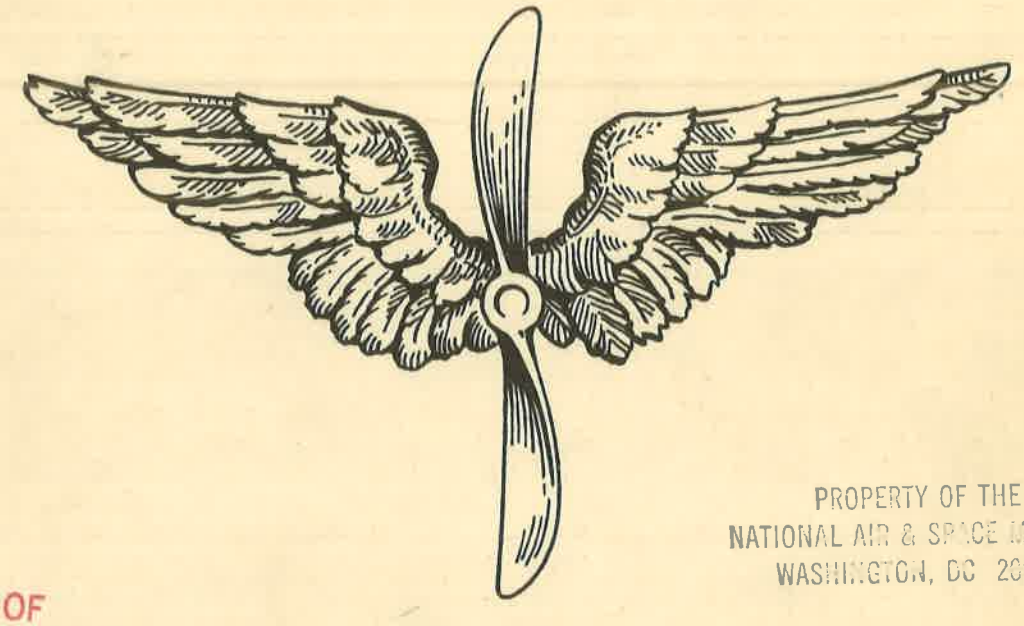
Aircraft

FINAL ASSEMBLY MECHANIC



P-40-E

PRELIMINARY

INSTRUCTION MANUAL

200 pages

★ U.S. ARMY AIR CORPS · AIR SERVICE COMMAND ★

The Drury Ptg. Co. 4-3-42—5M

Aircraft Final Assembly Mechanic

P-40-E

INTRODUCTION

This instruction manual is one of a series intended for use in training civilians for employment in Air Depots and Sub-Depots and for "up-grade" training of employed mechanics.

METHOD OF COMPILING

The material in these manuals was organized and compiled by foreman, mechanics and other skilled personnel in the various Air Depots. Each depot was assigned certain occupations to analyze and compile into the present form.

The first step in this procedure was to list the jobs or operations which are done in the respective occupations under suitable break down headings such as Divisions, Blocks, and Units.

These occupational job or operation lists were sent to all depots to be checked for accuracy and completeness. Revisions were made and Job, Operation, and Information Sheets were compiled.

Reference material from technical orders, manufacturers' manuals, hand books and from all available sources were used. Direct reference has been made frequently to technical orders for proper procedure. The language used and procedures listed have been made to conform to shop conditions.

ORGANIZATION

The instruction manuals are organized into three parts - Job Sheets, Operation Sheets, and Information Sheets.

Job Sheets provide specific assignments for the trainee to do with instructions as to procedure in doing the respective jobs.

Operation Sheets provide additional detailed instruction on operations in doing jobs which need further explanation.

Information Sheets provide essential information needed at the time the jobs are being done in order that they may be done intelligently and correctly. They supplement text books or serve in lieu of them when satisfactory text books are not available.

These manuals are really Occupational Analyses organized into instructional form. They are issued in loose leaf form so that changes and additions, in order to keep up to date, may be easily made by inserting new sheets. Jobs which are included in the manuals, but which may not be done at a particular air depot, may be easily removed.

SUGGESTED USE OF MANUALS

These manuals can be used in different ways depending upon the method of instruction used and the instructional conditions existing. Some possible uses of the manuals are:

1. On the job training.
   a. The manuals may serve as a guide to the foreman, his assistant or to the special "on the job" instructor as to what the learner should learn in the particular department. From it a progress chart can easily be made upon which the trainee's learning accomplishments day by day can be recorded.

b. The manuals can be used as references by the trainees in outside study of how to do various jobs which they see others doing in their departments; or as a review of jobs which they have done in order to get them more clearly in mind and to secure additional technical information concerning them. The trainees will also find the instruction manuals helpful when they make written reports of the work done during the day.

2. Training in the class room and in training shops.
   a. They can serve as a guide to the instructor in organizing his training program and in making his daily instruction plans.
   b. The manuals can be used by the trainees as reference material to refresh their minds on what they have learned and seen in classroom lectures and shop demonstrations.
   c. They can serve as a guide for doing jobs in the shop, after listening to lectures and observing demonstrations made by the instructor.
   d. They can serve as manuals for group instruction and demonstrations by the instructor as needed. General class room instruction and demonstrations on certain phases of the work can be presented regardless of how far the learner has advanced. Supplementary classes can also be given in various related subjects such as Blue Print Reading, Technical Theory and Air Depot Organization and Regulations.

3. Other Uses.
   These manuals can serve as a guide to outside schools and other agencies who may be cooperating with the Air Corps in its training program.

FINAL FORM

The instruction manuals in their present form are only for immediate emergency and use. It is planned to carefully edit and illustrate them and later issue them information as official manuals. Their final form may be different than at present.

SUGGESTIONS FOR IMPROVEMENT

It is realized that these manuals can be improved. Some ways for improvement are already apparent and suggestions have been received which will be helpful when revisions are made. Other needs for improvement will become apparent as the manuals are put into use. Copies of suggested additions and revisions should be sent to Air Service Command.

Criticism and suggestions are solicited and will be welcome. Send them to:

TRAINING AND OPERATIONS
Air Service Command
Wright Field
Dayton, Ohio.

Recognition is given Middletown Air Depot, Department of Public Instruction, Pennsylvania, Derry Township Public Schools, Hershey, Pennsylvania for their services in the developing and organizing of the material in this publication.

P-40E AIRPLANE

Aircraft Final Assembly

1. Preparation of Engine for Installation
2. Installation of Accessories and Fittings Prior to Mounting Engine on Airplane
3. Installation of Engine and Accessories on Mount
4. Assemble Wing Accessories
5. Install Complete Wing
6. Install Empennage
7. Inspect Fuselage Flight Controls and Install Static Ground Wire
8. Inspect Engine and Accessories
9. Inspect Propellers
10. Inspect Fuel Tanks
11. Inspect Wings and Fuselage
12. Inspect Landing and Tail Gears
13. Inspect Interior of Fuselage
14. Prior Inspection for Engine Run-up Test
15. Engine Run-up Test
16. Final Check on Run-up Test

PREPARATION OF ENGINE FOR INSTALLATION

Tools and Equipment

1. 10" adjustable wrench

PROCEDURE	REFERENCES
1. Unscrew and remove bolts from engine packing box ----	
2. Remove lid from box ----------	
NOTE: Engine and accessories remain on base of box for cleaning and inspection. T.O. 02-5AD-2 Figure 12.	
3. Clean engine of all anti-rust grease with clean dry rags ----------	
4. Check engine for type numbers and inspection signatures ----------	
5. Check accessories for type numbers and inspection signatures ----------	

AIRCRAFT ENGINE INSTALLATION
REFERENCES: T.O. 03-5CA-3, T.O. 03-5CA-1, T.O. 03-5AA-1, T.O. 03-10EA-1, T.O. 01-25CF-2, Fig. 47, 48

INSTALLATION OF ACCESSORIES AND FITTINGS PRIOR TO MOUNTING ENGINE ON AIRPLANE

Tools and Equipment

1. Adjustable wrenches
2. Open end wrenches
3. Combination slip-joint pliers
4. Diagonal pliers
5. Long-nose pliers
6. Screw-driver

PROCEDURE	REFERENCES
1. Install starter	O.S.-1
2. Install stacks and stack covering	O.S.-2
3. Install generator	O.S.-3
4. Install fuel pump and fittings	O.S.-4
5. Install vacuum pump and fittings	O.S.-5
6. Install carburetor and fittings	O.S.-6
7. Install vapor eliminator and fittings	O.S.-7
8. Install engine mount on airplane	O.S.-8

DIVISION - P-40E AIRPLANE

AIRCRAFT ENGINE INSTALLATION
REFERENCES: T.O. 01-25CF-2, Fig. 51 and 8,
T.O. 01-25CF-1, Fig. 3,
T.O. 03-10F -1, T.O. 01-40AH-3
DRAWINGS 87-44-501, 87-44-504,
87-50-701, 87-54-501,
87-46-501

INSTALLATION OF ENGINE AND ACCESSORIES ON MOUNT

Tools and Equipment

1. Engine sling
2. Combination slip-joint pliers
3. Long-nose pliers
4. Diagonal pliers
5. Open end wrenches
6. Adjustable wrenches
7. Clamp wrench
8. Screw-driver

PROCEDURE	REFERENCES
1. Install engine on mount	O.S.- 9
2. Install fuel pressure signal and fittings	O.S.-10
3. Install oil cooler and fittings	O.S.-11
4. Connect fuel lines	O.S.-12
5. Connect oil lines	O.S.-13
6. Connect coolant lines	O.S.-14
7. Connect vacuum pump lines	O.S.-15
8. Connect vent lines	O.S.-16
9. Connect pressure lines	O.S.-17
10. Inspect and connect control rods	O.S.-18
11. Inspect installation	O.S.-19
12. Pre-oil engine	O.S.-20
13. Install flaps, air scoop and cowling	O.S.-21

DIVISION - P40E AIRPLANE

AIRCRAFT FINAL ASSEMBLY
REFERENCES: T.O.01-25CF-2

ASSEMBLE WING ACCESSORIES

Tools and Equipment

1. Socket wrenches
2. Diagonal side-cutting pliers
3. Screw-driver
4. Scale
5. Open end wrenches
6. Low speed drill with chuck

PROCEDURE	REFERENCES
1. Connect link rods to bearing block to torque tube of control stick	O.S.-22
2. Install wing flaps	O.S.-23
3. Connect flap control tube	O.S.-24
4. Install flap bondings and pads	O.S.-25
5. Install aileron bearing caps, aileron and aileron bondings	O.S.-26

INSTALL COMPLETE WING

PROCEDURE (Cont.)	REFERENCES
10. Connect airspeed lines at upper surface of left wing panel in cockpit ----------	O.S.-30
11. Rig aileron cables to tension ----------	O.S.-31
12. Rig ailerons to proper alignment ----------	O.S.-32
13. Rig ailerons for proper travel, and safety turnbuckles ----------	O.S.-33
14. Connect aileron trim tab rod to trim tab bracket with clevis pin and cotter key ----------	
NOTE: This aileron trim tab is operated electrically and is not rigged for travel and alignment by the final assembly mechanic.	
15. Rig flaps for travel and alignment, and safety --	O.S.-34
16. Connect flap position indicator cable to right flap panel ----------	O.S.-35
17. Connect the elevator push-pull rod at its junction to the elevator controls in cockpit --------	O.S.-36
18. Install airspeed system on left wing panel ------	O.S.-37
19. Inspect all work completed ----------	
20. Have department inspector check all work completed ----------	
21. Replace and close all inspection covers ---------	

INSTALL COMPLETE WING

Tools and Equipment

1. Hoisting slings
2. Hoist bar
3. Open end wrenches
4. Socket wrenches
5. Chain hoists
6. Drift pin
7. Screw-driver
8. Tensiometer
9. Turnbuckle key
10. Scale
11. Diagonal side-cutting pliers

	PROCEDURE	REFERENCES
1.	Attach hoisting slings to fuselage ----------	O.S.-27
2.	Weight tail of airplane by hanging two one hundred pounds sandbags on the hoist bar, one on each side of the fuselage ----------	
3.	Operate chain hoists and lift fuselage slightly --	
4.	Remove fuselage support ----------	
5.	Apply a light coat of grease on the surface on the surfaces of the fuselage and wing where the two come together ----------	
6.	Operate chain hoists and lift fuselage until wings can be moved into position under the fuselage ----	
7.	Lower fuselage onto wing and install wing angle bolts ----------	O.S.-28
8.	Inspect wing angle bolts for tightness and stripped threads ----------	
9.	Install wing fillets ----------	O.S.-29

INSTALL EMPENNAGE

Tools and Equipment

1. Open end wrenches
2. Socket wrenches
3. Diagonal side-cutting pliers
4. Screw-driver
5. Drift pin
6. Adjustable wrench
7. Tensiometer
8. Turnbuckle key
9. Protractor
10. Work bench
11. Scale
12. Jack

PROCEDURE	REFERENCES
1. Install horizontal stabilizer	O.S.-38
2. Install vertical stabilizer (fin)	O.S.-39
3. Install elevator horn, center bearing cap unit and bonding to horizontal stabilizer	O.S.-40
4. Install elevators and bonding	O.S.-41
5. Install elevator trim tabs	O.S.-42
6. Connect elevator trim tab linkage	O.S.-43
7. Install rudder and bondings	OS..-44
8. Install rudder trim tab, trim tab linkage and fairing	O.S.-45
9. Connect rudder linkage	O.S.-46
10. Install abrasion strips and fillets	O.S.-47
11. Rig elevator cables to tension	O.S.-48

INSTALL EMPENNAGE

PROCEDURE (Cont.)	REFERENCES
12. Rig elevators to proper alignment	O.S.-49
13. Rig elevators for proper travel, and safety turnbuckles	O.S.-50
14. Rig rudder cables to tension	O.S.-51
15. Rig rudder to proper alignment	O.S.-52
16. Rig rudder for proper travel, and safety turnbuckles	O.S.-53
17. Rig tail wheel cables to tension	O.S.-54
18. Rig tail wheel to alignment, and safety turnbuckles	O.S.-55
19. Inspect all work completed on empennage	
20. Have department inspector check all work completed on empennage	
21. Replace and close all inspection covers	

INSPECT FUSELAGE FLIGHT CONTROLS AND INSTALL STATIC GROUND WIRE

Tools and Equipment

1. Socket wrench
2. Screw-driver
3. Turnbuckle key
4. Open end wrench
5. Diagonal side-cutting pliers

PROCEDURE	REFERENCES
1. Rig trim tab indicators for proper travel	O.S.-56
2. Check rudder pedal adjustment for free movement by moving pedals back and forth	
3. Install static ground wire	O.S.-57
4. Inspect all work completed on fuselage flight controls	
5. Have department inspector check all work completed on fuselage flight control	
6. Replace and close all inspection covers	

INSPECT ENGINE AND ACCESSORIES

Tools and Equipment

1. Screw-driver
2. Diagonal cutters
3. Turnbuckle wrench
4. Open end wrenches
5. Reed and Prince screw-driver

PROCEDURE	REFERENCES
1. Remove engine cowling ----------	O.S.-58
2. Inspect fuel, vacuum, oil, coolant, primer, manifold pressure, blast tubes, and vent lines for chafing, cracks, leaks, dents, deterioration and hose connections and fittings ----------	
3. Inspect mounting of engine accessories for security of attachment ----------	
4. Inspect cowling brackets, line brackets, oil and prestone cooler brackets for cracks, looseness and safetying ----------	
5. Inspect spark plugs and connections for looseness ---	
6. Inspect valve mechanism cover for leaks, cracks, defective gasket and tightness ----------	
7. Inspect exhaust stacks for mounting and cracks ------	
8. Inspect adjustments of fuel, vacuum, oil regulator and suction regulator pumps and propeller governor for safetying ----------	

INSPECT ENGINE AND ACCESSORIES

PROCEDURE (Cont.) — REFERENCES

9. Inspect all nuts and bolts for tightness and safetying by visual, touch or mirror inspection ---------

   NOTE: Mirror is necessary to inspect safetying where access cannot be had otherwise ---------

10. Inspect control connections for tightness, freedom of movement and safetying ---------- I.S.-1

11. Inspect for threads beyond inspection hole in end bearing and jam nut for tightness ---------- I.S.-1

AIR SERVICE COMMAND
U.S. ARMY AIR CORPS

AIR DEPOT
INSTRUCTION MANUAL

DIVISION - P-40E AIRPLANE

AIRCRAFT FINAL INSPECTION
REFERENCES:

JOB 9
JOB SHEET SERIES

INSPECT PROPELLERS

Tools and Equipment

PROCEDURE	REFERENCES
1. Install propellers	O.S.-59
2. Check inside of propeller dome for high and low pitch setting	
3. Install propeller dome with blades in full feathering position	
4. Inspect propeller dome for safetying	

AIR SERVICE COMMAND
U.S. ARMY AIR CORPS

AIR DEPOT
INSTRUCTION MANUAL

DIVISION - P-40E AIRPLANE

AIRCRAFT FINAL INSPECTION
REFERENCES:

JOB 10
JOB SHEET SERIES

INSPECT FUEL TANKS

Tools and Equipment

1. Fire extinguisher
2. Diagonal cutter
3. Pliers
4. Screw-driver

PROCEDURE	REFERENCES
1. Inspect tanks and lines for leaks, for bonding and for safetying of plugs and turnbuckles on straps	
2. Check around filler caps for dirt and foreign matter	I.S.-2
3. Check flow of gasoline from tanks by operating selector valve	O.S.-60
4. Check installation of belly tank where provided for security of attachment and fuel line connection -	

INSPECT WINGS AND FUSELAGE

Tools and Equipment

1. Tensiometer
2. Pliers
3. Diagonal cutters
4. Turnbuckle wrench

PROCEDURE	REFERENCES
1. Inspect cables for fraying, fair lead guides and pulleys for condition and turnbuckles for proper linkage, and safetying ----------	I.S.-3
2. Test flight control mechanism for free operation. Be sure that control surfaces are clear before testing ----------	O.S.-61
3. Check for looseness or worn bearings of wing flap system by operating flaps before starting engine ----	
4. Inspect wings, ailerons, elevators, rudder and stabilizers for damage or obvious defects ----------	
5. Check all screws which attach wing tip to wing panel for security ----------	
6. Check all screws which attach wing inspection plates to surface of wings for security ----------	
7. Inspect all exterior surfaces for damage or obvious defects ----------	
8. Inspect pitot tube for security of mounting ---------	

INSPECT LANDING AND TAIL GEARS

Tools and Equipment

1. Jack stands

PROCEDURE	REFERENCES
1. Inspect wheels and condition of tires and for proper tire inflation by observing bead on both sides of tire ----------	
2. Inspect shock struts for leaks and proper inflation according to directions on struts ----------	
3. Check mechanism of wheels for proper functioning ----	O.S.-62
4. Inspect wheels and brakes for security of attachment and safetying of nuts and bolts ----------	

INSPECT INTERIOR OF FUSELAGE

Tools and Equipment

PROCEDURE	REFERENCES
1. Inspect tubing along walls for evidence of leaks, security of anchorage, chafing, kinks and connections ----------	
2. Inspect windows and cockpit enclosure for condition of frame and security of attachment, and operation ----------	
3. Check instruments for broken or loose glasses, cleanliness, security of mounting and damaged pointers ----------	I.S.-4
4. Check security of radio, heating system, bomb racks, first aid kit, mooring kit, hydraulic pump, electrical conduits and wiring and batteries --------	
5. Inspect cleanliness of interior ----------	

PRIOR INSPECTION FOR ENGINE RUN-UP TEST

Tools and Equipment

	PROCEDURE	REFERENCES
1.	Check flight controls for free and full movement ----	
2.	Check positions of control locks for proper operation in lock and release ----------	
3.	Lock rudder with external lock in stormy or windy weather ----------	
4.	Check tires for condition and proper inflation by observing bead on both sides of tire ----------	
5.	Check shock struts for oil leaks and inflation as indicated by directions on strut ----------	
6.	Lock landing gear with lock pins in wheel wells -----	
7.	Check quantity of oil ----------	
	NOTE: Proper quantity if 52 quarts ----------	
8.	Open fuel tank sumps and drain any accumulation of foreign matter ----------	
9.	Close sumps and resafety ----------	
10.	Service fuel tanks, if necessary ----------	O.S.-60
11.	Inspect engine fuel strainers for foreign matter, close and resafety strainer ----------	

PRIOR INSPECTION FOR ENGINE RUN-UP TEST

PROCEDURE (Cont.) REFERENCES

12. Work wobble pump to obtain fuel pressure and check lines for leaks ----------

    NOTE: Operate wobble pump slowly and through full stroke. Proper fuel pressure is 12-16 lbs. --

13. Check work order, signatures to determine if required work is done ----------

14. Check security of cowls and fairings ----------

15. Place nose of ship toward wind ----------

16. Set chocks in front of wheels and tie ropes to landing gear structure ----------

17. Have someone stand by with fire extinguisher until engines are started ----------

ENGINE RUN-UP TEST

Tools and Equipment

	PROCEDURE	REFERENCES
1.	Start engine	I.S.-5 O.S.-63
2.	Turn propeller switches to manual, and on and off switch to "ON"	
3.	Advance throttle to 800-1000 R.P.M.	
4.	Shut off ignition for brief moment to test switch for proper ground	
	NOTE: If engine begins to stop, switch is properly grounded. If engine does not stop, switch is not grounded	
5.	Turn ignition switch back to "Both" before engine stops	
6.	If oil pressure does not show in 30 seconds, shut off engine	
7.	In cold weather use oil dilution while running engine by using dilution switch not to exceed 2 minutes	
8.	Cut off fuel supply to engine to test switch over signal	O.S.-64
9.	Change position of propeller control to circulate oil in propeller	

ENGINE RUN-UP TEST

PROCEDURE (Cont.) REFERENCES

10. Check for leaks around engine ----------

11. Operate carburetor air control. Carburetor air gage should register change in temperature ----------

12. Turn on generator switch. If discharge shows on ammeter, turn off generator switch ----------

13. Change to another fuel tank, by using fuel selector valve ----------

14. Check continuously for oil pressures and coolant temperatures. Note oil temperature rise ----------

    NOTE: Proper coolant temperature is indicated below red mark on coolant temperature gage ---

15. Inerease engine R.P.M. until generator is charging --

    CAUTION: Oil temperatures should register at least 40° before increasing R.P.M. --------

16. Decrease engine R.P.M. until amperes snap to zero ---

17. Increase engine R.P.M. until ammeter indicates charge, continue to run at that speed ----------

18. Check hydraulic system ----------

    NOTE: When hydraulic pump is working, cracking noise indicates air in system ----------

ENGINE RUN-UP TEST

PROCEDURE (Cont.)	REFERENCES
19. Check flap indicator gage for full travel ----------	
20. Engage Gyro instruments, set clock and altimeter ----	
21. Check markings on instrument covers for position of white marks at bottom. If marks do not register cover is out of position ----------	
22. Run engine at cruising speed of 1850 R.P.M. ---------	
23. Check left and right ignition switches for proper functioning ----------	O.S.-65
24. Check fuel pressure for 12-16 lbs., and oil pressure for 65 lbs., by observing indication on instrument panel ----------	
25. Check for 4 inches vacuum suction ----------	
26. Set generator voltmeter for 28 volts on generator control panel, located in baggage compartment -------	
27. Work propeller controls to increase and decrease positions ----------	
28. Change fuel selector valve to another tank, to check flow of fuel ----------	
29. Run engines at maximum R.P.M. for ground check, marked by red lines on manifold pressure gage -------	
CAUTION: Place weight in rear of ship to keep tail of ship on ground ----------	

ENGINE RUN-UP TEST

PROCEDURE (Cont.) REFERENCES

30. Check propeller governor not to exceed 20 seconds by:

    (a) Setting propeller control in low pitch ---------

        NOTE: R.P.M. should not exceed red marks on tachometer gage ----------

    (b) Set propeller control in high pitch ----------

        NOTE: R.P.M. should not be less than 1550 -----

    (c) Return propeller control to low pitch ----------

31. Check propeller governor electrically by using propeller toggle switch for increase and decrease of R.P.M. ----------

32. Decrease speed to 1000 R.P.M. for cooling ----------

33. Remove chocks from landing gear ----------

34. Check brakes by taxying ship and observing function of turn indicator ----------

35. Park ship and dilute oil in cold weather ----------

36. Cut off engine by moving mixture control to "Idle Cut-Off". Advance throttle to full position. When propeller stops turn all switches to "OFF" position ----------

37. In loud voice say "Switches Off" as a matter of safety to others working around ship ----------

FINAL CHECK ON RUN-UP TEST

Tools and Equipment

1. Screw-driver
2. Diagonal cutters
3. Turnbuckle wrench
4. Open end wrenches
5. Reed and Prince screw-driver

PROCEDURE	REFERENCES
1. Safety all adjustments that were made during run up test	
2. Check source of any leaks on all pressure lines	
3. Pre-oil if second pre-oiling is required	
NOTE: Second pre-oiling is required on all engines out of storage	
4. Report ship ready for final inspection to inspection department	
5. Replace engine cowling	O.S.-66
6. Replace accessory cowling in fitting position	
7. Complete notes on run-up sheet and service sheet	
8. Return run-up and service sheets to inspection department	
9. Report ship ready for delivery to flight test	

Aircraft Final Assembly

1. How to Install Starter
2. How to Install Stacks and Stack Covering
3. How to Install Generator
4. How to Install Fuel Pump and Fittings
5. How to Install Vacuum Pump and Fittings
6. How to Install Carburetor and Fittings
7. How to Install Vapor Eliminator and Fittings
8. How to Install Engine Mount on Airplane
9. How to Install Engine on Mount
10. How to Install Fuel Pressure Signal and Fittings
11. How to Install Oil Cooler and Fittings
12. How to Connect Fuel Lines
13. How to Connect Oil Lines
14. How to Connect Coolant Lines
15. How to Connect Vacuum Pump Lines
16. How to Connect Vent Lines
17. How to Connect Pressure Lines
18. How to Connect Control Rods and Inspect
19. How to Inspect Installation
20. How to Pre-Oil Engine
21. How to Install Flaps, Air Scoop and Cowling
22. How to Connect Link Rods to Bearing Block on Torque Tube of Control Stick
23. How to Install Wing Flaps

Aircraft Final Assembly

24. How to Connect Flap Control Tube

25. How to Install Flap Bondings and Pads

26. How to Install Aileron Bearing Caps, Aileron and Aileron Bondings

27. How to Attach Hoisting Slings to Fuselage

28. How to Lower Fuselage onto Wing and Install Wing Angle Bolts

29. How to Install Wing Fillets

30. How to Connect Airspeed Lines at Upper Surface of Left Wing Panel in Cockpit

31. How to Rig Aileron Cables to Tension

32. How to Rig Ailerons to Proper Alignment

33. How to Rig Ailerons for Proper Travel, and Safety Turnbuckles

34. How to Rig Flaps for Travel and Alignment, and Safety

35. How to Connect Flap Position Indicator Cable to Right Flap Panel

36. How to Connect the Elevator Push-Pull Rod at its Junction to the Elevator Controls in Cockpit

37. How to Install Airspeed System on Left Wing Panel

38. How to Install Horizontal Stabilizer

39. How to Install Vertical Stabilizer (fin)

40. How to Install Elevator Horn, Center Bearing Cap Unit and Bonding to Horizontal Stabilizer

41. How to Install Elevators and Bondings

42. How to Install Elevator Trim Tabs

43. How to Connect Elevator Trim Tab Linkage

44. How to Install Rudder and Bondings

45. How to Install Rudder Trim Tab, Trim Tab Linkage and Fairing

Aircraft Final Assembly

46. How to Connect Rudder Linkage
47. How to Install Abrasion Strips and Fillets
48. How to Rig Elevator Cables to Tension
49. How to Rig Elevators to Proper Alignment
50. How to Rig Elevators for Proper Travel, and Safety Turnbuckles
51. How to Rig Rudder Cables to Tension
52. How to Rig Rudder to Proper Alignment
53. How to Rig Rudder for Proper Travel, and Safety Turnbuckles
54. How to Rig Tail Wheel Cables to Tension
55. How to Rig Tail Wheel to Alignment, and Safety Turnbuckles
56. How to Rig Trim Tab Indicators for Proper Travel
57. How to Install Static Ground Wire
58. How to Remove Engine Cowling
59. How to Install Propeller
60. How to Check Flow of Gasoline from Tanks
61. How to Test and Adjust Movable Flight Control Mechanism
62. How to Check Wheels and Brakes for Proper Operation
63. How to Start Engine
64. How to Check Switch-over Signal
65. How to Check Ignition Switches
66. How to Install Engine Cowling

NOMENCLATURE OF PARTS

RIGHT SIDE

1. Starter
2. Exhaust stacks
3. Stack coverings (two sections)
7. Carburetor
9. Engine mount
10. Fuel pressure signal
11. Oil cooler
13. Oil lines
    a. Bottom of oil tank to oil dilution valve
    b. Oil dilution valve to oil pump
    c. Oil pumps to oil cooler
    d. Oil cooler to oil tank
14. Coolant lines
    a. Front of cooler to front of rt. bank of cylinders
    b. Left side of prestone pump to outside of airplane
15. Vacuum pump lines--15d.-pressure side to oil separator
16. Vent lines
    a. Crankcase rear to "T" fitting on carburetor

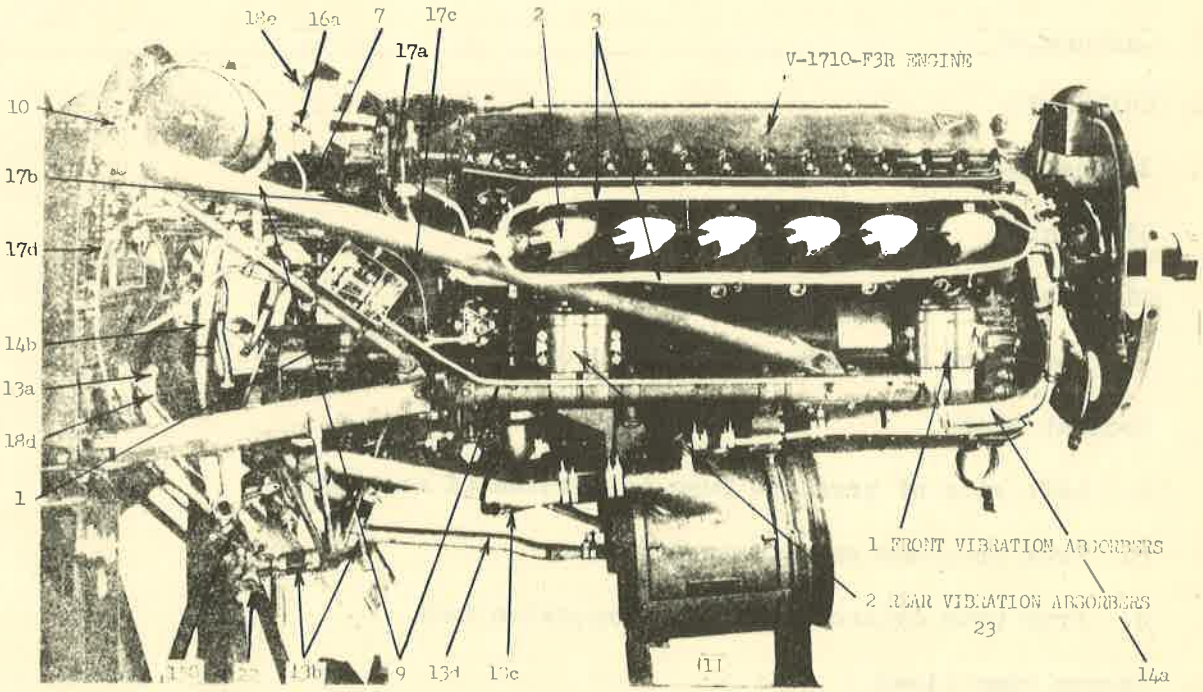
NOMENCLATURE OF PARTS (Cont.)

