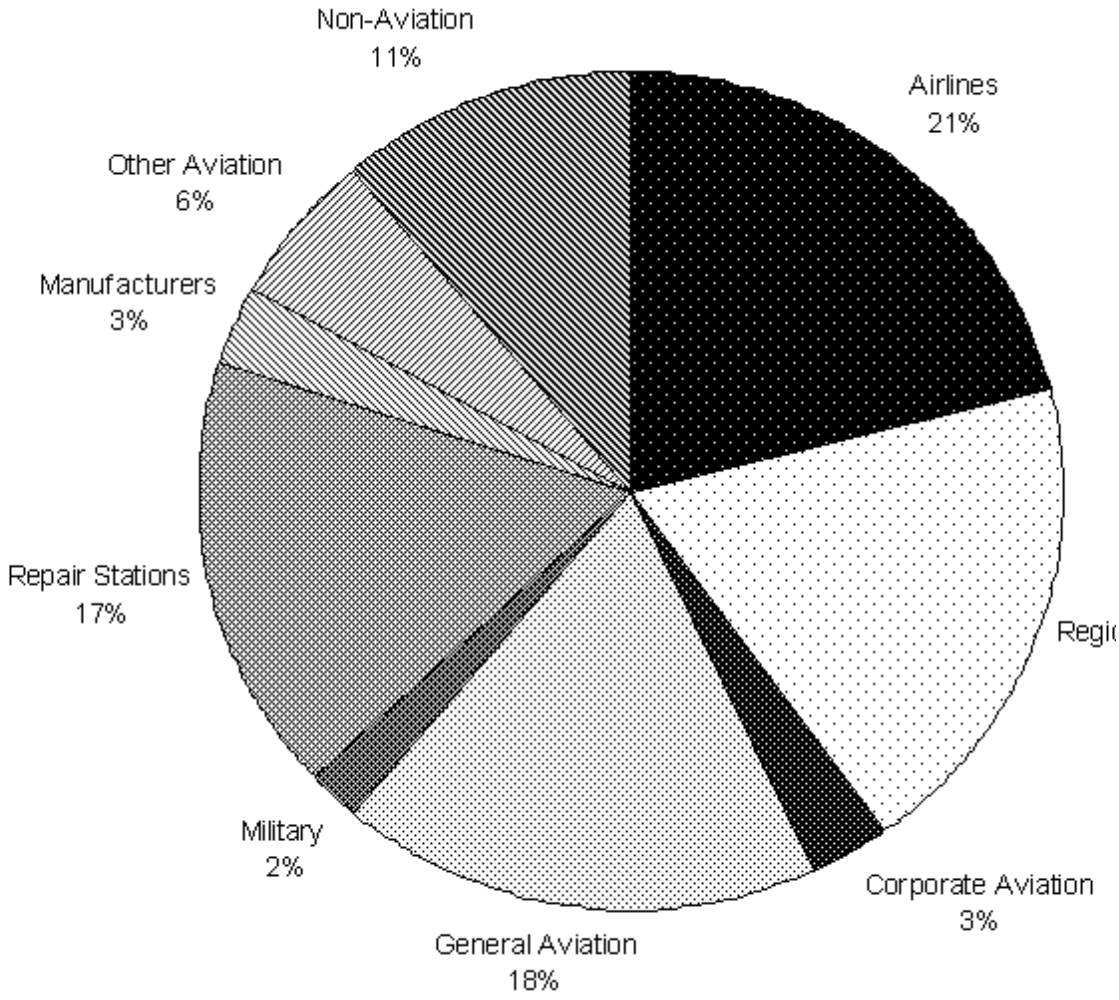
2.2 Placement Information

As a part of this project, a survey of aviation maintenance training providers was completed during the 2nd quarter of 1998.

The survey results reveal that current employment opportunities cover the entire spectrum of the aviation industry. Two areas of rapid employment growth that were virtually non-existent 25 years ago are the regional airlines and the third-party repair stations.

The survey reveals that the trend of graduates successfully finding airline employment opportunities continues. Approximately two-thirds of graduates finding employment in aviation will work on transport category aircraft or components.

The following chart represents information on 3,872 graduates for the year 1996-97, representing approximately 70% of that year's graduates.



3.0 CERTIFICATION OF AVIATION MAINTENANCE TECHNICIAN TRAINING PROGRAMS

There are any number of professions in which the establishing and enforcing of standards are of considerable importance. This process often involves two related procedures. First, programs of study must be approved and second, there will exist some procedures for evaluating the competence of those individuals who complete the program of study. As examples, in the field of engineering, educational programs are continually evaluated for the purpose of accreditation and graduates must also take a set of exams in order to be certified as a professional engineer. Programs for training teachers, in primary or secondary education, have to be accredited while graduates of those programs are expected to pass some form of examination in order to be certified. Aviation Maintenance Technicians undergo a similar process. Schools for training aviation maintenance personnel must be certified (accredited) and audited by the FAA, while the graduates of these schools must also pass a series of FAA specified tests in order to become licensed.

3.1 Present Method

Aviation Maintenance Training programs must meet the requirements of 14 CFR Federal Aviation Regulation Part 147. FAR 147 - Aviation Maintenance Technician Schools details the standards of performance and curriculum requirements to which aviation maintenance technician training programs must adhere. Requirements for individual testing are presented in 14 CFR Federal Aviation Regulation Part 65-Certification: Airman other than Flight Crewmembers.

FAA personnel responsible for the certification and surveillance of aviation maintenance training programs utilize material in FAA Order 8300.10 - Airworthiness Inspectors Handbook and Advisory Circular 147-3 - Certification and Operation of Aviation Maintenance Technician Schools.

Individuals seeking FAA certification as an aviation maintenance technician, after completion of the AMT training program must successfully complete a series of written, oral, and practical exams. The written exams also serves as the primary measure of AMT training program quality.

While this process generally serves to insure that all persons seeking AMT certification have completed certain minimum standards, there have been increased concerns that this system has been compromised on occasion. Recent fraudulent oral and practical exams in Texas and Florida bring into question this process.

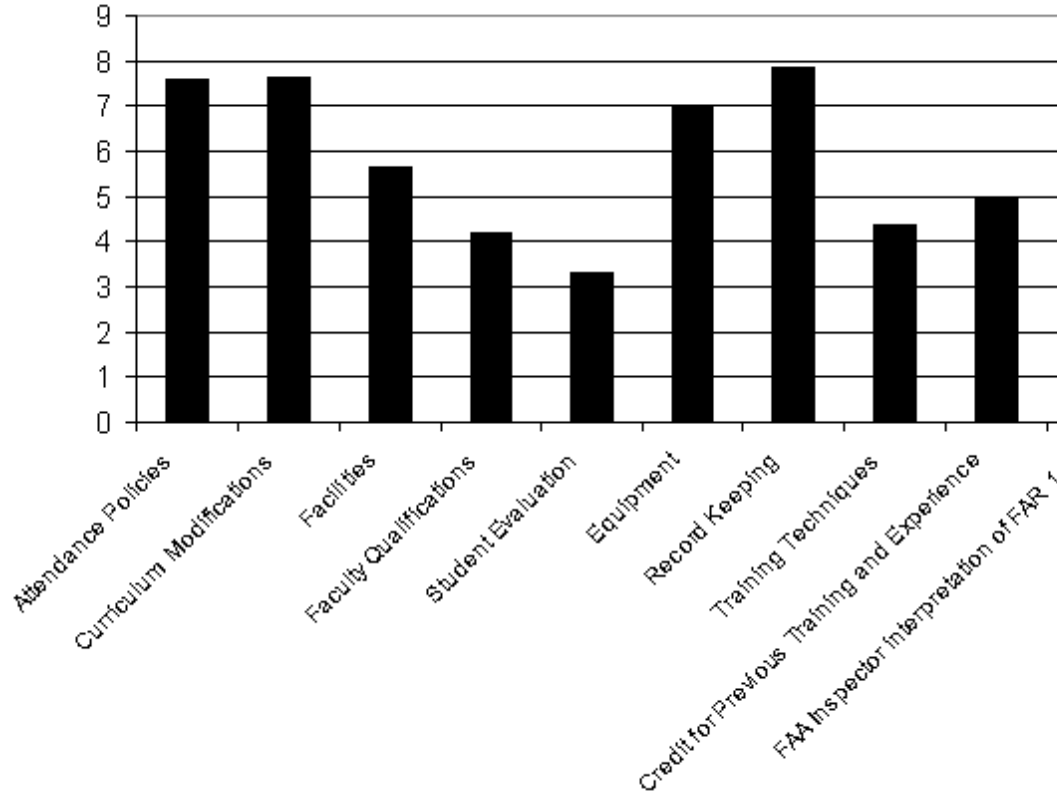
Additionally, the over-reliance on FAA testing stifles innovation in the educational process and only guarantees that the AMT can answer a series of multiple choice questions that are available on the open market complete with the correct answers.

