RESTRICTED DATA

This data, furnished in connection with the request of the Federal Aviation Administration for the operation of Aviation Maintenance Technician Course in Puerto Rico Aviation Maintenance Institute, shall not be disclosed outside the Puerto Rico Department of Education, and shall not be duplicated, used on disclosed in whole or in part for any purpose other than to evaluate the course; provided that if is awarded to this office as result of or in connection with the submission of this data, the Government of Puerto Rico shall have the right to disclose the data the extent provided in contract between both agencies
# AIRFRAME COURSE CURRICULUM MANUAL

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LIST OF EFFECTIVE PAGES

The following list shows all effective pages for the AIRFRAME COURSE CURRICULUM manuals. Added and revised pages are identified by the Revision No. and Date at the bottom corner. An asterisk (*) to the left of the pages numbers indicate pages added, two asterisk (**) deleted and three asterisk (***) changed by the current revision.

Upon receipt of the first and subsequent revisions to this manual, the user should determine that all previous revisions have been received and incorporated. Action should be taken promptly if the manual is incomplete.

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The Assistant Secretary of Occupational and Technical Education Program will submit revisions to the Airframe course curriculum manual to the Federal Aviation Administration for approval. The revision will be numbered consecutively. Upon receipt of revisions, the holder will revise the manual as indicated on the revision letter. When the required action is completed, the individual completing the action will write the revision number, sign and record the date the revision was entered, in the space provided below.

Changes to a page will be identified by using a bold italic font or a black bar alongside the paragraph either on the left or right side margins.

If any previous revisions missing, the holder of the Curriculum Manual will contact the General Course Coordinator prior to inserting any new revision or using the Curriculum Manual.

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| 23-A | Rig Fixed-Wing Aircraft |
| 24-A | Check Alignment of Structures |
| 25-A | Assemble Aircraft Components, Including Flight Control Surface |
| 26-A | Balance, Rig and Inspect Moveable Primary and Secondary Flight Control Surface |
| 27-A | Jack Aircraft |

**PRACTICAL PROJECTS – F. ASSEMBLY AND RIGGING**

| 22-A | Rig rotary-Wing Aircraft |
| 23-A | Rig Fixed-Wing Aircraft |
| 23-B | Rig Fixed-Wing Aircraft |
| 24-A | Check Alignment of Structure |
| 25-A | Assembly Aircraft Component, Including Flight Control Surfaces |
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29-C: Inspect, Check, Service and Repair Landing Gear Retraction System, Shock Struts, Brakes, Wheels, Tires and Steering System

29-D: Inspect, Check, Services and Repair Landing Gear Retraction System, Shock Struts, Brakes, Wheels, Tires and Steering System

29-E: Inspect, Check, Services and Repair Landing Gear Retraction System, Shock Struts, Brakes, Wheels, Tires and Steering System

29-F: Inspect, Check, Service and Repair Landing Gear Retraction System, Shock Struts, Brakes, Wheels, Tire and Steering System

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### PRACTICAL PROJECT – G. AIRCRAFT ELECTRICAL SYSTEM

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I. AIRFRAME STRUCTURES

A. WOOD STRUCTURES

TOTAL HOURS: 12
THEORY: 6
SHOP/LAB: 6

A. INSPECTION OF WOOD STRUCTURES
1. Glued Joint Inspection
2. Use of Magnifying Glass and Feeler Gauge
3. Wood Condition

B. SERVICE AND REPAIR OF WOOD STRUCTURES
1. Materials
2. Forms of Wood Used in Aircraft Structure
3. Species of Wood
4. Permissible Defects and Their Identification
5. Defects Not Permitted and Their Identification

C. GLUES
1. Casein Glues and Preservatives
2. Resin Glues

D. GLUING
1. Effect of Moisture Content on Joint Strength
2. Effect of Temperature on joint Strength
3. Explain “Open” and “Closed” Assembly Time
4. Use of Pressure Blocks and Clamps
5. Testing Glued Joints

E. SPLICED JOINTS
   1. Making a Scarf Joint

F. PLYWOOD SKIN REPAIRS
   1. Flush Patch
   2. Plug Patch
   3. Splayed Patch
   4. Scarf Patch – Preferred Repair
   5. Fabric Patch

G. SPAR AND RIB REPAIR
   1. Use of Reinforcement Plates
   2. Location of Splices

H. BOLT AND BUSHING HOLES
   1. Methods of Repairing Elongated Bolt Holes in Spars
   2. Use of Bushings to Minimize Elongation

I. RIB REPAIRS
   1. Repairs to Cap Strips
   2. Repairs to Trailing Edge

J. EFFECTS OF WOOD SHRINKAGE
   1. Dimensional Changes in Various Directions
   2. Repairs to Trailing Edges
K. IDENTIFY PROTECTIVE FINISHES

1. Protective Finish for End Grain of Spars

2. Importance of Dope-proof Finishes
Performance Goals
Performance Goals

I. AIRFRAME STRUCTURES

A. WOOD STRUCTURES

LEVEL

1: SERVICE AND REPAIR WOOD STRUCTURES (1)

1-A. Using AC 43.13-1B (as revised) and list of five types of wood, select two substitute woods that exceed the strength properties of aircraft spruce.

1-B. Using AC 43.13-1B (as revised) and information sheet containing sketches without dimensions of typical scarf joints, insert the dimensions to the sketches and determine the ratio dimensions.

2: IDENTIFY WOOD DEFECTS (1)

2-A. Using a sample of aircraft wood; identify the wood and describe the strength characteristics.

3: INSPECT WOOD STRUCTURES (1)

3-A. Using AC 43.13 1B (as revised) and given information, identify different species forms of aircraft wood
Wood Practical Projects
PRACTICAL PROJECT

I. AIRFRAME STRUCTURE

A. WOOD STRUCTURES

1-A: SERVICE AND REPAIR WOOD STRUCTURES

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 1.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding to identify the types of woods used in aviation.

REFERENCES:

1. AC 43:13-1B/2B (as revised) Acceptable methods, techniques and practices.

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

N/A

PROCEDURES:

Using AC 43.13-1B/2B (as revised) and list of five types of wood, select two substitute woods that exceed the strength properties of aircraft spruce.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURE

A. WOOD STRUCTURES

1-B: SERVICE AND REPAIR WOOD STRUCTURES

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 1.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding to measure and determine ratio dimension of scarf joints.

REFERENCES:

1. AC 43:13-1B (as revised) Acceptable methods, techniques and practices

2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Sample of Wood Splice

PROCEDURES:

Using AC 43.13-1B (as revised) and information sheet containing sketches without dimensions of typical scarf joints insert the dimensions to the sketches and determine the ratio dimensions.
I. AIRFRAME STRUCTURE

A. WOOD STRUCTURES

2-A: IDENTIFY WOOD DEFECTS

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding to identify and select aircraft wood.

REFERENCES:

1. AC 43.13-1B (as revised) Acceptable methods, techniques and practices

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Samples of woods.

PROCEDURES:

Using a sample of aircraft wood; identify the wood and describe the strength characteristics.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURE

A. WOOD STRUCTURES

3-A: INSPECT WOOD STRUCTURES

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding to identify and select aircraft wood

REFERENCES:

1. AC 43.13-1B (as revised) Acceptable methods, techniques and practices

2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Samples of wood

PROCEDURES:

Using AC 43.13 1B (as revised) and given information, identify different species forms of aircraft wood
I. AIRFRAME STRUCTURES

B. AIRCRAFT COVERING:

TOTAL HOURS: 12  THEORY: 6  SHOP/LAB: 6

A. AIRCRAFT FABRIC COVERING

1. Textile Fabric Used in Aircraft Covering
   a. Cotton Fabrics
   b. Linen Fabrics
   c. Synthetic Fabrics
   d. Glass Cloth

2. Miscellaneous Textile Materials
   a. Reinforcing Tape
   b. Surface Tape
   c. Lacing Cord
   d. Sewing Thread
   e. Special Fasteners

3. Preparation of the Structure for Covering
   a. Dope-proofing
   b. Chafe Points
c. Inter-rib Lacing

d. Preparations of Plywood Surface for Covering
   1) Cleaning
   2) Applications of Sealer and Dope

B. COVERING METHODS

1. The envelope Method
2. The Blanket Method
3. Reinforcing Tape
   a. Use of Anti-tear strips
4. Lacing
   a. Double Loop Lacing
   b. Fuselage Lacing
5. Surface Tape

C. RECOVERING AIRCRAFT SURFACE WITH GLASS CLOTH

1. Advantage of Glass Cloth
2. Classes of Glass Cloth Covering
3. Recommended Practices and Applications Methods

D. REPAIRS TO FABRIC AND FIBERGLASS COVERING

1. Repairs to Tears in Fabric
2. Sewed Patch Repair
3. Doped-on Repair
4. Repair by a Doped-in Panel
5. Repair of Fiberglass Covering
E. TESTING OF FABRIC COVERING

1. Strength Criteria for Aircraft Fabric
2. Tensile Testing of Undoped Fabric
3. Punch Testing of Aircraft Fabric

F. INSPECTION OF FABRIC

1. Causes of Fabric Deterioration
   a. Mildew
   b. Acid Dopes Film
   c. Insufficient Dope Film
   d. Storage Condition

2. Checking Conditions of Dope Fabric
   a. Areas Selected for Test
Performance Goals
I. AIRFRAME STRUCTURES

B. AIRCRAFT COVERING

4: SELECT AND APPLY FABRIC AND FIBERGLASS COVERING MATERIALS

A. Using AC 43.13-1B/2B (as revised), samples of cotton, linen and synthetic textile materials and samples of dopes and sewn seams, identify the samples sawed and the correct fabric to be used when the airspeed and wing loading is specified by the instructor.

5: INSPECT, TEST, AND REPAIR FABRIC AND FIBERGLASS

A. Using AC 43.13-1B/2B (as revised), a fabric tester, and a fabric covered aircraft or structure and the materials and tools necessary to make a repair, perform a fabric strength test and make a doped or sewn repair.
Practical Projects
PRACTICAL PROJECT

I. AIRFRAME STRUCTURE

B. AIRCRAFT COVERING

4-A: SELECT AND APPLY FABRIC AND FIBERGLASS COVERING MATERIALS

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding to identify and select aircraft fabric.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable methods, techniques and practices

2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Samples of Fabric (Cotton, linen, and synthetic textile material)

2. Samples of Dope

PROCEDURES:

Using AC 43.13-1B (as revised), samples of cotton, linen and synthetic textile materials and samples of dopes and sewed seams, identify the samples sawed and the correct fabric to be used when the airspeed and wing loading is specified by the instructor.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURE

B. AIRCRAFT COVERING

5-A: INSPECT, TEST, AND REPAIR FABRIC AND FIBERGLASS

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 4.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding to identify and select aircraft fabric.

REFERENCES:

1. AC 43:13-1B/2B (as revised) Acceptable methods, techniques and practices
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

1. Fabric Tester

SUPPLIES AND MATERIALS REQUIRED:

1. Fabric covered control surface

PROCEDURES:

Using AC 43.13-1B (as revised), a fabric tester, and a fabric covered aircraft or structure and the materials and tools necessary to make a repair, perform a fabric strength test and make a doped or sew repair.
I. AIRFRAME STRUCTURES

C. AIRCRAFT FINISHES

TOTAL HOURS:  24         THEORY:  12         SHOP/LAB:  12

A. FINISHING MATERIALS

1. Acetone
2. Alcohol
3. Benzene
4. Thinners
5. Mineral Spirits
6. Toluene
7. Turpentine
8. Linseed Oil
9. Zinc Chromate Primer – Original and Modified
10. Paint Remover
11. Epoxy Remover
12. Masking Materials
B. FINISHING SYSTEMS

1. Dope
   a. Kinds of Dope
   b. Aluminum Pigmented Dope
   c. Rejuvenator
   d. Thinners and Reducers
   e. Dope Proof Paints

2. Nitrocellulose Lacquers

3. Acrylic Nitrocellulose Lacquers

4. Enamels

5. Epoxy Finishes

6. Fluorescent Finishes

C. IDENTIFICATION OF FINISHES

1. Use of Engine Oil: Results and Conclusion

2. Use of Methyl-Ethyl-Ketone (MEK); Results and Conclusion

D. PAINT REMOVAL

1. Use of Strippers

2. Physical Precautions for Personnel Involved

E. COMPATIBILITY OF VARIOUS FINISHING SYSTEMS

1. Use of Zinc-Chromate Primers

2. Use of Wash Primers

3. Adhesion of Lacquers, Enamels, and Epoxy
F. APPLICATION METHODS

1. Surface Preparation
2. Preparation of Paint for Brushing or Spraying

G. SPRAY PRIMERS, DOPES AND PAINTS

1. Introduction to Spray Equipment
2. Use of Spray Gun
3. Application Technique

H. COMMON TROUBLES IN DOPE APPLICATION

1. Effects of Temperature in Doping, Including Roping
2. Effects of Humidity in Doping, Including Blushing
3. Bubbles and Blisters
4. Slack Panels
5. Pinholes
6. Peeling
7. Runs and Sags
8. Installation of Surface Tape, Drain Grommets, Inspection Ring and Reinforcing Patches
9. Number of Coats Required

I. COMMON TROUBLES IN PAINTING

1. Poor Adhesion
2. Spray Dust
3. Runs and Sags
4. Spray Mottle
5. Blushing
J. PAINTING TRIM AND REGISTRATION NUMBERS

1. Application Technique
2. Size and Spacing of Markings
3. Permanence, Embellishment, Color, and Legibility

K. DECALCOMANIAS

1. Types
2. Application Method
3. Removal
Performance Goals
PERFORMANCE GOALS

I. AIRFRAME STRUCTURE

C. AIRCRAFT FINISHES

6: APPLY TRIM, LETTERS AND TOUCH UP PAINT

A. Using 14 CFR part 45 to locate the information as to the location, size and display of aircraft registration marking. On grid or graph paper draw the letters and numbers (as specified by the instructor). Describe the application of trim and methods of touching up paint.

7: IDENTIFY AND SELECT AIRCRAFT FINISHING MATERIALS

A. Using labeled samples of Nitrate and butyrate dope, lacquer, zinc-chromate primer, enamel, and appropriate thinners, select the thinner which would be used with each of the sample materials.

8: APPLY FINISHING MATERIALS

A. Using AC 43:13-1B (as revised), a structure; apply finishing material.

9: INSPECT FINISHES AND IDENTIFY DEFECTS

A. Using AC 43.13-1B (as revised), random samples of aircraft parts with defects in the finish, recognize the kind of material that was originally applied as finish. Also describe which finishing material may be applied over it.
Practical Projects
PRACTICAL PROJECT

I. AIRFRAME STRUCTURE

C. AIRCRAFT FINISHES

6-A: APPLY TRIM, LETTERS AND TOUCH UP PAINT

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 4.0 Hrs.

PURPOSE:
To acquaint the student with the required knowledge and understanding to identify and select aircraft finishing materials

REFERENCES:
1. Federal Aviation Regulations

EQUIPMENT AND TOOLS REQUIRED:
N/A

SUPPLIES AND MATERIALS REQUIRED:
1. Graph paper
2. Pencil

PROCEDURE:
Using 14 CFR part 45 to locate the information as to the location, size and display of aircraft registration marking. On grid or graph paper draw the letters and numbers (as specified by the instructor). Describe the application of trim and methods of touching up paint
PRACTICAL PROJECT

I. AIRFRAME STRUCTURE

C. AIRCRAFT FINISHES

7-A: Identify and Select Aircraft Finishing Materials

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding to identify and select aircraft finishing materials

REFERENCES:

1. AC 43:13-1B/2B (as revised) Acceptable methods, techniques and practices
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Labeled samples of paint finishing
2. Zinc-Chromate
3. Thinners
4.Reducers
5. Solvents
6. Butyrate dope
7. Information sheet

PROCEDURES:

Using references and written information the student will write a complete list of materials paint finishing and select the thinner which would be used with each of the sample materials.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURE

C. AIRCRAFT FINISHES

8-A: Apply Finishing Materials

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 4.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding to apply aircraft finishing material.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable methods, techniques and practices.

2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

1. Compressor

2. Air-hoses

3. Air Regulator

4. Spray paint gun

5. Spray touch up paint gun

6. Small container
SUPPLIES AND MATERIALS REQUIRED:

1. Information sheet
2. Available colors finish
3. Dope
4. Thinners
5. Reducers
6. Paint Filter

PROCEDURES:

The student will prepare the surface for painting and apply primers, dopes and paint finish by spraying.
I. AIRFRAME STRUCTURE

C. AIRCRAFT FINISHES

9-A: Inspect Finishes and Identify Defects

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding to inspect finishes and identify defects.

REFERENCES:

1. AC 43.13-1B (as revised) Acceptable methods, techniques and practices
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Samples different paint finishing
2. Samples different structures painted
3. Information sheet
PROCEDURES:

Using reference and written information the student will recognize the kind of material that was originally applied as a finish. He will describe which finishing materials may be applied over the original finish. He will recognize defects in the finishes of the sample paint.
I. AIRFRAME STRUCTURE

D. SHEET METAL AND NON-METALLIC STRUCTURES

TOTAL HOURS: 162  THEORY: 66  SHOP/LAB: 96

A. AIRFRAME MATERIALS

1. Properties of Metals
2. Magnesium Alloys
3. Titanium
4. Ferrous Metals
5. Aluminum Alloys
   a. Casting Alloys
   b. Wrought Alloys
6. Selection and Substitution

B. HEAT TREATMENT

1. Heat Treating Mediums
2. Ferrous Metals
3. Non-Ferrous Metals
C. RIVETS

1. Head Styles
2. Rivet Sets
3. Composition
4. Replacement
   a. Larger Rivets
   b. Other Materials
5. Ice Box Rivets
6. Rivet Code
7. Shear and Bearing Strength
8. Drill Size

D. SHOP TOOLS

1. Large tools
   a. Shears
   b. Formers
   c. Saws
   d. Finishing Tools
2. Hand Tools
   a. Cutting Tools
   b. Layout Tools
3. Drills, Reamers, and Sharpening
4. Miscellaneous

E. SAFETY

1. Drilling
2. Grinding
3. Cleanliness

F. RIVETING
1. Tools
2. Preparation
3. Inspection and Rivet Failures
4. Removal and Replacement

G. STRUCTURE
1. Stress
2. Types of Structures
3. Primary, Secondary, and Non-structural

H. SHEET METAL REPAIR
1. Basic Requirements
2. Inspection of Damage
3. General Procedures
4. Structural Skin Repair
5. Stringer Repair
6. Frame Repair
7. Spar and Rib Repair
8. Miscellaneous
9. Logbook Entries and Form 337

I. BEND ALLOWANCE AND SETBACK
1. Straight Line Bends
2. 90 Degree Angles
3. Other
4. Layout and Duplication
5. Relief Holes
6. Joggles

J. CORROSION
   1. Types
   2. Factors
   3. Inspection
   4. Removal
   5. Prevention and Protection

K. SPECIAL RIVETS
   1. Blind Fasteners
   2. Hi-shear Rivets and Bolts
   3. Rivnut and Drill Nuts

L. FORMING PARTS
   1. Bumping
   2. Form Blocks

M. TRANSPARENT ENCLOSURES
   1. Glass
   2. Plastic
   3. Protection and Cleaning
   4. Replacement and Repair

N. PRESSURE SEALS
   1. Doors
   2. Windows
O. SEAT AND SAFETY BELT MECHANISMS

1. Requirements
2. Reclining Seats
3. Safety Belt Installation

P. GLASS CLOTH

1. Covering Method
   a. Three Covering Methods
2. Strength
3. Difficulty
4. Attachment

Q. BONDED STRUCTURE

1. Construction
   a. Natural Resins
   b. Cellulose Resins
   c. Protein Resins
   d. Synthetic Resins
2. Laminated Structural Materials
   a. Fiberglass Structure
      1) Fiberglass
      2) Polyester Resin
      3) Epoxy Resin
      4) Thixotropic Agents
3. Laminated Construction
   a. Fiberglass Lay-up
   b. Honeycomb
   c. Wood Core Sandwich
4. Repair of Laminated Structure
   a. Assessment of Damage
   b. Criteria of a Good Repair
   c. Equipment Needed

5. Specific Repairs to Laminated Structure
   a. Damage to Fiberglass Laminated Structure
      1) Surface Scratches
      2) Delamination
         a) Scarf Method
         b) Step Joint Method
   b. Damage to Honeycomb Structure
      1) Dents
      2) Surface Scratches
      3) Surface Delamination
      4) Skin Penetrated
         a) Core Not Damaged
         b) Core Damaged
         c) Radome Repair

6. General Consideration of Repair to Bonded Structure
   a. Cutting Information
   b. Surface Treatment
   c. Types of Adhesives
   d. Application of Heat and Pressure for Curing

7. Summary of Bonded Structure Repair
   a. Manufacturer Recommendations
   b. Corrosion
c. Strength and Rigidity
d. Cure Time

R. TRANSPARENT PLASTIC MATERIALS

1. Types of Transparent Plastics
   a. Cellulose Acetate
   b. Acrylic

2. Storage and Handling

3. Forming Procedures and Techniques
   a. Heating
   b. Forms
   c. Forming Methods
      1) Simple curve forming
      2) Compound curve forming
         a) Stretch Forming
         b) Male and Female Die Forming
         c) Vacuum Forming (Without Forms)
         d) Vacuum Forming (With Female Forms)
   d. Sawing and Drilling
      1) Sawing
      2) Drilling
   e. Cementing
      1) Application of Cement
      2) Application of Pressure
      3) Curing

4. Repairs
   a. Temporary Repairs
b. Permanent Repairs

c. Polishing and Finishing

d. Cleaning

5. Protection

6. Windshield Installation
Performance Goals
PERFORMANCE GOALS

I. AIRFRAME STRUCTURE

D. SHEET METAL AND NON-METALLIC STRUCTURE

10: SELECT, INSTALL AND REMOVE SPECIAL FASTENERS FOR METALLIC, BONDED AND COMPOSITE STRUCTURE (2)

A. Using the sheet metal project guidebook, AC 43.13-1B/2B (as revised), proper tools, and equipment, install special rivets and fasteners. Remove and reinstall special rivets and fasteners.

11: INSPECT BONDED STRUCTURES (2)

A. Using the composites project guidebook, inspect for delamination and separation.

12: INSPECT, TEST AND REPAIR FIBERGLASS, PLASTICS, HONEYCOMB, COMPOSITE AND LAMINATED PRIMARY AND SECONDARY STRUCTURES (2)

A. Using the composite project guidebook and the AC 43.13-1B/2B (as revised) inspect and repair a sample section of honeycomb structure.
B. Using the composite project guidebook, inspect and repair a sample section of laminated structure.

C. Using the composites guidebook and the AC 43.13-1B as revised) answer questions concerning laminate structure repair.

D. Using the composites project guidebook, and the AC 43.13-1B/2B (as revised), inspect and make a repair to plastics.

E. Given a section of fiberglass structure and written information, inspect for damage, test for delamination, and repair the damaged area.