RIGHT SIDE

17. Pressure lines
    a. Center of rear main manifold to firewall
    b. Rear right cylinder bank to firewall
    c. Rear crankcase to firewall
    d. Carburetor to right wing tank
18. Control rod:
    d. Cowl flaps
    e. Carburetor air scoop
22. Drain cock
23. Front and rear vibration absorbers
24. Engine

NOMENCLATURE OF PARTS (Cont.)

RIGHT SIDE



POWER PLANT - R.H. SIDE - P-40D & P-40E

Fig. 1

NOMENCLATURE OF PARTS

LEFT SIDE

2. Exhaust stacks
3. Stack coverings (two sections)
4. Generator
5. Fuel pumps
6. Vacuum pumps
7. Carburetor
8. Bulkhead
9. Engine mount
11. Oil cooler
13. Oil lines
    a. Bottom of oil separator to crankcase
14. Coolant lines
    c. Left side of prestone pump to outside of airplane
    d. From prestone pump to gang drain
    e. From both cylinder banks to expansion tank
15. Vacuum pump lines
    a. Suction side of pump to pressure relief valve
    b. Pressure side to oil separator
    c. Oil separator to gang drain

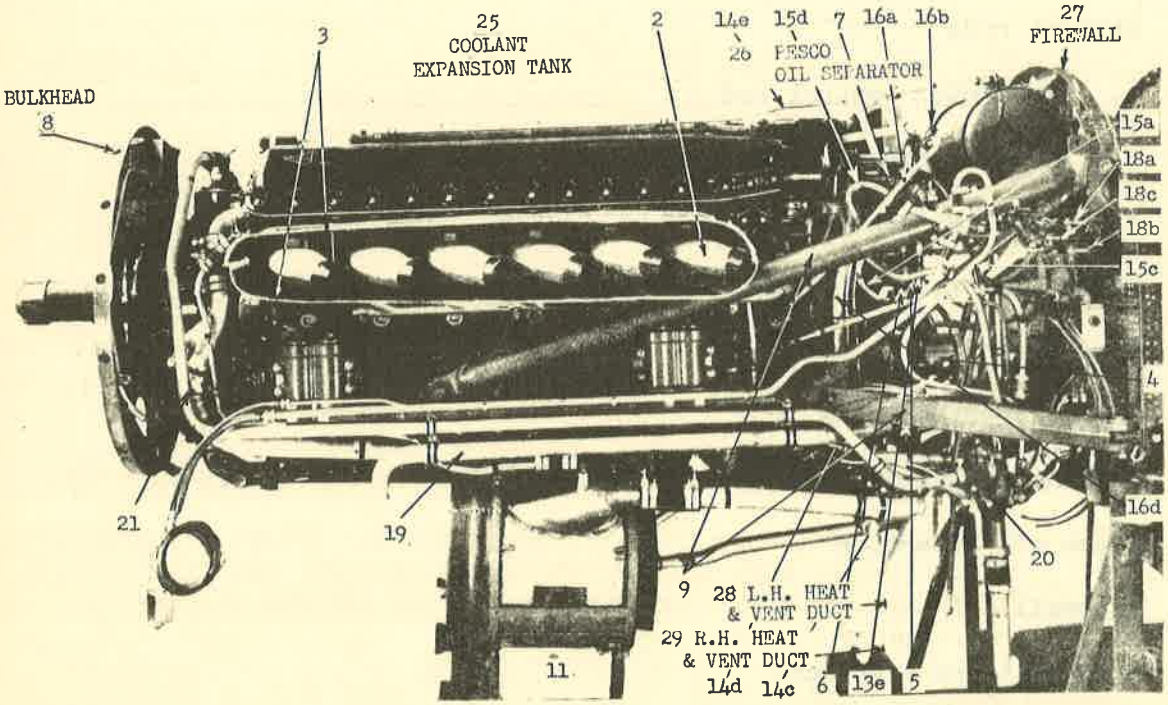
NOMENCLATURE OF PARTS (Cont.)

LEFT SIDE

16. Vent lines
    a. Crankcase rear to "T" fitting on carburetor
    b. "T" fitting on carburetor to oil tank
    d. Top of nose section to rear left side of engine
18. Control rods
    a. Carburetor control rod
    b. Throttle control rod
    c. Propeller control rod
19. Blast tube for fuel pump
20. Gang drain
21. Engine breather line
25. Coolant expansion tank
26. Pesco oil separator
27. Firewall
28. L.H. heat and vent duct
29. R.H. heat and vent duct

NOMENCLATURE OF PARTS (Cont.)

LEFT SIDE



POWER PLANT - L.H. SIDE - P-40D & P-40E

Fig. 2

HOW TO INSTALL STARTER

GENERAL INFORMATION:

Refer to T.O. 03-5CA-3, T.O. 05-5CA-1, and Figure 1 No. 1.

SAFETY:

TOOLS:

1. Special starter wrench
2. 9/16" open end wrench

PROCEDURE:

1. Unscrew and remove nuts holding starter plate to engine.
2. Remove starter cover plate.
3. Remove gasket.
4. Check engine starter jaw to make sure that the jaw has the proper rotation with the jaw of the starter.
5. Check engine starter jaw to see that it has proper clearance.

   NOTE: Clearance should be 1 11/16" from mounting flange. There should not be more than 5/32" clearance, nor less than 3/32" clearance, between the engine jaw and the starter jaw. Refer to T.O. 03-5CA-3.

6. Install gasket.
7. Oil the neoprene seal.
8. Install starter on engine with the starter mesh lever at an angle of 30° to the right of the vertical center line. Check to see that the crank arm is in line with the crank extension hole.

HOW TO INSTALL STARTER

PROCEDURE (Cont.)

9. Install washers, nuts and tighten.

10. Install pal nuts and tighten.

HOW TO INSTALL EXHAUST STACKS AND STACK COVERINGS

GENERAL INFORMATION:

Refer to Figures 1 and 2, Numbers 2 and 3.

SAFETY:

TOOLS:

1. 7/16" ratchet
2. 3/8" open end wrench

PROCEDURE:

1. Install exhaust stacks. (6 on each side)

   NOTE: Attach to studs in engine bank with flat brass nuts and lock washers.

2. Bolt shields together at each end with four 3/8" bolts and nuts.

3. Cotter pin each nut.

4. Clamp shields against stacks with five 1/4" bolts.

   NOTE: Shields come in sections, and are marked R-bottom and top, L-bottom and top.

HOW TO INSTALL GENERATOR

GENERAL INFORMATION:

Generator is located in rear center section of engine. Refer to T.O. 01-25CF-2, T.O. 03-5AA-1, and Figure 2 No. 4.

SAFETY:

TOOLS:

1. 9/16" open end wrench

PROCEDURE:

1. Check generator plate to see if it is the correct type.
2. Remove generator cover plate.
3. Remove cover plate on engine.
4. Install gasket.
5. Place generator in position, making certain that the electrical connection is directly on top.
6. Install flat washers.
7. Install self-locking nuts and tighten.

HOW TO INSTALL FUEL PUMP AND FITTINGS

GENERAL INFORMATION:

Refer to T.O. 03-10EA-1 and Figure 2 No. 5. The pressure plug on the fuel pump must be checked to see that it is on the pressure side of the fuel pump. The plug is generally marked with a "P".

SAFETY:

TOOLS:

1. 1/2" open end wrench
2. Combination slip-joint pliers
3. Diagonal pliers

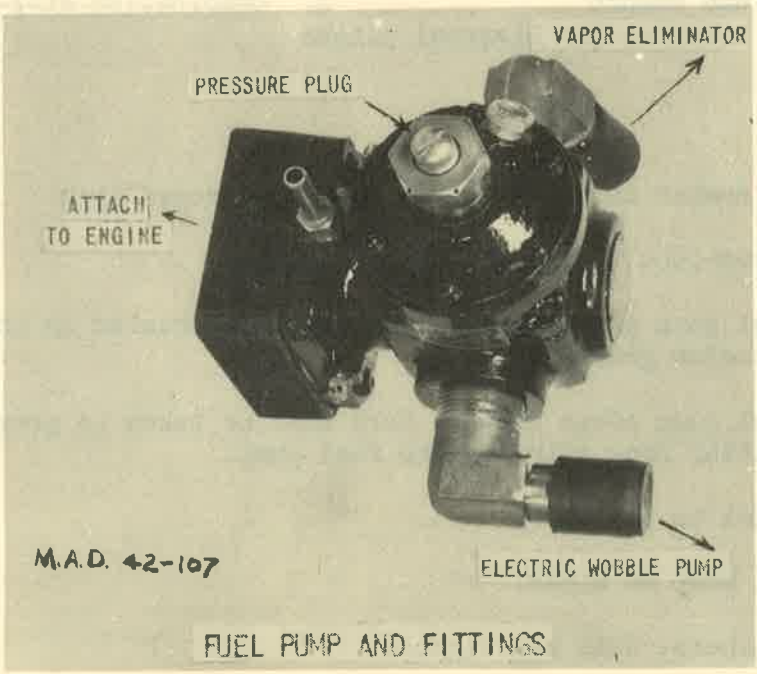
PROCEDURE:

1. Check the number on the plate of pump for proper type.
2. Apply thread-lube to all fitting threads.
3. Remove fuel pump plate cover. The cover is located on the left side of engine below generator.
4. Remove fuel pump cover plate. Care must be taken to prevent any foreign matter from entering the fuel pump.
5. Place gasket in position.
6. Mount fuel pump on studs.
7. Install washers, nuts and tighten.
8. Install a 3/4" - 90° fitting facing the rear of pump.

HOW TO INSTALL FUEL PUMP AND FITTINGS

PROCEDURE (Cont.)

9. Install a 3/4" - 90° fitting, facing in the up position.
10. Install a 1/4" straight fitting on bottom of pump.
11. Safety wire pressure plug.



FUEL PUMP AND FITTINGS

HOW TO INSTALL VACUUM PUMP AND FITTINGS

GENERAL INFORMATION:

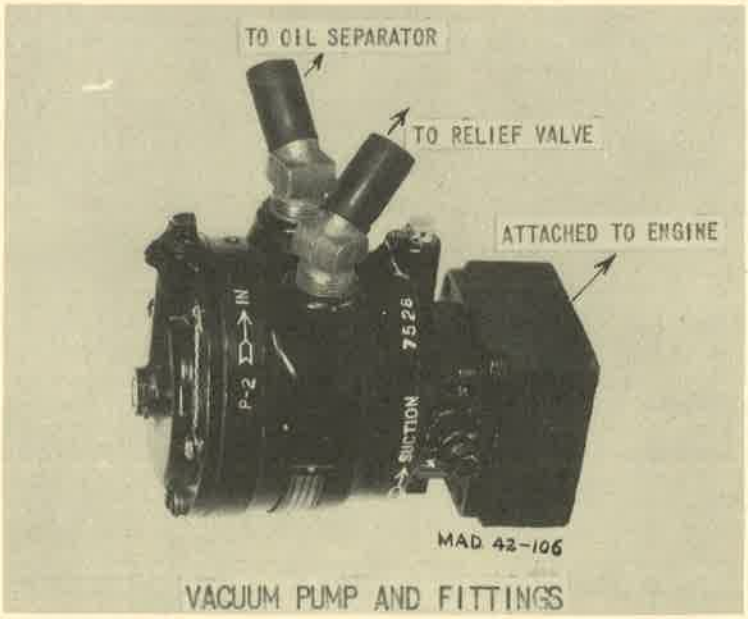
Refer to T.O. 01-25CF-3, T.O. 03-30AA-1 and Figure 1, Number 6.

SAFETY:

TOOLS:

1. 7/16" open end wrench

PROCEDURE:



VACUUM PUMP AND FITTINGS

HOW TO INSTALL VACUUM PUMP AND FITTINGS

PROCEDURE (Cont.)

1. Check the rotation of the pump drive to determine the suction and pressure sides of the pump.

2. Check to see that the marked lubrication plugs correspond to the correct sides of the pump.

3. Install a 1/2"-45° pressure hose fitting.

   NOTE: The pressure side of vacuum pump is connected to oil separator.

4. Install a 1/2"-45° suction base fitting.

   NOTE: Suction side of vacuum pump is connected to the relief valve which in turn is connected to the instrument panel in the cockpit.

HOW TO INSTALL CARBURETOR FITTINGS

GENERAL INFORMATION:

The carburetor for the P-40E comes already installed on the engine. All the fittings beginning with the 1/4" Street "L" are attached as described below. The carburetor is on the top of the rear section of engine. Refer also to T.O. 02-5AD-2 and Figure 1 and 2, number 7.

SAFETY:

TOOLS:

1. 8" adjustable wrench

PROCEDURE:

1. Apply thread-lube to all threads.
2. Install a 1/4"-90° fitting on the bottom center of the carburetor. Fitting faces right.
3. Install a 3/4"-45° fitting on the bottom of the right side.
4. Install a 1/4" Street "L" fitting on the top right side of carburetor.
5. Install a short 1/4" nipple on 1/4" Street "L".
6. Install a 1/4" "T" fitting on 1/4" nipple.
7. Install a 1/4" straight fitting on the right side of the 1/4" "T" fitting.
8. Install a 1/4"-90° fitting on front end of "T" fitting.

HOW TO INSTALL VAPOR ELIMINATOR AND FITTINGS

GENERAL INFORMATION:

SAFETY:

It is important that nothing is dropped in the openings of this instrument while being installed.

TOOLS:

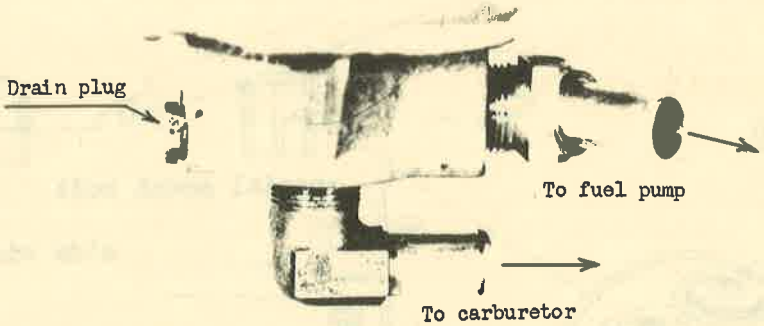
1. 6" and 10" adjustable wrenches
2. Screw-driver
3. 7/16" open end wrench

PROCEDURE:

1. Install the vapor eliminator on the rear right side of engine mount on the bracket provided for it.
2. Install a 3/4"-90° hose fitting on the bottom of the vapor eliminator tank facing left. (This line runs to the carburetor 3/4"-45° fitting.)
3. Install a 3/4"-45° fitting on the bottom of the vapor eliminator tank facing left. (This line runs to the fuel pump.)
4. Install a 1/4"-45° fitting on top of the tank facing front. (This line runs to the air vapor control valve.)

HOW TO INSTALL VAPOR ELIMINATOR AND FITTINGS

PROCEDURE (Cont.)



VAPOR ELIMINATOR AND FITTINGS

AIR SERVICE COMMAND
U.S. ARMY AIR CORPS

AIR DEPOT
INSTRUCTION MANUAL

DIVISION - P-40E AIRPLANE

AIRCRAFT ENGINE INSTALLATION

OPERATION 8
OPERATION SHEET SERIES

HOW TO INSTALL ENGINE MOUNT ON AIRPLANE

GENERAL INFORMATION:

All bolts are special and should be kept with mount at all times. Refer to T.O. 01-25CF-2, drawing 87-22-501 and Figures 1 and 2, No. 9.

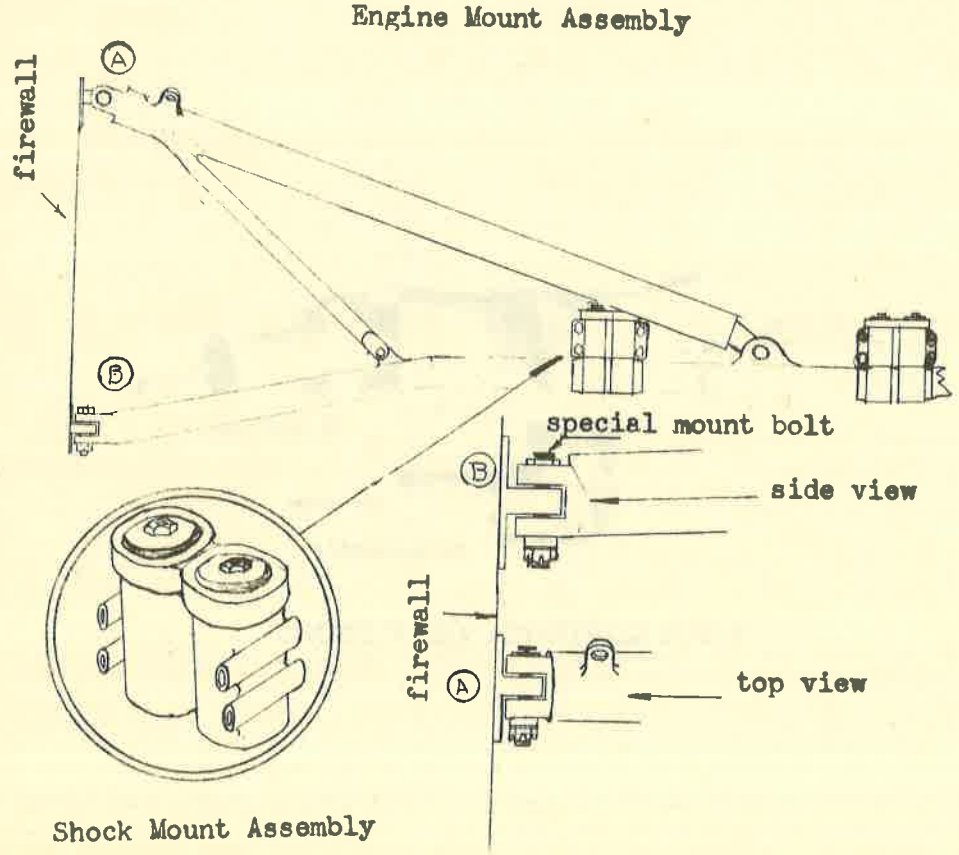
SAFETY:

Special care must be taken so as not to damage bolts in removing or installing mount.

TOOLS:

1. 5/8" ratchet wrench
2. 5/8" box socket wrench

PROCEDURE:



HOW TO INSTALL ENGINE MOUNT ON AIRPLANE

PROCEDURE (Cont.)

1. Check correct type of mount by numbers on plate.
2. Check for cracks, bends, etc.
3. Place both sections of mount on airplane.
4. Install special short bolts on top.
5. Install special long bolts at bottom.
6. Install spacer and washer on each bolt.
7. Install nut and tighten each nut.
8. Install cotter pin on each nut.
9. Install link arms with 4 special bolts.
10. Tighten these bolts and install cotter pins on each bolt.

HOW TO INSTALL ENGINE ON MOUNT

GENERAL INFORMATION:

Refer to T.O. 01-25CF-2, T.O. 02-5AD-2, Figure 12, and Figures 1 and 2 Number 9.

SAFETY:

Be sure all hooks are securely fastened.

TOOLS:

1. Allison Engine sling
2. Combination slip-joint pliers
3. Diagonal pliers
4. Long nose pliers
5. Adjustable wrench

PROCEDURE:

1. Install sling on engine.

   NOTE: Each hook is marked, front hooks are 1L - 1R, rear hooks are 6L - 6R. 1-L is hooked on left side to rod in front of exhaust stack; 6L is hooked on left side on the last rod behind the exhaust stack. 1R and 6R are hooked in same manner on right side.

2. Connect sling to electric or hand operated hoist.

3. Raise engine into position.

4. Bolt engine to shock mounts. (Two shocks on each side of mount.)

5. Fasten bolts connecting shock mounts to engine. (Four motor studs to each shock mount.

6. Fasten safety wire on all engine mount bolts.

HOW TO INSTALL FUEL PRESSURE SIGNAL AND FITTINGS

GENERAL INFORMATION:

Refer to T.O. 01-25CF-1 Figure 3 and T.O. 03-10F-1.

SAFETY:

TOOLS:

1. 6" adjustable wrench

PROCEDURE:

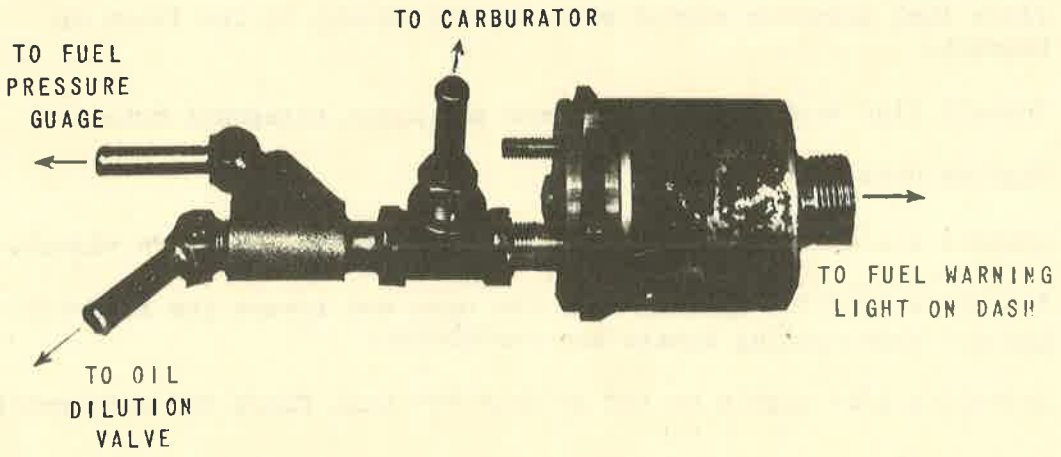
1. Place fuel pressure signal with conduit hookup to the front on bracket.
2. Install flat washers, lock washers and plain hexagonal nuts.
3. Tighten nuts.
4. Install a 1/4" straight coupling on rear of fuel pressure signal.
5. Install a 1/4" "T" fitting with the open end toward the firewall and the side opening toward the carburetor.
6. Install a 1/4" nipple on end of 1/4" "T" that faces the carburetor.
7. Install 3" length of hose with 2 strap clamps on 1/4" nipple.

   NOTE: This hose runs to the 1/4"-90° "L" on the carburetor.
8. Install a 1/4"-45° elbow fitting on oil dilution valve so that it points slightly upward to solenoid on top of firewall.
9. Install 1/4"-45° elbow fitting pointing to firewall.

HOW TO INSTALL FUEL PRESSURE SIGNAL AND FITTINGS

PROCEDURE (Cont.)

FUEL PRESSURE SIGNAL



M.A.D. 42-126

HOW TO INSTALL OIL COOLER AND FITTINGS

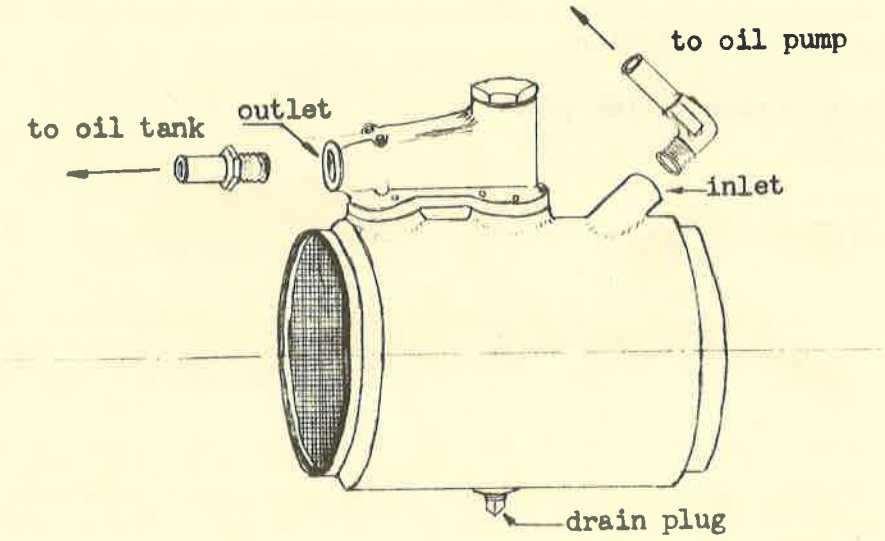
GENERAL INFORMATION:

Refer to T.O. 01-25CF-2 Figure 51, Figure 52 and Figures 1 & 2 Number 11.

