

RESTRICTED

1st series
TECHNICAL ORDER No. 01-50FA-3

**PRELIMINARY
HANDBOOK**

(CONTRACTOR'S UNEDITED INSTRUCTIONS ISSUED IN ACCORDANCE WITH PARA. 6, T. O. No. 00-5)

OF

OVERHAUL INSTRUCTIONS

FOR THE

TYPE P-66 PURSUIT AIRPLANE

MANUFACTURED BY

VULTEE AIRCRAFT, INC.

VULTEE FIELD, CALIFORNIA

Contract DAW535 ac-272

Model 544-6F



PUBLISHED BY AUTHORITY

OF

THE CHIEF OF THE AIR CORPS

BY

THE AIR SERVICE COMMAND

FIELD SERVICE SECTION

WRIGHT FIELD

DAYTON, OHIO

JANUARY 20, 1942

R&R Dayton 1-20-42 3M

110 pages

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NOTE - Page 110 of this Technical Order was not available with the rest of the manuscript copy. However, in order to make the information contained herein available to the service as expeditiously as possible, the handbook has been printed without this page. The missing pages will be furnished as soon as possible.

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SECTION IINTRODUCTION AND REFERENCES

1. This Technical Order is the Overhaul Instructions for the Model P-66 Airplane. It includes all necessary information for the major overhaul of this airplane. Overhaul personnel will read and become familiar also with the information contained in the P-66 Service Handbook which forms a part of the complete overhaul instructions.
2. It was assumed during the preparation of this Handbook that the book would be used as a reference text by highly skilled airplane technicians, and all non-essential information and elementary instructions were omitted. Instead emphasis was placed upon those repair operations which are peculiar to the Model P-66 Airplane, and accessories installed therein.
3. The overhaul of a considerable number of items is dealt with in publications issued by the U.S. Army Air Corps and the manufacturers of aeronautical equipment and parts. These publications are referred to in this Handbook when they contain applicable instructions, and are available to the Air Corps. Such publications will be found listed in the Indices published as Technical Orders of the 00 series.
4. Reference is made in this Handbook to the following publications: (Not including Air Corps, Army, Navy, or Federal Specifications)

T. O. No.	01-1-1	Cleaning of Aeronautical Equipment
	01-1-7	Long-Time Storage of Aircraft
	01-1-12	Inspection of Airfoils
	01-1-26	Replacement of Frayed Control Cables
	01-1-58	Tightening of Radial Engine Mount Bolts & Replacement of Rubber Vibration Absorbers
	01-1E-26	Repair and Cleaning of Fuel and Oil Tanks
	01-1E-31	Annealing of Fuel, Oil, and Water Lines
	01-50BA-6	Reinforcement of Engine Accessory Cowling, Inner Ring
	03-5-4	Cleaning and Polishing of Landing Lamp Reflectors
	03-5-9	Booster Coils, Types A-1 and C-1
	03-5C-1	Solenoid Assemblies - Starter Control (A.C. Types A-1, A-1A, B-1, and C-1) - Eclipse
	03-5CA-1	Starters and starter Motors (Eclipse)

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T. O. No.	03-5CA-3	Starters and Starter Motors (Eclipse)
	03-10-13	Operation and Inspection of Fuel Cock Controls
	03-10-20	Refilling of Plug Assembly, Corrosion-Resistant Cartridge
	03-15-2	Valve, Thermostatic, Oil Regulator
	03-15-4	Repair and Cleaning of Radiators and Oil Temperature Regulators
	03-20CB-2	Service and Overhaul Instructions, with Parts Catalog, Controllable Propellers (Two Position and Controllable Speed - Hamilton)
	03-30CC-4	Modification of Oil Pumps - Pesco
	03-45-1	Fire Extinguishers - Installation and Inspection - One Quart Pump Type
	05-1-1	Inspection, Maintenance, Storage, and Shipment of Instruments
	08-5-1	Shielding and Bonding of Aircraft
	11-20-3	Machine Gun Synchronizer, Type E-4
	11-35-5	Installation, Inspection and Use, Fixed Gun Sights, Type N-2 and N-2A
	17-1-2	Pressure Type Portable Cleaner
	23-15-1)	
	23-15-1A)	Repair and Manufacturing Practices, Aluminum Alloys
	23-15-1B)	
	29-1-3	Cleaning, Inspection, and Lubrication of Anti-Friction Bearings

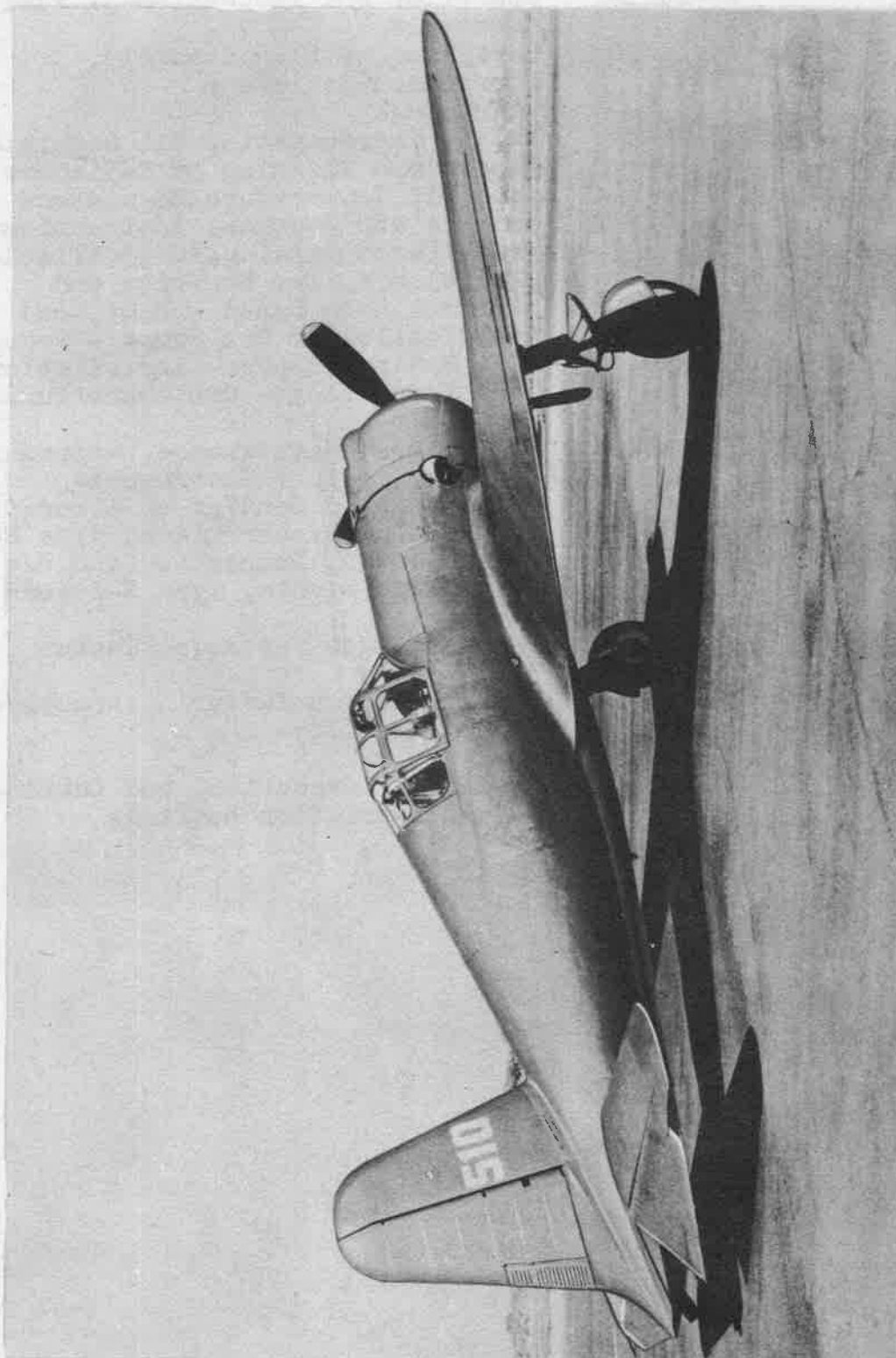


FIG. 1 THREE-QUARTER REAR VIEW
OF COMPLETE AIRPLANE

SECTION IIHEAT TREATED PARTS, AND FINISHES1. Heat-Treated Parts

a. Aluminum Alloy - In general, all structural members, such as extrusions and skin, are heat treated 24S material. The rivets used, are, in a majority of cases, Al7ST(AD) material; although in highly stressed areas, 24ST(DD) rivets are used. All aluminum alloy tubing is annealed after forming. Instructions for the heat-treating and annealing of aluminum materials are contained in U.S. Army Spec. 98-10026-B ("Heat Treatment of Non-Ferrous Parts Used in Aircraft").

b. Steel - Information on heat treatment of carbon and alloy steels is contained in U.S. Army Spec. 98-10025-A ("Heat-Treatment Process for Steels Used in Aircraft"). Steel parts heat-treated to a definite tensile strength and/or hardness are identified on their relevant detail or assembly drawings. Other steel parts either do not receive heat treatment, are normalized only, or are "torch normalized" welded assemblies or corrosion-resistant steel parts.

(1) Annealed and Normalized Parts. - Carbon and alloy steel parts not identified as being heat-treated are manufactured from steel in either the annealed or normalized condition.

(2) Welded Assemblies. - All welded assemblies used are made from normalized material and the joints "torch normalized" after welding. Briefly, torch normalizing is accomplished as follows:

(a) When the part has been welded and the weld has cooled, reheat the entire area outside of the original weld to from 800 to 1000 degrees, F., or dull red in the dark, and allow to cool in still air. Use a low velocity gas flame adjusted to be slightly on the carbonizing side.

(3) Corrosion-Resistant Steel Parts. - Welded corrosion-resistant steel parts are annealed after welding by heating to 1950-2000 degrees F. for 3 to 5 minutes and then quenching in water. The application of direct flame during heating is avoided. Scale formed by heat treatment is removed either by light sand-blasting, or by pickling in acid solution, followed by passivating to restore the chrome oxide film.

(4) Spring Parts. - Parts requiring spring temper were heat-treated for strain and embrittlement relief in accordance with U.S. Navy Spec. NAF PH-4 (Strain and Embrittlement Relief of Steel Springs).

(5) Parts Heat Treated to a Specified Tensile Strength.- Parts that are heat-treated to a specified tensile strength and/or hardness are identified on their relevant detail or assembly drawings.

2. Finishes

a. General. - The manufacture of the Model P-66 Airplane applied all protective coatings, finishes, and colors in accordance with the requirements of Vultee Finish Specification No. 184-8 and those publications forming a part thereof, in effect July 18, 1941.

b. Vultee Finish Specification 184-8. - This Specification covers methods and materials required in the preparation for and application of protective coating to aircraft parts and surfaces. Protective coatings as defined herein are not to be construed as applying to equipment and accessories unless specifically referred to in the relevant specification and/or drawing.

The following specifications shall govern the finishes and finishing procedures used in the manufacture of the Model P-66 Airplane:

U.S. Army Spec.	2-82-C	Compound, Rust Preventive, Heavy
U.S. Army Spec.	3-100-H	Protective Coatings and Finishes
U.S. Army Spec.	3-109-E	Dope, Pigmented, Nitrate
U.S. Army Spec.	3-154	Thinner, Dope and Lacquer
U.S. Army Spec.	3-158	Lacquer, Cellulose, Clear and Pigmented
U.S. Army Spec.	3-159-B	Dope, Semi-Pigmented
U.S. Army Spec.	50-11-38	Thinner, Toluene
U.S. Army Spec.	57-0-2A	High Grade Rust Proofing Process
U.S. Army Spec.	98-10025-A	Heat Treatment Process for Steels Used in Aircraft
U.S. Army Spec.	98-10026-B	Heat Treatment of Non-Ferrous Parts for Aircraft
U.S. Army Spec.	98-20004-C	Protective Treatment for Aluminum and Aluminum Alloys
U.S. Army Spec.	98-20007	Cleaning of Aircraft Surfaces
U.S. Army Spec.	98-20010	Protective Treatment for Magnesium Alloys
U.S. Army Spec.	98-24100-T	Doping Aircraft Fabric Surfaces
U.S. Army Spec.	98-24102-K	Insignia for Aircraft

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U.S. Air Corps Spec.	14080	Primer, Zinc Chromate
U.S. Air Corps Spec.	14093	Varnish, Spar and Seam Compound
U.S. Air Corps Spec.	14096	Dope, Nitrate, Clear, Aluminum
U.S. Air Corps Spec.	14105	Lacquer, Cellulose, Nitrate, Camouflage
U.S. Air Corps Spec.	14106	Dope, Cellulose Nitrate, Camouflage
U.S. Air Corps Spec.	24114	Camouflage Finishes for Aircraft
U.S. Air Corps Spec.	26562	Cement, Walkways
U.S. Army-Navy Spec.	AN-QQ-A-696	Anodic Treatment
U.S. Army-Navy Spec.	AN-QQ-P-421	Cadmium Plating
Fed. (U.S.) Spec.	JJJ-O-336	Linseed Oil
Fed. (U.S.) Spec.	TT-A-466	Aluminum, Pigment Paste

(1) Finish Color Scheme(a) General

1. All aluminum and aluminum alloy surfaces shall be coated with one coat of zinc chromate primer (U.S. Air Corps Spec. 14080) before receiving final paint finish.

2. Camouflage scheme and placing of roundels and stripes shall conform to customer's requirements and engineering drawings.

3. Insignias, numerals and markings shall conform to customer's requirements and engineering drawings.

4. Fabric covered surfaces shall be doped with clear or semi-pigmented dope and finished with aluminized dope until desired tautness is obtained. The weight of the dope covering shall be 4 oz. or more per square yard. The finished dope surface shall be given one or more coats of camouflage material.

(b) Exterior Surfaces

1. Upper surfaces shall be camouflaged with one or more coats of dark earth and dark green synthetic enamel or lacquer.

2. Underneath surfaces shall be camouflaged with one or more coats of sky blue.

3. Insignia colors shall be matte and equivalent to the following shades:

Dull red
Dull blue
Yellow
White

4. The exterior surfaces of shock struts other than bearing areas shall be cadmium plated and painted with one coat of zinc chromate primer and two coats of aluminum lacquer.

5. All attachments, fittings, etc., shall match adjacent surfaces.

(c) Interior Surfaces

1. All interior exposed fuselage surfaces, seats, etc., except where specifically noted otherwise in this specification, shall be finished with two coats of tinted (yellow-green*) primer applied over one coat of zinc chromate primer (lemon yellow**).

* Tinted primer, prepared as per U.S. Army Spec. 3-100-H, Sect. C-1c.

** Zinc chromate primer, U.S. Air Corps Spec. 14080.

2. Surfaces and parts forward of the pilot's seat that require an anti-glare finish shall have two coats of flat black lacquer applied over the initial primer coat. This applies to the instrument panels, radio, terminal and fuse boxes only.

3. All interior surfaces visible when cowl flaps are open shall be finished with one coat of zinc chromate primer and one or more coats of camouflage lacquer to match exterior camouflage.

4. All magnesium base alloy parts shall receive two coats of zinc chromate primer immediately after chemical treatment and one or more coats of paint material to match adjacent surfaces; magnesium base alloy parts forward of the firewall shall be given one or more coats of aluminized lacquer over the two coats of zinc chromate primer.

5. All interior unexposed surfaces except interior metal surfaces of fabric covered flight control surfaces shall have one coat of zinc chromate primer plus one coat of tinted primer. Zinc chromate primer may be used instead of tinted primer for the second coat.

6. The interior metal surfaces of fabric covered flight control surfaces shall have two coats of zinc chromate primer.

7. The interior surfaces of the wing which are exposed when the landing gear is extended and when the flaps are down shall be finished with one coat of zinc chromate primer and two coats of aluminized lacquer.

8. All levers or handles, fuel and oil tank filler caps, and lubricating fittings shall have an identifying color corresponding to the particular marking color assigned to the liquids or gases that they may control.

9. The wobble pump lever, flare release handles, emergency latch and sliding enclosure latch shall be given two coats of red lacquer.

10. Electrical conduits, fittings and boxes located in the interior of the wings shall receive the same protective paint finish as adjacent surfaces. Conduits, fittings and boxes located in the interior of the fuselage shall receive no protective finish. No paint protection shall be applied to the interior of any conduits or boxes.

(d) Surfaces Not Requiring a Paint Coating

1. Special interior accessories which are not to be used for handholds shall retain their original finish of aluminum, cadmium plating, polished metal, etc.

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2. Control cables shall not be painted.

3. All interior parts forward of and including the firewall, except magnesium base alloys, shall not be painted.

4. Care shall be taken that paint is not applied to bearing surfaces, oil holes, adjustable screw threads and rubber or synthetic rubber parts.

5. With the exception of shock struts, no cadmium plated surfaces shall be painted.

6. No aluminum alloy tubular parts shall be painted on the exterior surface except where difficult masking would otherwise be required (such as in dipping of some tubular parts and spraying of conduits on the interior of the wing.)

(2) Cleaning of Parts

(a) General

1. All surfaces shall be cleaned in accordance with U.S. Army Specification No. 98-20007.

2. Parts shall be thoroughly cleaned of any oil, scale, etc., before application of any paint coating, plating or surface treatments, such as anodizing or chromic acid dip.

3. Parts should be rapidly dried and inspected with a minimum amount of handling to avoid soiling of surfaces before the application of the primer protective coating.

(3) Treatment of Ferrous and Copper Base Alloys

(a) Cadmium Plating - (Ref. U.S. Army-Navy Spec. AN-QQ-P-421).

1. All steel parts, including tubular parts, shall be cadmium plated, with the following exceptions:

- a. Stainless steel parts.
- b. Members or portion of members which act as bearing surfaces.
- c. Flexible control cables.
- d. Parts exposed to hydraulic fluid
- e. Parts immersed in grease
- f. Parts that are to be treated as in parts (b), (c), (d), or (e) below.

2. Steel springs less than 1/4 inch diameter shall be baked for three hours at a temperature of $375^{\circ} \pm 25^{\circ}\text{F.}$ after the plating operation. Plated springs shall not be flexed before the baking operation. Springs more than 1/4 inch in thickness of section do not require baking.

3. Brass, bronze and copper parts in contact with dissimilar metals or wood shall be cadmium plated, except in the following cases:

a. Brass and bronze plumbing fittings need not be cadmium plated.

b. Brass, bronze, or copper electrical fittings (such as screws, nuts and buss bars) in contact with each other, need not be cadmium plated; but when in contact with other metals, such as aluminum, they shall be cadmium plated.

4. Cadmium plated parts that are to receive a paint coating shall, after the final water rinse from plating solution, be immersed for one to two minutes in a three to five per cent solution of chromic acid. This treatment improves the surface for better paint adhesion.

5. All welding, brazing or soldering shall be completed before any plating operation.

(b) Chrome Plating - Steel or bronze parts that are subject to abrasion or wear, such as hydraulic operating units, tubular slide supports for pilot's seat, cameras or guns may be hard chrome plated.

(c) Tin Plating - Tin plating may be applied on parts that are to be subsequently soldered.

(d) Dull Black Nickel - Dull black nickel may be used on steel or brass screws, bolts and fasteners which are to match dull black surfaces.

(e) Parkerizing Treatment - When Parkerizing is desired, the finish shall conform to U.S. Army Specification 57-0-2A. This treatment is suitable for steel armament parts requiring a non-glaring flat black surface that is also wear and rust resistant.

(f) Steel Tubular Parts, Interior Treatment

1. Steel tubular parts with open ends shall receive one coat of zinc chromate primer on the interior. The coating may be applied by filling or spraying.

2. Steel tubular parts with closed ends shall be protected with a coating of raw linseed oil, Federal (U.S.) Spec. JJJ-0336 (or Paralketone) on the interior surfaces. The oil shall be circulated through the entire structure or part. Inter-connecting holes, #44 drill for tubes under one inch in diameter,

#31 drill for tubes over one inch in diameter, may be drilled in low-stressed areas between the various members before assembly so that complete circulation will be obtained. The temperature of the linseed oil shall not be less than 160°F., and the oil shall be forced through the structure for a minimum time of two minutes, and thoroughly drained. All accessible holes drilled in the assembly or part shall be closed with cadmium plated Parker self-tapping screws, size #2 for the #44 drilled holes and size #6 for the #31 drilled holes.

(4) Treatment of Aluminum Base Alloys

(a) Anodic Treatment (Ref. U.S. Army-Navy Spec. AN-QQ-A-696)

1. In order to provide for better paint adhesion and thus insure better protection against corrosion, all aluminum and aluminum alloy surfaces shall be anodically treated except for the following listed under sub-paragraph 5 below.

2. Assemblies, containing castings, extrusions, forgings or a continuous hinge, where torch or spot welding is involved, shall be anodized except where limited by sub-paragraph 5 below.

3. As far as it is practicable, forming, drilling and cutting shall be performed on parts prior to anodizing.

4. With the exception of parts assembled by welding and parts which are not under stress, all parts shall be treated in detail before assembly.

5. Parts not requiring anodic treatment:
a. Surfaces or parts fabricated from Alclad, 2S, 3S, and 52S.

b. Aluminum or aluminum alloy die castings containing dissimilar metal inserts need not be anodized unless such die castings are an integral part of an assembly that requires the anodic treatment. In such cases it will be necessary to shield the metal inserts from contact with the chromic acid bath.

c. Aluminum alloy die castings or forgings containing more than 5% copper as the alloying ingredient.

6. Anodizing parts shall be dried, inspected, and painted as promptly as possible during which time exposure to contamination shall be kept at a minimum.

7. Parts which are not anodized shall be treated by one of the methods listed in parts (b) and (c) on the following page.

(b) Chromic Acid Dip Treatment - This treatment is used in lieu of anodizing and is as follows:

Clean parts with hot alkaline soap solution and immerse in 5% chromic acid at 140°F to 160°F for two to three minutes.

(c) Alcoholic Phosphoric Acid Treatment - This treatment is also used in lieu of anodizing and is as follows:

Apply the alcoholic phosphoric acid compound (U.S. Army Spec. 98-20007), preferably hot, to the surface by dipping, washing or spraying.

(d) Aluminum Alloy Tubular Parts, Interior Treatment - Aluminum alloy tubular parts with open ends shall receive one interior coat of zinc chromate primer. The coating may be applied by dipping or spraying.

Aluminum alloy tubular parts with closed or sealed ends do not require any interior paint protective coating.

(e) Heat Treatment Quenching - To guard against intergranular corrosion, all aluminum alloy parts thicker than but not including .032" shall be quenched from heat treating temperatures by immediate immersion in cold water. Parts .032" and lighter may be either quenched in water or in air blast, but in either case the quenching shall be sufficiently rapid as to obtain minimum physical values and anti-corrosion characteristics specified by the U.S. Army.

(5) Treatment of Magnesium Base Alloy Parts

(a) Chrome Pickle Treatment (Ref. U.S. Army Spec. 98-20010)

1. This treatment may be used for all magnesium alloy castings and wrought forms covered by U.S. Air Corps Specifications with the following exception:

Parts which are machined to fine dimensional tolerances. During the full-time chrome pickle treatment there is a maximum surface loss of .0006 inch.

2. A short-time treatment with a 10 to 20 second dip is permitted on completely machined surfaces that are unpainted and serve as bearing areas or fits.

The short-time treatment removes up to .0002 inch per surface.

3. Assemblies, such as castings, containing inserts of brass, bronze, or steel shall have the non-magnesium parts suitably protected by "stop-off" lacquers or wax coatings during pickling.

(b) Dichromate Treatment

1. The dichromate process is recommended in preference to the chrome pickle treatment for parts that will not permit the dimensional change that occurs during the chrome pickle treatment.

2. The dichromate process may be used to treat assemblies or castings that contain inserts of brass, bronze or steel, also aluminum inserts if the hydrofluoric acid dip is omitted from the process.