13: INSPECT, CHECK, SERVICE, AND REPAIR WINDOWS, DOORS AND INTERIOR FURNISHINGS

A. Using the sheet metal project guidebook, and AC 43.13-1B/2B (as revised), inspect and check an Aircraft door and seal, list all repairs; as needed.

*B. Using the sheet metal project guidebook, and AC 43.13-1B/2B (as revised); inspect and aircraft window and list all repairs, as needed.

C. Using the sheet metal project guidebook, and AC 43.13-1B/2B (as revised); inspect and check the Seat tracks and locking mechanism, and list all repairs as needed.

D. Using the sheet metal project guidebook, and AC 43.13-1B/2B (as revised); inspect and check the seat belt and seat belt installation. List repairs as needed.

14: INSPECT AND REPAIR SHEET METAL STRUCTURES

A. Using the sheet metal project book, inspect structures, Identify scratches reparable by burnishing. Burnish one or more scratches.
B. Using the sheet metal project book, the AC 43.13-1B/2B (as revised), and three 6”x6” pieces of .032 aluminum make a flush patch as laid out in the project guide.

15: INSTALL CONVENTIONAL RIVETS

A. Using the sheet metal project guidebook and the AC 43.13-1B/2B (as revised), cut aluminum alloys, lay out rivet patterns, drill rivet holes, and install the proper type and length rivets.

B. Using the sheet metal project guidebook the AC 43.13-1B/2B (as revised) and reference drawing fabricate the airfoil tab assembly.

16: FORM, LAY OUT, AND BEND SHEET METAL

A. Using the sheet metal project guidebook, and the AC 43.13-1B/2B (as revised), calculate and layout dimensions and bend lines for a large radius bend at a specified angle of bend. Select a different type of material which requires a small radius bend. Calculate and layout bend lines for 130 degree bend.

* OPTIONAL PROJECT
Practical Projects
I. AIRFRAME STRUCTURES

D. SHEET METAL AND NON-METALLIC STRUCTURES

10-A: Select, Install and Remove, Special Fasteners for metallic, Bonded and Composite Structure

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:
To acquaint the student with the required knowledge and understanding to install special rivets and fasteners.

REFERENCES:
1. AC 43.13-1B/2B (as revised) Acceptable methods, techniques and practices.
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:
N/A

SUPPLIES AND MATERIALS REQUIRED:
1. Samples special fasteners
2. Information Sheet
3. Special rivets
10-A: Select, Install and Remove, Special Fasteners for metallic, Bonded and Composite Structure

PROCEDURES:

Using reference and written information the student will answer five questions concerning precautions necessary for proper fit when installing special hi-shear and pull type rivets. He will identify and list by type eight different special rivets and fasteners used in aircraft.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

D. SHEET METAL AND NON-METALLIC STRUCTURES

11-A: Inspect Bonded Structures

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding to identify aircraft bonded structures defects.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices.
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Composite kit, 2-samples of bonded structures, 3-information sheet

PROCEDURES:

The student will inspect bonded structures samples and identify the possible defects. Also identify on composite kit the different materials for repair bonded structures.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

D. SHEET METAL AND NON-METALLIC STRUCTURES

12: INSPECT, TEST AND REPAIR FIBERGLASS, PLASTICS, HONEYCOMB, COMPOSITE AND LAMINATED PRIMARY AND SECONDARY STRUCTURES

A: TEACHING LEVEL: (2)
AVERAGE COMPLETION TIME: 4.0 Hrs.

PURPOSE:
To acquaint the student with the required knowledge understanding to evaluate repairs on bonded honeycomb structures.

REFERENCES:
1. AC 43.13-1B/2B (as revised) Acceptable Methods Techniques and Practices
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:
N/A

SUPPLIES AND MATERIALS REQUIRED:
1. Composite kit
2. Sample bonded honeycomb structure
3. Information sheet
12-A: Inspect, Test and Repair Fiberglass, Plastic, Honeycomb, Composite and Laminate Primary and Secondary Structures

PROCEDURES:

The student will identify and write the possible defect on bonded honeycomb structure, will write the correct procedures for repairs on bonded honeycomb structure.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

D. SHEET METAL AND NON-METALLIC STRUCTURES

12-B: Inspect, Test and repair Fiberglass, Plastic, Honeycomb, Composite and Laminate Primary and Secondary Structures.

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 8.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding to identify defects and repair composite aircraft structures.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Methods Techniques and Practices
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Composite kit
2. Laminate structures sample
3. Information sheets
12-B: Inspect, Test and repair Fiberglass, Plastic, Honeycomb, Composite and Laminate Primary and Secondary Structures.

PROCEDURES:

The student will inspect and identify damage on laminate structures samples. Using AC 43.13-1B Chapter 2(as revised): Typical Laminate repairs; use the correct procedures to repair laminate structures.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

D. SHEET METAL AND NON-METALLIC STRUCTURES

12-C: Inspect, Test and Repair Fiberglass, Plastic Honeycomb, Composite and Laminate Primary and Secondary Structures.

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 12.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding to identify and check aircraft laminate structure.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Methods Techniques and Practices

2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Information Sheet

2. Laminate Structures Samples
12-C: Inspect, Test and Repair Fiberglass, Plastic Honeycomb, Composite and Laminate Primary and Secondary Structures.

PROCEDURES:

Using the given information and references the student will read; understand and answer questions concerning to aircraft laminate structures.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

D. SHEET METAL AND NON-METALLIC STRUCTURES

12-D: Inspect, Test and Repair, Fiberglass, Plastic Honeycomb, Composite and Laminated Primary and Secondary Structures

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 6.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding in performing repair on plastics.

REFERENCES:

1. AC 4.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Sand paper 320,4000,600, 2 polish compound, 3-plastic sample, 4-wax polish compound, 5-polish cloth, 6-information sheets.
12-D: Inspect, Test and Repair Fiberglass, Plastic Honeycomb, Composite and Laminate Primary and Secondary Structures

PROCEDURES:

After observing a demonstration by the instructor and using the project guide reference, the student will demonstrate to the instructor the procedure to repair damage on a plastic sample. He will repair a simple scratch on plastic.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

D. SHEET METAL AND NON-METALLIC STRUCTURES

12-E: Inspect, Test and Repair Fiberglass, Plastic Honeycomb, Composite and Laminate Primary and Secondary Structures.

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 8.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding to perform inspection and repair on bonded structures.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Method, Techniques and Practices
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

1. Coins or test equipment

SUPPLIES AND MATERIALS REQUIRED:

1. Bonded structures sample
2. Information sheets
12-E: Inspect, Test and Repair Fiberglass, Plastic Honeycomb, Composite and Laminate Primary and Secondary Structures

PROCEDURES:

Using the project guide references, the student will demonstrate to the instructor the correct procedure to test a bonded structure for delamination and will explain the proper procedure to a repair damage area.
I. AIRFRAME STRUCTURES

D. SHEET METAL AND NON-METALLIC STRUCTURES

13-A: Inspect, Check, Service and Repair Windows, Doors and Interior Furnishings

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 3.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding in performing an inspection of aircraft doors, door's seals and the lock mechanism operation.

REFERENCES:

1. AC 443.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices.


EQUIPMENT AND TOOLS REQUIRED:

1. Basic hands tools

2. Aircraft PA 32-300 or PA 23-250

SUPPLIES AND MATERIALS REQUIRED:

1. Information sheet

2. Aircraft door sample
13-A: Inspect, Check, Service and Repair Windows, Doors and Interior Furnishings

PROCEDURES:

The instructor will demonstrate to the student the correct procedure to inspect an aircraft doors, door’s lock mechanism (including Emergency Exits), windows and interior furnishings. After this demonstration, the student will make a complete inspection on a given aircraft door and he will write a list of repairable damage on the door, window or interior furnishings.
PRACTICAL PROJECT

I. AIRFRAME SYSTEM AND COMPONENTS

D. SHEET METAL AND NON-METALLIC STRUCTURES

13-B: Inspect, Check, Service and Repair Windows, Doors and Interior Furnishings

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 3.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding of the standard practices of tire servicing.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices
2. FAA-H-8083-31A Airframe Handbook
3. PA 23-250 Aztec or PA 32-300 Cherokee Maintenance Manuals

EQUIPMENT AND TOOLS REQUIRED:

1. Basic Hand Tools
2. Special Tools for PA 23-250 or PA 32-300

SUPPLIES AND MATERIALS REQUIRED:

1. Information Sheets
2. Aircraft door sample
3. Windows and seals

PROCEDURES:

Using the given reference and an aircraft, the students will check and inspect the aircraft windows and he will write a list of discrepancies and the proper corrective action to be taken.
I. AIRFRAME STRUCTURES

D. SHEET METAL AND NON-METALLIC STRUCTURES

13-C: Inspect, Check, Service and Repair Windows, Doors and Interior Furnishings

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding in performing, checks and inspections of aircraft interior furnishings.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices
2. PA 23-250 and PA 32-300 Maintenance Manuals

EQUIPMENT AND TOOLS NEEDED:

1. Basic hands tools
2. Available Aircraft PA 23-250 or PA 32-300

SUPPLIES AND MATERIALS:

1. Information sheets
13-C: Inspect, Check, Service and Repair Windows, Doors and Interior Furnishings

PROCEDURES:

Using the given references and written information, the student will check and inspect the seat tracks and locking mechanism in accordance with the aircraft manufacturer maintenance service manual. The student will make a list of discrepancies noticed at this time. At this time, the instructor will explain and demonstrate possible corrective actions to be taken for the reported discrepancies.
I. AIRFRAME SYSTEM AND COMPONENTS

D. SHEET METAL AND NON-METALLIC STRUCTURES

13-D: Inspect, Check, Service and Repair Windows, Doors, and Interior Furnishing

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding in performing aircraft safety belt inspections and repairs.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices
2. PA 23-250 Aztec or PA 32-300 Cherokee Maintenance Manuals

EQUIPMENT AND TOOLS REQUIRED:

1. Basic Hand tools
2. Specials Tools for PA 23-250 or PA 32-300

SUPPLIES AND MATERIALS:

1. Information Sheets
2. Aircraft Safety belt samples
13-D: Inspect, Check, Service and Repair Windows, Doors and Interior Furnishings

PROCEDURES:

On a given aircraft, the student will check and inspect the seat belts, seat belts locking mechanism, installation, and general condition. The student will make a list of discrepancies noticed at this time. At this time, the instructor will explain and demonstrate the proper corrective actions to be taken based on the manufacturer's recommendations.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

D. SHEET METAL AND NON-METALLIC STRUCTURES

14-A: Inspect, and Repair Sheet-Metal Structures.

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:
To acquaint the student with required knowledge, understanding and skill to perform sheet-metal skin repairs by burnishing.

REFERENCES:
1. AC 43.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:
1. Polish Equipment

SUPPLIES AND MATERIALS REQUIRED:
1. Metal polish compound
2. Polish cloth
3. Piece metal skin sample
4. Information sheets
14-A: Inspect, and Repair Sheet-Metal Structures

PROCEDURES:

On a given piece of aluminum sheet-metal skin, the students will apply the method and technique to repair surface scratches by burnishing. The student will use metal polish compound to burnish the scratches. The instructor will inspect and grade the work performed and will discuss with the student the required maintenance entries for the work performed, if this work had been performed on an airworthy aircraft.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

D. SHEET METAL AND NON-METALLIC STRUCTURES

14-B: Inspect, and Repair Sheet-Metal Structures

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 12.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge, understanding and skill to perform stressed-skin metal repairs.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Methods, techniques and Practices
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

1. Cutting shears
2. Files (round, flat, half round)
3. Air drill
4. Drill bits #30
5. Rivet Gun
6. Rivet Gun Regulator
14-B: Inspect, and Repair Sheet-Metal Structures

7. Rivet set AN4704
8. Bucking bar
9. Vice
10. Worktable
11. Cleco pliers
12. Cleco (#30)
13. Hole saw cutter 2” diameter
14. Drill Press
15. Safety goggles
16. Grease pencil
17. Ruler (metallic type)
18. Protractor
19. Paper for drawing
20. Compass
21. Dimpling tool

SUPPLIES AND MATERIALS REQUIRED:

1. Information sheet
2. Aluminum alloy sheet 6” x 6” 2024T3 .032
3. Aluminum alloy sheet 6” x 6” 2024T3 .040
4. Aluminum alloy sheet 2 ½” x 2 ½” 2024 T .032
5. Approx. 30 each aluminum alloy rivets AN470AD4-4
14-B: Inspect, and Repair Sheet-Metal Structures

PROCEDURES:

Using the references and write information provided, the student will perform a repair on a damaged sheet-metal skin, simulating a stress-skin area on a wing structure. He will determine and present to the instructor the correct rivet layout and spacing to be used in accordance with specifications in the reference publications and instruction sheets. After the work has been inspected and graded, the instructor will discuss with the student the maintenance entries and/or forms (for example FAA 337 Form) required, if this work had been performed on an airworthy aircraft.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

D. SHEET METAL AND NON-METALLIC STRUCTURES

15-A: Install Conventional Rivets

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 6.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and skill to perform in performing conventional aircraft rivet installation

REFERENCES:

1. AC 43.13-1B (as revised) Acceptable Methods, Techniques and Practices.

EQUIPMENT AND TOOLS REQUIRED:

1. Cutting shears
2. Flat file
3. Air drill
4. Drill bits; #40, #30, #21
5. Rivet gun, with regulator
15-A: Install Conventional Rivets

6. Rivet sets
   a. 470-3
   b. 470-4
   c. 470-5
   d. Flush set

7. Bucking bar

8. Vice

9. Work table

10. Cleco pliers

11. Clecos #40 or # 30

12. Safety goggles

13. Grease pencil

14. Metal ruler

15. Rivet cutter

16. Micro Countersink

17. Countersink bits #3/32, 1/8, 5/32

18. Dimpling tool

SUPPLIES AND MATERIALS REQUIRED:

1. Information sheet

2. Two pieces aluminum alloy sheet 6” x 5” 2024T3-.032

3. Rivets
   a. 20 each AN470AD3
15-A: Install Conventional Rivets

b. 20 each AN470AD4

c. 20 each AN470AD5

d. 10 each An442AD4

e. 10 each AN430AD4

f. 10 each AN426AD3

g. 10 each AN426AD4

h. 10 each AN426AD5

PROCEDURES:

Using the suggested references and written information provided, the student will cut two pieces of aluminum alloy 6" x 5", 2024T3-.032; in which he will layout hole location, drill holes and install the proper type and length rivets. He will prepare rows of holes to install different sizes of rivets and will use air-powered riveting gun to install conventional rivets. He must select rivet sets and bucking bars suitable for each type of rivet used.
I. AIRFRAME STRUCTURES

D. SHEET METAL AND NON-METALLIC STRUCTURES

15-B: Install Conventional Rivets

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 20.0 Hrs.

PURPOSE:
To acquaint the student with the required knowledge and understanding of how to fabricate designed aircraft sections or components in accordance with provided specifications.

REFERENCES:
1. AC 43.13-1B/2B (as revised) Acceptable Method, Techniques and Practices
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:
1. Cutting shears
2. Files (Round file, flat file and half round)
3. Air drill
4. Drill bits (#40, 1/4")
5. Rivet Gun
6. Rivet Gun regulator
15-B: Install Conventional Rivets

7. Rivet set AN470-3
8. Bucking bar (any appropriate for the work)
9. Vice
10. Worktable
11. Cleco Pliers
12. Clecos (#40) (quantity as needed)
13. Hole saw cutter (3/4 diameter)
14. Drill press
15. Safety goggles
16. Grease pencil
17. Ruler (metal type)
18. Protractor
19. Paper (for drawing)
20. Light hammer or mallet
21. Brake Bender
22. Deburring Tool
23. Air Compressor
24. Air Hoses

SUPPLIES AND MATERIALS REQUIRED:

1. Information sheet
2. Two sheets aluminum alloy 2024T3 .025 x 10 ¼"x 5"
3. Three sheets aluminum alloy 2024T3 .025 x 4"x2 ½"
15-B: Install Conventional Rivets

4. One sheet aluminum alloy 2024T3 .025 x 2 ¼" x 10 ¼"

5. Seventy (70) each AN470AD3-3 rivets (approx.).

6. Aileron tab drawing

7. Plywood or Hardwood 6" x 6" ¾ thick

PROCEDURES:

Using the references and written information provided, the student will fabricate an airfoil tab assembly. The quality of work fabricating this tab must be such that it could be acceptable to install on an airworthy aircraft. After fabricating the airfoil tab assembly, the student will discuss with the instructor the required maintenance record entry required, if it was to be installed on an airworthy aircraft.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURE

D. SHEET METAL AND NON-METALLIC STRUCTURES

16-A: Form, Lay out, and Bend Sheet Metal

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 4.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and practice to form layouts and bends in sheet metal.

REFERENCE:

1. AC 43.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices

2. Use FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

1. Pencils

2. Calculator

3. Ruler

SUPPLIES AND MATERIALS REQUIRED:

1. Information Sheets
16-A: Form, Lay out, and Bend Sheet Metal

PROCEDURES:

The student will solve mathematic problems, calculate and layout dimensions and bend lines for a specified bend angle. He will make bends using recommended bending techniques. The student will select different types of materials, some which will require smaller bend radiuses. He must calculate and layout lines for a 130 degrees bend. He will bend the materials to the specified bend, using the minimum bend radius permissible in the reference table for the type and thickness of the material used.
I. AIRFRAME STRUCTURES

E. WELDING

TOTAL HOURS: 42 THEORY: 18 SHOP/LAB: 24

A. TYPES OF WELDING
   1. Gas Welding
   2. Electric Arc Welding
   3. Electric Resistance Welding

B. OXYACETYLENE WELDING EQUIPMENT
   1. Acetylene Gas
   2. Acetylene Cylinders
   3. Oxygen Gas
   4. Oxygen Cylinders
   5. Welding Torch
   6. Welding Torch Tips
   7. Goggles
   8. Filler Rod

C. USE OF GAS WELDING EQUIPMENT
   1. Setting Up Equipment
   2. Oxyacetylene Flame Adjustment
   3. Oxyacetylene Welding Processes
4. Extinguishing the Torch
5. Fundamental Gas Welding Techniques

D. WELDING POSITIONS
1. Flat Welds
2. Overhead Welding
3. Horizontal Welding
4. Vertical Welds

E. WELDED joints
1. Butt Joints
2. Tee Joints
3. Lap Joints
4. Corner Joints
5. Edge Joints

F. CORRECT FORMING OF A WELD
1. Expansion and Contraction of Metals During Welding
2. Characteristics of a Good Weld

G. OXYACETYLENE WELDING OF FERROUS METALS
1. Mild Steel
2. Chrome-Molybdenum Steel
3. Stainless Steel

H. OXYACETYLENE WELDING OF NON-FERROUS METALS
1. Aluminum
2. Magnesium
3. Titanium
I. OTHER USES OF THE OXYACETYLENE FLAME
   1. Cutting Torch
   2. Brazing
   3. Silver Soldering

J. SOFT SOLDERING
   1. Applications
   2. Strength
   3. Soldering Copper and Soldering Irons

K. ELECTRICAL ARC WELDING
   1. Metallic Arc Welding
   2. Gas Shielded Arc Welding
      a. Tungsten Inert Gas (TIG)
      b. Metal Inert Gas (MIG)
      c. Plasma Arc Welding

L. TECHNIQUES OF ARC WELDING
   1. Starting the Arc
   2. Multiple Pass Welding
   3. Position Welding
      a. Flat Position
      b. Overhead
      c. Vertical
   4. Types of Welds
      a. Bead Welds
      b. Groove Welds
      c. Fillet Welds
M. WELDING STEEL AIRCRAFT STRUCTURE

1. Steel Parts Not to Be Welded

2. Repair of Tubular Members
   a. Welded Sleeve
   b. Welded Patch Repair
   c. Inner Sleeve Method
   d. Engine Mounts
   e. Repairs at Fuselage Fittings
   f. Repairs to Tubular Landing Gear
   g. Built Up Tubular Spars
   h. Steel Struts
Performance Goals
PERFORMANCE GOALS

I. AIRFRAME STRUCTURES

E. WELDING

17: WELD MAGNESIUM AND TITANIUM (1)
   A. Select answers to questions covering the welding soldering of magnesium and titanium.

18: SOLDER STAINLESS STEEL (1)
   A. Select answer to questions covering the soldering of stainless steel.

19: FABRICATE TUBULAR STRUCTURES (1)
   A. Using the AC43.13-1B (as revised) and samples of tubular structure inspect and list whether there are signs of: smooth seam and uniform in thickness, tapered smoothly into the base metal, there are No signs of blowholes, porosity or projecting globules.

20: SOLDER, BRAZE, GAS-WELD AND ARC-WELD STEEL (2)
   A. Using the welding project guidebook, splice a wire by soldering.

   B. Using the welding project guidebook, set up the gas welding equipment.
C. Using the welding project guidebook, and the AC 43.13-1B (as revised) to braze two steel plates together.

D. Using the welding project guidebook, and the AC 43.13-1B (as revised) and the arc-welding equipment, run beads until one has been used.

### 21: WELD ALUMINUM AND STAINLESS STEEL

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<td>A.</td>
<td>Select answer to questions covering the welding of aluminum and stainless steel.</td>
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Practical Projects
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

E. WELDING

17-A: WELD MAGNESIUM AND TITANIUM

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:

To acquaint the student with required knowledge and understanding in the process of welding magnesium and titanium.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices
2. FAA-H-8083-31A Airframe Handbook Vol. 2

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. List of questions.

PROCEDURE:

Select the correct answer to the questions regarding the process of welding magnesium and titanium parts.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

E. WELDING

18-A: SOLDER STAINLESS STEEL.

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding of repairing stainless steel by soldering.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices
2. FAA-H-8083-31A Airframe Handbook Vol. 2

EQUIPMENT AND TOOLS REQUIRED:

1. List of questions.

SUPPLIES AND MATERIALS REQUIRED:

Select the correct answer to the questions regarding the process of stainless steel parts by soldering.
I. AIRFRAME STRUCTURES

E. WELDING

19-A: FABRICATE TUBULAR STRUCTURES.

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE

To acquaint the student with required knowledge and understanding in the process of welding aluminum and stainless steel.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices

2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

1. Samples of tubular structures

SUPPLIES AND MATERIALS REQUIRED:

Using the AC43.13-1B (as revised) and samples of tubular structure, inspect and list whether there are signs of: smooth seam and uniform in thickness, tapered smoothly into the base metal, there are No signs of blowholes, porosity or projecting globules.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

E. WELDING

20-A: Solder, braze, gas-weld and arc-weld steel.

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding of electric wire repair by soldering.