SAFETY:

TOOLS:

1. 10" adjustable wrench



Oil Cooler

PROCEDURE:

1. Check specifications of oil cooler. (A.C. Spec. 95-28138)
2. Install 1"-90° long fitting on inlet. (Inlet marked on cooler)
3. Install 1" straight long fitting on outlet. (Outlet marked on cooler)
4. Install rubber on rear of cooler.

HOW TO INSTALL OIL COOLER AND FITTINGS

PROCEDURE (Cont.)

5. Install fabric sleeve assembly on front with supporting band.

6. Place cooler in position.

   NOTE: If cooler does not become tight, a piece of sponge rubber can be added to the loose end of link.

7. Place supporting strap around cooler rim and install bolts.

8. Install nuts and tighten.

9. Safety nuts with cotter pins.

HOW TO CONNECT FUEL LINES

GENERAL INFORMATION:

When disconnecting fuel lines from engine, disconnect only those necessary to remove the engine. All fuel lines are connected to respective fittings by a hose connection and hose clamps. Lines are distinguished according to T.O. 01-40AA-3. Refer to drawings 87-44-501, 87-44-504, T.O. 01-40AA-3, and T.O. 01-25CF-2 Figures 55, 56, 57, 58.

SAFETY:

TOOLS:

1. Special clamp wrench

PROCEDURE:

1. Connect fuel pump line (red band) from fuel pump to air vapor eliminator.
2. Connect air vapor eliminator line (red band) from air vapor eliminator to carburetor.
3. Connect drain line (red band) from bottom of fuel pump to gang drain.

HOW TO CONNECT OIL LINES

GENERAL INFORMATION:

When disconnecting lines from engine, disconnect only those necessary to remove the engine. All oil lines are connected to respective fittings by a hose connection and hose clamps. Lines are distinguished according to T.O. 01-40AA-3. Refer also to drawing 87-46-501, T.O. 01-40AA-3, T.O. 01-25CF-2, and Figures 1 and 2 No. 13 at the beginning of the analysis.

SAFETY:

TOOLS:

1. Clamp wrench

PROCEDURE:

1. Connect a 1 1/2" line (yellow band) from bottom of oil tank to fitting on oil dilution valve.
2. Connect a 1/2" line (yellow band) from oil dilution valve to oil pump.
3. Connect a 1" line (yellow band) from the oil pump to the oil cooler.
4. Connect a 1" line (yellow band) from the oil cooler to the oil tank.
5. Connect a 1/4" line (yellow band) from the magnetos to the gang drain. (Drain line)
6. Connect a 1/2" line (yellow band) from bottom of oil separator to crankcase.

HOW TO CONNECT COOLANT LINES

GENERAL INFORMATION:

When disconnecting lines from engine, disconnect only those necessary to remove the engine. All coolant lines are connected to respective fittings by a hose connection and hose clamps. Lines are distinguished according to T.O. 01-40AA-3. Refer to drawing 87-50-701, T.O. 01-40AA-3, T.O. 01-25CF-2, Figures 50 and 51, and Figures 1 and 2, No. 14.

SAFETY:

TOOLS:

1. Clamp wrench

PROCEDURE:

1. Connect a 1 1/2" line (black-white-black band) from front of cooler to front of right bank of cylinders.
2. Connect a 1/2" line (black-white-black band) from front of cooler to front of right back of cylinders (pressure relief line).
3. Connect a 1" line (black-white-black band) from rear of prestone pump to expansion tank.
4. Connect a 1" line (black-white-black band) from the left side of prestone pump to outside of airplane. (Drain line)
5. Connect 1/4" line (black-white-black band) from prestone pump to gang drain.
6. Connect a 1/2" line (black-white-black band) from the two banks of cylinders in the center front and running back to expansion tank.

HOW TO CONNECT VACUUM PUMP LINES

GENERAL INFORMATION:

When disconnecting lines from engine, disconnect only those necessary to remove the engine. All vacuum pump lines are connected to respective fittings by a hose connection and hose clamps. Lines are distinguished according to T.O. 01-40AA-3. Refer to drawing 87-54-501, T.O. 01-40AA-3, and Figures 1 and 2 No. 15.

SAFETY:

TOOLS:

1. Clamp wrench

PROCEDURE:

1. Connect a 1/2" line (green-white band) from suction side of vacuum pump to pressure relief valve.
2. Connect a 1/2" line (green-white band) from vacuum release valve to firewall fitting.
3. Connect a 1/2" line (blue-green band) from pressure side of vacuum pump to firewall fitting.
4. Connect a 1/2" line (blue-green band) from the pressure side of vacuum pump to oil separator.
5. Connect a 1/2" line (blue-green band) from top of oil separator to gang drain.

HOW TO CONNECT VENT LINES

GENERAL INFORMATION:

When disconnecting lines from engine, disconnect only those necessary to remove the engine. All vent lines are connected to respective fittings by a hose connection and hose clamps. Lines are distinguished according to T.O. 01-40AA-3 and Figures 1 and 2 No. 16.

SAFETY:

TOOLS:

1. Clamp wrench

PROCEDURE:

1. Connect a 1/2" line (black-red band) from each side of crankcase rear to "T" fitting on rear of carburetor (vent line).

2. Connect a 3/4" line (black-red band) from "T" fitting on carburetor to oil tank (vent line).

3. Connect a 1" line (black-red band) from "L" fitting on top of fly-wheel case to rear of air duct assembly.

4. Connect a 1" line (black-red band) from top of nose section to rear left side of engine. (This line vents into the outside skin of the flap bracket.)

HOW TO CONNECT PRESSURE LINES

GENERAL INFORMATION:

When disconnecting lines from engine, disconnect only those necessary to remove the engine. All pressure lines are connected to respective fittings by a hose connection and hose clamps. Lines are distinguished according to T.O. 01-40AA-3, and Figure 1 No. 17.

SAFETY:

TOOLS:

1. Clamp wrench

PROCEDURE:

1. Connect a 1/4" line (blue-white band) from the center of rear main manifold to fitting on firewall.
2. Connect a 1/4" line (blue-white band) from rear right cylinder band to firewall fitting.
3. Connect a 1/4" line (yellow band) from rear crankcase to firewall fitting.
4. Connect a 1/4" line (red band) from carburetor to fuel pressure signal.
5. Connect a 1/4" line (red band) from fuel pressure signal to oil dilution solenoid.
6. Connect a 1/4" line (red band) from oil dilution solenoid to firewall fitting.
7. Connect a 1/4" line (red band) from carburetor to vapor control valve.

HOW TO CONNECT PRESSURE LINES

PROCEDURE (Cont.)

8. Connect a 1/4" line (red band) from vapor control valve to vapor eliminator.

9. Connect a 1/4" line (red band) from carburetor to right wing tank.

HOW TO CONNECT CONTROL RODS

GENERAL INFORMATION:

All control rods fasten to their respective controls with 10-32 aircraft bolts, castellated nuts and cotter keys. All bolts must be magnaflux inspected before installation. Rods may be operated from cockpit to ascertain proper line in connecting. Refer to Figures 1 and 2, Number 18.

SAFETY:

TOOLS:

1. 3/8" open end wrench

PROCEDURE:

1. Connect carburetor mixture control rod to carburetor mixture control.
2. Connect throttle control rod to throttle control.
3. Connect propeller control rod to propeller control.
4. Connect cowl flaps control rods to brackets on cowl flaps.
5. Connect carburetor air scoop control rod to carburetor air scoop control.

HOW TO FINAL INSPECT INSTALLATION

GENERAL INFORMATION:

SAFETY:

TOOLS:

PROCEDURE:

1. Check all hose clamps for tightness or defects.
2. Check all control rod bearings.
3. Check to see that all jam nuts are tight.
4. Check to see that all bolts are safetied.
5. Check to see that no lines are rubbing.
6. Check to see that all control cables move freely.
7. Check to see that nothing has been left lying on the engine.
8. Check to see that all accessories have been installed.
9. Check oil cooler strap.

HOW TO PRE-OIL ENGINE

GENERAL INFORMATION:

Before pre-oiling engine, T.O. 03-15-10 must be complied with. Refer also to T.O. 03-5-10, T.O. 02-1-1, T.O. 02-1-22.

SAFETY:

TOOLS:

1. Spark plug wrench
2. Pre-oiling unit

PROCEDURE:

1. Fill oil tank complying with T.O. 02-1-1.
2. Service to proper level at oil change.
3. Break oil inlet connection at the oil pump and drain approximately one gallon of oil.
4. Reinstall oil inlet line to oil pump.
5. Remove all front or outside spark plugs from the engine.
6. Remove oil pressure relief valve.
7. Place mixture control in idle cut-off or, if engine is not equipped with idle cut-off, open throttle to full open position.
8. Place fuel valve in "off" position.
9. Make sure ignition switch is off.
10. Turn engine over by hand until sufficient oil is expelled through the pressure relief valve opening to indicate that no air remains in the oil inlet line or pump.
11. Reinstall oil pressure relief valves.

HOW TO PRE-OIL ENGINE

PROCEDURE (Cont.)

12. Make "dummy" start, or starts, of engine to obtain minimum of thirty propeller revolutions. (Use portable energizer or external battery source, if available.)

13. Reservice the oil tank to proper levels.

14. Reinstall spark plugs.

15. Make normal engine start.

16. Check oil pressure gauge for indicated oil pressure. If engine does not show normal pressure within thirty seconds shut off and refer to applicable Technical Order for particular engine model to determine the cause of the trouble.

HOW TO INSTALL FLAPS, AIR SCOOP AND COWLING

GENERAL INFORMATION:

Refer to T.O. 01-25CF-2 Figure 8.

SAFETY:

TOOLS:

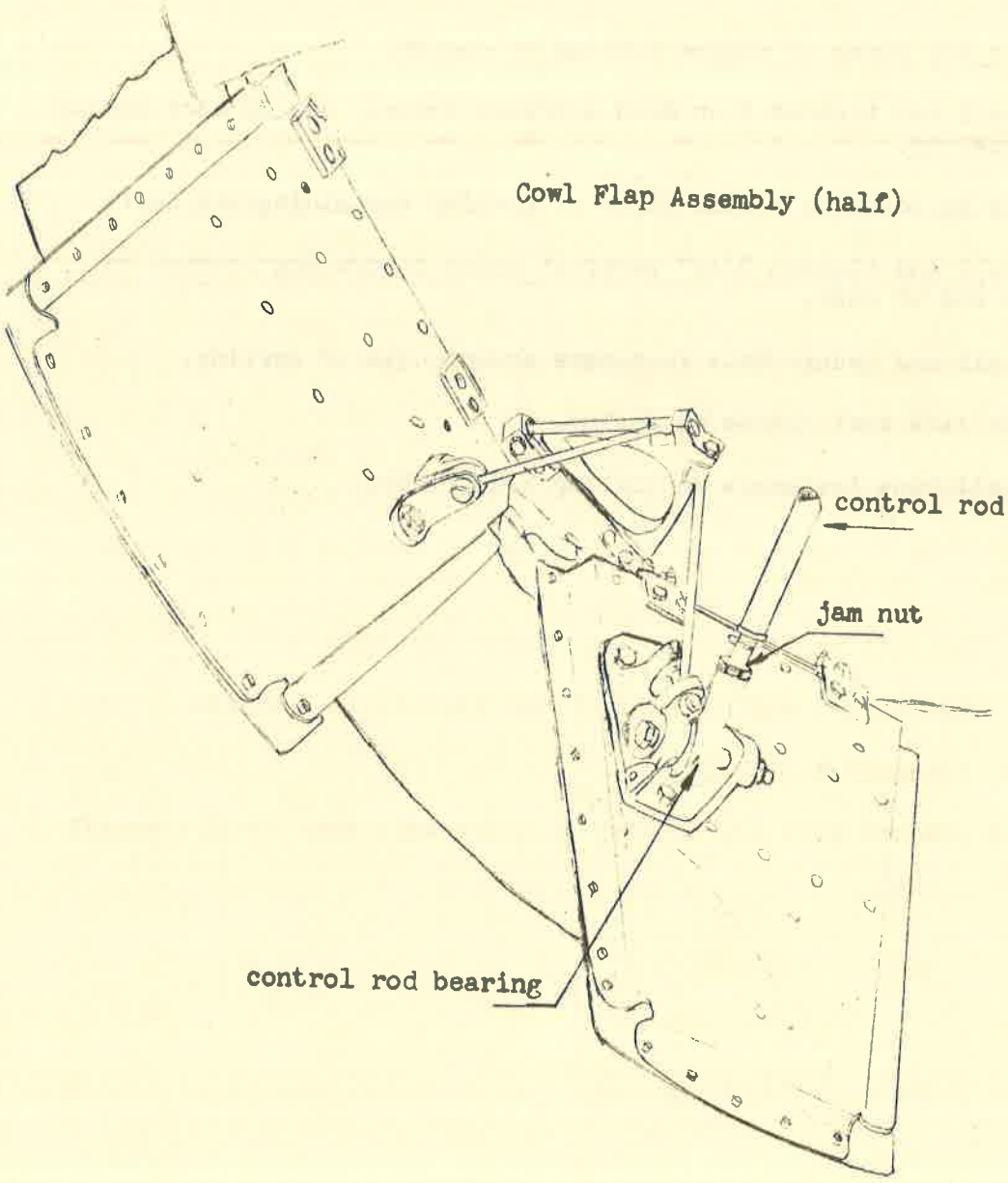
1. Screw-driver
2. 3/8" open end wrench

PROCEDURE:

1. Place cowl mounting bracket on engine mount arm.
2. Insert one bolt on each side.
3. Install nuts and tighten.
4. Install Philips head screws on rear end of bracket attaching the bracket to firewall.
5. Place flap unit on brackets of cowl mounting ring.
6. Install No. 10 aircraft bolts and flat washers in bracket.
7. Install nuts and tighten.
8. Connect control rods (2) to cowl flap brackets with 10-32 aircraft bolts.

HOW TO INSTALL FLAPS, AIR SCOOP AND COWLING

PROCEDURE (Cont.)



HOW TO INSTALL FLAPS, AIR SCOOP AND COWLING

PROCEDURE (Cont.)

9. Place top piece of engine cowling on engine.

10. Install and tighten four Reed & Prince screws, one in each corner of cowling.

11. Place in position bottom piece of cowling containing air ducts.

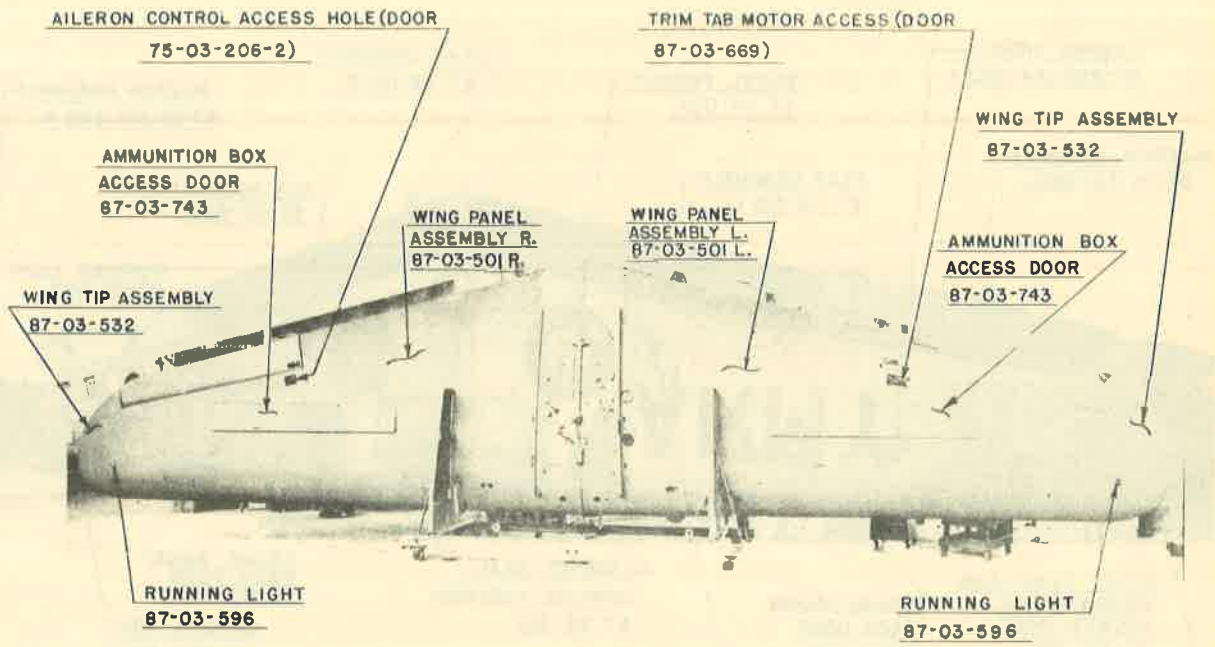
12. Install and tighten 7/16" aircraft bolts in cowling bracket on rear end of cowl.

13. Install and secure Dzus fasteners around edge of cowling.

14. Place side cowl pieces on engine.

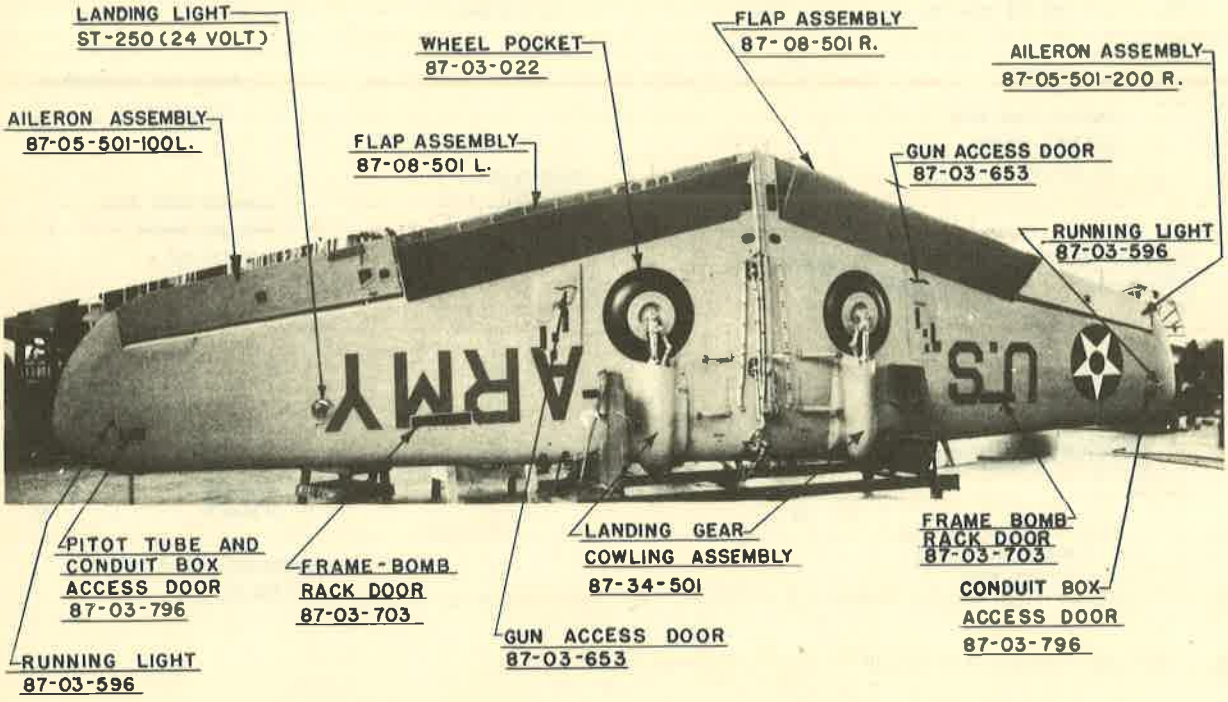
15. Install Dzus fasteners in cowling side pieces.

NOMENCLATURE OF PARTS



WING ASSEMBLY

NOMENCLATURE OF PARTS (Cont.)



WING ASSEMBLY BOTTOM VIEW

HOW TO CONNECT LINK RODS TO BEARING BLOCK ON TORQUE TUBE OF CONTROL STICK

GENERAL INFORMATION:

SAFETY:

TOOLS:

1. Socket wrench
2. Diagonal side-cutting pliers
3. Screw-driver
4. Scale
5. Open end wrench

PROCEDURE:

1. Adjust link rods coming through top of wing at bearing block so that the overall length of each one is 7 inches.

   CAUTION: When lengthening the link rods be sure that they are not extended so that the safety holes in the links are uncovered.

2. Tighten jam nuts securely after adjustments are made.

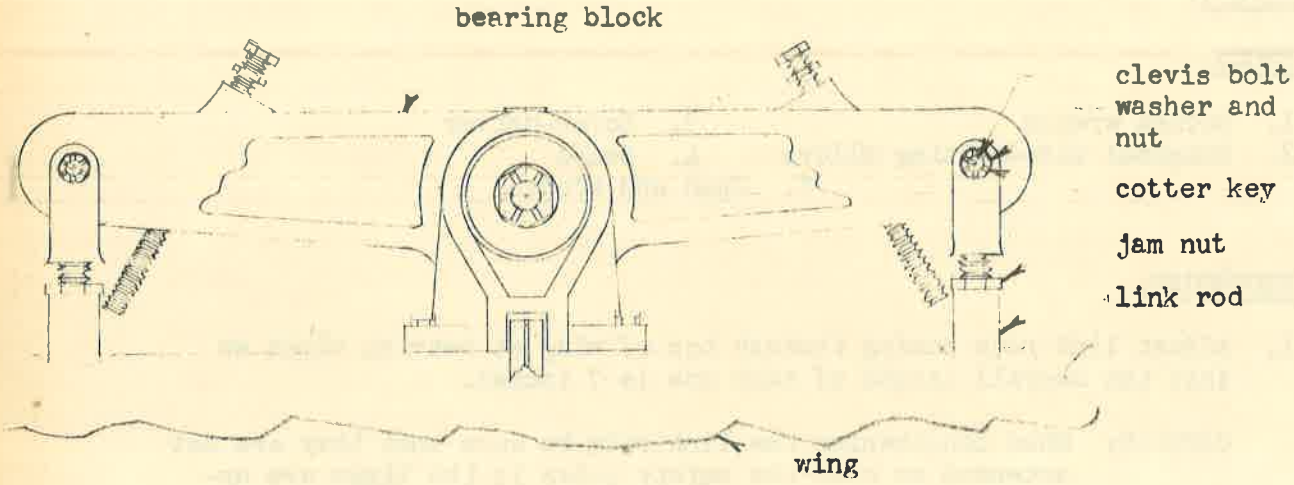
3. Align holes in link rods and bearing block.

4. Install the two clevis bolts, washers and nuts with heads of bolts toward the front.

5. Safety bolts and nuts by installing cotter keys.

HOW TO CONNECT LINK RODS TO BEARING BLOCK ON TORQUE TUBE OF CONTROL STICK

PROCEDURE (Cont.)



Rear View of Bearing Block and Link Rods

HOW TO INSTALL WING FLAPS

GENERAL INFORMATION:

Requires three men. Refer to Figures 7, 28 and 73 of T.O. 01-25CF-2.

SAFETY:

TOOLS:

1. Low speed drill with chuck
2. Diagonal side-cutting pliers
3. Open end wrenches

PROCEDURE:

1. Inspect all parts for defects (visual inspection).
2. Hold flap in down position.
3. Align hinge holes in wing and flap.
4. Lubricate hinge wire with oil.
5. Insert end of hinge wire in hinge holes of wing and flap starting in middle of flap.

   NOTE: The hinge wire is installed in two sections.
6. Fasten loop end of hinge wire in chuck of a low speed electric drill. Refer to Figure 28.
7. Start the electric drill and at the same time guide and pass the wire through the hinge holes until the end of the wire is flush with the edge of the flaps.

   CAUTION: It is important that the wire is properly guided through the hinge holes, or it may damage the flap.

HOW TO INSTALL WING FLAPS

PROCEDURE (Cont.)

8. Repeat procedure for installing the remaining section of hinge wire in flap.

9. Safety wire the loop ends of the two sections of hinge wire together.

10. Repeat procedure for installing the wing flap on the remaining wing panel.

HOW TO CONNECT FLAP CONTROL TUBE

GENERAL INFORMATION:

Refer to T.O. 01-25CF-2.

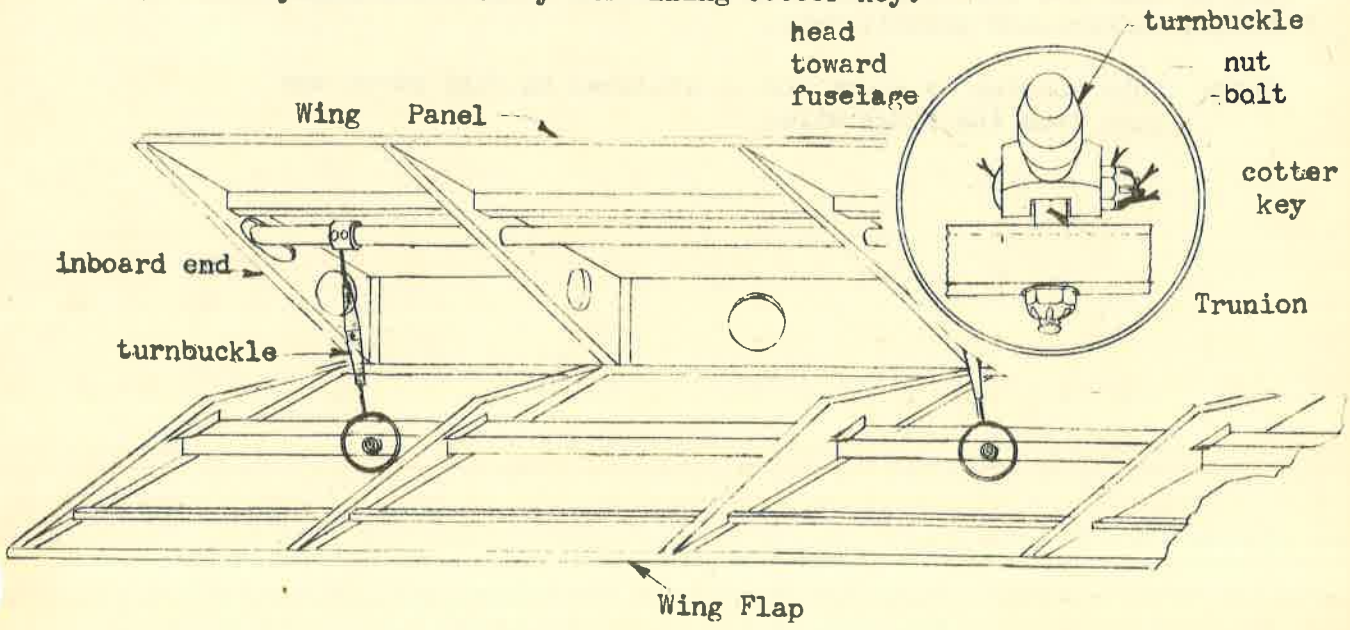
SAFETY:

TOOLS:

1. Socket wrench
2. Diagonal side-cutting pliers

PROCEDURE:

1. Place flap in the down position.
2. Place clevis end of turnbuckle of flap control tube on the trunion of the flap and align holes.
3. Install bolt and nut in turnbuckle and trunion, inserting the bolt so that the head is toward the fuselage.
4. Safety nut and bolt by installing cotter key.



