STUDENTS NOTEBOOK

AIRP[illegible]E AND ENGINE MECHANICS COURSE

B-24 AND B-32

ARMY AIR FORCES TECHNICAL SCHOOL

KEESLER FIELD, MISSISSIPPI

Student's Name _____

Class No. _____ ASN _____

Squadron _____

REMEMBER -

"Facts are good only so long as they ARE FACTS.
Get used to 'Lookin' It Up' in Tech. Orders."

REPRODUCTION UNIT
KEESLER FIELD

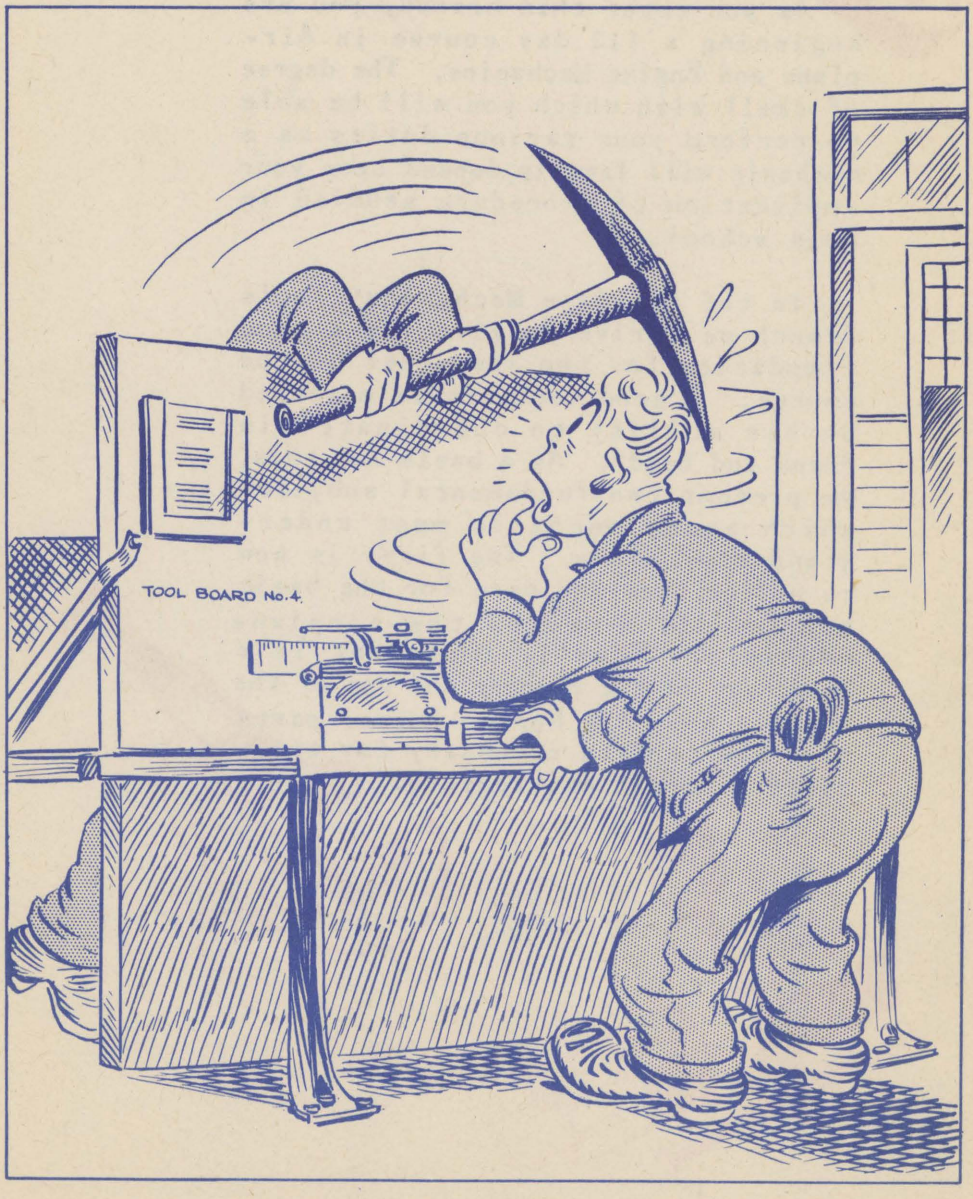
Preface Page

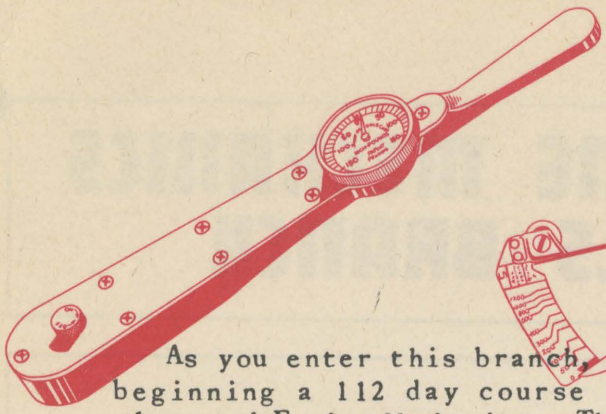
STUDENT NOTEBOOK

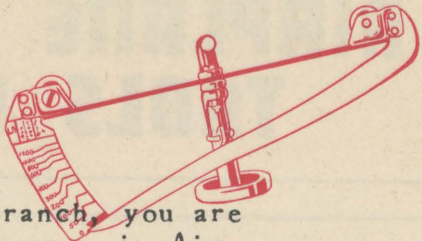
This notebook is issued so that you can obtain a preview of the training which you will be given during the next few months. Considerable space has been allowed for notes which you may find desirable to make.

Due to rapid progress in airplane design, maintenance procedures and methods of instruction, changes will occur in all probability during the time you are in school. To keep you informed, revised sheets for any day in which major changes are made will be supplied the branch concerned. You will obtain from the instructor of the first day's work in each branch, all changes which have been made to date. You can make the correct substitutions in your book, retaining the rescinded sheets for your notes.

AIRPLANE MECHANICS TOOLS BRANCH

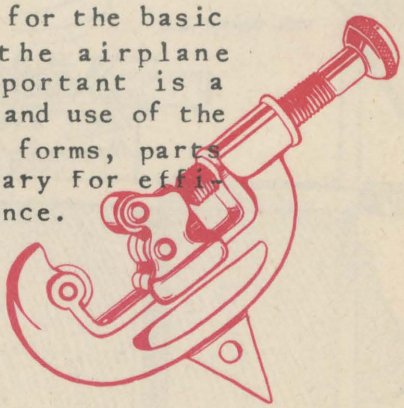


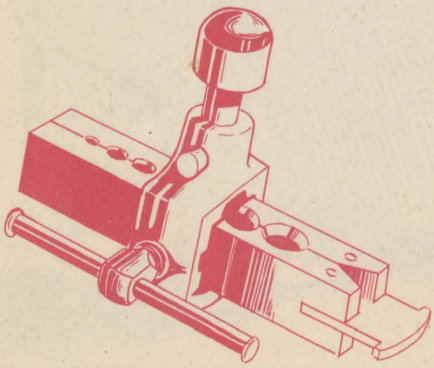




As you enter this branch, you are beginning a 112 day course in Airplane and Engine Mechanics. The degree of skill with which you will be able to perform your various duties as a mechanic will largely depend upon your application of procedure studied in this school.

In the Airplane Mechanics' Tools Branch we strive to give you a good foundation for the remainder of the course. A good mechanic is measured by his ability to coordinate his "hand and head". As a basis for this, we present two fundamental subjects which every mechanic must understand thoroughly. The first is how to select, use and care for the basic hand tools used by the airplane mechanic. Equally important is a knowledge of the purpose and use of the various Army Air Forces forms, parts tags and reports necessary for efficient aircraft maintenance.





3/18/44

AIRPLANE MECHANICS' TOOLS BRANCH

PHASE 1

THE AIRPLANE MECHANIC'S BASIC TOOLS; TECHNICAL ORDER INDEX

YOU WILL: Learn to select and use tools properly; Learn how to locate vital information in Technical Orders.

YOU SHOULD READ: TM 10-590, Sections I, and II, Par. 2, 3 and 5; Section III, Par. 23 and 26. Phase 1 Training Exercises.

NOTES & SKETCHES:

3/18/44

AIRPLANE MECHANICS' TOOLS BRANCH

PHASE 2

AIRCRAFT HARDWARE MAINTENANCE INSPECTION RECORD

YOU WILL: Identify aircraft hardware; Select the proper type and size tool for assigned jobs; Learn the purpose of Airplane Maintenance Instruction Forms; Start a Form 41B.

YOU SHOULD READ: TM 10-590, Section II, Par. 17-19. TM 1-424, Section VI, Par. 27-29, 31 and 39. Phase 2 Training Exercises.

NOTES & SKETCHES:

AIRPLANE MECHANICS' TOOLS BRANCH

PHASE 3

PRECISION ASSEMBLY AND DISASSEMBLY METHODS: AIRPLANE FLIGHT REPORTS

YOU WILL: Learn how to apply wrench torque correctly; Initial airplane flight reports.

YOU SHOULD READ: Phase 3 Training Exercises.

NOTES & SKETCHES:

AIRPLANE MECHANICS' TOOLS BRANCH

PHASE 4

USE OF FABRICATING TOOLS

YOU WILL: Make a Dzus wrench; Solder electrical connections; Heat treat metal, Polish plexiglass.

YOU SHOULD READ: TM 10-590, Section II, Par. 4, 7, and 8; Section IV, Par. 36. TM 1-424, Section I, and II, Par. 3 and 6; Section III, Par. 7 and 10; Section IV, Par. 13; Section VII, Par. 44. Phase 4 Training Exercises.

NOTES & SKETCHES:

3/18/44

AIRPLANE MECHANICS' TOOLS BRANCH

PHASE 5

AIRCRAFT PLUMBING UNITS

YOU WILL: Bend, flare, anneal and bead tubing; Disassemble and assemble aircraft plumbing units.

YOU SHOULD READ: TM 1-424, Section I, Par. 2a. (2); Section VI, Par. 37; and VII, Par. 43 and 44. Phase 5 Training Exercises.

NOTES & SKETCHES:

AIRPLANE MECHANICS' TOOLS BRANCH

PHASE 6

SAFETYING METHODS AND DEVICES; PARTS TAGS

YOU WILL: Safety aircraft units with cotter pins, lock washers, lock nuts, and safety wire; Learn the purpose of and initiate Parts Tags.

YOU SHOULD READ: TM 10-590, Section II, Par. 4;
TM 1-424, Section VI, Par. 28-31, 33-36, 38 and 39, Section VII, Par. 42.
Phase 6 Training Exercises.

NOTES & SKETCHES:

AIRPLANE MECHANICS' TOOLS BRANCH

PHASE 7

USE OF LAYOUT AND ASSEMBLY TOOLS

YOU WILL: Layout and rivet sheetmetal; Layout airplane skin patch; Grind and sharpen drills.

YOU SHOULD READ: TM 1-424, Section VI, Par. 32.
TSKF No. STE-1.
TM 10-590, Section II, Par. 11 and 12; Section IV, Par. 36.
Phase 7 Training Exercises.

NOTES & SKETCHES:

AIRPLANE MECHANICS' TOOLS BRANCH

PHASE 8

USE OF SPECIAL AIRCRAFT MECHANICS TOOLS: SUPPLY SYSTEM FORMS

YOU WILL: Disassemble and assemble airplane engine cylinders;
Learn the purpose of and initiate supply forms.
Complete a practical and written examination.

YOU SHOULD READ: Phase 8 Training Exercises.

NOTES & SKETCHES:

AIRPLANE MECHANICS' TOOLS BRANCH
QUESTIONS

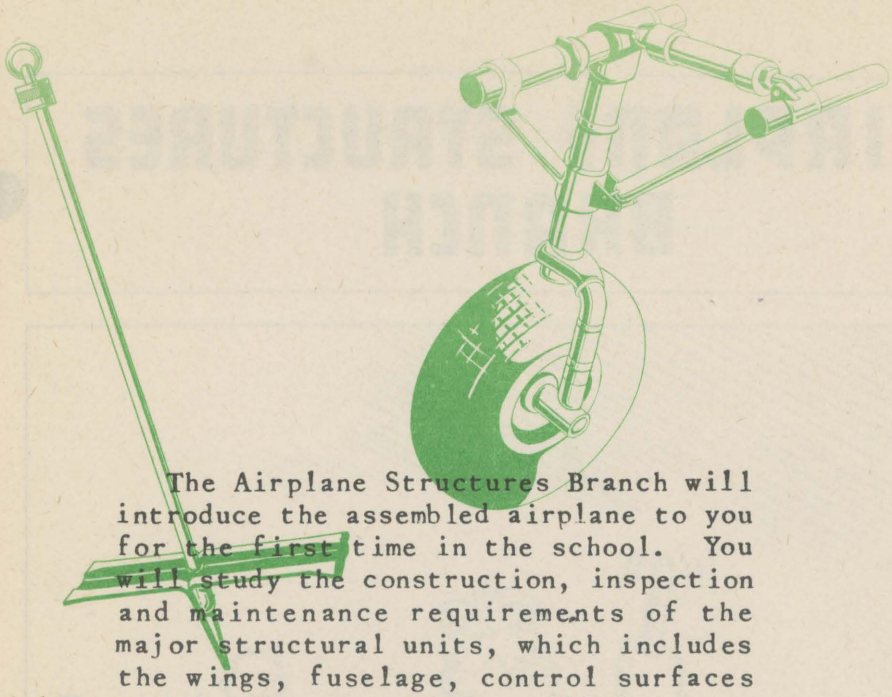
1. What are Technical Orders? Why are they important to the mechanic?
2. How are wrench sizes determined?
3. What is meant by "wrench torque"?
4. What is meant by "restricted material"?
5. How is the palnut used?
6. Which class of screw fit is nost generally employed in aircraft construction?
7. Why are slotted and plain engine nuts called high strength nuts?
8. What is the purpose of Form 41B?
9. What other airplane maintenance forms are used in conjunction with the Form 41B?
10. What is the purpose of Historical Record Forms 60A, 60B and 61?
11. What is the most important reason for a neat layout of parts in the disassembly of equipment?
12. Why should a box end wrench or socket be used in preference to an open end wrench?
13. What is the purpose of Flight Report, Form 1A? Form 1?
14. Why is flux applied to an object that is to be soldered?
15. What determines the proper type of a hacksaw blade for sawing a particular metal?
16. What is the best general cleaning agent for plexiglas?
17. What is the purpose of a flare on tubing?
18. How may a flare be checked for accuracy?
19. How close to a flare may a bend be made in the tubing?
20. What is meant by thread seizure and how is it prevented?
21. Why is it important to have no more than three threads showing at each end of a turnbuckle barrel after it has been safetied?
22. Why is it important to twist safety wire by hand thus avoiding scratching the wire with pliers?
23. What factors will govern the selection of rivets for any particular job?
24. What distance should rivets project through the metal before being upset?
25. What are the minimum and maximum permissible distances between holes drilled for 1/8" rivets?

Questions: (Cont'd)

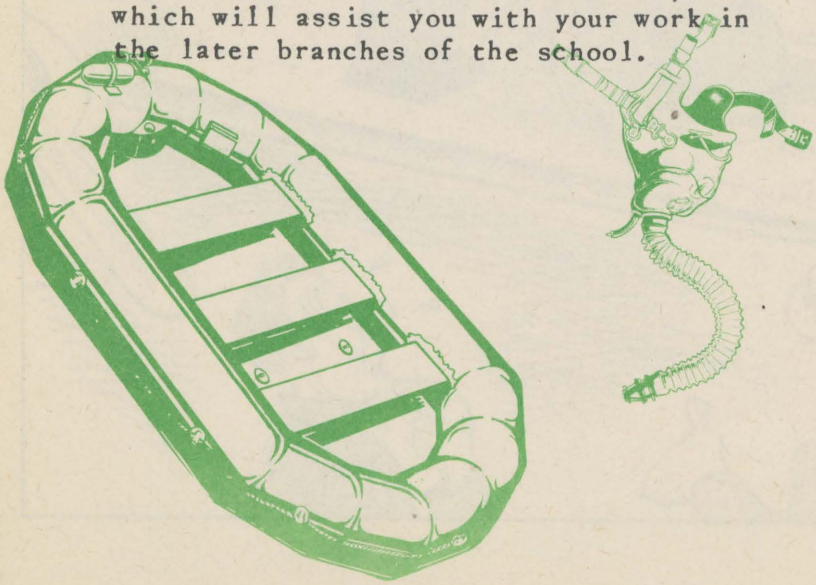
26. Why is it better to use light rather than heavy blows with a hammer when upsetting a rivet?
27. What is the correct method of removing lock nuts or palnuts?
28. What information must be known before an article can be ordered on a Form 81?
29. Name the various Supply Forms, their purposes and uses.
30. How is necessary technical information located in Technical Orders?
31. Why are some screw threads right hand, others left hand?
32. Where are tapered threads used?
33. Why should fine threads be used on bolts where there is considerable vibration?
34. Why is it important that a mechanic examine the code marking on a bolt before he uses it on an airplane?
35. Why is it important to never use a file without a handle?