During workshops, FAA personnel continuously commented that they felt that they were not fully prepared for the duties related to AMT training program surveillance. Specific issues identified included a lack of quality training directly related to the educational components of AMT training programs, the lack of standardization in rule interpretations and the general consensus that lacking specific guidance material many refer to the general procedures used for FAR 145 Repair Stations.

The authors for a previous project completed a survey of aviation maintenance training providers, during the 2nd quarter of 1998. The purpose of this survey was to identify which aspects of the present certification process are creating problems for the training provider or are preventing the incorporation of new curriculum content and technology into existing AMT programs. Information was requested on the turnover rate of FAA-PMIs being assigned to schools. The results show that in the past 5 years, schools have had an average of 2.3 inspectors assigned to them. This turnover rate would mean that a school is having an inspector assigned for just slightly over 2 years. A turnover rate of this magnitude would have a sizable impact on the belief expressed by AMT training providers that inspectors are unfamiliar with both FAR 147 and the content and quality of a specific program.

Respondents were asked to prioritize the areas causing the greatest problems in the operation of an approved FAR 147 program. The following chart provides the results of this question.

Areas causing the greatest problem(s) in the Operation of approved FAR 147 programs.



 # Of respondents = 75

The above table shows that when respondents were asked to list their greatest problems in the operation of their FAR 147 program, four of the top five problems, were certification issues: Record Keeping; Attendance Policies; FAA Inspector interpretation of FAR 147; and curriculum modification. The other significant operational problem identified was equipment, which is not a certification issue. Respondents expressed concern with the difficulty and high cost of obtaining equipment. Other problems related to certification, but not considered as serious, include credit for previous training and experience, student evaluations, faculty qualifications, and training techniques.

The questionnaire results clearly show that from the view of the Part 147 training provider, the present system is not adequately measuring program quality nor encouraging the upgrading of curriculum content. Program administrators and FAA inspectors are clearly more focused on record-keeping issues rather than meaningful program improvement. The questionnaire results reveal that making meaningful curriculum changes under the current system of certification and surveillance could fall short of the changes that the industry is requesting.

3.2 Recommended Changes To The Certification And Surveillance Process

The core of this curriculum is the student performance objectives that allow the student to be measured to an acceptable standard in each required skill. This also allows for students to progress in their training at different rates. This is a significant departure from the traditional method used for AMT training. FAA personnel tasked with the monitoring of AMT training programs must change from the present methods to outcome-based methods that are typically used for school accreditation.

FAA Personnel must focus their attention on graduate competency, graduate placement, instructor standards and instructor-student interaction. AMT training providers should be encouraged to participate in self-testing of their graduates. This testing method can provide an increased level of program quality assurance and graduate competency.

3.3 Specific Problems

Problems commonly cited with the present certification and surveillance system are:

- Present methods of certification and surveillance do not address the uniqueness of the education process and different student learning styles.
- Places arbitrary and unnecessary burdens on the training provider making it difficult in keeping the curriculum current with technological advances and responsive to industry needs.
- Places excessive requirements on manipulative skills at the expense of cognitive learning.
- Reliance on national testing data to evaluate quality of instruction.
- The surveillance process used to insure compliance with regulatory requirements focuses on specific check list items such as proper display of Air Agency Certificate and training hours. This process fails to address student learning or curriculum relevance.

4.0 CERTIFICATION STANDARDS FOR AMT TRAINING PROGRAMS USING THE MODEL CURRICULUM

The training of aviation maintenance technicians is a complex operation requiring both the imparting of manual skills with a sound knowledge of basic subject theory as well as a comprehensive understanding of the aircraft or system on which the technician will have to work. Students should have an appreciation of the high value of, and treat accordingly, the aircraft, test equipment, and tools which they will use in their work. Students should be instructed and encouraged to develop safe work routines, a sense of responsibility, technical honesty, and integrity. It is the honesty and integrity of the AMT which in many instances will determine the level of safety of an aircraft. The standards of performance for AMT training insure that graduates will meet the minimum levels of knowledge, skills and abilities to perform normal and routine tasks expected of entry-level maintenance technicians and insure that the graduate is prepared to further develop his/her technical skills and knowledge. The student performance objectives in this curriculum provide the knowledge, skills and abilities required to enter all of the sectors of the aviation maintenance industry.

This proposed curriculum provides for the elimination of the Airframe and Powerplant ratings for AMT training provider certification and the inception of a single rating of aviation maintenance training.

This curriculum provides for 1900 instructional hours. The curriculum is divided into nine instructional units. Each instructional unit contains student performance objectives related to the subject matter 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.

Given that this curriculum is performance-outcome based, there is no requirement mandating that a student must complete 1900 hours of instruction. If the student can demonstrate the acceptable level of performance and competency for the student performance objective (SPO) the training provider may credit the student for completing the SPO.

Just as the methods and focus of student training need to change, it is equally important that the

present approach to school certification be modified. The current system of certification places an emphasis on the detailed surveillance of attendance and record keeping. It encourages an adherence to the status quo, and discourages innovation and the incorporation of new technology into the curriculum. The successful operation of this curriculum is centered on the following principles:

- To continuously evaluate and modify curriculum effectiveness based on student outcome performance.
- To be responsive to continuing technological changes in industry,
- To be responsive to continuing changes and best practices relative to aircraft maintenance procedures.
- To be responsive to continuing changes and best practices relative to training and evaluation.

Currently, the FAA is often viewed in an adversarial role. The certification and operation of this curriculum requires a working partnership with FAA inspectors that enable the inspector to gain an in-depth level of curriculum knowledge and evaluation methods. FAA program monitoring should more closely resemble an academic accreditation visit than a repair station audit.

These proposed certification standards, procedures, and operational methods will provide programs with the needed flexibility to meet current industry requirements, while at the same time, hold aviation maintenance technician training programs accountable for student performance.

4.1 Standards

The standards of performance, detailed in this section, establish the minimum threshold criteria for Aviation Maintenance Technician training programs. AMT training programs must meet and adhere to these standards to obtain and remain certified by the Federal Aviation Administration.

These standards of performance are not intended to impose upon AMT training programs rigid uniformity of educational objectives or program operations but to provide minimum acceptable levels of performance. It is of paramount importance that AMT training remains current with technology and industry requirements. AMT training programs should operate with the philosophy of "exceeding the minimums". The FAA should support and facilitate these efforts.

The following areas of AMT training are addressed to provide the standards of performance for AMT training programs: Curriculum, Instructional Techniques, Faculty, Student Evaluation, Program Operation, Facilities, Equipment, Quality Assurance, Institutional and Financial Support, Industry Advisory Committee.

4.2 Curriculum

The curriculum content should provide an integrated educational experience directed toward development of the ability to apply pertinent knowledge and skills to the solution of practical problems. Aviation Maintenance Technician training courses must be applications-oriented with an emphasis on the development of critical thinking skills necessary for troubleshooting.

The AMT training provider should develop an individual program with clearly-written student performance objectives. Student performance levels must be set for each student performance objective. The student performance objectives must cover the breadth of knowledge, skills, and abilities required to perform the duties expected of the aviation maintenance technician in today’s aviation industry.

4.3 Instructional Techniques

The successful teaching of this curriculum will require the utilization of modern educational methods

and technology. Where appropriate, AMT training providers should be encouraged to utilize accepted educational methods and technology to provide for effective and efficient learning.

One of the guiding concepts behind a properly developed AMT 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 today's airline industry. For this reason, throughout the curriculum, an emphasis must be placed on the maintenance principles and practices as they relate to transport category aircraft and airline operations.

4.4 Integration

It is important that general concepts such as safety, team building, human factors, and error analysis be integrated into each student's laboratory activities.

4.5 Acceptable Methods of Instruction

Since no single method of instruction works for all subject material, the AMT curriculum requires the use of various instructional methods. The following are acceptable methods for classroom instruction: lecture, discussion, computer based instruction, and demonstration. Practical skills may be taught using individualized projects, group projects, shared projects, structured co-op's, and internships.

4.6 Faculty

A well-qualified faculty is the most important component of an aviation maintenance-training program. The AMT program must provide an appropriate number of instructors some of whom are required to be FAA certificated in aircraft maintenance and have experience in the appropriate technical-specialty area.

The faculty of an aviation program must possess the experience, qualifications, and capabilities essential for the successful conduct of the program in accordance with the program mission. These qualities include appropriate aviation background, experience, professional certificates, demonstrated teaching ability, and continued professional development.

An aircraft maintenance-training program should have a balanced staff of persons suitably qualified in all the subjects listed in its curriculum. The school must be able to present convincing evidence that each member of its educational and administrative staff is fully qualified to perform their assigned duties.

4.7 Instructor to Student Ratio

A sufficient number of faculty members are required to give adequate attention to each student in the program. The appropriate student-faculty ratio will vary greatly and depend on the nature of the courses and activities. For some subjects, a large lecture may be suitable while, for other laboratory activities, the ratio must be kept much smaller.

The AMT training provider must present convincing evidence that the ratio of instructors to students is appropriate for the subject matter and method of instruction utilized.