HOW TO INSTALL FLAP BONDINGS AND PADS

GENERAL INFORMATION:

Refer to T.O. 01-25CF-2.

SAFETY:

TOOLS:

1. Screw-driver
2. Open end wrench

PROCEDURE:

1. Attach one end of bonding on outboard end of flap control tube with proper bolt, washer and elastic nut according to T.O.

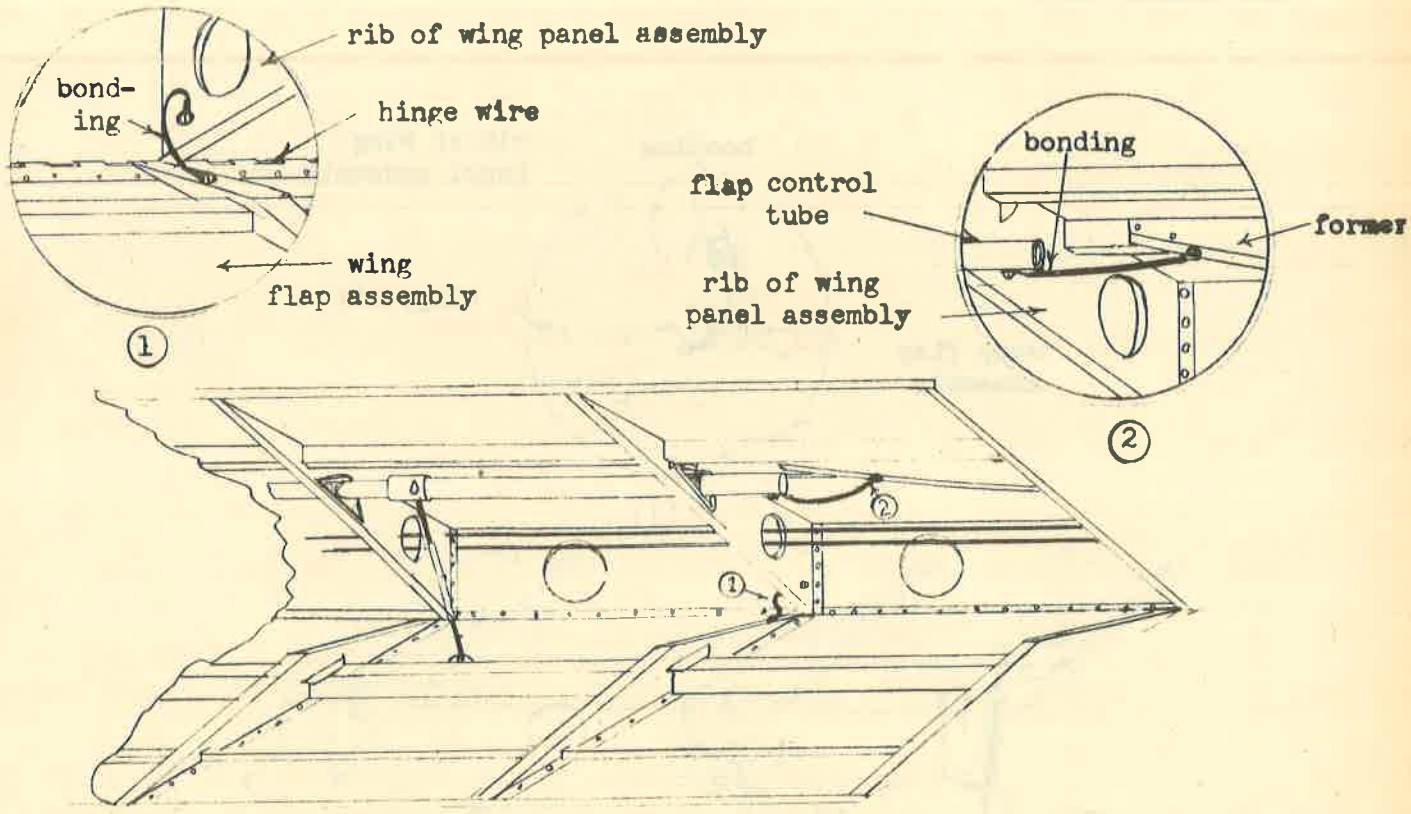
2. Attach the other end of bonding to the former of the wing about three inches from the end of the flap control tube with proper bolt, washer and elastic nut.

3. Install proper bonding between the second rib on the outboard end of flap and the corresponding rib on the wing, using proper bolts, washers and elastic nuts.

   NOTE: This bonding is short and is attached on ribs about one inch from the hinge wire.

HOW TO INSTALL FLAP BONDING AND PADS

PROCEDURE (Cont.)

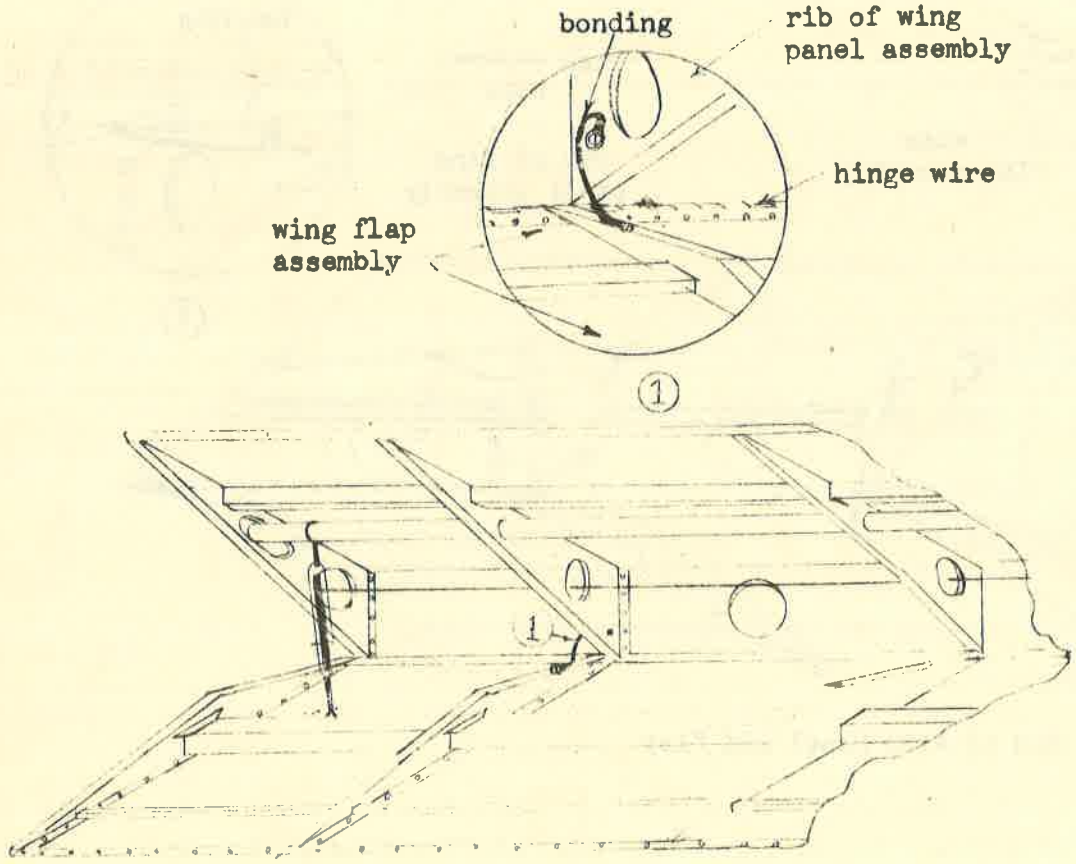


Outboard End of Wing Panel and Flap

HOW TO INSTALL FLAP BONDINGS AND PADS

PROCEDURE (Cont.)

4. Install proper bonding between the second rib on the inboard end of flap and the corresponding rib on the wing, using proper bolts, washers and elastic nuts.

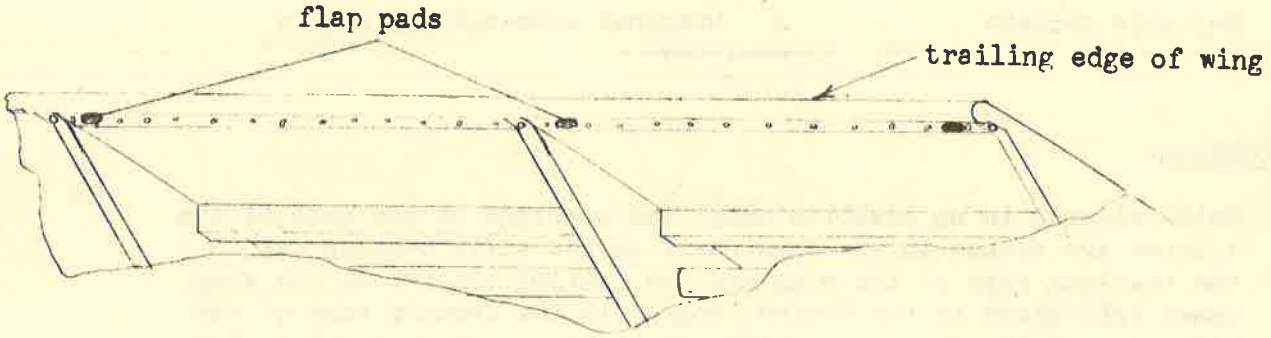


Inboard End of Wing Panel and Flap

HOW TO INSTALL FLAP BONDINGS AND PADS

PROCEDURE (Cont.)

5. Install flap pads using rubber cement on under side of trailing edge of wing where trailing edge of flap contacts wing. Place a pad at every rib just off the trailing edge of the wing.



HOW TO INSTALL AILERON BEARING CAPS, AILERONS AND AILERON BONDINGS

GENERAL INFORMATION:

Requires three men. Refer to T.O. 01-25CF-2.

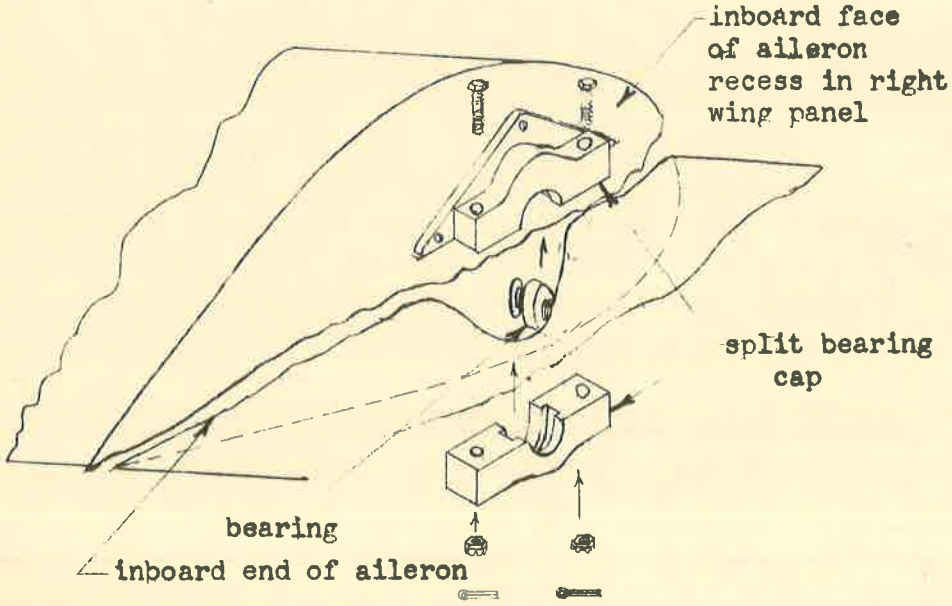
SAFETY:

TOOLS:

1. Suitable sockets
2. Diagonal side-cutting pliers
3. Screw-driver

PROCEDURE:

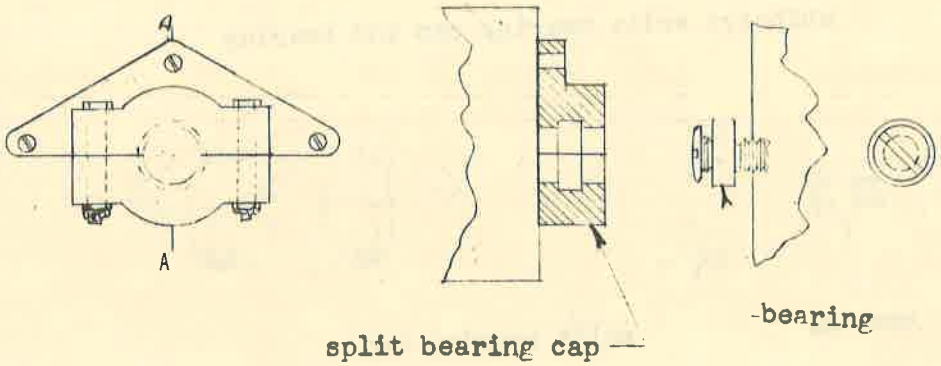
1. Raise aileron in up position until the bearings on the ends of the aileron are seated in the upper half of the split bearing cap on the trailing edge of the wing and the bearing bracket on the wing comes into place in the bracket holder in the leading edge of the aileron. At the same time guide the aileron control arm into the socket in the wing.

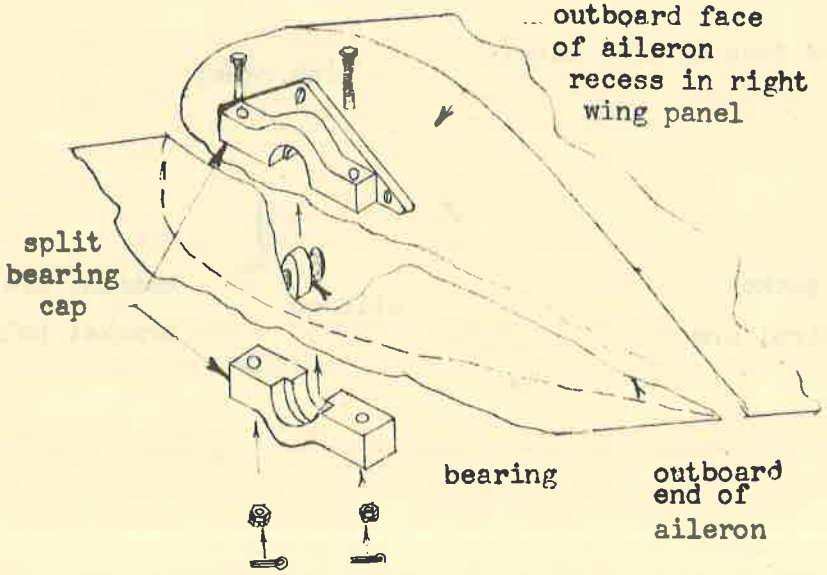


HOW TO INSTALL AILERON BEARING CAPS, AILERONS AND AILERON BONDINGS

PROCEDURE (Cont.)

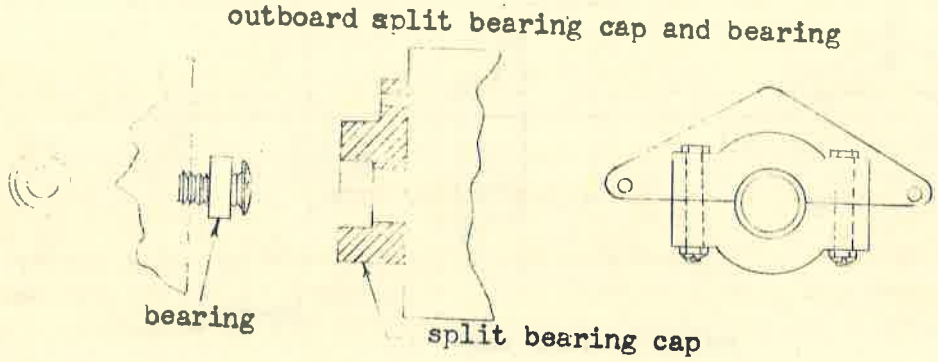
Inboard split bearing cap and bearing

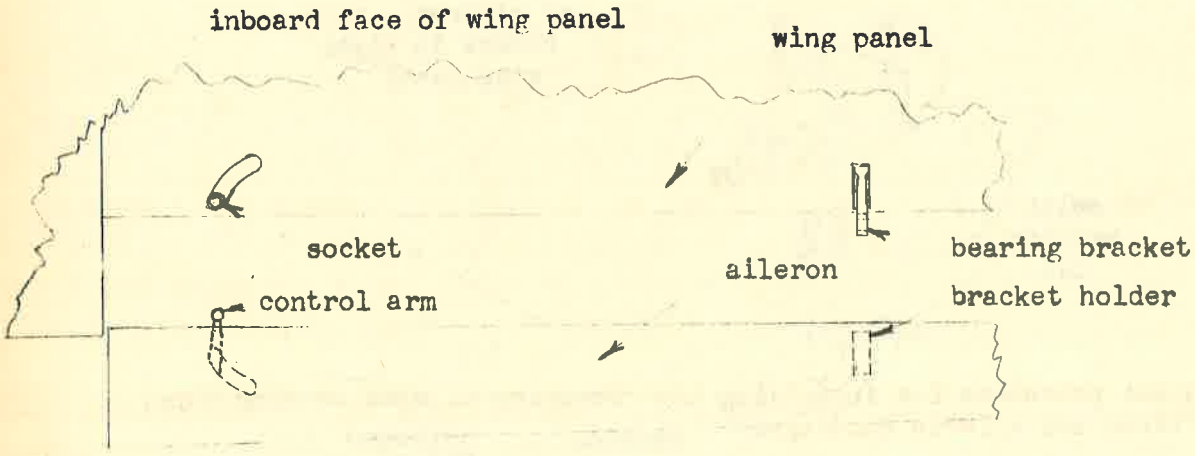




HOW TO INSTALL AILERON BEARING CAPS, AILERONS AND AILERON BONDINGS

PROCEDURE (Cont.)





HOW TO INSTALL AILERON BEARING CAPS, AILERONS AND AILERON BONDINGS

PROCEDURE (Cont.)

2. Install proper bolt, washer and nut in bearing bracket and holder.

   NOTE: Head of bolt is toward fuselage.

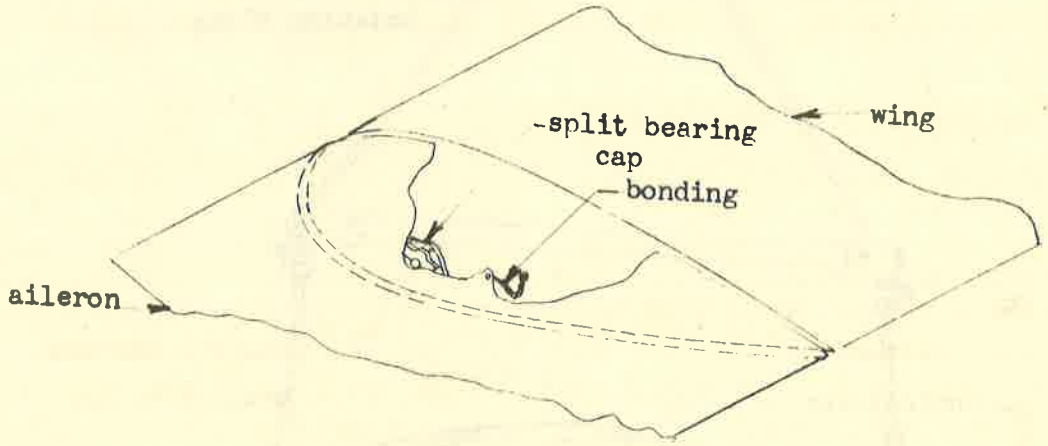
3. Install bearing caps with proper bolts and nuts.

   NOTE: Head of bolts are on top. There are no washers on the bearing cap bolts.

4. Safety nuts and bolts by installing cotter keys.

5. Install the two bondings between the aileron and wing using Parker Kaylon screws and star lock washers. One bonding is on the outboard end of aileron and the other is on the inboard end of aileron.

   NOTE: The inboard and outboard bonding are located similarly between the aileron and wing panel as shown in sketch.



6. Repeat procedure for installing the remaining aileron bearing caps, aileron and aileron bondings.

HOW TO ATTACH HOISTING SLINGS TO FUSELAGE

GENERAL INFORMATION:

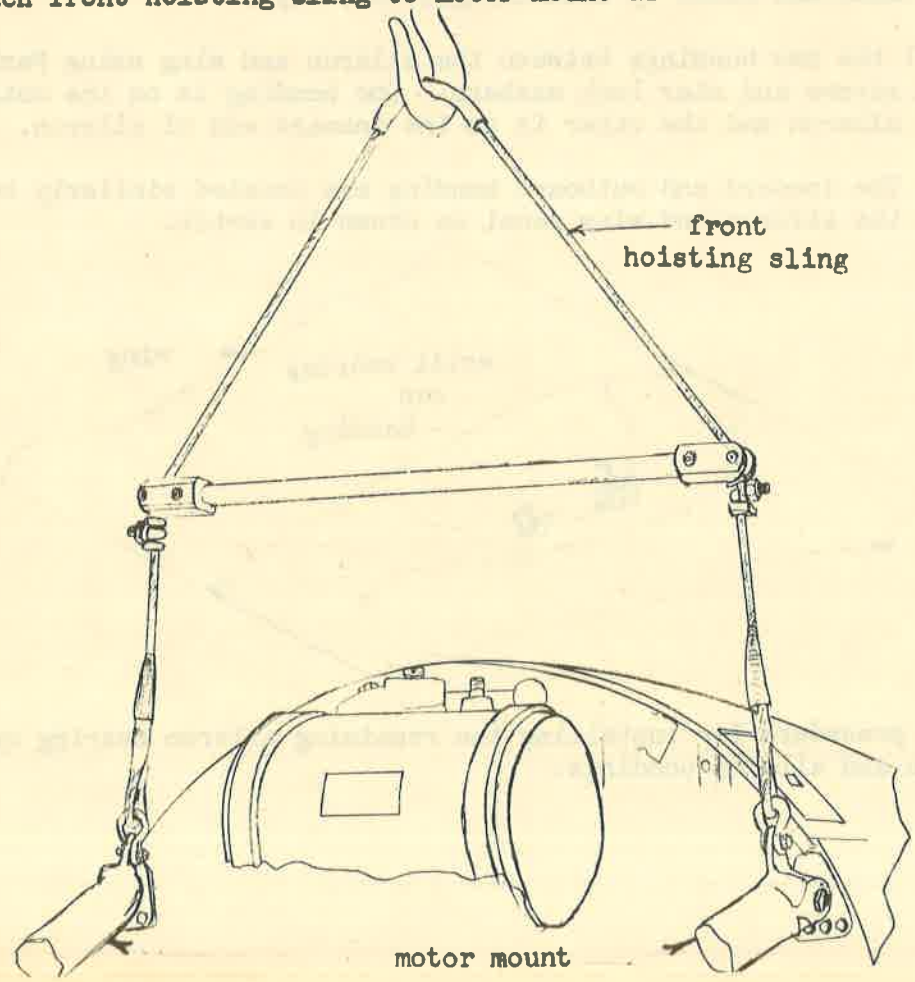
SAFETY:

TOOLS:

1. Hoisting slings
2. Hoist bar
3. Open end wrench

PROCEDURE:

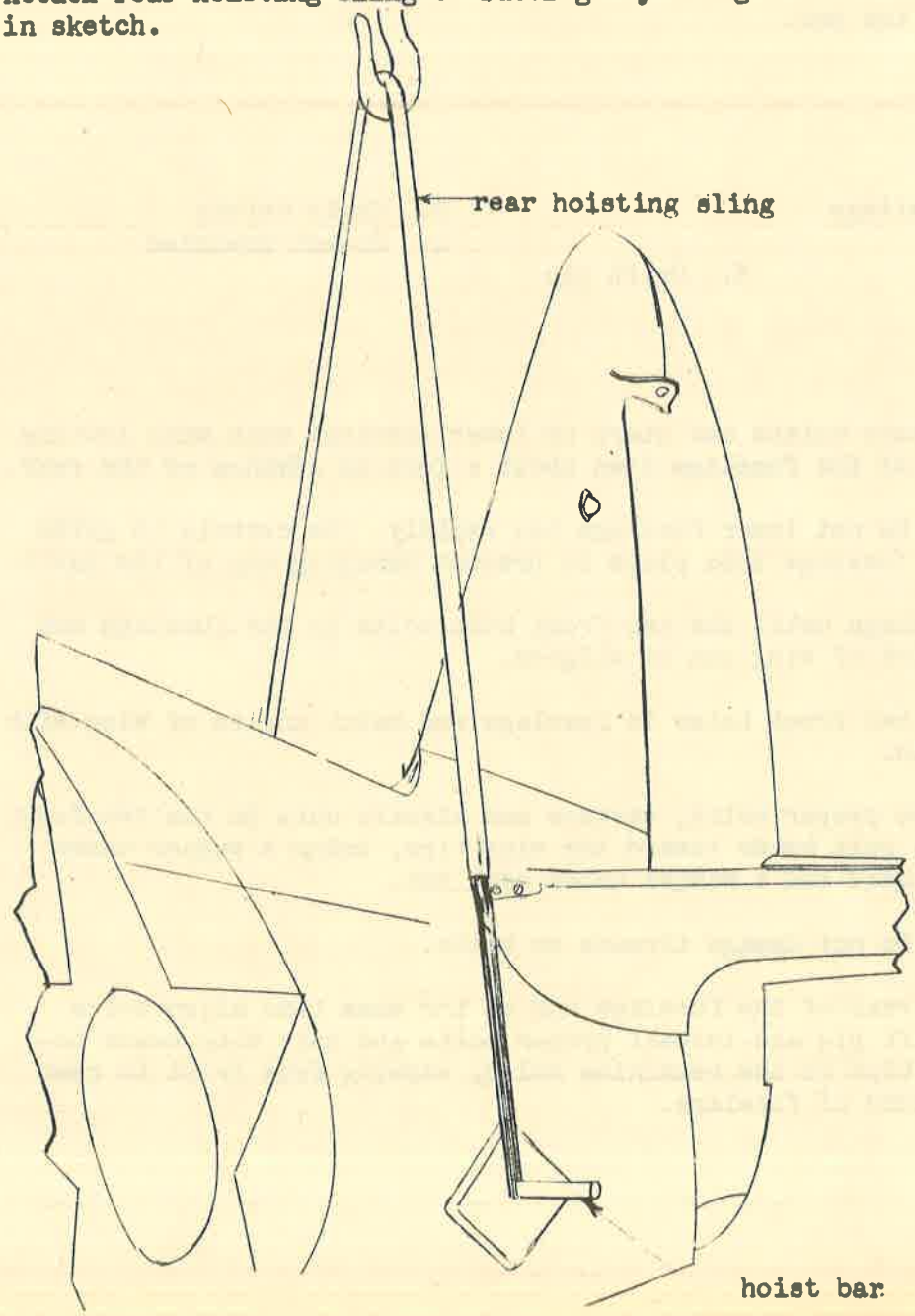
1. **Attach front hoisting sling to motor mount as shown in sketch.**



HOW TO ATTACH HOISTING SLINGS TO FUSELAGE

PROCEDURE (Cont.)

2. **Attach rear hoisting sling to fuselage by using a hoist bar as shown in sketch.**



AIR SERVICE COMMAND
U.S. ARMY AIR CORPS

AIR DEPOT
INSTRUCTION MANUAL

DIVISION - P-40E AIRPLANE

AIRCRAFT FINAL ASSEMBLY

OPERATION 28
OPERATION SHEET SERIES

HOW TO LOWER FUSELAGE ONTO WING AND INSTALL WING ANGLE BOLTS

GENERAL INFORMATION:

Requires ten men.

SAFETY:

TOOLS:

1. Hoisting slings
2. Hoist bar
3. Chain hoists
4. Socket wrenches
5. Drift pin

PROCEDURE:

1. Operate chain hoists and start to lower fuselage onto wing letting the front of the fuselage down about a foot in advance of the rear.