REFERENCES:

1. AC 43.13-1B Acceptable Methods, Techniques and Practices
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

1. Soldering kit

SUPPLIES AND MATERIALS REQUIRED:

1. Two pieces electric cables
2. Solder material
3. Information sheet
20-A: Solder, braze, gas-weld and arc-weld steel

PROCEDURES:

Using the given references and soldering equipment, the student will splice an electric wire by soldering.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

E. WELDING

20-B: Solder, braze, gas-weld and arc-weld steel

TEACHING LEVEL 2

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding in setting up gas welding equipment.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

1. Gas weld Torch
2. Oxygen bottle
3. Acetylene bottle
4. Oxygen house
5. Acetylene hose
6. Oxygen Acetylene Regulators
7. Special tool wrench
20-B: Solder, braze, gas-weld and arc-weld steel.

SUPPLIES AND MATERIALS REQUIRED:

1. Information sheet

PROCEDURES:

Using the references and instructions provided, the student will set up the gas welding equipment to perform oxy-acetylene welding practice.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

E. WELDING

20-C: Solder, braze, gas-weld and arc-weld steel

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 4.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding in the brazing method of welding.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

1. Gas welding equipment
2. Welding goggles
3. Lighter
4. Welding gloves

SUPPLIES AND MATERIALS REQUIRED:

1. Two steel plates
2. Welding all purpose rods
20-C: Solder, braze, gas-weld and arc-weld steel.

3. Information sheets

PROCEDURES:

Using the above references and information sheets provided, student will weld together two steel using the brazing method.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

E. WELDING

20-D: Solder, braze, gas-weld and arc-weld steel

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:
To acquaint the student with the required knowledge and understanding in gas-welding steel parts.

REFERENCES:
1. AC 43.131-1B/2B Acceptable Methods, Techniques and Practices
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:
1. Gas welding equipment
2. Welding goggles
3. Welding gloves
4. Flint-lighter

SUPPLIES AND MATERIALS REQUIRED:
1. Two steel plates
2. Welding rod
20-D: Solder, braze, gas-weld and arc-weld steel.

3. Oxygen and acetylene

4. Information sheets

PROCEDURES:

The student will identify and select parts which he considers repairable by welding. He will set up a portable gas welding set, clean and prepare steel parts for welding, and use the portable welding set to repair the steel parts. He will preheat the parts, select the correct size tip and adjust the oxy-acetylene torch for the correct type of flame. He will select and use the proper filler rod and demonstrate to the instructor his ability in welding steel parts and normalize them.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

E. WELDING

20-E: Solder, braze, gas-weld and arc-weld steel

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 4.0 Hrs.

PURPOSE:

To acquaint the student with required knowledge and understanding in the process of arc-welding.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

1. Arc welding equipment
2. Arc weld mask
3. Welding gloves

SUPPLIES AND MATERIALS REQUIRED:

1. Steel plate
2. Arc weld rod
3. Information sheets
20-E: Solder, braze, gas-weld and arc-weld steel.

PROCEDURES:

Using the above references, the information sheets provided and the arc welding equipment, the student will run beads on a steel plate. After practice, the student will discuss with the instructor the difference of good, acceptable and non-acceptable arc-welding beads.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

E. WELDING

21-A: WELD ALUMINUM AND STAINLESS STEEL

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 4.0 Hrs.

PURPOSE:

To acquaint the student with required knowledge and understanding in the process of welding aluminum and stainless steel.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Question sheet

PROCEDURES:

Using the above references, the information sheets provided, the student shall answer questions covering the welding of aluminum and stainless steel.
I. AIRFRAME STRUCTURES

F. ASSEMBLY AND RIGGING

TOTAL HOURS: 72  THEORY: 24  SHOP/LAB: 48

A. USE CORRECT AIRCRAFT NOMENCLATURE

1. Classification by Powerplants
2. Classification by Wing Configuration
3. Classification by Tail Surface Configuration
4. Classification by Landing Gear Configuration
5. Nomenclature of Aircraft Components
   a. Fuselage
   b. Wings
   c. Empennage and Control Surfaces
   d. Landing Gears

B. INTERPRET THEORY OF FLIGHT

1. The Atmosphere
2. Lift and Drag
3. Airfoil and Streamlined Shapes
4. Drag Components
5. Characteristics of Airfoils
6. Lift and Drag Devices
7. Thrust

8. Stability and Control about the Axis of Fixed Wing Aircraft
   a. Longitudinal Stability
   b. Directional Stability
   c. Lateral Stability
   d. Control of the Airplane

9. Maneuvers
   a. Straight and Level Flight
   b. Performance Limitations

C. USE NOENCLATURE APPLICABLE TO ROTARY WING AIRCRAFT
   1. Rotary Wing Characteristics
   2. Axis of Rotorcraft
   3. Primary Flight Controls
   4. Maintenance Concepts

D. VERIFY ALIGNMENT OF STRUCTURES
   1. Fuselage Station Numbering Systems
   2. Wing Station numbering Systems

E. ASSEMBLY COMPONENTS
   1. Bolted Installations
   2. Aircraft Nuts
   3. Safety Devices
   4. Screws

F. IDENTIFY AIRCRAFT CONTROL CABLE
   1. Types of Control Cable
      a. Non-flexible
b. Flexible

c. Extra Flexible

d. Fiber Cores

2. Size of Cable

3. Materials

G. INSTALL SWAGED CABLE TERMINALS

1. Nico press Terminals

2. Swaged Terminals

3. Cutting Control Cables

H. VERIFY CORRECT CONTROL RESPONSE

1. Control Movement and Resultant Control Surface Displacement

2. Control Surface Displacement and Resultant Action of the Airplane

3. Effect of Tabs on Primary Control Surfaces

4. Controllable Flaps, Slots and High Lift, High Drag Devices

5. Control Locks

I. INSTALL AND TENSION A CONTROL CABLE, INSPECT A CABLE CONTROL SYSTEM

1. Removal and Installation of Cable

2. Tension of Cables

3. Standard Cable (Clevises, Shackles, Clevis Pins, Bolts, Nuts, Pulleys, Turnbuckles, Etc.)

4. Control Surface Travel

J. CHECK STATIC BALANCE OF A CONTROL SYSTEM

1. Balanced Control Surfaces

   a. Static Balance
b. Aerodynamic Balance

2. Check Balance of Control Surface

3. Recommend Corrective Action to Balance the Surface

K. INSPECT AND ADJUST PUSH-PULL CONTROL SYSTEMS

1. Push-pull and torque Tube Type Actuating Systems

2. Inspection and Adjustment of Push-pull Systems

L. JACKING AIRCRAFT

1. Preparation of Aircraft for Jacking

2. Selection of Jacking Equipment

3. Safety Precautions

4. Jacking a Complete Aircraft

5. Jacking One Wheel of an Aircraft
Performance Goals
PERFORMANCE GOALS

I. AIRFRAME STRUCTURES

F. ASSEMBLY AND RIGGING

22: RIG ROTARY-WING AIRCRAFT

A. Using the assembly and rigging project guide book and the AC 43.13-1B/2B (as revised), answer questions on rotary-wing aircraft.

23: RIG FIXED-WING AIRCRAFT

A. Using the assembly and rigging project guide book and the AC 43.13-1B/2B (as revised); install a control cable and check for proper tension, routing movement and safety.

B. Using the 43.13-1B/2B (as revised); make a thimble-eye splice.

24: CHECK ALIGNMENT OF STRUCTURES

A. Using the assembly and rigging project guidebook check for proper alignment of the structure by doing symmetry check.

25: ASSEMBLY AIRCRAFT COMPONENTS, INCLUDING FLIGHT CONTROL SURFACES

A. Using the assembly and rigging project guidebook remove and install hardware as directed by the instructor.
26: BALANCE, RIG AND INSPECT MOVABLE PRIMARY AND SECONDARY FLIGHT CONTROL SURFACES

A. Using the assembly and rigging project guide book, static balance a control surface.

B. Using the assembly and rigging project guidebook and a propeller protractor measure the travel of a control surface as stated in the appropriate manual or written instructions. Re-rig the surface as needed.

27: JACK AIRCRAFT

A. Using the appropriate service manual or written instructions follow the instructions to raise an aircraft and subsequently lower the aircraft. All safety precautions will be observed.

* OPTIONAL PROJECT
Practical Projects
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

F. ASSEMBLY AND RIGGING

22-A: RIG ROTARY-WING AIRCRAFT

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding in performing installation and rigging of aircraft control cable.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. List of Questions

PROCEDURES:

Using the assembly and rigging project guide book and the AC 43.13-1B (as revised), answer questions on rotary-wing aircraft.
I. AIRFRAME STRUCTURES

F. ASSEMBLY AND RIGGING

23-A: Rig Fixed-Wing Aircraft

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 6.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding in performing installation and rigging of aircraft control cable.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices
2. FAA-H-8083-31A Airframe Handbook
3. Available Aircraft Maintenance Manuals

EQUIPMENT AND TOOLS REQUIRED:

1. Cable Tension Meter
2. Available Aircraft (PA 23-250, PA 32-300)

SUPPLIES AND MATERIALS REQUIRED:

1. Safety wire .032, .40
2. Information Sheets
23-A: Rig Fixed-Wing Aircraft

PROCEDURES:

Using manufacturer aircraft maintenance manuals, the above references and the instruction sheets provided, the student will perform a control cable installation, adjust cable tension, confirm correct cable routing, and will safety all turnbuckles and/or attaching devices in accordance with the approved and acceptable methods.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

F. ASSEMBLY AND RIGGING

23-B: Rig Fixed-Wing Aircraft

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 6.0 Hrs.

PURPOSE:

To acquaint student with the required knowledge and understanding in performing aircraft control cable splices.

REFERENCES:

1. AC 43.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices

2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

1. Nico-press tool

2. Basic hand tool

SUPPLIES AND MATERIALS REQUIRED:

1. Sample control cable piece

2. Thimble nico-press (size available)

3. Information Sheets
23-B: Rig Fixed-Wing Aircraft

PROCEDURES:

Using the above references and instruction sheets provided, student will perform a control cable thimble eye splice.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

F. ASSEMBLY AND RIGGING

24-A: Check Alignment of Structures

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 6.0 Hrs.

PURPOSE:

To acquaint student with the required knowledge and understanding to check alignment of aircraft structures in accordance with the manufacturer specifications.

REFERENCES:

1. Available Aircraft Maintenance (PA-23.50, PA32.300) or equivalent reference

EQUIPMENT AND TOOLS REQUIRED:

1. Basic hand tools
2. Level
3. Measuring tape
4. Plumb bob
5. Available aircraft

SUPPLIES AND MATERIALS REQUIRED:

1. Information Sheets
2. Chalk
24-A: Check Alignment of Structures

PROCEDURES:

The student will level an aircraft fuselage and verify the alignment of the structure. Using the data available in the manufacturer’s manuals, he will interpret the information and record the measurements necessary to verify the alignment of the aircraft landing gear, wings and fixed tail surfaces.
I. AIRFRAME STRUCTURES

F. ASSEMBLY AND RIGGING

25-A Assemble Aircraft Components, Including Flight Control Surfaces

TECHNICAL LEVEL  3

AVERAGE COMPLETION TIME:  8.0 Hrs.

PURPOSE:

To acquaint student with the required knowledge and skill in the selection and installation of aircraft hardware.

REFERENCES:

1. Available Aircraft Maintenance Manuals (PA-23.20 and PA 32.300)
2. AC 43.13-1B/2B (as revised) Acceptable Methods, Techniques and Practices

EQUIPMENT AND TOOLS REQUIRED:

1. Basic hand/s tools

SUPPLIES AND MATERIALS REQUIRED:

1. Hardware Necessary
2. Information Sheet

PROCEDURES:

The student will identify and select the required hardware (bolts, nuts, screws, etc.) from the stock room supply. He will install, torque and safety these fasteners on an aircraft. After the work is completed, the student will present to the instructor and discuss with him the required maintenance record entries, simulating a return to service situation.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

F. ASSEMBLY AND RIGGING

26-A Balance, Rig and Inspect Movable Primary and Secondary Flight Control Surfaces

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 8.0 Hrs.

PURPOSE:

To acquaint student with the required knowledge, understanding and skill in performing flight control surface balance.

REFERENCES:

1. Available Aircraft Maintenance Manuals (PA-23.250, PA 32.300)

EQUIPMENT AND TOOLS REQUIRED:

1. Basic hands tools
2. Weight Scale
3. Balance jig equipment
4. Available aircraft flight control

SUPPLIES AND MATERIALS REQUIRED:

1. Hardware Necessary
2. Information Sheets
26-A Balance, Rig and Inspect Movable Primary and Secondary Flight Control Surfaces

PROCEDURES:

Using the above references and information sheets, the student will interpret the manufacturer's instructions and will follow the procedures using the proper equipment to check for an unbalance condition of the flight control surface. The student will present to the instructor a sample of the required maintenance records entries, simulating a return to service condition.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

F. ASSEMBLY AND RIGGING

26-B Balance, Rig and Inspect Movable Primary and Secondary Flight Control Surfaces

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 8.0 Hrs.

PURPOSE:

To acquaint student with the required knowledge, understanding and skill in inspecting and rigging aircraft control surfaces.

REFERENCES:

1. Available Aircraft Maintenance Manuals (PA-23.25, PA 32.300)
2. Aircraft specifications

EQUIPMENT AND TOOLS REQUIRED:

1. Basic hands tools
2. Protractor (universal propeller protractor)
3. Ruler
4. Templates
5. Rigging fixtures
26-B  Balance, Rig and Inspect Movable Primary and Secondary Flight Control Surfaces

SUPPLIES AND MATERIALS REQUIRED:

1. Hardware Necessary

2. Information sheets

PROCEDURES:

Using the manufacturer maintenance manuals, and aircraft specification, the student will measure and record the travel of a flight control surface from a given aircraft. The student will rig the control surface, as needed. He will prepare and discuss with the instructor the required maintenance records entries, simulating a return to service situation.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

F. ASSEMBLY AND RIGGING

27-A  Jack Aircraft

TEACHING LEVEL:  (3)

AVERAGE COMPLETION TIME:  4.0 Hrs.

PURPOSE:

To acquaint student with the required knowledge, understanding and skill to jack an aircraft.

REFERENCES:

1. Available Aircraft Maintenance Manuals (PA-23.250, PA 32.300)

EQUIPMENT AND TOOLS REQUIRED:

1. Aircraft jacks

2. Basic hand tools

3. Tails stand

4. Ballast

SUPPLIES AND MATERIALS REQUIRED:

1. Information Sheets
27-A  Jack Aircraft

PROCEDURES:

Using the above references and written information sheets, the student will jack and aircraft using the appropriate equipment and ballast. He will follow all safety procedures to raise and subsequently lower the aircraft. The student will discuss with the instructor the required maintenance record entry, simulating a return to service situation.
I. AIRFRAME STRUCTURES

G. AIRFRAME INSPECTION

TOTAL HOURS: 36  THEORY: 12  SHOP/LAB: 24

A. PURPOSE

1. To determine Serviceability and Airworthiness of the Aircraft.

2. The procedure to be used of frequency of the inspection will be determined by the utilization of the Aircraft.

B. TYPES OF INSPECTION

1. Air Carrier Maintenance (14 CFR Part 121)

2. Air Taxi Maintenance (14 CFR Part 135)

3. Progressive Inspection (14 CFR Part 91.409)


C. 100 HOUR AND ANNUAL INSPECTION

1. What Establishes the Frequency and Type of Inspection Required 91.409.

2. Persons Authorized to Conduct a 100 Hour Inspection.

3. Persons Authorized to Conduct an Annual Inspection.

4. Maximum Time Authorized Between Annual Inspections.

5. Use of Manufactures Service Information, Inspection Aids, Airworthiness Directives and Type Certificate Data Sheets.


8. Scope and Detail of Inspections
   a. CFR 14 part 43, Appendix D
   b. Manufacturers Inspection Schedule

9. Use of Checklist and Other Additional Performance Rules

D. ROTORCRAFT INSPECTIONS


3. Inspection of Rotorcraft with “Airworthiness Limitations” Section, maintenance must be done in accordance with that maintenance manual, 14 CFR Part 43.16.

E. INSPECTION PROCEDURE

1. Inspection for Airworthiness May Take the Place of Annual of 100 Hour.

2. Annual or 100 Hour May Not Apply to Certain Aircraft
   a. Special Flight Permit
   b. Experimental Flight Permit
   c. Other Certificates Which May Be Exempted

3. Some Inspections May Be Mandatory at Time Interval Specified By Manufacturer

4. Other Special Inspections
   a. Overweight Landing
   b. Hard Landing
   c. Severe Turbulence
PERFORMANCE GOALS
PERFORMANCE GOALS

I. AIRFRAME STRUCTURES

G. AIRFRAME INSPECTION

LEVEL

28 PERFORM AIRFRAME CONFORMITY AND AIRWORTHINESS INSPECTIONS

A. Using manufacturer’s manual, written procedures, forms, and an aircraft conduct and annual inspection. Research the airworthiness directives for applicable airworthiness directives. Verify through the type certificate data sheets that the aircraft conforms to certification standards. Make a proper return to service entry or an entry indicating reasons for not returning the aircraft to service in a sample log book (provided by the instructor) and a list of discrepancies to the instructor.

B. The student will accomplish a 100 hours inspection on an airframe and record the conditions disclosed as a result of the inspection.
PRACTICAL PROJECTS
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

G. AIRFRAME INSPECTION

28-A Perform Airframe Conformity and Airworthiness Inspections

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 12.0 Hrs.

PURPOSE:

To acquaint the student with the required understanding and skill in performing airframe conformity inspections.

REFERENCES:

1. Airworthiness directives
2. Manufacturer Manuals
3. Type Certificate Data Sheets or Aircraft specifications
4. 14 CFR (EA-14 CFR -M2)

EQUIPMENT AND TOOLS REQUIRED:

1. PA 23-250 OR PA 32-300 Aircraft

SUPPLIES AND MATERIALS REQUIRED:

1. LogBook Sample
2. Information sheets
28-A Perform Airframe Conformity and Airworthiness Inspections

PROCEDURES:

The student will accomplish an airframe conformity inspection and record discrepancies found.
PRACTICAL PROJECT

I. AIRFRAME STRUCTURES

G. AIRFRAME INSPECTION

28-B Perform Airframe Conformity and Airworthiness Inspections

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 12.0 Hrs.

PURPOSE:
To acquaint the student with the required understanding and skill in performing airframe inspections.

REFERENCES:
1. Airworthiness Directives
2. Manufacturer Manuals
3. 100 hours inspection forms
4. Type Certificate Data Sheets
5. Aircraft Specifications
6. 14 CFR Part 91,121,125,135)

EQUIPMENT AND TOOLS REQUIRED:
1. PA 23-250 OR PA 32-300 Aircraft

SUPPLIES AND MATERIALS REQUIRED:
1. Log Book Sample
2. Information sheets
3. 100 hours inspection forms
28-B Perform Airframe Conformity and Airworthiness Inspections

PROCEDURES:

The student will accomplish a 100 hours inspection on an airframe and record the conditions disclosed as a result of the inspection.
II. AIRFRAME SYSTEM AND COMPONENTS

A. AIRCRAFT LANDING GEAR SYSTEMS

TOTAL HOURS: 72    THEORY: 28    SHOP/LAB: 44

A. LANDING GEAR ARRANGEMENT

1. Conventional Gear
2. Tricycle Gear
3. Tandem/Bicycle Gear
4. Boogie Wheel Arrangement
5. Fixed Gear
6. Retractable Gears
   a. Electrically Operated
   b. Hydraulically Operated
   c. Emergency Extension
      1) Manually
      2) Hand Pump
      3) Accumulator Pressure
      4) Pneumatic

B. SHOCK STRUTS

1. Spring Oil Struts
2. Air Oil Struts (Oleo Struts)
a. Cylinder
b. Piston
c. Orifice
d. Metering Pin
e. Metering Tube
f. Recoil Valve
g. Spacers and Bearings
h. Seals
i. Schrader Valve
   1) High Pressure Valve Core Type
      a) Identification of High Pressure core
   2) Poppet Type
   3) Combination Type
j. Torque Links/Scissors
   1) Purpose
   2) Disconnect on Nose Gear Before Towing Aircraft
   3) Operation of Shock Strut
      a) Shock Absorption of Landing
      b) Shock Absorption During Static or Taxing
   4) Deflating Shock Struts on Aircraft
      a) Clear All Equipment From Under the Aircraft
      b) Release Air Pressure Slowly
      c) Fluid Loss May Be Noted
   5) Servicing a Shock Strut With Hydraulic Fluid
      a) Sources of Information for Correct Fluid
      b) Remove Schrader Valve
c) Correct Fill Level

6) Servicing Shock Struts With Air or Nitrogen
   a) Reinstall Schrader Valve and New Gasket
   b) Inflate Strut With Compressed Air or Nitrogen to Manufacturers Specifications
      1. Inches of Piston Extension
      2. Inflate to Specified Pressure (PSI)

7) Bleeding a Shock Strut
   a) Jack Aircraft to Fully Extended Strut
   b) Service with correct fluid
   c) Connect Bleeder Hose to Filler Point, Submerse Other End in a Container of Fluid
   d) Compress and Telescope Strut Unit Air Bubbles Cease
   e) Remove Bleeder Hose, Install Schrader Valve, and Inflate Strut

8) Inspection of Shock Struts
   a) Fluid Leaks
   b) Proper Extension
   c) Damage to Exposed Piston

C. MAIN LANDING GEAR ALIGNMENT, SUPPORT, RETRACTION, AND SAFETY DEVICES

1. Torque Links
2. Trunnion
3. Drag Struts
4. Electric and Hydraulic Gear Retraction Devices
   a. Gear-Up Locks
b. Gear Down Locks
   1) Gear Ground Locks
c. Sequence Valves
d. Landing Gear Safety Switches

5. Gear Position Indicators
   a. Lights
   b. Printed Tabs
c. Wheel Silhouette
d. In Transit Indication
e. Gear Unsafe Warning Horn

D. NOSE WHEEL STEERING SYSTEM

1. Light Aircraft
   a. Mechanical Linkage to Rudder

2. Large Aircraft
   a. Cockpit Control
   b. Metering Valve
c. Power Source
d. One or More Steering Cylinders
e. Pressurizing Anti-shimmy Assembly
f. Follow Up Mechanism
g. Safety Devices

E. SHIMMY DAMPERS

1. Types
   a. Piston Type
   b. Vane Type
c. Steer Damper

F. BRAKE SYSTEMS

1. Independent Systems
   a. Master Cylinder
      1) Cups Seal
      2) Piston
      3) Return Spring
      4) Compensating Port

2. Power Brake control System (PBCV)
   a. Power Source
      1) Main Hydraulic System
      2) Accumulator
   b. Pressure Ball – Check Brake Control Valve
   c. Power Brake Sliding Spool Control Valve
   d. Brake Debooster Valve
   e. Brake fuse – Lockout Cylinder
   f. Emergency Air Brake system