4.8 Instructor Duties

In addition to the classroom and laboratory teaching duties, it is imperative that instructors be allowed sufficient time for lesson planning, developing and grading student tests and practical projects, preparing training aids and lectures, and keeping abreast of current developments in

aviation and technology.

4.9 Professional Development

The field of aviation maintenance technology is changing rapidly. Thus, the currency of material being taught and the people teaching the material are of paramount concern. Faculty members must maintain current knowledge of their field and understanding of the tasks which industry expects technicians to perform. Instructors normally remain current by active participation in professional societies, reading industry publications, and continuing technical education activities. A school should have a well-planned, adequately-funded, and effective program for the professional development of its teaching staff.

4.10 Instructor Evaluation

The AMT training provider must have policies and procedures in place to ensure the evaluation of instructors. The purpose of faculty evaluations is to insure teaching effectiveness, accountability, professional development, and service to students. Instructor evaluations will be conducted on, at least, an annual basis. New instructors should be evaluated more frequently. The instructor evaluation process should include many different inputs ranging from administrative and/or peer evaluations to student evaluations. The evaluation should include classroom and laboratory instruction.

The evaluation of all regular and part-time faculty, along with appropriate follow-up action where necessary, should ensure teaching effectiveness, conformance of presentations to course objectives, technical accuracy, and lead to continued program improvement.

4.11 Evaluation of Student Performance

Aircraft maintenance is subject to rapid evolution and the frequent introduction of new technology and equipment. As a consequence, both the training and evaluation must keep abreast of new developments. A comprehensive evaluation system that monitors and assesses student progress and performance is required. There are several different components that should comprise an evaluation system. Since the duties of an aircraft maintenance technician require both mental and manual abilities, excellent diagnostic techniques, and considerable ingenuity, the evaluation process should include practical examinations in addition to the written, computer-based, and oral ones. However, since a comprehensive practical examination is time consuming and generally difficult to administer, a program may dispense with formal summative practical examinations and assess the student's practical work throughout the period of training.

In most circumstances, the student's level of technical accomplishment is determined, to a large extent, by written examinations administered throughout and at the end of training. Other criteria, such as total performance throughout a period of training, should also be taken into consideration.

An approved AMT training program that can present convincing evidence it has developed and implements a comprehensive student evaluation system may seek approval that will allow program graduates to bypass the written, oral, and practical testing requirements as specified in CFR 14, FAR Part 65.

4.12 Grading

The main problem with criterion-referenced evaluation is determining what level of achievement constitutes mastery and how to assign letter grades. The grading system and standards to be used are left up to the individual programs to establish. However, whatever system is utilized, it is important that it clearly identifies if the students have satisfactorily met criteria and completed the requirements for the SPOs listed against that course or unit.

The minimum score for mastery (for example, 70 percent) should be determined, and the test difficulty designed with that score in mind. A method should be established for students who have failed a course or unit to remediate this work. This remediation may require the student to repeat the entire course or unit, or if the failed material can be clearly identified, only the applicable material need be repeated.

4.13 Evaluation of Practical Skills

The evaluation of practical skills is difficult and subjective, yet must be accomplished to insure that the student has mastered the necessary skills. Programs must set clear standards for acceptable performance and all instructors must consistently apply these standards.

These standards will vary from project to project. All students should be instructed as to what is acceptable performance prior to beginning the practical task. Elements to consider in evaluating practical work should include: proper use of tools and equipment, safe work practices, proper use of technical data, teamwork and related human factors skills, quality of final work (i.e. proper operation or airworthiness), and material usage (i.e. waste).

4.14 Facilities

The school must provide suitable classrooms and laboratories adequate to accommodate the largest number of students scheduled for attendance at any one time. All facilities must conform to applicable Federal, State, and local safety and environmental codes. All facilities must be continually maintained to at least the same standards under which the most recent approval is granted.

4.15 Classrooms

Classrooms shall be properly heated, lighted, and ventilated for their designated purpose. Classrooms should be located so that noise from aircraft and lab activities do not interfere with lectures or other classroom functions. The size of the classroom will depend on the number of students seated at any one time, audiovisual equipment to be used, and if demonstrations will be performed in the classroom. Each student must be provided with adequate space for note taking and other tasks.

4.16 Laboratory Facilities

Lab space must be adequate for its use. All lab space must be properly lighted with the necessary environmental controls for the location and use. Laboratories should include the appropriate electrical, compressed air, parts cleaning, work benches, and storage space as applicable for its intended use.

4.17 Learning Resources

The program must have suitable equipment and training devices to perform the instruction as detailed in the program’s approved curriculum. This equipment shall include, but not be limited to, aircraft, training aids, test equipment, special tools, and technical software packages. These resources should be suitable for transport category aircraft where specified. It is incumbent upon the school to present evidence that the equipment is available and in sufficient quantity to permit students to successfully complete all required practical projects.

Tools and test equipment that require calibration when used in aircraft “return to service” training activities do not require regular calibration when used solely for training purposes. Tools and test equipment must be in proper operating and suitable condition for the intended training use.

Technical data and reference material that includes, but is not limited to, Federal Aviation Regulations, FAA Advisory Circulars, manufacturer manuals, and technical publications must be available and maintained at an appropriate currency to provide for students to complete required projects. This requirement should not be interpreted to mandate that all publications be complete and current to industry standards. Publications should be suitable for their intended training purpose.

Instructional and learning media resources should be available and maintained to contemporary standards.

AMT training programs are increasingly dependent upon the use of computers for certain types of student instruction. The computer facilities available to the student and staff, therefore, must reflect these requirements to encourage the use of computers by providing accessibility and availability as a part of the curriculum. Distance learning techniques should be considered for certain subject areas to allow for additional teacher observed time in areas where tactile skill development is critical.

4.18 Advisory Committees

It is recognized that advisory committees can contribute significantly to the growth and development of an aviation maintenance technician training program as a means of assuring technical currency of the program and maintaining a close working relationship with the supporting and employing industries.

Each certified program must have a functional advisory committee, composed of aviation industry representatives, which must meet at least annually.

The advisory committee should be broad-based and composed primarily of individuals actively engaged in the aviation maintenance technology field. The members should have an intimate knowledge of the current work of AMT technicians and the work they are likely to do in the near future.

The committee should meet a minimum of once a year with the administration, faculty and students to discuss program needs, progress, and problems, and to recommend solutions. In addition to the annual meeting, regular communication should occur with the committee throughout the year.

To be effective, advisory committees must be properly supported, logistically and administratively. They should be given meaningful assignments that are properly within their areas of expertise, and their advice must be given serious consideration. The advisory committee should periodically review curriculum and course content to ensure that the current and future needs of the aviation maintenance industry are being met.

4.19 Continuous Quality Improvement

Continuous Quality Improvement is an ongoing process aimed at understanding and improving program quality and student learning. It involves setting appropriate criteria and high standards for learning quality systematically gathering, analyzing, and interpreting evidence to determine how well performance matches those expectations and standards and using the resulting information to document, explain, and improve performance. When it is integrated into an AMT training program Continuous Quality Improvement can effectively improve the quality of the training.

An effective Continuous Quality Improvement program should contain the following principles.