   CAUTION: Do not lower fuselage too rapidly. Be certain to guide fuselage into place to prevent damaging any of the parts.

2. Lower fuselage until the two front bolt holes in the fuselage and match angles of wing can be aligned.

3. Align the two front holes in fuselage and match angles of wing with a drift pin.

4. Install the proper bolts, washers and elastic nuts in the two front holes with bolt heads toward the wing tips, using a washer under each bolt head and a washer under each nut.

   CAUTION: Do not damage threads on bolts.

5. Lower the rear of the fuselage and at the same time align holes with a drift pin and install proper bolts and nuts with heads toward wing tips in the remaining holes, working from front to rear on both sides of fuselage.

HOW TO LOWER FUSELAGE ONTO WING AND INSTALL WING ANGLE BOLTS

PROCEDURE (Cont.)

NOTE: The last bolt on each side of the fuselage which holds the fuselage to the wing is a stud bolt. These two rear bolts do not require nuts.

AIR SERVICE COMMAND
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AIR DEPOT
INSTRUCTION MANUAL

DIVISION - P-40E AIRPLANE

AIRCRAFT FINAL ASSEMBLY

HOW TO INSTALL WING FILLETS

GENERAL INFORMATION:

Requires two men. Refer to T.O. 01-25CF-2

SAFETY:

TOOLS:

1. Screw-driver

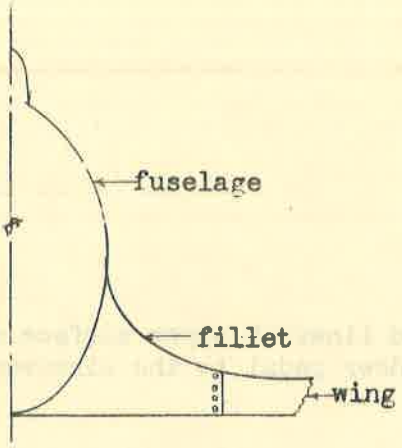
PROCEDURE:

1. Place proper rear section of fillet between the left wing panel and fuselage.
2. Align holes in fillet with holes in fuselage and wing panel.
3. Secure fillet to fuselage and wing with proper screws.
4. Place proper front section of fillet between the left wing panel and fuselage.

   NOTE: This section overlaps the rear section about 1/2".
5. Align holes in fillet with holes in fuselage and wing panel.
6. Secure fillet to fuselage and wing with proper screws.
7. Repeat procedure for installing fillets between the right wing panel and fuselage.

HOW TO INSTALL WING FILLETS

PROCEDURE (Cont.)



HOW TO CONNECT AIRSPEED LINES AT UPPER SURFACE OF LEFT WING PANEL IN COCKPIT

GENERAL INFORMATION:

Refer to T.O. 01-25CF-2

SAFETY:

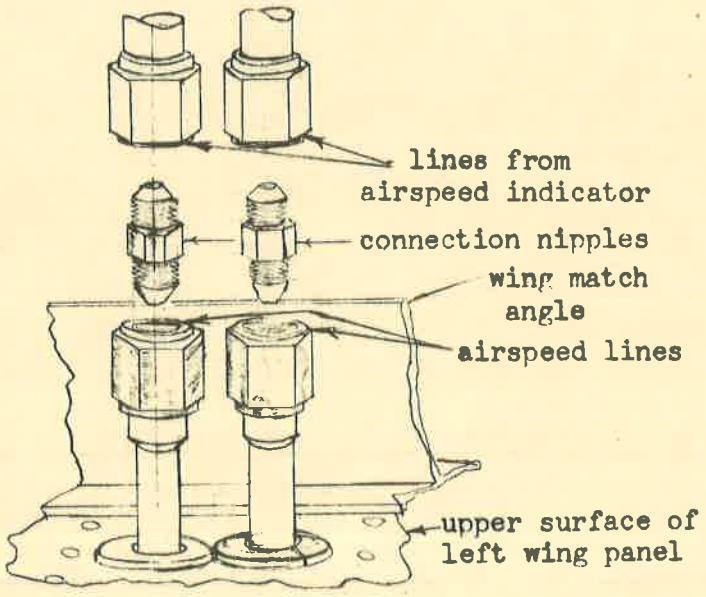
TOOLS:

1. Open end wrench

PROCEDURE:

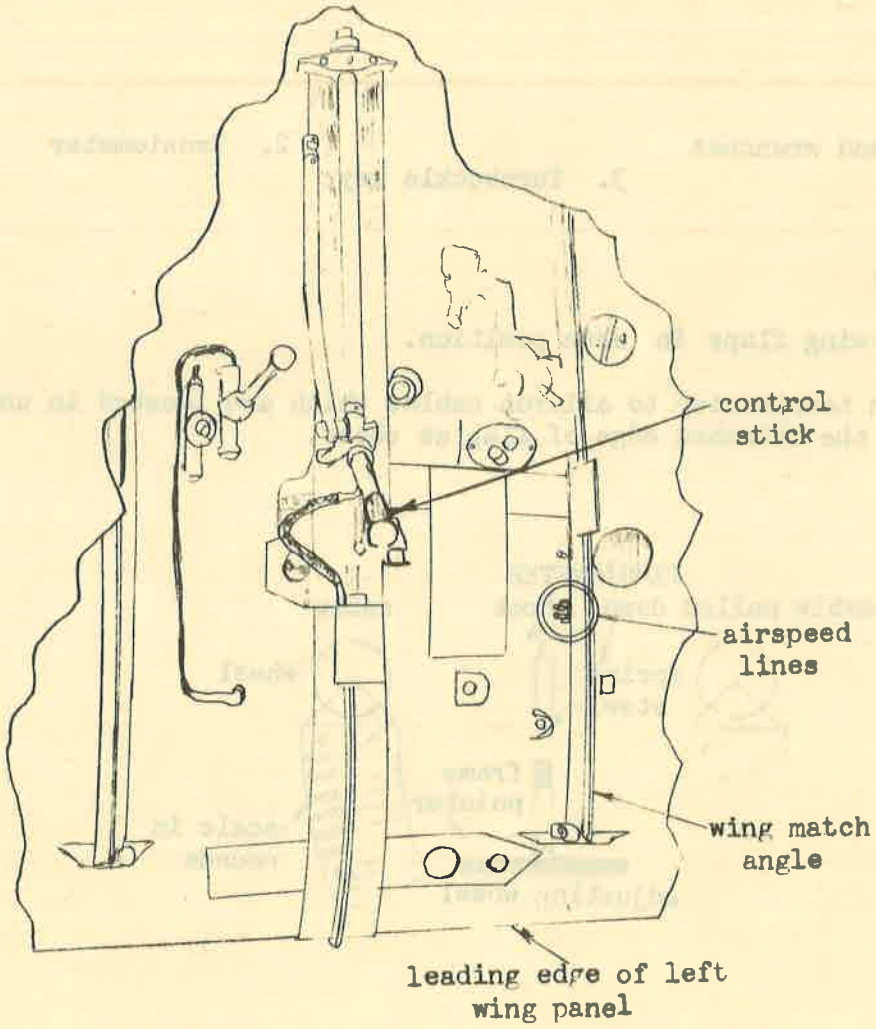
1. Connect the two airspeed lines at upper surface of left wing panel in front of the left rudder pedal to the airspeed lines from the airspeed indicator.

   NOTE: In making these two connections the arrangement of the lines does not matter at this time.



HOW TO CONNECT AIRSPEED LINES AT UPPER SURFACE OF LEFT WING PANEL IN COCKPIT

PROCEDURE: (Cont.)



HOW TO RIG AILERON CABLES TO TENSION

GENERAL INFORMATION:

Requires two men. Work on one aileron at a time.

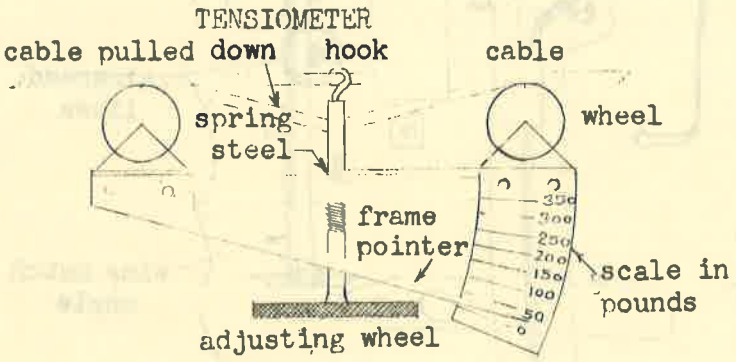
SAFETY:

TOOLS:

1. Open end wrenches
2. Tensiometer
3. Turnbuckle key

PROCEDURE:

1. Place wing flaps in down position.
2. Attach tensiometer to aileron cables which are located in under wing along the attached edge of flap as shown.



3. Check specifications for aileron cable tension.

HOW TO RIG AILERON CABLES TO TENSION

PROCEDURE (Cont.)

4. Find tension of cable by turning the adjusting wheel of the tensiometer until the cable is drawn tight, but do not strain tensiometer by excessive turning of adjusting wheel after the cable is drawn tight.

5. If tension of cable is low, tighten both turnbuckles on the aileron cable the same number of turns until the desired tension is obtained.

   CAUTION: Always remove tensiometer from cable when tightening or loosening turnbuckles.

6. If tension of cable is high, loosen both turnbuckles the same number of turns until the desired tension is obtained.

7. Repeat procedure for rigging cables of remaining aileron to tension.

HOW TO RIG AILERONS TO PROPER ALIGNMENT

GENERAL INFORMATION:

Requires two men.

SAFETY:

TOOLS:

1. Turnbuckle key

PROCEDURE:

1. Hold control stick in neutral position.
2. Check aileron for droop according to specifications.
3. If aileron has too much droop:
   a. Locate cable that brings aileron up by moving the aileron.
   b. Take up desired turns on turnbuckle on this cable.
   c. Take off the same number of turns from the turnbuckle on the other cable.
   d. Check for droop to see whether the desired position for the aileron has been obtained.
   e. If desired droop is not obtained, repeat previous procedure.

HOW TO RIG AILERONS TO PROPER ALIGNMENT

PROCEDURE (Cont.)

4. If aileron is too high:
   a. Locate cable that brings aileron down by moving the aileron.
   b. Take up desired turns on turnbuckle on this cable.
   c. Take off the same number of turns from the turnbuckle on the other cable.
   d. Check to see whether the desired position for the aileron has been obtained.
   e. If desired position is not obtained repeat previous procedure.
5. Repeat procedure for rigging remaining aileron to proper alignment.
6. Recheck both ailerons for tension and droop.

HOW TO RIG AILERONS FOR PROPER TRAVEL, AND SAFETY TURNBUCKLES

GENERAL INFORMATION:

Requires two men. The same two men who rigged the ailerons for proper alignment should also rig ailerons for proper travel, having same man in the cockpit for both occasions.

SAFETY:

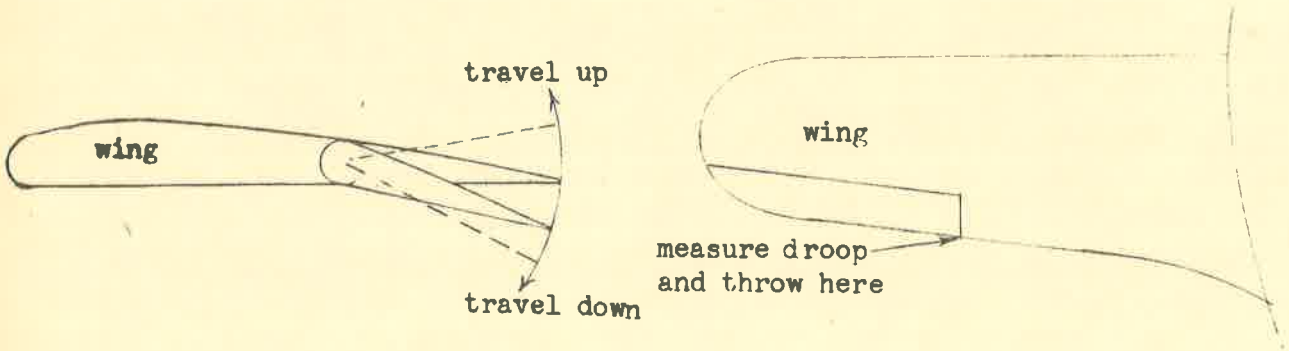
TOOLS:

1. Open end wrenches
2. Scale
3. Diagonal side-cutting pliers

PROCEDURE:

1. Move control stick to its left extremity, and hold in that position.
2. Check left aileron's up throw according to specifications.

NOTE: Measurements are made from the center of the trailing edges of the aileron and wing panel at the inboard end of aileron.



HOW TO RIG AILERONS FOR PROPER TRAVEL, AND SAFETY TURNBUCKLES

PROCEDURE (Cont.)

3. If aileron does not have enough up throw:

   a. Loosen jam nut on left hand stop.

   b. Turn left aileron stop in to desired position.

   c. Recheck left aileron's up throw and continue to turn in stop until desired up throw has been obtained.

   d. Tighten jam nut.

4. If aileron has too much up throw:

   a. Repeat the procedure used when the aileron did not have enough up throw, except turn stop out until desired up throw has been obtained.

      NOTE: The down throw of the right aileron is automatically obtained when the up throw of the left aileron is obtained.

5. Repeat procedure for rigging right aileron for proper up throw.

6. Recheck both ailerons for droop according to specifications.

7. If the droop has been maintained throughout this procedure:

   a. Safety turnbuckles on aileron cables.

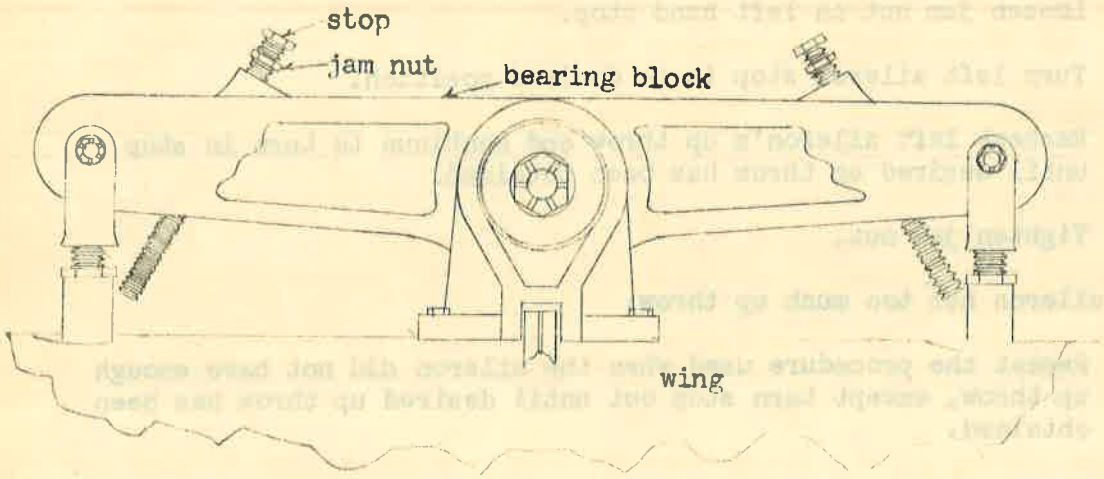
8. If the droop has not been maintained throughout this procedure:

   a. Repeat procedures for rigging droop and tension.

   b. Recheck ailerons for proper travel.

HOW TO RIG AILERONS FOR PROPER TRAVEL, AND SAFETY TURNBUCKLES

PROCEDURE (Cont.)



Rear View of Bearing Block

HOW TO RIG FLAPS FOR TRAVEL AND ALIGNMENT, AND SAFETY

GENERAL INFORMATION:

Requires two men.

SAFETY:

TOOLS:

1. Turnbuckle key
2. Diagonal side-cutting pliers

PROCEDURE:

1. Run flaps up against trailing edge of wing by means of the hydraulic hand pump in the cockpit.

   CAUTION: Be sure the landing gear latch is locked before operating hydraulic pump.

2. Check both flaps to see whether the trailing edges meet the contour of the trailing edge of the wing.

3. If the flaps do not draw up evenly against the trailing eoge of the wing:

   a. Check locations where flaps do not draw up against wing.

   b. Lower flaps.

      CAUTION: Be sure everything is cleared from under the flaps before lowering them. The flaps have a travel of 45°.

   c. Tighten turnbuckle nearest the part of the flap that did not draw up against wing.

HOW TO RIG FLAPS FOR TRAVEL AND ALIGNMENT, AND SAFETY

PROCEDURE (Cont.)

NOTE: Tightening the nearest turnbuckle does not always correct this defect. To obtain the desired adjustment, the turnbuckles next to the nearest one may have to be turned out or in before the flaps can be drawn to proper contour.

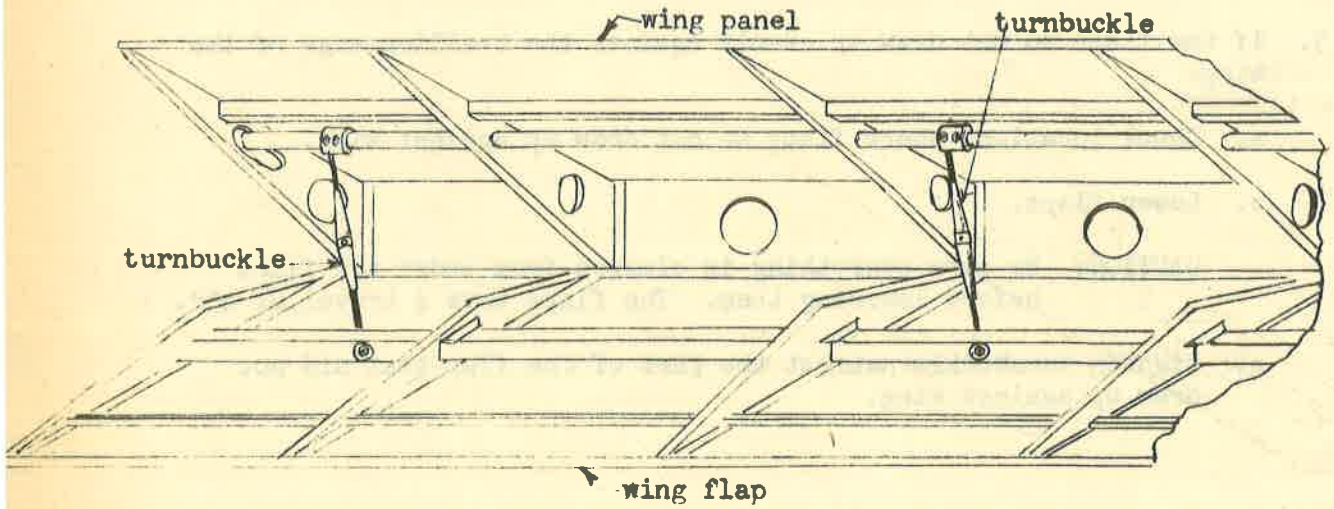
d. Raise flaps to see whether they draw up evenly against the contour of the trailing edge of the wing.

e. Repeat procedure of adjusting turnbuckles until the flaps properly meet the contour of the trailing edge of the wing.

4. If the flaps do draw up evenly against the trailing edge of the wings:

a. Lower flaps.

b. Safety wire turnbuckles according to P-40E specifications.



HOW TO CONNECT FLAP POSITION INDICATOR CABLE TO RIGHT FLAP PANEL

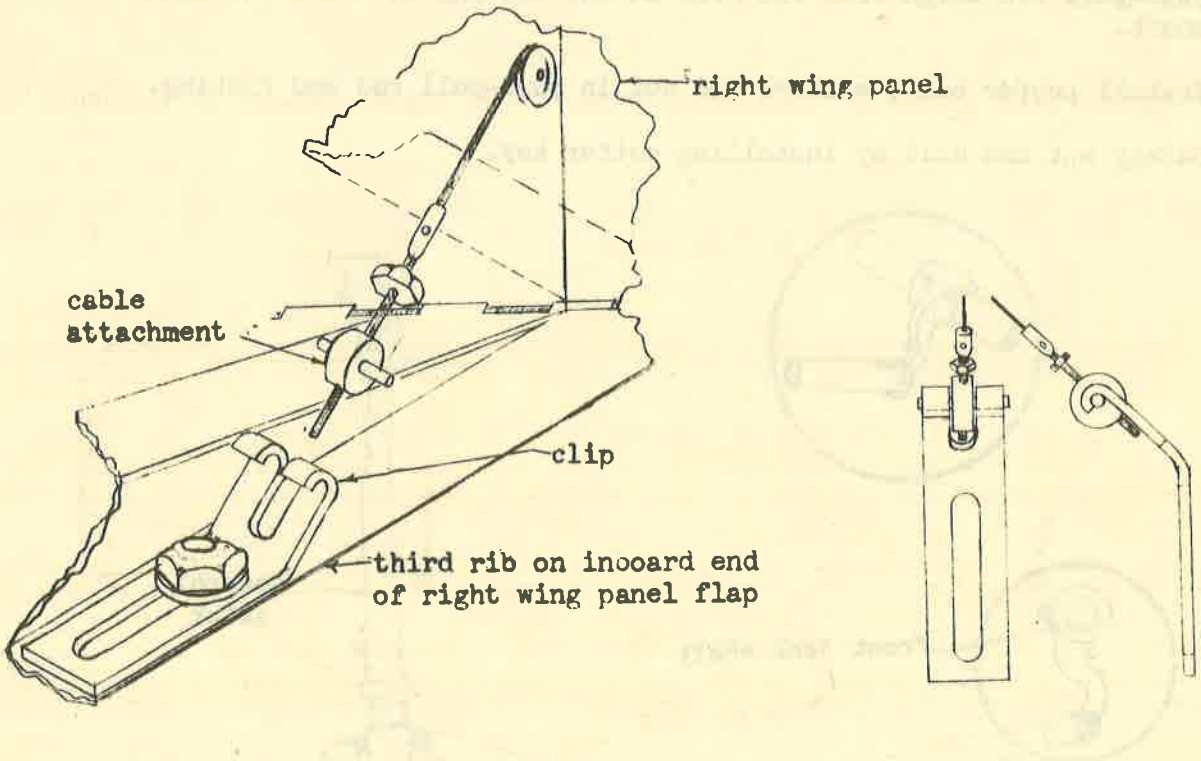
GENERAL INFORMATION:

SAFETY:

TOOLS:

PROCEDURE:

1. Connect flap position indicator cable to right flap panel by hooking the cable attachment pins in the clip on the flap panel as shown in sketch.



AIR SERVICE COMMAND
U.S. ARMY AIR CORPS

AIR DEPOT
INSTRUCTION MANUAL

DIVISION - P-40E AIRPLANE

AIRCRAFT FINAL ASSEMBLY

OPERATION 36
OPERATION SHEET SERIES

HOW TO CONNECT THE ELEVATOR PUSH-PULL ROD AT ITS JUNCTION TO THE ELEVATOR CONTROLS IN COCKPIT

GENERAL INFORMATION:

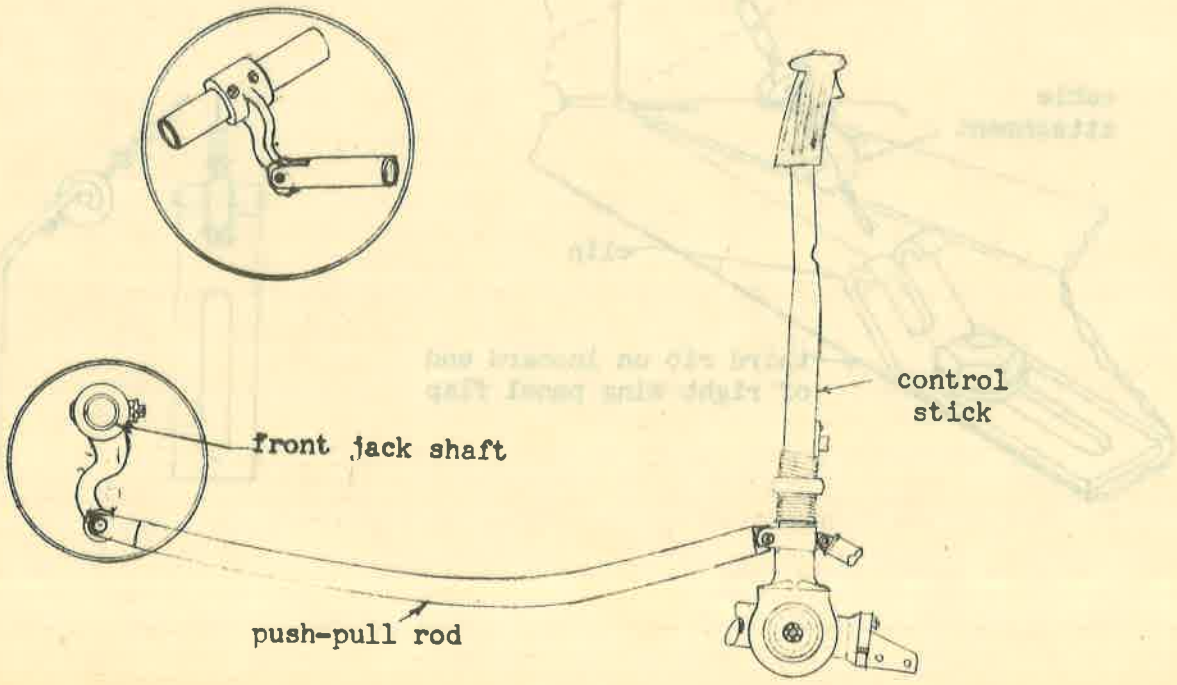
SAFETY:

TOOLS:

1. Open end wrenches
2. Diagonal side-cutting pliers

PROCEDURE:

1. Pull control stick back until the holes in the rear end of the elevator push-pull rod align with the hole in the fitting in the front jack shaft.
2. Install proper bolt, washers and nut in push-pull rod and fitting.
3. Safety nut and bolt by installing cotter key.



HOW TO INSTALL AIRSPEED SYSTEM ON LEFT WING PANEL

GENERAL INFORMATION:

Requires two men.

SAFETY:

TOOLS:

1. Open end wrenches
2. Screw-driver
3. Diagonal side-cutting pliers

PROCEDURE:

1. Remove pitot tube and conduit inspection plate.
2. Slip proper lines through the pitot tube.
3. Connect the lines to the pitot head.

   NOTE: The two connecting fittings on the pitot head are marked for identification; the one fitting having a "P" for pressure marked on it, and the other fitting having an "S" for static marked on it. Identify the lines on the opposite end of the pitot tube according to their arrangement on the pitot head; that is, know which is the pressure line and which is the static line on the end of the pitot tube which is inserted into the wing. It is important that the pressure line and static line can be told apart in making a later connection.

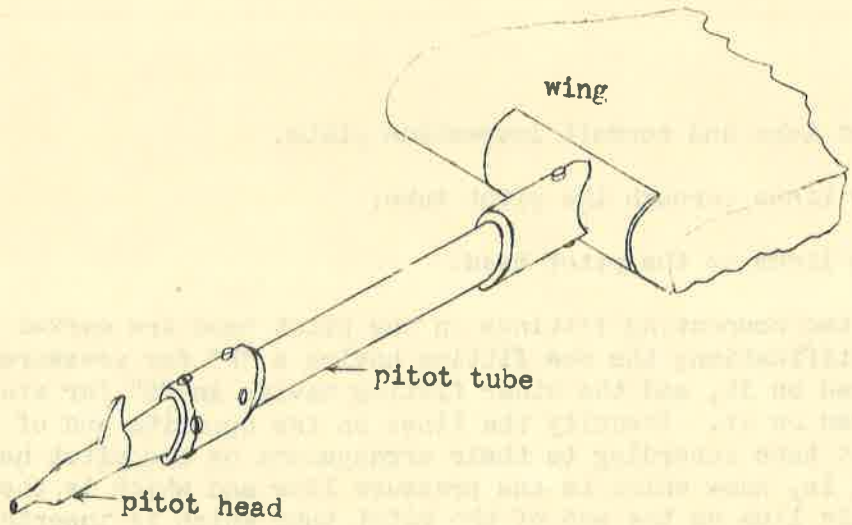
4. Slip pitot head into the pitot tube so that the fin on the pitot head will be on top when the pitot tube is installed on the wing.
5. Align holes in pitot head and tube.
6. Install the four screws in the pitot head and tube.
7. Safety the four screws by installing safety wire.