3. Power Boost Brake Systems
   a. Reservoir
   b. Power Boost Master Cylinders
   c. Shuttle Valves

G. BRAKE ASSEMBLES

1. Single Disc Brake
2. Dual Disc Brake
3. Multiple Disc Brake
4. Segmented Rotor Brake
5. Expander Tube Brake
6. Advantages and Disadvantages of Each Type Brake Assembly

H. INSPECTION AND MAINTENANCE OF BRAKE SYSTEMS

1. Remove, Inspect and Replace a Brake Assembly
   a. Locating Reference Information to Determine Procedures
   b. Heat Crack of Drums and Discs
   c. Brake Linings
   d. Pistons and Seals
   e. Fluid Level - Independent System
      1) Common Reservoir
      2) Master Cylinder Integral Reservoir
   f. Lines and Fittings
   g. Flexible Hoses
      1) Ballooning Flexible Hoses

2. Adjust Brake Clearances
   a. Automatic Adjusters
   b. Manual Adjustment

3. Bleeding Air from Brake Systems
   a. Power Brake Control Valve Systems
      1) Using Accumulator Pressure
      2) Using System Pressure
   a. Independent Brake Systems
      1) Gravity Feed Bleeding
      2) Pressure Feed Bleeding
4. Troubleshooting a Brake System
   a. Loss of Brake Fluid
      1) Internal Leaks
      2) External Leaks
   b. Creeping Brake Pedal
   c. Grabbing Brake
      1) Grease or Oil Saturated Linings
      2) Corroded Brake Drum or Disc
   d. Spongy Brake Pedal Movement
      1) Air in System
      2) Ballooning Flexible Hoses
   e. Fading Brakes
      1) Glazed Brake Linings
      2) Wet Brake Linings
   f. Dragging Brakes
      1) Broken or Weak Return Springs
         a) Master Cylinder Return Spring
         b) Brake Release Spring
      2) PBCV Open
      3) Contaminated Fluid
      4) Excessively Corroded Brake Drums or Discs
   g. Excessive Brake Pedal Travel
      1) Worn Linings
      2) Linkage Adjustments
h. Overheated Brakes
   1) Safety Precautions
   2) Proper Extinguishing Methods
   3) Dangers of Sudden Cooling

I. AIRCRAFT LANDING WHEELS

1. Material Used
   a. Aluminum Alloy
   b. Magnesium Alloy
      1) Fire Hazard of Magnesium Wheels

2. Types of Wheels
   a. Split Wheel
   b. Removal Flange
   c. O-ring seal between wheel sections
   d. Torqueing of Assembly Hardware

3. Inspection of Wheels
   a. Corrosion
   b. Cracks
   c. Dents and Warpage

J. AIRCRAFT TIRES AND TUBES

1. Cleaning and Storage of Tires
   a. Proper Cleaning Procedures
   b. Tire Storage
      1) Climatic Conditions
      2) Proper Racks for Storage
2. Construction Features of Tires and Tubes
   a. Balance Dot on Tires
   b. Balance Stripe on Tubes
   c. Alignment of Balance References During Tire and Tube Mounting

3. Manufacturers Tire Data
   a. Size
   b. Ply Rating
   c. Tubeless or Tube Type
   d. Speed Rating
   e. Manufacturers Name
   f. Serial Number
   g. Tire Type

4. Recapped Tires
   a. Number of Recaps Permitted
   b. Data Applied By Recapped

5. Demount, Inspect, Repair, and Reinstall Tires and Tubes on Wheel
   a. Demounting Procedure and Safety Precautions
   b. Inspection of Tires and Tubes
   c. Tire and Tube Repairs
   d. Mounting of Tires and Tubes
   e. Inflation of Tires and Tubes

6. Balancing Tire and Wheel Assembly

7. Remove, Inspect, Service, and Reinstall Tire and Wheel Assembly
   a. Sources of Service Information
   b. Jacking Procedures and Safety Precautions
c. Axle Thread Protection

d. Wheel Bearings

e. Inspection of Wheels
   1) Fuse Plugs
   2) Any Defects

f. Installation of Wheel Assembly
   1) Pre-Seat Wheel Bearings
   2) Final Torque of Wheel Nut

K. BRAKE ANTI-SKID SYSTEM

1. Components and Their Function
   a. Transducer
   b. Anti-skid Velocity Comparator
   c. Anti-skid Valve
   d. Anti-skid Cockpit Indicator Light
      1) Normal Operation
      2) System Malfunction

L. LANDING GEAR SYSTEM MAINTENANCE

1. Periodic Inspection
   a. Thoroughly Clean All Surfaces
   b. Shock Struts
      1) Leaks
      2) Proper Servicing Fluid and Air
      3) Damage to Piston Surface
      4) Installed Ground Locks
      5) Condition of Attaching Brackets and Hardware
6) General condition for Bent or Cracked Structural Units

7) All Areas of Corrosion

c. Shimmy Dampers and Steering Units
   1) Cables
   2) Leakage
   3) Security of Attachment

d. Wheels
   1) Corrosion
   2) Bent, Warped, or Damaging Defects
   3) Wheel Bolt for Looseness
   4) Fuse Plugs for Security

e. Tires
   1) Wear
   2) Cuts
   3) Deterioration
   4) Presence of Grease or Oil
   5) Alignment of Slippage Marks
   6) Proper Inflation

2. Landing Gear Rigging and Adjustment

   a. Use Manufacturers Service Manual for Proper Adjustment
      1) Up Lock Clearances
      2) Down Lock Clearances
      3) Landing Gear Position Limit Switches
      4) Door Linkage
3. Landing Gear Retraction Check

a. When Required

1) During an Annual Inspection of the Landing Gear

2) After Performing Maintenance That Might Affect the Landing Gear Operation or Clearances within the Wheel Well Area

3) After a hard or Overweight Landing

4) Checking the Landing Gear Position and Warning System

5) Operation of Cross-flow Valve

6) Any Time a Malfunction in the Retraction system is known or suspected
PERFORMANCE GOALS
II. AIRFRAME SYSTEM AND COMPONENTS

A. AIRCRAFT LANDING GEAR SYSTEMS

LEVEL 29: INSPECT, CHECK, SERVICE AND REPAIR LANDING GEAR, RETRACTION SYSTEMS, SHOCK STRUTS, TIRES, BRAKES, WHEELS, AND STEERING SYSTEMS

A. Using written procedures and the AC 43.13-1B (as revised) de-mount a tire. Inspect the tire, the tube, (if tube type tire) and the wheel assembly. Determine and list repairs ad needed. Reinstall the tire and inflate to the proper pressure. All safety precautions will be observed.

B. Using appropriate written service information, wheel assembly mounted on an airplane or mock-up, remove the wheel from the axle. Inspect the wheel assembly and the bearings. Prepare a list of discrepancies found. Lubricate the bearings, re-install the wheel assembly on the axle, and adjust the bearing play. All safety precautions will be observed.

C. Using a completely assembled shock strut installed on an airplane or mock-up, deflate the shock strut, drain the fluid, remove the piston, install seals, re-assemble the shock strut, re-install the air valve, service with fluid, inflate the shock strut and check for leaks. All safety precautions will be observed.

D. Using an airplane or mock-up incorporating an operational nose wheel or tail wheel steering mechanism and dampener, inspect and adjust the steering mechanism and dampener.
E. Using a wheel assembly containing a brake assembly on an airplane or mock-up, remove the brake-actuating cylinder, inspect the cylinder and re-install the actuating cylinder, check for leaks and bleed the air out of the system.

F. Using an operational, retractable landing gear, written information or manufacturer’s service manual, operate the retractable landing gear, inspect, adjust, and lubricate the landing gear as needed.
PRACTICAL PROJECTS
PRACTICAL PROJECT

II. AIRFRAME SYSTEM AND COMPONENTS

A. AIRCRAFT LANDING GEAR SYSTEMS

29-A Inspect, check, service and repair landing gear, retraction systems, shock struts, brakes, wheels, tires, and steering systems

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 8.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding of the standard practices of tire servicing.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook
3. Manufacturer's Service Manual

EQUIPMENT AND TOOLS REQUIRED:

1. Nitrogen bottle and Air Compressor
2. Air Hoses
3. Air gooseneck
4. Air pressure gage.
5. Core removal tool.
6. Basic hand-tools
7. Torque wrench
29-A Inspect, check, service and repair landing gear, retraction systems, shock struts, brakes, wheels, tires, and steering systems

SUPPLIES AND MATERIALS REQUIRED:

1. Written information
2. Talc
3. Wheel Assembly
4. Tire Assembly.

PROCEDURES:

The student will demount a tire; remove tube, and wheel assembly. He will determine and list the necessary repairs. After presenting his findings to the instructor and making the necessary repairs, if any, he will reinstall the tube and tire and inflate to the correct tire pressure. He will observe all safety precautions related to tire servicing.
PRACTICAL PROJECT

II. AIRFRAME SYSTEM AND COMPONENTS

B. AIRCRAFT LANDING GEAR SYSTEMS

29-B Inspect, check, service and repair landing gear, retraction systems, shock struts, brakes, wheels, tires, and steering systems

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 6.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and skill in the inspection, service and repair of aircraft wheels.

REFERENCES:

2. AC 43.13-1B/2B (as revised)
4. Manufacturer’s Service Manual

EQUIPMENT AND TOOLS REQUIRED:

1. Aircraft or landing gear mock-up (with wheel and tire assembly)
2. Hand tools
3. Torque wrench
4. Aircraft jacks
29-B Inspect, check, service and repair landing gear, retraction systems, shock struts, brakes, wheels, tires, and steering systems

SUPPLIES AND MATERIALS REQUIRED:

1. Written information
2. Bearing grease

PROCEDURES:

The student will raise the aircraft and remove the wheel assembly from the axle. He will inspect the wheel assembly and bearing and prepare a written list of discrepancies found. He will describe the reason for rejecting any wheel component and describe the repairs that may be necessary. He will inspect, lubricate, and reinstall the wheel bearings and the wheel assembly on the aircraft wheel axle. The student will check for proper bearing play, torque and safety attaching nut and lower the airplane.
II. AIRFRAME SYSTEMS AND COMPONENTS

A. AIRCRAFT LANDING GEAR SYSTEMS

29-C Inspect, check, service, and repair landing gear, retraction, systems, shock struts, brakes, wheels, tires and steering systems.

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 8.0 Hrs.

PURPOSE

To acquaint the student with the required knowledge and skills in the inspection and service of landing gear shock struts.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook
3. Manufacturer’s Service Manual

EQUIPMENT AND TOOLS REQUIRED:

1. Aircraft or Landing gear mock-up
2. Air Compressor or nitrogen bottle
3. Basic Hand tools
29-C Inspect, check, service and repair landing gear, retraction systems, shock struts, brakes, wheels, tires, and steering systems

SUPPLIED AND MATERIAL REQUIRED:

1. Written information
2. Replacement seals
3. Hydraulic fluid

PROCEDURES:

The students will deflate a shock strut, drain the fluid, remove the piston from the cylinder, install seals, reassemble the strut, service with fluid, reinstall the air valve and inflate the strut. He will locate and interpret information from the service instruction and explain the probable causes of malfunctions normally encountered in the operation of shock struts assemblies.
PRACTICAL PROJECT

II. AIRFRAME SYSTEMS AND COMPONENTS

A. AIRCRAFT LANDING GEAR SYSTEMS

29-D Inspect, check, service, and repair landing gear, retraction, systems, shock struts, brakes, wheels, tires and steering systems.

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 6.0 Hrs.

PURPOSE

To acquaint the student with the required knowledge, understanding and skills in the inspection and service of steering system and mechanism.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook
3. Manufacturer’s Service Manual

EQUIPMENT AND TOOLS REQUIRED:

1. Aircraft or mock-up
2. Basic hand tools

SUPPLIES AND MATERIALS REQUIRED:

1. Written information
2. Hydraulic fluid
29-D Inspect, check, service and repair landing gear, retraction systems, shock struts, brakes, wheels, tires, and steering systems

PROCEDURES:

The student will inspect, adjust, and service a nose wheel steering and dampener mechanism. He will list all discrepancies found and discuss them with the instructor the proper repairs for his findings, based on the aircraft manufacturer recommendations.
PRACTICAL PROJECT

II.  AIRFRAME SYSTEMS AND COMPONENTS

A.  AIRCRAFT LANDING GEAR SYSTEMS

29-E  Inspect, check, service, and repair landing gear, retraction, systems, shock struts, brakes, wheels, tires and steering systems.

TEACHING LEVEL:  (3)

AVERAGE COMPLETION TIME:  4.0 Hrs.

PURPOSE

To acquaint the student with the required knowledge and skills in the inspection service and repair of aircraft brakes.

REFERENCES:

1.  AC 43.13-1B/2B (as revised)
2.  FAA-H-8083-31A Airframe Handbook
3.  Manufacturer’s Service Manual

EQUIPMENT AND TOOLS REQUIRED:

1.  Aircraft or mock-up (with hydraulic brake system)
2.  Jacks
3.  Basic hand-tools

SUPPLIES AND MATERIALS REQUIRED:

1.  Written information
29-E Inspect, check, service and repair landing gear, retraction systems, shock struts, brakes, wheels, tires, and steering systems

PROCEDURES:

The student will remove the wheel from the axle, inspect the brake assembly, adjust the clearance as necessary and reinstall the wheel. He will list all discrepancies found and discuss with the instruction the possible repairs, based on the manufacturer service manuals.
PRACTICAL PROJECT

II. AIRFRAME SYSTEMS AND COMPONENTS

A. AIRCRAFT LANDING GEAR SYSTEMS

29-F Inspect, check, service, and repair landing gear, retraction systems, shock struts, brakes, wheels, tires and steering systems.

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 8.0 Hrs.

PURPOSE

To acquaint the student with the required knowledge and skills in the operation, test, and service of brake actuating systems.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook
3. Manufacturer’s Service Manual

EQUIPMENT AND TOOLS REQUIRED:

1. An operational hydraulic brake system installed in an airplane or mock-up.
2. Jacks
3. Basic hand tools
4. Bleeder tank
29-F  Inspect, check, service and repair landing gear, retraction systems, shock struts, brakes, wheels, tires, and steering systems

SUPPLIES AND MATERIALS REQUIRED:

1.  Written information
2.  Hydraulic fluid

PROCEDURES:

The student will remove a brake actuating cylinder and perform a functional test of the system. He will inspect and reinstall the brake actuating cylinder, following the instructions on the manufacturer service manuals. The student must discuss with the instructor his findings and the work that was performed on this unit.
PRACTICAL PROJECT

II. AIRFRAME SYSTEMS AND COMPONENTS

A. AIRCRAFT LANDING GEAR SYSTEMS

29-G Inspect, check, service, and repair landing gear, retraction, systems, shock struts, brakes, wheels, tires and steering systems.

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 4.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and skills in the inspection service and repair of retractable landing gear.

REFERENCES:

1. AC 43.13-1B/2B (as revised)

2. FAA-H-8083-31A Airframe Handbook

3. Manufacturer’s Service Manual

EQUIPMENT AND TOOLS REQUIRED:

1. An operational retractable landing gear

2. Lubrication equipment

3. Mirror

4. Measuring devices
29-G Inspect, check, service and repair landing gear, retraction systems, shock struts, brakes, wheels, tires, and steering systems

SUPPLIES AND MATERIALS REQUIRED:

1. Written information
2. Grease

PROCEDURES:

The student will operate the retractable, landing gear, inspect and adjust the landing gear to meet return to service standards. He will also lubricate the landing gear as needed.
II. AIRFRAME SYSTEM AND COMPONENTS

B. HYDRAULIC AND PNEUMATIC POWER SYSTEMS

TOTAL HOURS: 48  
THEORY: 18  
SHOP/LAB: 30

A. IDENTIFY AND SELECT HYDRAULIC FLUIDS

1. Vegetable Base Fluids
   a. Odor
   b. Viscosity
   c. Color
   d. Military Specifications
   e. Type of Seals

2. Mineral Base Fluids
   a. Odor
   b. Viscosity
   c. Color
   d. Military Specifications
   e. Type of Seals

3. Chemical Base Fluids
   a. Trade Names
   b. Odor
c. Color

d. Viscosity

e. Precautions during Servicing

f. Types of Seals

4. Hydraulic Fluid Contamination

a. Contamination Control

b. Contamination Check

B. SELECT AND INSTALL SEALS

1. Types of Seals

   a. Packing

   b. Gaskets

2. Materials

   a. Natural Rubber

   b. Synthetic

      1) Neoprene

      2) Butyl Rubber

      3) Teflon

3. Design

   a. O-ring

   b. Chevron

   c. Cup

   d. Square

   e. Special

   f. Miscellaneous
4. Installation of Seals

5. Removal of Seals

6. Cure Date of Seals

C. COMPARE CONSTANT PRESSURE AND OPEN CENTER TYPES OF HYDRAULIC SYSTEMS

1. Constant Pressure Systems
   a. Selector Valve Arrangement

2. Open Center Systems
   a. Selector Valve Arrangement

3. Live Line System
   a. Variable Displacement Pump

D. INTERPRET REFERENCE INFORMATION PERTAINING TO OPERATION OF BASIC HYDRAULIC SYSTEM COMPONENTS

1. Hand Pumps
   a. Single Action
   b. Double Action

2. Actuating Cylinders
   a. Single Action
   b. Double Action
      1) Balanced
      2) Unbalanced

3. Reservoir
   a. Vented
   b. Pressurized

4. Check Valves
a. Plain Check Valve  
b. Orifice Type Check Valve  

5. Selector Valves  
a. Design Types  
   1) Rotor  
   2) Poppet  
   3) Spool  

6. Relief Valves  
a. Ball Type  
b. Poppet Type  
c. Sleeve Type  
d. Main System Relief Valve  
e. Thermal Relief Valve  

7. Pressure Regulators  
a. Balanced Type  
b. Spool Type  

8. Accumulator  
a. Bladder Type  
b. Diaphragm Type  
c. Piston Type  

9. Flap Overload Valve  

10. Sequence/Timing Valve  

11. Cross-flow Valve  

12. Shuttle Valve
13. Hydraulic Fuse

14. Pressure Gauges and Snubbers

15. Hydraulic Filters
   a. Micronic
   b. Screen

E. INTERPRET INFORMATION PERTAINING TO SERVICING HYDRAULIC RESERVOIRS

1. Hydraulic Reservoir Construction Features
   a. Filler Openings
   b. Expansion Space
   c. Fluid Quantity
   d. Filters
   e. Pressurized Reservoirs
   f. Stand Pipe
   g. Internal Baffles

F. IDENTIFY AND DESCRIBE THE OPERATION OF CONSTANT AND VARIABLE DISPLACEMENT HYDRAULIC PUMPS

1. Constant Displacement Pumps
   a. Gear Type
   b. Piston Type
   c. Gerotor Type
   d. Vane Type

2. Variable Displacement Pumps
   a. Stroke Reduction Type
   b. Intake Starvation Type
c. Demand Type


G. CHECK, INSPECT, REMOVE, AND INSTALL HYDRAULIC POWER PUMPS

1. Methods of Driving Pumps
   a. Engine Driven
   b. Electrically Driven
   c. Air Driven

2. Inspection of Pumps

3. Removal and Installation of Hydraulic Pumps

H. INSPECT, SERVICE AND CHECK A HYDRAULIC ACCUMULATOR

1. Operation of Accumulators

2. Servicing Accumulators

3. Inspection, Removal, and Installation of Accumulators
   a. Design Types of Accumulators
      1) Bladder
      2) Diaphragm
      3) Piston

I. TROUBLESHOOT AND DETERMINE THE CAUSE OF LOW, HIGH, OR FLUCTUATING SYSTEM HYDRAULIC PRESSURE

1. Normal System Operation

2. Low System Pressures

3. High System Pressures

4. Fluctuating Pressures

5. Adjustment of Pressures
J. INSPECT, CHECK, AND SERVICE A HYDRAULICALLY OPERATED SYSTEM

1. System Operation
2. Inspection of System
3. Servicing Hydraulic Systems

K. INTERPRET REFERENCE INFORMATION PERTAINING TO OPERATION OF BASIC PNEUMATIC SYSTEM COMPONENTS

1. Use of Pneumatics
   a. Brakes
   b. Opening and Closing Doors
   c. Driving Hydraulic Pumps, Alternators, Starters, Water Injection Pumps
   d. Operating Emergency Devices

2. Similarities of Pneumatic and Hydraulic Systems

3. Sources of Pneumatic Power
   a. Storage Bottles
   b. Installed Air Compressors
   c. Bleed Air

4. Pneumatic System Components
   a. Relief Valves
   b. Control Valves
   c. Check Valves
   d. Restrictions
      1) Fixed
      2) Variables
   e. Filters
1) Micronic
2) Screen

f. Air Compressors
   1) Electrically Operated
   2) Hydraulically Operated

g. Moisture Separation

h. Chemical

i. Pressure Transmitter

j. Pressure Switch

k. Condensation Dump Valve

5. Pneumatic Power System Maintenance
   a. Lubricating Oil Level for Compressor
   b. Pumping of the Pneumatic System
      1) Excessive Oil or Foreign Matter
      2) Draining of System Air Bottles
   c. Servicing Storage Bottles
      1) Nitrogen
      2) Clean Dry Air
   d. Operational and Leak Check Installation
PERFORMANCE GOALS
II. AIRFRAME SYSTEM AND COMPONENTS

B. HYDRAULIC AND PNEUMATIC SYSTEMS

30 REPAIR HYDRAULIC AND PNEUMATIC POWER SYSTEM COMPONENTS

   A. Using hydraulic components, not requiring complex disassembly or reassembly. Seal. Fluids and written reference information; disassemble. Inspect, install seals, reassemble and test component.

31 IDENTIFY AND SELECT HYDRAULIC FLUIDS.

   A. Given samples of hydraulic fluids; distinguish the fluids by color, odor, and specification number. When shown a sample placard or data plate, select the fluid used to service the system.

   * B. Given samples of hydraulic fluid, describe the characteristics of each type of hydraulic fluid.

32 INSPECT, CHECK, SERVICE, TROUBLESHOOT, AND REPAIR HYDRAULIC AND PNEUMATIC POWER SYSTEMS.

   A. Given a hydraulic system on an aircraft or mock-up, written inspection and service instructions; trouble shot, inspect check and repair the hydraulic system.

   B. Given a pneumatic power system, written procedures for inspecting, checking servicing, repairing and troubleshoots the system and list all repairs as needed.