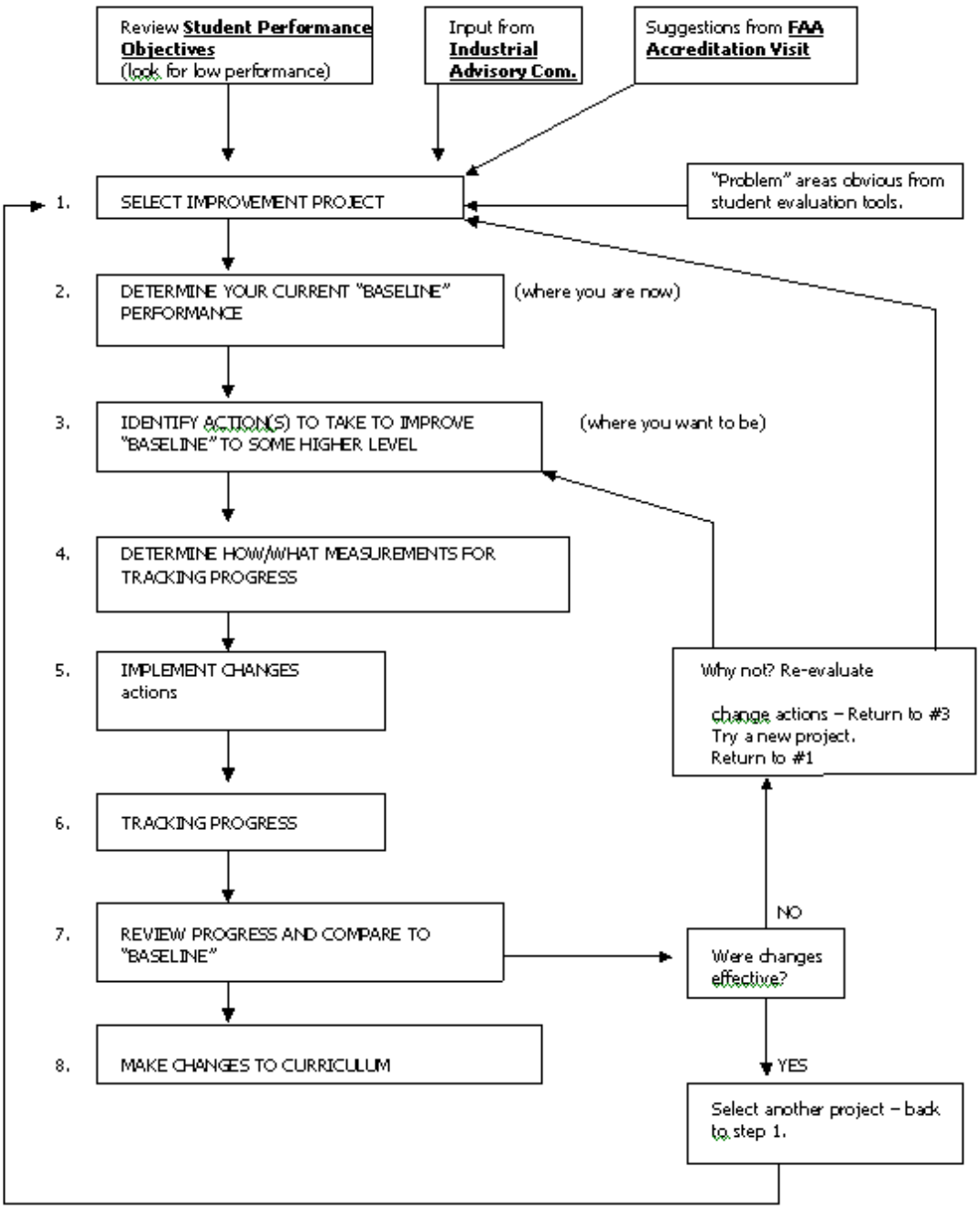
1. Assesses what is taught and what students are expected to learn.
2. Provides information regarding curriculum strengths & weaknesses.
3. Focuses on process as well as on outcomes.

4. Actively involves teachers and students.
5. Provides information for improving learning.
6. Uses multiple and varied measures.
7. Is carried out at various key points.
8. Provides feedback to those most affected.

Assessment is an integral part of a continuous improvement program. Each AMT training provider should have in place a continuous improvement program. The purpose of this program is to not only improve the classroom instruction but also to continuously integrate new technology into the curriculum.

Figure 1 is an example of a continuous improvement process.

Figure 1. Continuous Improvement Process



5.0 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.

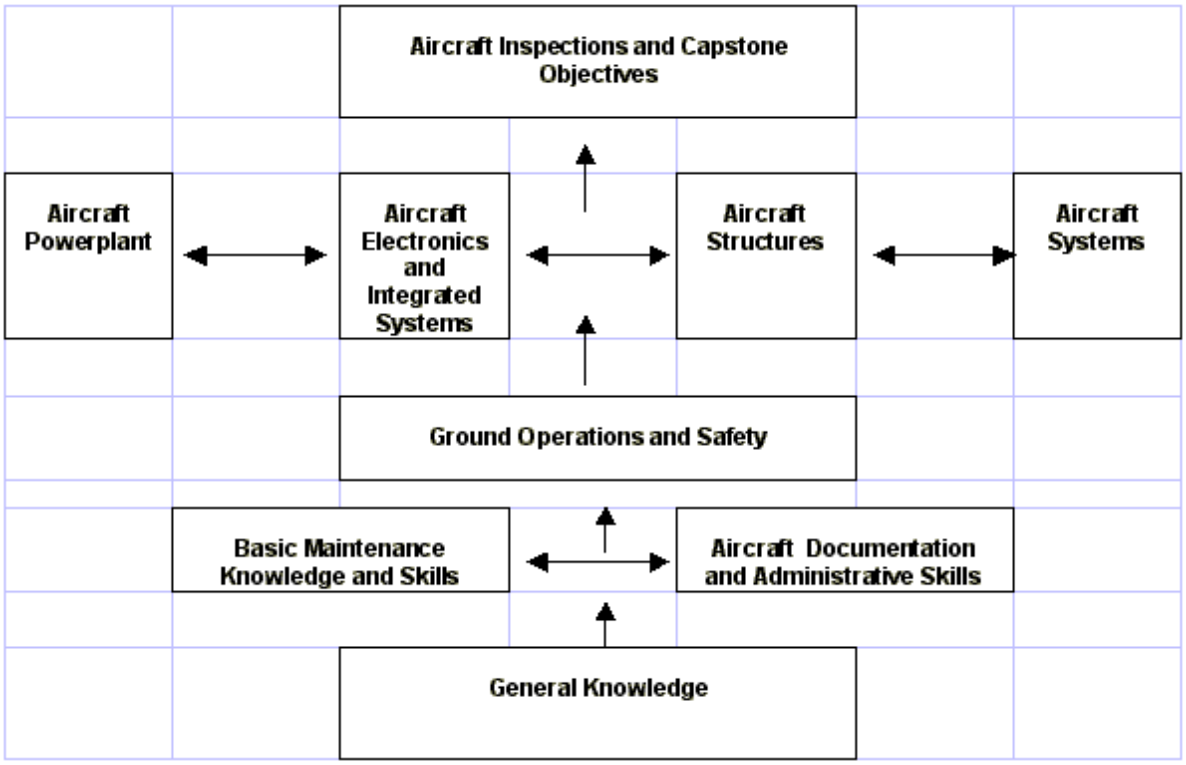
Instructional units contain student performance objectives related to the subject content of the instructional unit. The student performance objectives may be further divided into modules based on subject content. The instructional units are in hierarchical order. This order presents the subordinate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

5.1 Material Sequencing

The instructional units in this curriculum should be presented 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.

Student performance objectives should arranged within the instructional unit, to insure a curriculum flow that allows the student to build on previously learned knowledge and to develop a complete understanding of the subject area. Figure 2 shows the instructional units in their hierarchical order.

Figure 2. Instructional Unit Hierarchic



5.2 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.

5.3 Instructions Units

5.3.1 General Knowledge Instructional Unit

The material in this instructional unit provides the AMT 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, theory of flight, aircraft identification, computer skills, human factors, maintenance resource management, reading comprehension, English language and writing skills.

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-lieu-of-providing formal instruction.

5.3.2 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 AMTs 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.

5.3.3 Aircraft Documentation and Administrative Skills Instructional Unit

The material within this instructional unit provides the student with the knowledge, skills, and abilities to use and understand the technical support material and emphasizes the importance of the record-keeping requirements for aircraft and aircraft operators.

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.

5.3.4 Ground Operations and Safety Instructional Unit

This instructional unit provides the AMT 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,and lubricants and oils.

5.3.5 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, inspection, 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, inspection, 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, inspection, damage assessment (lighting strikes, ground damage, etc) and troubleshooting operational malfunctions.

5.3.6 Aircraft Electronics and Integrated Systems Instructional Unit

The Aircraft Electronics and Integrated Systems instructional unit contains six 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.

5.3.7 Aircraft Systems Instructional Unit

The Aircraft Systems instructional unit provides the AMT student with a detailed knowledge of aircraft systems with a focus on transport aircraft 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.

5.3.8 Aircraft Structures Instructional Unit

This instructional unit provides the student with the knowledge, skills and abilities to inspect, maintain and repair aircraft structures. Emphasis is on hands-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).

5.3.9 Aircraft Inspections and Capstone Objectives Instructional Unit

This instructional unit requires the student to use the knowledge, skills, and experiences learned during AMT education. In addition, programs have the flexibility to provide unique capstone student performance objectives or advanced technical courses to complete the students’ education. Programs should focus capstone objectives to best fulfill the students’ career objectives. Examples of acceptable capstone objectives would include advanced non-destructive training to American Society of Non-Destructive Testing standards, advanced composites (manufacturing focus), regional aircraft familiarization courses, specific aircraft gas turbine engine training, aviation industry co-ops, internships and apprenticeships. The capstone objective may be tailored to an individual student or a class of students.

5.4 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		**60 hours**
Basic Maintenance Knowledge and Skills		**60 hours**
Aircraft Documentation and Administrative Skills		**70 hours**
Ground Operations and Safety		**50 hours**
Aircraft Powerplant Gas Turbine Engine module Reciprocating Engine module Propeller module	 240 hours 190 hours 70 hours	500 hours
Aircraft Electronics and Integrated Systems Electrical Theory module Maintenance Practices for Electrical Systems module Electrical Power Generation Systems module Communication, Navigation and Warning Systems module Flight Management Systems module	 100 hours 50 hours 50 hours 125 hours 75hours	400 hours
Aircraft Systems		270 hours
Aircraft Structures		350 hours
Aircraft Inspections and Capstone Objectives		140 hours
Total Instructional Hours		1900 hours

5.5 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.