NOTES & SKETCHES:

AIRPLANE STRUCTURES BRANCH



The Airplane Structures Branch will introduce the assembled airplane to you for the first time in the school. You will study the construction, inspection and maintenance requirements of the major structural units, which includes the wings, fuselage, control surfaces and landing gear. You will learn to perform some of the emergency operations required in flight and to make emergency repairs to metal and fabric surfaces. Here also, you will study oxygen equipment used for high altitude missions and life rafts used in over-water flight. The purpose of this branch is to provide familiarization with the entire airplane which will assist you with your work in the later branches of the school.



AIRPLANE STRUCTURES BRANCH

PHASE 1

INTRODUCTION TO THE B-24 AIRPLANE; FLIGHT REPORT AND MAINTENANCE INSPECTION RECORD FORM

YOU WILL: Learn to interpret airplane markings; Locate equipment according to stations; Moor the airplane; Complete Form 1 and 1A and 41B.

YOU SHOULD READ: TM 1-410, Section I, Par. 4, 5a-e, 6, 7 and 8c. Phase 1 Training Exercises.

NOTES & SKETCHES:

AIRPLANE STRUCTURES BRANCH

PHASE 2

FIXED SURFACES AND FUSELAGE CONSTRUCTION AND REPAIR

YOU WILL: Perform inspection of the fuselage and fixed surfaces; Make and apply a patch to the skin of the airplane.

YOU SHOULD READ: TM 1-410, Section I, Par. 3a-g, i; Section II; Section XIII, Par. 62. TSKF No. STE-1 TSKF No. A1E-3 - 50-hour inspection. Phase 2 Training Exercises.

NOTES & SKETCHES:

AIRPLANE STRUCTURES BRANCH

PHASE 3

CABINS AND COMPARTMENTS; MISCELLANEOUS EQUIPMENT

YOU WILL: Inspect cabins and compartments; Use, inspect and maintain fire extinguishers, life rafts, vests and safety belts; Make minor repairs to plexiglas.

YOU SHOULD READ: TM 1-410, Section III; Section XIII, Par. 63. TM 1-411, Section V, Par. 38, 39; Sections VI and VII. TSKF No. A1E-3-25 Hour Inspection, Page 4. Phase 3 Training Excercises.

NOTES & SKETCHES:

AIRPLANE STRUCTURES BRANCH

PHASE 4

FLIGHT CONTROL SURFACES

YOU WILL: Remove, inspect and install all flight control surfaces; Use the propeller protractor to measure amount of control surface throw or travel; Perform emergency operation of flaps.

YOU SHOULD READ: TM 1-410, Section IV, Par. 19-21, 23a-b-c; Section XI, Par. 50, 52 and 53. TSKF No. A1E3, 25-Hour Inspection. Phase 4 Training Exercises.

NOTES & SKETCHES:

AIRPLANE STRUCTURES BRANCH

PHASE 5

FABRIC REPAIR AND FLIGHT CONTROL MECHANISM

YOU WILL: Patch fabric covered surfaces; Inspect flap control linkages; Obtain proper tension in control cables.

YOU SHOULD READ: TM 1-410, Section IV, Par. 21; Section V, Par. 26b; Section XIII, Par. 59-60.
TSKF No. A1E3, 25-Hour Inspection. Phase 5
Training Excercises.

NOTES & SKETCHES:

AIRPLANE STRUCTURES BRANCH

PHASE 6

FLIGHT CONTROL MECHANISM (CONT'D)

YOU WILL: Operate and inspect control surface locks; Align and inspect all flight control mechanisms.

YOU SHOULD READ: TM 1-410, Section V, Par. 26 and 27. TSKF No. A1E-3-25 Hour Inspection, Page 4. Phase 6 Training Exercises.

NOTES & SKETCHES:

AIRPLANE STRUCTURES BRANCH

PHASE 7

MAIN AND NOSE LANDING GEAR

YOU WILL: Raise the airplane with jacks; Retract the nose and main landing gear by normal and emergency operation; Check landing gear alignment; Inflate shock struts; Remove and replace parts of the landing gear.

YOU SHOULD READ: TM 1-410, Section VI, Par. 30-32; Section VII. Phase 7 Training Excercises.

NOTES & SKETCHES:

AIRPLANE STRUCTURES BRANCH

PHASE 8

LOADING AND BALANCING; DE-ICERS

YOU WILL: Learn to load an airplane properly for safe flight; Operate and inspect the de-icer system.

YOU SHOULD READ: TM 1-410, Section XII.
TM 1-411, Section IX. Phase 8 Training Exercises.

NOTES & SKETCHES:

AIRPLANE STRUCTURES BRANCH

PHASE 9

OXYGEN EQUIPMENT

YOU WILL: Learn the importance and proper use of oxygen; Service, inspect and maintain the low pressure system; Fit and maintain oxygen masks.

YOU SHOULD READ: TM 1-705, Section VI, Par. 25, 28, 29, 31 and 32. TSKF No. A1E3, Preflight and Daily Inspection. Phase 9 Training Exercises.

NOTES & SKETCHES:

AIRPLANE STRUCTURES BRANCH

PHASE 10

TIRES, TUBES, WHEELS AND BEARINGS

YOU WILL: Remove, inspect and install wheels and tires; Clean and lubricate bearings; Simulating an actual flight, complete Forms 1 and 1A.

YOU SHOULD READ: TM 1-410, Sections VIII and IX. Phase 10 Training Exercises.

NOTES & SKETCHES:

Rev. 5/1/44

AIRPLANE STRUCTURES BRANCH

PHASE 11

AIRPLANE FAMILIARIZATION AND PRACTICAL EXAMINATION

YOU WILL: Locate the major units which make up the entire airplane; Complete a practical and written examination on the subjects studied in the Branch.

YOU SHOULD READ: Phase 11 Training Exercises.

NOTES & SKETCHES:

AIRPLANE STRUCTURES BRANCH
Questions:

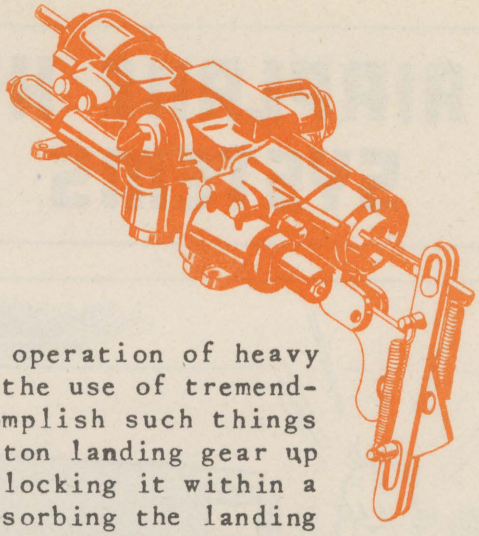
1. How is an airplane moored in the field when mooring kits are not available? Describe.
2. What is the advantage of locating equipment by use of Station designation?
3. Name the four principal airfoils which compose the empennage.
4. Why should the three surface control locks be set so that one engages at a time instead of all engaging simultaneously?
5. How would placing the load too far forward affect the performance of the airplane? Too far aft?
6. What are some of the dangers resulting from overloading an airplane?
7. Where is the serial number found on an airplane?
8. Who is responsible for maintaining the Form 41B?
9. Why is it recommended that a pencil be used instead of a scribe, when laying out a patch on sheet metal?
10. On a patch where a bucking tool cannot be used, what type of rivet or rivets could be used?
11. Why are acetone, dope thinner, paint remover, etc., not recommended for use in removing paint and grease from plexiglas?
12. Can a safety belt with a slight tear in it be mended and returned to service?
13. What is the proper procedure in removing old dope from a fabric surface? Why is this method necessary?
14. Why does a turnbuckle with more than three threads showing either have to be changed or removed?
15. Why is it not possible to lock each control surface individually?
16. What precautions must be taken when raising an airplane?
17. If fluid is leaking past the packing gland of the shock strut, how may this be corrected?
18. Why is it necessary that all cargo be tied down in an airplane prior to and during flight?
19. Can the de-icer system be checked for operation while the airplane engines are not running? If so, how?
20. Is there a substitute for Oxygen?
21. Why is it best to keep your own personal oxygen mask at all times?
22. Name the precautions to be taken when filling an oxygen system.

Questions: (Cont'd)

23. How can a mechanic tell whether a tire has slipped on the wheel?
24. What is the proper procedure in repairing a tire and tube that have been cut?
25. What effects would an unbalanced wheel and tire have on an airplane? How may this be corrected?
26. Would you consider a small crack in a wheel to be a dangerous condition?
27. During installation of a wheel on an airplane, one particular piece of equipment must go on first. What is it?
28. How could sand or dust on the floor of a cockpit or cabin affect the pilot or pilots flying the airplane?
29. What special equipment should be checked when preparing for an overwater flight? What do you check on it?
30. In metal repair, what determines the thickness of the metal of the patch to be used?
31. What type of nut should be used on hinge points of flight control surfaces?
32. Why are control cables for use in cold weather operations set with a little more tension than normal?
33. Where would you be most likely to find broken wires on the control cables?
34. What method is used to identify different control cables?
35. Is it necessary that a person eat only certain foods before he takes off for a high altitude mission? Why?
36. Where are the jacking points on a B-24 airplane?
37. How is the correct inflation of a shock strut determined?
38. How is the B-24 nose wheel lowered in an emergency?
39. Why does an A13 regulator supply little or no oxygen at sea level with auto-mox on?
40. How do demand regulators differ in operation from the continuous flow type?
41. Why is it sometimes necessary to spread a routine 25 hour inspection over the period of between 20 and 30 flying hours?

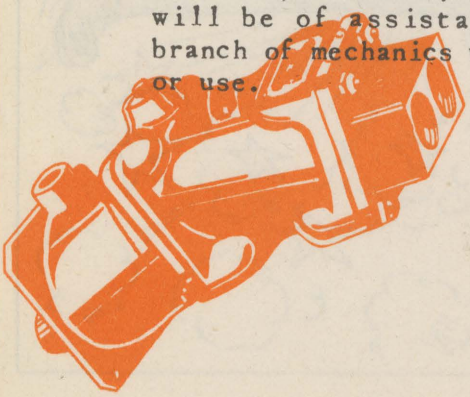
NOTES & SKETCHES

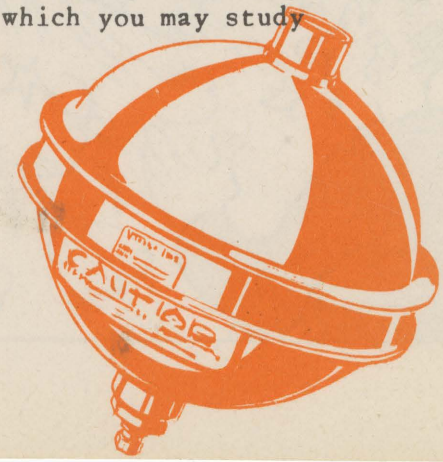
AIRPLANE HYDRAULIC SYSTEMS BRANCH



The successful operation of heavy aircraft requires the use of tremendous force to accomplish such things as lifting a half-ton landing gear up into the wing and locking it within a few seconds; or absorbing the landing shock of a thirty ton airplane traveling at a speed of a hundred miles per hour. In combat, this force is needed to open the bomb bay doors, operate gun turrets, wing flaps, etc. Thus the success of the entire mission may be dependent upon the operation of this equipment.

The Hydraulics Branch presents your opportunity to learn how these forces are produced and controlled, and how the hydraulic mechanisms are kept in working condition for that moment when they are needed. You will also learn a basic process of trouble shooting in a complicated hydraulic system which will be of assistance to you in any branch of mechanics which you may study or use.





AIRPLANE HYDRAULIC SYSTEMS BRANCH

PHASE 1

HYDRAULIC PRINCIPLES; BASIC HYDRAULIC SYSTEMS

YOU WILL: Learn how hydraulic pressure is used to move parts of the airplane; Adjust a relief valve; Check a relief valve and an actuating cylinder for internal leakage.

YOU SHOULD READ: TM 1-411, Section II, Par. 3-9, 11 and 12. TSKF No. A1E6, Section 1-3. Phase 1 Training Exercises.

NOTES & SKETCHES:

AIRPLANE HYDRAULIC SYSTEMS BRANCH

PHASE 2

THE BASIC OPEN CENTER HYDRAULIC SYSTEM; OPERATION, INSPECTION AND MAINTENANCE

YOU WILL: Trace out and operate an open center hydraulic system; Adjust an automatic selector valve; Clean a cuno strainer; Replace a defective hydraulic unit.

YOU SHOULD READ: TM 1-411, Supplement No. 2, Section I, Par. 2, 7 and 11.
Phase 2 Training Exercises.

NOTES & SKETCHES:

AIRPLANE HYDRAULIC SYSTEMS BRANCH

PHASE 3

INSPECTION, MAINTENANCE AND TROUBLE SHOOTING

YOU WILL: Learn the principle and operation of a pressure regulator system; Operate the open center and hand pump systems; Inspect and locate trouble in the systems.

YOU SHOULD READ: TM 1-411, Par. 9.
TM 1-411, Supplement No. 2, Section I, Par. 9. Phase 3, Training Exercises.

NOTES AND SKETCHES:

AIRPLANE HYDRAULIC SYSTEMS BRANCH

PHASE 4

FLAP AND BOMB DOOR HYDRAULIC SYSTEMS - OPERATION, INSPECTION, MAINTENANCE AND TROUBLE SHOOTING

YOU WILL: Operate the bomb door and flap systems by normal and emergency means; Inspect the systems; Locate troubles.

YOU SHOULD READ: TM 1-411, Section IV.
Phase 4 Training Exercises.

NOTES & SKETCHES:

3/20/44

AIRPLANE HYDRAULIC SYSTEMS BRANCH

PHASE 5

LANDING GEAR HYDRAULIC SYSTEM - OPERATION, INSPECTION, MAINTENANCE AND TROUBLE SHOOTING

YOU WILL: Operate, inspect and locate troubles in the landing gear system; Service shimmy dampers and shock struts; Replace seals in a shock strut.

YOU SHOULD READ: TM 1-410, Section VI.
Phase 5 Training Exercises.

NOTES & SKETCHES:

3/20/44

AIRPLANE HYDRAULIC SYSTEMS BRANCH

PHASE 6

BRAKE HYDRAULIC SYSTEM - OPERATION, INSPECTION AND MAINTENANCE

YOU WILL: Operate and bleed the hydraulic brake system; Adjust brake control valve; Equalize brakes; Replace brake blocks and tubes.

YOU SHOULD READ: TM 1-410, Section X, Par. 45, 48, 49. Phase 6 Training Exercises.

NOTES AND SKETCHES:

AIRPLANE HYDRAULIC SYSTEMS BRANCH

PHASE 7

ELECTRIC AUXILIARY SYSTEM - OPERATION, INSPECTION AND MAINTENANCE OF UNITS

YOU WILL: Operate the electric auxiliary system in its normal and emergency uses; Inspect and locate troubles in the system.

YOU SHOULD READ: TM 1-411, Section II, Par. 5.
TM 1-411, Supplement No. 2, Section I, Par. 8.
Phase 7 Training Exercises.

NOTES AND SKETCHES:

AIRPLANE HYDRAULIC SYSTEMS BRANCH

PHASE 8

COMPLETE HYDRAULIC SYSTEM - OPERATION, INSPECTION AND MAINTENANCE: SHIMMY DAMPERS

YOU WILL: Operate, inspect and trouble shoot on the complete system.

YOU SHOULD READ: Phase 8 Training Exercises.

NOTES & SKETCHES:

AIRPLANE HYDRAULIC SYSTEMS BRANCH

PHASE 9

LOCATION AND CORRECTION OF MECHANICAL DEFECTS; PRACTICAL EXAMINATION

YOU WILL: Make a 50-hour inspection; Locate trouble and perform general maintenance of the complete system; Take a practical and written examination.

YOU SHOULD READ: Phase 9 Training Exercises.