3. The following magnesium materials are not suitable to receive the dichromate treatment: tubing, U.S. Air Corps Spec. 11318, Grade II, and sheets, U.S. Air Corps Spec. 11317B, (Made from AM 3S, AM 403, or Dowmetal M). Such materials may be treated by the chrome pickle process.

(6) Miscellaneous Treatments and Finishes

(a) Shop Protective Coating - One coat of zinc chromate primer shall be applied to all magnesium alloy surfaces as soon as practicable after the following operations: dichromating, anodizing chromic acid dip, etc.

(b) Dope Proofing - Parts or assemblies finished with two coats of zinc chromate primer, U.S. Air Corps Spec. 14080, shall need no further protection from contact with doped surfaces.

(c) Joints and Seams - The overlapping portions of all metal joints and seams, regardless of the finish on adjacent surfaces, shall receive two coats of zinc chromate primer on each contacting surface.

(d) Markings - Plumbing lines shall be marked with paint or cellulose tape with the following colors:

Fuel - - - - -	Broad red band
Oil - - - - -	Broad black band
Hydraulic - - - - -	Broad white band
Engine Starting - - - - -	Broad green band
Oxygen - - - - -	Narrow white band and narrow blue band

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Manifold Pressure - - - -	Broad yellow band
Vacuum - - - - - - - -	Broad yellow band
Air Speed - - - - - - -	Broad yellow band
Air Speed Pressure Lines -	Broad yellow band and mark all nuts with a "P" stamp
Air Speed Static - - - -	Broad yellow band and mark all nuts with an "S" stamp

The widths of the broad and narrow bands for pipe diameters up to and including $7/16$ inch shall be $3/8$ and $1/8$ inch respectively, and for pipe diameters upwards of $7/16$ inch shall be $3/4$ and $1/4$ inch.

Electrical wires shall have an identifying number at each end. Such numbers shall be as specified in Vultee Dwg. #61-78002. A cellulose tape, suitably numbered, shall be encircled around the wire near the terminals a sufficient number of times to secure permanent anchorage.

Additional protection and anchorage shall be obtained by brushing the tape, specified in parts 1 and 2, after assembly, with Du Pont's Methacrylate #RC-903, or equivalent. The tape used shall be equivalent to the "Scotch" Cellulose Tape manufactured by the Minnesota Mining and Manufacturing Company, Minneapolis, Minnesota, U.S.A.

(e) Numbering of Electric Wires - An identifying number is banded to each end of every electrical wire. These numbers are specified on Vultee Dwg. #61-78002. A length of numbered cellulose tape, suitably numbered, is wrapped around the wire near the terminals, a sufficient number of turns to insure a permanent anchorage. The tape used for this purpose is equivalent to "Scotch" Numbered Cellulose Tape, manufactured by the Minnesota Mining and Manufacturing Company, Minneapolis, Minnesota, U.S.A.

(f) Corrosion Prevention - General Precautions

1. Special care shall be taken that dissimilar metal particles, screws, nuts, etc., are not lodged in inaccessible sections of the airplane, as they may be a serious source of corrosion.

2. The use of steel wool on aluminum, magnesium or stainless steel surfaces is not desirable and should be held to a minimum.

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3. Salt or chrome tan leather shall not be used in contact with any structural parts. The use of leather other than oil tanned may cause excessive corrosion in contact with aluminum alloys.

4. Welded aluminum alloy parts shall be cleaned of all flux as soon as practicable after welding.

(7) Bonding and Dissimilar Metal Contacts

(a) Bonding

1. Bonding shall be in accord with the U.S. Army Handbook of Instructions for Airplane Designers.

2. All bonding connections shall be sealed against moisture.

(b) Dissimilar Metal Contacts

1. Contacting surfaces of dissimilar metals shall receive two coats of zinc chromate primer.

2. If the assembly is subject to moisture, additional insulation shall be provided by coating the contacting surfaces with Fuller's Zinc Chromate Compound in such manner that it will squeeze out and form a fillet around the boundary.

SECTION IIIDISMANTLING, CLEANING, AND INSPECTION

1. General - The work outlined in this Section consists of preparing the airplane for overhaul. The inspection accomplished should be complete as possible at this state of disassembly. Major sub-assemblies which cannot be inspected should be marked "Repairable", and routed to the sub-assembly group for further disassembly, inspection, repair and assembly as outlined in Section IV.

The following is a list of special airplane tools furnished by the contractor for use in connection with work prescribed in this Section. Refer to Fig. 1, Sect. 5, of P-66 Service Handbook.

<u>Drawing No.</u>	<u>Description</u>
51-87106	Lubricator, Synchronized Gun Impulse Tube
VS-525	Wrench
Cat. #710	Screwdriver - Manufactured by Reed and Prince Mfg. Co., Worcester, Massachusetts, U.S.A.

The following special tools for shock absorber disassembly are not furnished by the contractor, but are shown in Fig. 21, Chap. 2, Sect. 4 of P-66 Service Handbook.

<u>U.A.P.</u> <u>Drawing No.</u>	<u>Description</u>
21260	Wrench, Ldg. Gr. Strut Piston Stop
21259	Wrench, Tail Gr. Strut Piston Stop
21261	Wrench, Ldg. Gr. Strut Packing Nut
21262	Wrench, Tail Gr. Strut Packing Nut

2. Dismantling

a. General - General instructions for removing major assemblies are given in P-66 Service Handbook.

b. Tear Down Procedure for Major Overhaul - The procedure following is listed in logical progression for the most efficient, complete disassembly of the airplane. However, in actual practice, several non-related operations may be carried out simultaneously by different crews. With regard to the items listed following, refer to P-66 Service Handbook for applicable paragraphs.

- (1) Engine and Accessory Compartment Cowling
- (2) Battery
- (3) Fuel and Oil from Tanks
- (4) Fuselage Side Panels and all Inspection Doors and Removable Fairing

- (5) Propeller (Refer to Manufacturers Handbook)
- (6) Synchronized Machine Guns, Blast Tubes,
Ammunition Chutes and Ejector Chutes
- (7) Engine and Mount
NOTE: Remove engine, oil tank, and oil cooler
unit from mount as a sub-assembly
operation.
- (8) Engine and Propeller Controls
- (9) Windshield and Cockpit Enclosure
- (10) Pilot's Forward and Aft Armor Plate
- (11) Instrument Panel, Electrical and Control Panels
NOTE: Remove instruments and controls from panels
as a sub-assembly operation.
- (12) Electrical Units, Wiring, Junction Boxes, and
Accessible Conduit
- (13) Cockpit Seat
- (14) Fuselage Furnishings and Radio Equipment
- (15) Brake Master Cylinders, Parking Brake, Mechanism
and Surface Control Lock
- (16) Control Stick, Rudder Pedals, and Tab Control
Handwheel Assemblies
- (17) Hydraulic Oil Reservoir, Selector Valves, and
Emergency Hand Pump
- (18) All Control Cables
- (19) Elevators
- (20) Rudder
- (21) Vertical and Horizontal Stabilizer
- (22) Ailerons
- (23) Wing Flaps and Actuating Mechanism
- (24) Wing Mounted Machine Guns, Blast Tubes,
Ammunition and Ejector Chutes

- (25) Wing Outer Panels
- (26) Emergency Fuel Pump and Control Linkage
- (27) Plumbing (oil, fuel, hydraulic, instrument, brake, and ventilation)
- (28) Landing Gear Strut Assemblies
- (29) Landing Gear Actuating Mechanism
- (30) Tail Wheel Assembly
- (31) Leak Resistant Fuel Cells
- (32) Center Section
- (33) Fuselage Semi-Monocoque Section
- (34) Firewall
- (35) Side Panel Supports
- (36) Procedure for further disassembly of the remaining structure will be obvious upon inspection. Further disassembly of major units removed as an assembly may be accomplished as required by the demands of particular project.

3. Cleaning

a. General - Air Corps requirements and substitute materials for the cleaning of aeronautical equipment are given in T. O. No. 01-1-1. The information listed hereunder is the recommendation of the contractor for the cleaning of the P-66 Airplane at this stage of disassembly.

b. Detail Procedure

(1) Complete Airplane

(a) Accumulated mud and grime should be removed from the lower portion of the fuselage, wings, monocoque structure, empennage, engine section and cowlings by steam cleaning with a steam jenny. Operating instructions for the Air Corps Pressure Type Portable Cleaner are given in T. O. No. 17-1-2.

CAUTION: When cleaning the airplane, avoid application of water and steam to anti-friction shielded bearings.

(b) A solution equivalent to Turco Products, Los Angeles, California, U.S.A., "Turco Composition #400", should be used for final cleaning of the complete airplane. Make up this solution in the proportion of three pounds of Composition #400 to fifty U.S. gallons of water. Apply this solution with a soft bristle brush by starting at the bottom and working up. Care must be exercised to prevent the solution running down over unwashed surfaces and streaking, as it will leave a streak that is practically impossible to remove. After the surface has been washed with the solution, it should be rinsed with clear water. Surplus water should be wiped off with a dry rag. This solution, in the amount recommended, is free from any properties that would cause corrosion or excessive strain. This composition in solution develops suds or foam, and reacts very much like that of a soapy fluid.

NOTE: The preceding cleaning procedure applies to fabric as well as metal-covered surfaces.

(2) Corroded Parts

(a) If corrosion is in evidence, the affected parts should be washed with a cleaner equivalent to Kelite Products, Los Angeles, California, U.S.A., "P-27 Remover".

(b) After all dirt, grease and paint have been removed, the surfaces should be rinsed with running water, swabbed with a 10% solution of potassium dichromate, and allowed to air dry. Special attention should be given to coating the joints and seams. After the solution is thoroughly dry, the appropriate finish should be applied.

(c) Small corroded spots should be cleaned by rubbing with steel wool before applying the dichromate solution.

CAUTION: This cleaner is very powerful and workmen must wear rubber gloves when using it.

(3) Cleaning Metal Surfaces Prior to Painting. - All metal surfaces should be cleaned prior to painting with a compound equivalent to W. P. Fuller Co., San Francisco, California, U.S.A., "Fullerene Cleaner", diluted to the proportion of two parts of cleaner to one and one-half parts of water. Following the dilution, 2% by volume of phosphoric Acid should be added.

(4) Cleaning Lacquered or Enameled Surfaces. - A cleaner equivalent to E. I. DuPont de Nemours & Co., Wilmington, Del., U.S.A., "Duco No. 7" polish, should be used to remove foreign matter from painted surfaces. This substance also gives the finish a slight gloss.

(5) Cleaning of Brazed or Silver Soldered Brass Fittings. - Brass fittings which are brazed or silver soldered to copper tubing should be allowed to cool slowly in air and cleaned by immersing, when cold, in a 10% by weight solution of sulphuric acid for 30 minutes. Rinse the parts in hot water.

(6) Cleaning Glass. - The same cleaner as that used before painting metal surfaces as described in sub-paragraph (3) preceding, should be used with the exception that no Phosphoric Acid should be added.

(7) Cleaning Transparent Plastic Panels. - The transparent plastic used in the cockpit enclosure may be cleaned by rinsing with water and then wiping dry with a soft cloth. Care must be taken not to rub hard particles of grit or sand into the surface. If the plastic becomes soiled with grease or oil, solvents for these substances, such as kerosene or naphtha, may be used to remove dirt. Solvents for this type of plastic, such as esters, ketones, aromatic hydrocarbons or chlorinated hydrocarbons must not be used as cleaners.

(8) Removing Excess Zinc Chromate Compound. - Pure Ethyl Acetate should be used to remove any excess chromate compound.

4. Inspection

a. General. - As soon as possible after dismantling, the entire airplane should be checked for corrosion. Some spots may be noted by a discoloration of the paint, together with a blister effect. At the same time, a general check for cracks and other mechanical damage can be made. The following inspections should be accomplished at this stage of disassembly.

(1) Wings. - The trailing sections of the wings should be checked for corrosion around the rib flanges and the skin adjacent to the ribs. The following special items should be checked.

(a) Center section to outer wing upper and lower junction cap strip -- cracks, elongated holes, and corrosion. Also check spar web at point of attachment of fitting.

(b) Landing gear pivot shaft forward bearing fitting in wing nose section -- cracks and corrosion.

(c) Aileron and wing flap hinge fitting brackets -- cracks and corrosion.

(d) Aileron and wing flap hinges -- worn spots and play.

(e) Wing and flap skin -- dents, wrinkles, scratches and holes.

(f) Center section wing-to-fuselage attachment fittings -- cracks, corrosion, and elongated holes.

(g) Junction boxes in wing panels including landing lamp wells -- corrosion.

(h) Center section and outer panel structure exposed to view -- general condition and corrosion. Check skin for "oil-canning" or distortion.

(i) Bullet-resistant fuel cells -- leaks and corrosion around fittings. Condition of compartment liners.

(2) Fuselage

(a) Steel Tube Structure - The fuselage should be thoroughly inspected for dents, scratches and cracks. The lower portion of the fuselage interior should be checked for corrosion. Remove fuselage tube structure drain plugs if there is any evidence of water or rust flakes. Inspect monocoque structure-to-fuselage attachment fittings for cracks, corrosion and elongated holes. Inspect all fuselage tubing welded joints, attaching brackets and bellcranks.

(b) Monocoque Structure - Check interior of structure and elliptical bulkhead rings and pulley bracket fittings for cracks. Inspect skin covering for dents, wrinkles, and holes. Inspect skin covering for cracks in area of vertical stabilizer forward attachment fitting.

(c) Firewall - Check for loose rivets, "oil-canning", and general condition.

(3) Empennage - The covering of the horizontal and vertical stabilizers should be checked for scratches, dents and wrinkles. Inspect leading edges of vertical and horizontal stabilizers for dents and cracks along rivet holes. Inspect all attachment fittings for cracks, elongated holes and corrosion. Inspect monocoque skin at point of attachment of vertical stabilizer to forward attachment fitting. Inspect monocoque aft bulkhead at point of attachment of vertical stabilizer rear spar.

(4) Landing Gear - Inspect landing gear forward and rear bearing fittings for cracks, and corrosion. Check for elongated holes in fittings at point of their attachment to wing structure. Inspect shock absorber for oil leakage at the solder sweat joint at the top of the cylinder and at the welded dome in the bottom of the piston. Check for oil leakage through the piston packing. Inspect brake lines for leaks.

(5) Tail Gear. - Inspect retracting mechanism linkage and all fittings for cracks, corrosion, or misalignment. Inspect position limit lock cables for wear or frayed ends. Inspect shock absorber for oil leakage at welds on both ends, and at the weld around the boss of the filler plug. Check for oil leakage through the piston packing.

(6) Engine. - Inspect engine proper in accordance with the instructions contained in relevant Engine Overhaul Handbook. Inspect engine mount for general condition, corrosion and cracks. Check general condition of cowlings and supports, including dents, cracks and loose rivets or screws. Carefully inspect exhaust collector ring for evidence of cracks or burned spots. Check general condition of all engine controls, plumbing and conduit.

SECTION IVDISASSEMBLY, INSPECTION, REPAIR AND ASSEMBLY1. Generala. General

(1) This Section contains general instructions for restoring the airplane to, as near as possible, its condition when new -- such work being the normal function of the Air Depots.

(2) Removal and installation instructions, also the major portion of disassembly and assembly instructions, are contained in the P-66 Service Handbook.

(3) Special airplane tools furnished by the contractor for use in connection with disassembly and assembly operations are shown in Fig. 1, Sect. V of P-66 Service Handbook.

b. Reference Drawings - Each sub-paragraph of this section that is devoted to repair instructions is preceded by a list of the Vultee drawings that will be of value in understanding completely the operations involved in the work described.

c. Inspecting General Condition

(1) To avoid repetition of elementary instructions, the expression "inspect for general condition" is used in this Section of the Handbook to signify an inspection for:

- (a) Corrosion
- (b) Cracks
- (c) Dents, holes, tears, distortion, or other mechanical damage.
- (d) Loose rivets, screws and bolts.
- (e) Stripped threaded holes.
- (f) Elongated holes.
- (g) Deteriorated, non-metallic parts (fabric covering, moulding strips, and the like).
- (h) Excessive clearance or wear in bearings or other moving parts subject to wear.

like. (i) Foreign material in plumbing lines and the

edges of rivets. (j) Paint chipping or flaking off from around

(2) The inspector should bear in mind, when checking for deterioration and wear, that while a given part's condition may not completely justify replacement at the time of inspection, it should be replaced if it is reasonable to believe that normal wear and deterioration will be sufficient to render the part unserviceable before the next normal overhaul period.

2. Wing

a. Disassembly

(1) General - The wing, being a stressed skin structure, is not readily disassembled, other than removing outer panels from the center section. However, should internal access be necessary, this may be gained by the following methods:

(a) By removing existing access doors and panels in the outer wing and center section panels. Refer to Fig. 1, Sect. 4, Chap. 2 of the P-66 Service Handbook.

(b) By removing wing tips.

(c) By removing landing lamp well.

(d) Through the landing gear strut and wheel wells.

(e) Through the fuel cell compartments.

(f) By cutting additional access doors in skin covering.

(g) By removing skin covering where necessary.

(2) Access Provisions - Access provisions incorporated in the wing structure are shown in Fig. 1, Sect. 4, Chap. 2 of the P-66 Service Handbook, and are listed in the paragraphs following -- together with recommendations and limitations on additional access opening that may be installed as part of the wing structure.

(a) Center Section Panel

Structure 1. Access Directly Below Fuselage

The portion directly below the fuselage structure extending from Station #0 to #15, forward of the front spar; Station #0 to #9, between front and rear spars; and Station #0 to #37.25, aft of the rear spar, may be readily inspected at all times as the nose section, top and trailing edge of the center section are not covered with skin between these stations.

2. Access to Fuel Tank Compartments
Between Stations #9 and #84

a. Remove the machine screws attaching the fuel tank compartment cover plates, extending from Station #0 to #84, to the center section panel. Remove fuel cells and then the fuel tank lining. This will permit inspection and repair of the entire fuel tank area.

b. If additional access is required for repair of the fuel tank area, forward of the 50% chord line, an access hole may be installed between the rib stations extending from Station #9 and #84. These cut-outs are subject to the following limitation.

It shall not cross any seam or rib. Refer to Fig. 7 of this Handbook.

3. Access Between Stations #0 and #104.653,
Forward of the Front Spar

a. Working through landing gear strut and wheel wells, access may be gained to nose skin, between Stations #64.75 and #29.75 and forward face of auxiliary spar.

b. To gain access between front spar and auxiliary spar, remove landing gear mechanism inspection door. For further access, additional cut-outs may be installed, between Stations #29.75 and #64.75 and front and auxiliary spars, with the following limitation.

The cut-out shall not cross any seam or rib. Refer to Fig. 7 of this Handbook.

c. To gain access to interior of center section left-hand nose skin, between Stations #104.653 and #84, remove either closing rib at Station #104.653 or install additional handholes.

4. Access to Trailing Edge Ribs Between
Stations #15 and #104.653

Upon removal of wing flaps, complete access may be gained to trailing edge ribs, transverse stringers and center section upper trailing edge skin covering between these stations.

5. Access to Intermediate Ribs Between
Stations #84 and #99.375

Remove left and right gun access door on top of center section panel between these stations.

(b) Outer Wing Panel

#114.5

1. Access Between Stations #108.843 and

With outer wing panel removed, complete access may be gained between rib Stations #106 and #118 of the outer wing panel by first removing the outer wing panel closing ribs at Station #108.843. For additional access the ammunition box access door on top of wing panel may be either opened or removed.

#146.5

2. Access Between Stations #114.5 and

The ammunition box access door is the only removable panel between these stations, and provides only access to aft face of front spar between Stations #108.843 and #136.5. For further access to nose section and intermediate ribs between the remaining stations, access cut-outs may be installed subject to the following limitation and with reference to Fig. 7.

a. It shall not cross any seam or rib.

#193.528

3. Access Between Stations #146.5 and

a. Remove aileron bellcrank access door, trim tab mechanism inspection door (left-hand panel only) landing lamp (left-hand panel only), the assembly access door and the electrical inspection door. Refer to Fig. 1, Sect. 4, Chap. 2 of this Handbook.

b. For further access facilities, install access cut-out doors, as shown in Fig. 7, of this Handbook.

(c) Wing Tip

Complete access to interior of wing tip may be had upon removal of wing tip from outer wing panel.

b. Inspection

(1) Center Section - Inspect for general condition, giving particular attention to the following:

(a) With fuel cells removed, inspect interior of fuel tank area for the following:

1. Loose or broken cellular rubber backing plates.

2. Appreciable wear in backing plates that would allow contact of leak-resistant cells with wing panel structure.

(b) Inspect aileron cable fairleads, bellcranks and pulley brackets, aft of rear spar, for wear and cracks.

(c) Inspect landing gear operating mechanism bay for corrosion.

(d) Inspect landing gear strut and wheel wells for corrosion.

(e) Inspect rear spar for cracks at point of attachment of wing flap hinge and operating mechanism brackets.

(f) Inspect trailing edge ribs and stringers for corrosion.

(g) Inspect center section panel for loose rivets.

(h) Inspect front and rear spar webs for cracks at point of attachment of center-section-to-outer wing panel attachment fittings.

(i) Inspect fuselage-to-center section attachment fittings for security of attachment and for elongated holes.

(2) Outer Panels - Inspect for general condition, giving particular attention to the following:

(a) Corrosion inside the "closed" section at trailing edge of wing, through which the control cables pass.

(b) Cracks at point of attachment of aileron hinge brackets to rear spar.

(c) Cracks at point of attachment of outer wing panel-to-center section attachment fittings to front and rear spars.

(d) Wrinkles in wing panel nose section and intermediate panel skins.

(e) Cracks in pulley and aileron bellcrank support brackets.

(f) Condition of wing tie-down fitting.

(g) Corrosion within landing lamp bay.

(h) Condition of wing tip-to-outer wing panel attachment gang channels and nut plate installation.

(3) Wing Tips, Wing Flaps and Ailerons

(a) Wing Tips - Inspect for general condition, giving particular attention to the following:

1. Corrosion at installation of wing tip navigation lamp assemblies and extreme outboard end of wing tip.

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2. Cracks in ribs and stringers.
3. Cracks in wing tip to center section attachment screw holes.

(b) Wing Flaps

1. Flap hinge and actuating mechanism brackets for cracks and corrosion at point of attachment to flap spar.
2. Dents and wrinkles in flap skin surface.

(c) Ailerons

1. Aileron and aileron tab hinge brackets for cracks.

c. Repair

Reference Drawings

Center Section

61-06002	Panel Assem. - Wing Center
61-06013	Spar Assem. - Center Section Front
61-06017	Spar Assem. - Center Section Rear
61-06103	Fitting - Front Spar Wing-to-Fuselage
61-06104	Fitting - Rear Spar Wing-to-Fuselage
61-06028	Beam Assem. - Center Section Auxiliary - Sta. 37.5 to 64.75
61-06155	Install. - Cap Strip Center Section Wing Junction
61-31315	Install. - Fuselage Wing Attachment Fitting Sta. 115 Rear
61-31316	Install. - Fuselage Wing Attachment Fitting Sta. 76.25 Front
61-40103	Fitting - Landing Gear Forward Bearing
61-40108	Bracket - Landing Gear Pivot Shaft Rear Bearing

Outer Wing Panel

61-08002	Panel Assem. - Outer Wing
61-08003	Tip Assem. - Outer Wing
61-08009	Spar Assem. - Outer Wing Auxiliary
61-08010	Spar Assem. - Outer Panel Front
61-08011	Spar Assem. - Outer Panel Rear
61-08103	Fitting - Outer Wing Main Spar Attachment
61-08109	Fitting - Sta. #106 Outer Wing Upper Attachment
61-08110	Fitting - Sta. #106 Outer Wing Lower Attachment
61-08111	Install. - Outer Wing Junction Fitting

61-12004	Tab Assem. - Aileron
61-12005	Frame Assem. - Aileron
61-12010	Bracket Assem. - Aileron Hinge Sta. 184.5
61-12011	Bracket Assem. - Aileron Hinge Sta. 146.5
61-12012	Bracket Assem. - Aileron Hinge Sta. 114.5
61-12013	Bracket Assem. - Aileron Tab
61-12103	Bracket Assem. - Aileron Hinge

Wing Flaps

61-16002	Flap Assem. - Center Section (Frame)
61-17001	Install. - Wing Flap

(1) Skin - Standard and typical repairs for aluminum alloy structures are given in T. O. No. 23-15-1. For typical repairs to the wing skin, applicable to the P-66 airplane, refer to Fig. 7 of this Handbook. When damaged skin is to be replaced, the gauge and material used should be the same as that of the original skin, the rivets and screws used should be adequate to transfer the shear load, and the proper treatment of Groov-pins should be exercised.