5.5.1 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

5.5.2 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

5.5.3 Manipulative Skill

Manipulative Skill 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”

5.6 Curriculum Presentation

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

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

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

6.0 Student Performance Objectives

6.1 General Knowledge

SPO Item #	Student Performance Levels Knowledge	Application	Manipulative Skills	Student Performance Objectives
GK 1	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 2	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 3	C	B	A	Demonstrate the ability to state and explain the principles of the theory of flight for fixed and rotary wing aircraft
GK 4	B	C	A	Demonstrate the ability to identify FAA type certified aircraft
GK 5	C	C	B	Demonstrate the ability to perform basic functions on a PC type computer using typical desktop application programs
GK 6	B	B	A	Demonstrate the ability to state and explain the basic principles and procedures used in troubleshooting
				Demonstrate the ability to state and explain the concepts

GK 7	B	B	A	used in Maintenance Resource Management – Factors
GK 8	B	B	A	Demonstrate the ability to state and explain the concepts used in Team Building
GK 9	B	B	A	Demonstrate the ability to state and explain the concepts used in Situational Awareness and fatigue
GK 10	B	B	A	Demonstrate the ability to state and explain the concepts used in Error Analysis and shift turnover
GK 11	C	C	A	Demonstrate the ability to read and comprehend aircraft technical manuals and related materials
GK 12	C	C	A	Demonstrate the ability to write in the English language by writing aircraft defect and repair statements
GK 13	C	C	A	Demonstrate the ability to speak the English language by reading and explaining aircraft technical material

6.2 Basic Maintenance Knowledge & Skills

SPO **Item #**	**Student Performance Levels** **Knowledge**	**Application**	**Manipulative Skills**	**Student Performance Objectives**
MKS 1	C	C	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	B	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 Processes for various aircraft and engine applications
MKS 13	C	A	A	Demonstrate the ability to identify and determine the specifications 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	C	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	B	B	A	Demonstrate the ability to inspect aircraft exterior finishes and Identify defects in the finish and their cause
MKS 19	C	C	C	Demonstrate the ability to correctly safety aircraft bolts, nuts, turnbuckles and connectors
MKS 20	C	C	C	Demonstrate the ability to remove and install aircraft studs and Thread-repair oil inserts
MKS 21	C	C	C	Demonstrate the ability to install and repair threads in/on aluminum and steel

6.3 Aircraft Documentation and Administrative Skills

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

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	B	B	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	B	C	A	Demonstrate the ability to read, comprehend, locate and apply information contained in manufacturer's Component Overhaul Manuals.
ADAS 11	B	B	A	Demonstrate the ability to read, comprehend, and apply information contained in air Carrier (Pt. 121 and 135) Engineering Orders and work cards
ADAS 12	C	C	A	Demonstrate the ability to state and explain the Aviation Maintenance Technician privileges within the limitations prescribed by Part 65
ADAS 13	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 14	B	B	A	Demonstrate the ability to state and explain the maintenance and maintenance release requirements for aircraft operating under FAR Part 121
ADAS 15	B	B	A	Demonstrate the ability to state and explain tool and test equipment calibration requirements
ADAS 16	A	B	A	Demonstrate the ability to locate and explain aircraft Category 2 and Category 3 inspection and release for flight requirements

6.4 Ground Operations and Safety

SPO Item #	Student Performance Levels Knowledge	Application	Manipulative Skills	Student Performance Objectives
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.
GOS 3	C	C	A	Demonstrate the ability to select the appropriate sheet for an item and identify the various information and warnings contained on the MSDS sheet
GOS 4	C	C	A	Demonstrate the ability to explain the EPA, OSHA 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	C	C	A	Demonstrate the ability to explain standard safety practices and procedures for working around jet blast hazard areas
GOS 9	B	B	B	Demonstrate the ability to perform aircraft interior, exterior and powerplant cleaning
GOS 10	B	B	A	Demonstrate the ability to explain the general properties and purposes of aircraft fuels, lubricants and greases
GOS 11	C	C	A	Demonstrate the ability to identify and select aircraft fuels
GOS 12	C	C	A	Demonstrate the ability to identify and select powerplant lubricants
GOS 13	C	C	A	Demonstrate the ability to identify and select hydraulic fluids
GOS 14	C	C	A	Demonstrate the ability to identify and select aircraft lubricants and greases
GOS 15	C	C	A	Demonstrate the ability to identify and select propeller lubricants
GOS 16	B	B	A	Demonstrate the ability to explain the procedures and precautions for deicing aircraft.
GOS 17	C	C	C	Demonstrate the ability to use proper hand signals for taxiing and ground movement of aircraft
GOS 18	C	B	B	Demonstrate the ability to use proper voice procedures for aircraft radio transmissions.

6.5 Aircraft Powerplant Turbine Engines

SPO Item #	Student Performance Levels Knowledge	Application	Manipulative Skills	Student Performance Objective
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	B	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	C	C	C	Demonstrate the ability to perform routine maintenance tasks on aircraft gas turbine engines
PPT 8	C	C	C	Demonstrate the ability to inspect aircraft gas turbine engine installations
PPT 9	C	B	B	Demonstrate the ability to troubleshoot operational malfunctions on an aircraft gas turbine engine
PPT 10	C	C	C	Demonstrate the ability to remove and install aircraft gas turbine engines
PPT 11	C	C	B	Demonstrate the ability to adjust and rig aircraft gas turbine engine controls
PPT 12	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 13	C	B	A	Demonstrate the ability to explain the concepts and parameters used in aircraft gas turbine engine trend monitoring.
PPT 14	C	A	A	Demonstrate the ability to state and explain the special inspections that are required on aircraft gas turbine engines
PPT 15	C	C	B	Demonstrate the ability to perform routine borescope inspections of aircraft gas turbine engines

PPT 16	C	C	C	Demonstrate the ability to start, ground run, perform ground run checks, and shutdown an aircraft gas turbine engine
PPT 17	C	C	C	Demonstrate the ability to identify and select lubricants acceptable for use in aircraft gas turbine engines and on engine installations
PPT 18	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 19	C	C	C	Demonstrate the ability to service an aircraft gas turbine engine lubrication systems
PPT 20	C	B	C	Demonstrate the ability to perform routine maintenance tasks on aircraft gas turbine engine lubrication systems and systems components
PPT 21	C	B	B	Demonstrate the ability to troubleshoot operational malfunctions on aircraft gas turbine engine lubrication systems and system components
PPT 22	C	C	C	Demonstrate the ability to inspect aircraft gas turbine engine lubrication systems
PPT 23	C	B	A	Demonstrate the ability to identify and explain the purpose/function of the components in aircraft gas turbine engine ignition system
PPT 24	C	C	C	Demonstrate the ability to inspect aircraft gas turbine engine ignition systems
PPT 25	C	C	B	Demonstrate the ability to troubleshoot operational malfunctions on aircraft gas turbine engine ignition system and system components
PPT 26	C	B	C	Demonstrate the ability to perform routine maintenance tasks on aircraft gas turbine engine ignition systems and system components
PPT 27	C	B	A	Demonstrate the ability to identify and explain the purpose/function of the components in aircraft gas turbine engine starting systems
PPT 28	C	C	C	Demonstrate the ability to inspect aircraft gas turbine engine starting systems
PPT 29	C	B	B	Demonstrate the ability to troubleshoot operational malfunctions on aircraft gas turbine engine starting systems and system components
PPT 30	C	B	C	Demonstrate the ability to perform routine maintenance tasks on aircraft gas turbine engine starting systems and system components
PPT 31	C	B	A	Demonstrate the ability to identify and explain the purpose/function of the components in aircraft gas turbine engine fuel systems
PPT 32	C	C	C	Demonstrate the ability to inspect aircraft gas turbine engine fuel systems and control systems
				Demonstrate the ability to perform routine maintenance

PPT 33	C	B	B	tasks on aircraft gas turbine engine fuel systems, fuel controls and system components
PPT 34	B	B	B	Demonstrate the ability to troubleshoot operational malfunctions on aircraft gas turbine engine fuel systems, fuel controls and system components
PPT 35	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 36	C	C	B	Demonstrate the ability to inspect aircraft gas turbine engine ice control systems
PPT 37	C	B	C	Demonstrate the ability to inspect aircraft gas turbine engine exhaust systems and system components
PPT 38	C	B	C	Demonstrate the ability to perform routine maintenance tasks on aircraft gas turbine engine exhaust systems and system components
PPT 39	C	B	B	Demonstrate the ability to troubleshoot operational malfunctions on aircraft gas turbine engine exhaust systems and system components
PPT 40	C	C	B	Demonstrate the ability to inspect aircraft gas turbine engine thrust reverser systems and system components
PPT 41	C	B	B	Demonstrate the ability to perform routine maintenance tasks on aircraft gas turbine engine thrust reverser systems and system components
PPT 42	C	B	B	Demonstrate the ability to troubleshoot operational malfunctions on aircraft gas turbine engine thrust reverser systems and system components
PPT 43	C	B	A	Demonstrate the ability to identify and explain the purpose/function of the components in aircraft gas turbine engine electrical systems
PPT 44	C	C	C	Demonstrate the ability to inspect aircraft gas turbine engine electrical systems and system components
PPT 45	C	B	C	Demonstrate the ability to perform routine maintenance tasks on aircraft gas turbine engine electrical systems and system components
PPT 46	C	A	A	Demonstrate the ability to explain the operation of typical aircraft Auxiliary Power Units and APU system interface
PPT 47	C	A	A	Demonstrate the ability to identify typical aircraft Auxiliary Power Units
PPT 49	C	A	A	Demonstrate the ability to locate and identify typical aircraft Auxiliary Power Unit components by proper nomenclature
PPT 49	B	A	A	Demonstrate the ability to perform routine maintenance tasks on aircraft Auxiliary Power Units
PPT 50	B	A	A	Demonstrate the ability to troubleshoot operational malfunctions on aircraft Auxiliary Power Units