NOTES & SKETCHES:

AIRPLANE HYDRAULIC SYSTEMS BRANCH

Questions:

1. If the piston area in a cylinder were 4 sq. in. and the pressure were 100 lb. per square inch, what force would be required to balance it?
2. What is the purpose of a check valve in a hydraulic system?
3. Why is air used in an accumulator in which fluid is stored under pressure?
4. What is an "open center" hydraulic system?
5. What emergency will bring the suction check valve of an open center system into use?
6. Why should lines to the engine driven hydraulic pump always be disconnected at the firewall first?
7. In the case of external leakage of the selector valve, what should the mechanic do?
8. If the pressure switch of a hydraulic system keeps cutting in and out, what accumulator trouble might you suspect?
9. At what pressure does an unloading valve begin to charge an accumulator?
10. What two hydraulic systems can the hand pump operate?
11. Give the steps in checking a fluid line during an inspection.
12. Why are both flaps operated by one actuating cylinder?
13. What is the source of power for the emergency operation of the flaps?
14. What is the purpose of the main landing gear restrictor?
15. What advantage is there in having two separate brake systems operated by the same pedal?
16. Name the five operations necessary to complete a brake bleeding job.
17. Does Pascal's Law apply in the electric auxiliary system?
18. What is the purpose of the surge check valve?
19. What maintenance does the electrical auxiliary pump require between overhaul periods?
20. If the electric motor operates without the pump putting out any pressure, what might be the cause?

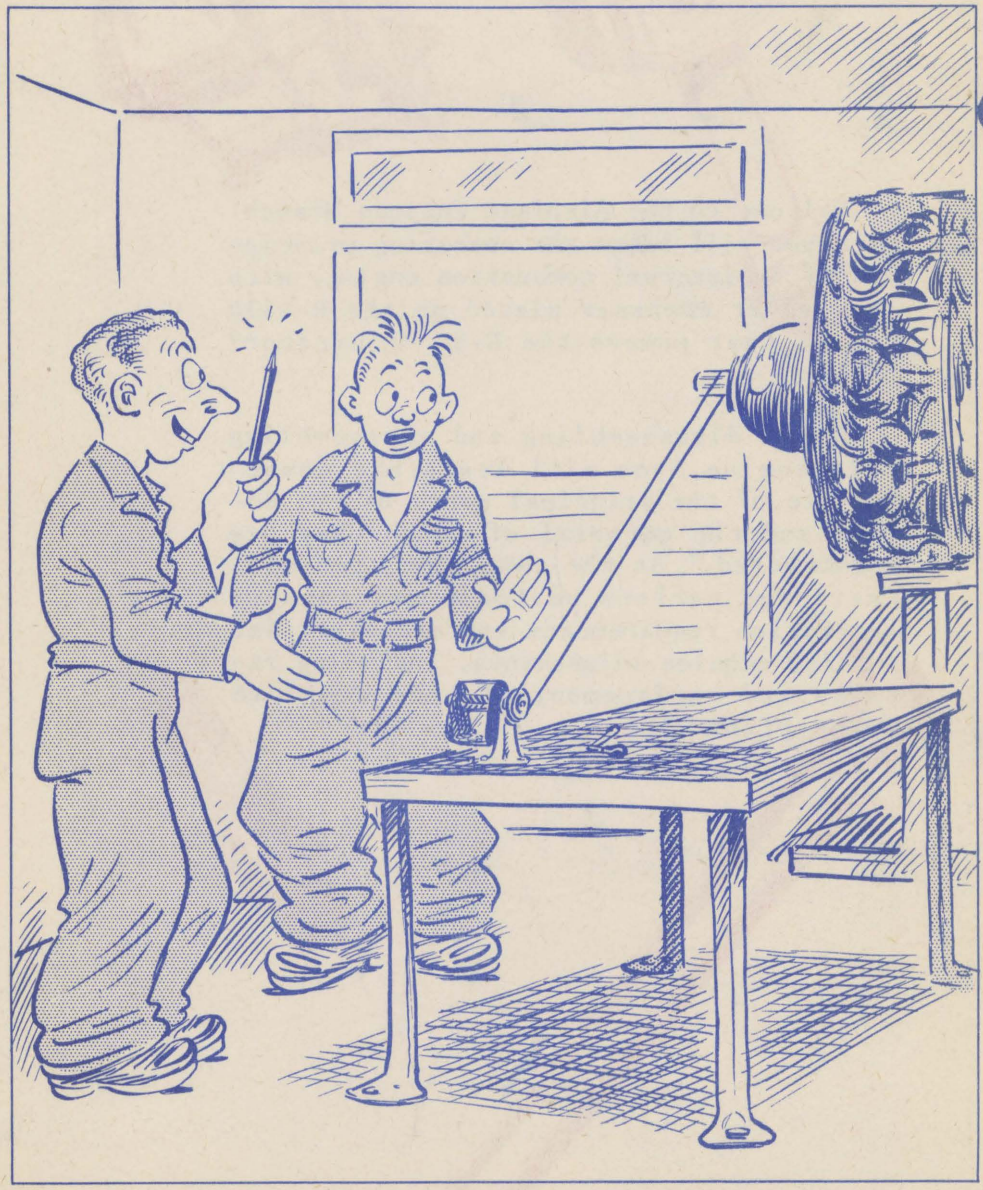
AIRPLANE HYDRAULIC SYSTEMS BRANCH

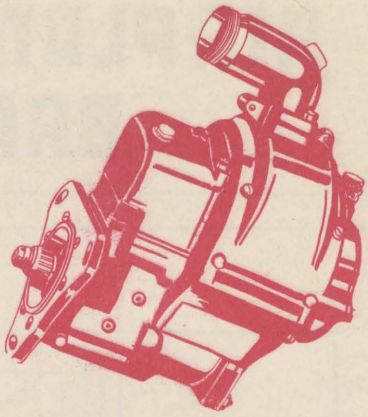
Questions: (Cont'd)

21. In how many ways can the bomb doors be opened hydraulically? Closed hydraulically?
22. What systems can be operated from the right accumulator? From the left accumulator?
23. If a condition that requires maintenance is discovered during an inspection and is corrected at once, should an entry be made in Form 41B? Give reasons for your answer.
24. How would the mechanic show on the Form 41B the fact that he found two defects in the hydraulic system?
25. What should fluid pressure be when checking air pressure in the accumulators?
26. How may a check valve be checked for internal leakage?
27. How would a mechanic check hydraulic lines for security of mounting?
28. What trouble is indicated by erratic action of the brake with pressure jumping?
29. Name two ways in which a bomb door actuating cylinder might be checked for leakage.
30. Why would unequal brake pressures cause overheating of a brake drum?
31. Why is the property of incompressibility of a liquid important in hydraulics?
32. What is the difference between force and pressure?
33. Name the equipment units which are hydraulically operated on the B-24 airplane.

NOTES & SKETCHES

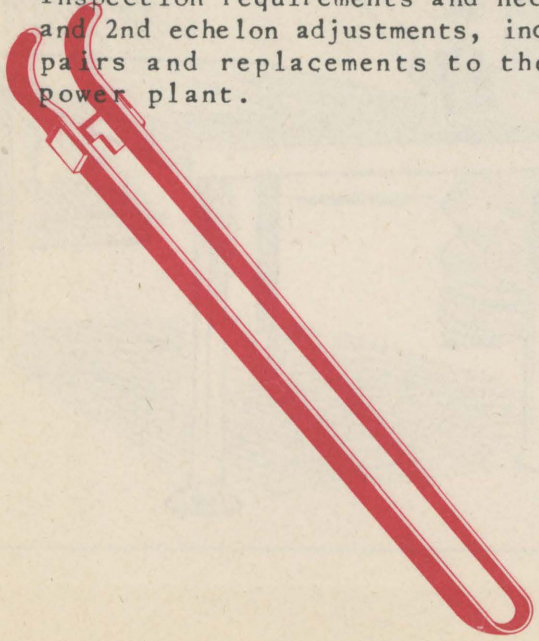
AIRPLANE ENGINES BRANCH

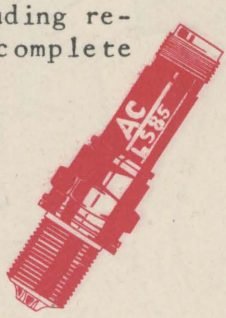




Welcome to the Airplane Engines Branch! Here you will learn the operating principles of an internal combustion engine, with particular emphasis placed on the R-1830 engine that powers the B-24 "Liberator" bomber.

While disassembling and reassembling this engine, you will learn the nomenclature of the principal parts of the engine and the material of which they are constructed. At the same time, you will learn and perform periodic maintenance inspection requirements and necessary 1st and 2nd echelon adjustments, including repairs and replacements to the complete power plant.





AIRPLANE ENGINES BRANCH

PHASE 1

ENGINE POWER SECTION, OPERATING PRINCIPLES AND LUBRICATION

YOU WILL: Learn the operating principles of the internal combustion engine; Study the construction and lubrication of the airplane engine power section.

YOU SHOULD READ: TM 1-405, Section I; Section II, Par. 9, 15-17; Section III, Par. 18-25, 27-29; Section IV, Par. 35, 37, 38 and 42; Section V, Par. 45, 46; Section VI, Par. 48, 49, 52a, (1), and (4), b.
Phase 1 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ENGINES BRANCH

PHASE 2

ENGINE FRONT SECTION - OPERATION AND LUBRICATION; INTRODUCTION TO VALVE TIMING

YOU WILL: Time the cylinder valve action to the crankshaft and piston positions; Study the parts nomenclature, lubrication and operation of the front section.

YOU SHOULD READ: TM 1-405, Section III, Par. 21; Section IV, Par. 43; Section V, Par. 45 and 46. Phase 2 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ENGINES BRANCH

PHASE 3

VALVE MECHANISM - REMOVAL AND INSTALLATION, CLEARANCE ADJUSTMENT

YOU WILL: Adjust valve clearance; Remove and install cylinder rocker arms, valve springs, valves and deflector baffles; Check piston ring clearances.

YOU SHOULD READ: TM 1-405, Section III, Par. 19, 20 and 22; Section VI, Par. 49.
Phase 3 Training Exercises.

NOTES AND SKETCHES:

AIRPLANE ENGINES BRANCH

PHASE 4

MAGNETO - CONSTRUCTION; OPERATION, TIMING, ADJUSTMENT, INSPECTION AND TEST

YOU WILL: Learn the operating principles and maintenance requirements of the magneto; Locate and correct magneto troubles.

YOU SHOULD READ: TM 1-406, Section III, Par 21-28; Section IX, Par. 77, 78 (b to f), 81, 84.
Phase 4 Training Exercises.

NOTES AND SKETCHES:

AIRPLANE ENGINES BRANCH

PHASE 5

IGNITION SYSTEM MAINTENANCE

YOU WILL: Install, time and synchronize magnetos; Remove, service and install spark plugs; Repair ignition manifolds.

YOU SHOULD READ: TM 1-405, Section I, Par. 4c; Section III, (Fig. 23); Section IV, Par. 44, TM 1-406, Section IX, Par. 85-87.
Phase 5 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ENGINES BRANCH

PHASE 6

BLOWER, INTERMEDIATE AND REAR SECTIONS; ACCESSORY DRIVE SYSTEM

YOU WILL: Study the construction, operation and lubrication of these sections; Remove and install the engine main oil pump sump, filter screen and push rod cover tubes.

YOU SHOULD READ: TM 1-405, Section III, Par. 26 (a-d), 27b (3, 4 and 5), and 31; Section V, Par. 45 and 46. Phase 6 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ENGINES BRANCH

PHASE 7

ENGINE MOUNTS, FIXED TYPE
FIRE EXTINGUISHERS AND ENGINE STORAGE

YOU WILL: Study the method of mounting the engine to the airplane; Inspect and operate the fire extinguisher system; Install and remove the engine driven accessories; Learn to treat the engine for storage.

YOU SHOULD READ: TM 1-405, Section III, Par. 29 and 34. Phase 7 Training Exercises.

NOTES AND SKETCHES:

AIRPLANE ENGINES BRANCH

PHASE 8

ENGINE INSPECTION AND MAINTENANCE PROCEDURES

YOU WILL: Make the 200 hour inspection of the complete engine, engine driven accessories and engine mount assemblies; Complete a pratical and written examination.

YOU SHOULD READ: TSKF No. A1E-3, A11 information pertaining to Columns 20 through 29 of Form 41B, covering 25-hour through 200-hour inspections.
Phase 8 Training Exercises.

NOTES AND SKETCHES:

ENGINES BRANCH

Questions:

1. What is the purpose of the fins on engine cylinder barrels?
2. Why must piston rings be handled with extreme care?
3. What is meant by the term ''firing order''?
4. How many crankshaft revolutions are required to fire all cylinders of an R–1830 engine?
5. What is the direction of the R–1830 crankshaft rotation as viewed from the front?
6. State the purpose of a crankcase breather.
7. What is meant by the term cycle?
8. Is the propeller of an R–1830 engine driven at a faster or slower speed than the crankshaft? What is the ratio? Why?
9. What purpose do cylinder deflector baffles serve?
10. Failure of a magneto condenser will cause what trouble? Why?
11. Why is ignition wire enclosed within metal shielding?
12. What is the purpose of a magneto ''compensating'' cam?
13. Where is a thermo-couple gasket used on the R-1830 engine? Why?
14. Which magneto fires all rear spark plugs? Why?
15. Will engine lubricating oil pressure be greater when the oil is cold or when it is hot?
16. The possibility of a master rod bearing failure might first be indicated by what?
17. What will be the result of an improperly installed engine oil screen?
18. Primer lines serve what purpose?
19. What is a ''humidity indicator'' card and what is its purpose?
20. What type gas is used to extinguish engine fires?
21. What is the prescribed manner of disposing of unserviceable sodium filled engine valves?
22. What is the purpose of pre-oiling an aircraft engine?
23. How often may intake pipe packing nuts be tightned on an R-1830 engine before replacement is required?
24. Can any commercial bearing of proper size be used for replacing ball bearings to airplane engines and/or accessories? Why?
25. Give three causes of excessive engine oil consumption.

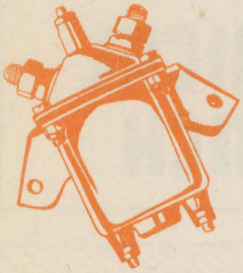
ENGINES BRANCH

Questions: (Cont'd)

26. What devise is especially provided to protect propeller shaft threads? Why?
27. Why is it necessary to provide clearance for piston rings?
28. What harm may result from prolonged overspeeding of airplane engines?
29. Is it permissible to reuse engine piston rings?
30. Why must cylinder hold down nuts be tightened with even torque?
31. Why must engines be given special preparation before storage?
32. Why is it necessary to prepare an engine for operation after storage?
33. Why is valve clearance adjustment necessary?
34. For what purpose may silk thread be used on an airplane engine?
35. What constitutes a basic airplane engine?
36. What constitutes a complete airplane engine?
37. Is it permissible to continue operation of an airplane engine after an accident involving sudden stoppage of the propeller?
38. What provision is made for determining which cylinders of a twin row radial engine contains the master rods?
39. For what purpose are "dynafocal" pedestals employed?
40. How may an accumulation of oil within the lower cylinder combustion chambers of a radial engine be determined?
41. What is the pre-flight inspection of the engine pressure type fire extinguishers?
42. How may an R-1830 engine be stopped if it will not stop when the ignition switch is turned to the "off" position?
43. What is the meaning of the term "manifold pressure"?
44. How may a loose cylinder deflector baffle be determined?
45. How might a leaking intake pipe be detected?
46. Why are screens used in engine crankcase breathers?
47. What is a supercharger bearing vent, and what is its purpose?

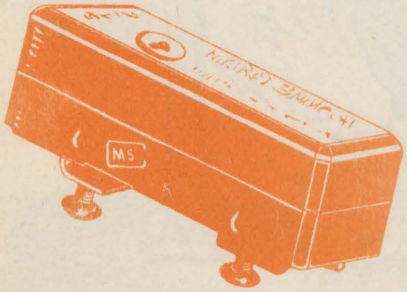
NOTES & SKETCHES

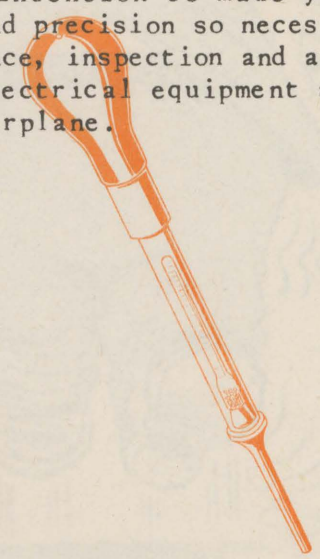
AIRPLANE ELECTRICAL SYSTEMS BRANCH



The Electrical Branch will provide you with the opportunity for obtaining a sound basis in electrical fundamentals. With such a foundation, you will be able to intelligently apply yourself to the interpretation of blueprints and to the electrical problems which you will encounter later on.