HOW TO INSTALL AIRSPEED SYSTEM ON LEFT WING PANEL

PROCEDURE (Cont.)

8. Insert pitot tube in the leading edge near the outboard end of the left wing panel.

9. Secure the tube to the wing with the proper screws.



HOW TO INSTALL AIRSPEED SYSTEM ON LEFT WING PANEL

PROCEDURE (Cont.)

10. At the pitot tube and conduit access door in the left wing panel, connect the two airspeed lines from the pitot tube to the two airspeed lines which come through the wing.

11. Check for proper arrangement of lines by blowing through the pitot head.

    NOTE: Have a man in cockpit to check movement of the airspeed indicator.

12. If cockpit airspeed indicator does not register clockwise:

    a. Reverse the arrangement of the lines.

    b. Check for proper arrangement of lines after making change.

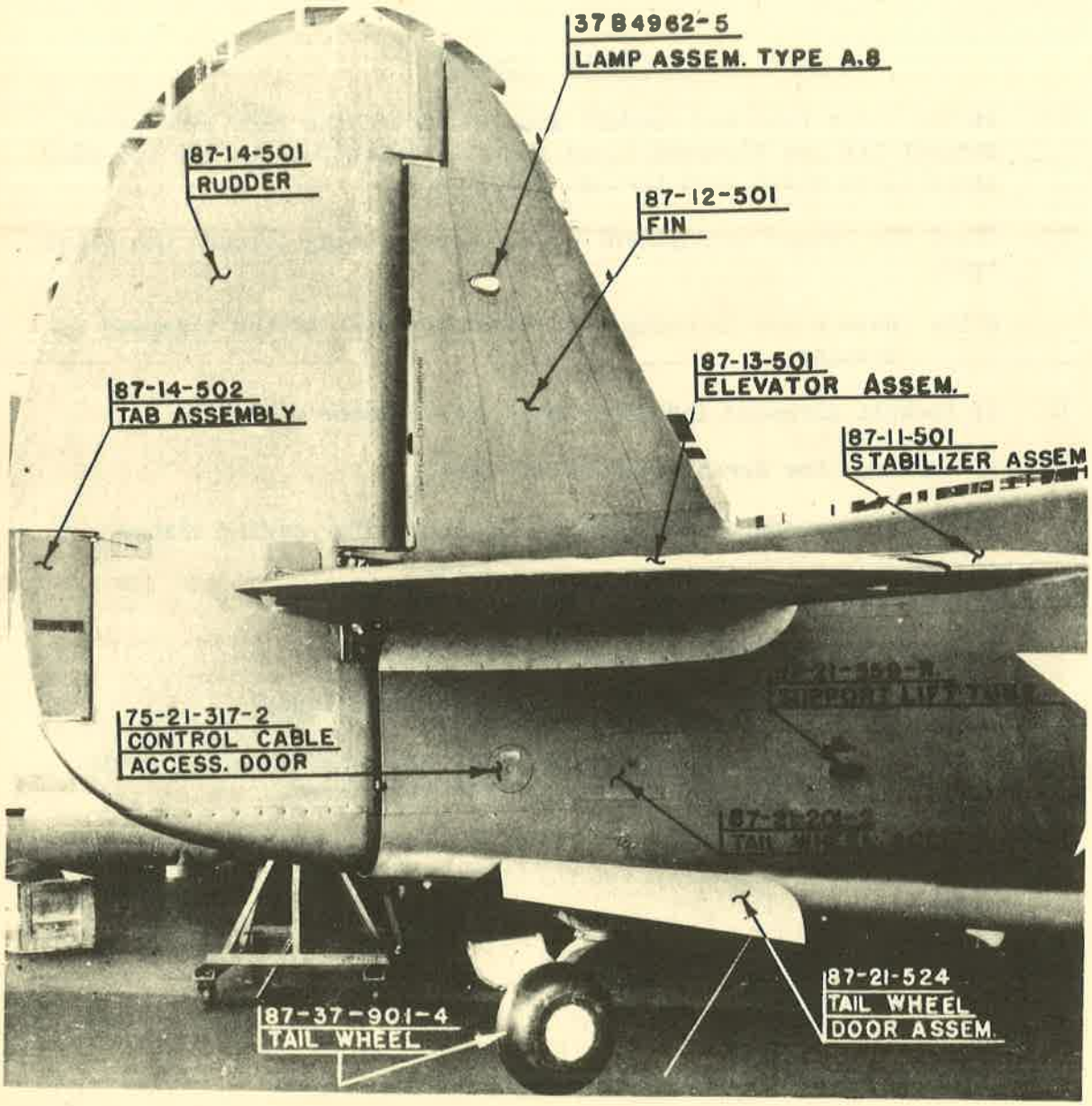
13. If lines are connected properly:

    a. Mark the pressure line with black tape.

    b. Mark the static line with black and green tape.

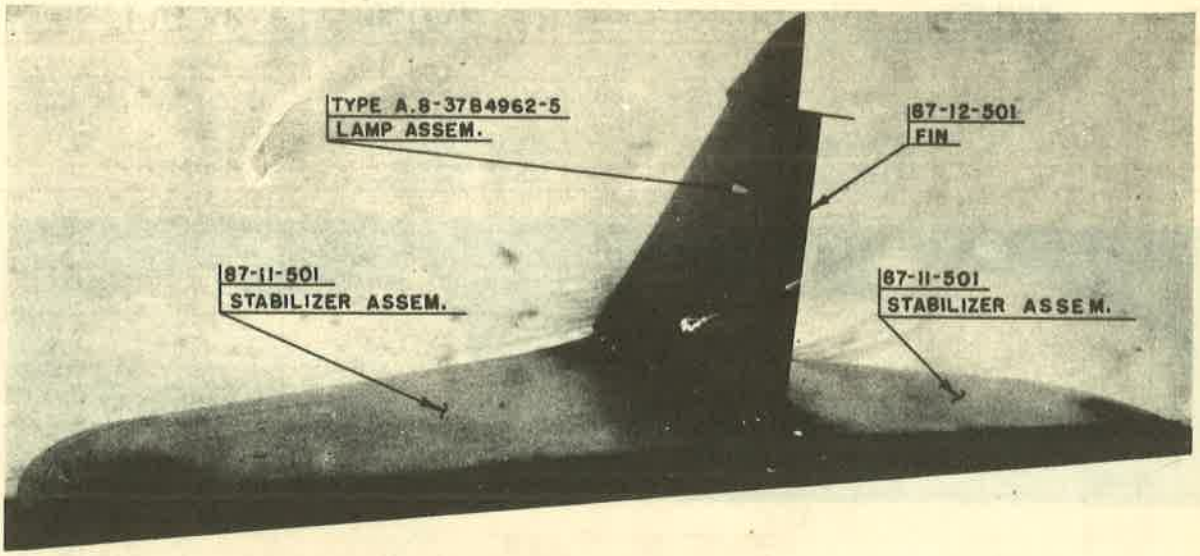
    NOTE: The identification of these two lines should be made according to the note under step three.

NOMENCLATURE OF PARTS



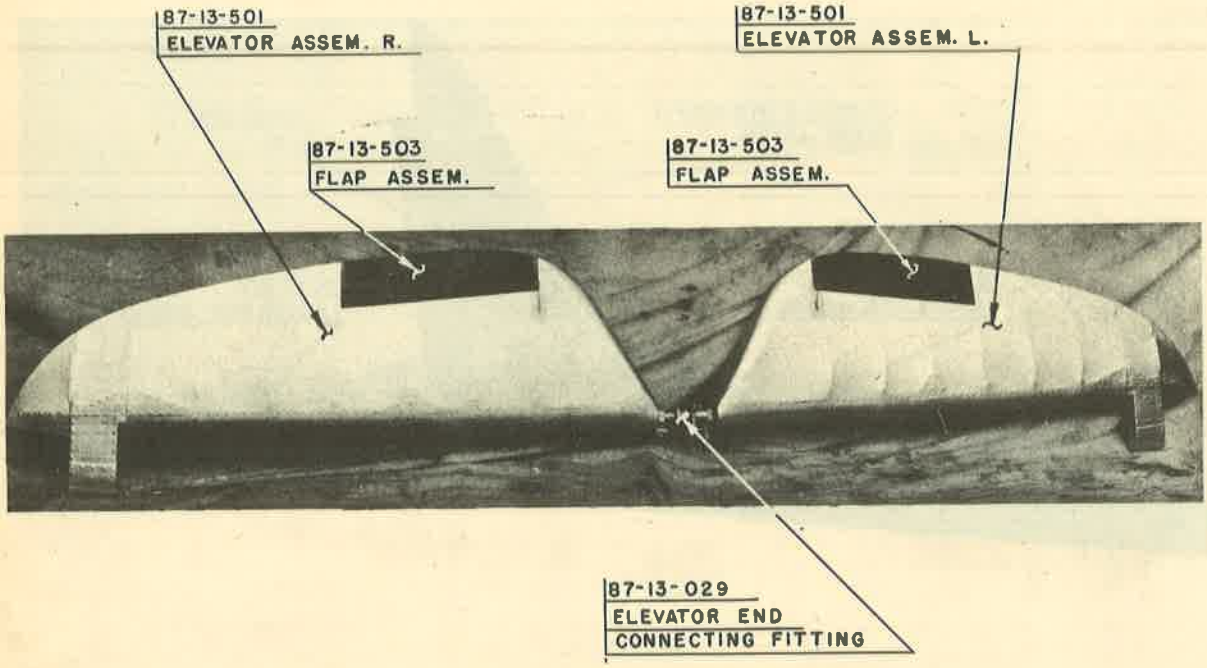
EMPENNAGE INSTALLATION - P-40D & P-40E

NOMENCLATURE OF PARTS (Cont.)



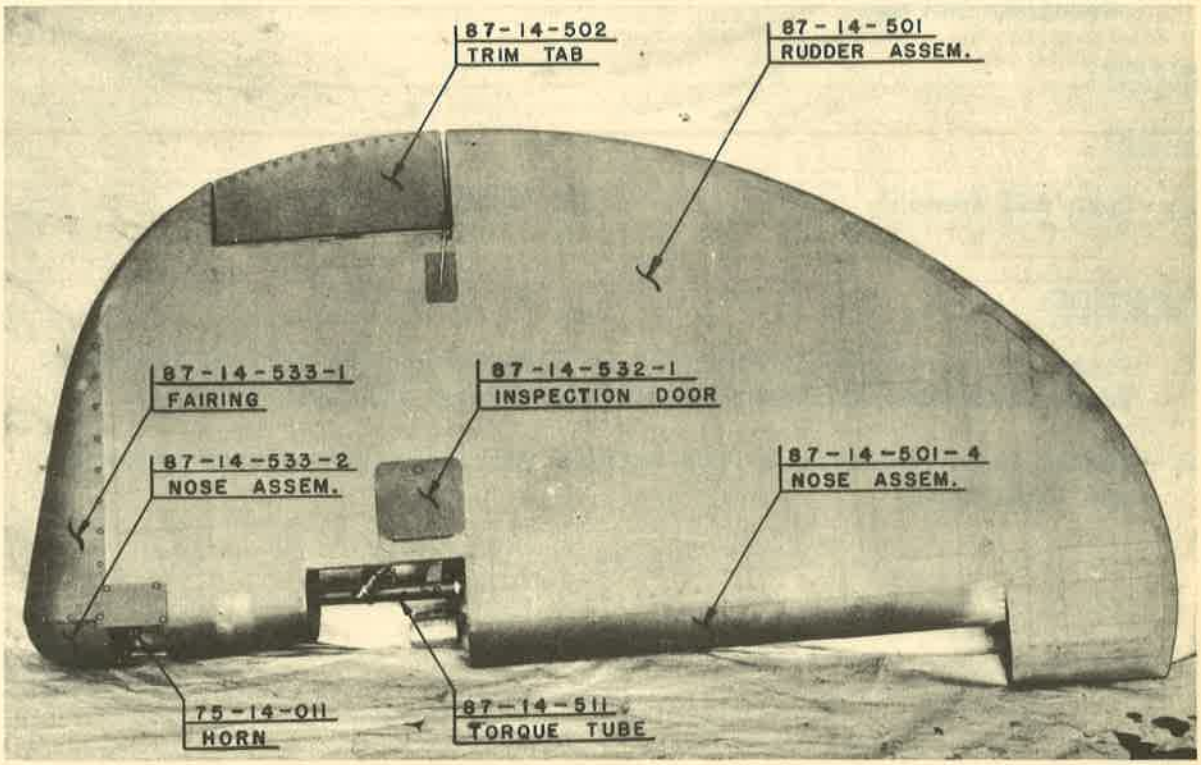
STABILIZERS COMPLETE- P-40D & P-40E

NOMENCLATURE OF PARTS (Cont.)



ELEVATOR ASSEMBLY P-40D & P-40E

NOMENCLATURE OF PARTS (Cont.)



RUDDER ASSEMBLY - P-40D & P-40E

HOW TO INSTALL HORIZONTAL STABILIZER

GENERAL INFORMATION:

Requires two men.

SAFETY:

TOOLS:

1. Open end wrench
2. Socket wrench

PROCEDURE:

1. Place the horizontal stabilizer in position on the tail of the fuselage, inserting the stabilizer studs through the tail fittings.
2. Secure the stabilizer to the tail by installing the proper washers and lock nuts.

HOW TO INSTALL VERTICAL STABILIZER (FIN)

GENERAL INFORMATION:

Requires two men.

SAFETY:

TOOLS:

1. Open end wrench
2. Socket wrench

PROCEDURE:

1. Have electrical department connect the electric cable for the light in the fin.
2. Place the fin in position on the horizontal stabilizer so that the horizontal stabilizer studs protrude from the top of the fin fittings.
3. Secure the fin to the horizontal stabilizer with the proper washers and lock nuts.

HOW TO INSTALL ELEVATOR HORN, CENTER BEARING CAP UNIT AND BONDING TO HORIZONTAL STABILIZER

GENERAL INFORMATION:

SAFETY:

TOOLS:

1. Socket wrench
2. Diagonal side-cutting pliers

PROCEDURE:

1. With the elevator horn on the left side and down place the center bearing cap unit on the horizontal stabilizer attachment bracket.

2. Align holes and install the four stud bolts of proper size in the cap unit and stabilizer bracket. Tighten bolts until they are snug, but be careful not to strip threads by excessive tightening.

   NOTE: The bottom right stud bolt which secures the center cap unit to the stabilizer bracket also secures a bracket for supporting the breeze tab control unit.

3. Have bolts inspected by the department inspector.

4. Safety each stud bolt individually with safety wire to the center bearing unit through their respective anchor holes in the cap unit for this purpose.

5. Connect the elevator horn to the elevator link with the proper bolt. washer and nut, inserting the bolt so that the head is toward the left edge of the horizontal stabilizer.

6. Safety the nut and bolt with a cotter key.

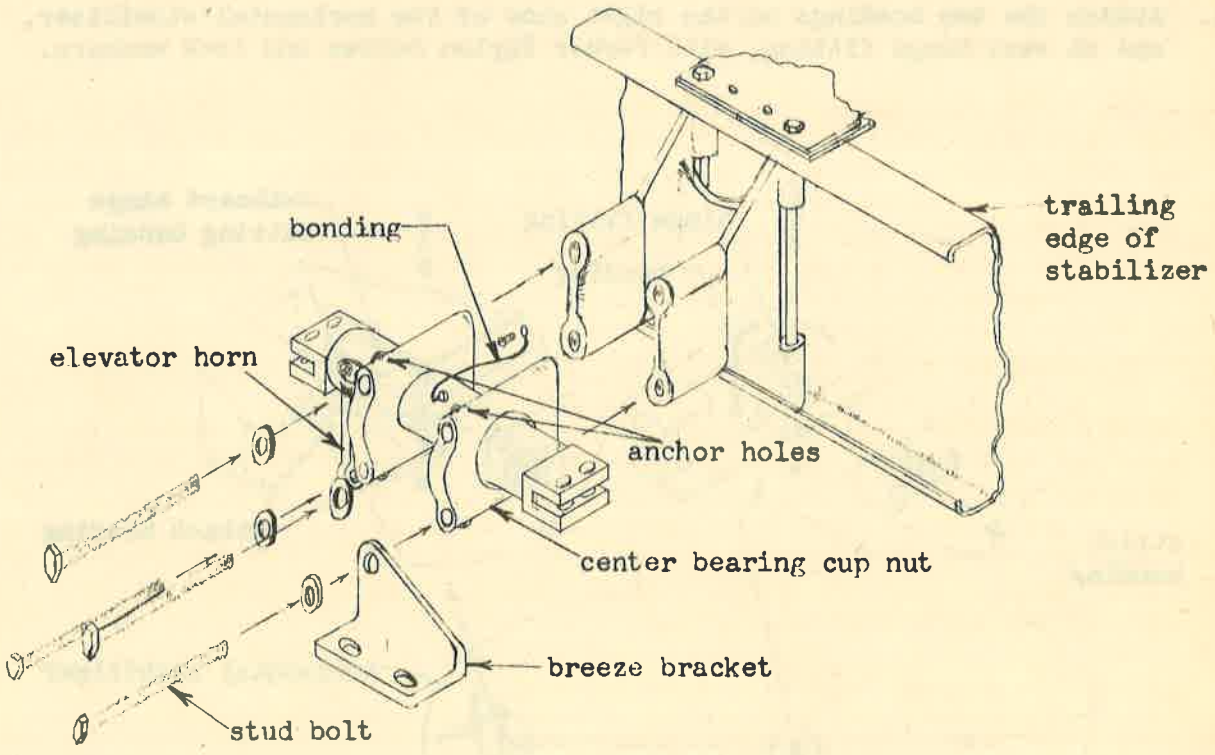
HOW TO INSTALL ELEVATOR HORN, CENTER BEARING CAP UNIT AND BONDING TO HORIZONTAL STABILIZER

PROCEDURE (Cont.)

7. Install bonding, one end to front side of bearing cap and the other end to the trailing edge of the horizontal stabilizer. Use Parker Kaylon Screws and star washers.

8. Anchor breeze bracket to the breeze control unit extending from the horizontal stabilizer with the proper stud bolts.

9. Safety the stud bolts by installing safety wire.



HOW TO INSTALL ELEVATORS AND BONDINGS

GENERAL INFORMATION:

Requires three men.

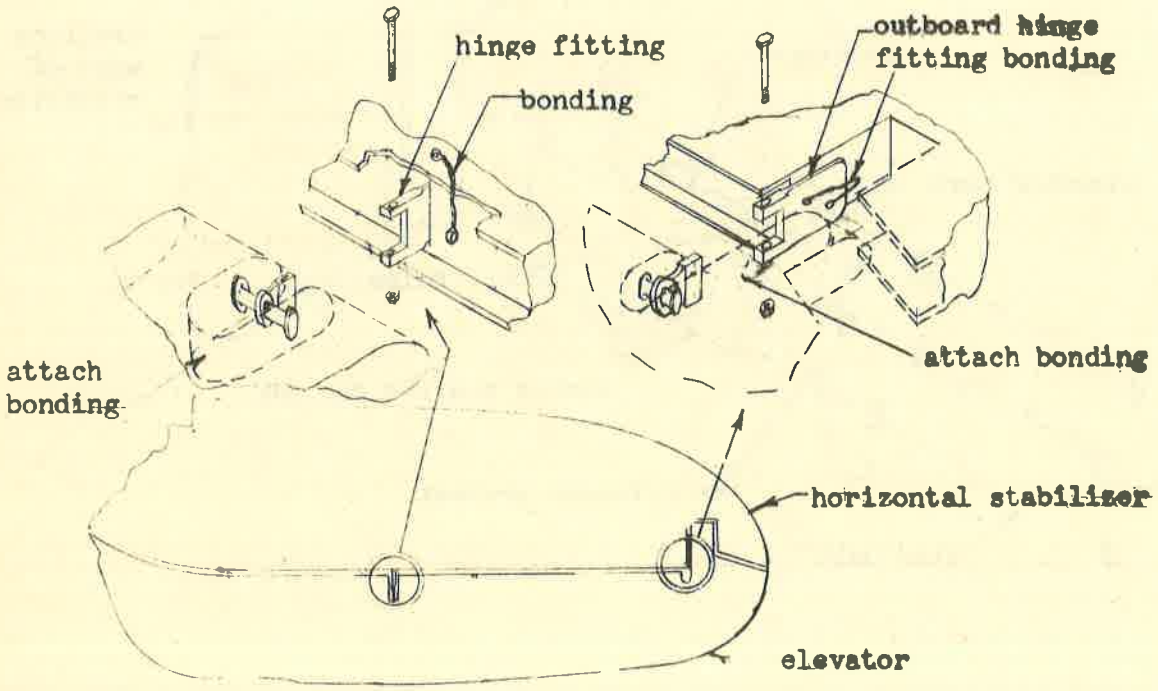
SAFETY:

TOOLS:

1. Sockets
2. Screw-driver
3. Drift pin

PROCEDURE:

1. Attach the two bondings on the right side of the horizontal stabilizer, one at each hinge fitting, with Parker Kaylon Screws and lock washers.

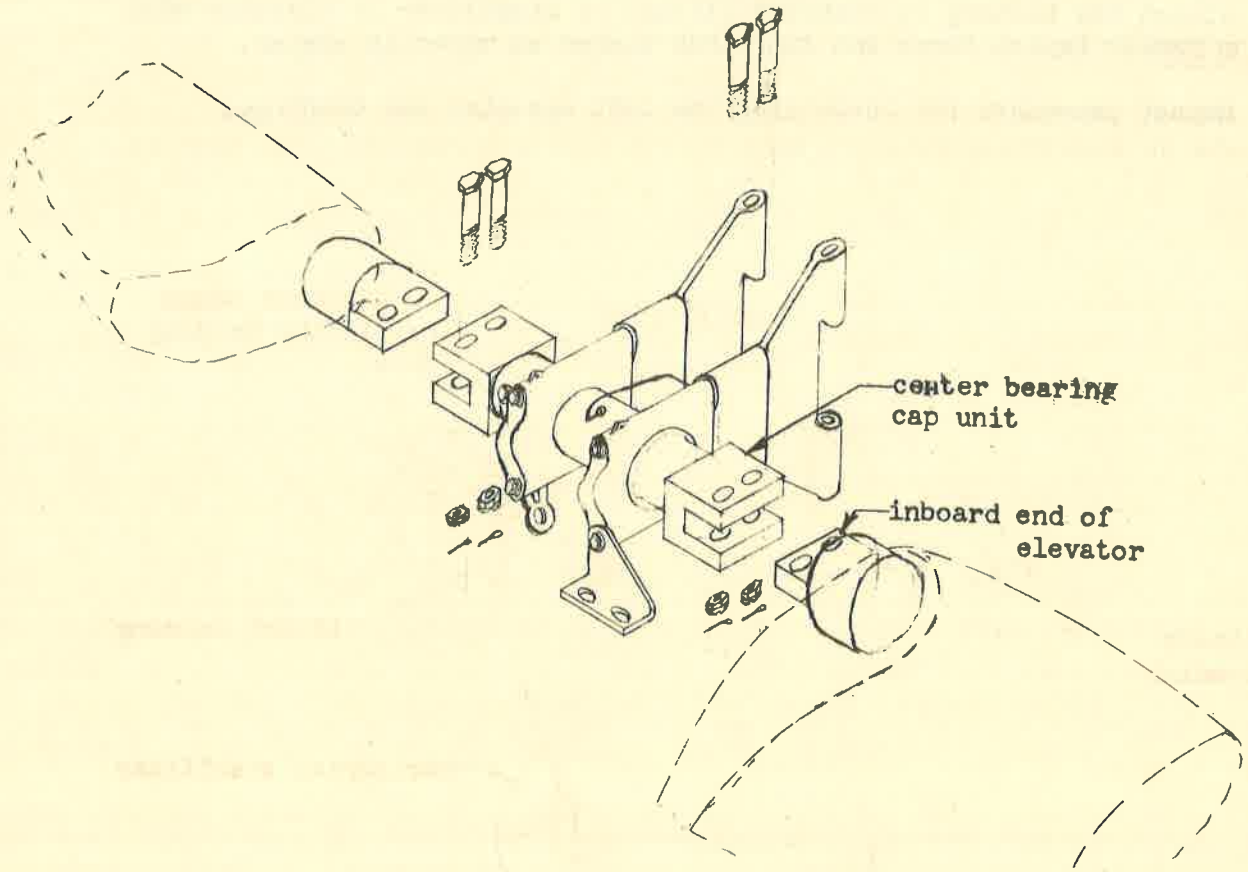


HOW TO INSTALL EVELATORS AND BONDINGS

PROCEDURE (Cont.)

2. Hold right elevator in position at trailing edge of horizontal stabilizer and attach the middle bonding to the elevator.

3. Insert the inboard end of the elevator in the slot of the center bearing cap unit, and at the same time push elevator forward inserting the middle and outboard hinge fittings in place.



HOW TO INSTALL ELEVATORS AND BONDINGS

PROCEDURE (Cont.)

4. Align holes in hinge fittings of stabilizer and elevator with a drift pin if necessary.
5. Install proper bolts and nuts with bolt heads up.
6. Safety bolts and nuts by installing cotter pins.
7. Place elevator in down position.
8. Attach the bonding on outboard fitting of stabilizer to elevator with a Parker Kaylon Screw and star lock washer as shown in sketch.
9. Repeat procedure for installing the left elevator and bondings.

HOW TO INSTALL ELEVATOR TRIM TABS

GENERAL INFORMATION:

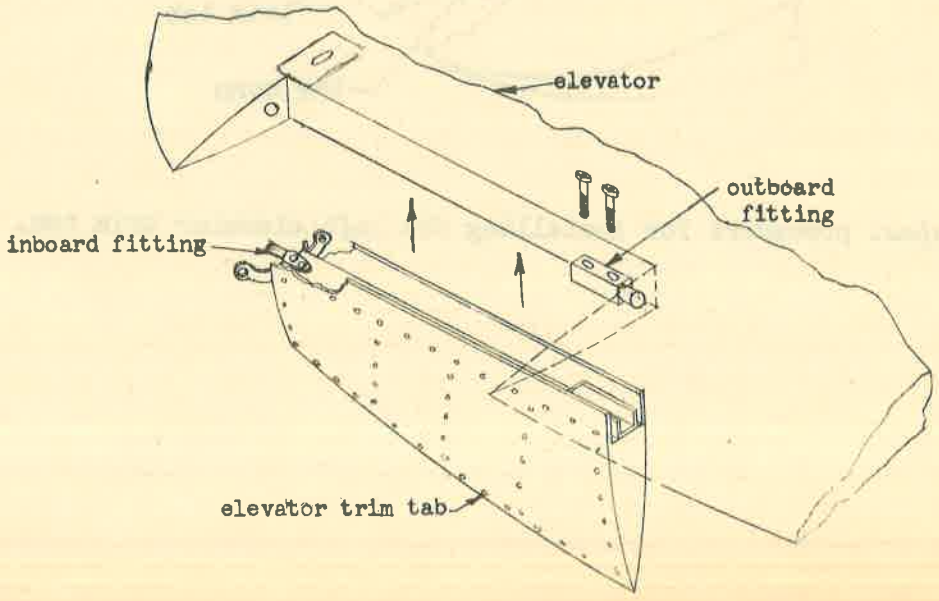
SAFETY:

TOOLS:

1. Screw-driver
2. Diagonal side-cutting pliers

PROCEDURE:

1. With the right elevator trim tab in down position insert the inboard fitting of the trim tab in the hole in the elevator.
2. Insert the outboard fitting of the trim tab in the hole in the elevator.
3. With the tab still in a down position, raise the outboard end of tab until the holes in the outboard fitting and in the front face of the tab can be aligned.
4. Install the proper fillister head screws in the fitting and tab.
5. Safety screws by connecting them together with safety wire.