6.6 Aircraft Powerplants Reciprocating Engines

S P O Item #	Student Performance Levels Knowledge	Application	Manipulative Skills	Student Performance Objective
PPR 1	C	B	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
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	B	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
PRP 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	B	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.
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	B	Demonstrate the ability to troubleshoot operational malfunctions on aircraft reciprocating engine ignition systems and system components
PPR 21	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
PRP 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	B	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.
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	B	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.
				Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft reciprocating engine exhaust

PPR 33	C	B	C	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
PRP 38	C	B	B	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
PPR 42	C	B	B	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.

6.7 Aircraft Powerplants Propellers

S P O Item #	Student Performance Levels Knowledge	Application	Manipulative Skills	Student Performance Objective
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
				Demonstrate the ability to identify typical aircraft

PPP 4	C	A	A	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
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 to 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	A	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

6.8 Aircraft Electronics and Integrated Systems

6.8.1 Electrical Theory

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

AEIS – ET 2	B	A	A	nucleus, and ion
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
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 the operation of a potentiometer and rheostat
AEIS – ET 10	C	C	A	Demonstrate the ability to write and apply Ohm series, parallel and series-parallel dc circuits
AEIS – ET 11	B	A	A	Demonstrate the ability to define and explain power and wattage
AEIS – ET 12	B	B	A	Demonstrate the ability to state and apply basic power formulas
AEIS – ET 13	B	A	A	Demonstrate the ability to state and explain the basic law of magnetism
AEIS – ET 14	B	A	A	Demonstrate the ability to define and explain magentomotive force and permeability
AEIS – ET 15	B	A	A	Demonstrate the ability to identify the instruments used to measure current, voltage and resistance
AEIS – ET 16	C	B	C	Demonstrate the ability to properly use a ammeter, voltmeter and ohmmeter
AEIS – ET 17	C	B	A	Demonstrate the ability to define and explain AC and DC electrical flow
AEIS – ET 18	B	A	A	Demonstrate the ability to identify a sine wave
AEIS – ET 19	B	B	A	Demonstrate the ability to determine the peak value, peak-to-peak value, and effective value of a sine wave
AEIS – ET 20	B	B	A	Demonstrate the ability to compute peak value when given the rms value
AEIS – ET 21	B	A	A	Demonstrate the ability to define and explain hertz, kilohertz and megahertz
AEIS – ET 22	B	B	A	Demonstrate the ability to compute wavelength when given frequency
AEIS – ET 23	C	B	B	Demonstrate the ability to identify and explain the usage of an oscilloscope
AEIS – ET 24	B	B	B	Demonstrate the ability to measure amplitude, period and frequency using an oscilloscope

AEIS – ET 25	B	A	A	Demonstrate the ability to define and explain inductance, henry and mutual inductance
AEIS – ET 26	B	A	A	Demonstrate the ability to define and explain reactance and impedance
AEIS – ET 27	B	B	A	Demonstrate the ability to calculate inductive reactance, total inductance and impedance
AEIS – ET 28	B	B	A	Demonstrate the ability to state and apply the formula for inductive reactance
AEIS – ET 29	B	A	A	Demonstrate the ability to define and explain capacitance, farad and capacitive reactance
AEIS – ET 30	B	A	A	Demonstrate the ability to explain impedance matching
AEIS – ET 31	B	A	A	Demonstrate the ability to identify and explain the factors that determine capacitance
AEIS – ET 32	B	B	A	Demonstrate the ability to calculate total capacitance of capacitors connected in series and parallel
AEIS – ET 33	B	B	A	Demonstrate the ability to calculate capacitive reactance
AEIS – ET 34	B	B	A	Demonstrate the ability to calculate total inductance of inductors connected in series and parallel
AEIS – ET 35	B	B	A	Demonstrate the ability to calculate the impedance of series RC and RLC circuits and parallel RLC circuits
AEIS – ET 36	B	A	A	Demonstrate the ability to define and explain resonance
AEIS – ET 37	B	A	A	Demonstrate the ability to explain the characteristics of series and parallel resonant circuits
AEIS – ET 38	B	A	A	Demonstrate the ability to explain the difference between P-type and N-type semiconductor materials
AEIS – ET 39	B	A	A	Demonstrate the ability to identify forward and reverse biased diodes
AEIS – ET 40	B	A	A	Demonstrate the ability to name and explain solid diode ratings
AEIS – ET 41	B	A	A	Demonstrate the ability to identify and explain the characteristics of zener and varactor diodes
AEIS – ET 42	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 43	B	B	A	Demonstrate the ability to identify the schematic symbols for NPN and PNP transistors
				Demonstrate the ability to identify the correct bias for the

AEIS – ET 44	B	B	A	emitter-base and collector-base junctions of a transistor
AEIS – ET 45	B	A	A	Demonstrate the ability to identify and explain the characteristics of the common-emitter, common common-collector amplifier configurations
AEIS – ET 46	B	B	A	Demonstrate the ability to identify the schematic symbol for light sensitive devices
AEIS – ET 47	B	A	A	Demonstrate the ability to explain the operating principles of light emitting diode (LED)
AEIS – ET 48	B	A	A	Demonstrate the ability to explain the operating characteristics and modes of a liquid crystal display
AEIS – ET 49	B	A	A	Demonstrate the ability to identify and explain the characteristics of two basic types of integrated circuits
AEIS – ET 50	B	A	A	Demonstrate the ability to identify and explain the characteristics of digital integrated circuits
AEIS – ET 51	B	A	A	Demonstrate the ability to identify and explain the characteristics of linear integrated circuits
AEIS – ET 52	B	A	A	Demonstrate the ability to identify and explain the characteristics of the binary number system
AEIS – ET 53	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 54	B	A	A	Demonstrate the ability to identify and explain the term “flip-flop” as it relates to digital circuits
AEIS – ET 55	B	A	A	Demonstrate the ability to identify the logic diagrams and symbols for the three basic types of “flip-flops”
AEIS – ET 56	B	A	A	Demonstrate the ability to identify and explain the characteristics of the two most common types of sequential logic circuits
AEIS – ET 57	B	A	A	Demonstrate the ability to identify and explain the characteristics of simple microprocessors
AEIS – ET 58	B	A	A	Demonstrate the ability to locate, identify ARINC specifications
AEIS – ET 59	B	B	A	Demonstrate the ability to explain ARINC specifications: ARINC 429 and ARINC 629
AEIS – ET 60	B	B	A	Demonstrate the ability to decode ARINC 429 Data Words for binary and binary coded decimal word formats
AEIS – ET 61	B	B	A	Demonstrate the ability to explain data transmission specifications : CSDB, ASCB, and MANCHESTER

6.8.2 Maintenance Practices for Electrical Systems

SPO Item #	Student Performance Levels Knowledge	Application	Manipulative Skills	Student Performance Objectives
AEIS – MP 1	C	B	A	Demonstrate the ability to locate and explain the 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
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 electrical systems
AEIS – MP 17	C	C	C	Demonstrate the ability to inspect aircraft wiring, coax, connector plugs, switches and protective devices
AEIS – MP 18	C	C	C	Demonstrate the ability to install aircraft wiring, coax, switches and protective devices
AEIS – MP 19	C	C	C	Demonstrate the ability to repair aircraft wiring and coax using splices and terminations
AEIS – MP 20	C	C	C	Demonstrate the ability to remove, install and torque aircraft electrical connector plugs; solder and pin replacement types
AEIS – MP 21	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 22	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 23	B	B	B	Demonstrate the ability to inspect aircraft antennas
AEIS – MP 24	B	B	B	Demonstrate the ability to perform routine maintenance tasks on aircraft antennas
AEIS – MP 25	C	C	B	Demonstrate the ability to inspect aircraft electronics equipment installations and electronic equipment racks
AEIS – MP 26	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

6.8.3 Electrical Power Generation Systems

SPO Item #	Student Performance Levels Knowledge	Application	Manipulative Skills	Student Performance Objectives
AEIS – EP 1	B	B	A	Demonstrate the ability to identify and explain the principles of electrical power generation within aircraft lead-acid batteries
				Demonstrate the ability to service and charge aircraft