It is also our intention to make you aware of the care and precision so necessary in the maintenance, inspection and adjustments of all electrical equipment as used on the B-24 airplane.





AIRPLANE ELECTRICAL SYSTEMS BRANCH

PHASE 1

ELECTRICAL FUNDAMENTALS I

YOU WILL: Investigate sources of electrical energy; Build a fundamental circuit; Wire series and parallel circuits.

YOU SHOULD READ: TM 1-406, Section I, Par. 1, 5, 10, 11, 2(a, b, c,) and 13; Section IV, Par. 36 and 40; Section XII, Par. 108. Phase 1 Training Exercises.

NOTES & SKETCHES:

3/21/44

AIRPLANE ELECTRICAL SYSTEMS BRANCH

PHASE 2

ELECTRICAL FUNDAMENTALS II

YOU WILL: Perform experiments on magnetism; Study the construction of solenoid switches and relays; Learn to maintain aircraft storage batteries.

YOU SHOULD READ: TM 1-406, Section I, Par. 9; Section IV, Par. 37; Section VII, Par. 57 and 65.
Phase 2 Training Exercises.

NOTES AND SKETCHES:

AIRPLANE ELECTRICAL SYSTEMS BRANCH

PHASE 3

ELECTRICAL FUNDAMENTALS III

YOU WILL: Perform experiments on electro-magnetic inductions; Change mechanical into electrical energy; Determine the basic differences between generation of direct current and alternating current.

YOU SHOULD READ: TM 1-406, Section III, Par. 23, 25-29: Section VI, Par. 46-48, 50 and 53.
Phase 3 Training Exercises.

NOTES & SKETCHES:

3/21/44

AIRPLANE ELECTRICAL SYSTEMS BRANCH

PHASE 4

ELECTRICAL FUNDAMENTALS IV

YOU WILL: Prepare electrical leads for installation;
Disassemble and assemble electrical connector plugs;
Learn the principle of continuity checking devices.

YOU SHOULD READ: TM 1-406, Section I, Par. 13; Section II, Par. 106 (d, 3) and 108.
Phase 4 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ELECTRICAL SYSTEMS BRANCH

PHASE 5

CIRCUIT TESTING

YOU WILL: Check the continuity of aircraft cable installations; Locate and analyse typical electrical troubles.

YOU SHOULD READ: TM 1-406, Section I, Par. 11, 12; Section II, Par. 16; Section XII, Par. 108.
Phase 5 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ELECTRICAL SYSTEMS BRANCH

PHASE 6

LIGHTING SYSTEMS

YOU WILL: Wire and operate formation and bomb-bay lights; Extract simple circuits from blueprints.

YOU SHOULD READ: TM 1-406, Section I, Par. 13; Section II, Par. 16 and 17; Section XI, Par. 103 (Fig. 114). Phase 6 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ELECTRICAL SYSTEMS BRANCH

PHASE 7

ELECTRICAL WIRING DIAGRAMS

YOU WILL: Extract the B-24 starter system from the blue print; Wire the starter system for a single engine; Wire the B-24 battery circuit.

YOU SHOULD READ: TM 1-406, Section VII; Section X, Par. 88, 91-93; Section XII, Par. 106 and 107. Phase 7 Training Exercises.

NOTES AND SKETCHES:

AIRPLANE ELECTRICAL SYSTEMS BRANCH

PHASE 8

STARTER SYSTEMS

YOU WILL: Wire the four engine starter system; Complete the 50-hour inspection of the starter system; Analyze troubles in the starter system.

YOU SHOULD READ: TM 1-406, Section IV, Par. 37; Section X, Par. 91 and 92; Section XII, Par. 108; Phase 8 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ELECTRICAL SYSTEMS BRANCH

PHASE 9

ELECTRIC MOTORS AND INVERTERS

YOU WILL: Correlate electrical systems with wiring diagrams; Operate, wire inspect and maintain motors and inverters.

YOU SHOULD READ: TM 1-406, Section III, Par. 33; Section XI, Par. 100, 102, 104 and 105.
Phase 9 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ELECTRICAL SYSTEMS BRANCH

PHASE 10

GENERATOR SYSTEM AND AUXILIARY POWER UNITS

YOU WILL: Become familiar with all units of the generator system; Wire a single engine generator system; Operate the auxiliary power plant.

YOU SHOULD READ: TM 1-406, Section VII, Par. 66 and 69. Phase 10 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ELECTRICAL SYSTEMS BRANCH

PHASE 11

GENERATOR SYSTEM OPERATION AND ADJUSTMENT

YOU WILL: Operate and adjust voltage regulators and reverse current relay switches; Parallel the four engine generator system.

YOU SHOULD READ: TM 1-406, Section VIII.
Phase 11 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ELECTRICAL SYSTEMS BRANCH

PHASE 12

INSPECTION AND MAINTENANCE OF THE ELECTRICAL SYSTEM

YOU WILL: Analyze generator system troubles; Complete a practical and written examination.

YOU SHOULD READ: Phase 12 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ELECTRICAL SYSTEMS BRANCH

Questions:

1. What is the main source of electrical power in the B-24 airplane?
2. Mention two sources of auxiliary electrical power on the B-24.
3. What is meant by the term "polarity"?
4. How are the generators on the B-24 driven?
5. Which cable would have the larger resistance. #2 or #4?
6. What does a fuse or circuit breaker protect?
7 Mention one reason for using a solenoid switch in a high current carrying circuit.
8. What is the meaning of "18E201" as shown on a blueprint?
9. What is the function of the master ignition switch as used on the B-24?
10. Describe a SPST toggle switch.
11. Why is there a movable cam installed on the rear of the G-6 starter motor?
12. Why is one landing light lead larger than the other two?
13. What is the function of a limit switch? Give an example.
14. Mention three ways of checking the continuity of an electrical circuit.
15. How would you determine whether the generator reverse current relay switches were closed if you were standing on the flight deck?
16. What effect would a "short circuit" have on an electrical path? Why?
17. How would the loss of residual magnetism affect the operation of a generator?
18. How can you differentiate between the positive and negative coil terminals of a solenoid?
19. Why is it dangerous to substitute a starter solenoid switch for a defective battery solenoid switch?
20. How does oil in the flywheel housing affect the operation of the starter?
21. What should be the position of the generator main line switch when adjusting the voltage regulators?
22. What would cause a solenoid switch to chatter?

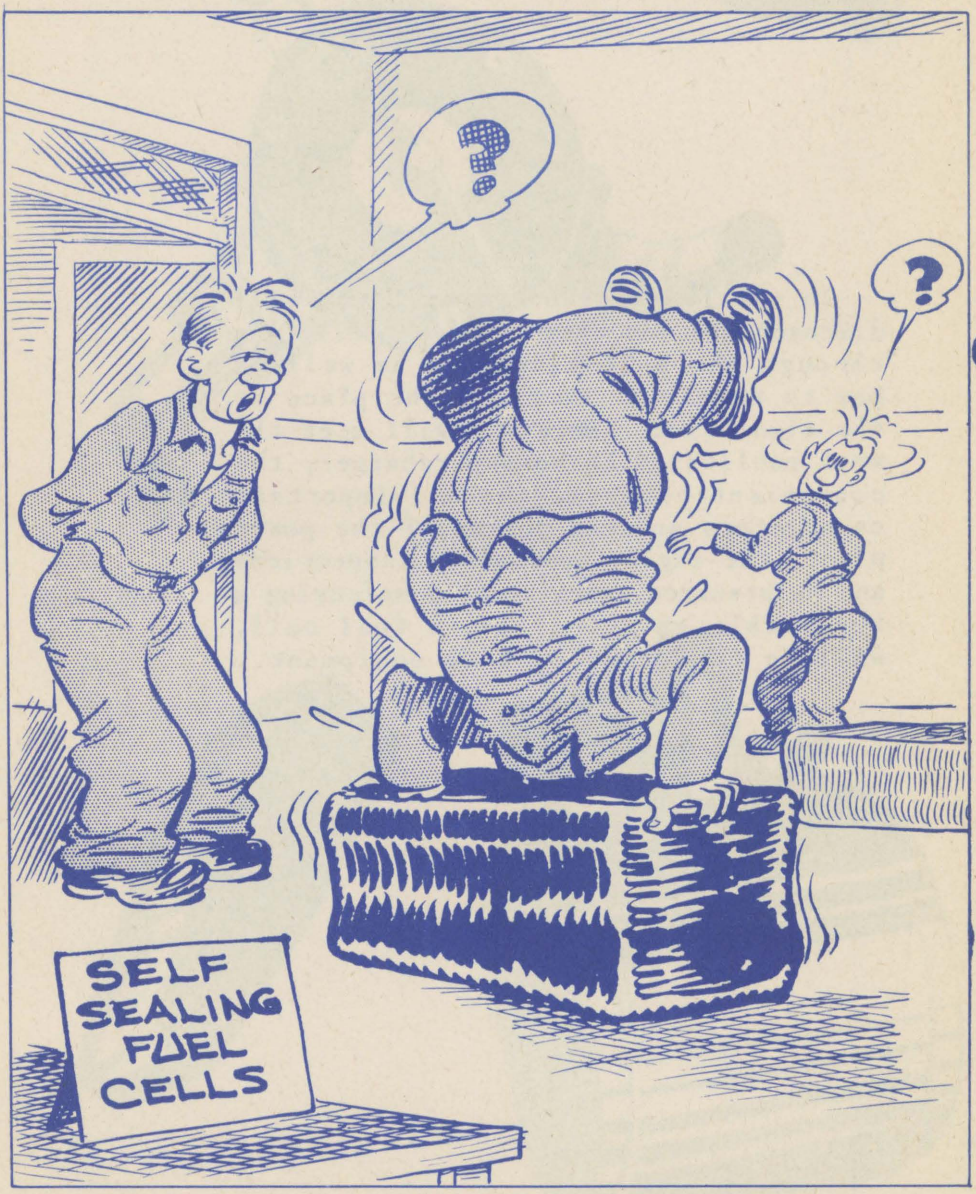
AIRPLANE ELECTRICAL SYSTEMS BRANCH

Questions: (Cont'd)

23. What is the voltage at the power splice if (a) the engines are not operating (b) the battery disconnect switches are on, and (c) the A. P. U. is in operation?
24. During normal flight, what supplies the electrical energy to light the navigation lights?
25. The B-24 has two 24 volt batteries connected in parallel. What advantage is gained by this hook-up?
26. What is a hydrometer?
27. How could you use a flashlight as a continuity checker?
28. What symbol used in the Form 41-B would indicate that water had been added to the battery?
29. Is it possible to operate both inverters on the B-24 at the same time?
30. Why is it necessary to have a clearance between the meshing solenoid plunger and the bell crank on a G-6 starter?

NOTES & SKETCHES

AIRPLANE FUEL SYSTEMS BRANCH



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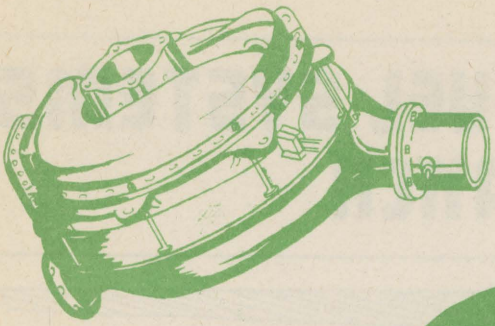
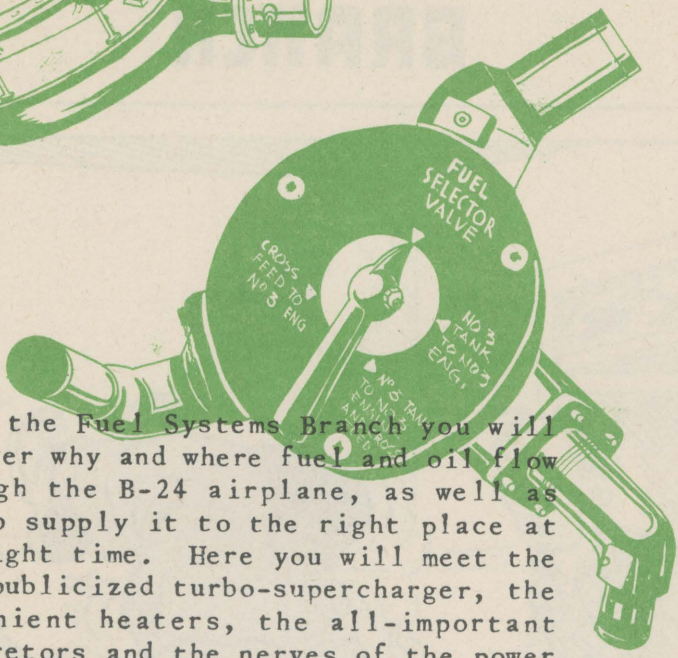
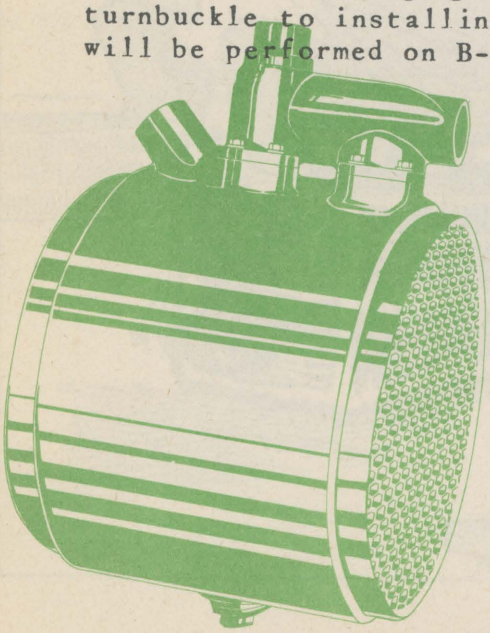
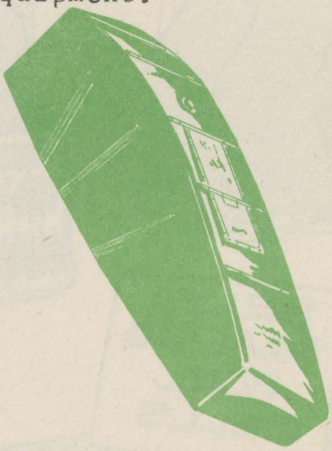




In the Fuel Systems Branch you will discover why and where fuel and oil flow through the B-24 airplane, as well as how to supply it to the right place at the right time. Here you will meet the much publicized turbo-supercharger, the convenient heaters, the all-important carburetors and the nerves of the power plant, the engine controls. Inspections and maintenance, ranging from safetying a turnbuckle to installing a fuel cell, will be performed on B-24 equipment.





AIRPLANE FUEL SYSTEMS BRANCH

PHASE 1

OIL SYSTEMS

YOU WILL: Inspect the airplane oil system; Remove and replace oil system units; Perform first and second echelon maintenance on the oil system.

YOU SHOULD READ: TM 1-407, Section II and Phase 1 Training Exercises.

NOTES & SKETCHES:

AIRPLANE FUEL SYSTEMS BRANCH

PHASE 2

FUEL SYSTEMS

YOU WILL: Study the operation of the B-24 fuel system; Transfer fuel with selector valves and learn to maintain the fuel system units.

YOU SHOULD READ: TM 1-407, Section III and Phase 2 Training Exercises.

NOTES & SKETCHES:

AIRPLANE FUEL SYSTEMS BRANCH

PHASE 3

PRESSURE INJECTION CARBURETORS

YOU WILL: Learn to inspect and perform 1st and 2nd echelon maintenance of carburetor; Remove, install and adjust carburetors.

YOU SHOULD READ: TM 1-407, Section IV, Par. 19-22 and 25-28; TM 1-407, Supplement No. 1 (FSE-1) and Phase 3 Training Exercises.

NOTES AND SKETCHES:

AIRPLANE FUEL SYSTEMS BRANCH

PHASE 4

SELF-SEALING FUEL CELLS

YOU WILL: Learn proper methods of handling, removing and installing self-sealing fuel cells.

YOU SHOULD READ: TM 1-407, Section III, Par. 12a-d, 18 and Phase 4 Training Exercises.

NOTES AND SKETCHES:

AIRPLANE FUEL SYSTEMS BRANCH

PHASE 5

AIRPLANE AND GROUND COMBUSTION HEATERS

YOU WILL: Operate and learn the maintenance requirements of airplane and ground heaters; Disassemble and test these heaters.