* OPTIONAL; PROJECTS
PRACTICAL PROJECTS
II. AIRFRAME SYSTEM AND COMPONENTS

B. HYDRAULIC AND PNEUMATIC POWER SYSTEMS

30-A Repair Hydraulic and Pneumatic Power System Components

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge in hydraulic and pneumatic power system components repair.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook Vol. 2
3. Manufacturer service information

EQUIPMENT AND TOOLS REQUIRED

1. Basic Hand Tools

SUPPLIES AND MATERIALS REQUIRED:

1. Hydraulic component
2. Seals and fluids
3. Written information
30-A  Repair Hydraulic and Pneumatic Power System Components

PROCEDURES:

The student will install seals in one unit in accordance with the procedures specified and test the unit.
II. AIRFRAME SYSTEM AND COMPONENTS

B. HYDRAULIC AND PNEUMATIC POWER SYSTEMS

31-A Identify and Select Hydraulic Fluid

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME:  6.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge in hydraulic fluid characteristics and specifications.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Written information
2. Fluid samples
3. Sample placards of the type used or attached to hydraulic reservoir.
31-A Identify and Select Hydraulic Fluid

PROCEDURES:

The student will distinguish between the sample fluids by colors, odor and specification number when shown the sample placard or reservoir data plate, he will select the fluid that would be used to service the system. He will describe the characteristics of each type of hydraulic fluid.
II. AIRFRAME SYSTEM AND COMPONENTS

B. HYDRAULIC AND PNEUMATIC POWER SYSTEMS

31-B Identify and Select Hydraulic Fluid

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 6.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge in hydraulic fluid in hydraulic characteristics.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Written information
2. Fluid samples

PROCEDURES:

The student will identify samples of vegetable, petroleum and synthetic base hydraulic fluid and describe the characteristics or each type of fluid.
PRACTICAL PROJECTS

II. AIRFRAME SYSTEM AND COMPONENTS

B. HYDRAULIC AND PNEUMATIC POWER SYSTEMS

32-A Inspect, check, service, troubleshoot and repair hydraulic and pneumatic power system

TEACHING LEVEL (3)

AVERAGE COMPLETION TIME: 8.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge, understanding and skill in the operation of hydraulic and pneumatic power system.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

1. Hydraulic system on an aircraft or mock-up
2. Basic hand-tools

SUPPLIES AND MATERIALS REQUIRED:

1. Written information
2. Manufacturer’s publications applicable to the specific system
32-A Inspect, check, service, troubleshoot and repair hydraulic and pneumatic power system

PROCEDURES:

The student will operate, troubleshoot, check, describe and repair the faults in the system. He will make the necessary repairs to restore the system to operating tolerances.
II. AIRFRAME SYSTEM AND COMPONENTS

B. HYDRAULIC AND PNEUMATIC POWER SYSTEMS

32-B Inspect, check, service, troubleshoot and repair hydraulic and pneumatic power system

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 8.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge, and understanding in the operation and repair of hydraulic and pneumatic power system.

REFERENCES:

1. AC 43.13-1B/2B (as revised)

2. FAA-H-8083-31A Airframe Handbook

EQUIPMENT AND TOOLS REQUIRED:

1. Pneumatic system on an aircraft or mock-up

2. Basic hand-tools

SUPPLIES AND MATERIALS REQUIRED:

1. Written information

2. Manufacturer’s publications applicable to the specific system
32-A Inspect, check, service, troubleshoot and repair hydraulic and pneumatic power system

PROCEDURES:
The student will interpret information and explain the operation of the specific system and list all repairs as needed to operate system correctly.
II. AIRFRAME SYSTEM AND COMPONENTS
   C. CABIN ATMOSPHERE CONTROL SYSTEMS

   TOTAL HOURS: 30  THEORY: 18  SHOP/LAB: 12

A. OXYGEN AND THE ATMOSPHERE
   1. Need for Oxygen
   2. Atmospheric Pressure Changes with Altitude
   3. Temperature Changes With Altitude

B. AIR CONDITIONING AND PRESSURIZATION TERMINOLOGY
   1. Absolute Pressure
   2. Absolute Temperature
   3. Adiabatic Cooling
   4. Ambient Temperature
   5. Ambient Pressure
   6. Barometric Pressure
   7. Cabin Altitude
   8. Differential Pressure
   9. Gauge Pressure
10. Ram Air Temperature Rise

11. Temperature Scales
   a. Centigrade
   b. Fahrenheit
   c. Kelvin

C. SOURCES OF CABIN PRESSURE
   1. Reciprocating Engine Internal Superchargers
   2. Turbine Engine Compressor Bleed Air
   3. Positive Displacement Compressors (Superchargers)
   4. Centrifugal Cabin Compressors
   5. Supercharger Controls
   6. Supercharger Instrumentation

D. PRESSURIZATION CONTROLS
   1. Controller
   2. Cabin Pressure Regulator
      a. Isobaric Mode
      b. Differential Mode
      c. Cabin Pressure Safety Valve

E. AIR DISTRIBUTION
   1. Controls
   2. Ducting
   3. Filters
F. COMBUSTION HEATERS
   1. Fuel System
   2. Ignition System
   3. Air System
   4. Inspection and Maintenance

G. AIR CYCLE COOLING SYSTEMS
   1. Principle of Operation

H. AIR CYCLE SYSTEM COMPONENTS
   1. Primary Heat Exchanger
   2. Primary Heat Exchanger Bypass Valve
   3. Shutoff Valve
   4. Refrigeration Bypass Valve
   5. Secondary Heat Exchanger
   6. Refrigeration Unit
   7. Water Separators
   8. Ram Air Valve

I. ELECTRONIC TEMPERATURE CONTROLS
   1. Cabin Temperature Pickup Unit
   2. Cabin Temperature Selector
   3. Cabin Temperature Regulator
   4. System Operation
J. VAPOR CYCLE SYSTEMS
   1. Refrigeration Cycle
   2. Basic Laws of Thermodynamics
   3. System’s Principles of Operation

K. VAPOR CYCLE SYSTEM COMPONENTS
   1. Compressor
   2. Condenser
   3. Receiver – Drier
   4. Sight Glass
   5. Expansion Valve
   6. Evaporator

L. SERVICING VAPOR CYCLE SYSTEMS
   1. Physical Precautions Required
   2. Refrigerant – 12 (R-12)
   3. Manifold Set
   4. Purging the System
   5. Evacuating the System
   6. Recharging
   7. Checking Oil Level

M. OXYGEN SYSTEMS - GENERAL
   1. Continuous Flow Systems
   2. Pressure Demand Systems
3. Portable Oxygen Systems
4. Cylinders for Gaseous Oxygen
5. Solid Sate Oxygen Systems
6. Oxygen Systems Plumbing

N. **OXYGEN VALVES**
   1. Filler Valves
   2. Check Valves
   3. Shutoff Valves
   4. Pressure Reducing Valves
   5. Pressure Relief Valves

O. **OXYGEN REGULATORS**
   1. Diluter Demand Style
   2. Continuous Flow type

P. **OXYGEN SYSTEM COMPONENTS**
   1. Flow Indicator
   2. Pressure Gauge
   3. Masks

Q. **SERVICING GASEOUS OXYGEN SYSTEMS**
   1. Safety Precautions
   2. Leak Testing
   3. Draining an Oxygen System
   4. Cleaning the Oxygen System – Approved Cleaning Agents
a. Anhydrous Ethyl Alcohol
b. Isopropyl Alcohol
c. Trichlorethylene
d. Commercial Compounds

5. Purging the Oxygen System
6. Charging Oxygen Cylinders
7. Hydrostatic Checks
8. Temperature – Pressure Conversion Charts
PERFORMANCE GOALS
II. AIRFRAME SYSTEM AND COMPONENTS

C. CABIN ATMOSPHERE CONTROL SYSTEMS

33 INSPECT, CHECK, TROUBLESHOOT, SERVICE, AND REPAIR HEATING, COOLING, AIR CONDITIONING, PRESSURIZATION SYSTEMS AND AIR CYCLE MACHINES

A. Using written information, and a diagram answer questions concerning the inspection, check troubleshoot, service and repair heating, cooling, air conditioning, pressurization systems, and air cycle machines.

34 INSPECT, CHECK, TROUBLESHOOT, SERVICE, AND REPAIR HEATING, COOLING, AIR-CONDITIONING, AND PRESSURIZATION SYSTEMS

A. Using written information and a diagram answer questions concerning the inspection, check, troubleshoot, service and repair of a vapor cycle Freon system.

35 INSPECT, CHECK, TROUBLESHOOT, SERVICE, AND REPAIR OXYGEN SYSTEMS

A. Using manufacturer’s service manual or equivalent written information, check the oxygen system for leakage, and system pressure. Inspect oxygen masks for contamination and proper operation.
PRACTICAL PROJECTS
PRACTICAL PROJECT

II. AIRFRAME SYSTEM AND COMPONENTS

C. CABIN ATMOSPHERE CONTROL SYSTEMS

33-A INSPECT, CHECK, TROUBLESHOOT, SERVICE, AND REPAIR HEATING, COOLING, AIR CONDITIONING, PRESSURIZATION SYSTEMS AND AIR CYCLE MACHINES

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 3.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding in the inspection, service and repair of heating, cooling, air conditioning, pressurization systems and air cycle machines.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook Vol. 2
3. Aircraft heating, cooling, air conditioning, pressurization systems and air cycle machines system mock-up instructions

EQUIPMENT AND TOOLS REQUIRED:

SUPPLIES AND MATERIALS REQUIRED:

1. Written information
2. Soap and water solution

PROCEDURES:

Using written information, and a diagram answer questions concerning the inspection, check troubleshoot, service and repair heating, cooling, air conditioning, pressurization systems, and air cycle machines.
II. AIRFRAME SYSTEM AND COMPONENTS

C. CABIN ATMOSPHERE CONTROL SYSTEMS

34-A INSPECT, CHECK, TROUBLESHOOT, SERVICE, AND REPAIR HEATING, COOLING, AIR-CONDITIONING, AND PRESSURIZATION SYSTEMS

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 3.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding in the inspection, service and repair of oxygen systems.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook Vol. 2

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Written information

PROCEDURES:

Using written information and a diagram; answer questions concerning the inspection, check, troubleshoot, service and repair of a vapor cycle Freon system.
II. AIRFRAME SYSTEM AND COMPONENTS

C. CABIN ATMOSPHERE CONTROL SYSTEMS

35-A Inspect, Check, Troubleshoot, Service and Repair Oxygen Systems

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 6.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding in the inspection, service and repair of oxygen systems.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook Vol. 2
3. Aircraft oxygen system mock-up instructions

EQUIPMENT AND TOOLS REQUIRED:

1. Oxygen system mock-up

SUPPLIES AND MATERIALS REQUIRED:

1. Written information
2. Soap and water solution
35-A Inspect, Check, Troubleshoot, Service and Repair Oxygen Systems

PROCEDURES:

The student will check the oxygen system for leakage, check bottle pressure, check oxygen system pressure, and inspect oxygen masks for contamination and check and oxygen mask and regulator for proper operation.
II. AIRFRAME SYSTEM AND COMPONENTS

D. AIRCRAFT INSTRUMENT SYSTEMS

TOTAL HOURS: 24    THEORY: 12    SHOP/LAB: 12

A. AIRCRAFT INSTRUMENT SYSTEMS

1. Instrument Requirements in Modern Aircraft
2. Flight Instruments – Minimum Required
3. Engine Instruments – Minimum Required
4. Navigational Instruments
5. Instrument Cases – Airtight – Vented
6. Instrument Dials
7. Instrument Range Markings
8. Instrument Panels – Shock Mounts
9. Bonding of Instrument Panels
10. Repair of Instruments

B. HANDLING AND STORAGE OF INSTRUMENTS

1. Preservations of Instruments
   a. Pickling, Wrapping, Sealing in Plastic
   b. Dust Protection – Humidity Protection
   c. Packing Cartons – Metal, Cardboard, Fiberglass
C. INSPECT AIRCRAFT INSTRUMENT SYSTEM

1. External Pilot Static System

2. Instrument Inspection
   a. Pointers, Flags, Etc., for Proper Position Power-Off
   b. Pointers, Flags, and Gyro Noise, Etc., for Proper Position Power-On

3. Range Markings Proper and Legible – Slippage Mark

4. Instrument Panel
   a. Proper Bonding
   b. Shock Mounts
   c. Binding or Rubbing Between Panels of the Airframe

5. Check Conditions of All Wiring and Plumbing

D. CHECK, TROUBLESHOOT, AND REPAIR AIRCRAFT INSTRUMENT SYSTEMS

1. Pitot Static Systems - Airspeed - Altimeter Check

2. Gyro Altitude Indicator System - Vacuum - Electric

3. Temperature Indicating Systems - Vapor Pressure, Thermocouple

4. Pressure Indicating Systems - Bourdon Tube Autosyn

d. Packing Material – Foam, Plastic coated Hair, Etc.

2. Storage of Serviceable Instruments
   a. Extended Storage of Instruments – Inspect Periodically
   b. Shipping of Instruments – Proper Cartons
   c. Use of Drying Agents
   d. Large Units – Use of Shock Mounts

C. INSPECT AIRCRAFT INSTRUMENT SYSTEM

1. External Pilot Static System

2. Instrument Inspection
   a. Pointers, Flags, Etc., for Proper Position Power-Off
   b. Pointers, Flags, and Gyro Noise, Etc., for Proper Position Power-On

3. Range Markings Proper and Legible – Slippage Mark

4. Instrument Panel
   a. Proper Bonding
   b. Shock Mounts
   c. Binding or Rubbing Between Panels of the Airframe

5. Check Conditions of All Wiring and Plumbing

D. CHECK, TROUBLESHOOT, AND REPAIR AIRCRAFT INSTRUMENT SYSTEMS

1. Pitot Static Systems - Airspeed - Altimeter Check

2. Gyro Altitude Indicator System - Vacuum - Electric

3. Temperature Indicating Systems - Vapor Pressure, Thermocouple

4. Pressure Indicating Systems - Bourdon Tube Autosyn

d. Packing Material – Foam, Plastic coated Hair, Etc.
5. Positions Indicating Systems
   a. Swinging a Compass

6. Speed Indicating Systems - MACH - IAS - TAS
PERFORMANCE GOALS
II. AIRFRAME SYSTEMS AND COMPONENTS

C. AIRCRAFT INSTRUMENT SYSTEMS

36: INSPECT, CHECK, SERVICE, TROUBLESHOOT, AND REPAIR ELECTRONIC FLIGHT INSTRUMENT SYSTEMS AND BOTH MECHANICAL AND ELECTRICAL, HEADING, SPEED, ALTITUDE, TEMPERATURE, PRESSURE, AND POSITION INDICATING SYSTEMS TO INCLUDE THE USE OF BUILT-IN TEST EQUIPMENT (BITE)

A. Using the AC 43.13-1B/2B (as revised), the EA-ITP-AB, EA-14 CFR -1M and the projects sheets; answer questions concerning instruments.

37: INSTALL INSTRUMENTS AND PERFORM A STATIC PRESSURE SYSTEM LEAK TEST

A. Using AC 43.13-B/2B (as revised), remove and install two instruments, checking the lines and/or wires for proper routing, security, and condition. Answer questions on operating principle and the use of the static pressure system leak test.
PRACTICAL PROJECTS
II. AIRFRAME SYSTEM AND COMPONENTS

D. AIRCRAFT INSTRUMENT SYSTEMS

36-A INSPECT, CHECK, SERVICE, TROUBLESHOOT, AND REPAIR ELECTRONIC FLIGHT INSTRUMENT SYSTEMS AND BOTH MECHANICAL AND ELECTRICAL, HEADING, SPEED, ALTITUDE, TEMPERATURE, PRESSURE, AND POSITION INDICATING SYSTEMS TO INCLUDE THE USE OF BUILT-IN TEST EQUIPMENT (BITE)

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 4.0 Hrs.

PURPOSE:
To acquaint the student with the required knowledge of aircraft instruments

REFERENCES:
1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook Vol. 2

EQUIPMENT AND TOOLS REQUIRED:
N/A

SUPPLIES AND MATERIALS REQUIRED:
1. Written information
2. Questions concerning static pressure system leak test
36-A INSPECT, CHECK, SERVICE, TROUBLESHOOT, AND REPAIR ELECTRONIC FLIGHT INSTRUMENT SYSTEMS AND BOTH MECHANICAL AND ELECTRICAL, HEADING, SPEED, ALTITUDE, TEMPERATURE, PRESSURE, AND POSITION INDICATING SYSTEMS TO INCLUDE THE USE OF BUILT-IN TEST EQUIPMENT (BITE)

PROCEDURES:

Using the AC 43.13-1B/2B (as revised), FAA-H-8083-31A Airframe Handbook Vol. 2; answer questions concerning instruments.
II. AIRFRAME SYSTEM AND COMPONENTS

D. AIRCRAFT INSTRUMENT SYSTEMS

37-A Install Instruments and Perform a Static Pressure system Leak Test

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 8.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge in instrument installation and static pressure system leak check.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook Vol. 2

EQUIPMENT AND TOOLS REQUIRED:

1. Aircraft or instrument mock-up
2. Pitot static Leak Tester
3. Basic hand-tools

SUPPLIES AND MATERIALS REQUIRED:

1. Written information
2. Questions concerning static pressures system leak test
37-A Install Instruments and Perform a Static Pressure system Leak Test

PROCEDURES:

The student will remove and install two instruments, checking the lines, and/or wires for proper routing, security and condition, Answer questions on operating principle and use of the static pressure system leak test.
II. AIRFRAME SYSTEM AND COMPONENTS

E. COMMUNICATION AND NAVIGATION SYSTEMS

TOTAL HOURS: 36  THEORY: 18  SHOP/LAB: 18

A. BASIC RADIO PRINCIPLES
   1. Simple A. C. Circuits
   2. Frequency Bands

B. BASIC EQUIPMENT COMPONENTS
   1. Transmitters
   2. Receivers
   3. Antennas
   4. Microphones
   5. Power Supplies

C. COMMUNICATION SYSTEMS
   1. VHF (Very High Frequency) Communications
   2. HF (High Frequency) Radio Systems

D. NAVIGATION EQUIPMENT
   1. VOR (Very High Frequency Omnidirectional Range)
      a. Course Deviation Indicator
      b. Tests and Test Facilities
2. ILS (Instrument Landing System)
   a. Localizer
   b. Glideslope
   c. Marker Beacons
3. DME (Distance Measuring Equipment)
4. ADF (Automatic Direction Finding)
5. Transponder
6. Doppler Systems
7. INS (Inertial Navigation Systems)
8. Airborne Weather Radar
9. Radio Altimeters

E. EMERGENCY LOCATOR TRANSMITTERS
   1. Use in Civil Aircraft
   2. Transmitter
   3. Batteries
   4. Acceptable Test Procedures

F. EQUIPMENT INSTALLATION
   1. Instrument Panel Mounting
   2. Cooling
   3. Moisture
   4. Vibration Isolation

G. MINIMIZING RADIO INTERFERENCE
   1. Isolation
2. Bonding
3. Shielding
4. Static Discharge Wicks
   a. Carbon Braid
   b. Metallic Braid
   c. Null field

H. AIRCRAFT ANTENNA INSTALLATION
1. Fixed and Trailing Wire Antennas
2. Whip and Blade Antennas
3. Flush Mounted Antennas
4. Coaxial Cable and Fittings
5. Radomes
6. Radome Inspection
7. Radome Maintenance and Repair
8. Calibration of Loop Antennas

I. FCC REGULATIONS PERTAINING TO TWO-WAY RADIO OPERATION
1. FCC License Requirements
2. FCC Regulations Covering Transmission Techniques
PERFORMANCE GOALS
II. AIRFRAME SYSTEM AND COMPONENTS

E. COMMUNICATION AND NAVIGATION SYSTEMS

38 INSPECT, CHECK AND TROUBLESHOOT, AUTOPILOT, SERVOS AND APPROACH COUPLING SYSTEMS.

A. Answer statements (essay type), concerning the purposes and operation of an auto-pilot, using the AC 43.13-B (as revised) and the FAA-H-8083-31A Airframe Handbook Vol.

39 INSPECT, CHECK AND SERVICE AIRCRAFT ELECTRONIC COMMUNICATION AND NAVIGATION SYSTEMS, INCLUDING VHF PASSENGER ADDRESS INTERPHONES AND STATIC DISCHARGE DEVICES, AIRCRAFT VOR, ILS, LORAN, RADAR BEACON TRANSPONDERS, FLIGHT MANAGEMENT COMPUTERS, AND GPWS.

A. Answer questions dealing with types of equipment used in various aircraft, where and how the equipment is mounted, cooled, and the reduction of electrical interference.

40 INSPECT AND REPAIR ANTENNA AND ELECTRONIC EQUIPMENT INSTALLATIONS

A. Using aircraft manufacturer's manual and/or AC 43.13-1B (as revised), locate and inspect a fixed wire antenna or a blade antenna as specified by the instructor), also inspect the antenna wiring. Using the antenna defect sheet list all repairs needed.
PRACTICAL PROJECTS
PRACTICAL PROJECT

II. AIRFRAME SYSTEM AND COMPONENTS

E. COMMUNICATION AND NAVIGATION SYSTEMS

38-A INSPECT, CHECK AND TROUBLESHOOT, AUTOPILOT, SERVOS AND APPROACH COUPLING SYSTEMS.

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 4.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding in the inspection, checking and troubleshooting auto-pilot, servos and approach coupling systems.

REFERENCES:

AC 43.13-1B/2B
FAA-H-8083-31A Airframe Handbook Vol. 2

EQUIPMENT AND TOOLS REQUIRED:

1. Aircraft with electronic installation and antennas.

SUPPLIES AND MATERIALS REQUIRED:

1. Written information

PROCEDURES:

Answer statements (essay type), concerning the purposes and operation of an auto-pilot, using the AC 43.13-1B/2B (as revised) and the FAA-H-8083-31A Airframe Handbook Vol. 2
II. AIRFRAME SYSTEM AND COMPONENTS

E. COMMUNICATION AND NAVIGATION SYSTEMS

39-A INSPECT, CHECK AND SERVICE AIRCRAFT ELECTRONIC COMMUNICATION AND NAVIGATION SYSTEMS, INCLUDING VHF PASSENGER ADDRESS INTERPHONES AND STATIC DISCHARGE DEVICES, AIRCRAFT VOR, ILS, LORAN. RADAR BEACON TRANSPONDERS, FLIGHT MANAGEMENT COMPUTERS, AND GPWS.

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 4.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding in the inspection, and servicing of aircraft communication and navigation systems.

REFERENCES:

AC 43.13-1B/2B (as revised)
FAA-H-8083-31A Airframe Handbook Vol. 2

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Written information

PROCEDURES:

Answer questions dealing with types of equipment used in various aircraft, where and how the equipment is mounted, cooled, and the reduction of electrical interference.
PRACTICAL PROJECT

II. AIRFRAME SYSTEM AND COMPONENTS

E. COMMUNICATION AND NAVIGATION SYSTEMS

40-A Inspect, and Repair Antenna and Electronic Equipment Installation

TEACHING LEVEL 2

AVERAGE COMPLETION TIME: 10.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding in the inspection and repair of antennas.