(2) Groov-Pins

(a) General - Groov-pins are made by forming three shallow grooves along the shank of a standard rivet. The pins are then driven into slightly undersize holes. Groov-pins are not used as structural rivets, but rather as tacking rivets to prevent oil-canning of otherwise unsupported areas of skin--and are usually driven into blind holes.

(b) Removal and Installation of Groov-Pins - Groov-pins are located along the lines of attachment of the leading edge skin to the upper and lower edges of the front spar. See Fig. 9 of this Handbook.

1. To Remove Groov-Pin

a. Use a #26 (.147) drill and slowly drill through the center of the Groov-pin head to a depth of about 1/8 inch. A small portion of the upper ends of the grooves can be seen when this depth is reached, if the drill was properly centered. During the procedure, the drill should be removed several times and the hole inspected to avoid drilling too deep.

NOTE: The drill chuck should be tightened just sufficiently to drive the drill, so that the chuck will slip if the drill jams. Otherwise, the drill may break upon jamming and present the difficult job of removing the drill stub from the hole.

b. After drilling, pry off the rivet head to a point where the grooves are visible. This can be done by tilting the drill carefully until the head snaps off, or by using a 1/8 inch diameter punch.

c. After the head is removed, continue drilling with the #26 drill, for a depth of not more than 3/8 inch, or until the drill jams. Usually the drill jams just before the end of the rivet shank is reached, and the remaining portion of the rivet can be twisted out by hand-reversing the drill, or with a slim punch.

2. To Install New Groov-Pin

NOTE: Groov-pins, as received, cannot be installed in a hole from which another pin has been removed, as the hole will be slightly over-size --making it necessary to deform the Groov-pin shank to obtain a tight fit. Proceed as follows:

a. Enlarge the Groov-pin shank slightly by squeezing in a large vise -- with the rivet head against one pair and the end of the shank against the other. If a suitable vise is not available, the rivet shank can be enlarged by placing the head in a rivet set and striking the end of the shank two or three sharp blows with a hammer.

b. Drive the Groov-pin into place, with a hand rivet-set and hammer.

IMPORTANT: Do not drive these pins with an air hammer, as it is then impossible to obtain the "feel" of the pin as it is driven into place. It is very important that these pins be driven very tightly into place -- to the extent that several heavy blows with a 1-1/2 lb. ball-pein hammer are required to seat the head.

(3) Wing Spar Splices - For typical front, rear and auxiliary web member splices, refer to Fig. 8 of this Handbook, noting the following:

(a) Clean holes up to 1/4 inch diameter may be ignored, providing they are not near the edge of the splice plates.

(b) Small dents not exceeding 1 inch in length and not deeper than 0.1 inch may be considered negligible and need not be repaired.

(c) In the case of cracks, 1/8 inch diameter holes must be drilled at the ends in order to prevent the crack spreading.

(d) The splice plate must overlap the damaged portion as shown in Fig. 8.

(4) Wing Beam Connection Fittings - In cases where holes in the wing beam connection fittings show evidence of cracks, wear, or elongation, replace with new attachment fitting.

(5) Ailerons and Wing Flaps

(a) Ailerons - The ailerons being skin covered are repaired in quite the same manner as wing panels. To repair damaged ribs and spar will necessitate removing skin covering. If the trailing edge is buckled, the trailing edge tube must be removed, restored to shape or replaced. Replace hinge fittings if cracks are evident.

(b) Wing Flaps - Repair to the wing flaps will be quite similar to the repair of ailerons, with the exception that the closing surface of the flap is open and does not require skin removal for repair to ribs and spar.

(6) Fuel Cell Compartments and Leak-Resistant Cells

(a) Fuel Cell Compartments - Damage to wing panel skin, within the area of the fuel cell compartment, should be repaired in the following manner:

1. Remove fuel cells.
2. Remove section or sections of fuel cell tank hard cellular rubber backing strips damaged within the immediate location of the break in panel skin.
3. Repair break in skin with suitable patch after "cleaning up" jagged breaks and preventing cracks from spreading. Refer to Fig. 7.
4. Install new cellular backing strips, over repaired area, by cementing in position using U.S. Rubber Company Cement, Type #5066.

NOTE: Sheets of cellular rubber may be cut to same size as damaged section, heated and formed to contour of compartment, where necessary.

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Cellular Rubber, as used in the P-66 Airplane, may be purchased from the U.S. Tire and Rubber Company, Akron, Ohio, U.S.A.

(b) Leak Resistant Cells - Repair to the leak-resistant fuel cells may be accomplished by applying the following materials, tools and method of repair.

MATERIALS REQUIRED

Interior Patching Material

Curved Buna, type "OR" sheet 1/32 inch thick; shore hardness 58-63; tensile strength 2200 lbs. per sq. inch minimum; elongation 550% minimum, or equivalent, purchased from W. J. Voit Rubber Co., Inc., 1600 E. 25th St., Los Angeles, California.

Exterior Patching Material

14 to 15 ounces, square woven hose covered duck, rubber covered with one friction coat and one skim coat on each side and curved to a total thickness of 1/16 inch, or equivalent, purchased from W. J. Voit Rubber Co., Inc., 1600 E. 25th St., Los Angeles, California.

Cement

High grade Buna type "OR" cement, cold setting or equivalent, purchased from W. J. Voit Rubber Co., Inc., 1600 E. 25th St., Los Angeles, California.

Solvent

Toluol or Benzol of commercial quality

NOTE: Buna type "OR" (oil resistant) sheet may be secured from the major rubber companies under the following trade names:

"Hycar" Type "OR", Hydrocarbon Chemical and Rubber Co., Akron, Ohio.

"Ameripol" Type "OR", Goodrich Company, Akron, Ohio.

"Chemigum" Type "OR", Goodyear Tire and Rubber Company, Inc., Akron, Ohio.

TOOLS REQUIRED

Brush or applicator (one inch)
Rubber roughing tool (coarse carborundum paper or
punched metal plate)
Roller stitcher (1/16 inch thick by 1-1/8 inch diameter
plain bearing)
Knife (any sharp knife appropriate for cutting rubber)

REPAIR PROCEDURE

NOTES: The use of solvent should be confined to thinning
of the cement and cleaning of the roughened areas.
In the latter case it should be used sparingly.

Do not attempt to speed-up drying time of cement
by blowing with hot or cold air.

Repair interior and exterior of tank
simultaneously, as follows:

1. Clean fuel cell surface of any
grease or foreign matter with solvent.
 2. Rough up area surrounding tear with
rubber roughing tool or coarse carborundum paper, taking particular
pains not to tear the liner.
 3. Cut patches of the interior and ex-
terior patching material so that it overlaps the tear two (2)
inches all around.
 4. Rough up side of patches that are
to be laid against liner.
 5. Apply three coats of cement to both
roughened area and patch. These three coats should be applied
very thin, and each coat should be allowed to dry thoroughly
(approximate drying time is one hour per coat), before the succeed-
ing coat is applied.
 6. Center both patches, inner and
outer, carefully over tear and then roll surfaces to obtain a
smooth mating surface.
- d. Assembly - All ordinary assembly operations involving
the wing and its related units are covered in Paragraph 2, Section
5 of the P-66 Service Handbook.