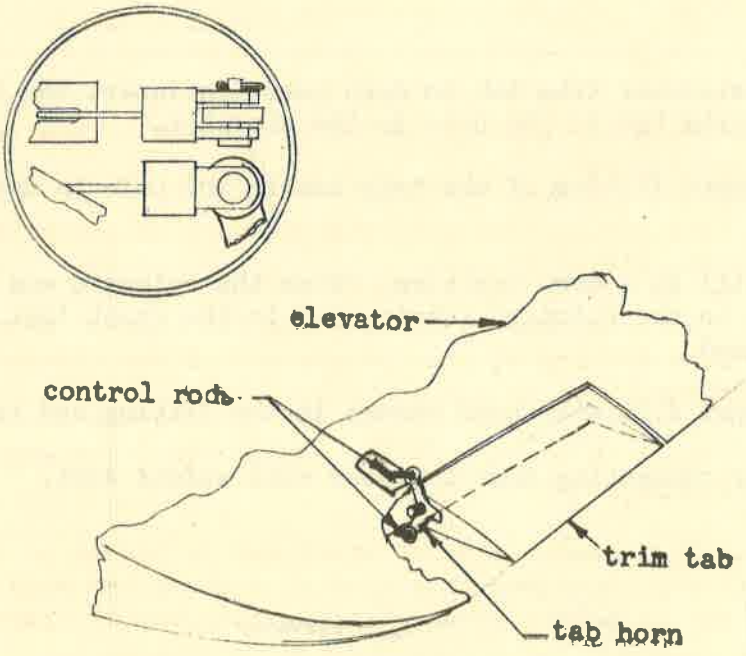


HOW TO INSTALL ELEVATOR TRIM TABS

PROCEDURE (Cont.)

6. Move tab into neutral position.

7. Connect the two control rods to the tab horn with the proper clevis pins and cotter pins.



8. Repeat procedure for installing the left elevator trim tab.

HOW TO CONNECT ELEVATOR TRIM TAB LINKAGE

GENERAL INFORMATION:

SAFETY:

TOOLS:

1. Open end wrenches
2. Adjustable wrench
3. Screw-driver

PROCEDURE:

1. Turn the elevator trim tab control, which is located on the left side in the cockpit, to neutral.

2. Adjust the left trim tab so that the trailing edge aligns with the trailing edge of the elevator.

   NOTE: This adjustment is made by turning the tab control segment in the breeze fitting at the inboard end of the elevator with a screw-driver.

3. Place the proper two lock washers on the breeze fitting coming from the tail of the fuselage.

   NOTE: One washer is a spacer made of steel and is placed on the fitting first; the other is a special lock washer made of aluminum and is placed on the fitting next to the spacer.

4. Connect the breeze fitting coming from the tail to the stationary breeze fitting on the inboard end of the elevator.

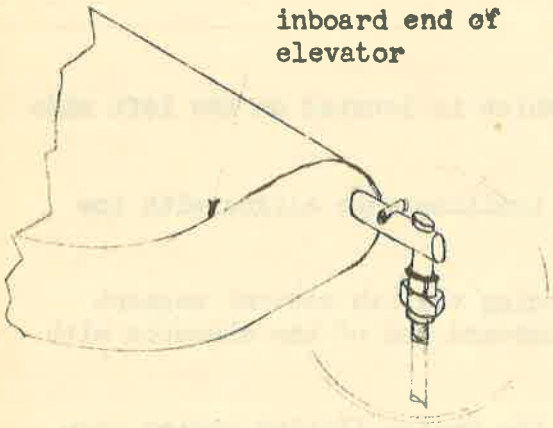
   CAUTION: Be sure the segment in the fitting coming from the tail fits into the slotted segment in the stationary fitting on the elevator before tightening the connection.

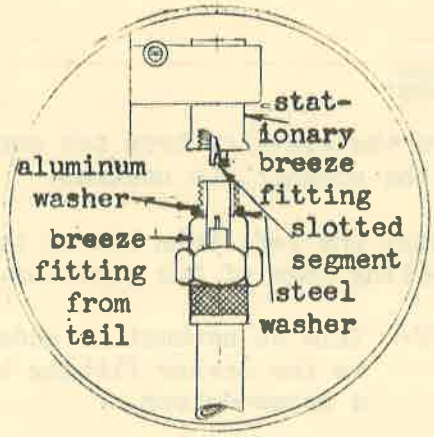
HOW TO CONNECT ELEVATOR TRIM TAB LINKAGE

PROCEDURE (Cont.)

5. Check the control in the cockpit and the tab to see whether they are both in neutral after making connection.

6. Safety connection by bending the aluminum washer up against the flat portion of the fitting on the elevator.





7. Repeat procedure for connecting the right trim tab linkage.

HOW TO INSTALL RUDDER AND BONDINGS

GENERAL INFORMATION: Requires three men.

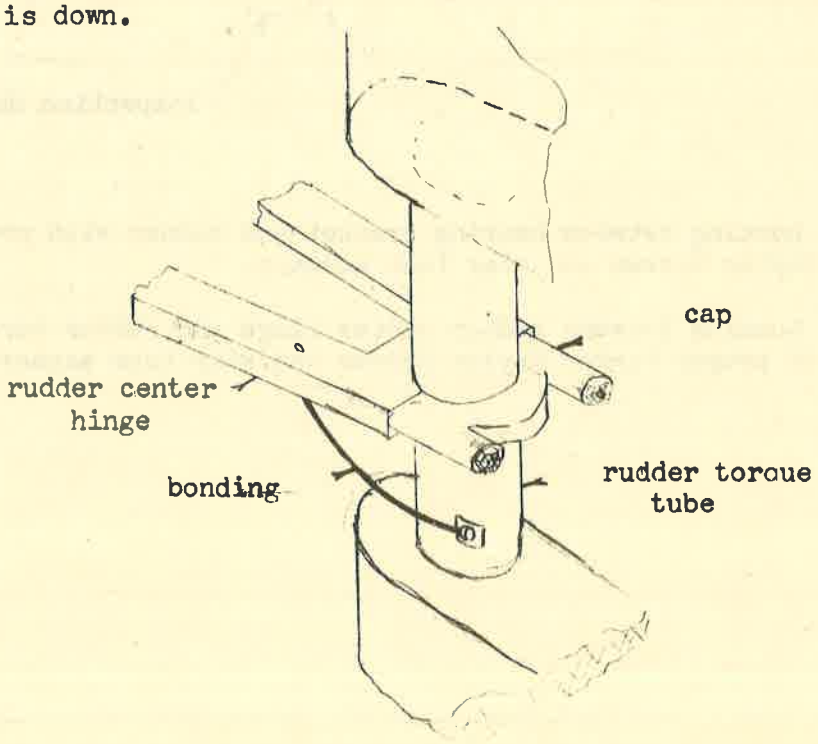
TOOLS:

1. Open end wrenches
2. Diagonal side-cutting pliers

PROCEDURE:

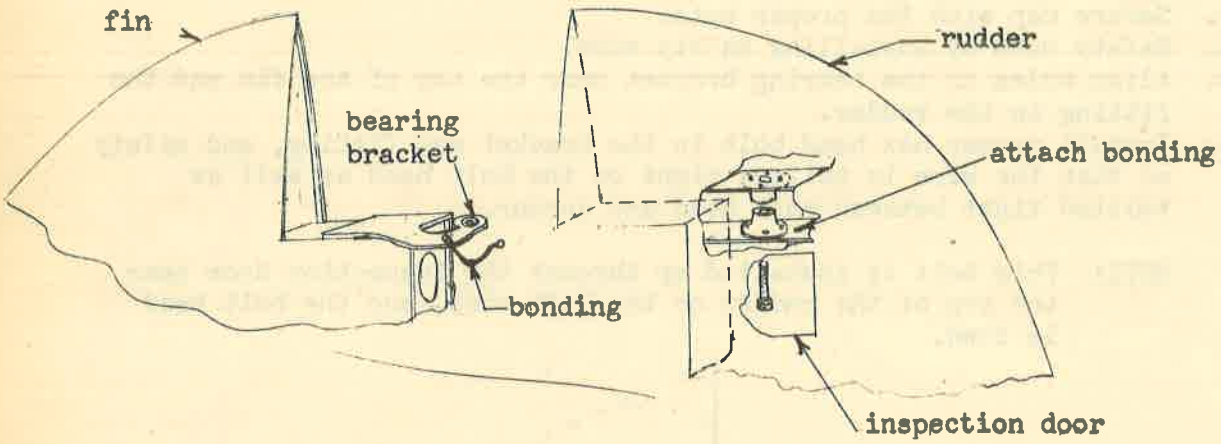
1. Hold rudder in place on the fin.
2. Place cap on rudder center hinge studs.
3. Secure cap with the proper nuts.
4. Safety nuts by installing safety wire.
5. Align holes in the bearing bracket near the top of the fin and the fitting in the rudder.
6. Install proper hex head bolt in the bracket and fitting, and safety so that the wire is pulling tight on the bolt head as well as twisted tight between bolt head and anchor.

NOTE: This belt is installed up through the inspection door near the top of the rudder on the left side, and the bolt head is down.



HOW TO INSTALL RUDDER AND BONDINGS

PROCEDURE (Cont.)



7. Install bonding between bearing bracket and rudder with proper Parker Kaylon Screws and star lock washers.

8. Install bonding between rudder center hinge and rudder torque tube with proper Parker Kaylon Screws and star lock washers.

HOW TO INSTALL RUDDER TRIM TAB, TRIM TAB LINKAGE AND FAIRING

GENERAL INFORMATION:

SAFETY:

TOOLS:

1. Screw-driver
2. Diagonal side-cutting pliers
3. Open end wrenches
4. Adjustable wrench

PROCEDURE:

1. Hold rudder trim tab so that it is at a right angle to the rudder surface on the left side of the rudder.
2. Align the holes in the trib tab fittings on the rudder with the holes in the front face of the tab.
3. Install the proper fillister head screws in fittings and tab.
4. Safety screws by installing safety wire.
5. Pass the breeze connection end of the trim tab actuating link through the slot in the right side of rudder.
6. Secure the breeze connection end of the actuating link in the ring of the breeze control unit with the two set screws in the ring.
7. Connect the clevis end of the trim tab actuating link to the arm on the trim tab with the proper clevis pin and cotter pin; the head of the clevis pin should be on top.

HOW TO INSTALL RUDDER TRIM TAB, TRIM TAB LINKAGE AND FAIRING

PROCEDURE (Cont.)

8. Turn rudder trim tab control, which is located on the left side in the cockpit, to neutral.

9. Adjust trim tab so that the trailing edge aligns with the trailing edge of the rudder.

   NOTE: This adjustment is made by turning the tab control segment in the stationary breeze fitting on the trailing edge of the horizontal stabilizer.

10. Place the proper two lock washers on the breeze fitting coming from the tail of the fuselage.

    NOTE: One washer is a spacer made of steel and is placed on the fitting first; the other is a special lock washer made of aluminum and is placed on the fitting next to the spacer.

11. Connect the breeze fitting coming from the tail to the stationary fitting on the breeze control unit.

    CAUTION: Be sure the segment in the fitting coming from the tail fits into the slotted segment in the stationary fitting before tightening the connection.

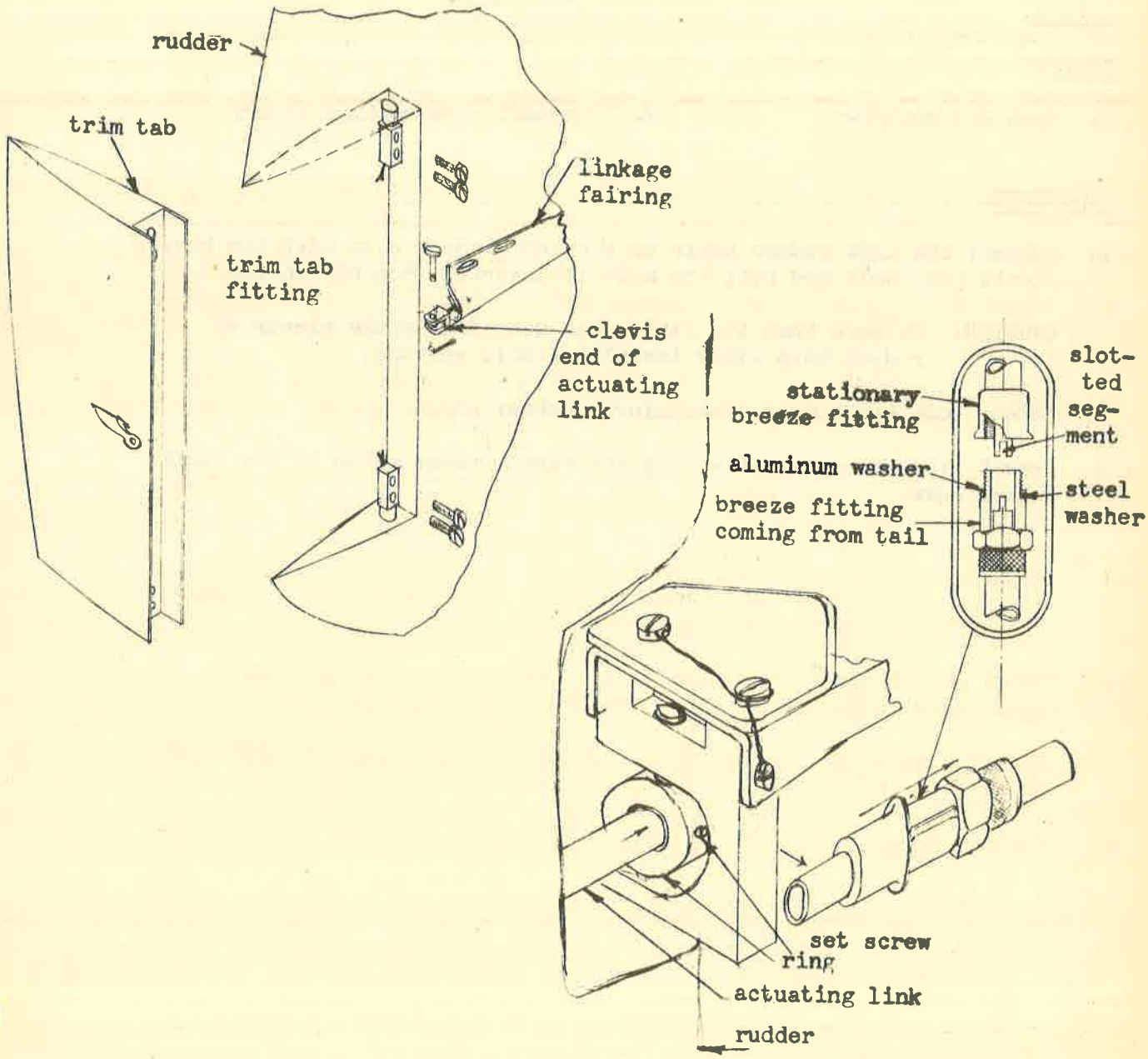
12. Check the rudder trim tab control in the cockpit and the tab to see whether they are both in neutral after making connection.

13. Safety connection by bending the aluminum washer against the flat portion of the stationary fitting on the breeze control unit.

14. Install linkage fairing on rudder with proper screws.

HOW TO INSTALL RUDDER TRIM TAB, TRIM TAB LINKAGE AND FAIRING

PROCEDURE (Cont.)



AIR SERVICE COMMAND
U.S. ARMY AIR CORPS

AIR DEPOT
INSTRUCTION MANUAL

DIVISION - P-40E AIRPLANE

AIRCRAFT FINAL ASSEMBLY

HOW TO CONNECT RUDDER LINKAGE

GENERAL INFORMATION:

SAFETY:

TOOLS:

1. Open end wrenches
2. Diagonal side-cutting pliers

PROCEDURE:

1. Connect the left rudder cable to the left rudder horn with the proper clevis head bolt and nut; the bolt is inserted from the bottom.

   CAUTION: Be sure that the cable does not bind in the clevis of rudder horn after installing bolt and nut.

2. Safety bolt and nut by installing a cotter pin.

3. Repeat procedure for connecting the right rudder cable to the right rudder horn.

HOW TO INSTALL ABRASION STRIPS AND FILLETS

GENERAL INFORMATION:

Requires two men.

SAFETY:

TOOLS:

1. Screw-driver

PROCEDURE:

1. Cement abrasion strips along edges of fillets that contact the vertical and horizontal stabilizer, using "rubber to metal" cement.

   CAUTION: Be sure strips are not wrinkled and are cemented securely to fillets. Also be sure that all holes in the fillets are free from cement.

2. Place proper fillet between the left side of the fuselage and the bottom surface of the horizontal stabilizer.

3. Align holes in fillet with holes in fuselage and stabilizer.

4. Secure fillet to fuselage and stabilizer with proper screws.

5. Repeat above procedure for installing the fillet between the right side of the fuselage and the bottom surface of the horizontal stabilizer.

6. Place proper fillet between the right side of the fin and top surface of horizontal stabilizer.

   NOTE: This fillet overlaps the bottom fillet at the leading edge of the horizontal stabilizer.

HOW TO INSTALL ABRASION STRIPS AND FILLETS

PROCEDURE (Cont.)

7. Align holes in fillet with holes in fin and stabilizer.

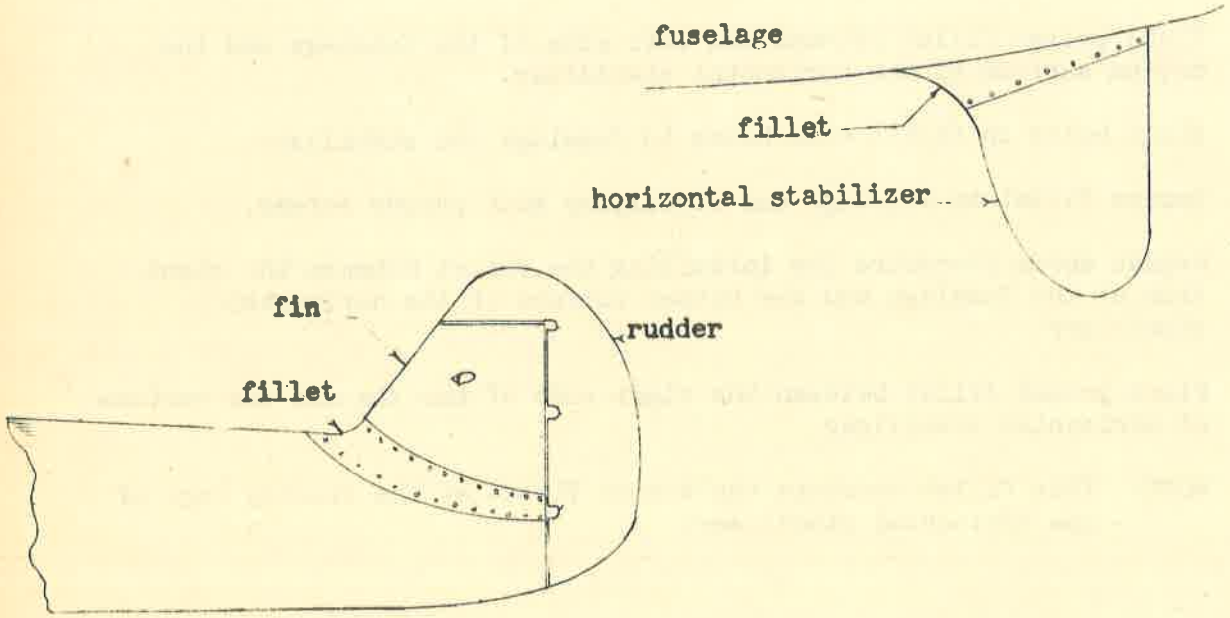
8. Secure fillet to fin and stabilizer with proper screws.

9. Place proper fillet between the left side of the fin and top surface of horizontal stabilizer.

   NOTE: This fillet overlaps the right top fillet at the leading edge of the fin as well as the left bottom fillet at the leading edge of the horizontal stabilizer.

10. Align holes in fillet with holes in fin and stabilizer.

11. Secure fillet to fin and stabilizer with proper screws.



HOW TO RIG ELEVATOR CABLES TO TENSION

GENERAL INFORMATION:

Requires three men.

SAFETY:

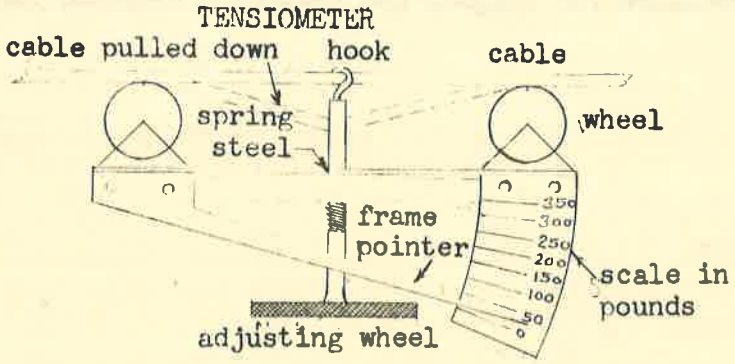
TOOLS:

1. Turnbuckle key
2. Tensiometer

PROCEDURE:

1. Locate the elevator control cables through the fuselage door access by moving the elevators up and down.
2. Attach tensiometer to one of the elevator cables.

NOTE: Elevator should be blocked up so weight is off cable.



HOW TO RIG ELEVATOR CABLES TO TENSION

PROCEDURE (Cont.)

3. Check specifications for elevator cable tension.

4. Find tension of cable by turning the adjusting wheel of the tensiometer until the cable is drawn tight, but do not strain tensiometer by excessive turning of adjusting wheel after the cable is drawn tight.

5. If tension of cable is low, tighten both turnbuckles on the elevator cable the same number of turns until the desired tension is obtained.

   CAUTION: Always remove tensiometer from cable when tightening or loosening turnbuckles.

6. If tension of cable is high, loosen both turnbuckles the same number of turns until the desired tension is obtained.

   NOTE: Not more than three threads should show on either end of turnbuckle after adjusting.

7. Repeat procedure for rigging the remaining elevator cables to tension.

HOW TO RIG ELEVATORS TO PROPER ALIGNMENT

GENERAL INFORMATION:

Requires three men.

SAFETY:

TOOLS:

1. Turnbuckle key

PROCEDURE:

1. Hold control stick in neutral position.
2. Check the elevators for neutral by sighting over the elevator surfaces and the surface of the horizontal stabilizer to see whether surfaces are in the same plane.
3. If elevators are too low:
   a. Locate cables that bring the elevators up by moving the elevators.
   b. Take up desired turns on turnbuckles on these cables.
   c. Take off the same number of turns from the turnbuckles on the other cables that bring the elevators down.
   d. Repeat procedure until surfaces are properly aligned.
4. If elevators are too high:
   a. Reverse the procedure used when they were too low.
5. Recheck elevator cables for tension.

HOW TO RIG ELEVATORS FOR PROPER TRAVEL, AND SAFETY TURNBUCKLES

GENERAL INFORMATION:

Requires three men.

SAFETY:

TOOLS:

1. Open end wrenches
2. Protractor
3. Diagonal side-cutting pliers

PROCEDURE:

1. Find degree reading of elevator in neutral position with a protractor and mark location of protractor on surface of elevator so that all future readings can be obtained from this same location.
2. Move control stick to its rear extremity, and hold it that position.
3. Check the elevators in the up position with a protractor for desired up throw.
4. Check specifications for proper elevator up throw.
5. If elevators do not have enough up throw:
   a. Loosen large jam nut on the control stick stop in the cockpit.
   b. Turn out the bushing on the stop until the desired up throw is obtained.
   c. Tighten large jam nut against end of female strut after desired up throw is obtained.
6. If elevators have too much up throw:

HOW TO RIG ELEVATORS FOR PROPER TRAVEL, AND SAFETY TURNBUCKLES

PROCEDURE (Cont.)

a. Loosen large jam nut on the control stick stop in the cockpit.

b. Turn in the bushing on the stop until the desired up throw is obtained.

c. Tighten large jam nut against end of female strut after desired up throw is obtained.

7. Move control stick to its forward extremity, and hold in that position.

8. Check the elevators in the down position with a protractor for desired down throw.

9. Check specifications for proper elevator down throw.

10. If elevators do not have enough down throw:

a. Loosen small jam nut on the control stick stop in the cockpit.

b. Turn the male strut counter-clockwise until the desired down throw is obtained.

c. Tighten small jam nut against end of male strut after desired down throw is obtained.

11. If elevators have too much down throw:

a. Loosen small jam nut on the control stick stop in the cockpit.

b. Turn the male strut clockwise until the desired down throw is obtained.

HOW TO RIG ELEVATORS FOR PROPER TRAVEL, AND SAFETY TURNBUCKLES

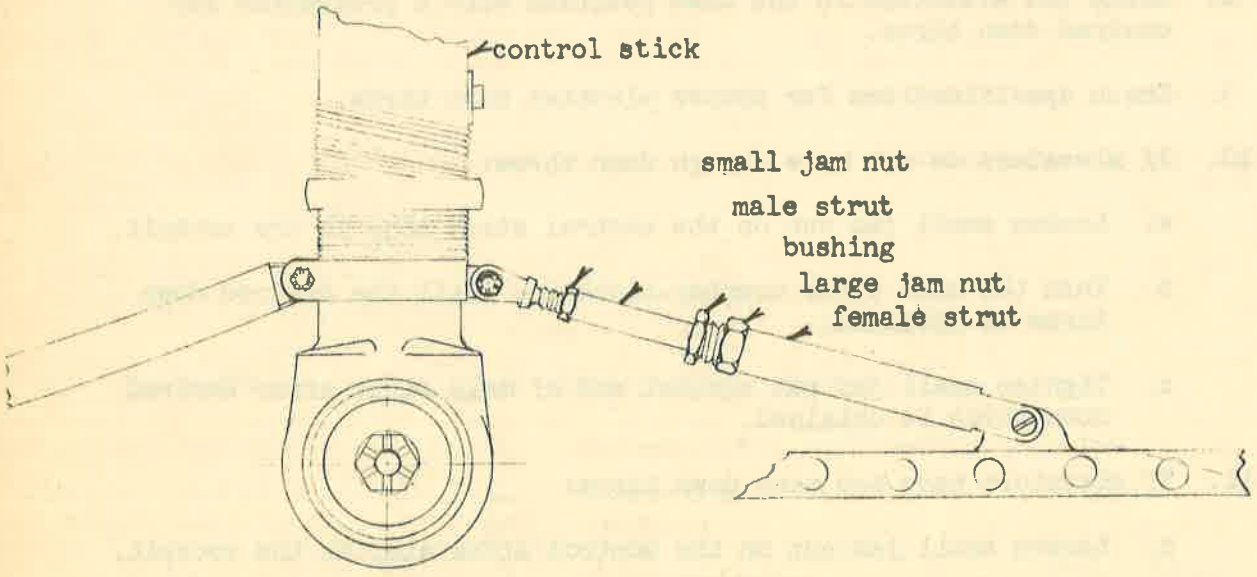
PROCEDURE (Cont.)

c. Tighten small jam nut against end of male strut after desired down throw is obtained.

12. Recheck elevators for tension, alignment and travel.

13. Safety turnbuckles by installing safety wire.

14. Recheck elevators for tension, alignment and travel.



HOW TO RIG RUDDER CABLES TO TENSION

GENERAL INFORMATION:

Requires three men.