AEIS – EP 2	C	C	C	lead-acid batteries
AEIS – EP 3	C	C	C	Demonstrate the ability to inspect aircraft lead-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 on aircraft certified under Part 25
AEIS – EP 13	B	A	A	Demonstrate the ability to identify and explain the operating principles of aircraft DC generators, starter generators and alternators
AEIS – EP 14	B	B	B	Demonstrate the ability to inspect aircraft DC generators, starter-generators and alternators installations and circuits
AEIS – EP 15	B	B	B	Demonstrate the ability to perform routine maintenance tasks on aircraft DC generators, starter-generators and alternators installations and circuits
AEIS – EP 16	B	B	B	Demonstrate the ability to troubleshoot operational malfunctions in aircraft DC generators, starter-generators and alternators and their circuits
AEIS – EP 17	B	A	A	Demonstrate the ability to identify and explain the operating principles of aircraft AC generators
AEIS – EP 18	B	B	B	Demonstrate the ability to inspect aircraft AC generators, generator installations and generator circuits
AEIS – EP 19	B	B	B	Demonstrate the ability to perform routine maintenance tasks on aircraft AC generators, generator installations and generator circuits

AEIS – EP 20	B	B	B	Demonstrate the ability to troubleshoot operational malfunctions in aircraft AC generators and generator circuits
AEIS – EP 21	B	B	A	Demonstrate the ability to identify and explain the operating principles of aircraft inverters, current transformers and rectifiers
AEIS – EP 22	B	B	B	Demonstrate the ability to inspect aircraft inverters, current transformers and rectifiers, their installation and circuits
AEIS – EP 23	B	B	B	Demonstrate the ability to perform routine maintenance tasks on aircraft inverters and rectifiers, their installation and circuits
AEIS – EP 24	B	A	A	Demonstrate the ability to identify and explain the operating principles of aircraft starters and motors
AEIS – EP 25	B	B	B	Demonstrate the ability to inspect aircraft electrical motors, their installation and circuits
AEIS – EP 26	B	B	B	Demonstrate the ability to perform routine maintenance tasks on aircraft electrical motors, their installation and circuits
AEIS – EP 27	C	B	A	Demonstrate the ability to explain the principles of electrical power distribution and load requirements for aircraft.5
AEIS – EP 28	C	A	A	Demonstrate the ability to explain the operation of electrical power distribution circuits for aircraft.
AEIS – EP 29	C	B	B	Demonstrate the ability to troubleshoot operational malfunctions in the electrical power distribution system for aircraft.
AEIS – EP 30	B	B	A	Demonstrate the ability to perform an electrical load analysis

6.8.4 Communication, Navigation and Warning Systems

SPO Item #	Student Performance Levels Knowledge	Application	Manipulative Skills	Student Performance Objectives
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
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 explain the operating principles of an aircraft ACARS (ARINC Communication Addressing and Reporting System) communication system
AEIS – CNW 10	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 11	B	A	A	Demonstrate the ability to explain the operating principles of an aircraft Satellite communication system
AEIS – CNW 12	B	A	A	Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Satellite communication system
AEIS – CNW 13	B	A	A	Demonstrate the ability to explain the operating principles of an aircraft compass and attitude sensing systems found in aircraft.
AEIS – CNW 14	B	A	A	Demonstrate the ability to explain the operating principles of an aircraft Inertial Navigation system
AEIS – CNW 15	B	A	A	Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Inertial Navigation system
AEIS – CNW 16	B	A	A	Demonstrate the ability to explain the operating principles of an aircraft laser and conventional gyros
AEIS – CNW 17	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 18	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 19	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 20	B	A	A	Demonstrate the ability to explain the operating principles of an aircraft VHF Navigation (VOR/ILS).
				Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft VHF

AEIS – CNW 21	B	A	A	Navigation (VOR/ILS).
AEIS – CNW 22	B	A	A	Demonstrate the ability to explain the operating principles of an aircraft Marker Beacon system.
AEIS – CNW 23	B	A	A	Demonstrate the ability to explain the operating principles of an aircraft Distance Measuring Equipment (DME) system.
AEIS – CNW 24	B	A	A	Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Distance Measuring Equipment (DME) system.
AEIS – CNW 25	B	A	A	Demonstrate the ability to explain the operating principles of an aircraft Radio Altimeter system.
AEIS – CNW 26	B	A	A	Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Radio Altimeter system.
AEIS – CNW 27	B	A	A	Demonstrate the ability to explain the operating principles of an aircraft Global Positioning System (GPS).
AEIS – CNW 28	B	A	A	Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Global Positioning System (GPS).
AEIS – CNW 29	B	A	A	Demonstrate the ability to explain the operating principles of an aircraft ATC Transponder system.
AEIS – CNW 30	B	A	A	Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft ATC Transponder.
AEIS – CNW 31	B	A	A	Demonstrate the ability to explain the operating principles of an aircraft Weather Radar system.
AEIS – CNW 32	B	A	A	Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Weather Radar system.
AEIS – CNW 33	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 34	B	A	A	Demonstrate the ability to explain the operating principles of an aircraft Traffic Alert and Collision Avoidance System (TCAS).
AEIS – CNW 35	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).
AEIS – CNW 36	B	A	A	Demonstrate the ability to explain the operating principles of an aircraft Windshear Warning Systems.
AEIS – CNW 37	B	A	A	Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Windshear Warning Systems.
AEIS – CNW 38	B	A	A	Demonstrate the ability to explain the operating principles of an aircraft Ground Proximity Warning Systems (GPWS).

AEIS – CNW 39	B	A	A	Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Ground Proximity Warning Systems (GPWS).
AEIS – CNW 40	B	A	A	Demonstrate the ability to explain the operating principles of an aircraft Stall Warning Systems.
AEIS – CNW 41	B	A	A	Demonstrate the ability to identify and explain the purpose/function of the components in an aircraft Stall Warning Systems.
AEIS – CNW 42	B	A	A	Demonstrate the ability to locate and explain the procedures for ground testing an aircraft Stall Warning System.
AEIS – CNW 43	B	A	A	Demonstrate the ability to explain the operating principles of an aircraft Flight Data and Cockpit Voice Recorder System.
AEIS – CNW 44	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 System.
AEIS – CNW 45	B	A	A	Demonstrate the ability to explain the operating principles of an Emergency Locator Transmitter (ELT) System
AEIS – CNW 46	B	A	A	Demonstrate the ability to identify and explain the purpose/function of the components in an Emergency Locator Transmitter (ELT) System.
AEIS – CNW 47	B	A	A	Demonstrate the ability to locate and explain the procedures for ground testing an Emergency Locator Transmitter (ELT) System.

6.8.5 Flight Management Systems

SPO Item #	Student Performance Levels Knowledge	Application	Manipulative Skills	Student Performance Objectives
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
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).
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
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).
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).
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).
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).
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.

AEIS – FMS 23	B	A	A	Demonstrate the ability to identify the primary and secondary control functions for an Autoflight Control System.
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.
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.
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.
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.
AEIS – FMS 29	B	A	A	Demonstrate the ability to explain the function and principles of operation for the Autopilot Flight Director System.
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.
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.
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.
AEIS – FMS 33	B	A	A	Demonstrate the ability to explain the function and principles of operation for the Maintenance Monitor Systems.
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.
AEIS – FMS 35	B	A	A	Demonstrate the ability to identify and explain the function of the controls in an Autoflight Control System.
AEIS – FMS 36	B	A	A	Demonstrate the ability to identify and explain the annunciator and warnings used in an Autoflight Control System.
AEIS – FMS 37	B	A	A	Demonstrate the ability to locate and explain the procedures for troubleshooting faults in an Autoflight Control System.
AEIS – FMS 38	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 39	B	A	A	Demonstrate the ability to identify and explain the purpose and function of servos and actuators used in autoflight systems.

AEIS – FMS 40	B	A	A	Demonstrate the ability to explain the principles of operation of Built In Test Equipment Systems (BITE).
AEIS – FMS 41	B	A	A	Demonstrate the ability to locate and explain the operation procedures for Built In Test Equipment (BITE).
AEIS – FMS 42	B	A	A	Demonstrate the ability to explain the principles of operation of Central Maintenance Computer Systems (CMC).
AEIS – FMS 43	B	A	A	Demonstrate the ability to locate and explain the operation procedures for Central Maintenance Computers (CMC).