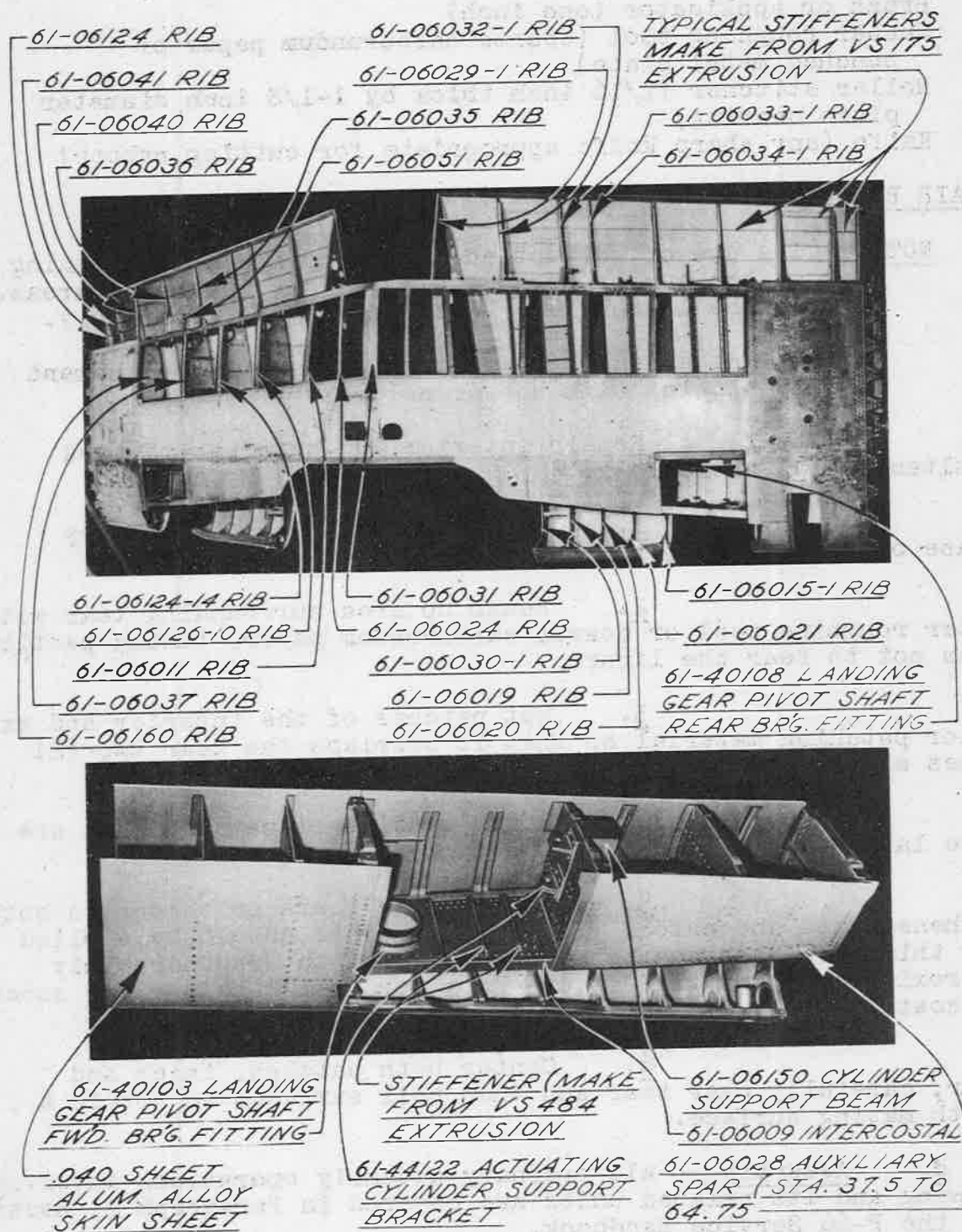


FIG. 2 WING CENTER
PANEL STRUCTURE

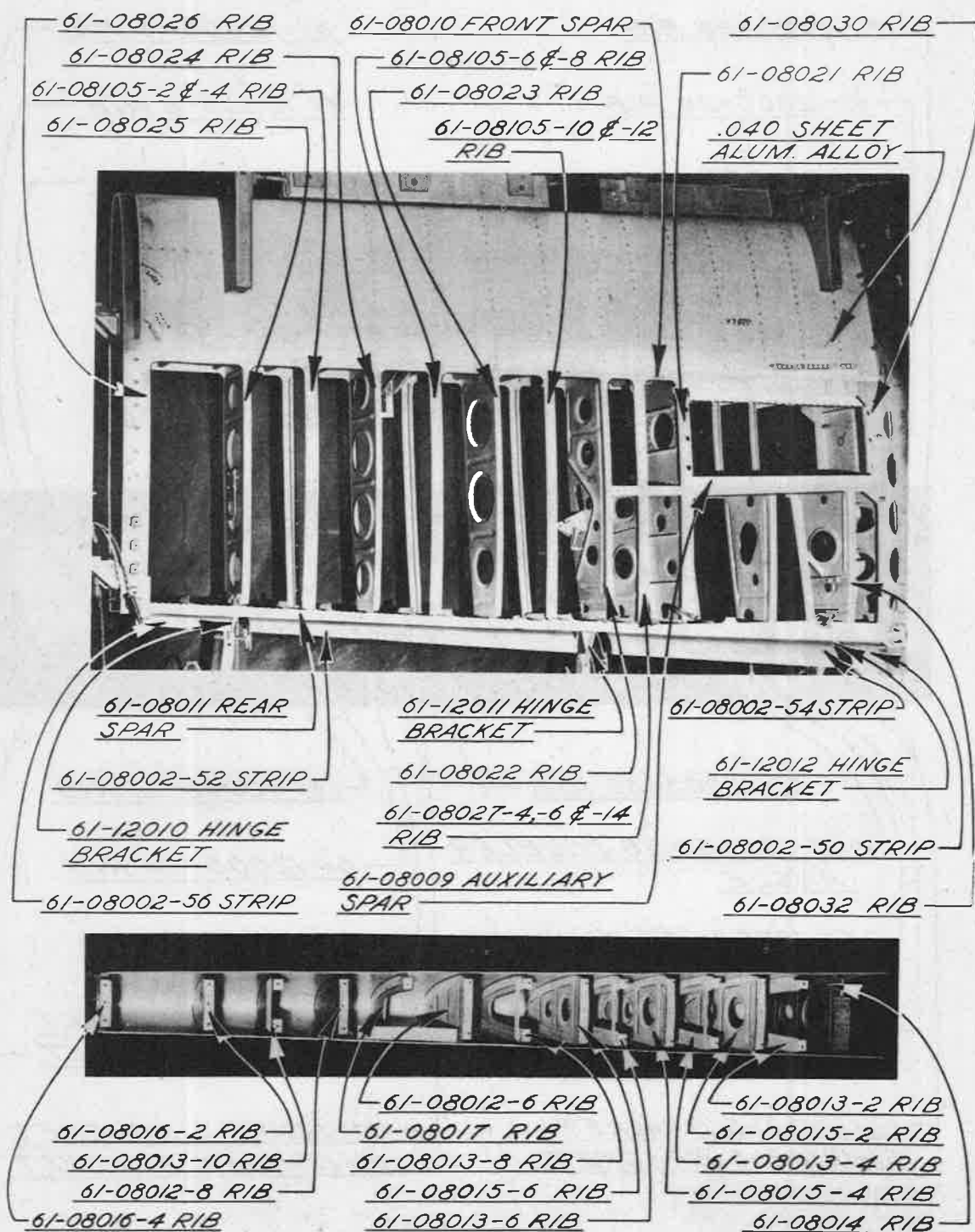


FIG. 3 WING OUTER
PANEL STRUCTURE

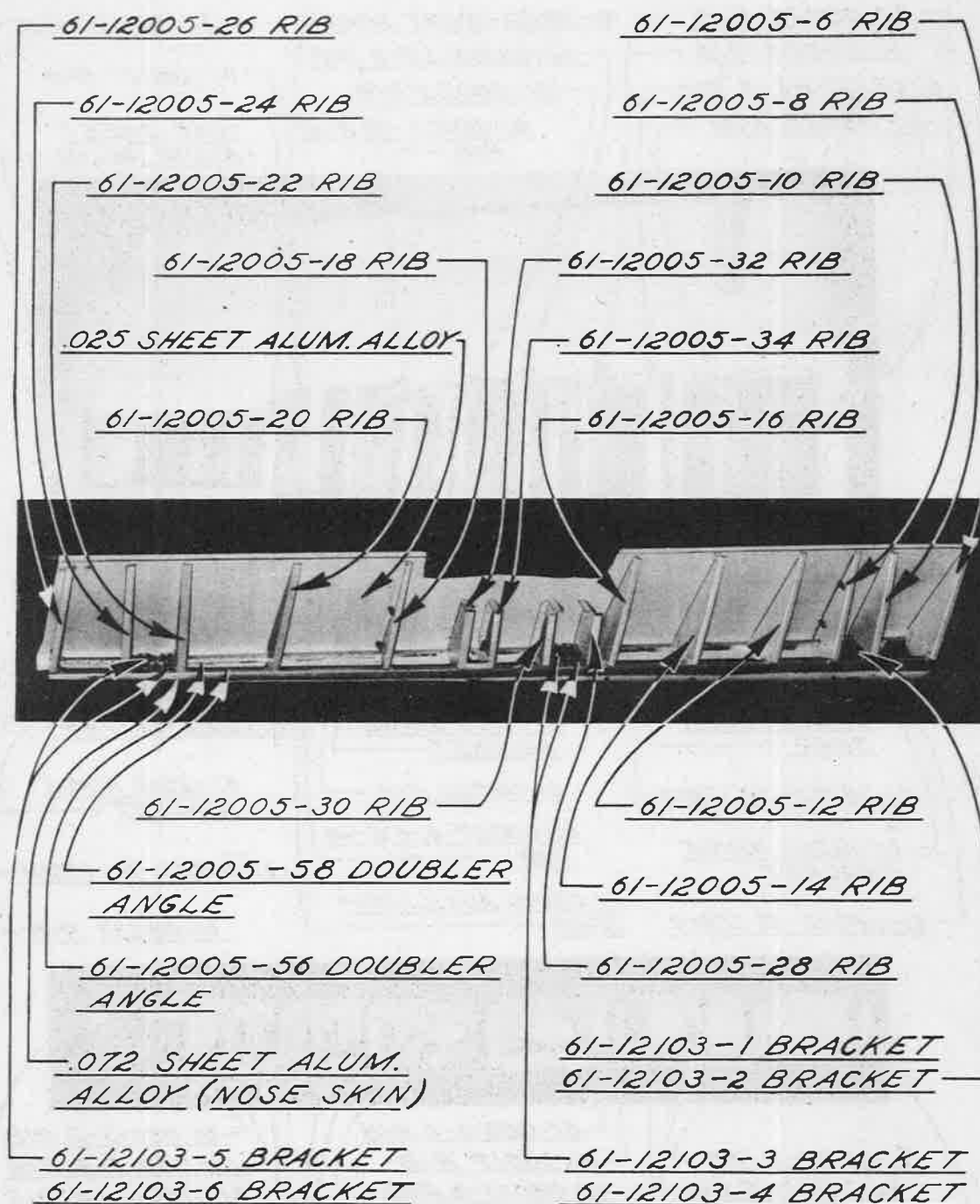


FIG. 4 AILERON FRAME ASSEMBLY

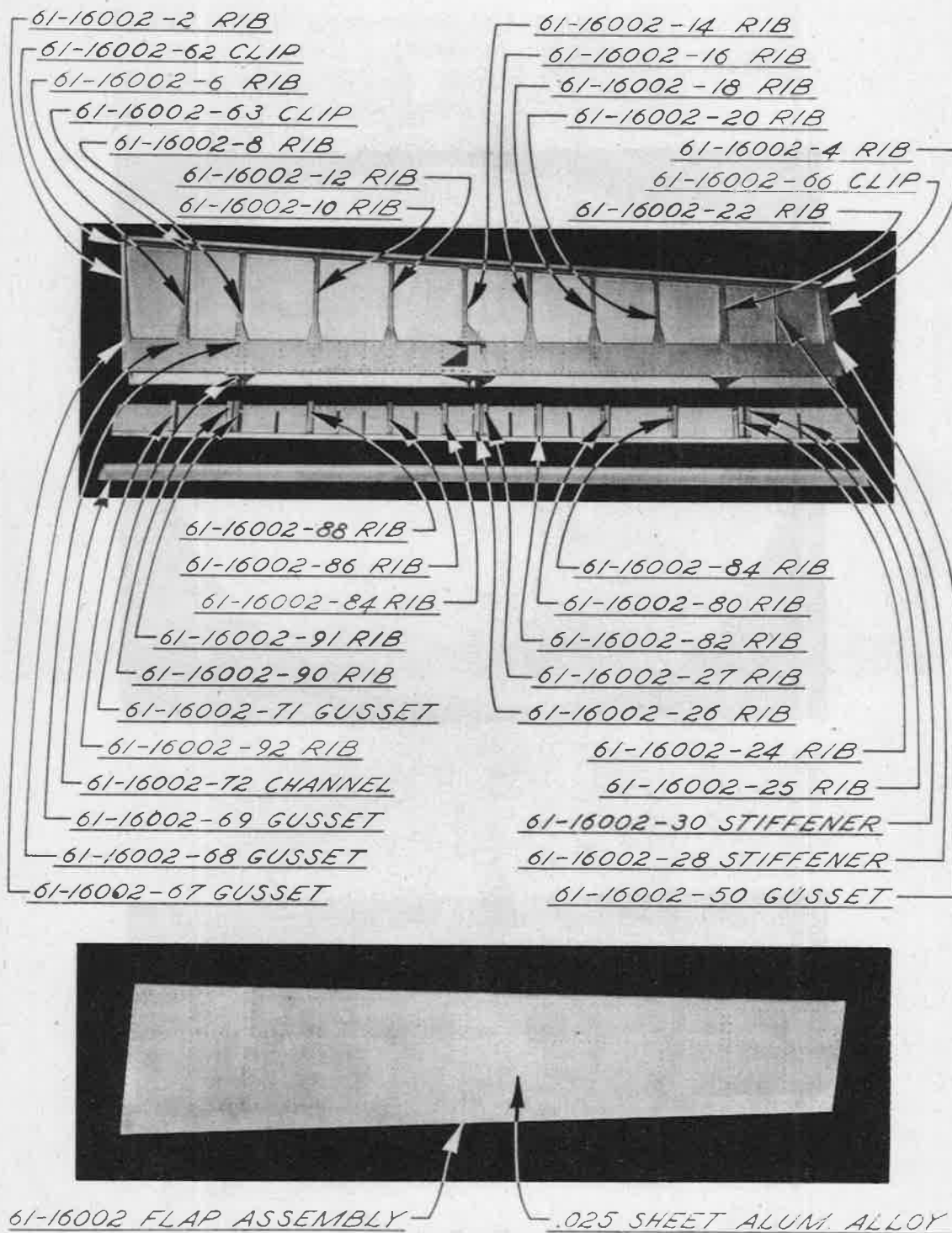


FIG. 5 WING FLAP FRAME

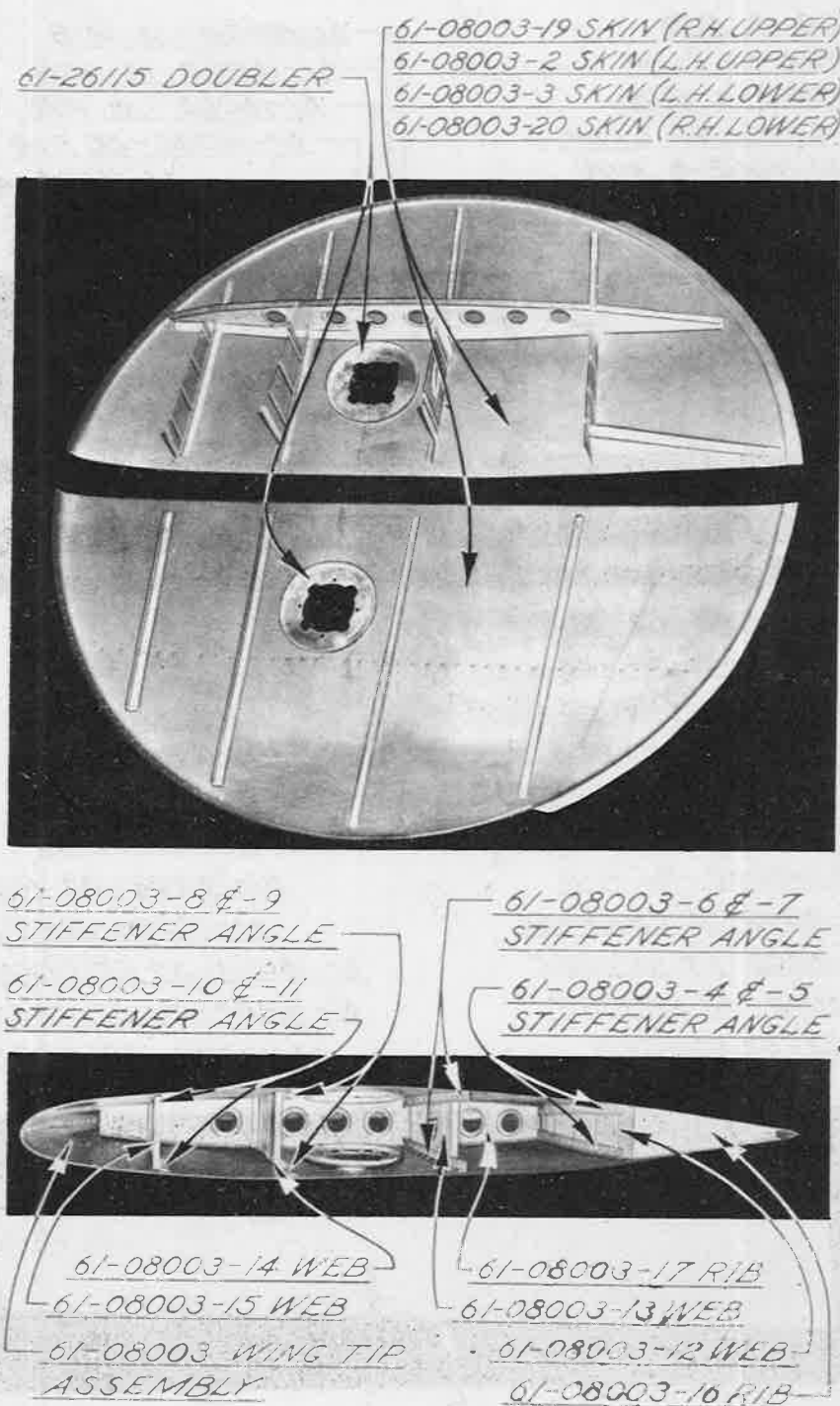
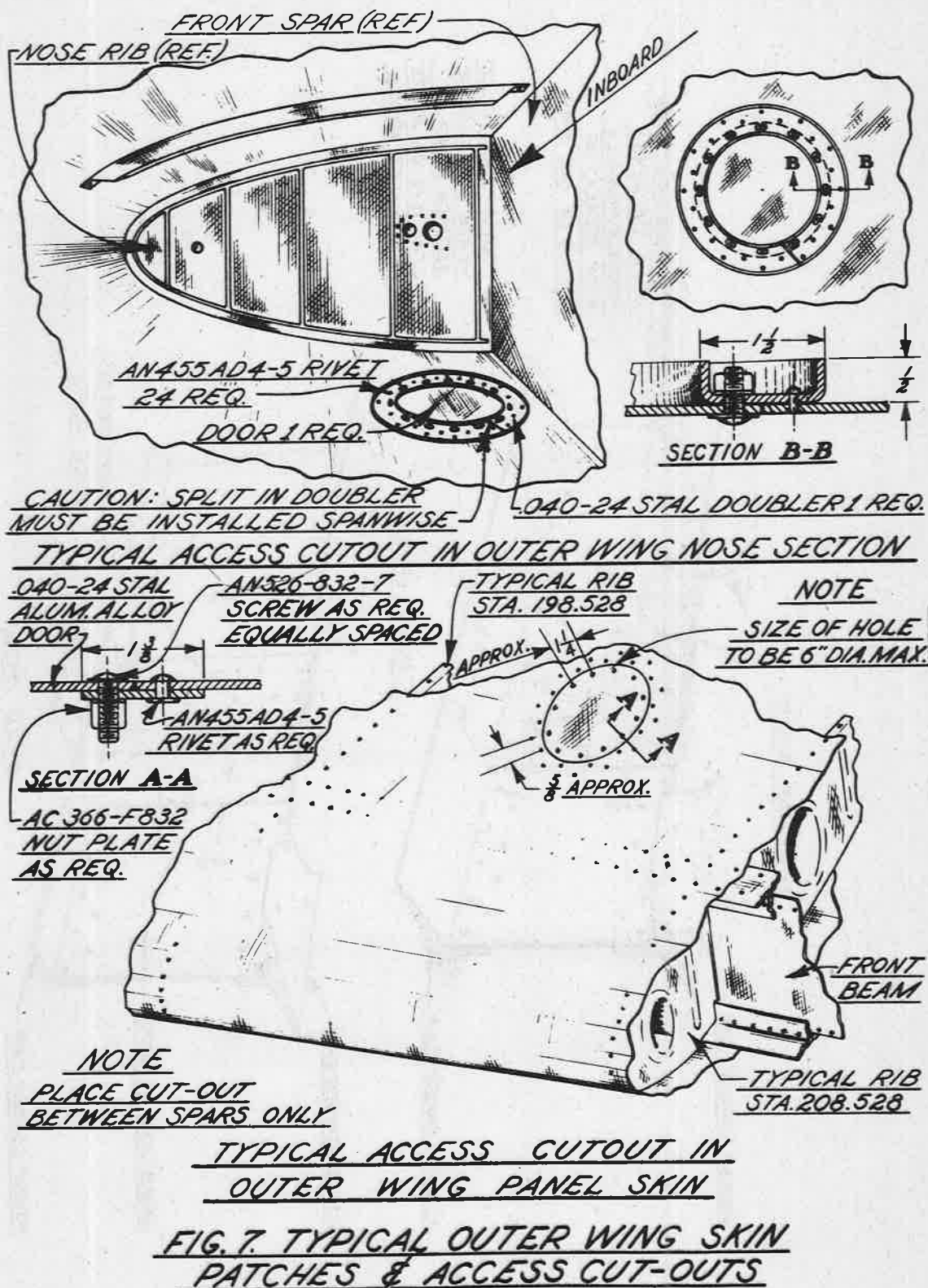


FIG. 6 WING TIP ASSEMBLY



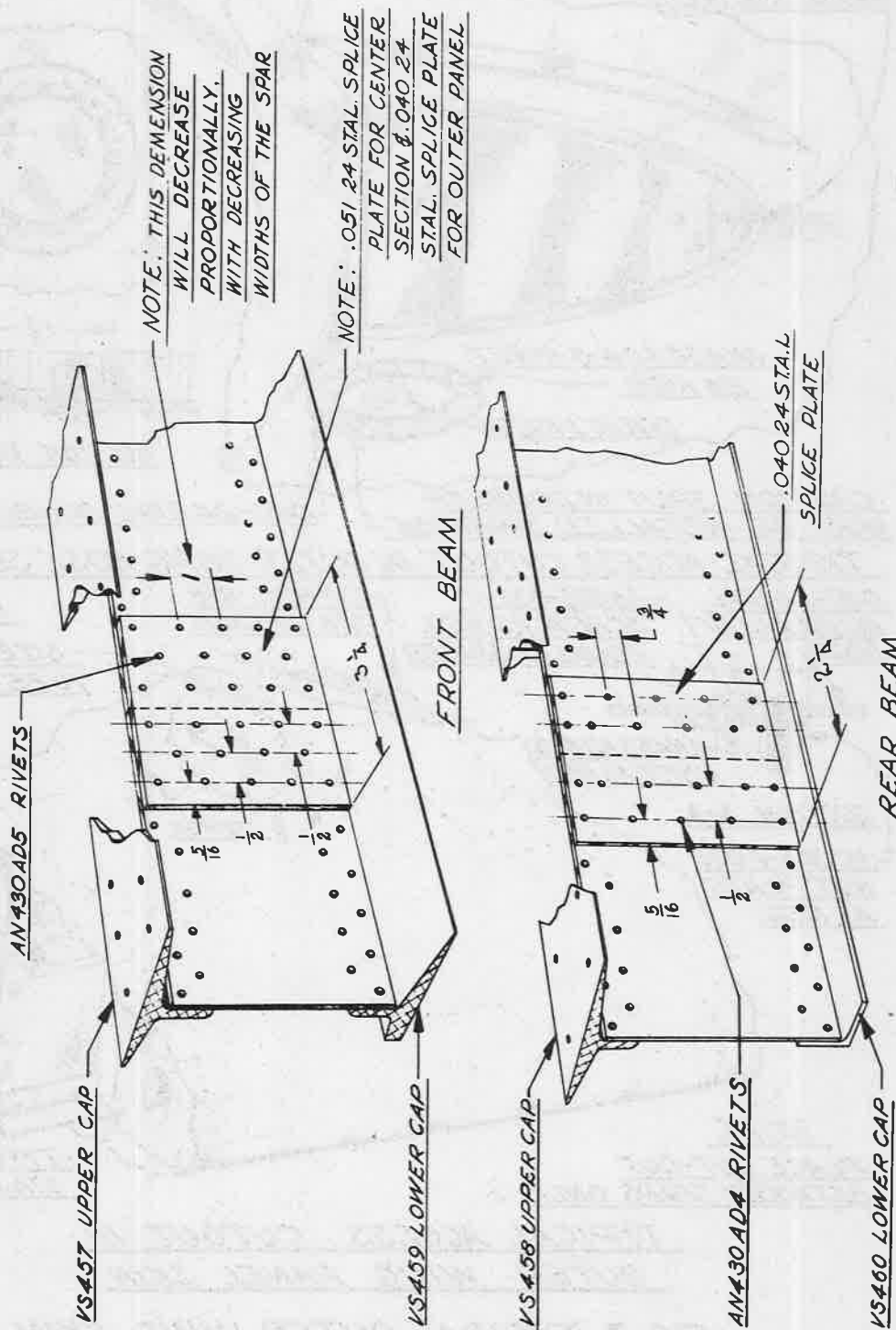


FIG.8. TYPICAL SPAR WEB MEMBER SPLICE

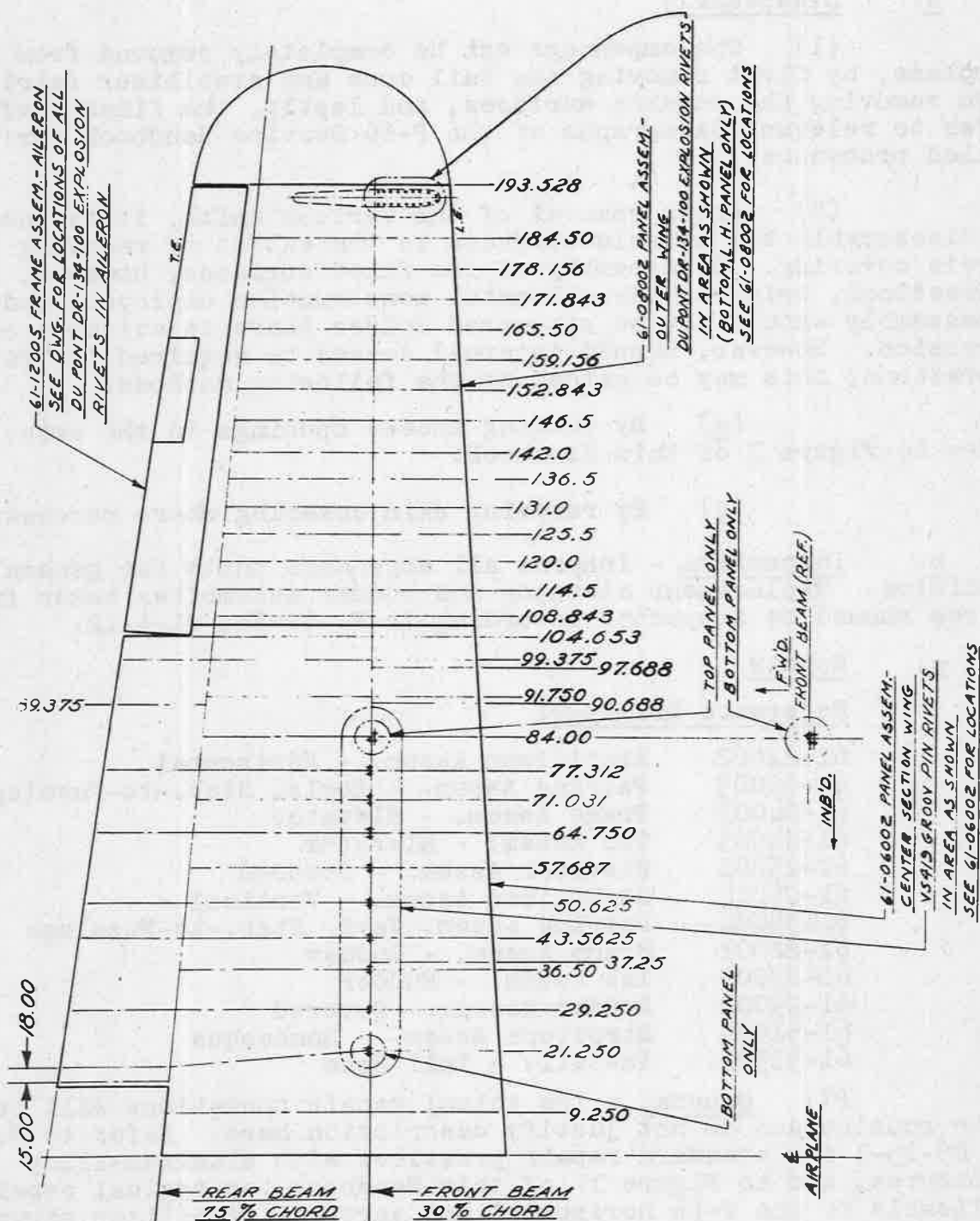


FIG. 9 WING BLIND RIVET LOCATION DIAGRAM

3. Empennage

a. Disassembly

(1) The empennage can be completely removed from the airplane, by first removing the tail cone and stabilizer fairings, then removing the movable surfaces, and lastly, the fixed surfaces. Refer to relevant paragraphs of the P-66 Service Handbook for detailed procedure.

(2) After removal of the various units, it is possible to disassemble the movable surfaces to the extent of removing the fabric covering. Disassembly of the fixed surfaces, however, is impractical, owing to the all-metal construction employed; and this disassembly should not be attempted unless there is evidence of corrosion. However, should internal access be required for repair operations, this may be gained by the following methods:

(a) By cutting access openings in the skin.
Refer to Figure 7 of this Handbook.

(b) By removing skin covering where necessary.

b. Inspection - Inspect all empennage units for general condition. Replacement elevator and rudder assemblies taken from stores should be inspected according to T. O. No. 01-1-12.

c. Repair

Reference Drawings:

61-22002	Stabilizer Assem. - Horizontal
61-30003	Fairing Assem. - Horiz. Stab.-to-Fuselage
61-24002	Frame Assem. - Elevator
61-24003	Tab Assem. - Elevator
61-25002	Elevator Assem. - Covered
61-26014	Stabilizer Assem. - Vertical
61-30004	Fairing Assem. Vert. Stab.-to-Fuselage
61-28002	Frame Assem. - Rudder
61-28003	Tab Assem. - Rudder
61-29002	Rudder Assem. - Covered
61-31004	Structure Assem. - Monocoque
61-31901	Install. - Tail Cone

(1) General - The actual repair operations will be quite routine and do not justify description here. Refer to T. O. No. 23-15-1 for standard repair practices with aluminum-alloy structures, and to Figure 17 of this Handbook for typical repairs applicable to the P-66 horizontal and vertical stabilizer structure. The procedure for replacing the monocoque-to-empennage attachment fittings at, and near, the rear bulkhead will be obvious upon inspection. The only precaution necessary is that of making sure that the new fittings are properly aligned to receive the attaching parts.

(2) Replacement of Blind Rivets - To permit the use of a bucking tool on blind rivets, an access hand hole may be cut in the skin adjacent to the rivet pattern. Refer to Fig. 7 of this Handbook. If facilities are available, the use of explosion type rivets will prove a satisfactory means of replacing blind rivets.

d. Assembly - All ordinary replacement and assembly operations involving the empennage and its related units are covered in the relevant paragraphs of the P-66 Service Handbook. For additional assembly information, refer to Fig. 15 of this Handbook.