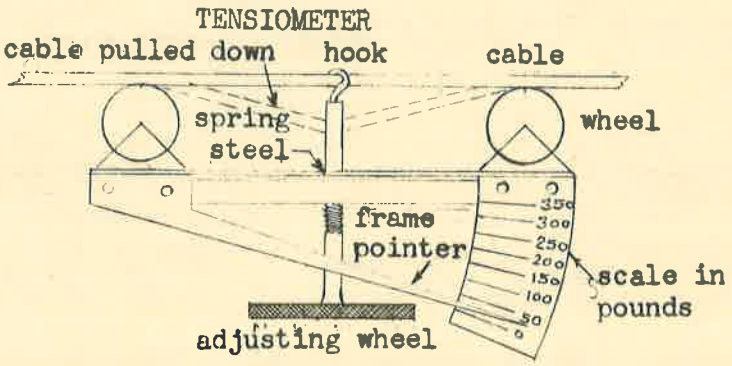
SAFETY:

TOOLS:

1. Turnbuckle key
2. Tensiometer

PROCEDURE:

1. Connect the left and right rudder control cables to their respective rudder pedals in the cockpit with the proper bolts, washers and nuts.
2. Safety bolts and nuts with cotter keys.
3. Locate the rudder control cables through the fuselage door access by moving the rudder left and right.
4. Attach tensiometer to one of the rudder cables.



HOW TO RIG RUDDER CABLES TO TENSION

PROCEDURE (Cont.)

5. Check specifications for rudder cable tension.

6. Find tension of cable by turning the adjusting wheel of the tensiometer until the cable is drawn tight, but do not strain tensiometer by excessive turning of adjusting wheel after the cable is drawn tight.

7. If tension of cable is low, tighten both turnbuckles on the rudder cables the same number of turns until the desired tension is obtained.

   CAUTION: Always remove tensiometer from cable when tightening or loosening turnbuckles.

8. If tension of cable is high, loosen both turnbuckles the same number of turns until the desired tension is obtained.

HOW TO RIG RUDDER TO PROPER ALIGNMENT

GENERAL INFORMATION:

Requires three men.

SAFETY:

TOOLS:

1. Turnbuckle key

PROCEDURE:

1. Hold rudder pedals in neutral position.
2. Check the rudder for neutral by sighting over the rudder surface and the surface of the fin to see whether the surfaces are in the same plane.
3. If rudder is too far to the left:
   a. Locate cable that pulls rudder to the right by moving rudder left and right.
   b. Take up desired turns on turnbuckle on the right rudder control cable.
   c. Take off same number of turns from the turnbuckle on the left rudder control cable.
   d. Repeat procedure until surfaces are properly aligned.
4. If rudder is too far to the right:
   a. Reverse the procedure used when it was too far to the left.
5. Recheck rudder cables for tension.

HOW TO RIG RUDDER FOR PROPER TRAVEL, AND SAFETY TURNBUCKLES

GENERAL INFORMATION:

Requires three men.

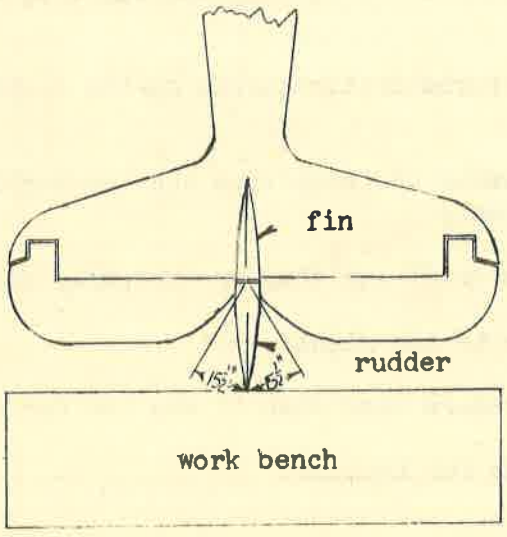
SAFETY:

TOOLS:

1. Open end wrenches
2. Work bench
2. Scale
3. Diagonal side-cutting pliers

PROCEDURE:

1. Push left rudder pedal in as far as it will go.
2. Check the travel of rudder to the left with the specification sheet.



HOW TO RIG RUDDER FOR PROPER TRAVEL, AND SAFETY TURNBUCKLES

PROCEDURE (Cont.)

3. If rudder does not travel far enough to the left:

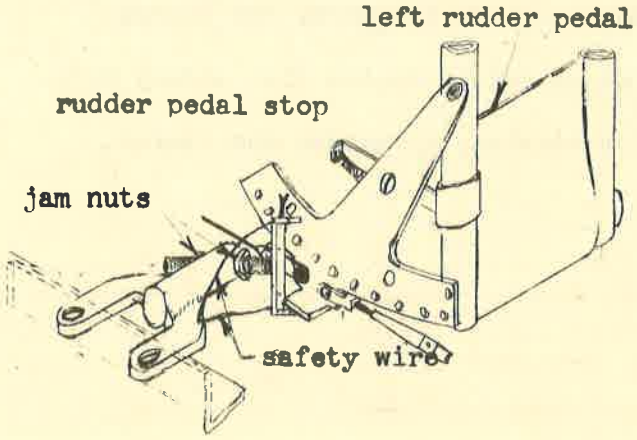
   a. Loosen jam nuts on the left rudder pedal stop behind the left rudder pedal in the cockpit.

   b. Turn in the rudder stop until the desired travel to the left is obtained.

   c. Tighten jam nuts on stop after desired travel has been obtained.

      CAUTION: Be sure that the arms of the stop are in a vertical position before tightening the jam nuts.

   d. Safety stop to the inside of the fuselage with safety wire.



HOW TO RIG RUDDER FOR PROPER TRAVEL, AND SAFETY TURNBUCKLES

PROCEDURE (Cont.)

4. If rudder travels too far to the left:

   a. Loosen jam nuts on the left rudder pedal stop behind the left rudder pedal in the cockpit.

   b. Turn out the rudder stop until the desired travel to the left is obtained.

   c. Tighten jam nuts on stop after desired travel has been obtained.

      CAUTION: Be sure that the arms of the stop are in a vertical position before tightening the jam nuts.

   d. Safety stop to the inside of the fuselage with safety wire.

5. Repeat procedure on right rudder pedal stop to obtain the proper travel of rudder to the right.

6. Recheck rudder for tension, alignment and travel.

7. Safety turnbuckles on rudder cables with safety wire.

8. Recheck rudder for tension, alignment and travel.

HOW TO RIG TAIL WHEEL CABLES TO TENSION

GENERAL INFORMATION:

Requires three men.

SAFETY:

TOOLS:

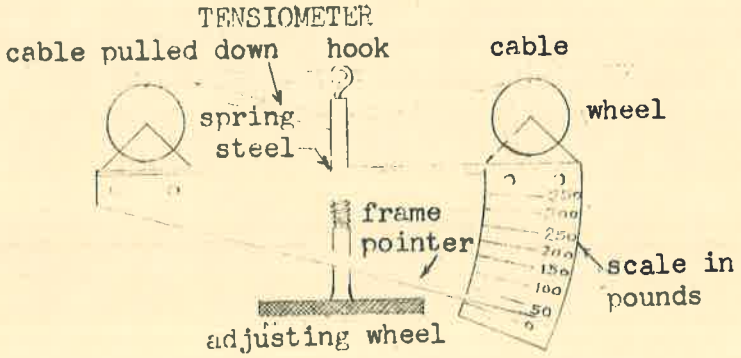
1. Jack
2. Turnbuckle key
3. Tensiometer

PROCEDURE:

1. Place a jack under the jack pad on bottom of the tail of the fuselage.
2. Jack up tail until the tail wheel can be fully extended.
3. Locate the tail wheel control cables through the fuselage door access by moving the tail wheel left and right.

   NOTE: Be sure tail wheel knuckle is on the left side of the tail wheel before rigging.

4. Attach tensiometer to one of the tail wheel cables.



HOW TO RIG TAIL WHEEL CABLES TO TENSION

PROCEDURE (Cont.)

5. Check specifications for tail wheel cable tension.

6. Find tension of cable by turning the adjusting wheel of the tensiometer until the cable is drawn tight, but do not strain tensiometer by excessive turning of adjusting wheel after the cable is drawn tight.

7. If tension of cable is low, tighten both turnbuckles on the tail wheel cables the same number of turns until the desired tension is obtained.

   CAUTION: Always remove tensiometer from cable when tightening or loosening turnbuckles.

8. If tension of cable is high, loosen both turnbuckles the same number of turns until the desired tension is obtained.

HOW TO RIG TAIL WHEEL TO ALIGNMENT, AND SAFETY TURNBUCKLES

GENERAL INFORMATION:

Requires three men.

SAFETY:

TOOLS:

1. Turnbuckle key
2. Diagonal side-cutting pliers

PROCEDURE:

1. With the tail still jacked up, hold the rudder pedals in neutral position.
2. Check tail wheel for neutral by seeing whether the tail wheel aligns with the fuselage.
3. If tail wheel is too far to the left:
   a. Locate cable that pulls tail wheel to the right by moving tail wheel left and right.
   b. Take up desired turns on turnbuckle on the right tail wheel control cable.
   c. Take off same number of turns from the turnbuckle on the left tail wheel control cable.
   d. Repeat procedure until tail wheel is aligned properly with the fuselage.

HOW TO RIG TAIL WHEEL TO ALIGNMENT, AND SAFETY TURNBUCKLES

PROCEDURE (Cont.)

4. If tail wheel is too far to the right:

   a. Reverse the procedure used when it was too far to the left.

5. Recheck tail wheel cables for tension.

6. Safety turnbuckles on cables with safety wire.

7. Recheck tail wheel for tension and alignment.

HOW TO RIG TRIM TAB INDICATORS FOR PROPER TRAVEL

GENERAL INFORMATION:

Requires three men.

SAFETY:

TOOLS:

1. Socket wrench
2. Screw-driver
3. Turnbuckle key
4. Diagonal side-cutting pliers

PROCEDURE:

1. Turn rudder trim tab indicator in the cockpit to the left as far as possible. Refer to Figure 80 of T.O. 01-25CF-2.

2. Check travel to left against specification sheet.

3. Turn rudder trim tab indicator to the right as far as possible.

4. Check travel to right against specification sheet.

5. If rudder trim tab indicator has too much travel in one direction and not enough in the other direction:

   a. Remove indicator sprocket cover in cockpit.

   b. Loosen turnbuckles on trim tab chain.

      NOTE: Be sure to count the number of turns the turnbuckles are loosened so that they can be tightened the same number of turns after making adjustments.

HOW TO RIG TRIM TAB INDICATORS FOR PROPER TRAVEL

PROCEDURE (Cont.)

c. Relocate chain on sprocket of indicator until the desired travel is obtained in both directions.

d. Tighten the turnbuckles on the trim tab chain the same number of turns that they were loosened.

e. Safety turnbuckles with safety wire.

f. Replace indicator cover in cockpit.

6. Re-rig rudder trim tab to alignment.

7. Turn elevator trim tab indicator in the cockpit in the N.H. (nose heavy) direction as far as possible.

8. Check travel in N.H. direction against specification sheet.

9. Turn elevator trim tab indicator in the T.H. (tail heavy) direction as far as possible.

10. Check travel in T.H. direction against specification sheet.

11. If elevator trim tab indicator has too much travel in one direction and not enough in the other direction:

    a. Repeat procedure used in relocating chain on the rudder trim tab indicator.

12. Re-rig elevator trim tabs to alignment.

HOW TO INSTALL STATIC GROUND WIRE

GENERAL INFORMATION:

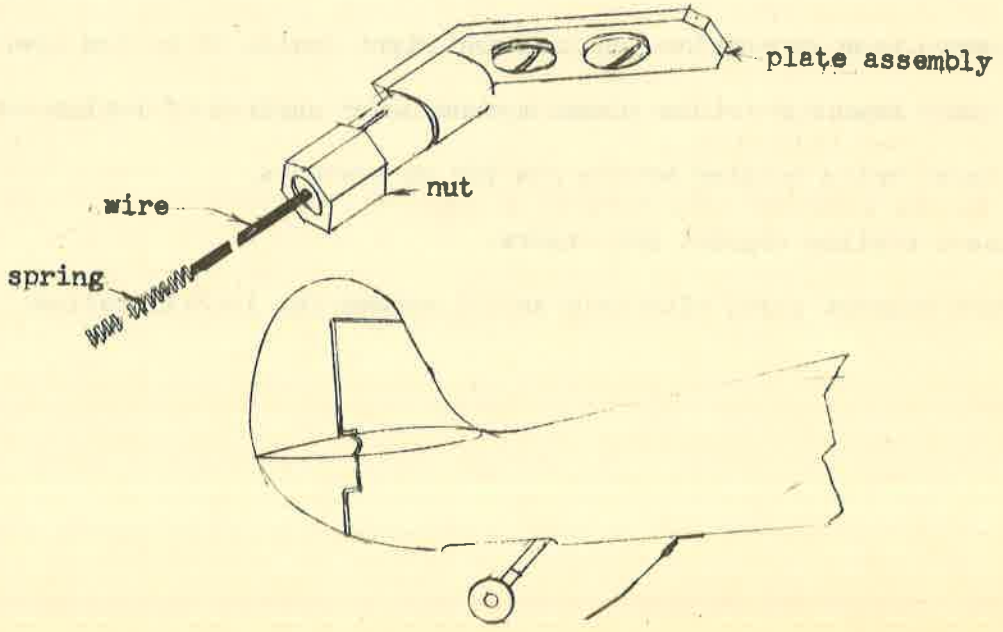
SAFETY:

TOOLS:

1. Screw-driver
2. Open end wrench

PROCEDURE:

1. Hold plate assembly in place on bottom of fuselage in front of tail wheel.
2. Secure plate assembly to fuselage with proper screws and washers.
3. Insert static ground wire in plate assembly so that the spring on the other end of the wire drags slightly on the ground and points to the rear of the airplane.
4. Secure the static ground wire in the plate assembly by tightening the static ground nut.



HOW TO REMOVE ENGINE COWLING

GENERAL INFORMATION:

SAFETY:

TOOLS:

1. Screw-driver
2. Diagonal cutters
3. Turnbuckle wrench
4. Open end wrenches
5. Reed and Prince screw-driver

PROCEDURE:

1. Remove right and left segment cowling by turning Dzus fasteners.
2. Remove screws from top cowling segment by using Reed and Prince screw-driver and open end wrench.
3. Remove flexible air duct clamp located above carburetor.
4. Remove top cowling segment.
5. Loosen the three expander rings inside of bottom cowling at front end.
6. Remove hose connections on left and right inside of bottom cowling.
7. Remove Reed and Prince screws around outer surface of bottom cowling.
8. Loosen bolts holding bottom cowling on brackets.
9. Lower cowling segment and remove.
10. Mark segment parts with ship serial number for identification.

HOW TO REMOVE ENGINE COWLING

PROCEDURE: (Cont.)

11. Check condition of cowling.

    NOTE: Any repairs necessary should be stated on repairable parts tag to be attached to segments.

12. Place all cowling parts on hand truck obligated to ship from which cowling was removed.

HOW TO INSTALL PROPELLER

GENERAL INFORMATION:

SAFETY:

TOOLS:

1. 4 foot bar
2. Screw-driver
3. Pliers
4. Diagonal cutters
5. 9/16" open end wrench

PROCEDURE:

1. Examine propeller shaft for burrs, nicks, rust.
2. Coat propeller shaft with clean engine oil.
3. Put rear cone on propeller shaft.
4. Install propeller nut lock adapter into center of propeller shaft.
5. Prepare propeller for hoisting by turning the wide hub spline of the propeller so that it will approximately line up with the wide spline on the propeller shaft when hoisted.
6. Remove brush assembly from mounting box around propeller shaft.
7. Hoist propeller to line up with propeller shaft.
8. Line up shaft and hub splines by turning propeller back and forth while propeller is supported with hoist.
9. Slide propeller onto shaft carefully to prevent damage to retaining nut and shaft threads.

HOW TO INSTALL PROPELLER

PROCEDURE: (Cont.)

10. Tighten propeller retaining nut with weight of 200 lbs. on end of 4 foot bar.

11. Put light coating of Prussian blue on end of a contact brush in brush assembly.

12. Install brush assembly into mounting case and clamp into place.

13. Turn propeller slightly to make print of Prussian blue in slip ring.

14. Remove brush assembly and observe to determine by blue mark if brush is in proper position in slip ring.

    NOTE: Proper position is exact center of slip ring.

15. If position of brush is forward of center remove propeller and rear cone and place shim in back of rear cone.

16. If position of brush is rear of center have rear cone machined.

17. Repeat steps 7, 8, 9, 10, 11, 12, and 13 until brush is in position in slip ring.

18. Remove all traces of Prussian blue from brush and slip ring.

19. Install lock.

20. Install locking pin into lock.

21. Place power unit into position, and tighten securely with bolts.

22. Safety all bolts with safety wire.

HOW TO INSTALL PROPELLER

PROCEDURE: (Cont.)

23. Put dome cover over motor and fasten with screws, safety screws.

24. Put spinner into position on propeller.

25. Install plates on rear of propeller.

HOW TO CHECK FLOW OF GASOLINE FROM TANKS

GENERAL INFORMATION:

SAFETY:

TOOLS:

1. Fire extinguisher
2. Diagonal cutter
3. Pliers
4. Screw-driver

PROCEDURE:

1. Open all gas tank sump covers.
2. Open drains on all gas tank sumps.
3. Remove screen in main gas strainer.
4. Set selector valve on "off" position.
5. Snap static line to gas tank before inserting gas hose nozzle. Fill reserve tank with 15 gallons of fuel.
6. Check tank for leaks around sump.
7. Set selector valve to reserve tank position.

   NOTE: Gasoline should flow from main gas strainer by working wobble pump or by gravity feed.

8. Set selector valve to wing tank position.

   NOTE: Gasoline should then stop flowing from strainer.

9. Complete filling of reserve tank.

HOW TO CHECK FLOW OF GASOLINE FROM TANKS

PROCEDURE: (Cont.)

10. Set selector valve to fuselage tank position.

11. Repeat steps 5 and 6 for wing tank.

12. Set selector valve to wing tank position.

    NOTE: Gasoline should flow from main gas strainer by working wobble pump or by gravity feed.

13. Set selector valve to fuselage tank position.

    NOTE: Gas should stop flowing from strainer.

14. Complete filling of wing tank.

15. Set selector valve to "off" position.

16. Repeat steps 5 and 6 for fuselage tank.

17. Set selector valve to fuselage position.

    NOTE: Gas should flow from strainer by working wobble pump or by gravity feed.

18. Set selector valve to "off" position.

    NOTE: Gas should stop flowing from strainer.

19. Complete filling of fuselage tank.

20. Replace screen and close main gas strainer.

21. Set selector valve on reserve position.

22. Work wobble pump until fuel gauge registers 4 pounds pressure.

HOW TO CHECK FLOW OF GASOLINE FROM TANKS

PROCEDURE: (Cont.)

23. Continue working wobble pump to maintain 4 pounds pressure.

24. Check all fuel lines for leaks.

AIR SERVICE COMMAND
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AIR DEPOT
INSTRUCTION MANUAL

DIVISION - P-40E AIRPLANE

AIRCRAFT FINAL INSPECTION

HOW TO TEST AND ADJUST MOVABLE FLIGHT CONTROL MECHANISM

GENERAL INFORMATION:

SAFETY:

TOOLS:

1. Tensiometer
2. Pliers
3. Diagonal cutters
4. Turnbuckle wrench

PROCEDURE:

1. Adjust turnbuckles to obtain proper tension on cables, and safety.

   NOTE: Not over three threads should show outside of turnbuckle barrel.

2. Clear control surfaces of any obstruction that would interfere with free operation.

3. Operate each control surface separately from cockpit for free and full movement.

4. If movement is not free and full, check for obstructions in pulley groove, pulley bearing, broken pulley, pulley and fair lead brackets and warped control surface, binding of cable attachment at control surfaces or pilots levers.

5. Replace any defective pulleys, bearings, pulley and fair lead brackets, and warped control surface and fair leads.

6. Adjust cable attachment at control levers and control surfaces to obtain free movement.

HOW TO TEST AND ADJUST MOVABLE FLIGHT CONTROL MECHANISM

PROCEDURE: (Cont.)

7. Operate all control surfaces at same time, from cockpit by using hand and foot controls, to check for fouling of surface controls and cables.

8. If control surfaces foul, adjust travel of controls and pilots levers, and replace pulley and fair lead guide positions.

9. Safety all adjustments.

HOW TO CHECK WHEELS AND BRAKES FOR PROPER OPERATION

GENERAL INFORMATION:

SAFETY:

TOOLS:

1. Jack stands

PROCEDURE:

1. Hoist ship.
2. Support ship on jack stands.
3. Release brakes with control in cockpit.
4. Turn wheels and check for trueness.
5. Check operation of brakes by
   (a) Operating pedal controls in cockpit.
   (b) Applying and setting parking brakes.
   (c) Testing locking of wheels.
   (d) Applying and releasing brakes.

   NOTE: Wheels should turn freely when brakes are released.
6. Check tail wheel gear swivel mechanism for full movement and synchronization of lock.
7. Remove jack stands and lower ship.

HOW TO START ENGINE

GENERAL INFORMATION:

SAFETY:

TOOLS:

PROCEDURE:

1. Set brakes on and ignition switch "OFF".
2. Turn propeller through at least 3 revolutions by hand to clear cylinders of oil.
3. Turn battery switch "ON". Engage for booster check.
4. Set fuel selector on "Reserve".
5. Work wobble pump until pressure of 12-16 lbs. is indicated on fuel pressure gage.
6. If engine is cold, prime two to four strokes.

   NOTE: Priming is not necessary in warm weather or if engine is warm.

7. Connect energizer and energize the starter.
8. Place mixture control in "Idle Cut-Off" position.
9. Open throttle to cracked position.
10. Open cowl flaps.
11. Set carburetor air control "Open".

HOW TO START ENGINE

PROCEDURE: (Cont.)

12. Set control stick back.

13. Engage starter.

14. When engine starts place mixture control in "Auto Rich".

15. Have radio man check radio for static noises while engine runs.

HOW TO CHECK SWITCH-OVER SIGNAL

GENERAL INFORMATION:

All fuel lines and valves are identified by red coloring.

SAFETY:

TOOLS:

PROCEDURE:

1. Shut off fuel supply to engine.
2. Observe fuel pressure gage for lower pressure indication.
3. Observe switch over light signal for operation below 12 1/4 or over 11 3/4 pounds pressure.
4. Turn fuel supply to "ON" position.

HOW TO CHECK IGNITION SWITCHES

GENERAL INFORMATION:

SAFETY:

TOOLS:

PROCEDURE:

1. Check both ignition switches by:

   (a) Turning switch from "BOTH" to "L".

   NOTE: Drop in R.P.M. should not exceed 100.

   (b) Turning switch back to "BOTH" then switch to "R".

   (c) Turning switch to "BOTH".

HOW TO INSTALL ENGINE COWLING

GENERAL INFORMATION:

SAFETY:

TOOLS:

1. Screw-driver
2. Diagonal cutters
3. Turnbuckle wrench
4. Open end wrenches
5. Reed and Prince screw-driver

PROCEDURE:

1. Raise lower cowling into place.
2. Insert bracket bolts and tighten.
3. Insert and tighten Reed and Prince screws around outer surface of bottom cowling.
4. Replace hose connections on right and left inside of bottom cowling.
5. Tighten the three expander rings inside of bottom cowling.
6. Place top cowling segment into position.
7. Replace flexible air duct clamp located above carburetor.
8. Insert and tighten top cowling screws, using Reed and Prince screw-driver and open end wrench.
9. Place right and left cowling segments in position and tighten Dzus fasteners.
10. Safety bolts and screws where required.

Aircraft Final Assembly

1. Inspection of End Bearings
2. Filling Fuel Tanks
3. Inspection and Adjustment of Flight Control Mechanism
4. Inspection of Instruments
5. Energizing Starter

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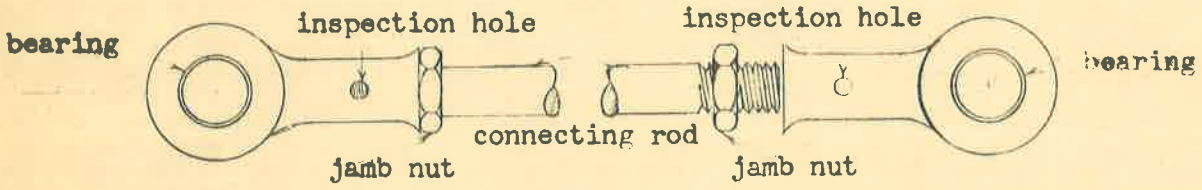
INSPECTION OF END BEARINGS

An end bearing is an attachment with one end threaded to fit over end of control rod. It is provided with ball bearings to provide accurate and free movement of control to device operated by control rod. It is necessary that the end bearing be screwed on the control rod to or beyond a fixed depth. This fixed depth is determined by an inspection hole in the end bearing. When an inspection is made, if a piece of safety wire can be run through inspection hole, the bearing should be turned further onto control rod until wire cannot be run through inspection hole. This will provide the fixed depth necessary for accurate operation of the device to which control rod is connected.

When an adjustment is made the jam nut on control rod should be tightened thoroughly to safety the adjustment.



FILLING FUEL TANKS

To avoid accompanying fire hazard when fuel tanks are being filled, static line on delivery hose will be attached to convenient uninsulated metallic part of aircraft as prescribed in T.O. 06-5-1. The static line is attached by means of a suitable clip on the free end of line. The line will not, however, be attached adjacent to the filler neck of the tank. Static line will be attached before filler cap is removed and shall so remain until tank is filled and filler cap is replaced.

In order to avoid possible damage to filler neck, delivery hose nozzle will not be allowed to remain in tank without support. All dirt and foreign matter around filler necks will be removed.

INSPECTION AND ADJUSTMENT OF FLIGHT CONTROL MECHANISM

Control cables are located throughout the fuselage and wings of the ship. Access to the cables is through inspection apertures, covered by inspection plates located on upper and lower surfaces of the wings and both sides of fuselage toward empennage; removable section of floor in pilots compartment and interior of fuselage in back of pilots compartment.

Motion required for the operation of the movable surface controls is transmitted through the control cables. Correct tension of cables is required for the accurate movement of the surface controls. The correct tension is determined by the use of a tensiometer. Identification of cables is by having someone operate the controls in pilots compartment when inspection and adjustment of cables is required. Inspection and adjustment of cable pulleys, fair leads, turnbuckles and horn attachments will be made when cables are adjusted.

When correct adjustment is made the movable control surfaces should form a part of the contour of the fixed surface when the control levers in pilots compartment are in a neutral position.

INSPECTION OF INSTRUMENTS

The glass covers on the instruments should be clean and tightly held in the mountings. It is obvious that glasses having finger marks and scratches would interfere with the readings of the instruments. Glasses will be cleaned to remove finger marks and cracked or broken glasses will be replaced when an inspection is made.

The glasses on some of the instruments have colored markings to indicate safety and warning. The markings are painted on the glasses within the range of safety and warning readings. For example, if the pointer reached the red marking, danger is indicated. The green marking indicates safety. A white mark is placed at the bottom, part of which is painted on the glass and the part on the mounting. The glass must be held securely in its mounting to provide a matching of that part of the white marking on the glass and that on the mounting. If the white marking did not match or line up, correct safety and warning readings would not be had.

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ENERGIZING STARTER

The starter on P-40E ships is energized by connecting an energizer to the hand crank energizing connection. The energizer is provided with an electric motor, shafting and gearing to transmit the power necessary to energize the starter. Connection to shop power outlet is by an extension cord and plug connection. The energizer shaft is inserted in the energizing connection on the ship . An on and off switch is used when energizing the starter.

When the power energizer is not available the starter is energized by using a hand crank. The hand crank is inserted in the energizing connection on the ship. The hand crank is a part of the ships equipment.