REFERENCES:

AC 43.13-1B/2B (as revised)

FAA-H-8083-31A Airframe Handbook Vol. 2

EQUIPMENT AND TOOLS REQUIRED:

1. Aircraft with electronic installation and antennas.

SUPPLIES AND MATERIALS REQUIRED:

1. Written information

PROCEDURES:

The student will locate repair and replacement information for a fixed wire antenna, a blade or whip antenna and a flush type antenna. He will list all repairs needed.
II. AIRFRAME SYSTEM AND COMPONENTS

F. AIRCRAFT FUEL SYSTEMS

TOTAL HOURS: 36  THEORY: 12  SHOP/LAB: 24

A. FUEL LINES AND FITTINGS

1. Compatibility of Fitting.

2. Routing in Vicinity of
   a. Control Cables
   b. Electric Wiring or Conduit
   c. Heat Sources

3. Alignment

4. Bonding

5. Support Clamps

6. Color Code for Fuel Lines

B. FUEL SYSTEMS CONTAMINATION

1. Water

2. Foreign Particles

3. Contamination with Other Grades of Fuel

4. Microbial Growth

5. Sediment
   a. Fine Sediment
b. Coarse Sediment

c. Settling Time for Sediment Check

6. Contamination Detection

   a. Food Color
   
   b. Hypodermic Needle
   
   c. Chemical Powder
   
   d. Visual Check of Drained Fuel Sample

7. Contamination Control

   a. During Storage
   
   b. During Aircraft Servicing
   
   c. After Servicing Aircraft Fuel Tanks

C. AIRCRAFT FUEL SYSTEM

1. Purpose

   a. Stores Fuel
   
   b. Cleans Fuel
   
   c. Delivers Fuel to System

      1) Quantity
      
      2) Pressure

2. Types of Fuel Systems

   a. Gravity Feed System
   
   b. Pressure Feed System

D. FUEL SYSTEM COMPONENTS

1. Fuel Tanks

   a. Fuel Tank Sump and Drain
   
   b. Vents
1) Size for Small Tanks

2) Size for Large Tanks

c. Internal Baffles
d. Expansion Space
e. Filler Neck and Scupper Drain
f. Fuel Cap Restraining Device
g. Required Markings Near Filler Cap
h. Strength Requirements for Fuel Cell.

2. Fuel Cells

a. Bladder Type Fuel Cells

b. Integral Fuel Cells

3. Fuel Filters

a. FAA Requirements

b. Light Aircraft Fuel Filters

c. Filters for Large Multi-engine Aircraft

4. Fuel Pumps

a. Hand Pumps

b. Engine Driven Pumps

c. Electrically Operated Pumps

d. Boost Pumps
   1) Centrifugal Type-Non-positive Displacement
   2) Sliding Vane Type-Positive Displacement

5. Fuel Valves

a. Selector Valves

   1) Poppet Type
2) Cone Type
3) Rotor Type
4) Cross-feed Valve
5) Fuel Transfer Valve

b. Fuel Shutoff Valve
   1) Manually Operated
   2) Electrically Operated

6. Fuel System Indicators
   a. Fuel Quantity Indicator
      1) Sight Glass
      2) Mechanical
      3) Electrical
      4) Electronic
   b. Fuel Flowmeter
      1) Transmitter
      2) Indicator
   c. Fuel Pressure Gauge
      1) Single Indicator
      2) Engine Gauge Unit
      3) Differential Pressure Indicator
         a) Air Connection
         b) Fuel Connection
      4) Bourdon Tube Type Indicator
      5) Remote Indicator Electrically Operated
   d. Fuel Pressure Warning Signal
1) Pressure Switch
2) Warning Light
e. Valve-in-transit Lights
f. Fuel Temperature Indicator

E. MULTI-ENGINE FUEL SYSTEMS

1. Tank Arrangement
   a. Interconnecting Check Valves

2. Cross-feed System

3. Manifold System
   a. Single Point Refueling

4. Fuel Shutoff Requirement

F. TROUBLESHOOTING THE FUEL SYSTEM

1. Use of Aircraft and Engine Maintenance Manuals

2. Location of Leaks and Defects
   a. Internal
   b. External

3. Replacement of Seals
   a. Removal of Old Seals and Compound
   b. Check New Seals for Cleanliness and Serviceability
   c. Proper Torque during Installation

G. FUEL TANK REPAIRS

1. Welding Fuel Tanks
   a. Purging Tank Prior to Welding
      1) CO2
      2) Nitrogen
3) Steam

b. Detecting Leak Location
   1) Air Pressure Not Over 5 P.S.I.
   2) Use Soap or Bubble Solution

c. Removing Flux after Welding
   1) Flushing
   2) Soaking Tank
   3) Rinsing Tank
   4) Checking for Complete Flux Removal

2. Fuel Cell Repairs
   a. Detecting fuel Leak
   b. Removal from Aircraft
   c. Repair According to Manufacturers Recommendations

3. Integral Fuel Tanks
   a. Fuel Leak Classifications
      1) Slow Seep
      2) Seep
      3) Heavy Seep
      4) Running Leak
   b. Leak Repairs to Integral Tanks
      1) In Accordance with Manufacturers Specifications

H. FIRE SAFETY PRECAUTIONS

1. Turbine Fuels

2. Aviation Gasoline

3. Removing Fuel; Spills
I. FUEL DUMP SYSTEMS

1. FAA Requirements
   a. Transport Aircraft
   b. General Aviation Aircraft
   c. Take-off Weight
   d. Landing Weight

2. Design Requirements
      1) Reciprocating Engine Aircraft
      2) Turbine Powered Aircraft
   b. Two Independent Systems
      1) Left Wing System
      2) Right Wing System
      1) Dump Fuel Clear of Aircraft Cabin
      2) Dump Fuel Clear of Engine Intakes

3. Fuel Dump System Components
   a. Plumbing Lines
   b. Control Valves
   c. Dump Chutes
      1) Fixed
      2) Extendable
   d. Chute Operating Mechanism
PERFORMANCE GOALS
II. AIRFRAME SYSTEM AND COMPONENTS

F. AIRCRAFT FUEL SYSTEMS

41 CHECK AND SERVICE FUEL DUMP SYSTEMS

A. Using written information, AC 43.13-1B (as revised) and FAA-H-8083-31A Airframe Handbook Vol. 2, describes the checking and servicing requirements of a fuel dump system.

42 PERFORM FUEL MANAGEMENT, TRANSFER, AND DEFUELING

A. Using diagrams or mock-up, AC 43.13-1B (as revised) and FAA-H-8083-31A Airframe Handbook Vol. 2 describe the procedures necessary to transfer or cross-feed fuel and de-fuel the system.

43 INSPECT, CHECK, AND REPAIR PRESSURE FUEL SYSTEM

A. Using visual aids, AC 43.13-1B (as revised) and FAA-H-8083-31A Airframe Handbook Vol. 2 describe the procedures to be followed when inspecting, checking and repairing a pressure type fuel system.

44 REPAIR AIRCRAFT FUEL SYSTEM COMPONENTS

A. Using AC 43.13-1B (as revised), FAA-H-8083-31A Airframe Handbook Vol. 2 appropriate reference information, typical fuel tanks, fuel strainers, selector valves, and fuel lines; inspect, list and describe the repairs as needed.
45 INSPECT AND REPAIR FLUID QUANTITY INDICATING SYSTEMS

A. Using ac 43.13-1B (as revised), EA-14 CFR -1M, appropriate reference information; describe the inspection and repair procedures.

46 TROUBLESHOOT, SERVICE, AND REPAIR FLUID PRESSURE AND TEMPERATURE WARNING SYSTEMS

A. Using an operating fuel system installed in an airplane or mock-up, a schematic or diagram of the system, and appropriate information; check and adjust fuel pressure as needed.

B. Using appropriate written information; write a brief explanation of how the temperature warning system in a typical jet transport airplane works.

47 INSPECT, CHECK, SERVICE, TROUBLESHOOT AND REPAIR AIRCRAFT FUEL SYSTEM

A. Using an operation fuel system, selector valve, fuel boost pumps and written information or service information; inspect, check, service, troubleshoot and list repairs as needed.

B. Using appropriate service or written information, EA-14 CFR-1M and fuel tanks; inspect tanks, describe the construction characteristics, installation and servicing precautions.
PRACTICAL PROJECTS
PRACTICAL PROJECT

II. AIRFRAME SYSTEMS AND COMPONENT

H. AIRCRAFT FUEL SYSTEM

41-A CHECK AND SERVICE FUEL DUMP SYSTEMS

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 1.0 Hrs.

PURPOSE:
To acquaint the student with the required knowledge, understanding and skill in the repair of aircraft fuel system components.

REFERENCES:
1. 14 CFR Part 23
2. AC 43.13.1B/2B (as revised)

EQUIPMENT AND TOOLS REQUIRED:
N/A

Supplies and materials required:
1. Written information

PROCEDURE:
Using written information, AC 43.13-1B (as revised) and 14 CFR -1M, describe the checking and servicing requirements of a fuel dump system
PRACTICAL PROJECT

II. AIRFRAME SYSTEMS AND COMPONENT

H. AIRCRAFT FUEL SYSTEM

42-A PERFORM FUEL MANAGEMENT, TRANSFER, AND DEFUELING

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 1.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge, understanding and skill in the operation of the transfer, cross-feed and defueling of the aircraft fuel system.

REFERENCES:

1. AC 43.13.1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook Vol. 2

EQUIPMENT AND TOOLS REQUIRED:

1. Fuel system Mock—up
2. Fuel system diagrams

PROCEDURE:

Using diagrams or mock-up, AC 43.13-1B/2B (as revised) and FAA-H-8083-31A Airframe Handbook Vol. 2 describe the procedures necessary to transfer or cross-feed fuel and defuel the system.
PRACTICAL PROJECT

II. AIRFRAME SYSTEMS AND COMPONENT

H. AIRCRAFT FUEL SYSTEM

43-A INSPECT, CHECK, AND REPAIR PRESSURE FUEL SYSTEM

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 1.0 Hrs.

PURPOSE:
To acquaint the student with the required knowledge, understanding and skill in the checking and repair of the pressure type fuel system.

REFERENCES:
1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook Vol. 2

EQUIPMENT AND TOOLS REQUIRED:
N/A

PROCEDURE:
Using visual aids, AC 43.13-1B/2B (as revised) and EA-14 CFR -1M, describe the procedures to be followed when inspecting, checking and repairing a pressure type fuel system.
PRACTICAL PROJECT

II. AIRFRAME SYSTEMS AND COMPONENT
   H. AIRCRAFT FUEL SYSTEM

44-A REPAIR AIRCRAFT FUEL SYSTEM COMPONENTS

TEACHING LEVEL: (2)
AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:
To acquaint the student with the required knowledge, understanding and skill in the repair of aircraft fuel system components.

REFERENCES:
1. 14 CFR Part 23
2. AC 43.13-1B/2B (as revised)

EQUIPMENT AND TOOLS REQUIRED:
Typical aircraft fuel tanks, fuel strainer, selector valves, fluid lines, flexible hoses, and fuel drains.

PROCEDURE:
The student will locate and interpret information from the manuals and describe the repair procedures for fuel system components as specified.
II. AIRFRAME SYSTEMS AND COMPONENT

H. AIRCRAFT FUEL SYSTEM

45-A INSPECT AND REPAIR FLUID QUANTITY INDICATING SYSTEMS

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:
To acquaint the student with the required knowledge to inspect and repair fluid quantity indicating system.

REFERENCES:
1. 14 CFR Part 23
2. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook Vol. 2
3. Fuel system Mock-up instructions
4. Aircraft manufacturer’s service manual

EQUIPMENT AND TOOLS REQUIRED:
1. Fuel System Mock-up or aircraft with fuel quantity indicating system.

SUPPLIES AND MATERIALS REQUIRED:
1. Written information

PROCEDURE:
The student will inspect the operating system, correctly interpret information from the manuals and describe the repair that would be undertaken to correct the malfunction indicated by the instructor.
PRACTICAL PROJECT

II. AIRFRAME SYSTEMS AND COMPONENT

H. AIRCRAFT FUEL SYSTEM

46-A TROUBLESHOOT, SERVICE, AND REPAIR FLUID PRESSURE AND TEMPERATURE WARNING SYSTEMS

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:
To acquaint the student with the required knowledge and understanding the operation, service and repair of fuel pressure and temperature warning system.

REFERENCES:
1. 14 CFR Part 23
2. AC 43.13-1B/2B (as revised)

EQUIPMENT AND TOOLS REQUIRED:
1. Operating fuel system installed in an airplane or mock-up
2. Basic hand tools

SUPPLIES AND MATERIALS REQUIRED:
1. Written information

PROCEDURE:
The student will operate the system and adjust the pressure. He will interpret information from the service information and identify the cause of the faults. He will repair the system as directed in the service manual.
PRACTICAL PROJECT

II. AIRFRAME SYSTEMS AND COMPONENT

H. AIRCRAFT FUEL SYSTEM

46-B TROUBLESHOOT, SERVICE, AND REPAIR FLUID PRESSURE AND TEMPERATURE WARNING SYSTEMS

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 3.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding of the operation, of the fuel temperature warning system.

REFERENCES:

1. 14 CFR Part 23
2. AC 43.13-1B/2B (as revised)

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Written information

PROCEDURE:

Using appropriate written information; write a brief explanation of how the temperature warning system in a typical jet transport airplane works
AIRFRAME COURSE CURRICULUM MANUAL

PRACTICAL PROJECT

II. AIRFRAME SYSTEMS AND COMPONENT

H. AIRCRAFT FUEL SYSTEM

47-A INSPECT, CHECK, SERVICE, TROUBLESHOOT AND REPAIR AIRCRAFT FUEL SYSTEM

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 6.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding of the construction, installation and servicing of fuel tanks.

REFERENCES:

1. AC 43.13-1B/2B (as revised)

2. FAA-H-8083-31A Airframe Handbook Vol.2

EQUIPMENT AND TOOLS REQUIRED:

Operational fuel system Mock-up

SUPPLIES AND MATERIALS REQUIRED:

1. Written information

PROCEDURE:

Using an operational fuel system, the student will inspect, check, service troubleshoot and list repairs as needed
PRACTICAL PROJECT

II. AIRFRAME SYSTEMS AND COMPONENT

H. AIRCRAFT FUEL SYSTEM

47-B INSPECT, CHECK, SERVICE, TROUBLESHOOT AND REPAIR AIRCRAFT FUEL SYSTEM

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 6.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding of the construction, installation and service of fuel tanks.

REFERENCES:

1. AC 43.13-1B/2B (as revised)

2. FAA-H-8083-31A Airframe Handbook Vol. 2

EQUIPMENT AND TOOLS REQUIRED:

1. Fuel system Mock-up or aircraft

SUPPLIES AND MATERIALS REQUIRED:

1. Fuel tank of separate type, flexible bladder and integral type
PROCEDURE:

The student will inspect three different types of tanks. Using reference information, he will describe the construction characteristics, the installation and servicing precautions for each type of tank.
II. AIRFRAME SYSTEM AND COMPONENTS

G. AIRCRAFT ELECTRICAL SYSTEMS

TOTAL HOURS: 108   THEORY: 48   SHOP/LAB: 60

A. TYPES AND CHARACTERISTICS OF AIRCRAFT FUSES, CIRCUIT BREAKERS, AND SWITCHES

1. Circuit Protection in Aircraft
2. Circuit Breakers
3. Circuit Breakers Switches
4. Characteristics and Uses of Fuses
5. Replacement of Blown Fuses
6. Switches
7. Switch Designations

B. SELECT AND INSTALL AIRCRAFT ELECTRICAL SWITCHES AND WIRING TO COMPONENTS

1. Determine Current Requirements
2. Determine Wire Requirements
3. Wiring Procedures
4. Electrical Cable Chart in AC 43.13-1B (as revised)
5. Select Aircraft Switches
6. Installation of Open Wiring and Closed Wiring
C. INSTALLATION REQUIREMENTS AND CHARACTERISTICS FOR AIRCRAFT ELECTRICAL WIRING SYSTEMS AND JUNCTION BOXES

1. Single Wire Systems
2. Ground Return Path
3. Allowable Voltage Drop
4. Aluminum vs. Copper Wire
5. Junction Boxes
6. Terminal Strips
7. Shielding Wiring and Equipment

D. INSTALL ELECTRICAL TERMINALS, SPLICES AND BONDING JUMPERS

1. Selection of Cable Terminals
2. Wire Preparation
3. Methods of Attaching Wire or Cable
4. Special Precautions
5. Splicing Wire or Cable
6. Bonding Jumpers
7. Allowable Resistance
8. Bonding Connection
9. Current Carrying Capacity

E. INSTALL AIRCRAFT ELECTRICAL WIRING IN A CONDUIT

1. Removal of Damaged Wiring From Conduit
2. Cleaning of Conduit
3. Preparing Wiring for Pulling Through Conduit
4. Check for Correct Circuit Continuity

F. CHECK AND CONNECT QUICK-DISCONNECT PLUGS AND RECEPTACLES

1. Quick-disconnect Connector Terminology
2. Classes of Connectors as Given in AC 43.13-1B (as revised)
3. Wire Connection to Connectors
4. Pin and Socket Locator Identification Letters or Numbers
5. Causes of Malfunctions
6. Wire Protection
7. Methods of Securing Connectors

G. PROTECT ELECTRICAL EMERGENCY SWITCHES AGAINST ACCIDENTAL ACTUATION

1. Guarded Switches
2. Non-guarded Safeties Switches

H. CHECK, TROUBLESHOOT, AND REPAIR AIRCRAFT DC GENERATOR ELECTRICAL SYSTEM

1. Compound DC Generator Electrical System Components
2. Voltage Regulators
3. Equalizing Circuit and Adjustment
4. Effect of Residual or Stray Magnetism in a Generator Field
5. Flashing the Field
6. Reverse Current Cutout Relays
7. Voltage and Current Indication
8. Effects of Open and short Circuits in Generators
9. Current Limiters
I. METHODS OF PROVIDING AC IN AIRCRAFT HAVING ONLY DC ELECTRICAL SYSTEMS

1. Common Needs for AC in Aircraft Having Only a DC Electrical System
2. Methods of Converting DC to AC in Aircraft
3. Operating Principles of Rotary Inverts
4. Heat Dissipation for Inverters
5. Operating Principles of Solid State Inverters
6. Frequency Control for Inverters
7. Special Uses of AC in Aircraft
8. Use of Alternators on One or More Engines to Furnish AC

J. TROUBLESHOOT AND REPAIR A DC ELECTRICAL SYSTEM SUPPLIED BY AN ALTERNATOR

1. Use of Alternators for DC Aircraft electrical Systems
2. Field Excitation Control for Voltage Regulation
3. Rectification of the AC to Obtain DC Output
4. Over-voltage and Overload Protection

K. CHARACTERISTICS AND ADVANTAGES OF AC AIRCRAFT ELECTRICAL SYSTEMS

1. Advantages of AC Electrical Systems in Aircraft
2. Determining Frequency of AC Generator Output
3. Use of 400 Cycle AC for Aircraft
4. Transformer Principles
5. Transformer – Rectifier Units
L. IDENTIFY COMPONENTS AND OPERATING ELEMENTS OF 115/200 VOLT AC AIRCRAFT ELECTRICAL SYSTEM

1. AC Generator Design and Arrangement
2. Principle of Operation of the C.S.D. Unit
3. Annunciator Panel in Flight Compartment
4. Busses and bus Tie Relays
5. External Power

M. REPAIR AIRCRAFT ELECTRICAL SYSTEM COMPONENTS

1. Solenoid Chatter Causes
2. Operational Symptoms of Solenoid Chatter
3. Effects of Solenoid Chatter
4. Preventative or Corrective Action

N. INSPECT INSTALLATION AND CHECK CIRCUITS OF ANTI-COLLISION AND POSITION LIGHTS

1. Anti-collision Lights
2. Crew Vision Requirements
3. Placards
4. Location of Lights
5. Position Lights for Navigation
6. Viewing Angles
7. Colors and Intensity
8. Electrical Circuit Requirements

O. INSPECT, CHECK AND REPAIR LANDING AND TAXI LIGHT INSTALLATIONS

1. Purposes and Uses of Landing Lights
2. Repair Procedures for Retractable Landing Lights
3. Repair Procedures of Fixed Landing Lights
4. Taxi Lights

P. INSPECT, CHECK, SERVICE, AND REPAIR AIRCRAFT INTERIOR LIGHTING INSTALLATIONS
   1. DC Cabin Lighting Systems
   2. Seat Reading Lights
   3. Entry Lights and Compartment Lights

Q. INSPECT, CHECK, SERVICE, AND REPAIR PASSENGER CABIN LIGHTS AND LIGHTING CIRCUITS
   1. DC Cabin Lighting Systems
   2. Seat Reading Lights
   3. Entry Lights and Compartment Lights

R. INSPECT, CHECK, SERVICE, AND REPAIR COCKPIT LIGHTS AND LIGHTING CIRCUITS
   1. Types of Overhead and Panel Lighting Installations for Cockpit Lighting
   2. Instrument Lighting
   3. Servicing Procedures for Cockpit Lighting

S. INSPECT AND CHECK ELECTRICAL EQUIPMENT INSTALLATIONS FOR ELECTRICAL COMPONENT REPLACEMENT
   1. Electrical Equipment Installations in Bays or Compartments
   2. Shock Mounting
   3. Plug-in Quick Disconnect Connectors
   4. Ventilation and Cooling for Shelf or Rack Mounted units
   5. Servicing Procedures and Precautions
T. LOCATE REPLACEMENT PROCEDURES AND PARTS NUMBERS FOR ELECTRICAL COMPONENTS REPLACEMENT

1. Locating Replacement Procedures for Electrical Components

2. Locating Part Numbers
PERFORMANCE GOALS
II. AIRFRAME SYSTEM AND COMPONENTS

G. AIRCRAFT ELECTRICAL SYSTEMS

48 REPAIR AND INSPECT AIRCRAFT ELECTRICAL SYSTEM COMPONENTS: CRIMP AND SPLICE WIRING TO MANUFACTURER’S SPECIFICATIONS; AND REPAIR PINS AND SOCKETS OR AIRCRAFT CONNECTORS.

A. Using AC 43.13-1B (as revised); select wire, materials and splice a wire by soldering.

49 INSTALL, CHECK, AND SERVICE AIRFRAME ELECTRICAL WIRING, CONTROLS, SWITCHES, INDICATORS, AND PROTECTIVE DEVICES

A. Using written information, AC 43.13-1B (as revised), a mock-up, switches, electrical components, assorted electrical wire, assorted connectors, protective devices, and buss bars, connect components into a circuit using a volt-ohmmeter to measure voltages as specified points in the circuits (as specified by instructor).

50 INSPECT, CHECK, TROUBLESHOOT, SERVICE AND REPAIR ALTERNATING CURRENT AND DIRECT CURRENT ELECTRICAL SYSTEMS

A. Using manufacturer’s manual and volt ohmmeter, inspect, check, troubleshoot and service aircraft electrical circuits, as specified by the instructor, and list all discrepancies and describe repairs as needed.
INSPECT, CHECK AND TROUBLESHOOT CONSTANT SPEED AND INTEGRATED SPEED DRIVE GENERATORS

B. Using written information, answer questions dealing with operation of generators.
PRACTICAL PROJECTS
PRACTICAL PROJECT

II. AIRFRAME SYSTEMS AND COMPONENT

G. AIRCRAFT ELECTRICAL SYSTEM

48-A Repair and Inspect aircraft electrical system component, crimp and splice wiring to manufacturer’s specifications and repair pins and sockets of aircraft connectors.