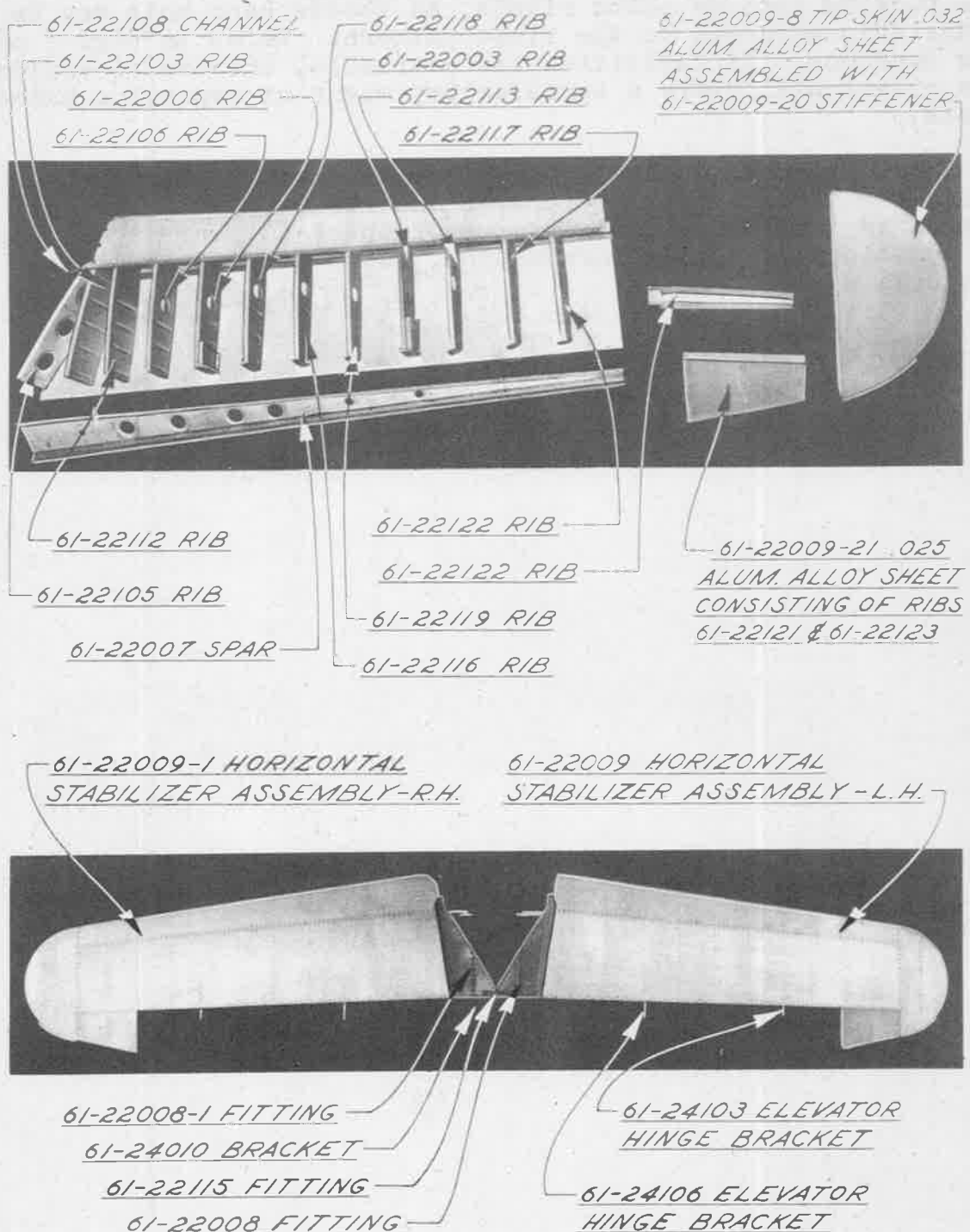


FIG.10 HORIZONTAL STABILIZER
 STRUCTURE

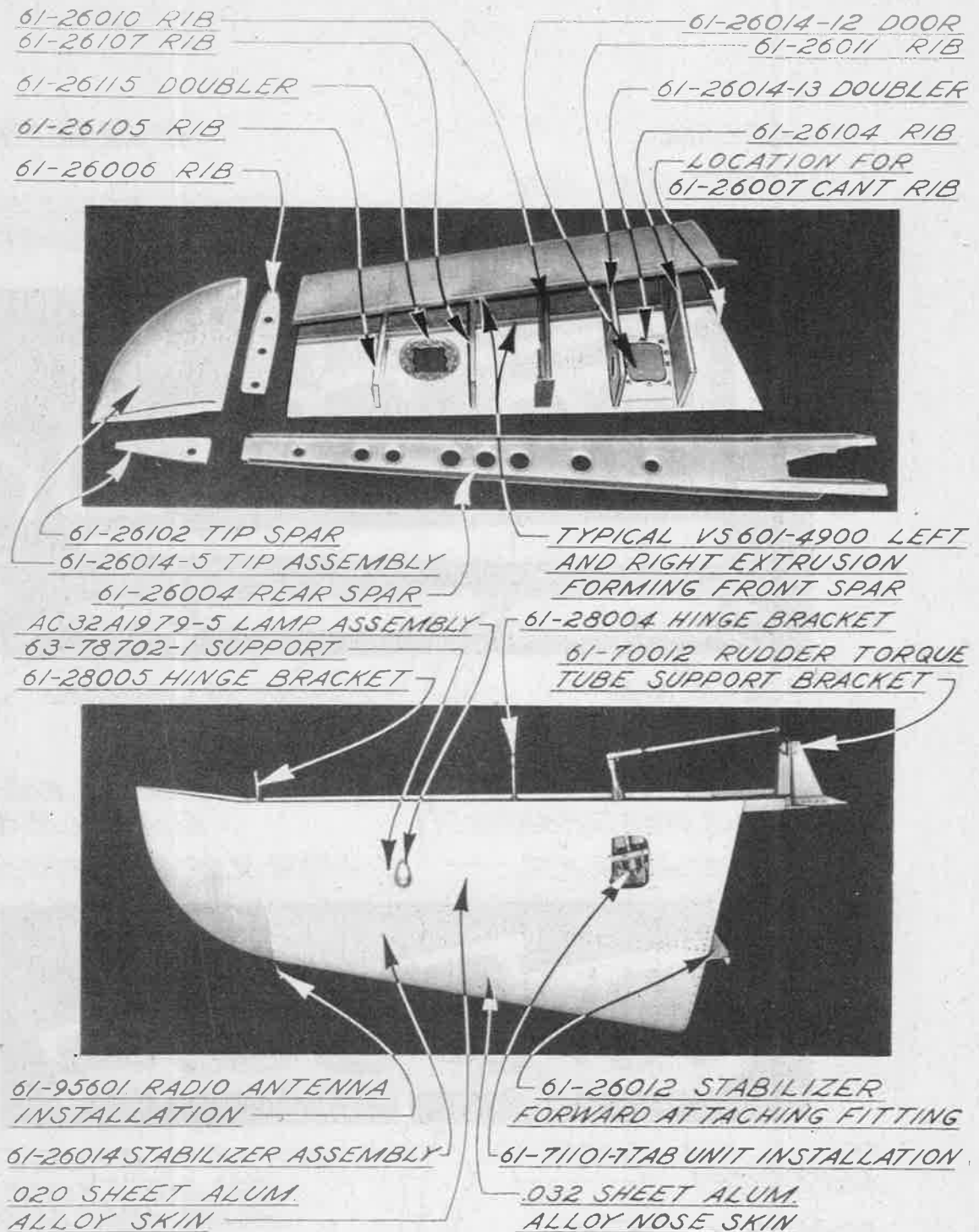


FIG. II VERTICAL STABILIZER STRUCTURE

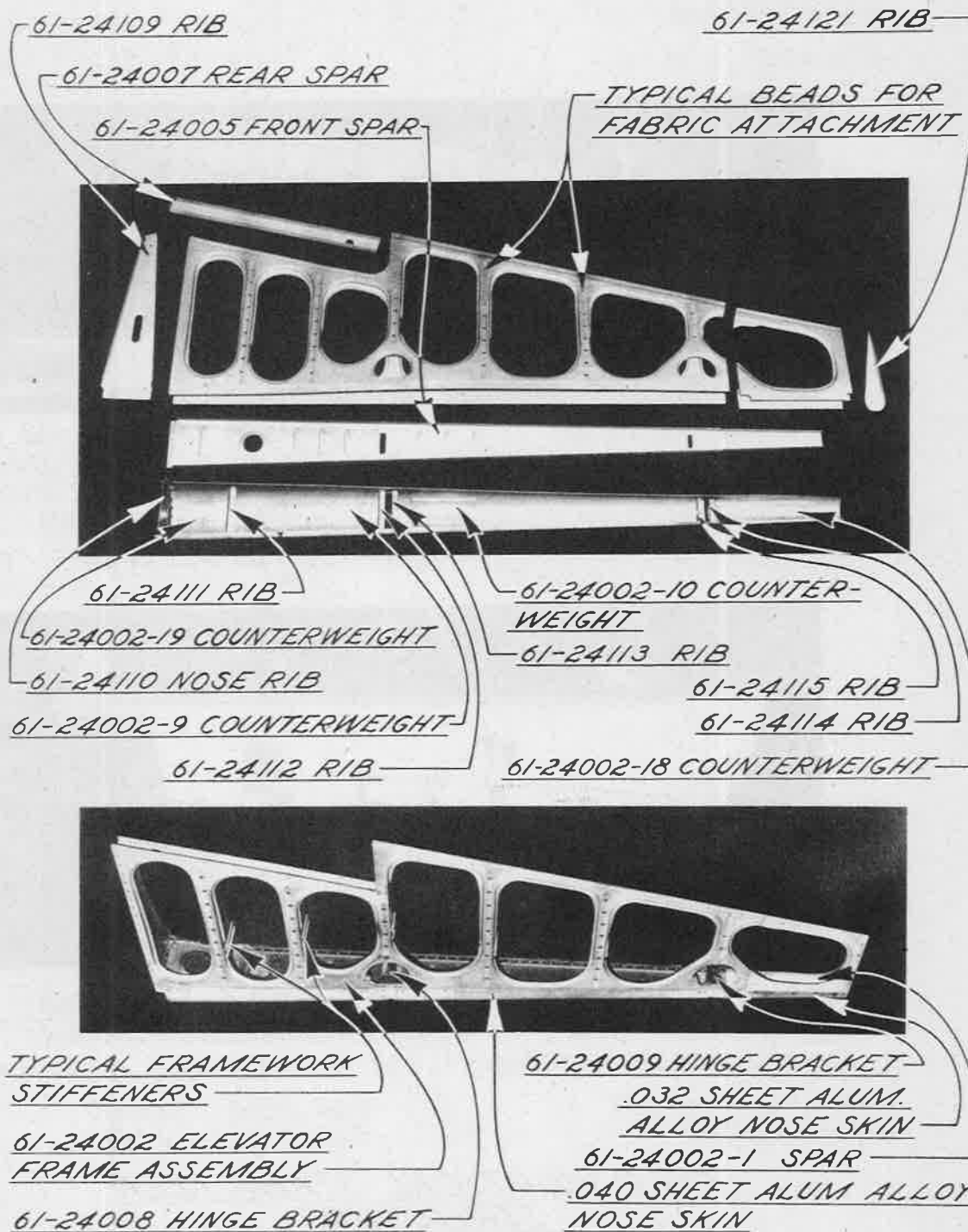


FIG. 12 ELEVATOR STRUCTURE

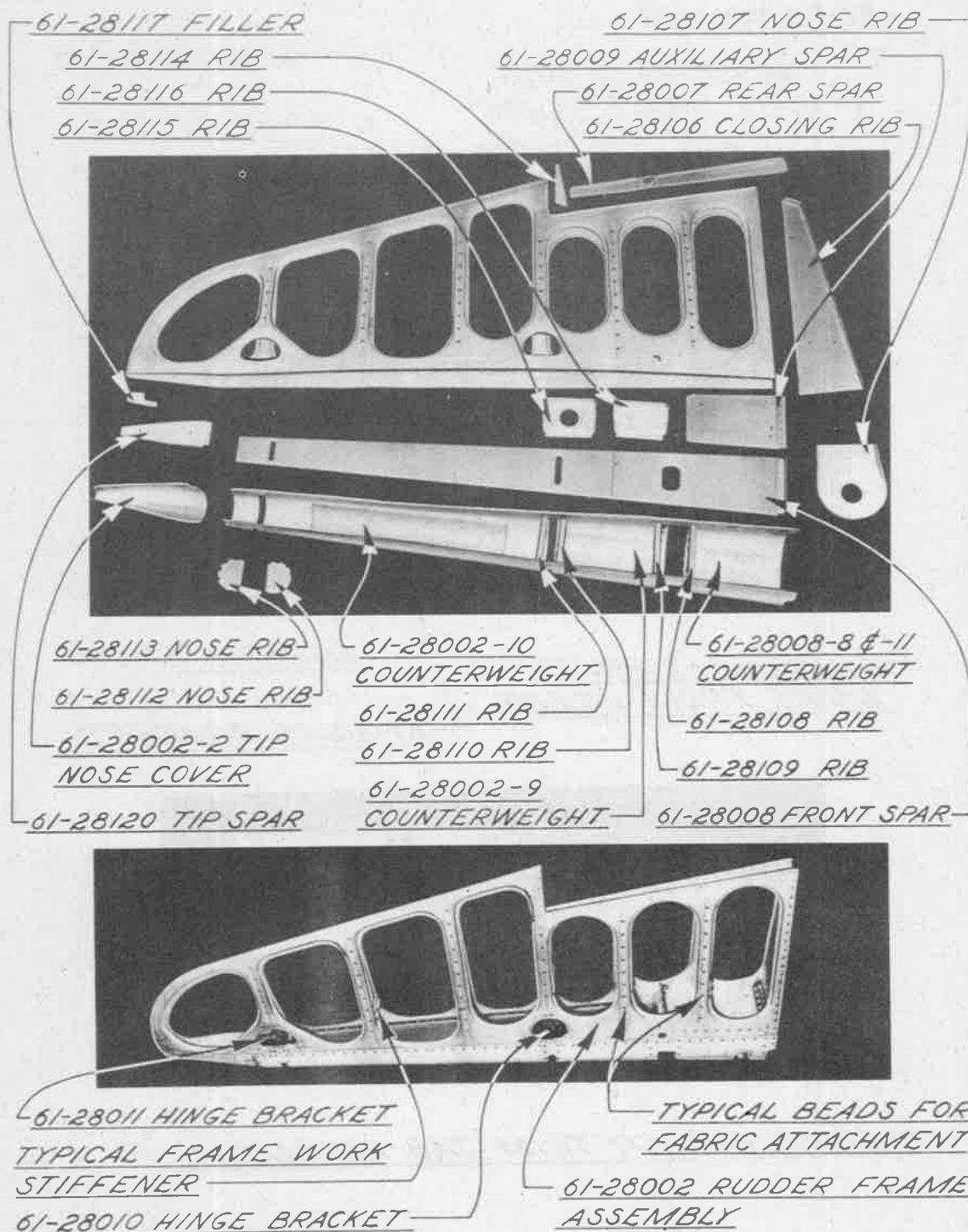


FIG. 13 RUDDER STRUCTURE

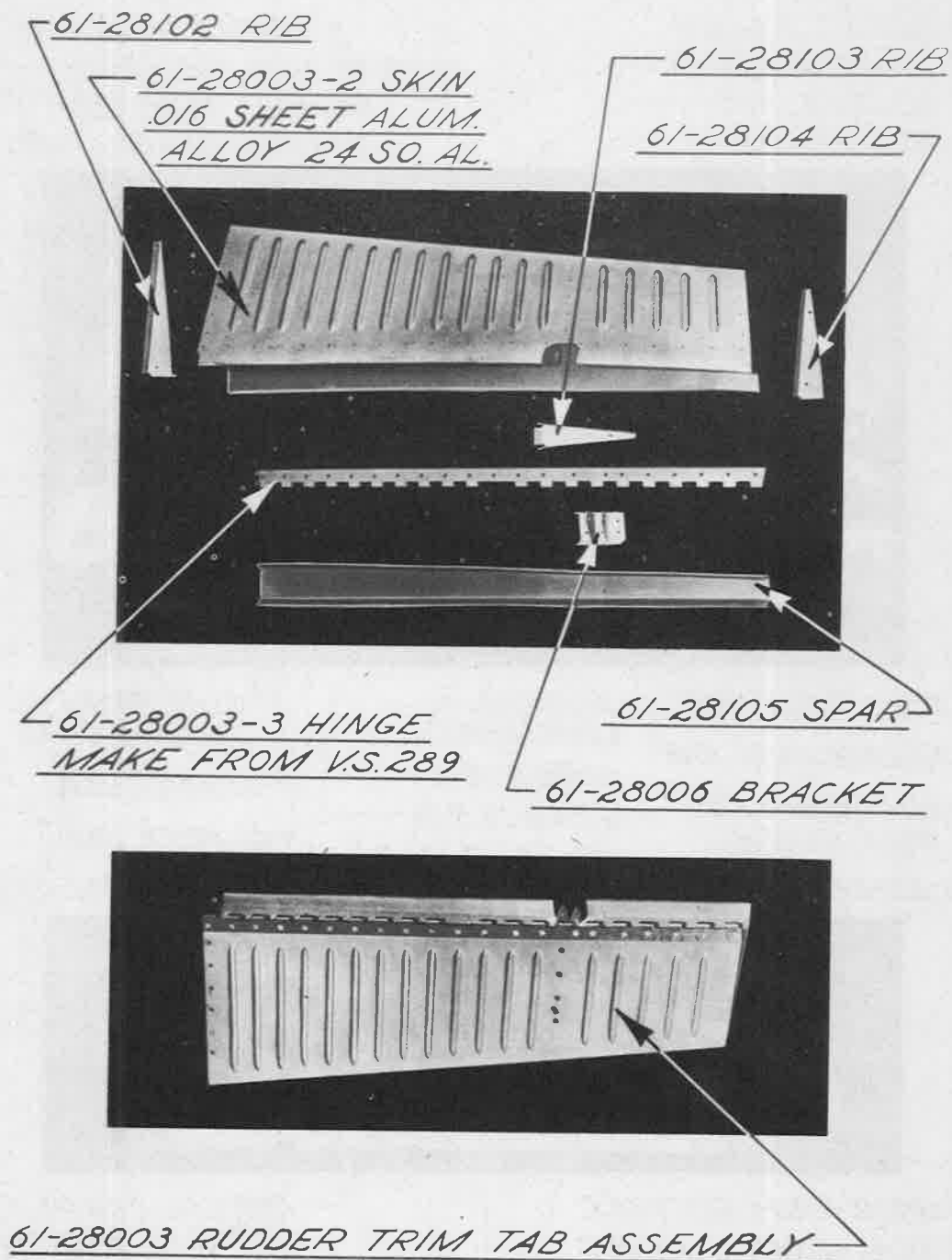


FIG.14 TRIM TAB
STRUCTURE

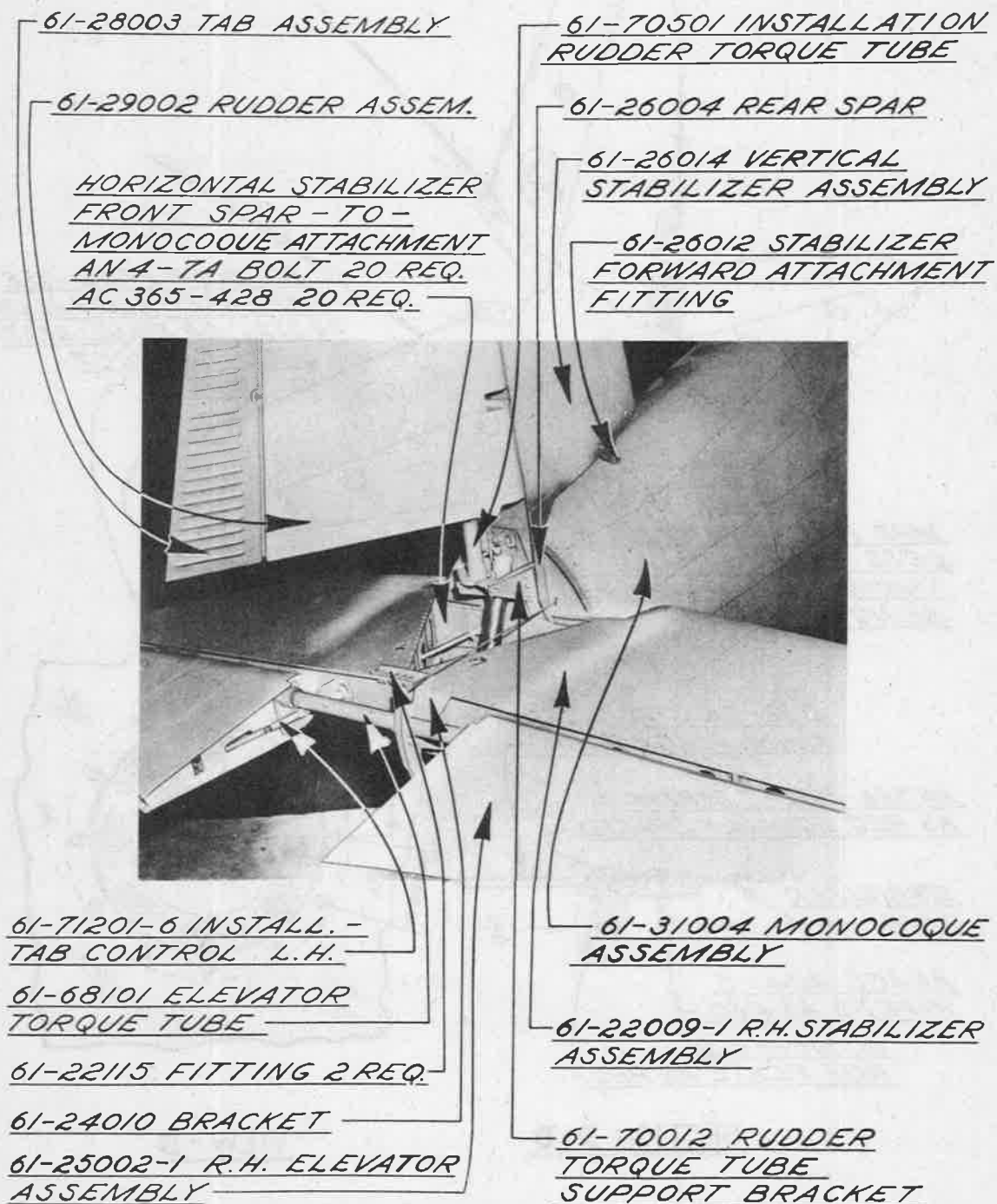


FIG. 15 HORIZONTAL & VERTICAL
STABILIZER ATTACHMENT

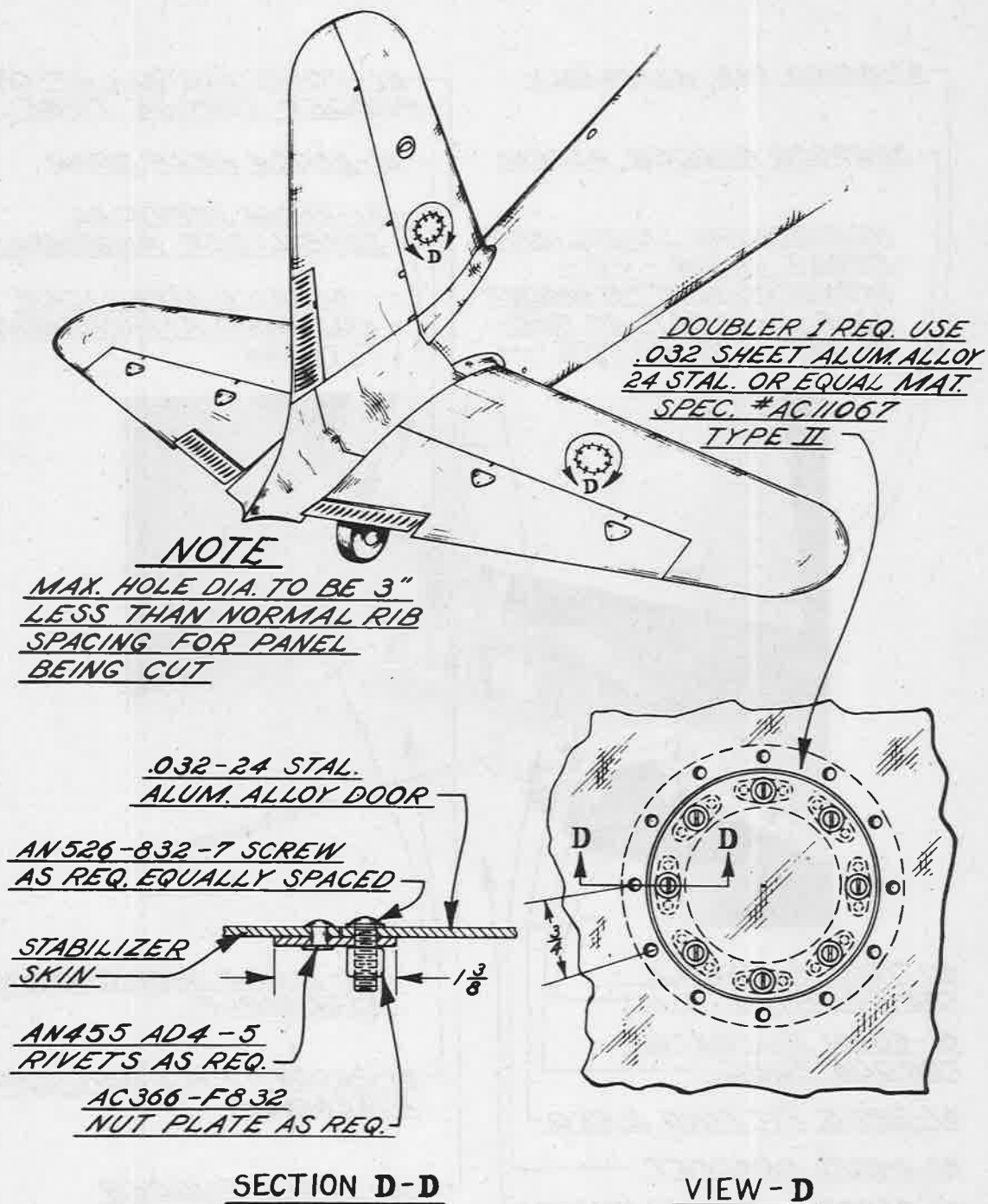


FIG.16 TYPICAL STABILIZER SKIN
PATCHES & ACCESS CUT-OUTS

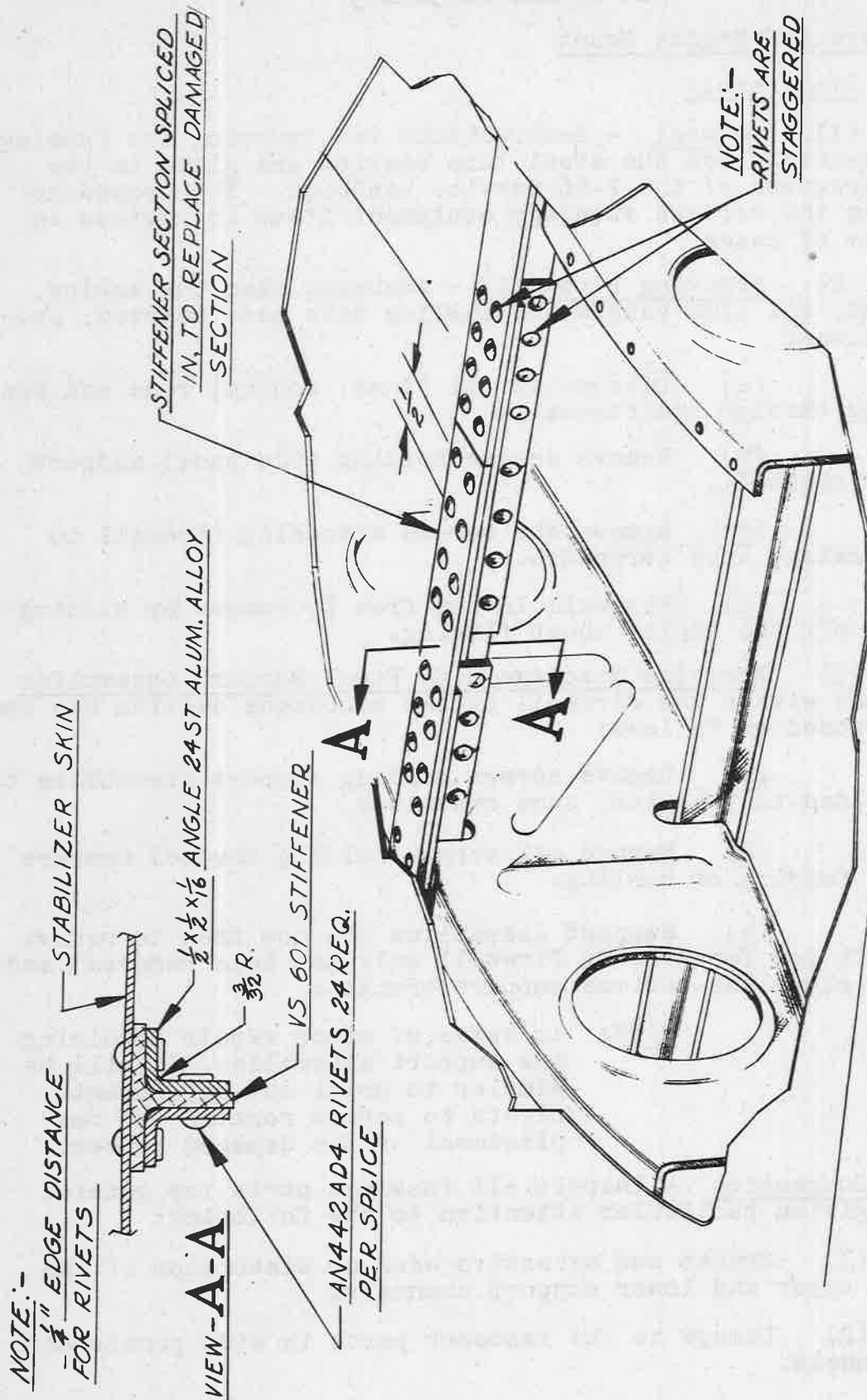


FIG.17. TYPICAL VERTICAL AND HORIZONTAL
STABILIZER STRINGER SPLICE

4. Fuselage and Engine Mounta. Disassembly

(1) General - Instructions for removing the fuselage monocoque section from the steel tube section are given in the relevant paragraph of the P-66 Service Handbook. The procedure for removing the various fuselage equipment items is obvious in the majority of cases.