YOU SHOULD READ: Phase 5 Training Exercises.

NOTES & SKETCHES:

AIRPLANE FUEL SYSTEMS BRANCH

PHASE 6

TURBOSUPERCHARGER AND SUPERCHARGER REGULATORS

YOU WILL: Study the operation of the turbosupercharger and its regulators; make those inspections of the equipment normally performed by the airplane mechanic.

YOU SHOULD READ: TM 1-407, Section V, Par. 29-33, 36-40. Phase 6 Training Exercises.

NOTES & SKETCHES:

AIRPLANE FUEL SYSTEMS BRANCH

PHASE 7

TURBOSUPERCHARGER SYSTEM

YOU WILL: Inspect and trouble-shoot the supercharger installation. Remove and install superchargers.

YOU SHOULD READ: TM 1-407, Par. 29-32; Phase 7 Training Exercises.

NOTES & SKETCHES:

3/21/44

AIRPLANE FUEL SYSTEMS BRANCH

PHASE 8

POWER PLANT CONTROL SYSTEM

YOU WILL: Rig the carburetor and supercharger controls; Learn the maintenance of the power plant controls and B-24 starting and stopping procedure; Take a practical and written exmination.

YOU SHOULD READ: TM 1-407, Section VI; Phase 8 Training Exercises.

NOTES AND SKETCHES:

AIRPLANE FUEL SYSTEMS BRANCH

Questions:

1. What factors would cause oil pressure to be too high or too low?
2. Why would an incorrectly installed oil screen be a serious matter?
3. What changes in the oil system are necessary to "winterize"a B-24?
4. What installation causes a fuel pressure drop to be registered during oil dilution?
5. How and to what value is the fuel pressure adjusted?
6. How is it possible for all four engines to use fuel from one set of tanks?
7. How is the fuel in the bomb bay and auxiliary fuel tanks made available to the engines?
8. How is the screen of the main line strainer drained and cleaned?
9. How does a carburetor function to cause an aircraft engine to perform properly under various circumstances?
10. What is done to properly drain and flush a carburetor?
11. What job is done by each of the following units on the carburetor, and why are they important?
    (a) Automatic mixture control?
    (b) Manual mixture control?
    (c) Accelerating pump?
    (d) Idle needle?
    (e) Primer?
12. What steps are taken in making the idle speed and idle mixture adjustments on a B-24 Carburetor? Why is this important?
13. What inspections are made on the fuel cell system? They are entered in what column of form 41B?
14. What precautions-both "do's" and "don'ts"-must be followed in fuel cell removal and replacement?
15. How can one tell where a fuel cell is to be placed by looking at its fittings?
16. What units or drains are connected directly to the fuel cells, and where are they located?
17. When and why should heaters not be used?
18. How is a type D-1 ground heater started, stopped and inspected?
19. How may B-24 heaters be shut off in an emergency?

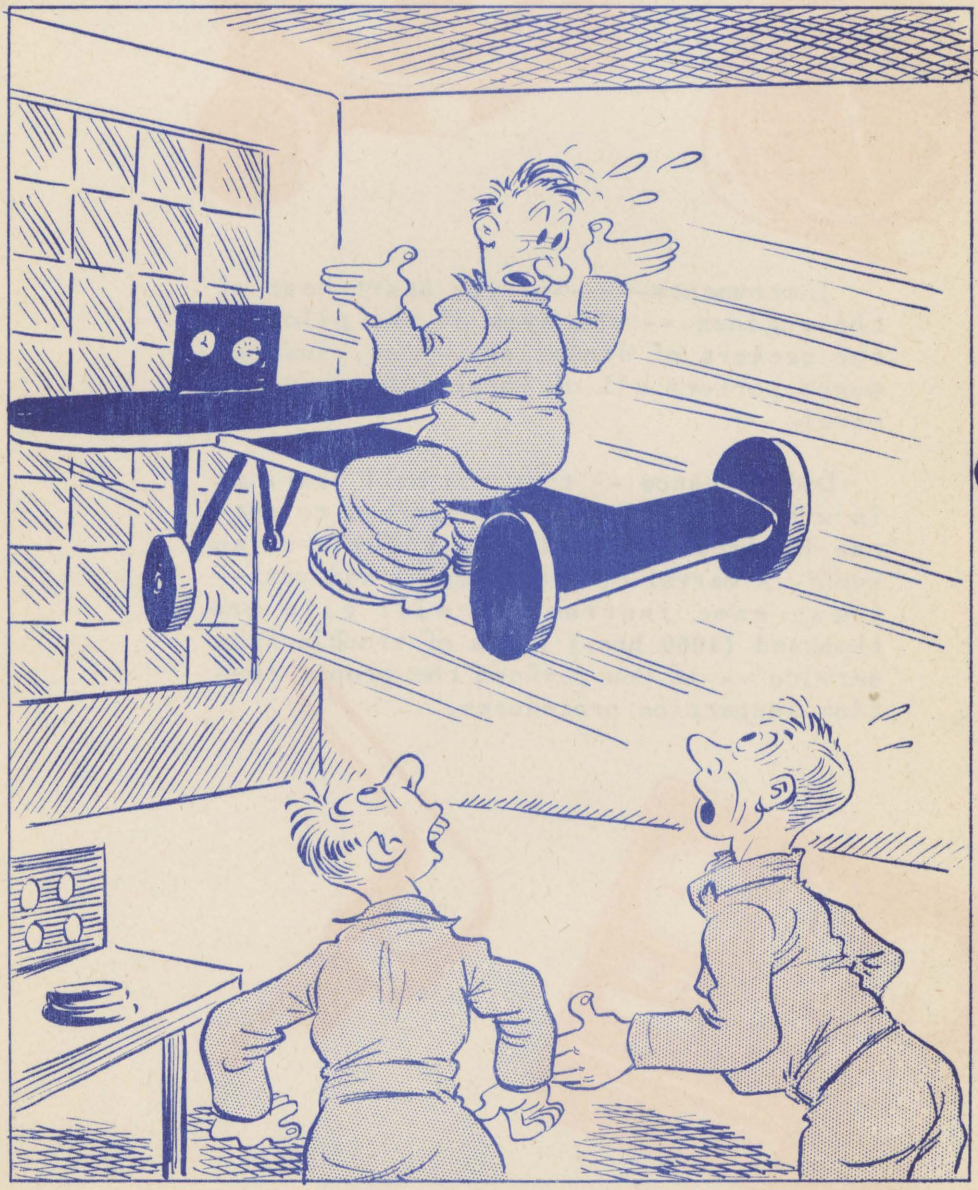
AIRPLANE FUEL SYSTEMS BRANCH

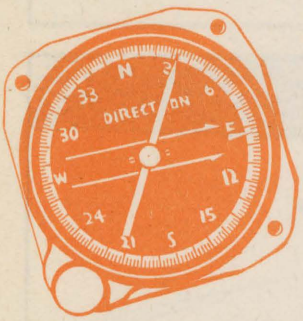
Questions: (Cont'd)

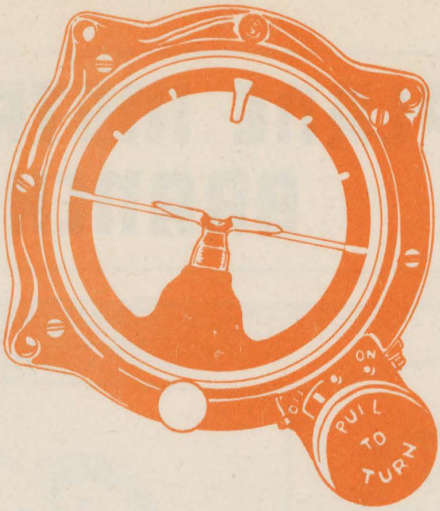
20. What is the purpose and location of each of the following heater units?
    a. Igniter
    b. Reigniter
    c. Oven
    d. Flame arrestor
    e. Fan
    f. Overheat switch
    g. Thermo-snap switch
    h. Magnetic valve
    i. Three way heater
    j. Solenoid valve
    k. Restriction fitting
21. Explain how or why a supercharger enables an airplane to fly higher than is possible without it.
22. How is each of the following measured?
    a. Nozzle box clearance
    b. Cooling cap clearance
    c. Bucket wheel run out
    d. Stretching of buckets
23. What is the purpose of the supercharger regulator? Explain how the A-13 regulator accomplishes this.
24. What units comprise the electronic regulator system? What is the purpose of each unit?
25. Through what units does air pass before it reaches the engine cylinders?
26. What is the purpose of each of the following units? How does each accomplish its purpose?
    a. Intercooler
    b. Alternate air filter
    c. Induction system half screen
    d. Exhaust expansion joint
    e. Ram air shut-off door
    f. Internal supercharger
    g. Exhaust balance line
27. What is manifold pressure, how is it measured, and why is it important?
28. For what does one check during an inspection of the induction system?
29. What are the purpose, and the method of setting throttle stops? Supercharger stops?
30. What is the "Run Up" preflight on the supercharger?
31. What points are examined during the periodic inspections of power plant controls? In what column of form 41B are entries made?
32. Describe the general method of synchronizing a throttle or mixture control unit.

NOTES & SKETCHES

AIRPLANE INSTRUMENTS BRANCH

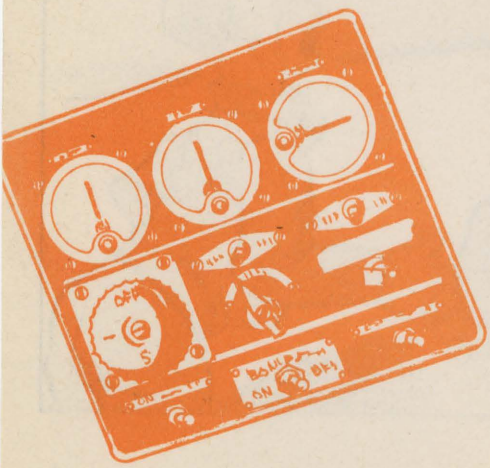






Instruments---------the heart-beat of the engines -- the eyes of the pilot -- the seekers of direction -- yes, instruments perform all of these functions and more!

Did you know -- that the ball bearings in a flight indicator are matched to one-one hundred thousandth (0.00001") of an inch? A marvel of precision -- and yet -- these same instruments will give one thousand (1000 hrs.) hours of trouble free service -- if you perform the proper routine inspection procedures.



AIRPLANE INSTRUMENTS BRANCH

PHASE 1

PRESSURE GAGES, THERMOMETERS AND FLAP POSITION INDICATOR

YOU WILL: Learn how to inspect, maintain and trouble shoot these instruments; How to put on operation markings; How instruments should be mounted.

YOU SHOULD READ: TM 1-413, Sections IX, XVI, XVII and XX; Section XXI, Par. 146. TM 1-413, Supplement No. 1, Section I. Phase 1 Training Exercises.

NOTES & SKETCHES:

AIRPLANE INSTRUMENTS BRANCH

PHASE 2

SYNCHRONOUS A. C. INSTRUMENTS

YOU WILL: Learn the component units of the autosyn system; How they operate, methods of installation and inspection; How to locate and remedy troubles which may occur in the system.

YOU SHOULD READ: TM 1-413, Sections XIX; TM 1-413, Supplement No. 1, Section V. Phase 2 Training Exercises.

NOTES & SKETCHES:

AIRPLANE INSTRUMENTS BRANCH

PHASE 3

PITOT STATIC AND GYRO INSTRUMENTS

YOU WILL: Learn the use and relationship of these instruments to each other and to their systems; How the pilot knows the height, speed and altitude of the airplane; Perform inspections and maintenance on both the pitot-static and the vacuum systems.

YOU SHOULD READ: TM 1-413, Section XXIII-XXIX. Phase 3 Training Exercises.

NOTES AND SKETCHES:

AIRPLANE INSTRUMENTS BRANCH

PHASE 4

COMPASSES

YOU WILL: Learn the operation and use of compasses; Inspect compasses, and compensate each type of magnetic compass by at least two swinging methods.

YOU SHOULD READ: TM 1-413, Section XXII; TM 1-413, Supplement No. 1, Section II.
Phase 4 Training Exercises.

NOTES AND SKETCHES:

AIRPLANE INSTRUMENTS BRANCH

PHASE 5

TYPES A-5 AND C-1 AUTOMATIC PILOTS

YOU WILL: Study the two types of auto pilot and learn the differences between them; Perform ground operational checks on both types and perform other maintenance procedures, such as checking servo cable tension, fluid level, etc.

YOU SHOULD READ: TM 1-413, Supplement No. 1, Section VII. Phase 5 Training Exercises.

NOTES & SKETCHES:

AIRPLANE INSTRUMENTS BRANCH

PHASE 6

GYRO FLUX-GATE COMPASS AND PRACTICAL EXAMINATON

YOU WILL: Study the gyro flux-gate compass; Learn the advantages that it has over other types of compasses, and elementary trouble-shooting on the system. In addition, inspect and trouble-shoot representative instruments systems, using knowledge that you should have gained in the previous branch work.

YOU SHOULD READ: Phase 6 Training Exercises.

NOTES & SKETCHES:

AIRPLANE INSTRUMENTS BRANCH

Questions:

1. Which of the hydraulic pressure gages on the B-24 airplane show an indicated pressure continuously?
2. Why do these gages show pressure at all times?
3. What different temperatures are measured on the B-24 airplane?
4. Why is the free-air thermometer considered the master thermometer on the airplane installation?
5. Why is carburetor air temperature rather than carburetor mixture temperature measured on the B-24 airplane?
6. What unit in the flap position indicating system is most likely to cause an incorrect indication?
7. How are the instruments on the panel illuminated?
8. What engine functions of the B-24 are measured with Autosyn instruments?
9. Why are the Autosyn transmitters grouped on one panel in the engine nacelle rather than mounted separately near the point of measurement?
10. If one of the two ampere autosyn instrument fuses burns out, how many instruments would be inoperative?
11. What are some of the advantages of combining two indicating mechanisms in one case, as is done with Autosyn instruments?
12. After cold weather maintenance is performed on the Autosyn oil pressure transmitter, why doesn't the light oil in the line mix immediately with the engine oil?
13. Why is the measurement of fuel pressure called a differential pressure measurement?
14. Why should the inverter be turned on before the engines are started?
15. What instruments operate from the pitot-static tube?
16. If the pitot-static tube were not parallel to the longitudinal axis of the airplane, what instrument would be most affected?
17. Why are there two red radial lines on the B-24 Airspeed indicator?
18. Why did the addition of the nose turret necessitate a change in the pitot-static system?

Questions: (Cont'd)

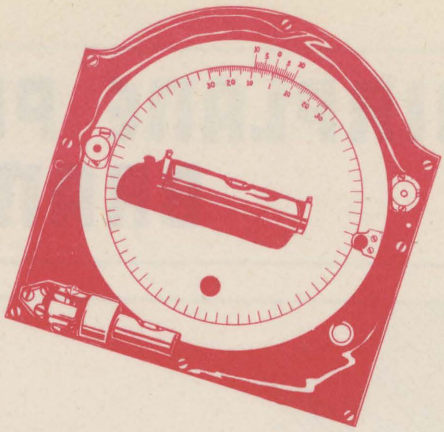
19. Why are the gyro instruments driven by suction instead of air pressure?
20. Why must the bank and turn indicator be caged during maneuvers?
21. What are some of the advantages of common or central air filter over individual air filters on the gyro instruments?
22. Why are two vacuum pumps used on the B-24 airplane?
23. What trouble might result if there were no check valve and pressure relief valve in the vacuum lines?
24. If these valves were missing, would the gyros tend to spin faster or slower at high altitudes?
25. Why cannot the pilot's magnetic compass be shielded from the airplane's magnetic field, so that no compensation would be necessary?
26. What does the compass do that the directional gyro cannot do?
27. For what reasons should the Magnesyn or remote indicating compass be more accurate than the pilot's type compass?
28. Why can variation not be compensated for in swinging the compass?
29. Why are the pilot's compass and the remote indicating compass both retained on the airplane?
30. Why is it necessary to have a compass correction card on the airplane after the compass has been compensated?
31. What are five of the chief differences in the types C-1 and A-5 automatic pilots?
32. Would failure of the airplane's inverters affect the operation of the C-1 auto pilot?
33. After operating the emergency servo release lever of the A-5 pilot, why must the airplane be landed before the auto pilot can be used again?
34. Why are there no sensitivity and ratio knobs on the A-5 pilot as there are on the C-1 pilot?
35. From the standpoint of electrical power consumption, which of the two pilots is more economical?