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 6.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge, understanding and skill in the inspections and repair of aircraft electrical wires.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook Vol. 2

EQUIPMENT AND TOOLS REQUIRED:

1. Soldering iron or soldering gun
2. Electric extension (AC)
3. Wire stripper
4. Plastic sleeve
48-A Repair and Inspect aircraft electrical system component, crimp and splice wiring to manufacturer’s specifications and repair pins and sockets of aircraft connectors.

SUPPLIES AND MATERIALS REQUIRED:

1. Written information
2. Electric wires solder (Rosin-core)

PROCEDURES:

The student will solder splice the selected wire using proper techniques and procedures.
II. AIRFRAME SYSTEMS AND COMPONENTS

G. AIRGRAFT ELECTRICAL SYSTEM

49-A Install check and service airframe electrical wiring, control, Switches, indicators and protective devices.

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 24.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge, understanding and skill in the installation, check and service of airframe electrical systems.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook Vol. 2
3. Manufacturer’s Service Manual

EQUIPMENT AND TOOLS REQUIRED:

1. An aircraft or electrical mock-up
2. Crimping tool
3. Hand tools
49-A Install, check and service airframe electrical wiring, control, Switches, indicators and protective devices.

SUPPLIES AND MATERIALS REQUIRED:

1. Written Information
2. Electric component
3. Electrical wires
4. Electric cable terminals

PROCEDURES:

The student will connect an electrical component to the Aircraft or Mock-up electrical system, such as a landing light, position light, rotating beacon or other. He will determine wire requirements and protection for the installation and also check the circuit for proper operation.
II. AIRFRAME SYSTEMS AND COMPONENTS

H. AIRCRAFT ELECTRICAL SYSTEM

50-A. Inspect, check, service and repair alternating and direct current electrical systems.

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 26.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge, understanding and skill in the servicing and repair of alternating and direct current systems.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook Vol. 2
3. Electrical system mock-up instructions

EQUIPMENT AND TOOLS REQUIRED:

1. An aircraft or electrical mock-up
2. Voltmeter

SUPPLIES AND MATERIALS REQUIRED:

1. Written information

PROCEDURES:

The student will read and record voltage and output, locate and correct malfunctions introduced by instructor, and list all discrepancies and describe repairs as needed.
II. AIRFRAME SYSTEMS AND COMPONENTS

H. AIRCRAFT ELECTRICAL SYSTEM

50-B. INSPECT, CHECK AND TROUBLESHOOT CONSTANT SPEED AND INTEGRATED SPEED DRIVE GENERATORS.

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 4.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding in the servicing and troubleshooting of constant speed and integrated speed drive generators systems.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook Vol. 2

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Written information

PROCEDURES:

Using written information provided, the student will answer questions dealing with operation of generators.
II. AIRFRAME SYSTEM AND COMPONENTS

H. POSITION AND WARNING SYSTEMS:

TOTAL HOURS:  18  THEORY:  6   SHOP/LAB:  12

A. WARNING SYSTEM

1. Principles of Operation of Speed, Stall, and Take-Off Warning Systems
   a. Speed or Mach Warning System
   b. Stall Warning System
   c. Take-Off Warning System

2. Inspection Checking and Servicing of Speed, Stall and Take-Off Warning Systems

B. ANTI-SKID CONTROL SYSTEMS

1. Principles of Operation

2. Skid Detectors

3. Anti-skid Computer

4. Electrical/Hydraulic Control Units for Braking

5. Cockpit Controls and Ground/Flight Interface

6. Inspection and Check of Anti-skid Systems
C. POSITION INDICATING SYSTEM

1. Landing Gear Position Indicating Systems
2. Flap Position Indicating Systems
3. Annunciator Light Systems
PERFORMANCE GOALS
II. AIRFRAME SYSTEMS AND COMPONENTS

H. POSITION AND WARNING SYSTEMS

51 INSPECT, CHECK AND SERVICE SPEED AND CONFIGURATION WARNING SYSTEMS, ELECTRICAL BRAKE CONTROLS AND ANTI-SKID SYSTEMS.

A. Using written information and diagrams, complete essay statements on the principles of operation of speed or Mach warning, stall warning, take-of warning and anti-skid brake control systems.

52 INSPECT, CHECK TROUBLESHOOT, AND SERVICE LANDING GEAR POSITION INDICATING AND WARNING SYSTEMS.

A. Using manufacturer’s manual or equivalent written information, and aircraft or mockup having retractable landing gear with a position indicating and warning system, inspect and check operation of each component of the position indicating and unsafe warning system. Troubleshoot and list all malfunctions and describe the repairs needed.
PRACTICAL PROJECTS
II. AIRFRAME SYSTEMS AND COMPONENTS

F. POSITION AND WARNING SYSTEMS

51-A Inspect, Check and Service Speed and Configuration Warning Systems, Electrical Brake Controls and Anti-skid systems.

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 4.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding of the operation, installation, service and configuration warning systems, electrical brake controls and anti-skid systems.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook Vol. 2

EQUIPMENT AND TOOLS REQUIRED:

N/A

SUPPLIES AND MATERIALS REQUIRED:

1. Written information
2. Visual training aid or diagrams
51-A Inspect, Check and Service Speed and Configuration Warning Systems, Electrical Brake Controls and Anti-skid systems.

PROCEDURES:

The student will complete 15 statements on the principle of operation and basic method of installation of speed or Mach warning, stall warning, take-off warning and electrical/hydraulic antiskid brake control system.
II. AIRFRAME SYSTEMS AND COMPONENTS

H. POSITION AND WARNING SYSTEMS

52-A Inspect, Check, Troubleshoot, and Service Landing Gear Position Indicating and Warning System.

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 8.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge, understanding and skill in the operation, service and repair of landing gear position indicating and warning systems.

REFERENCES:

1. AC 43.13-1B/2B (as revised)

2. FAA-H-8083-31A Airframe Handbook Vol. 2

3. Aircraft Manufacturer's Service Manual or landing gear mock-up manufacturer's instruction.

EQUIPMENT AND TOOLS REQUIRED

1. Aircraft or mock-up having retractable landing gear with position indicating and warning system installed and operating.

2. Aircraft Jacks

3. Basic Hands tools
52-A Inspect, Check, Troubleshoot, and Service Landing Gear Position Indicating and Warning System.

SUPPLIES AND MATERIALS REQUIRED

1. Written information

PROCEDURES:

The student will check the operation of the position indicating and warning lights by operating the landing gear inspect the components of the position indicating and warning system, troubleshoot and list all malfunctioning and describe the repairs needed.
II. AIRFRAME SYSTEM AND COMPONENTS

I. ICE AND RAIN CONTROL

TOTAL HOURS: 18  THEORY: 9  SHOP/LAB: 9

A. GENERAL EFFECTS OF ICE

1. Types of Ice Encountered in Flight
   a. Rime Ice
   b. Glaze Ice

2. Aircraft Performance during Icing
   a. Decreased Lift
   b. Increased Weight
   c. Increased Drag
   d. Decreased Trust

3. Methods of Preventing or Controlling Ice
   a. Heating Surfaces Using Hot Air
   b. Heating by Means of Electrical Elements
   c. Breaking Up Ice Formations
   d. Chemical Spray

B. PNEUMATIC DEICING SYSTEMS

1. Deicer Boot Construction
2. Pneumatic System Operation
   a. Small Aircraft
   b. Larger Aircraft Using Multiple Sections for Each Wing
   c. Pressuring Corresponding Wing Sections
   d. Regulating Pressure
   e. Regulating Vacuum

3. Pneumatic Deicing System Components
   a. Engine Driven Air Pump
      1) Vane Type
      2) Methods of Lubricating the Pumps
      3) Maintenance of Engine Driven Pump
   b. Safety Valves
      1) Purpose and Location
   c. Oil Separation
      1) Used With Wet Type Air Pump
      2) Maintenance of Oil Separator
   d. Combination Regulator, Unloading Valve and Oil Separator
      1) Functions
      2) Maintenance
   e. Suction Regulating Valve
      1) Purpose
      2) Maintenance
f. Solenoid Distributor Valve
   1) Function
   2) Operational Check

g. Electronic Timer
   1) Operational Sequence
   2) Time Intervals

4. Pneumatic Deicing system Maintenance
   a. Operational Checks
      1) Engine Driven Air Pump
      2) External Air Source
      3) Proper Air Pressure
      4) Correct Suction
      5) Proper Operating Sequence

   b. Adjustments
      1) Control Linkage
      2) Pressure Relief Valve
      3) Suction Relief Valve

   c. Troubleshooting
      1) Adjustment Trouble
      2) Component Malfunction Trouble
      3) Final Operational Check

   d. Inspection
      1) Pre-flight
      2) Periodic
Deicer Boot Maintenance

1) Cleaning
2) Resurfacing
3) Repairing
4) Cold Patch
5) Storage of Removed Deicer Boots

C. THERMAL ANTI-ICING SYSTEMS

1. Anti-icing Using Combustion Heaters
   a. Five Protection Controls
   b. Duct Pressure Safety Switch

2. Anti-icing Using Exhaust Heaters
   a. Exhaust Heat Muffs
   b. Heat Controls
   c. Manual Operation

3. Anti-icing Using Engine Bleed Air
   a. Source of Air
   b. Shut Off Valve
   c. Temperature Indicator
   d. Overheat Warning Light

4. Pneumatic System Ducting
   a. Materials Used
   b. Expansion Bellows
   c. Pressure Checking
   d. Leak Checking
5. Ground Deicing of Aircraft  
   a. Frost Removal  
      1) Use of Deicing Fluid  
      2) Time of Application Before Flight  
   b. Removing Ice and Snow Deposits  
      1) Precautions to be Used to Prevent Damage  
      2) Light Dry Snow Removal  
      3) Use of Chemicals on Heavy Snow  
      4) Inspection of Aircraft After Snow Removal  
      5) Snow and Ice on Turbine Engine Compressor  

D. WINDSHIELD ICING CONTROL SYSTEMS  
1. Electrical  
2. Heated Air  
3. Chemical  

E. MISCELLANEOUS ANTI-ICE, DEICE SYSTEMS  
1. Pilot Tube Anti-icing  
2. Window Defrost System  
3. Windshield and Carburetor Chemical Deicing System  
4. Water Drain Heaters  

F. RAIN ELIMINATING SYSTEMS  
1. Electrical Windshield Wiper System  
2. Hydraulic Windshield Wiper System  
3. Pneumatic Rain Removal System
4. Chemical Rain Repellant

5. Maintenance of Rain Removal System
   a. Windshield Wiper Systems
   b. Pneumatic Rain Removal Systems
PERFORMANCE GOALS
II. AIRFRAME SYSTEMS AND COMPONENTS

I. ICE AND RAIN CONTROL SYSTEMS:

LEVEL

53 INSPECT, CHECK, TROUBLESHOOT, SERVICE, AND REPAIR AIRFRAME ICE AND RAIN CONTROL SYSTEMS

A: Using written information, AC 43.13-1B/2B (as revised), schematic diagrams, remove, inspect, and reinstall and check the operation of an electrically heated pitot tube. Complete a work sheet showing work accomplished.
PRACTICAL PROJECTS
PRACTICAL PROJECT

II. AIRFRAME SYSTEMS AND COMPONENTS

I. ICE AND RAIN CONTROL SYSTEMS:

53-A Inspect, Check, Troubleshoot, Service and Repair Airframe Ice and Rain Control Systems.

TEACHING LEVEL: (2)

AVERAGE COMPLETION TIME: 9.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding the operation, inspection, service and repair of ice and rain control systems.

REFERENCES:

1. AC 43.13-1B/2B (as revised)
2. FAA-H-8083-31A Airframe Handbook Vol. 2
3. Ice and rain control system mock-up manufacturer's instructions.

EQUIPMENT AND TOOLS REQUIRED:

1. Ice and Rain control system mock-up

SUPPLIES AND MATERIALS REQUIRED:

1. Written information
53-A Inspect, Check, Troubleshoot, Service and Repair Airframe Ice and Rain Control Systems.

PROCEDURES:

The students will locate appropriate work procedures, to remove, inspect, reinstall and check the operation of an electrically heated pitot tube. He will complete a work sheet showing work accomplished.
II. AIRFRAME SYSTEM AND COMPONENTS

J. FIRE PROTECTION SYSTEM

TOTAL HOURS: 12  THEORY: 6  SHOP/LAB: 6

A. GENERAL

1. Detection Methods
2. Detection System Requirements
3. Types of fires
4. Fire Zones

B. FIRE DETECTION SYSTEMS

1. Thermal Switch Systems
2. Thermocouple Systems
3. Continuous Loop Systems
4. Lindberg Detection Systems

C. FIRE EXTINGUISHING AGENTS

1. Hydrocarbon Agents
   a. Halon 1301
   b. Halon 1211
   c. Halon 1011
   d. Halon 1001
2. Inert Cold Gas Agents
   a. Carbon Dioxide (CO₂)
   b. Nitrogen (N₂)

D. FIRE EXTINGUISHING SYSTEMS

1. High Rate of Discharge Systems
2. Conventional Systems
3. Reciprocating Engine Systems
4. Turbojet Fire Protection systems
5. Turbine Engine Extinguishing Systems
6. Turbine Engine Ground fire Protection

E. FIRE PROTECTION SYSTEM INSPECTION AND MAINTENANCE

1. Fire Detection Maintenance and Inspection
2. Detection System Troubleshooting
3. Extinguisher System Maintenance
   a. Container Pressure Check
   b. Freon Discharge Cartridges
   c. Freon Containers
   d. Carbon Dioxide Cylinders

F. COCKPIT AND CABIN INTERIORS

1. Extinguisher Types
2. Unsuitable Extinguisher
3. Smoke Detection Systems
   a. Carbon Monoxide Detectors
b. Photoelectric Smoke Detectors

c. Visual Smoke Detectors
PERFORMANCE GOALS
II. AIRFRAME SYSTEMS AND COMPONENTS

J. FIRE PROTECTION

54 INSPECT, CHECK, AND SERVICE SMOKE AND CARBON MONOXIDE DETECTION SYSTEMS

A. Using written information, complete essay, completion type statements concerning photoelectric and visual smoke detectors and chemical type carbon monoxide detectors.

55 INSPECT, CHECK, SERVICE, TROUBLESHOOT, AND REPAIR AIRCRAFT FIRE DETECTION AND EXTINGUISHING SYSTEMS

A. Using manufacturer’s or equivalent written information, an aircraft or mockup fire detection and extinguishing system, inspect, check, troubleshoot and repair the systems.

B. Using written information and drawings of fire detectors, write a brief description of the operation of a thermal switch, thermocouple, and continuous loop fire detectors.
PRACTICAL PROJECTS
PRACTICAL PROJECT

II. AIRFRAME SYSTEMS AND COMPONENTS

J. FIRE PROTECTION

54-A INSPECT, CHECK, AND SERVICE SMOKE AND CARBON MONOXIDE DETECTION SYSTEMS

TEACHING LEVEL: (1)

AVERAGE COMPLETION TIME: 1.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge, understanding and skill in the operation inspection and repair of fire detection and extinguishing systems.

REFERENCE:

1. FAA-H-8083-31A Airframe Handbook Vol. 2
2. Mock-up manufacturer’s information

EQUIPMENT AND TOOLS REQUIRED:

1. Fire detector Mock-up
2. Voltmeter

SUPPLIES AND MATERIAL REQUIRED:

1. Written information

PROCEDURE:

Using written information, complete essay, completion type statements concerning photo-electric and visual smoke detectors and chemical type carbon monoxide detectors.
PRACTICAL PROJECT

II. AIRFRAME SYSTEMS AND COMPONENTS

J. FIRE PROTECTION

55-A Inspect, Check, Service, Troubleshoot and Repair Aircraft Fire Detection and Extinguishing System

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 2.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge, understanding and skill in the operation inspection and repair of fire detection and extinguishing systems.

REFERENCE:

1. FAA-H-8083-31A Airframe Handbook Vol. 2
2. Mock-up manufacturer’s information

EQUIPMENT AND TOOLS REQUIRED:

1. Fire detector Mock-up
2. Voltmeter

SUPPLIES AND MATERIAL REQUIRED:

1. Written information
55-A Inspect, Check, Service, Troubleshoot and Repair Aircraft Fire Detection and Extinguishing System PROCEDURES:

Procedure: On a mock-up, the student will trace the circuit of a fire detection system and activate the system alarm. He will use a voltmeter to locate a malfunction introduced into the mock-up circuit and correct it.
II. AIRFRAME SYSTEMS AND COMPONENTS

J. FIRE PROTECTION

55-B Inspect, Check, Service, Troubleshoot and Repair Aircraft Fire Detection and Extinguishing System

TEACHING LEVEL: (3)

AVERAGE COMPLETION TIME: 3.0 Hrs.

PURPOSE:

To acquaint the student with the required knowledge and understanding in the operation of aircraft detection system.

REFERENCE:

1. FAA-H-8083-31A Airframe Handbook Vol. 2
2. Fire detection manufacturer instruction

EQUIPMENT AND TOOLS REQUIRED:

1. Fire detector Mock-up

SUPPLIES AND MATERIALS REQUIRED:

2. Written information

PROCEDURES:

The student will write a brief description of the method of operation for each of the following types of fire detectors: thermal-switch, thermocouple and continuous loop.
## GLOSSARY OF TERMS AND DEFINITIONS

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC 43.13-1B/2B</td>
<td>An advisory Circular in book form issued by the Federal Aviation Administration which covers acceptable methods, techniques, and practices for aircraft inspection and repair.</td>
</tr>
<tr>
<td>AC Out Put</td>
<td>Alternating current produced or generated.</td>
</tr>
<tr>
<td>ADF</td>
<td>Automatic Direction Finder: A method of radio navigation that keeps the pilot informed of his heading relative to the station.</td>
</tr>
<tr>
<td>Airframe</td>
<td>The structure of an aircraft without the power plant.</td>
</tr>
<tr>
<td>Aircraft spruce</td>
<td>Wood species origin from USA and Canada that meets FAA requirements set forth on AC 43.13-1B.</td>
</tr>
<tr>
<td>Anti-icing</td>
<td>The prevention of ice formation.</td>
</tr>
<tr>
<td>Anti-tear Strip</td>
<td>Strips of fabric of the same materials as the airplane is covered with, laid over the wing rib under the reinforcing tape.</td>
</tr>
<tr>
<td>Airworthiness (airworthy)</td>
<td>Meets all of the requirements established on the Federal Aviation Regulations (US-FAR)</td>
</tr>
<tr>
<td>Arc-Welding</td>
<td>A form of welding in which the heat required to melt the metal is produced by an electric arc.</td>
</tr>
<tr>
<td>Term</td>
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<tr>
<td>------------------------------------------</td>
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</tr>
<tr>
<td>CSD Unit-Constant Speed Drive</td>
<td>A unit used to maintain a constant rotation speed of aircraft AC alternators even though the engine speed varies.</td>
</tr>
<tr>
<td>CO Detector-Carbon Monoxide Detector</td>
<td>A device used to detect the presence and concentration of carbon monoxide gas.</td>
</tr>
<tr>
<td>Chafe Points</td>
<td>Metal seam of protruding rivets or screws, which requires protective covering before fabric application.</td>
</tr>
<tr>
<td>Check</td>
<td>Means to very proper operation.</td>
</tr>
<tr>
<td>DC Out Put</td>
<td>Direct current produced or generated.</td>
</tr>
<tr>
<td>DME-Distance Direction Equipment</td>
<td>Electronic Navigation equipment which measures the time required for a signal to travel from the airplane to a ground station and return to the airplane. This time is translated into nautical miles to the station.</td>
</tr>
<tr>
<td>Dope-proof Paint</td>
<td>A finish applied over a varnished surface to prevent the solvents in the dope coming in contact with the varnish and lifting it.</td>
</tr>
<tr>
<td>8083-31A</td>
<td>Airframe handbook developed and first printed in 1972. Provide basic information on principles fundamentals and technical procedures in the subject areas relating to the airframe rating.</td>
</tr>
<tr>
<td>FAA FORM 337</td>
<td>Major Repair and Alteration From required to be fill-out upon the completion of any major repair or alteration as set forth on FAR 43.</td>
</tr>
<tr>
<td>FCC-Federal Communications Commission</td>
<td>That part of the federal government that regulates the transmission of energy or intelligence by radio.</td>
</tr>
<tr>
<td>Gas-Weld</td>
<td>The method of fusing metals together by a flame using gas as its fuel. The most common types of gas welding are oxy-acetylene and oxy-hydrogen.</td>
</tr>
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# GLOSSARY OF TERMS AND DEFINITIONS

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<tr>
<td><strong>HF-High Frequency</strong></td>
<td>Frequency range between 3 to 30 Mhz.</td>
</tr>
<tr>
<td><strong>Honeycomb</strong></td>
<td>A hexagonal cellular material made of thin metal, paper or plastic, used as a core material for sandwich structure. Named after the bee’s honeycomb because of its appearance.</td>
</tr>
<tr>
<td><strong>Inspect</strong></td>
<td>Means to examine by sign and touch.</td>
</tr>
<tr>
<td><strong>ILS-Instrument Landing System</strong></td>
<td>A precision instrument approach system which normally consists of the following electronic components and visual aids: localizer, glide slope, outer marker, and approach lights.</td>
</tr>
<tr>
<td><strong>Loran-Long Range Aid To Navigation</strong></td>
<td>Low frequency navigation system; replaced by modern Loran-C navigational systems.</td>
</tr>
<tr>
<td><strong>MEK-Methyl Ethyl Ketone</strong></td>
<td>An important low-cost solvent similar to acetone. Used as a cleaning agent to prepare a surface for painting, and as a stripper for certain finished.</td>
</tr>
<tr>
<td><strong>Overhaul</strong></td>
<td>Means to disassemble, inspect, repair as necessary, and check.</td>
</tr>
<tr>
<td><strong>PBCV- Power Brake Control Valve</strong></td>
<td>A special form of pressure regulator between the aircraft hydraulic systems and the brake cylinders. The amount of pressure applied to the brakes is directly proportional to the force the pilots puts on the brake pedals.</td>
</tr>
<tr>
<td><strong>Repair</strong></td>
<td>Means to correct a defective condition. Repair of an airframe or power plant system includes components replacement and adjustment, but not component repair.</td>
</tr>
<tr>
<td><strong>Service</strong></td>
<td>Means to perform functions that assure continued operation.</td>
</tr>
<tr>
<td><strong>Troubleshoot</strong></td>
<td>Means to analyze and identify malfunctions.</td>
</tr>
</tbody>
</table>
TEXTBOOKS REQUIRED BY THE STUDENTS


CURRICULUM REQUIREMENTS

This is the description of the levels of proficiency at which items under each subject in the curriculum shall be taught.