(2) Removing Firewall - Assuming that the engine, engine mount, all side panels and cowling have been removed, proceed as follows:

(a) Disconnect all lines, control rods and conduit passing through the firewall.

(b) Remove screws holding side panel support channels to firewall.

(c) Remove the screws attaching firewall to clips on fuselage tube structure.

(d) Firewall is now free to remove by sliding forward and off the engine mount fitting.

(3) Removing Fuselage Side Panel Support Assemblies - Assuming that either the firewall or the monocoque section has been removed, proceed as follows:

(a) Remove screws holding support assemblies to brackets welded to the steel tube structure.

(b) Remove all screws holding channel members to fuselage fairing or cowling.

(c) Support assemblies are now free to remove by moving aft (or forward, if firewall only has been removed) and outboard to clear the various support brackets.

NOTE: In cases of minor repair involving the support assemblies, it will be simpler to drill out sufficient rivets to permit removal and replacement of the damaged member.

b. Inspection - Inspect all fuselage parts for general condition, giving particular attention to the following:

(1) Cracks and excessive wear or distortion of the side panel, upper and lower support channels.

(2) Damage to the fastener parts in side panels and support channels.

(3) Excessive wear or breakage of the sheet sealing discs in the firewall.

(4) All brackets and clips welded to the steel tube structure.

(5) Attachment fittings at aft end of steel tube structure and forward end of monocoque structure.

c. Repair

Reference Drawings:

61-31002	Fuselage Assembly - Complete
61-31003	Structure Assembly - Fuselage Tubing
61-31004	Structure Assembly - Fuselage Monocoque
61-31005	Firewall Assembly
61-31023	Fairing Assembly Lower Tube Structure
61-31601	Fairing Upper Forward Fuselage
61-31401	Install. Side Panel Support Structure
61-31301	Structure Assembly - Complete Fuselage Tube
61-32001	Install. - Windshield and Cockpit Enclosure
61-31021	Panel Assembly - Front Removable, R.H.
61-31022	Panel Assembly - Rear Removable, R.H.
61-31030	Panel Assembly - Front Removable, L.H.
61-31031	Panel Assembly - Rear Removable, L.H.
61-31032	Door Assembly - Monocoque Inspection

(1) Repairs to Steel Tube Structure

(a) Minor brackets, clips, and the like can be replaced without difficulty by following the instructions given in the relevant paragraphs of the P-66 Service Handbook. The fuselage tube structure is cadmium plated. Before making repairs, the plating should be protected or removed by one of the following methods:

1. When practicable, tightly wrap a sheet of .002 inch copper shim stock close to each side of the area of the part or tube to be stripped of plating, thus protecting the surrounding plating. This will eliminate the necessity for reworking the cadmium plating.

2. Apply a mixture of one (1) pound of V.S.P. ammonium nitrate to one (1) gallon of water to the area to be stripped. Emery cloth may also be used to remove the cadmium plating where only a small area of plating may be affected by the rework operations.

(b) Repair operations involving additional welding or welding over old welds should be confined, as much as possible, to locations near tube junctions, rather than in the central portion of tubes.

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CAUTION: Fuselage main tube structures are arc welded, and all welded fittings to the tube structure are gas welded; therefore, all joints cannot be repaired as satisfactorily by gas welding, as gas welding over arc welding is not always satisfactory.

(c) Major structural members and elaborate support assemblies can be replaced by cutting the tubes to be replaced at about two (2) inches from their junction with adjoining main structural members and using conventional sleeve joint welds to connect these "stubs" to the replacement members. Refer to Fig. 21 of this Handbook for example of typical weld repairs.

(d) By careful planning of the work involved, it is possible to carry out quite extensive repair operations on the steel tube structure, and obtain a completed structure equal in every way to the original undamaged assembly.

(e) Upon completion of all rework operations, refinish repaired area (including area where cadmium plating has been removed) with two (2) coats of zinc chromate primer, followed by two (2) coats of aluminum lacquer.

(2) Repairs to Monocoque Structure - The majority of operations will be quite routine and do not justify detailed description here. Refer to T.O. No. 23-15-1 for standard repair practices with aluminum-alloy structures, and to Figures 22 and 23 of this Handbook for typical repairs applicable to the P-66 fuselage monocoque structure.

(3) Water-Tighting Enclosure Track - To prevent storm water entering the cockpit enclosure, the surfaces between the track and track upper fuselage rail should be coated with zinc chromate prior to assembly. Coat in the following manner:

(a) Coat upper fuselage rail and sliding enclosure track, extending aft from windshield to the fixed enclosure section, with zinc chromate sealing compound #6, and allow to dry at least ten (10) minutes.

(b) Apply zinc chromate #2, approximately 1/32" thick, to the same surfaces and allow to dry at least thirty (30) minutes.

(c) Assemble parts in the usual manner and fillet the outer edge of track to support rail with zinc chromate #1 pressed in firmly with the fingers.

d. Assembly - All ordinary assembly operations involving the fuselage and its related units are covered in the relevant paragraphs of the P-66 Service Handbook. Reassembly of the fuselage side panel support assemblies and the firewall is substantially the reverse of the procedures for their removal.

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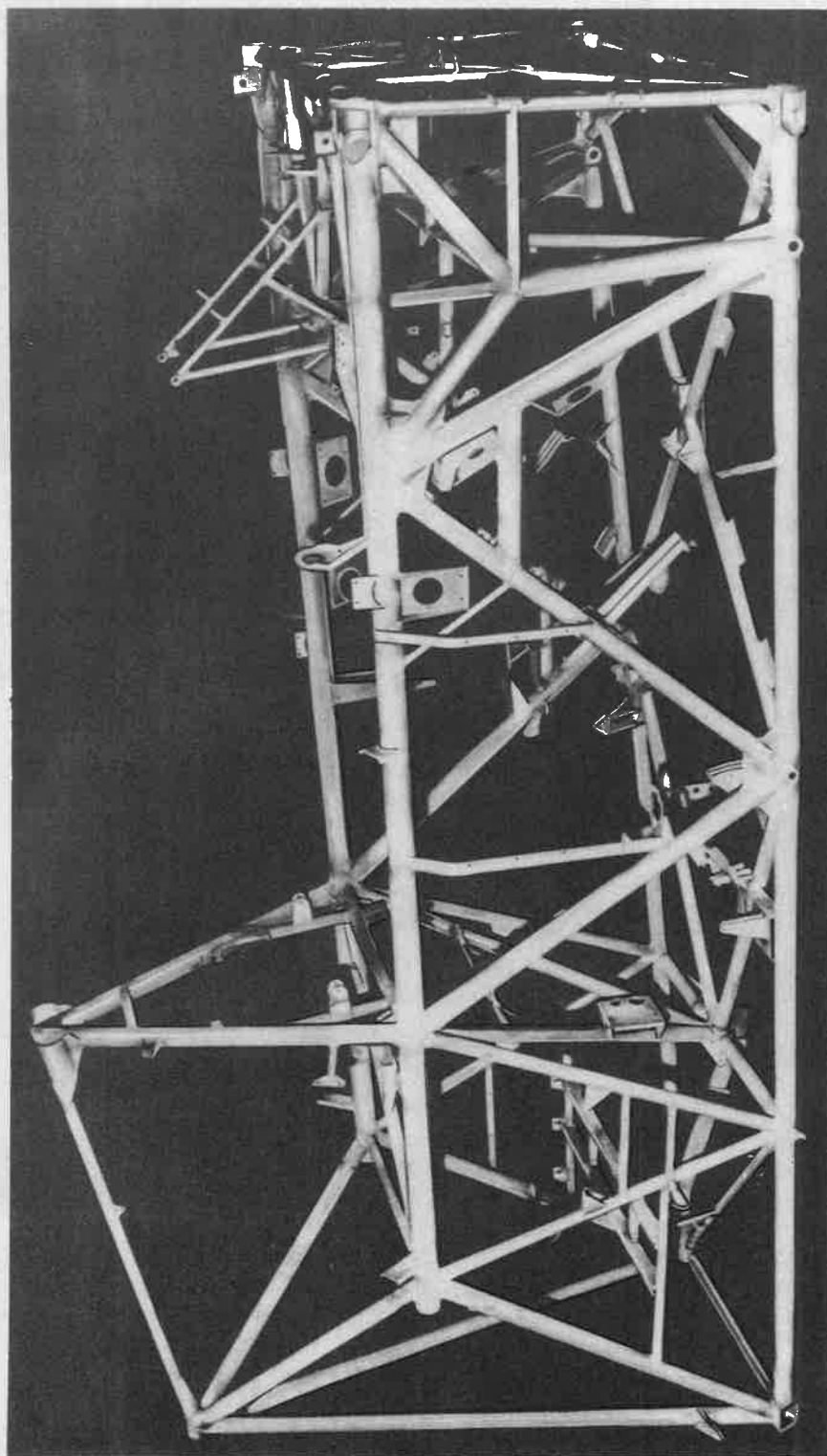


FIG. 18 FUSELAGE STEEL TUBE STRUCTURE ASSEMBLY

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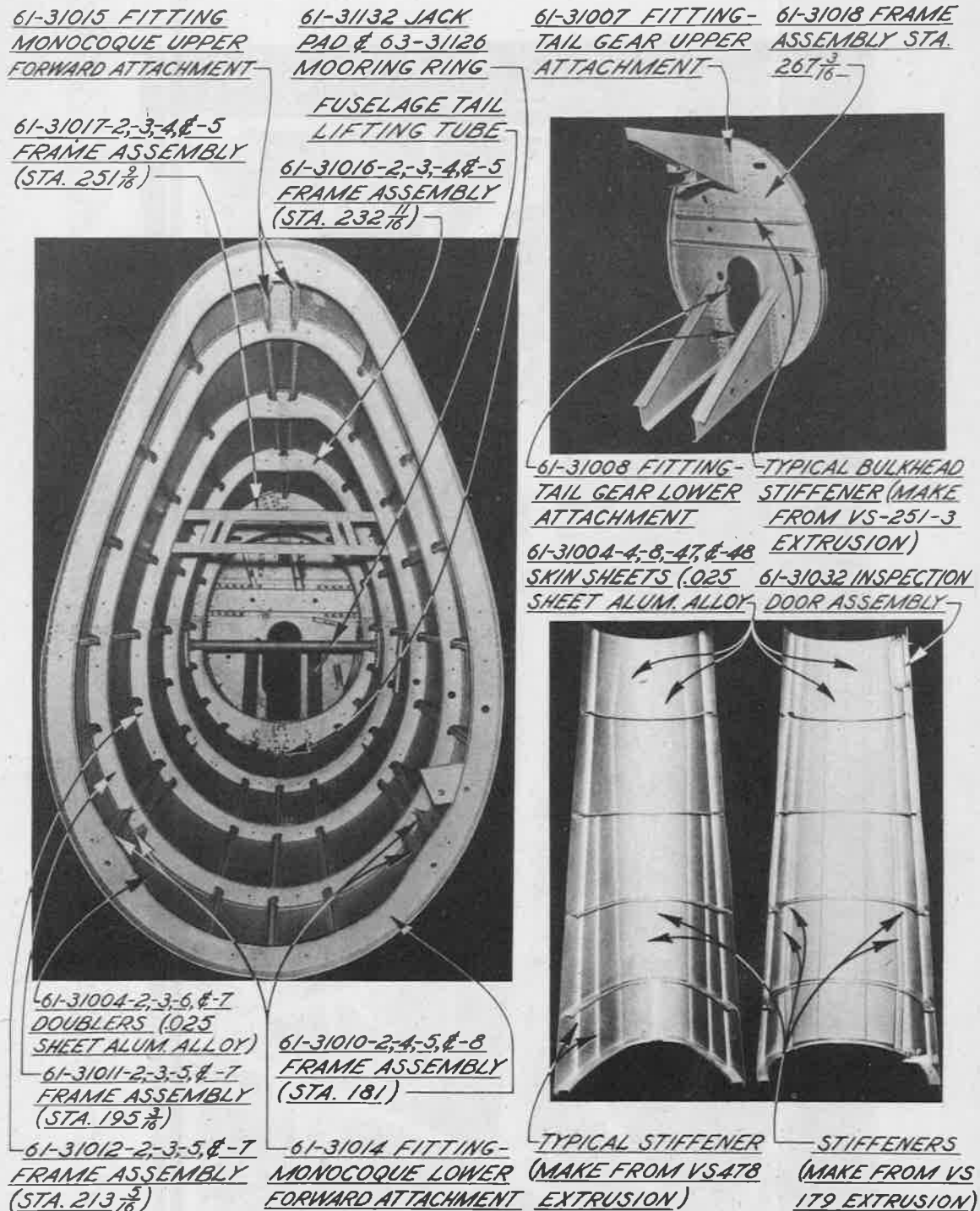


FIG. 19 FUSELAGE MONOCOQUE
STRUCTURE ASSEMBLY

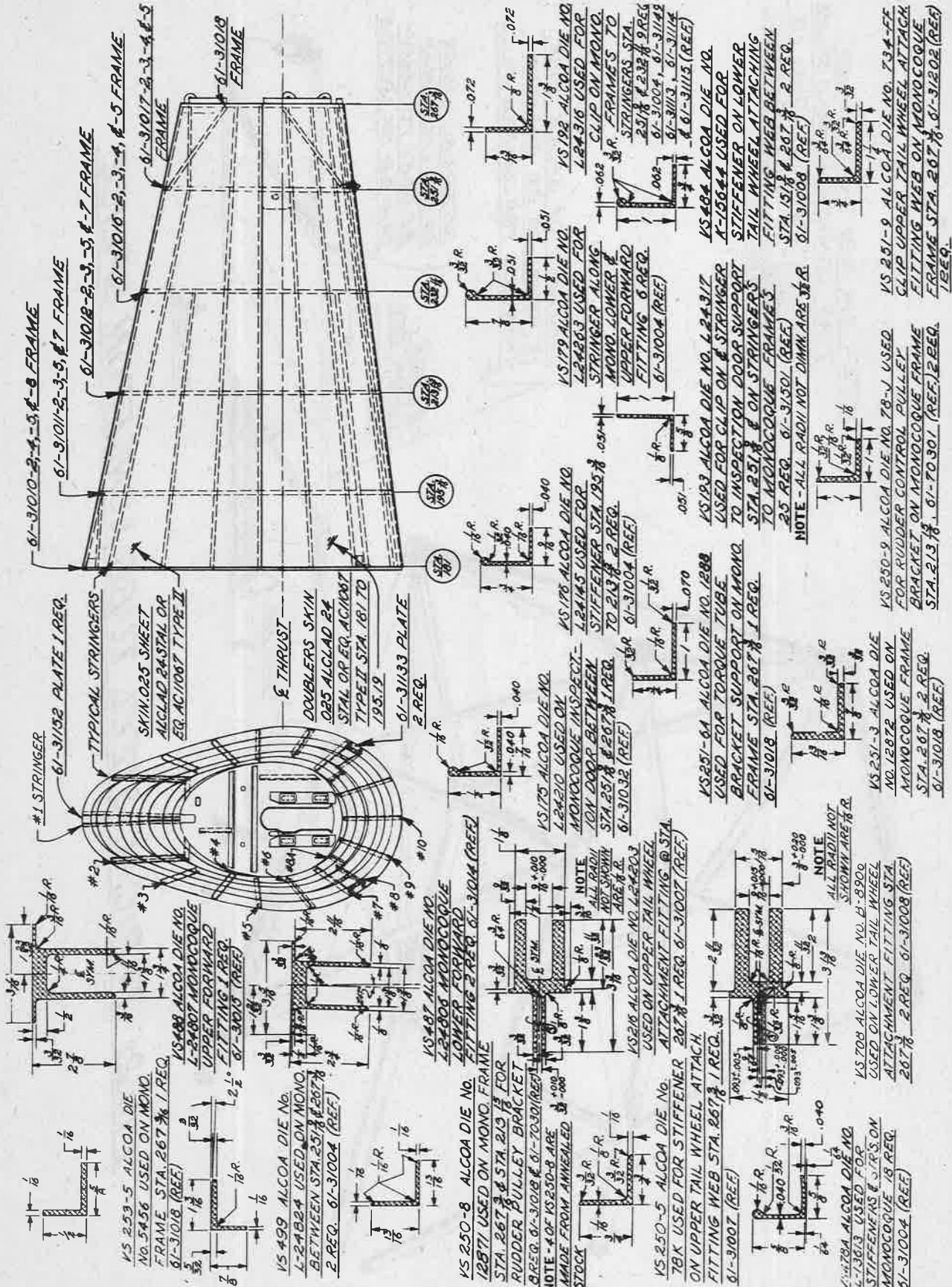


FIG. 20 MONOCOQUE STRUCTURE AND EXTRUSION DIAGRAM

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NOTE:- FOR TUBE SPLICE OTHER
THAN LONGERON, MAKE SPLICE
TUBE THICKNESS EQUAL TO
OR GREATER THAN TUBES WHICH
ARE BEING SPLICED

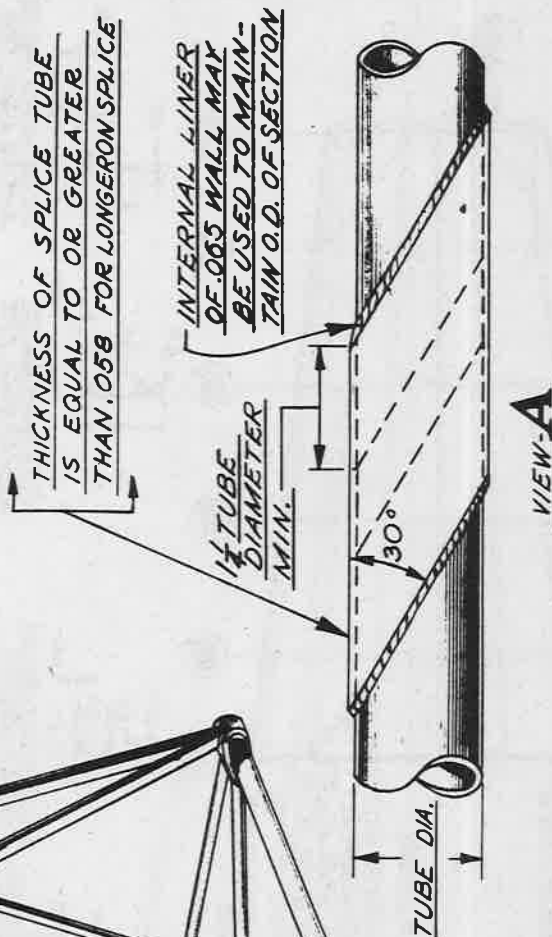
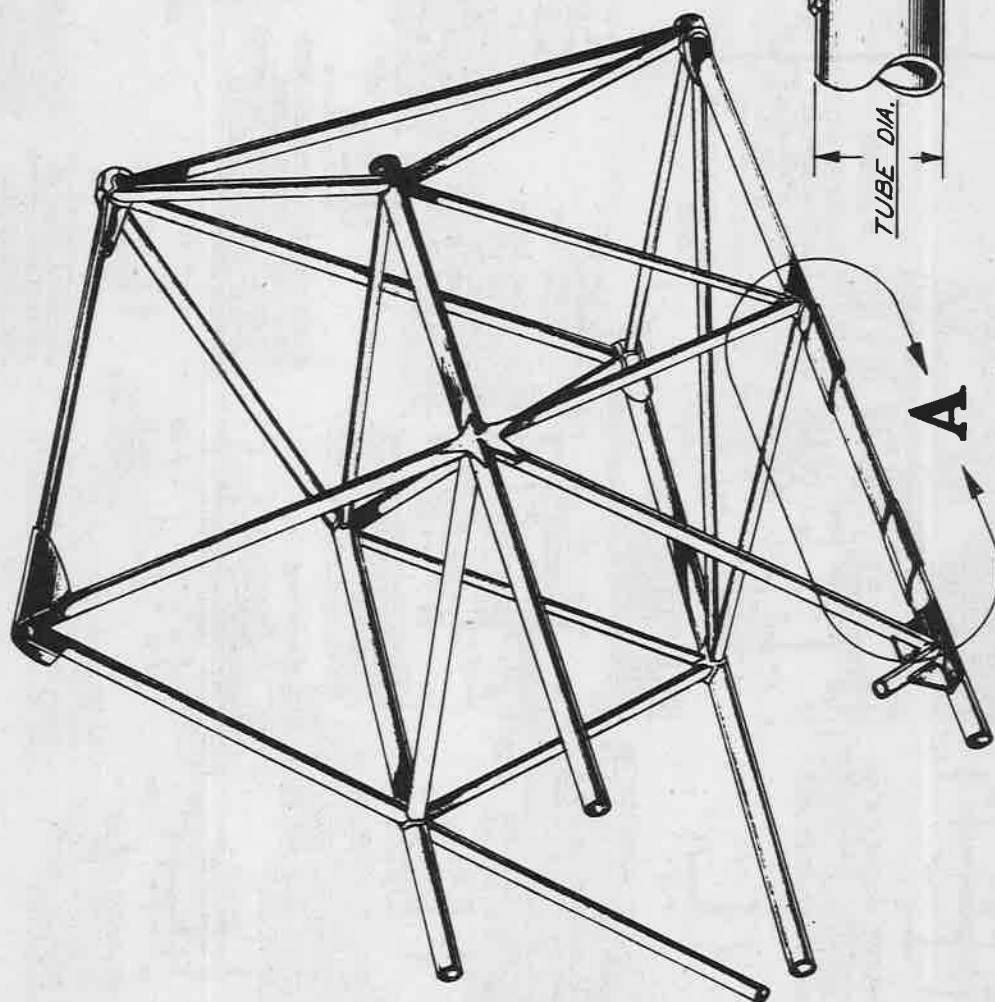