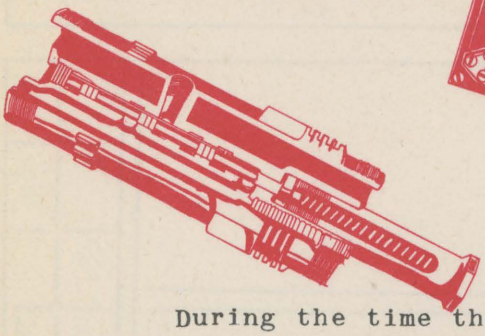
Questions: (Cont'd)

36. What is the advantage of connecting the servos into the control cables in parallel instead of in series?
37. What are the advantages of the gyro flux-gate compass over the Magnesyn remote indicating compass?
38. How would failure of the airplane's inverters affect the gyro flux-gate compass?
39. Would failure of the flux-gate gyro to spin necessarily render the whole flux-gate compass system inoperative?
40. Why is it necessary to have an amplifier in the flux-gate compass system?

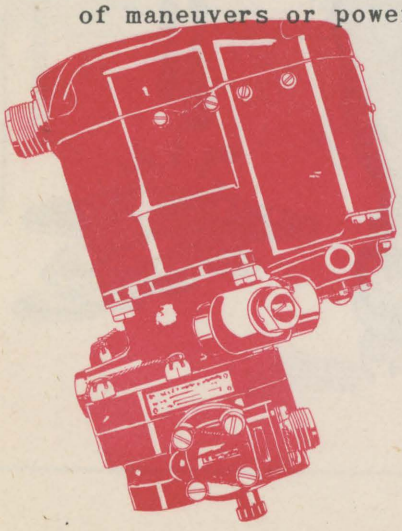
NOTES & SKETCHES

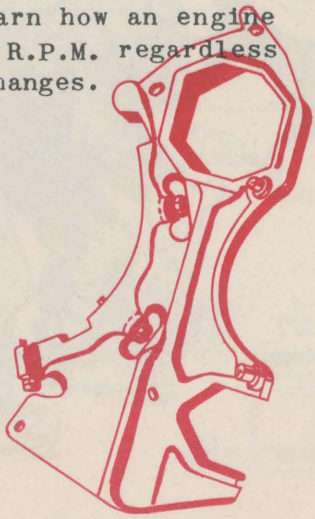
AIRPLANE PROPELLERS BRANCH





During the time that you are in the Airplane Propellers Branch, you will study the construction and operating principles of the various types of propellers. At the same time, you will learn proper maintenance procedures for service and inspection troubles that will be encountered, as well as the procedure for removal and installation on these various propellers. By means of a governor and a governor control, which are used in conjunction with the propeller, you will learn how an engine can maintain a constant R.P.M. regardless of maneuvers or power changes.





AIRPLANE PROPELLERS BRANCH

PHASE 1

PROPELLER CONSTRUCTION AND PRINCIPLE OF OPERATION; CHECKING BLADE ANGLE AND TRACK

YOU WILL: Learn propeller construction and principles of operation; Check blade angle and track.

YOU SHOULD READ: TM 1-412, Section I; Section VI, Par. 33, 34, and 36; Section XI, Par. 80; Section XII. Phase 1 Training Excercises.

NOTES & SKETCHES:

AIRPLANE PROPELLERS BRANCH

PHASE 2

PROPELLER REMOVAL AND INSTALLATION; DAILY AND 50-HOUR INSPECTION

YOU WILL: Remove and install the propeller on mock-ups; Complete the daily and 50-hour inspection requirements.

YOU SHOULD READ: TM 1-412, Section VI, Par. 39 a., b., and 40; Section XI, Par. 70 and 71.
Phase 2 Training Exercises.

NOTES & SKETCHES:

AIRPLANE PROPELLERS BRANCH

PHASE 3

PROPELLER GOVERNOR-OPERATION, INSTALLATION AND INSPECTIONS; FEATHERING SYSTEM

YOU WILL: Learn the construction and operating principle of the governor and governor control units; Remove and install the governor; Perform the periodic inspection requirements; Feather and unfeather the propeller.

YOU SHOULD READ: TM 1-412, Section VI, Par. 35-38. TSKF No. A4E1, Par. 1, 2, 4, and 5. X-Ray Manual (Diagrams and nomenclature). Phase 3 Training Exercises.

NOTES & SKETCHES:

AIRPLANE PROPELLERS BRANCH

PHASE 4

PROPELLER-PREFLIGHT, 100 and 200-HOUR INSPECTIONS; OIL DILUTION

YOU WILL: Complete the preflight, 100 and 200 hour inspection requirements; Perform oil dilution; Learn to synchronize engines by means of the governor and electric head control.

YOU SHOULD READ: TM 1-412, Section VI, Par. 40
TSKF No. A4E-1, Par. 6. Phase 4 Training Exercises.

NOTES & SKETCHES:

AIRPLANE PROPELLERS BRANCH

PHASE 5

PROPELLER ANTI-ICING SYSTEM-OPERATION AND INSPECTIONS; MINOR BLADE REPAIR

YOU WILL: Learn the operation of the anti-icing system; Perform local etching; Make minor blade repairs; Complete a practical and written examination.

YOU SHOULD READ: TM 1-412, Section VI; Section XI, Par. 72 and 74; Section XIII. Phase 5 Training Exercises.

NOTES & SKETCHES:

AIRCRAFT PROPELLER BRANCH

Questions:

1. What is the purpose of a propeller?
2. What is the purpose of a governor?
3. What is meant by the term ''feathering''?
4. What are the advantages of a controllable propeller?
5. What natural force present in every rotating propeller tends to put the blades in low pitch?
6. How is the propeller governor driven?
7. Why is an auxiliary system necessary to accomplish feathering?
8. What would be the result of ice forming on the propeller blades?
9. What are some probable causes of excessive propeller vibration?
10. What is the path of oil flow in a gear type pump?
11. When looking at a propeller, how can one determine the direction it rotates?
12. In what column in the Form 41-B would propeller inspections be entered?
13. What three possible conditions can exist in the governor during constant speed operation?
14. What are the three controlling forces in the propeller during constant speed operation? How do each affect blade angle change?
15. How would the R.P.M. of an operating engine be affected by increasing blade angle?
16. What is the purpose of coating the propeller blades with clean engine oil?
17. Would a small crack in a steel hub be sufficient cause to condemn it?
18. What is the purpose of oil dilution in the propeller system?
19. What precaution must always be taken before working on a propeller?
20. What is the advantage of the electric head control compared with the cable actuated control?
21. What is the color code for anti-icer system?
22. Where, in the cockpit of the B-24, are the feathering switches located?
23. How does a governor control the engine R.P.M.?
24. If the governor maintains a constant engine speed, how is it possible for the pilot to increase the speed of his airplane?

AIRCRAFT PROPELLER BRANCH

Questions: (Cont'd)

25. What is the purpose of the "range of operation" check in the operational preflight inspection?
26. Distinguish between the functions of the propeller governor and the electric head control?
27. What is the force that opposes speeder spring tension in the propeller governor?
28. What instrument is used to measure propeller blade angle?
29. Why are propellers with paddle type blades now used on the B-24 instead of propellers with tapered blades?
30. When a propeller is to be removed from the shaft, why are the blades placed in a feathered position before the dome is removed?
31. If the maximum or minimum limits of the electric governor control are incorrect, where and how would adjustments be made?
32. If the "range of operation" check was started once at 2000 r.p.m. and again at 1800 r.p.m. would the blade angle at 1200 r.p.m. be the same in both cases?

NOTES & SKETCHES

AIRPLANE ENGINE OPERATION BRANCH

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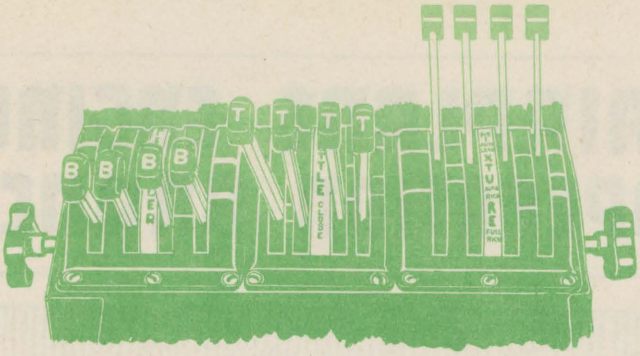
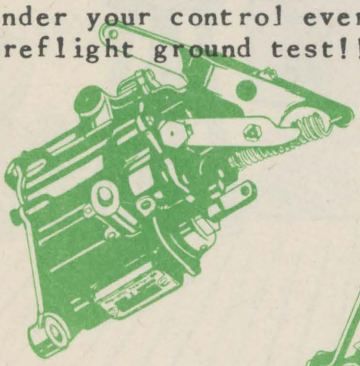
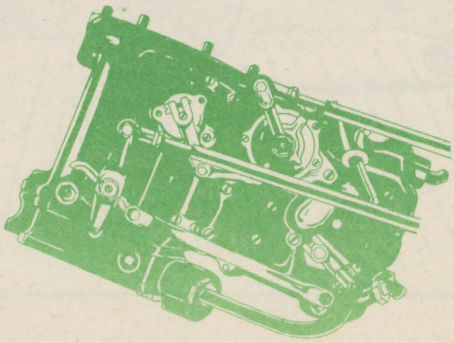


The Airplane Engine Operation Branch presents you with your first opportunity to actually observe the contributions of the units and systems you studied in other branches to the operations of an aircraft engine. As you progress through the branch, you will become familiar with engine inspection and operation procedure. Trouble shooting various systems, the performance of maintenance techniques and adjustments, such as the idle mixture adjustment on the carburetor, will help to make you a better mechanic.

When you hear the mighty roar of these powerful engines you will be thrilled to realize how much you have learned about them. Forty eight hundred horsepower under your control every time you pull a preflight ground test!!





AIRPLANE ENGINE OPERATION BRANCH

PHASE 1

ORIENTATION; ENGINE STARTING AND STOPPING PROCEDURES

YOU WILL: Perform preflight and daily inspections of the R-1830-43 engine; start, operate controls, and stop engine.

YOU SHOULD READ: Phase 1 Training Excercises.

NOTES & SKETCHES:

AIRPLANE ENGINE OPERATION BRANCH

PHASE 2

ENGINE WARM-UP; PREFLIGHT GROUND TEST OF IGNITION AND COOLING SYSTEMS; TROUBLE SHOOTING

YOU WILL: Warm up the engine; Make the preflight and ground checks of ignition and cooling systems; Diagnose and eliminate engine troubles.

YOU SHOULD READ: Phase 2 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ENGINE OPERATION BRANCH

PHASE 3

PREFLIGHT GROUND TEST OF THE OIL SYSTEM

YOU WILL: Perform oil dilution, preflight ground test of oil system, pre-oiling procedure of the R-1830-43 engine.

YOU SHOULD READ: Phase 3 Training Excercises.

NOTES & SKETCHES:

AIRPLANE ENGINE OPERATION BRANCH

PHASE 4

PREFLIGHT GROUND TEST OF THE B-24 GENERATOR

YOU WILL: Perform a preflight ground test of the B-24 generator system.

YOU SHOULD READ: Phase 4 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ENGINE OPERATION BRANCH

PHASE 5

GENERAL OPERATION OF THE FUEL SYSTEM

YOU WILL: Check the operation of the fuel system and the electric priming system; Make the fuel pressure relief valve as well as the idle speed and idle mixture adjustments.

YOU SHOULD READ: Phase 5 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ENGINE OPERATION BRANCH

PHASE 6

PREFLIGHT GROUND TEST OF THE HYDROMATIC PROPELLER SYSTEM (NORMALLY CONTROLLED GOVERNOR)

YOU WILL: Perform the ground test of the Hydromatic Propeller System and check the governor for constant speed operation.

YOU SHOULD READ: Phase 6 Training Exercises.

NOTES AND SKETCHES:

AIRPLANE ENGINE OPERATION BRANCH

PHASE 7

COMPLETE PREFLIGHT GROUND TEST; ADJUSTMENT OF ENGINE CONTROLS

YOU WILL: Perform the complete preflight ground test of the engine; Adjust engine controls; Learn trouble shooting procedure.

YOU SHOULD READ: Phase 7 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ENGINE OPERATION BRANCH

PHASE 8

TROUBLE RECOGNITION, ANALYSIS AND CORRECTION ON THE B-24 POWER PLANT INSTALLATION

YOU WILL: Analyze and correct some of the trouble likely to be encountered in the R-1830 engine installation.

YOU SHOULD READ: Phase 8 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ENGINE OPERATION BRANCH

PHASE 9

PREFLIGHT AND DAILY INSPECTION OF THE NACELLE, OPERATION OF TWIN ENGINE INSTALLATION

YOU WILL: Check the nacelle cooling system; Make the preflight and daily inspection of the twin engine installation.

YOU SHOULD READ: Phase 9 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ENGINE OPERATION BRANCH

PHASE 10

REMOVAL AND INSTALLATION OF PROPELLERS; GROUND CHECK OF PROPELLER SYSTEM

YOU WILL: Remove and Install a propeller; Check operation of the propeller feathering system.

YOU SHOULD READ: Phase 10 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ENGINE OPERATION BRANCH

PHASE 11

INSPECTION AND OPERATION OF TURBO-SUPERCHARGER; BALANCING OF GENERATOR SYSTEM

YOU WILL: Perform the preflight and daily inspection of the Turbo-Supercharger installation; Balance the twin engine generator system.

YOU SHOULD READ: Phase 11 Training Exercises.

NOTES AND SKETCHES:

AIRPLANE ENGINE OPERATION BRANCH

PHASE 12

COMPLETE PREFLIGHT GROUND TEST, TROUBLE ANALYSIS AND CORRECTION - TWIN ENGINE INSTALLATION

YOU WILL: Make a complete preflight ground test of a twin-engine installation including analysis and correction of troubles which commonly occur.

YOU SHOULD READ: Phase 12 Training Exercises.

NOTES & SKETCHES:

AIRPLANE ENGINE OPERATION BRANCH

Questions:

1. Why should a starter be replaced when excessive oil is found in the starter gear housing and flywheel?
2. Why must the fuel tank atmospheric vent be kept open?
3. Describe the proper way to drain, close and safety the main line strainer. What tools are needed?
4. In what sequence should the spark plugs be removed to release oil from the cylinders, if the propeller could not be pulled through?
5. Where is the propeller governor control set for starting? Why?
6. When the engine is to be stopped, why is the throttle fully opened?
7. Why must the fuel booster pump be operating during starting?
8. What would be the result of operating an engine "auto-lean" at high speed?
9. What instruments should be observed closely during warm-up?
10. Why should prolonged running of the engine at a speed of less than 1300 RPM be avoided?
11. Is there generally any relationship between engine temperatures and RPM?
12. Why is the oil pressure gage the first one that should be observed when the engine starts?
13. Why isn't the generator switch closed as part of the starting procedure?
14. Why is priming accomplished immediately before and during the time that the starter is engaged to the engine?
15. What effect would an open primer valve have on engine operation?
16. Why should the propeller control be placed in full increase RPM before starting the engine?
17. When increasing engine power, which should be increased first, RPM or manifold pressure? Which for decreasing power?
18. What must the instruments read before the warm-up period can be considered complete? Which instruments?
19. What is the operating range of the propeller governor used on the R-1830-43 power plant installation?
20. Why are controls checked with quadrant lever in mid-position?

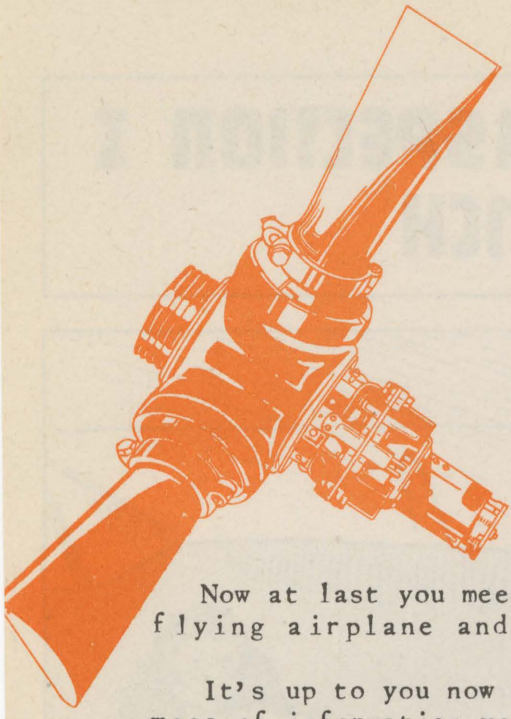
AIRPLANE ENGINE OPERATION BRANCH

Questions: (Cont'd)

21. How may fuel system troubles be localized by proper interpretation of instrument indications?
22. What instruments give indication of ignition trouble?
23. If there is more than one trouble in an engine what is the procedure for eliminating them?
24. In what technical order can the preflight requirements for the R-1830-43 engine be found?
25. Why is it necessary to cool the air that goes from the turbo-supercharger to the carburetor air intake?
26. What effect does increasing manifold pressure during constant speed operation have on propeller pitch?
27. How is the clearance between the nozzle box and turbine wheel of the turbo-supercharger checked and adjusted?
28. How is the supercharger operational preflight inspection made on the line?
29. Why should generators be free of load when adjusting the regulator?
30. At what temperature should the engine be stopped after completion of the ground test?
31. Describe procedure for installing cold plugs in a hot engine. To what torque should they be tightened?