TEACHING LEVELS:

(1) Level 1 requires:
   (i) Knowledge of general principles but not practical application.
   (ii) Development of sufficient manipulative skills to perform basic operations.
   (iii) Instruction by lecture, demonstration, discussion and limited practical application.

(2) Level 2 requires:
   (i) Knowledge of general principles, and limited practical application.
   (ii) Development of sufficient manipulative skills to perform basic operations.
   (iii) Instruction by lecture, demonstration, discussion and limited practical application.

(3) Level 3 requires:
   (i) Knowledge general principles, and performance of high degree of practical application.
AIRFRAME COURSE CURRICULUM MANUAL

AIRFRAME CURRICULUM SUBJECTS

This list is the subjects required in 792 hours in the Airframe Curriculum, in addition to 492 hours in General Curriculum subjects.

The number in parentheses before each item listed under each subject heading indicated the level of proficiency at which that item shall be taught.

I.  AIRFRAME STRUCTURES

A.  WOOD STRUCTURE

(1)  1. Service and repair wood structures.

(1)  2. Identify wood defects.

(1)  3. Inspect wood structures.

B.  AIRCRAFT COVERING

(1)  4. Select and apply fabric and fiberglass covering materials.

(1)  5. Inspect, test, and repair fabric and fiberglass.

C.  AIRCRAFT FINISHES

(1)  6. Apply trim, letters, and touch-up paint.

(2)  7. Identify and select aircraft finishing materials.

(2)  8. Apply finishing materials.

(2)  9. Inspect finishes and identify defects.
D. SHEET METAL AND NON-METALLIC STRUCTURES

(2) 10. Select, install, and remove special fasteners for metallic, bonded, and composite structures.

(2) 11. Inspect bonded structures.

(2) 12. Inspect, test, and repair fiberglass, plastic honeycomb, composite, and laminated primary and secondary structure.

(2) 13. Inspect, check, service, and repair windows, doors, and interior furnishing.

(2) 14. Inspect and repair sheet metal structures.

(3) 15. Install conventional rivets.

(3) 16. Form, lay-out and bend sheet metal.

E. WELDING

(1) 17. Weld magnesium and titanium.

(1) 18. Solder stainless steel.

(1) 19. Fabricate tubular structures.

(2) 20. Solder, braze, gas-weld, and arc-weld steel.

(1) 21. Weld aluminum and stainless steel.

F. ASSEMBLY AND RIGGING

(1) 22. Rig rotary-wing aircraft.

(2) 23. Rig fixed-wing aircraft.

(2) 24. Check alignment of structures.

(3) 25. Assemble aircraft components, including flight control surfaces.

G. AIRFRAME INSPECTION

(3) 28. Perform airframe conformity and air-worthiness inspections.

II. AIRFRAME SYSTEMS AND COMPONENTS

A. AIRCRAFT LANDING GEAR SYSTEMS

(3) 29. Inspect, check, service and repair landing gear, retraction systems, shock struts, brakes, wheels, tires, and steering systems.

B. HYDRAULIC AND PNEUMATIC POWER SYSTEM

(2) 30. Repair hydraulic and pneumatic power systems components.

(3) 31. Identify and selected hydraulic fluids.

(3) 32. Inspect, check, service, troubleshoot, and repair hydraulic and pneumatic power system.

C. CABIN ATMOSPHERE CONTROL SYSTEMS

(1) 33. Inspect, check, troubleshoot, service, and repair heating, cooling, air conditioning, pressurization systems.

(1) 34. Inspect, check, troubleshoot, service, and repair heating, cooling, air conditioning, and pressurization systems.

(2) 35. Inspect, check, troubleshoot, service and repair oxygen system.
D. AIRCRAFT INSTRUMENTS

(1) 36. Inspect, check, service, troubleshoot and repair electronic flight instrument systems and both mechanical and electrical heading, speed, altitude, temperature, pressure, and position indicating systems to include the use of built-in test equipment.

(2) 37. Install instruments and perform a static pressure system leak test.

E. COMMUNICATION AND NAVIGATION SYSTEMS

(1) 38. Inspect, check, and troubleshoot autopilot, servos and approach coupling systems.

(1) 39. Inspect, check, and service aircraft electronic communication and navigation systems, including VHF passenger address interphones and static discharge devices, aircraft VOR, ILS, LORAN, Radar beacon transponders, flight management computer, and GPWS.

(2) 40. Inspect and repair antenna and electronic equipment installations.

F. AIRCRAFT FUEL SYSTEMS

(1) 41. Check and service fuel dump systems.

(1) 42. Perform fuel management, transfer, and defueling.

(1) 43. Inspect, check, and repair pressure fueling systems.

(2) 44. Repair aircraft fuel system components.

(2) 45. Inspect and repair fluid quantity indicating systems.

(2) 46. Troubleshoot, service, and repair fluid pressure and temperature warning systems.
AIRFRAME CURRICULUM SUBJECTS

(3) 47. Inspect, check, service, troubleshoot, and repair aircraft fuel systems.

G. AIRCRAFT ELECTRICAL SYSTEMS

(2) 48. Repair and inspect aircraft electrical system components; crimp and splice wiring to manufacturers’ specifications; and repair pins and sockets of aircraft connectors.

(3) 49. Install, check, and service airframe electrical wiring, controls, switches, indicators, and protective devices.

(3) 50.a. Inspect, check, troubleshoot, service, and repair alternating and direct current electrical systems.

(1) 50.b. Inspect, check, and troubleshoot constant speed and integrated speed drive generators.

H. POSITION AND WARNING SYSTEMS

(2) 51. Inspect, check, and service speed and configuration warning systems, electrical brake controls, and anti-skid systems.

(3) 52. Inspect, check, troubleshoot, and service landing gear position indicating and warning systems.

I. ICE AND RAIN CONTROL SYSTEMS

(2) 53. Inspect, check, troubleshoot, service, and repair airframe ice and rain control systems.

J. FIRE PROTECTION SYSTEMS

(1) 54. Inspect, check, and service smoke and carbon monoxide detection systems.

(3) 55. Inspect, check, service, troubleshoot, and repair aircraft fire detection and extinguishing system
STUDENT WORKBOOK
AIRFRAME CURRICULUM
### AIRFRAME CURRICULUM

#### PRACTICAL PROJECT RECORD

**Student Name:** _____________________  **Student Num.** _____________________

**Instructor:** ____________________________  **Group:** _______________________

### I. AIRFRAME STRUCTURES

#### A. WOOD STRUCTURES – Practical Projects: 3

<table>
<thead>
<tr>
<th>Number</th>
<th>Practical Project Title</th>
<th>Level</th>
<th>Hour</th>
<th>Evaluation Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-A</td>
<td>Service and repair wood structures</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-B</td>
<td>Service and repair wood structures *Optional</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-A</td>
<td>Identify wood defects</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-A</td>
<td>Inspect wood structures</td>
<td>1</td>
<td></td>
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</tbody>
</table>

**TOTALS**

#### B. AIRCRAFT COVERING – Practical Projects: 2

<table>
<thead>
<tr>
<th>Number</th>
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<th>Level</th>
<th>Hour</th>
<th>Evaluation Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-A</td>
<td>Select and apply fabric and fiberglass covering materials</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Code</td>
<td>Task Description</td>
<td>Quantity</td>
<td></td>
<td></td>
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<tr>
<td>------</td>
<td>---------------------------------------------</td>
<td>----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-A</td>
<td>Inspect, test, and repair fabric and fiberglass</td>
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</table>

TOTALS
### C. AIRCRAFT FINISHES

<table>
<thead>
<tr>
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<th>Level</th>
<th>Hour</th>
<th>Evaluation Grade</th>
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</thead>
<tbody>
<tr>
<td>6-A</td>
<td>Apply trim, letters, and touch-up paint</td>
<td>1</td>
<td></td>
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</tr>
<tr>
<td>7-A</td>
<td>Identify and select aircraft finishing materials</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-A</td>
<td>Apply finishing materials</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-A</td>
<td>Inspect finishes and identify defects</td>
<td>2</td>
<td></td>
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<td></td>
<td><strong>TOTALS</strong></td>
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### D. SHEET METAL AND NON-METALLIC STRUCTURES

<table>
<thead>
<tr>
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<th>Practical Project Title</th>
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<th>Hour</th>
<th>Evaluation Grade</th>
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</thead>
<tbody>
<tr>
<td>10-A</td>
<td>Select, install, and remove special fasteners for metallic, bonded and composite structures.</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-A</td>
<td>Inspect bonded structures</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-A</td>
<td>Inspect, test, and repair fiberglass, plastics, honeycomb, composite, and laminated primary and secondary structures.</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-B</td>
<td>Inspect, test, and repair fiberglass, plastics, honeycomb, composite, and laminated primary and secondary structures.</td>
<td>2</td>
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</table>
### PRACTICAL PROJECT RECORD

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Score</th>
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<tbody>
<tr>
<td>12-C</td>
<td>Inspect, test, and repair fiberglass, plastics, honeycomb, composite, and laminated primary and secondary structures.</td>
<td>2</td>
</tr>
<tr>
<td>12-D</td>
<td>Inspect, test, and repair fiberglass, plastics, honeycomb, composite, and laminated primary and secondary structures.</td>
<td>2</td>
</tr>
<tr>
<td>12-E</td>
<td>Inspect, test, and repair fiberglass, plastics, honeycomb, composite, and laminated primary and secondary structures.</td>
<td>2</td>
</tr>
<tr>
<td>13-A</td>
<td>Inspect, check, service, and repair windows, doors and interior furnishings</td>
<td>2</td>
</tr>
<tr>
<td>13-B</td>
<td>Inspect, check, service, and repair windows, doors and interior furnishings</td>
<td>2</td>
</tr>
<tr>
<td>13-C</td>
<td>Inspect, check, service, and repair windows, doors and interior furnishings</td>
<td>2</td>
</tr>
<tr>
<td>13-D</td>
<td>Inspect, check, service, and repair windows, doors and interior furnishings</td>
<td>2</td>
</tr>
<tr>
<td>14-A</td>
<td>Inspect and repair sheet metal structures</td>
<td>3</td>
</tr>
<tr>
<td>14-B</td>
<td>Inspect and repair sheet metal structures</td>
<td>3</td>
</tr>
<tr>
<td>15-A</td>
<td>Install conventional rivets</td>
<td>3</td>
</tr>
<tr>
<td>15-B</td>
<td>Install conventional rivets</td>
<td>3</td>
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</tbody>
</table>
### Practical Project Record

<table>
<thead>
<tr>
<th>Number</th>
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<th>Level</th>
<th>Hour</th>
<th>Evaluation Grade</th>
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</thead>
<tbody>
<tr>
<td>16-A</td>
<td>Form, lay-out, and bend sheet metal.</td>
<td></td>
<td>3</td>
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</table>

**TOTALS**

### E. Welding – Practical Projects: 9

<table>
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<tr>
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<th>Practical Project Title</th>
<th>Level</th>
<th>Hour</th>
<th>Evaluation Grade</th>
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</thead>
<tbody>
<tr>
<td>17-A</td>
<td>Weld magnesium and titanium</td>
<td>1</td>
<td></td>
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<tr>
<td>18-A</td>
<td>Solder Stainless steel</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-A</td>
<td>Fabricate tubular structures</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-A</td>
<td>Solder, braze, gas-weld, and arc-weld steel</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-B</td>
<td>Solder, braze, gas-weld, and arc-weld steel</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-C</td>
<td>Solder, braze, gas-weld, and arc-weld steel</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-D</td>
<td>Solder, braze, gas-weld, and arc-weld steel</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-E</td>
<td>Solder, braze, gas-weld, and arc-weld steel</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-A</td>
<td>Weld aluminum and stainless steel</td>
<td>1</td>
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**TOTALS**
### F. ASSEMBLY AND RIGGING – Practical Projects: 8

<table>
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<tr>
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<th>Practical Project Title</th>
<th>Level</th>
<th>Hour</th>
<th>Evaluation Grade</th>
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</thead>
<tbody>
<tr>
<td>22-A</td>
<td>Rig rotary-wing aircraft</td>
<td>1</td>
<td></td>
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</tr>
<tr>
<td>23-A</td>
<td>Rig rotary-wing aircraft</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23-B</td>
<td>Rig rotary-wing aircraft</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-A</td>
<td>Check alignment of structures</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25-A</td>
<td>Assemble aircraft component, including flight control surfaces.</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26-A</td>
<td>Balance, rig, and inspect movable primary and secondary flight control</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26-B</td>
<td>Balance, rig, and inspect movable primary and secondary flight control</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27-A</td>
<td>Jack aircraft</td>
<td>3</td>
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</table>

**TOTAL**

### G. AIRFRAME INSPECTION – Practical Projects: 2

<table>
<thead>
<tr>
<th>Number</th>
<th>Practical Project Title</th>
<th>Level</th>
<th>Hour</th>
<th>Evaluation Grade</th>
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</thead>
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### PRACTICAL PROJECT RECORD

<table>
<thead>
<tr>
<th>28-A</th>
<th>Perform airframe conformity and airworthiness inspections</th>
<th>3</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>28-B</td>
<td>Perform airframe conformity and airworthiness inspections</td>
<td>3</td>
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</table>

**TOTAL**

### AIRFRAME SYSTEMS AND COMPONENTS

**A. AIRCRAFT LANDING GEAR SYSTEMS** – Practical Projects: 7

<table>
<thead>
<tr>
<th>Number</th>
<th>Practical Project Title</th>
<th>Level</th>
<th>Hour</th>
<th>Evaluation Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>29-A</td>
<td>Inspect, check, service, and repair landing gear retraction systems, shock struts, brakes wheels, tires and steering systems.</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29-B</td>
<td>Inspect, check, service, and repair landing gear retraction systems, shock struts, brakes wheels, tires and steering systems.</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29-C</td>
<td>Inspect, check, service, and repair landing gear retraction systems, shock struts, brakes wheels, tires and steering systems.</td>
<td>3</td>
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### PRACTICAL PROJECT RECORD

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<th>Level</th>
<th>Hour</th>
<th>Evaluation Grade</th>
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</thead>
<tbody>
<tr>
<td>29-D</td>
<td>Inspect, check, service, and repair landing gear retraction systems, shock struts, brakes wheels, tires and steering systems.</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>29-E</td>
<td>Inspect, check, service, and repair landing gear retraction systems, shock struts, brakes wheels, tires and steering systems.</td>
<td></td>
<td>3</td>
<td></td>
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<tr>
<td>29-F</td>
<td>Inspect, check, service, and repair landing gear retraction systems, shock struts, brakes wheels, tires and steering systems.</td>
<td></td>
<td>3</td>
<td></td>
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<tr>
<td>29-G</td>
<td>Inspect, check, service, and repair landing gear retraction systems, shock struts, brakes wheels, tires and steering systems.</td>
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**TOTALS**

#### B. HYDRAULIC AND PNEUMATIC POWER SYSTEMS

**Practical Projects: 5**

<table>
<thead>
<tr>
<th>Number</th>
<th>Practical Project Title</th>
<th>Level</th>
<th>Hour</th>
<th>Evaluation Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-A</td>
<td>Repair Hydraulic and pneumatic power systems components.</td>
<td>2</td>
<td></td>
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<tr>
<td>31-A</td>
<td>Identify and select hydraulic fluids.</td>
<td>3</td>
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</table>
### PRACTICAL PROJECT RECORD

<p>| | | | | |</p>
<table>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>31-B</td>
<td>Identify and select hydraulic fluids</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32-A</td>
<td>Inspect, check, service, and repair landing gear retraction systems, shock struts, brakes wheels, tires and steering systems.</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32-B</td>
<td>Inspect, check, service, and repair landing gear retraction systems, shock struts, brakes wheels, tires and steering systems.</td>
<td>3</td>
<td></td>
<td>A-9</td>
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**TOTALES**

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### C. CABIN ATMOSPHERE CONTROL SYSTEMS – Practical Projects: 3

<table>
<thead>
<tr>
<th>Number</th>
<th>Practical Project Title</th>
<th>Level</th>
<th>Hour</th>
<th>Evaluation Grade</th>
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</thead>
<tbody>
<tr>
<td>33-A</td>
<td>Inspect, check, troubleshoot, service, and repair heating, cooling, air conditioning, pressurization systems, and air cycle machines.</td>
<td>1</td>
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<tr>
<td>34-A</td>
<td>Inspect, check, troubleshoot, service, and repair heating, cooling, air conditioning, and pressurization systems.</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35-A</td>
<td>Inspect, check, troubleshoot, service and repair oxygen systems.</td>
<td>2</td>
<td></td>
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</tr>
<tr>
<td>Number</td>
<td>Practical Project Title</td>
<td>Level</td>
<td>Hour</td>
<td>Evaluation Grade</td>
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<td>--------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>-------</td>
<td>------</td>
<td>------------------</td>
</tr>
<tr>
<td>36-A</td>
<td>Inspect, check, service, troubleshoot and repair electronic flight instrument systems and both mechanical and electrical heading speed, altitude, temperature, pressure, and position indicating systems to include the use of built-in test equipment (BITE).</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37-A</td>
<td>Install instruments and perform a static pressure system leak test.</td>
<td>2</td>
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**TOTALS**

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**E. COMMUNICATION AND NAVIGATION SYSTEMS – Practical Projects 3**
### Practical Project Record

<table>
<thead>
<tr>
<th>Number</th>
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<th>Level</th>
<th>Hour</th>
<th>Evaluation Grade</th>
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<tbody>
<tr>
<td>38-A</td>
<td>Inspect, check, and troubleshoot autopilot, servos and approach coupling systems.</td>
<td>1</td>
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<tr>
<td>39-A</td>
<td>Inspect, check and service aircraft electronic communication and navigation systems,</td>
<td>1</td>
<td></td>
<td>A-11</td>
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<tr>
<td></td>
<td>including VHF passenger address interphones and static discharge devices, aircraft</td>
<td></td>
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<tr>
<td></td>
<td>VOR, ILS, LORAN, Radar beacon transponders, flight management computers, and GPWS.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-A</td>
<td>Inspect and repair antenna and electronic equipment installations</td>
<td>2</td>
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</tbody>
</table>

**TOTALS**

### F. Aircraft Fuel Systems – Practical Projects: 9

<table>
<thead>
<tr>
<th>Number</th>
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<th>Level</th>
<th>Hour</th>
<th>Evaluation Grade</th>
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<tbody>
<tr>
<td>41-A</td>
<td>Check and service fuel dump systems</td>
<td>1</td>
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<tr>
<td>42-A</td>
<td>Perform fuel management, transfer, and defueling</td>
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</tr>
<tr>
<td>43-A</td>
<td>Inspect, check and repair pressure fueling systems</td>
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</table>
### PRACTICAL PROJECT RECORD

<table>
<thead>
<tr>
<th>Number</th>
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<th>Level</th>
<th>Hour</th>
<th>Evaluation Grade</th>
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<tbody>
<tr>
<td>44-A</td>
<td>Repair aircraft fuel system components</td>
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<tr>
<td>45-A</td>
<td>Inspect and Repair Fluid Quantity Indicating Systems.</td>
<td>2</td>
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<td></td>
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<tr>
<td>46-A</td>
<td>Troubleshoot service and repair fluid pressure and temperature warning system.</td>
<td>2</td>
<td></td>
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<tr>
<td>46-B</td>
<td>Troubleshoot service and repair fluid pressure and temperature warning system.</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>47-A</td>
<td>Inspect, check, service, troubleshoot, and repair aircraft fuel systems.</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>47-B</td>
<td>Inspect, check, service, troubleshoot, and repair aircraft fuel systems.</td>
<td>3</td>
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**TOTALS**

### AIRCRAFT ELECTRICAL SYSTEMS – Practical Projects 4

<table>
<thead>
<tr>
<th>Number</th>
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<th>Level</th>
<th>Hour</th>
<th>Evaluation Grade</th>
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</thead>
<tbody>
<tr>
<td>48-A</td>
<td>Repair and inspect aircraft electrical system components; crimp and splice wiring to manufacturer’s specifications; and repair pins and sockets of aircraft connectors.</td>
<td>2</td>
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</tr>
</tbody>
</table>
### PRACTICAL PROJECT RECORD

<table>
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<th>Hour</th>
<th>Evaluation Grade</th>
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<tr>
<td>49-A</td>
<td>Install, check, and service airframe electrical wiring, controls, switches, indicators, and protective devices.</td>
<td>3</td>
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<tr>
<td>50-A</td>
<td>Inspect, check, troubleshoot, service and repair alternating and direct current electrical systems.</td>
<td>3</td>
<td></td>
<td>A-13</td>
</tr>
<tr>
<td>50-B</td>
<td>Inspect, check, and troubleshoot constant speed and integrated speed drive generators.</td>
<td>1</td>
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</table>

**TOTALS**

### H. POSITION AND WARNING SYSTEMS – Practical Projects: 2

<table>
<thead>
<tr>
<th>Number</th>
<th>Practical Project Title</th>
<th>Level</th>
<th>Hour</th>
<th>Evaluation Grade</th>
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</thead>
<tbody>
<tr>
<td>51-A</td>
<td>Inspect, check, and service speed and configuration warning systems, electrical brake controls, and antiskid systems.</td>
<td>2</td>
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<tr>
<td>52-A</td>
<td>Inspect, check troubleshoot, and service landing gear position indicating and warning systems.</td>
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**TOTALS**
### I. ICE AND RAIN CONTROL SYSTEMS – Practical Projects 1

<table>
<thead>
<tr>
<th>Number</th>
<th>Practical Project Title</th>
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<th>Hour</th>
<th>Evaluation Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>53-A</td>
<td>Inspect, check, troubleshoot, and service landing gear position indicating and warning systems.</td>
<td>2</td>
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**TOTALS**

### J. FIRE PROTECTION – Practical Projects 3

<table>
<thead>
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<th>Number</th>
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<th>Evaluation Grade</th>
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</thead>
<tbody>
<tr>
<td>54-A</td>
<td>Inspect, check, and service smoke and carbon monoxide detection systems.</td>
<td>1</td>
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<tr>
<td>55-A</td>
<td>Inspect, check, service, troubleshoot, and repair aircraft fire detection and extinguishing systems</td>
<td>3</td>
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<tr>
<td>55-B</td>
<td>Inspect, check, service, troubleshoot, and repair aircraft fire detection and Extinguishing systems.</td>
<td>3</td>
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**TOTALS**
### PRACTICAL PROJECT RECORD

<table>
<thead>
<tr>
<th><strong>TOTAL PRACTICAL PROJECT:</strong></th>
<th>83</th>
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<tbody>
<tr>
<td><strong>TOTAL HOURS:</strong></td>
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<td><strong>EVALUATION GRADE:</strong></td>
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</table>

**EVALUATION GRADE:** A-15