FIG. 21. TYPICAL STEEL TUBE LONGERON SPLICE

NOTE:- MAX. HOLE DIA. TO BE 3"
LESS THAN STRINGER
SPACING OR FRAME SPACING
WHICH EVER IS LEAST

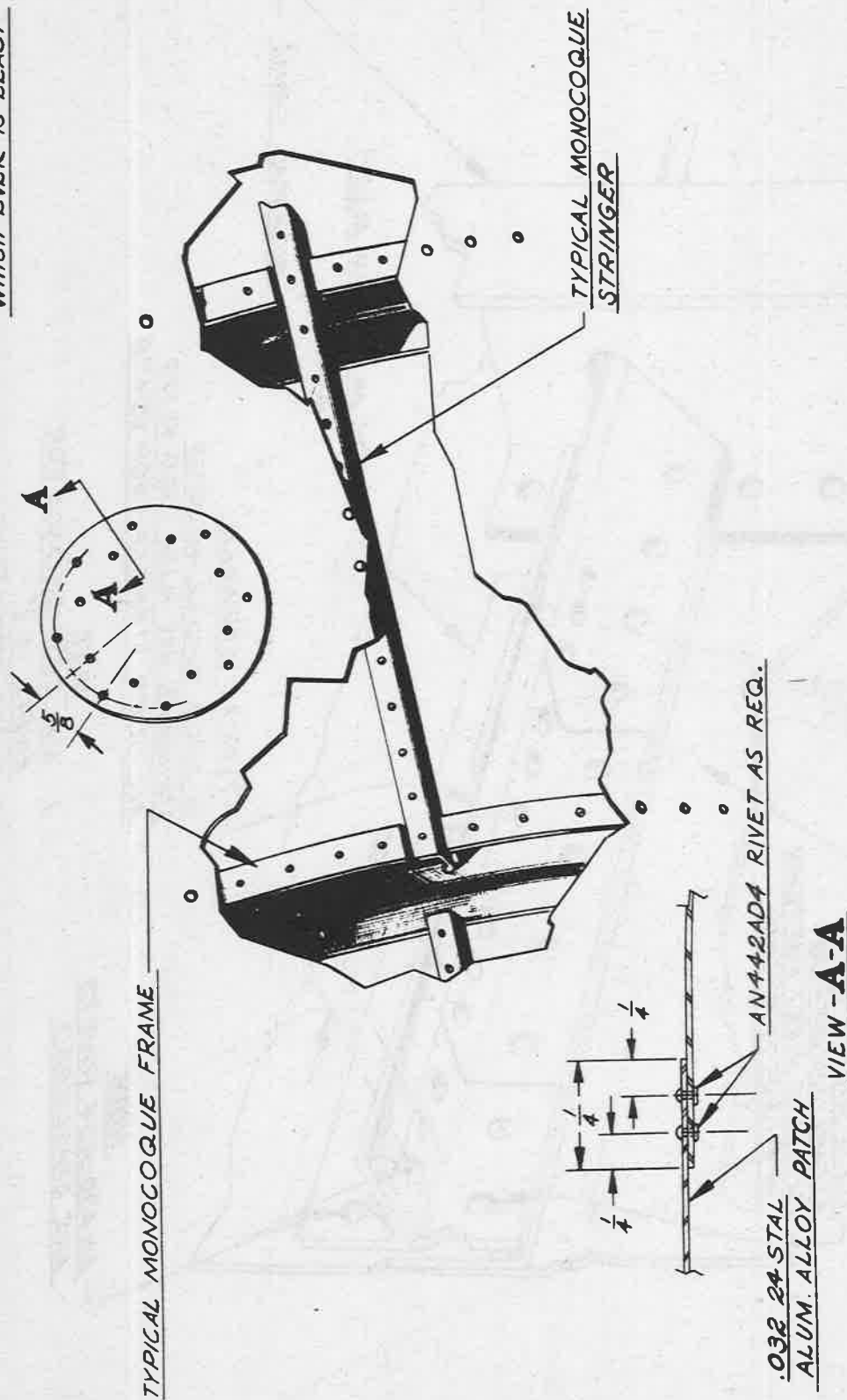


FIG. 22 TYPICAL REPAIR PATCH ON
FUSELAGE MONOCOQUE STRUCTURE

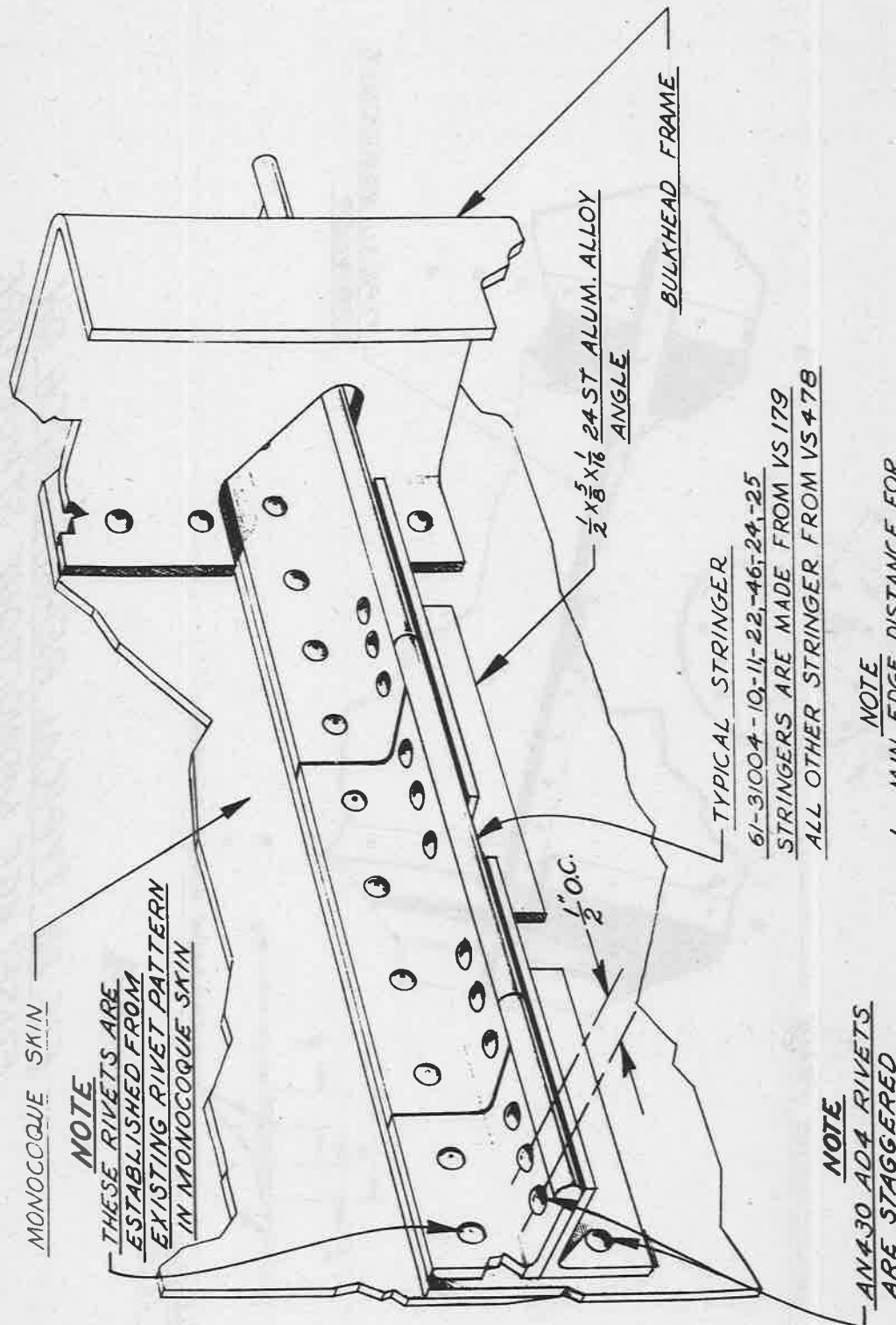


FIG. 23. TYPICAL MONOCOQUE
SECTION STRINGER SPLICE

5. Cowling

Instructions for disassembly, minor repair, and assembly of the cowling are given in the relevant paragraphs of the P-66 Service Handbook. The parts comprising this installation should be carefully inspected for general condition and the necessary repairs made.

6. Landing Gear

NOTE: The abbreviation "A.P.P.I.", as used in this paragraph, signifies "Aircraft Precision Products, Inc." ("United Aircraft Products, Inc." successors), Los Angeles, California, U.S.A., manufacturers of the landing gear strut assemblies and tail wheel shock absorbers used in the P-66 Airplane.

a. Disassembly - Instructions for removing the landing gear fairing, strut assembly, retracting mechanism, and wheel and tire from the airplane are given in the relevant paragraphs, P-66 Service Handbook. To disassemble the shock absorber strut, proceed according to the instructions in the same Handbook, following which all parts should be thoroughly washed in clean hydraulic oil (mineral oil - Air Corps Spec. 3580) and then inspected according to the instructions following:

b. Inspection - Inspect all landing gear strut assembly parts for general condition, giving particular attention to the following:

(1) Check condition of wheel bearings and axle threads.

(2) Carefully check all parts of the knuckle assembly, including axle and torque links, for evidence of cracks or looseness in the parts forming the built-up knuckle assembly.

NOTE: The only shrink fits in this strut are the axle into the knuckle and the strut into the elbow. Any signs of fatigue or looseness at these places is best corrected by the manufacturer. Should the sweat solder joint at the upper end of the strut leak, or if it is believed to be leaking, return it to the manufacturer.

(3) All bearing surfaces inside the shock absorber should be carefully inspected for scratches or evidence of abrasion. Evidence of rubbing is not serious, and in most cases a part should not be rejected for this reason. However, scratches on the bearing surfaces will increase friction and should be removed by light buffing. Slight scratches will be noticed on the O.D. of the bronze bearing at the upper end of the piston, even after a few hours of operation. These are not serious, however, and need not be buffed out.

(4) When scratches and/or abrasion have reached a point where buffing beyond the following limits is required to recondition the parts, replacement is recommended.

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<u>A.P.P.I. Part No.</u>	<u>Description</u>	<u>Normal Size</u>	<u>Replace At</u>
21153	Nut-Packing	$\frac{3.001}{3.003}$ I.D.	3.006 I.D.
21152	Adapter - Packing	$\frac{3.004}{3.001}$ I.D.	3.008 I.D.
11165	Bearing - Piston	$\frac{3.372}{3.370}$ O.D.	3.368 O.D.
11114	Retainer - Orifice	$\frac{2.591}{2.598}$ O.D.	2.586 O.D.

c. RepairReference Drawing:

A.P.P.I. 51104 Strut Assembly - Landing Gear Shock Absorber

Fig. 6, Sect. 4, Chap. 2 of the P-66 Service Handbook

The following general procedure should be followed to recondition the landing gear strut assemblies:

- (1) Rebush the torque links connecting between strut cylinder and piston. The bushings are installed to the limits as given in paragraph 6, c., Sect. 5 of the P-66 Service Manual.
- (2) Replace the torque link bolt if these show evidence of wear. Upper attachment bolt A.P.P.I. 11121-1, lower attachment bolt A.P.P.I. 11121-2 and hinge clevis bolt A.P.P.I. 11119.
- (3) Buff all bearing surfaces to remove scratches and abraded areas. This should be done very carefully, and if the scratches are so deep that it is necessary to buff the material beyond the value given in sub-paragraph b., (4) preceding, the part should be replaced.

NOTE: Straight scratches along the length of the strut are not harmful and need not be buffed out.

- (4) Replace the packing rings, if these have been in use for more than 200 hours.
- (5) Replace the felt washer in the packing nut.
- (6) Replace all other parts showing evidence of excessive wear or mechanical damage.

d. Assembly - Assembly is substantially the reverse of disassembly, and is described in Para. 6., (4), Section 5 of the P-66 Service Handbook.

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(1) Test - Test as follows:

(a) With strut in a vertical position, fully extended, fill with fluid to 300 lbs/sq.in. hydrostatic pressure. There shall be no seepage at the end of six (6) hours.

(b) With strut in horizontal position, fully extended, fill with fluid to 300 lbs/sq.in. hydrostatic pressure. There shall be no seepage at the end of two (2) hours.

7. Tail Gear

NOTE: The abbreviation "A.P.P.I." as used in this paragraph signifies "Aircraft Precision Products, Inc." ("United Aircraft Products, Inc." successors), Los Angeles, California, manufacturers of the landing gear strut assemblies and tail gear shock absorber used in the Type P-66 Airplanes.

a. Disassembly - Instructions for removal of the tail gear and its disassembly are given in Paragraph 7, (4), Section 5 of the P-66 Service Handbook.

b. Inspection - Inspect all tail gear parts for general condition, giving particular attention to the following:

(1) Check the link at each end of the tail wheel shock absorber for evidence of cracks and excessive bushing wear.

(2) Check the bolts attaching the links to the shock absorber for evidence of wear or fatigue.

(3) Inspect lock and retracting mechanism for wear.

(4) All bearing surfaces within the shock absorber should be carefully inspected for scratches or evidence of abrasion. Evidence of rubbing is not serious, and in most cases a part should not be rejected for this reason. However, scratches on the bearing surfaces will increase friction and should be removed by light buffing. Slight scratches will be noticed on the O.D. of the bronze bearing at the lower end of the piston, even after a few hours operation. These are not serious, however, and need not be buffed out unless extending the full length of the bearing.

(5) When scratches and/or abrasions have reached a point where buffing beyond the following limits is required to re-condition the parts, replacement is recommended.

<u>A.P.P.I. Part No.</u>	<u>Description</u>	<u>Normal Size</u>	<u>Replace At</u>
21178	Nut - Packing	$\frac{2.001}{2.003}$ I.D.	2.007 I.D.
11181	Adapter - Packing	$\frac{2.006}{2.010}$ I.D.	2.020 I.D.
21179-1	Bearing - Piston	$\frac{2.247}{2.248}$ O.D.	2.244 O.D.

c. RepairReference Drawings

61-46001	Install. - Tail Wheel and Tail Wheel Controls
61-46002	Wheel Assem. - Tail
61-46021	Knuckle Assem. - Tail Wheel
61-46022	Post Assem. - Tail Wheel
41175 A.P.P.I. (U.A.P.)	Strut Assem. - Tail Wheel Shock Absorber

Figure 7, Section 4, Chapter 2 of the P-66 Service Handbook.

The following general procedure should be followed to recondition the tail gear assembly.

- (1) Replace all bushings in accordance with the bushing chart in Paragraph 7., b., (4), (d), Sect. 5 of the P-66 Service Handbook.
- (2) Replace all bearing bolts showing evidence of wear.
- (3) Replace wheel and tail post bearings and races showing evidence of wear. Replace all other parts in those units which show evidence of excessive wear or mechanical damage.
- (4) Replace the packing rings in the shock absorber unit. These have a tendency to take a permanent "set" after being in use for a period; and best results will be obtained by replacement with new rings.
- (5) Replace all other parts showing evidence of excessive wear or mechanical damage.

d. Assembly

- (1) General - Assembly is substantially the reverse of disassembly and is described in Paragraph 7., (3), Sect. 5, of the P-66 Service Handbook.
- (2) Test - Test as follows:
 - (a) With strut in horizontal position, fully extended, fill with fluid to 300 lbs/sq.in. hydrostatic pressure. There shall be no evidence of seepage at the end of two (2) hours.
 - (b) With strut in vertical position, fully extended, fill with fluid to 300 lbs/sq.in. hydrostatic pressure. There shall be no seepage at the end of six (6) hours.

8. Engine and Accessories

a. Disassembly and Inspection - Complete instructions for the removal of the engine and its accessories from the airplane are given in the relevant paragraphs of the P-66 Service Handbook. Complete instructions regarding repair of the engine are given in the relevant Engine Overhaul Handbook. A list of applicable handbooks covering overhaul of the various engine accessories is given in the P-66 Service Handbook. Inspect the power plant installation for general condition, giving particular attention to the following:

(1) The vibration-absorbing bushings between engine and engine mount should be carefully inspected and replaced if necessary. Refer to T. O. No. 01-1-58.

(2) Inspect exhaust collector ring for burned spots and cracks. The carburetor air scoop, hot air valve and attaching studs should be checked for evidence of excessive wear and mechanical damage. Inspect condition of oil cooler air scoop and control valve.

(3) Inspect the cowl inner ring for cracks and loose rivets. Typical repair methods for the inner ring are shown in T. O. No. 01-50BA-6.

b. Repair and AssemblyReference Drawings:

61-56001	Install. - Demountable Power Plant
61-58003	Ring Assem. - Exhaust Collector
61-59201	Install. - Engine Section Engine and Access. Controls
61-66201	Install. - Engine Section Instruments
61-78201	Install. - Engine Section Electrical

Actual repair operations not covered by the references in sub-paragraph a., preceding, are conventional and do not merit detailed description here. All important assembly instructions will be found in the references given in sub-paragraph a., preceding.

9. Engine Controls

a. Disassembly and Inspection - Instructions for disassembly of the complete engine control system are given in the relevant paragraphs of the P-66 Service Handbook. Inspect all parts of the engine and propeller control system for general condition.

b. Repair and Assembly

Reference Drawings:

61-59101	Install. - Fuselage Sect. Engine & Access. Controls
61-59201	Install. - Engine Sect. Engine & Access. Controls
61-61001	Install. - Engine Sect. Starter System
61-61101	Install. - Fuselage Sect. Starter System

The anti-friction bearings in rod-ends and bellcranks should be cleaned and lubricated as outlined in T. O. No. 29-1-3. The bushing chart on the page following gives complete information for replacement purposes. Actual repair operations will be quite conventional and do not merit detailed description here. Instructions for assembly of the complete engine control system are given in relevant paragraphs of the P-66 Service Handbook. Refer to Fig. 24 of this Handbook when replacing oil cooler scoop operating mechanism bushings.

LOCATION OF BUSHING	BUSHING PART NUMBER	ASSEMBLY PART NUMBER	REAM BOSS BEFORE BUSHING	BUSHING O.D.	REAM AFTER BUSHING
Oil Cooler Scoop Actuat- ing Gear Box Drive End Bushing	ø61-58155 (see Note 1)	61-58025	$\frac{.8745}{.8755}$	$\frac{.8780}{.8760}$	$\frac{.7495}{.7505}$
Oil Cooler Scoop Actuat- ing Gear Box Pilot End Bushing	*61-58025-2 (see Note 1)	61-58025	$\frac{.8120}{.8130}$	$\frac{.8160}{.8140}$	$\frac{.6245}{.6255}$

ø Commercial Product, equal to and interchangeable with "COMPO" Bearing, Bound Brook Oil-Less Bearing Company, Bound Brook, New Jersey, U.S.A.

* Commercial Product, equal to and interchangeable with "OILITE" Bearing, Chrysler Corporation, Detroit, Michigan, U.S.A.

Note 1. Bushings Nos. 61-58115 and 61-58025-2 must be reamed in line.

FIGURE 24. ENGINE CONTROL SYSTEM BUSHING CHART

RESTRICTED

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10. Propeller

a. Instructions for disassembling the propeller control system are given in the relevant paragraphs of the P-66 Service Handbook and the information given repair of engine control in Paragraph 9, preceding, are applicable to the propeller control system.

b. Refer to T. O. No. 03-20CB-2 for overhaul instructions relevant to the propeller.

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11. Starting System - Refer to Technical Orders Nos. 03-5CA-1, 03-5CA-3, 03-5-9, and 03-5C-1 for instructions relevant to overhaul of the starter and other components of the starting system.

12. Oil System

a. Disassembly and Inspection - Refer to the relevant paragraphs of the P-66 Service Handbook for instructions for removing the oil system components. Inspect all oil system components for general condition, giving particular attention to the following:

- (1) Check tank straps for cracks and worn spots.
- (2) Inspect oil tank support structure for evidence of mechanical damage.
- (3) Inspect oil tank for cracks, dents and chafed areas. Special attention should be given to the inlet and outlet fittings.

b. Repair and Assembly

Reference Drawings:

61-63003	Tank Assem. - Oil
61-63001	Install. - Oil System
61-63007	Support Assem. - Oil Tank
61-63013	Support Assem. - Oil Cooler Lower
61-63103	Channel - Oil Tank Support Front
61-63104	Channel - Oil Cooler Upper
61-63109	Channel - Oil Tank Support Rear

- (1) All lines should be cleaned after removal from the airplane.
- (2) Refer to T. O. No. 01-1E-26 for instructions for cleaning and repairing of tanks.
- (3) The tank strap pads and oil cooler clamping ring pads should be replaced if appreciably worn, packed, or deteriorated by oil.
- (4) For oil cooler repair information, refer to T. O. Nos. 03-15-2 and 03-15-4.
- (5) Refer to relevant paragraphs in P-66 Service Handbook for instructions on assembling the oil system components.
- (6) For complete information regarding oil system lines, refer to Fig. 25 of this Handbook.

<u>PART NO.</u>	<u>NEXT ASSEMBLY</u>	<u>NO. REQ.</u>	<u>LOCATION</u>	<u>DIAM.</u>	<u>GAGE</u>	<u>MATERIAL</u>	<u>LENGTH</u>	<u>SHAPE</u>	<u>TYPE END</u>
61-63010-1	61-63001	1	Oil Tank to Oil Cooler	1	.049	52SoAlum.	33	F	-3
61-63010-2	61-63001	1	Oil Cooler to Engine	1	.049	52SoAlum.	16	F	-3
61-63010-4	61-63001	1	Oil Tank to "Y" Drain Valve and Thence to Engine	1-1/2	.049	52SoAlum.	9	F	-3
61-63010-5	61-63001	1	Vent, Oil Tank to Engine	1/2	.035	52SoAlum.	26	F	-3
61-63010-6	61-63001	1	Vent, Oil Tank to Engine	1/2	.035	52SoAlum.	26	F	-3
61-63010-7	61-63001	1	Filler Neck Over-flow, Filler Neck to Line 61-63010-9	1/2	.035	52SoAlum.	40	F	-3
61-63010-9	61-63001	1	Filler Neck Over-flow, Line 61-63010-7 to Out-let	1/2	.035	52SoAlum.	45	F	-3
61-63010-10	61-63001	1	Oil Dilution Solenoid to "Y" Valve	1/4	.035	Copper	60	F	-1

FIGURE 25. OIL SYSTEM LINES CHART

<u>PART NO.</u>	<u>NEXT ASSEMBLY</u>	<u>NO. REQ.</u>	<u>LOCATION</u>	<u>DIAM.</u>	<u>GAGE</u>	<u>MATERIAL</u>	<u>LENGTH</u>	<u>SHAPE</u>	<u>TYPE END</u>
61-63010-12	61-64101	1	Oil Dilution Solenoid to Line 61-63010-13	1/4	.035	Copper	40	F	-1
61-63010-13	61-64101	1	Oil Dilution, Line 61-63010-12 to Emergency Fuel Pump	1/4	.035	Copper	60	F	-1

NOTE: Under heading "SHAPE", "F" indicates line was preformed to a template.

FIGURE 25. OIL SYSTEM LINES CHART (CONT'D)

13. Fuel System

a. Disassembly, Inspection and Repair - To overhaul the fuel system thoroughly, all removable units should be disassembled from the airplane for inspection and necessary repairs.

(1) Lines

(a) All lines should be carefully removed and tagged with their location as an aid to re-assembly.

(b) After removing all fuel lines, clean thoroughly and carefully inspect for deep scratches or deformation. These conditions, if found, are sufficient cause for replacement. Refer to Fig. 3 of Handbook of Operation and Flight Instructions for the P-66 Airplane, and to the Fuel System Lines Chart following, for replacement data. Flared ends of lines should be checked. In cases where a slight scratch appears, it can be burnished out by using a burnishing tool or a fine-grade of emery cloth, using oil as a lubricant, to prevent scratches. Fuel lines which have been inspected and found to be in good condition should be re-installed in the airplane. Annealing need be done only as condition of tubes indicates. Refer to T. O. No. 01-1E-31 for instructions on annealing of lines.

(2) Corrosion-Resistant Cartridge Drain - Remove the corrosion-resistant cartridge; inspect; and refill as per instructions in T. O. No. 03-10-20.

(3) Fuel Tank Cells - Refer to relevant paragraph in the P-66 Service Handbook.

(4) Fuel System Controls - The emergency fuel pump system should be completely disassembled for inspection of all control rods, bushings, and bellcranks. The control rods and brackets should be checked for misalignment and deformation. Inspect fuel cock controls in accordance with T. O. No. 03-10-13.

(5) Fuel Pressure Warning Unit, 160-01 (Kollsman)

Refer to relevant handbook, Kollsman Instrument Company, Elmhurst, N. Y., U.S.A.

b. Assembly - The assembly of fuel system units not covered by reference Technical Orders is quite conventional and does not merit detailed discussion here.

c. Final Inspection

(1) Inspect vent lines for proper hook-up, and be sure the lines are open.

(2) Check through the entire system to insure that all lines are connected with the selector valve, and operate to the proper tanks.