NOTES & SKETCHES

AIRPLANE INSPECTION I BRANCH

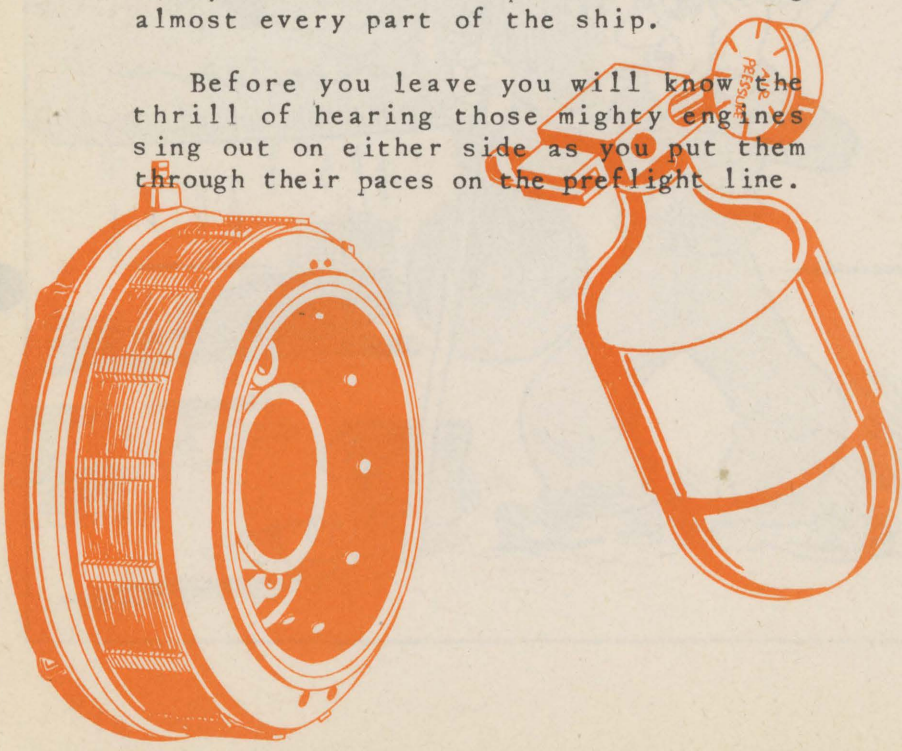


Now at last you meet the real thing, a flying airplane and she's your baby.

It's up to you now to put to work that mass of information you stored away since starting school.

You'll be required to pull preflight, daily and 25 hour inspections covering almost every part of the ship.

Before you leave you will know the thrill of hearing those mighty engines sing out on either side as you put them through their paces on the preflight line.



AIRPLANE INSPECTION I BRANCH

PHASE 1

DAILY AND 25-HOUR INSPECTION OF POWER PLANT; USE OF AAF FORMS 1, 1A and 41B.

YOU WILL: Simulating on actual flight, process a form 1 and 1A; Start a form 41B for use in the branch; Perform the above inspection on propellers and accessories, engine controls and cooling system.

YOU SHOULD READ: TM 1-415, Sections I-III; Airplane Maintenance Instruction Forms.
Phase 1 Training Exercises.

NOTES & SKETCHES:

AIRPLANE INSPECTION I BRANCH

PHASE 2

DAILY AND 25-HOUR INSPECTION OF POWER PLANT (CONT'D); ENGINE INSTRUMENTS, FUEL AND OIL SYSTEMS

YOU WILL: Perform the daily inspection of engine instruments; 25-hour inspection of manifolds and superchargers, fuel and oil systems, power plant general.

YOU SHOULD READ: TM 1-415, Section X, Par. 118; Section XII, Par. 127, 128, and 131. Airplane Maintenance Instruction Forms. Phase 2 Training Exercises.

NOTES & SKETCHES:

AIRPLANE INSPECTION I BRANCH

PHASE 3

DAILY AND 25-HOUR INSPECTION OF IGNITION AND ELECTRICAL, NIGHT FLYING EQUIPMENT, AUXILIARY POWER UNIT, NAVIGATION INSTRUMENTS

YOU WILL: Perform the required inspections of the above equipment; Service and start the A.P.U.

YOU SHOULD READ: TM 1-415, Section VIII and XI. Airplane Maintenance Instruction Forms. Phase 3 Training Exercises.

NOTES & SKETCHES:

AIRPLANE INSPECTION I BRANCH

PHASE 4

25-HOUR INSPECTION OF HYDRAULIC SYSTEM AND LANDING GEAR; HANDLING, CARE AND USE OF PARACHUTES

YOU WILL: Perform the required inspections of the above systems; Check a parachute, put it on, make a practice jump and learn to turn either to the right or left.

YOU SHOULD READ: TM 1-415, Section XI, Par. 40-46; Section IX, Par. 100. Airplane Maintenance Instruction Forms. Phase 4 Training Exercises.

NOTES & SKETCHES:

AIRPLANE INSPECTION I BRANCH

PHASE 5

25-HOUR INSPECTION OF FLIGHT CONTROL MECHANISMS, MOVABLE AND FIXED SURFACES, FUSELAGE, COCKPITS AND CABINS; PREFLIGHT AND DAILY INSPECTION OF OXYGEN SYSTEM

YOU WILL: Perform the inspections indicated above.

YOU SHOULD READ: TM 1-415, Section XI, Par. 48-55;
Airplane Maintenance Instruction Forms.
Phase 5 Training Exercises.

NOTES & SKETCHES:

AIRPLANE INSPECTION I BRANCH

PHASE 6

25-HOUR INSPECTION OF AIRPLANE GENERAL; DAILY INSPECTION OF THE ENTIRE AIRPLANE; INTERCHANGEABILITY OF AIRPLANE PARTS

YOU WILL: Perform the inspections indicated above; Determine whether one part can be substituted for another on a particular airplane.

YOU SHOULD READ: TM 1-415, Section VI-XII (all items marked daily); Airplane Maintenance Instruction Forms. Phase 6 Training Exercises.

NOTES & SKETCHES:

AIRPLANE INSPECTION I BRANCH

PHASE 7

MAINTENANCE AND SERVICING OF THE AIRPLANE

YOU WILL: Perform 1st and 2nd echelon maintenance necessary to clear defects on the airplane's form 41B; Service and ready the airplane for operation.

YOU SHOULD READ: Airplane Maintenance Instruction Forms. Phase 7 Training Exercises.

NOTES & SKETCHES:

AIRPLANE INSPECTION I BRANCH

PHASE 8

PREFLIGHT AND AFTER FLIGHT INSPECTIONS;
PREFLIGHT INSPECTION OF LIFE RAFTS;
TOWING AND HANDLING OF AIRPLANES; TAXI SIGNALS

YOU WILL: Move the airplane; Perform the preflight inspection before and during engine run up, the after flight inspections; Inspect life rafts; Practice taxi signals.

YOU SHOULD READ: TM 1-415, Section V; Airplane Maintenance Instruction Forms.
Phase 8 Training Exercises.

NOTES & SKETCHES:

AIRPLANE INSPECTION 1 BRANCH

Questions:

1. What is a field expedient method of checking propeller track?
2. What symbols in the "Status Today" column on the Form 41B require an exceptional release, and who has the authority to grant it?
3. What are the specific preflight inspections for a propeller and accessories?
4. Name and locate each of the engine controls.
5. What device is used to regulate the operating temperature of an air-cooled engine?
6. What damage could result from a loose tool, nut, or other object in an intake manifold?
7. What trouble should be looked for first if none of the autosyn instruments were operative?
8. What procedure is used to make fuel in each tank available for use in engines?
9. What is the purpose of a hopper type oil tank?
10. What is the purpose of a continuity tester?
11. What is the procedure for adjusting a voltage regulator? For paralleling a multi-engine installation?
12. What comprises night flying equipment?
13. Why is oil mixed with fuel for the fuel container of the A.P.U.?
14. Which instruments use pressure from the pitot-static tube, and what type of pressure (pitot or static) does each use?
15. What is the purpose of the hydraulic pressure accumulator?
16. Why is it necessary to extend the struts by jacking the airplane several times while filling with fluid?
17. What is the reason for "bleeding" brakes?
18. Is it permissible for first echelon to make repairs on the parachute or parachute pack?
19. Why are pulleys and fairleads made of phenolic materials?
20. What is the significance of diagonal wrinkles in skin surfaces?
21. Why must the fitting of a demand mask be practically airtight?

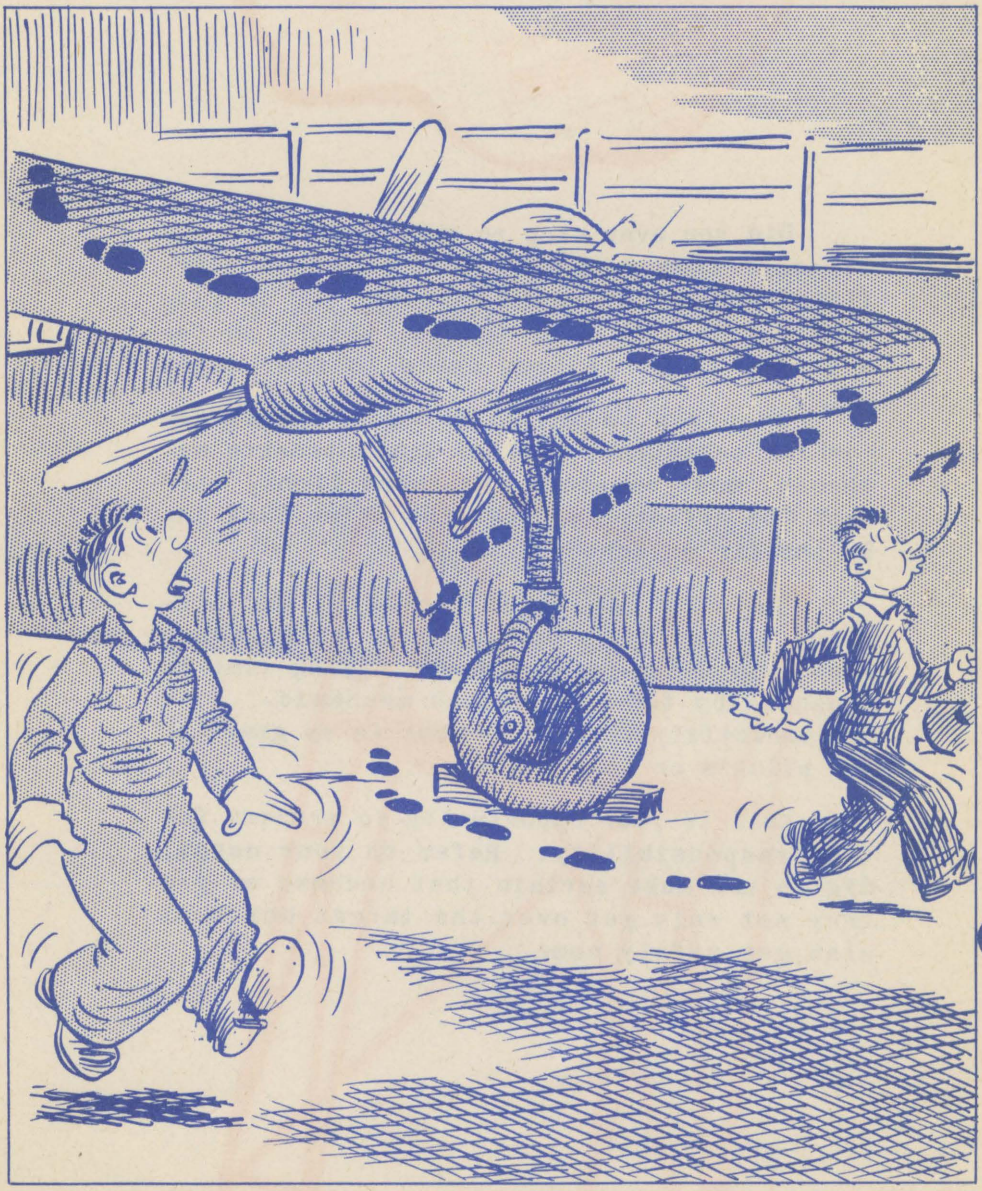
AIRPLANE INSPECTION 1 BRANCH

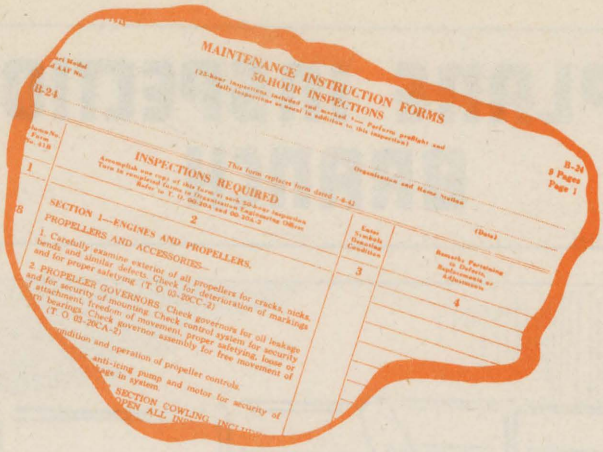
Questions: (Cont'd)

22. When inspecting fixed surfaces, where would you look particularly for damage due to corrosion?
23. Why are battery leads disconnected and taped during the cleaning of an airplane?
24. Which Technical Order has information on the parts that are interchangeable and the airplanes that have similar parts?
25. What is the purpose of the coating of graphite on the de-icer boots?
26. Give the proper signals to be used during engine run-up by the alert crew and cockpit crews for the following: Attention, Stop the Engine, Slow Down the Engine, Speed Up the Engine, Engine on Fire.
27. Explain how clearing the most serious defect in Form 41B would affect Form 1A.
28. What procedure is followed concerning the remarks written by the pilot?
29. List the switches that need to be turned on in order to start the engines.
30. Explain how the controls are locked.
31. How are the throttles, mixture controls, and propeller controls set prior to starting the engines?
32. What use can be made of Technical Orders when inspecting an airplane?

NOTES & SKETCHES

AIRPLANE INSPECTION II BRANCH





Did you ever stop to think how many days it would take an airplane to complete fifty flying hours? It could be completed in five bombing missions over Europe, which, on the average, requires from three to four days.

In order to maintain rigid, strategic bombing schedules, you, as a maintenance mechanic, must complete the inspections, correct the defects, and get the ships back into the air on schedule.

The most important factor of any airplane is the efficiency of its maintenance crew. In fact, an airplane's flying time is measured by the maintenance mechanic. Your responsibility for that bomber is as great as the pilot's or co-pilot's.

This is your opportunity to prepare for that responsibility. Refer to your notes, dig in and make certain that because of you they not only get over the target but they also get safely home.

AIRPLANE INSPECTION II BRANCH

PHASE 1

A. A. F. FORMS, BATTERIES, BATTERY CARTS, AND AUXILIARY POWER UNIT

YOU WILL: Initiate A. A. F. Forms 41B, 81, 82, 1, 1A and the 50-hour Maintenance Instruction Form for an airplane. Learn the operation, maintenance, and inspections of auxiliary power units, battery carts and batteries. Load and balance an airplane.

YOU SHOULD READ: Airplane maintenance instruction form (50-hour inspection requirements). Phase 1 Training Exercise.

NOTES & SKETCHES:

AIRPLANE INSPECTION II BRANCH

PHASE 2

50-HOUR INSPECTION, ENGINE INSTRUMENTS, NAVIGATION INSTRUMENTS AND COCKPITS AND CABINS

YOU WILL: Perform the above inspections, indicating conditions by appropriate symbols and explaining defects in the Maintenance Instruction Form. Clear as many defects as possible.

YOU SHOULD READ: Airplane maintenance instruction form (50-hour inspection requirements).
Phase 2 Training Exercise.