6.9 Aircraft Systems

SPO Item #	Student Performance Levels Knowledge	Application	Manipulative Skills	Student Performance Objectives
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.
ASYS 10	B	A	B	Demonstrate the ability to identify and explain the purpose/function of aircraft pneumatic system components
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
ASYS13	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 certified under Part 23 and 25.
ASYS 21	C	C	C	Demonstrate the ability to raise an aircraft using aircraft jacks
ASYS 22	C	B	A	Demonstrate the ability to explain the operation of typical brake and anti-skid systems used on aircraft certified.
ASYS 23	C	A	A	Demonstrate the ability to identify and explain the purpose/function of aircraft brake and anti-skid system components
ASYS 24	C	C	C	Demonstrate the ability to inspect aircraft brake and anti skid systems and system components
ASYS 25	C	C	C	Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft brake and anti-skid systems and system components
ASYS 26	C	C	B	Demonstrate the ability to troubleshoot operational malfunctions on aircraft brake and anti-skid systems and system components
ASYS 27	C	A	A	Demonstrate the ability to explain the operation of typical steering systems used on aircraft certified under Part 23 and 25
ASYS 28	C	B	A	Demonstrate the ability to identify and explain the purpose/function of aircraft steering system components
				Demonstrate the ability to inspect aircraft steering systems and system components

ASYS 29	C	C	B	
ASYS 30	C	C	B	Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft steering systems and system components
ASYS 31	C	C	B	Demonstrate the ability to troubleshoot operational malfunctions on aircraft steering systems and system components
ASYS 32	C	C	C	Demonstrate the ability to inspect aircraft wheels and tires
ASYS 33	C	C	C	Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft wheels and tires
ASYS 34	C	A	A	Demonstrate the ability to explain the operation of typical fuel systems used on aircraft certified under Part 23 and 25
ASYS 35	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 36	C	C	C	Demonstrate the ability to inspect aircraft fuel systems and system components
ASYS 37	C	C	C	Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft fuel systems and system components
ASYS 38	C	C	C	Demonstrate the ability to troubleshoot operational malfunctions on aircraft fuel systems and system components
ASYS 39	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 40	C	C	C	Demonstrate the ability to inspect aircraft fuel quantity indicating systems
ASYS 41	C	C	C	Demonstrate the ability to troubleshoot operational malfunctions on aircraft fuel quantity indicating systems
ASYS 42	C	B	A	Demonstrate the ability locate and explain to procedures for calibrating aircraft fuel quantity indicating systems
ASYS 43	C	A	A	Demonstrate the ability to explain the operation of fuel management systems, including transfer and dump operations
ASYS 44	C	A	A	Demonstrate the ability to explain the operation of fuel pressure and temperature indicating systems.
ASYS 45	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 46	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
				Demonstrate the ability to explain the operation of

ASYS 47	C	A	A	pressure fueling systems.
ASYS 48	B	A	A	Demonstrate the ability to locate the inspection procedures for pressure fueling systems.
ASYS 49	C	A	A	Demonstrate the ability to explain the operation of typical heating systems found on aircraft certified under Part 23 and 25
ASYS 50	C	B	A	Demonstrate the ability to identify and explain the purpose/function of aircraft heating system components
ASYS 51	C	C	B	Demonstrate the ability to inspect aircraft heating systems and system components
ASYS 52	C	C	C	Demonstrate the ability to troubleshoot operational malfunctions on aircraft heating systems and system components
ASYS 53	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 54	C	B	A	Demonstrate the ability to identify and explain the purpose/function of aircraft air conditioning system components
ASYS 55	C	C	B	Demonstrate the ability to inspect aircraft air conditioning systems and system components
ASYS 56	C	A	A	Demonstrate the ability to explain the operation of typical pressurization systems found on aircraft certified under Part 23 and 25
ASYS 57	C	B	A	Demonstrate the ability to identify and explain the purpose/function of aircraft pressurization system components
ASYS 58	C	C	B	Demonstrate the ability to inspect aircraft pressurization systems and system components
ASYS 59	C	B	B	Demonstrate the ability to troubleshoot operational malfunctions on aircraft pressurization systems and system components
ASYS 60	C	A	A	Demonstrate the ability to explain the operation of typical oxygen 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 oxygen system components
ASYS 62	C	C	B	Demonstrate the ability to inspect aircraft oxygen systems and system components
ASYS 63	C	B	B	Demonstrate the ability to troubleshoot operational malfunctions on aircraft oxygen systems and system components
ASYS 64	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 65	C	B	A	Demonstrate the ability to identify and explain the purpose/function of aircraft ice and rain control system components
ASYS 66	C	C	B	Demonstrate the ability to inspect aircraft ice and rain control systems and system components
ASYS 67	C	B	B	Demonstrate the ability to troubleshoot operational malfunctions on aircraft ice and rain control systems and system components
ASYS 68	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 69	C	B	A	Demonstrate the ability to identify and explain the purpose/function of aircraft and engine fire detection and extinguishing system components
ASYS 70	C	C	C	Demonstrate the ability to inspect aircraft and engine fire detection and extinguishing systems and system components
ASYS 71	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 72	C	B	B	Demonstrate the ability to troubleshoot operational malfunctions on aircraft and engine fire detection and extinguishing systems and system components
ASYS 73	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 74	C	B	B	Demonstrate the ability to inspect aircraft smoke and carbon monoxide detection systems
ASYS 75	B	B	A	Demonstrate the ability to identify and explain the function of instruments used with aircraft reciprocating engines
ASYS 76	B	B	A	Demonstrate the ability to identify and explain the function of instruments used with aircraft turbine engines
ASYS 77	B	B	A	Demonstrate the ability to identify and explain the function of aircraft flight instruments used in aircraft certified under Part 23
ASYS 78	B	B	A	Demonstrate the ability to identify and explain the function of aircraft flight instruments used in aircraft certified under Part 25
ASYS 79	B	A	A	Demonstrate the ability to identify and explain the function of aircraft navigation instruments used in aircraft certified under Part 23
ASYS 80	B	A	A	Demonstrate the ability to identify and explain the function of aircraft navigation instruments used in aircraft certified under Part 25
ASYS 81	B	A	A	Demonstrate the ability to identify and explain the function of aircraft system instruments used in aircraft certified under Part 23
				Demonstrate the ability to identify and explain the function of aircraft system instruments used in aircraft

ASYS 82	B	A	A	certified under Part 25
ASYS 83	B	A	A	Demonstrate the ability to explain the operation of aircraft fluid pressure and temperature measuring instrument systems
ASYS 84	B	A	A	Demonstrate the ability to explain the operation of aircraft engine speed measuring instrument systems
ASYS 86	C	C	C	Demonstrate the ability to perform pitot and static system tests
ASYS 87	B	B	B	Demonstrate the ability to perform routine maintenance tasks and repairs on aircraft and engine and instrument systems
ASYS 88	B	B	A	Demonstrate the ability to locate instrument markings
ASYS 89	C	A	A	Demonstrate the ability to explain the operating principles of an aircraft compass system found in aircraft certified under Part 23
ASYS 90	C	B	B	Demonstrate the ability to swing an aircraft compass

6.10 Aircraft Structures

SPO Item #	Student Performance Levels Knowledge	Application	Manipulative Skills	Student Performance Objectives
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
				Demonstrate the ability to properly drill holes in aircraft metals for rivet installation

ASTR 9	C	C	C	
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
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
				Demonstrate the ability to properly protect aircraft metal surfaces and structural components from corrosion

ASTR 28	C	C	C	
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
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
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
ASTR 67	C	B	B	Demonstrate the ability to locate and explain the procedures for rigging helicopter main and tail rotors
ASTR 68	C	B	A	Demonstrate the ability to locate and explain the procedures for tracking helicopter main and tail rotors

6.11 Aircraft Inspections and Capstone SPOs

SPO Item #	Student Performance Levels Knowledge	Application	Manipulative Skills	Student Performance Objectives
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 work cards

7.0 SUMMARY

Aviation maintenance training is at a critical juncture. Unless a dramatic change is made to the content and operation of AMT training programs, the gap between graduate capabilities and industry requirements will continue to widen.

The curriculum presented within this report provides the student performance requirements

necessary to develop the personnel trained to provide quality airworthy job performance required for the continued safe operation of the air transportation system. Additionally, the regulatory flexibility necessary for aviation maintenance training providers to train students to the needed level of mastery has also been addressed.

The broad requirements that comprise this curriculum were developed by the aviation industry. These training requirements have been further defined and clarified to produce a curriculum that will satisfy industry requirements while not exceeding AMT training provider capabilities.

While foreign countries have significantly increased AMT training requirements, the United States has placed increased responsibility on industry and AMT training providers to fill the training gap that exits between industry needs and school graduate capabilities. Some AMT training providers will say that they can continue to produce competent AMTs with 40-year-old aircraft engines and "wood and fabric" technical performance. These same training providers are also quick to site various difficulties in updating curriculum such as costs, low student enrollment, lack of industry support, and FAA regulations. Yet other countries such as Canada and the Netherlands are able to make the necessary changes to be both technologically current and responsive to industry needs.

The proposed operational guidelines will require a dramatic change in FAA certification procedures. It is essential that FAA Airworthiness Safety Inspectors be provided the necessary training and tools to perform their oversight functions.

APPENDIX A - 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	a process or action that is typical of the an AMT/ AMT-T while involved in the

Maintenance task(s)	maintenance, inspection, and or repair of an aircraft, engine or component in a line or scheduled maintenance activity