NOTES & SKETCHES:

AIRPLANE INSPECTION II BRANCH

PHASE 3

50-HOUR INSPECTION OF PROPELLERS AND ACCESSORIES, POWER PLANT GENERAL AND MANIFOLDS AND SUPERCHARGERS

YOU WILL: Perform the above inspections, make proper entries in your forms, and clear as many defects as possible.

YOU SHOULD READ: Airplane maintenance instruction forms (50-hour inspection requirements).
Phase 3 Training Exercise.

NOTES & SKETCHES:

AIRPLANE INSPECTION II BRANCH

PHASE 4

50-HOUR INSPECTION OF THE FUEL AND OIL SYSTEMS AND ENGINE CONTROLS

YOU WILL: Perform the above inspections, make proper entries in your form, and clear as many defects as possible.

YOU SHOULD READ: Airplane maintenance instruction forms (50-hour inspection requirements).
Phase 4 Training Exercise.

NOTES & SKETCHES:

AIRPLANE INSPECTION II BRANCH

PHASE 5

50-HOUR INSPECTION OF IGNITION AND ELECTRICAL SYSTEMS

YOU WILL: Perform the above inspections, make proper entries in your forms, and clear as many defects as possible.

YOU SHOULD READ: Airplane maintenance instruction forms (50-hour inspection requirements).
Phase 5 Training Exercise.

NOTES & SKETCHES:

AIRPLANE INSPECTION II BRANCH

PHASE 6

50-HOUR INSPECTION OF FLIGHT CONTROL MECHANISMS, MOVABLE AND FIXED SURFACES, FUSELAGE AND TAIL SKID

YOU WILL: Perform the above inspections, make proper entries in your forms, and clear as many defects as possible.

YOU SHOULD READ: Airplane maintenance instruction forms (50-hour inspection requirements).
Phase 6 Training Exercise.

NOTES & SKETCHES:

AIRPLANE INSPECTION II BRANCH

PHASE 7

50-HOUR INSPECTION OF LANDING AND NOSE GEAR, WHEELS AND BRAKES AND HYDRAULIC SYSTEM

YOU WILL: Perform the above inspections, make proper entries in your forms, and clear as many defects as possible.

YOU SHOULD READ: Airplane maintenance instruction forms (50-hour inspection requirements).
Phase 7 Training Exercise.

NOTES & SKETCHES:

AIRPLANE INSPECTION II BRANCH

PHASE 8

50-HOUR INSPECTION OF AIRPLANE GENERAL

YOU WILL: Perform the above inspections, make proper entries in your forms, and clear as many defects as possible. Use the interphone equipment.

YOU SHOULD READ: Airplane maintenance instruction forms (50-hour inspection requirements).
Phase 8 Training Exercise.

NOTES & SKETCHES:

(Rev. 5/1/44)

AIRPLANE INSPECTION 2 BRANCH

QUESTIONS

1. What is done with the completed Forms 1, 1A, and 41B?
2. What is the purpose of the APU?
3. What is the purpose of the equalizer switch on the APU?
4. What actuates the pitch changing mechanizm on the hydromatic propeller?
5. Where is the main oil pressure screen located on the R-1830-43 series engine?
6. What causes the external fire extinguisher safety disc to rupture?
7. Why is it necessary to synchronize the position indicator and landing flaps?
8. Why is bonding necessary on flight control mechanisms?
9. At what place are control cables most likely to be frayed?
10. How may the difference between a scratch or crack on a blade be determined?
11. What would foreign substance on the oil screens indicate?
12. What switches must be "On" before you can use interphone communications?
13. In what position must the fuel shut-off value be safetied?
14. Why is it important to check generator brushes after high altitude flight?
15. What source of information is available to determine the correct operating ranges of instruments?
16. Of what assistance are instruments in determining malfunctioning of the engine?
17. Describe the procedure and precautions observed when deflating shock struts.
18. What will happen if improper hydraulic fluid is used in a strut?
19. What is the "center of gravity" of an airplane?
20. What does "basic weight" mean? How is it determined?
21. What is the purpose of the vacuum system?
22. What controls the sequence of operation of the deicer boots?

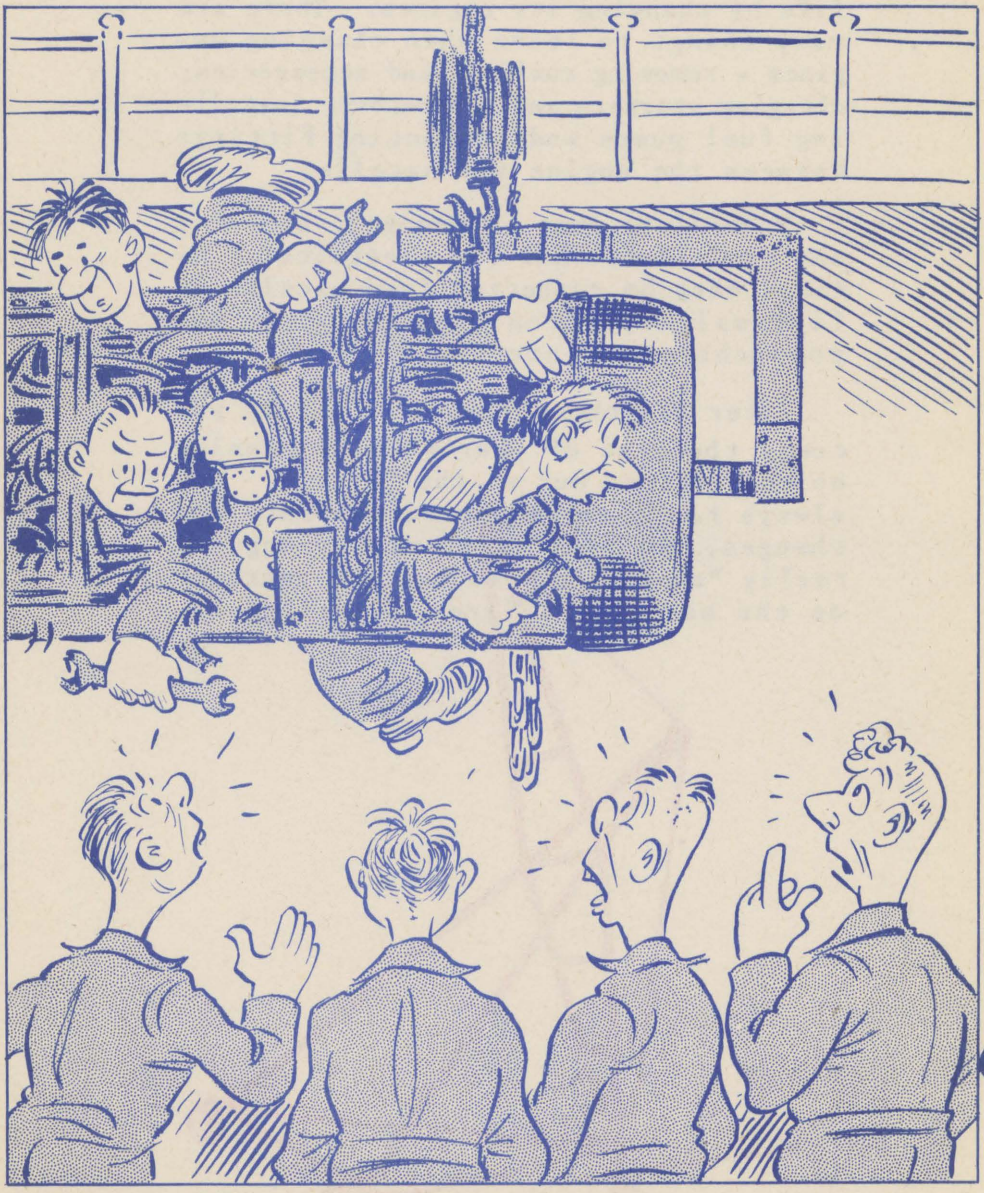
AIRPLANE INSPECTION 2 BRANCH

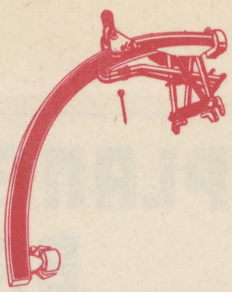
QUESTIONS: (Cont'd)

23. What forms are used to keep the record of weight and balance data of an individual airplane?
24. What safety precautions are to be observed before attempting to raise an airplane?
25. How do constant flow and demand type regulators in the oxygen system differ?
26. How is the cylinder head temperature gage checked against atmospheric temperature?
27. Why is it necessary to blow condensation out of the manifold pressure transmitter line?
28. How do you know when the compass was last swung?
29. What do you do if the compass correction card is missing?
30. How is the altimeter adjusted if the check against the station altimeter indicates a difference in reading?
31. What is the proper installation of the lockwire on the Hamilton Standard Hydromatic Propeller dome plug and retaining nut?
32. What is the proper installation of the cotter pin on the Hamilton Standard Hydromatic Propeller dome retaining nut lockscrew?
33. Why is it important to clean out the balance line and elbows on the supercharger?
34. Where would you look to locate references concerning clearances on the supercharger between the bucket wheel and cooling cap? Nozzle box?
35. What is the proper prodecure for bleeding a carburetor?
36. Does the poppet valve go up or down on the proper installation of the main oil screen?
37. What is to be done if engine oil is found in the generator?
38. Why is overthrow permitted on movable surfaces, whereas underthrow is not?
39. How is a Houdaille shimmy dampener bled?
40. How do you determine when the next 50 hour inspection is due?

NOTES & SKETCHES

AIRPLANE INSPECTION III BRANCH

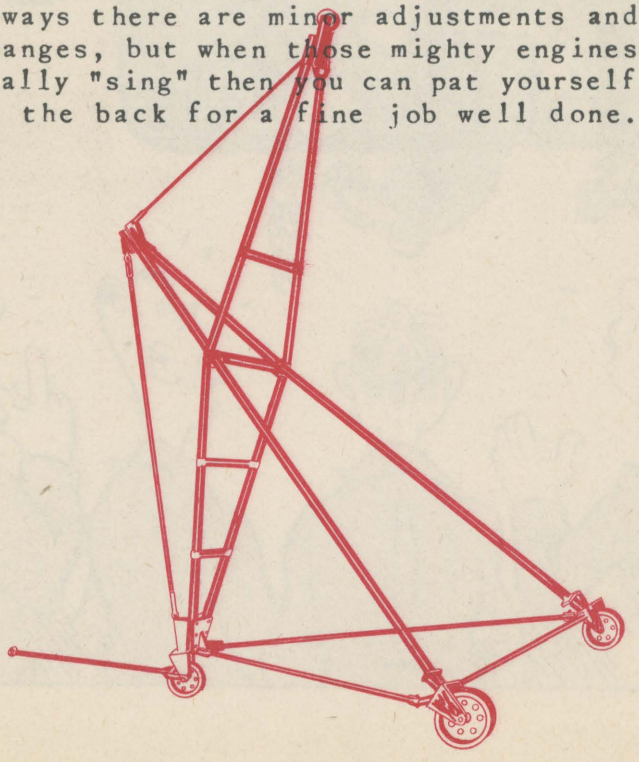




This is the branch that trains you to give the big B-24 bombers a new lease on life by changing its engines. There are many things to learn when changing engines - removing cowlings and accessories; changing starters and generators; installing fuel pumps and connecting fittings between the engine and nacelle.

Propellers must be mounted, checked, and pre-oiled. All the electrical fittings must be connected from nacelle to fire-wall synchronizing throttle and supercharger controls.

After all these jobs are done by you comes the test of your work by running up the engines out on the "lines". And always there are minor adjustments and changes, but when those mighty engines really "sing" then you can pat yourself on the back for a fine job well done.



AIRPLANE INSPECTION 3 BRANCH

PHASE 1

REMOVAL OF COMPLETE ENGINE AND NACELLE FROM THE B-24 AIRPLANE

YOU WILL: Deflate the nose wheel and main landing gear shock struts; Remove the propeller; Remove the complete nacelle; Protect exposed openings and electrical connections.

YOU SHOULD READ: Phase 1 Training Exercises.

NOTES & SKETCHES:

AIRPLANE INSPECTION 3 BRANCH

PHASE 2

REMOVAL OF THE ENGINE FROM THE NACELLE

YOU WILL: Remove the ring cowl, cowl flap assemdly, carburetor and fuel pump; Disconnect electrical equipment from the engine, necessary lines and fittings; Remove the engine from the ring mount.

YOU SHOULD READ: Phase 2 Training Exercises.

NOTES & SKETCHES:

AIRPLANE INSPECTION 3 BRANCH

PHASE 3

CLEANING AND INSPECTION OF POWER PLANT; PREPARATION OF ENGINE FOR STORAGE AND/OR SHIPMENT

YOU WILL: Seal openings on the engine and steam clean it; Prepare the accessories for storage or shipment.

YOU SHOULD READ: Phase 3 Training Exercises.

NOTES & SKETCHES:

3/21/44

AIRPLANE INSPECTION 3 BRANCH

PHASE 4

MOUNTING OF ENGINE IN NACELLE

YOU WILL: Install starter and generator on engine; Install engine and accessories in ring mount.

YOU SHOULD READ: Phase 4 Training Exercises.

NOTES & SKETCHES:

AIRPLANE INSPECTION 3 BRANCH

PHASE 5

INSTALLATION OF ACCESSORIES AND COWLING

YOU WILL: Connect fittings between nacelle and engine; Install ring cowl, cowl flaps and baffles; Check nacelle instrument circuits and operation of nacelle electrical units.

YOU SHOULD READ: Phase 5 Training Exercises.

NOTES & SKETCHES:

AIRPLANE INSPECTION 3 BRANCH

PHASE 6

INSTALLATION OF NACELLE TO AIRPLANE AND REPLACEMENT OF PROPELLER

YOU WILL: Install the nacelle and the propeller; Inflate the nose wheel and main landing gear shock struts.

YOU SHOULD READ: Phase 6 Training Exercises.

NOTES AND SKETCHES:

AIRPLANE INSPECTION 3 BRANCH

PHASE 7

COMPLETION OF INSTALLATION AND PREPARATION FOR OPERATIONAL CHECK

YOU WILL: Make the electrical connections between the firewall and the engine nacelle; Connect fuel and oil lines, ducts, cables and miscellaneous lines (nacelle to wing); Service with oil; Prepare carburetor for run-up.

YOU SHOULD READ: Phase 7 Training Exercises.

NOTES AND SKETCHES:

AIRPLANE INSPECTION 3 BRANCH

PHASE 8

OPERATIONAL CHECK AND TESTING OF ENGINE; FINAL ADJUSTMENTS

YOU WILL: Check the nacelle connections. Pre-oil the engine; Prepare for starting the engines; Start the engine and check for proper operations.

YOU SHOULD READ: Phase 8 Training Exercises.

NOTES & SKETCHES:

AIRPLANE INSPECTION 3 BRANCH

Questions:

1. What is normally done with a propeller during a regular engine change?
2. Where are the lifting eyes on the Pratt and Whitney engine?
3. At what point must the main fuel line be disconnected? The control cables?
4. Why is it advisable to cover the exhaust pipe to the turbo wheel?
5. Why is it necessary to cover fuel and oil lines?
6. At what points should the generator blower tube be disconnected?
7. What is done with carburetor at engine change?
8. Why are the oil tank vent line fittings removed from the engine?
9. How can the threads of the engine mount bolts be protected during hoisting operations?
10. How should the carburetor be sealed before cleaning?
11. Briefly explain how to prepare a carburetor for storage.
12. How is the propeller shaft usually protected?
13. What is done with the oil seperator at engine change?
14. What is done to the generator and starter before they are installed?
15. What torque is used on shock mounts?
16. On what engines will a vacuum pump be found? Where is it located?
17. How is the governor operation tested during the tightening of the mounting studs?
18. How are the throttle and mixture control rods safetied?
19. How are the autosyn circuits in the nacelle checked?
20. How many wires lead to the primer solenoid?
21. Why should the top mounting bolts be installed first?
22. Why should the nacelle be lined up so that it moves at right angles to the wing before mounting?
23. Name the correct order of mounting the parts of the propeller assembly on the airplane.
24. What is the position of the propeller blades as the dome is installed?
25. How is the propeller dome pre-oiled?

AIRPLANE INSPECTION 3 BRANCH

Questions: (Cont'd)

26. What holds the main (general disconnect) cannon plug intact?
27. Name four oil connections between the nacelle and wing?
28. By what path does fuel travel from the nozzle to the gang drain?
29. Is there any protection against radio interference in the wiring of the B-24?
30. Why should the waste gate be in the open position before the engine is started?
31. What would happen if the propellers were pulled through with the main line switch "On"?
32. At what RPM would you test the propeller governor for constant speed?

NOTES & SKETCHES