<u>PART NO.</u>	<u>NEXT ASSEMBLY</u>	<u>NO. REQ.</u>	<u>LOCATION</u>	<u>LENGTH</u>	<u>DIAM.</u>	<u>GAGE</u>	<u>MATERIAL</u>	<u>TYPE OF END FIT.</u>
<u>ENGINE SECTION FUEL LINES</u>								
61-64016-1	61-64201	1	Firewall to Carburetor (Connects to 61-64017-10)	18	1	.049	Aluminum	-3
61-64016-2	61-64201	1	Firewall to Carburetor (Connects to 61-64017-21)	25	1/4	.032	Aluminum	-1
<u>FUSELAGE SECTION FUEL LINES</u>								
61-64017-10	61-64101	1	Engine Driven Pump to Firewall (connects to 61-64016-1)	17	1	.049	52SoAlum.	-3
61-64017-12	61-64101	1	L.H. Vertical Section of Vent Line for L.H. Tank	43	5/8	.042	52SoAlum.	-1
61-64017-13	61-64101	1	L.H. Vertical Section of Vent Line for R.H. Tank	44	5/8	.042	52SoAlum.	-1
61-64017-14	61-64101	1	R.H. Vertical Section of Vent Line for L.H. Tank	50	5/8	.042	52SoAlum.	-1
61-64017-15	61-64101	1	R.H. Vertical Section of Vent Line for R.H. Tank	44	5/8	.042	52SoAlum.	-1
61-64017-16	61-64101	1	R.H. Tank Vent Outlet	43-1/2	5/8	.042	52SoAlum.	-1
61-64017-17	61-64101	1	L.H. Tank Vent Outlet	51	5/8	.042	52SoAlum.	-1

FIGURE 26. FUEL SYSTEM LINES CHART

<u>PART NO.</u>	<u>NEXT ASSEMBLY</u>	<u>NO. REQ.</u>	<u>LOCATION</u>	<u>LENGTH</u>	<u>DIAM.</u>	<u>GAGE</u>	<u>MATERIAL</u>	<u>TYPE OF END FIT.</u>
61-64017-18	61-64101	1	Upper Horizontal Section of Vent Line for L.H. Tank	42	5/8	.042	52SoAlum.	-1
61-64017-19	64-64101	1	L.H. Fuel Gage to L.H. Tank	31	1/4	.032	52SoAlum.	-1
61-64017-20	61-64101	1	R.H. Fuel Gage to R.H. Tank	26	1/4	.032	52SoAlum.	-1
61-64017-21	61-64101	1	Vent Line, R.H. Fuel Gage to Firewall (Connects to 61-64016-2)	41-1/2	1/4	.032	52SoAlum.	-1
61-64017-22	61-64101	1	Upper Horizontal Section for Vent Line of R.H. Tank	42	5/8	.042	52SoAlum.	-1
<u>WING CENTER SECTION FUEL LINES</u>								
61-64018-1	61-64301	1	Emergency Fuel Pump to Tee at Outlet Side of Engine-Driven Pump	20-1/2	1	.049	Aluminum	-3
61-64018-2	61-64301	1	Emergency Fuel Pump to Tee at Intake Side of Engine-Driven Pump	25-1/2	1	.049	Aluminum	-3
61-64018-4	61-64301	1	Fuel Cock to Reserve Fuel Supply	13	1	.049	Aluminum	-3
61-64018-5	61-64301	1	Fuel Cock to R.H. Check Valve	6	1	.049	Aluminum	-3

FIGURE 26. FUEL SYSTEM LINES CHART (CONT'D)

<u>PART NO.</u>	<u>NEXT ASSEMBLY</u>	<u>NO. REQ.</u>	<u>LOCATION</u>	<u>LENGTH</u>	<u>DIAM.</u>	<u>GAGE</u>	<u>MATERIAL</u>	<u>TYPE OF END FIT</u>
61-64018-6	61-64301	1	L.H. Tank to Vent Outlet	52	5/8	.042	Aluminum	-1
61-64018-7	61-64301	1	R.H. Tank to Vent Outlet	52	5/8	.042	Aluminum	-1
61-64018-10	61-64301	1	L.H. Fuel Gage to L.H. Tank	11	1/2	.042	Aluminum	-3
61-64018-11	61-64301	1	R.H. Fuel Gage to R.H. Tank	14	1/2	.042	Aluminum	-3
61-64018-12	61-64301	1	Drain Line from Engine-Driven Pump	13	1/4	.035	Aluminum	-1
61-64018-13	61-64301	1	Vent Line from 61-64017-15 to R.H. Fuel Tank	44-1/4	5/8	.042	Aluminum	-1
61-64018-14	61-64301	1	Vent Line from 61-64017-12 to L.H. Fuel Tank	44-1/4	5/8	.042	Aluminum	-1
61-64018-15	61-64301	1	R.H. Tank to R.H. Check Valve	13	1	.049	Aluminum	-3
61-64018-16	61-64301	1	L.H. Tank to Check Valve on Fuel Cock	15	1	.049	Aluminum	-3
61-64018-17	61-64301	1	R.H. Tank to R.H. Check Valve	9-3/4	1	.049	Aluminum	-3
61-64018-18	61-64301	1	L.H. Tank to Check Valve on Fuel Cock	7-1/2	1	.049	Aluminum	-3

FIGURE 26. FUEL SYSTEM LINES CHART (CONT'D)

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14. Engine and Aeronautical Instruments - Refer to relevant paragraphs in P-66 Service Handbook for instructions for removing the instrument panel from the airplane; together with listings of reference drawings and Technical Orders giving maintenance and overhaul information. Procedure for removal of the individual instruments from the panels is obvious upon inspection. General instrument repair instructions are contained in T. O. No. 05-1-1.

15. Surface Controls

NOTE: With the exception of the trim tab system, the surface control system of the P-66 Airplane is of conventional design and does not merit detailed discussion in this Handbook. The instructions given herein, therefore, will be largely confined to overhaul of the trim tab system.

a. Disassembly

(1) General - Instructions for removal of the complete surface control system are given in the relevant paragraphs of the P-66 Service Handbook.

(2) Trim Tab Units - The installation of the trim tab units is clearly shown in the diagram at Figure 28 of this Handbook. When the cables are removed from the trim tab units, it is important that the distance from the cable end to the "kink" at the tab drum aft end should be measured and noted for each tab cable removed. Also, note direction in which cable is wound on drum. This will permit assembling new cables to the nut-and-drum assemblies without difficulty.

b. Inspection - Inspect all control system parts for general condition. Refer to T. O. No. 01-1-26 for information on cable inspection and replacement. Inspect the trim tab units as follows:

(1) Inspect general condition of the unit, giving particular attention to the condition of the worm and nut.

(2) Check the end-play of nut-and-drum in the support housing and end plate. This should be between .004 and .010.

c. RepairReference Drawings

61-71004	Shaft Assem. - Trim Tab Control
61-71010	Unit Assem. - Trim Tab Control

All bushings in the control system showing appreciable wear should be replaced. Refer to the bushing chart on the pages following. All other parts showing evidence of excessive wear and/or mechanical damage should be replaced or reconditioned.

d. Assembly

(1) General - The assembly and rigging of the various units comprising the control system is substantially the reverse of their disassembly, and is covered by the relevant paragraphs in the P-66 Service Handbook.

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(2) Trim Tab Units - The construction of the tab unit assembly is clearly shown in Fig. 4., Sect. 5 of the P-66 Service Handbook.

(3) Rigging Alignment - The surface control lock (see relevant paragraphs - P-66 Service Handbook) is used to neutralize the rudder pedals and the pilot's control stick for the purpose of rigging the surface controls.

<u>LOCATION OF BUSHING</u>	<u>BUSHING PART NUMBER</u>	<u>ASSEMBLY PART NUMBER</u>	<u>REAM BOSS BEFORE BUSHING</u>	<u>BUSHING O.D.</u>	<u>REAM AFTER BUSHING</u>
Aileron Trim Tab Control Bearing	* A-652	61-71019	$\frac{.6235}{.6245}$	$\frac{.6260}{.6250}$	$\frac{.4925}{.5005}$
Aileron Trim Tab Handwheel Assembly	* A-838-6	61-71106	$\frac{.8745}{.8755}$	$\frac{.8780}{.8770}$	$\frac{.7500}{.7510}$
Trim Tab Control Base Assembly	* A-205-2	61-71112	$\frac{.2495}{.2505}$	$\frac{.2510}{.2500}$	$\frac{.1895}{.1905}$
Trim Tab Control Base Assembly	* A-521	61-71112	$\frac{.4995}{.5005}$	$\frac{.5030}{.5020}$	$\frac{.3745}{.3755}$
Emergency Fuel Pump Handle Lever	* A-838-5	61-64010	$\frac{.8745}{.8755}$	$\frac{.8780}{.8770}$	$\frac{.7500}{.7510}$
Elevator Trim Tab Handwheel Assembly	* A-838-6	61-71105	$\frac{.8745}{.8755}$	$\frac{.8780}{.8770}$	$\frac{.7500}{.7510}$
		61-71008	---	---	---

SURFACE CONTROLS BUSHING CHART

* Commercial Product, must be equal to or interchangeable with "OILITE"
Bushing, Chrysler Corporation, Detroit, Michigan, U.S.A.

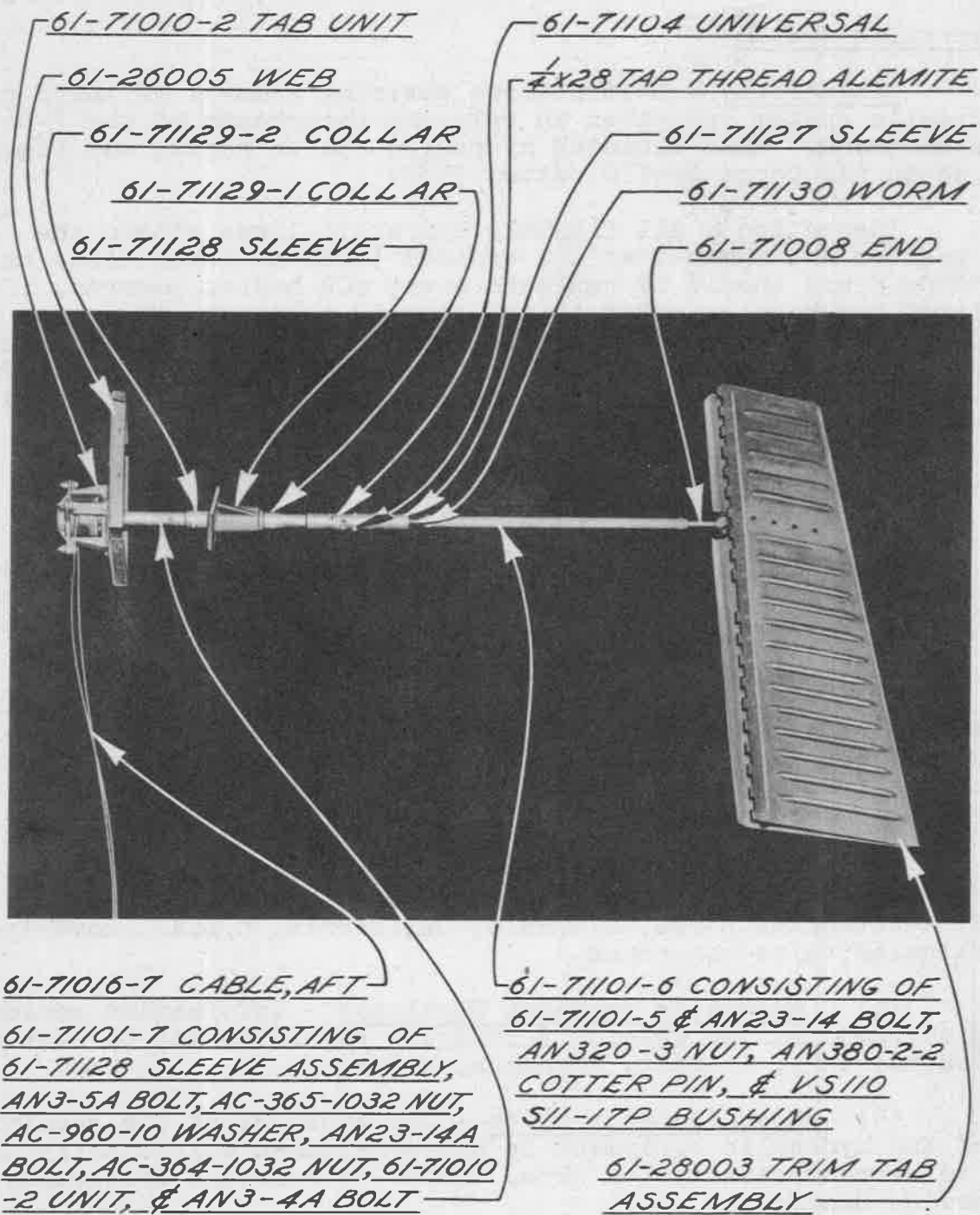


FIG. 28 RUDDER TRIM TAB
UNIT INSTALLATION

16. Hydraulic System

a. Disassembly - Instructions covering removal of units of the hydraulic system are given in relevant paragraphs of the P-66 Service Handbook. When cleaning hydraulic system parts, use liquid specified in Air Corps Specification 3580.

b. Inspection - All flexible hydraulic lines within the engine section and those that are exposed (such as brake lines on the landing gear) should be replaced every 800 hours; however, if this period has been extended to the time of overhaul, they must be changed at this time. All internal flexible hose should be replaced at every overhaul. The rigid lines should be carefully checked for minute cracks and worn surfaces. The lines should not be removed and annealed.

c. Repair

(1) Engine-Driven Hydraulic Pump - Overhaul engine-driven hydraulic pump in accordance with the instructions contained in "Handbook of Instructions for Combination Pumps", Pump Engineering Service Corp., Cleveland, Ohio, U.S.A. Also refer to T.O. No. 03-30CC-4.

(2) Emergency Hydraulic Hand Pump - Overhaul hydraulic hand pump in accordance with information contained in "Handbook of Instructions and Parts Catalog Covering Hand Pump No. 65008", which is available from Aircraft Accessories Corp., Glendale, California, U.S.A.

(3) Hydraulic Selector Valves - Overhaul selector valves in accordance with instructions contained in handbook by Aircraft Accessories Corp., Glendale, California, U.S.A., covering the particular valve concerned.

(4) Automatic Pressure Regulator - Information concerning the overhaul of the #AA-14513 pressure regulator may be obtained from Vickers, Inc., Detroit, Michigan, U.S.A.

(5) Miscellaneous Units - The overhaul of the remaining units of the hydraulic equipment is not considered sufficiently involved to warrant description here. Refer to relevant paragraphs, P-66 Service Handbook.

d. Assembly - All ordinary assembly operations involving the various hydraulic units are given in the relevant paragraphs of the P-66 Service Handbook and in the references in sub-paragraph c., preceding.

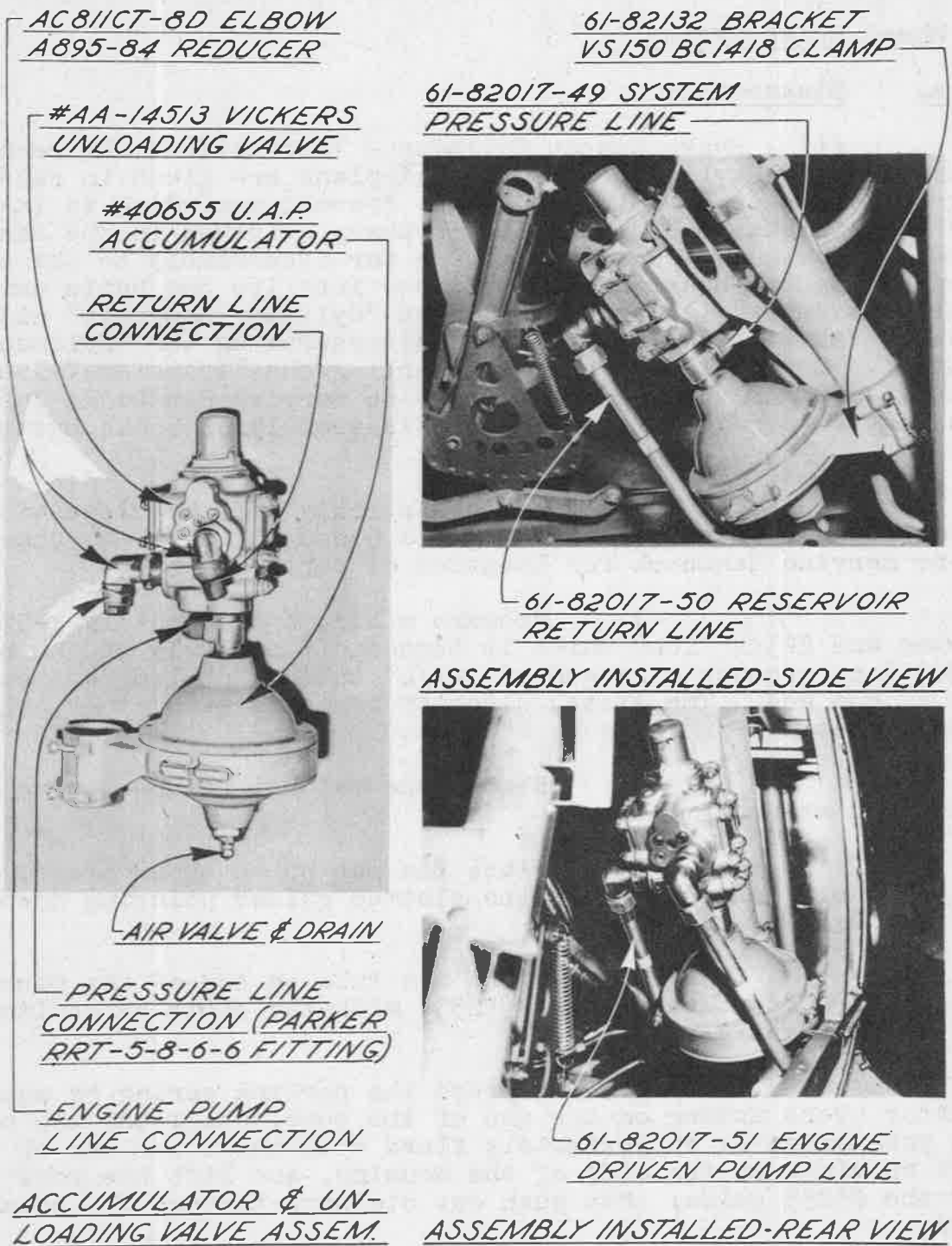


FIG.29 INSTALLATION OF HYDRAULIC
ACCUMULATOR & UNLOADING VALVE

17. Wheel Brake Systema. Disassembly

(1) Brake Master Cylinder - Instructions for removing the brake master cylinders from the airplane are given in relevant paragraphs of P-66 Service Handbook. Proceed according to instructions on maintenance of wheels and brakes, as given in the same Handbook. These instructions provide for disassembly to the extent of separating the brake master cylinder into its two basic units of "Housing Assembly" (lower portion) and "Cylinder Assembly" with "Transfer Valve Assembly", and then disassembling the "Cylinder Assembly". Instructions for disassembling the "Transfer Valve Assembly" are also contained in the P-66 Service Handbook, just preceding the paragraph relative to disassembly of brake master cylinder.

(a) The "Housing Assembly" may be disassembled in the following manner (refer to Figures 9 and 10, Sect. 4, Chap. 2 of P-66 Service Handbook for location of parts).

1. Procure a bar, approximately 1-5/8" in diameter and 2-3/4" long which is turned off squarely at the ends. In addition, procure a length of 1-3/4" tubing, 6" long and cut two slots at one end. The slots, directly opposite each other, should be approximately 3/4" wide by 1" deep.

2. Remove the ratchet return spring from the housing assembly.

3. Place the bar on an arbor press, and fit the housing assembly with the slotted guides pointing downward over the bar.

4. Place the tube on top of the parking spring yoke guide (Warner Part #3235) with the slots straddling the yoke (Warner Part #3234).

5. Depress the parking spring by means of the arbor press acting on the end of the tube, until the top of the #3235 yoke guide is approximately flush with the lower end of the square openings on the side of the housing, and lift the yoke up to clear the #3235 guide; then push out sideways through the square opening.

6. Remove housing assembly from arbor press and remove spring. Housing is now completely disassembled.

(2) Wheel Brakes - Refer to Service Bulletin #2-41, Bendix Aviation Corporation, Airplane Wheel And Brake Division, South Bend, Indiana, U.S.A.

b. Inspection - Two difficulties can arise in the operation of these brakes; either the brake master cylinder will not hold pressure, or else has a tendency to stick or bind during operation. Inspect as follows to determine the cause of faulty brake operation.

(1) Brake Master Cylinder Does Not Hold Pressure - This difficulty may be due to several causes which are listed in the sub-paragraphs following, together with the proper method of checking each.

NOTE: Before checking the brake master cylinder for cause of loss of pressure, the brakes should be placed in parked position and the entire system thoroughly checked for external leaks.

(a) Leaky Transfer Valve Gasket - Proceed as follows to determine whether this leakage exists:

1. With the brake off and the unit in a vertical position, remove the lower level indicating screw and let the liquid in the reserve chamber drain to that level.

2. Replace the lower level indicating screw, and remove the upper level indicating screw.

3. Put the brake in the parked position and put the rudder pedal in such a position that the open upper level indicating screw hole points downward as much as possible.

4. If a leakage past the transfer valve exists, liquid will be noticed dripping from this hole, since with the unit in the position outlined in 3., preceding, it is lower than the drilled opening in the cylinder between the transfer valve and the reserve chamber.

5. If no dripping through the open level indicating screw hole is observed under the above conditions, the leakage is past the compensator valve into the reserve chamber and the unit must be completely overhauled.

(b) Leaky Compensator Valve - If the inspection outlined under sub-paragraph (a), preceding, indicates leakage of the compensator valve, make the repairs outlined under sub-paragraph c., (1), (b), following.

(c) Worn or Damaged Sealing Cups or Cylinder Walls - If the inspection outlined in sub-paragraph (a), preceding, failed to indicate the cause of the trouble, it will be necessary to disassemble the cylinder and inspect for:

1. Damaged, swollen, or deteriorated piston sealing cups.

2. Heavy scoring of the cylinder walls, due to metal clips and the like, in the fluid.

NOTES: Slight scratches due to normal operation will not cause leakage.

Do not attempt to remove the #3721 spacer sleeve near the bottom of the cylinder. This is permanently pressed in and serves to stabilize or guide the piston rod spring.

(2) Brake Master Cylinder Binds During Operation -

This condition is evidenced by a tendency to bind or stick upon being extruded or allowed to return, and is due to swelling of the sealing cups. Swelling of the sealing cups can be determined after disassembling the unit by checking the diameter of the upper rubber cup on the side in contact with the piston, against the diameter of the piston. This diameter should be smaller than the piston diameter or, at the most, equal to the piston diameter. If the upper cup is found larger, both cups should be replaced by new cups, as outlined in the relevant paragraphs of the P-66 Service Handbook.

NOTE: Swelling of the cups in all cases is caused by the use of improper brake fluid. The control units are to be used with Spec. 3580 mineral oil only, and are equipped with cups made from a Neoprene Compound, a synthetic rubber. Replacement cups marked with a yellow dot, or with no marking, are made from a natural rubber and can be used only with Spec. 3586 brake fluid, and are never to be used with the master brake cylinders in the P-66 Airplane. The same method of marking is employed for the transfer valve packing ring No. 3643.

c. Repair

(1) Brake Master Cylinder Does Not Hold Pressure

(a) Leaky Transfer Valve Gasket - If leakage is observed, replace the aluminum gasket (Warner part No. 3348) under the transfer valve. Refer to relevant paragraphs, under the subject of maintenance of wheels and brakes, P-66 Service Manual.

(b) Leaky Compensator Valve - If leakage is observed, proceed as follows:

1. Remove the master cylinder from the airplane.

2. Disassemble according to instructions in relevant paragraph, P-66 Service Handbook.

3. After the piston rod lapping assembly (consisting of the piston rod, piston, and piston nut) has been obtained by dismantling the unit, remove the piston nut by holding the assembly at the head end of the piston in a vise with copper covered jaws. Refer to Sketch A, Figure 30. For Air Depot use, a simple tool may be turned up by means of which the piston may be held more advantageously in the vise. Refer to Sketch B, Figure 30.

4. After the piston nut has been removed, pull the rod out and inspect the seats on the piston rod end. If they are badly damaged, the parts should be replaced.

5. If the seat is found to be only slightly damaged, it should be lapped with grade 2A Clover Grinding Compound made by Clover Mfg. Co., Norwalk, Connecticut, U.S.A., or an equivalent grinding compound.

NOTE: If the seat is badly worn, it is advisable to use Clover, grade 1A, Compound for rough grinding, and finish with grade 2A.

6. Apply a small quantity of grinding compound to the seat on the rod and lap with a combined tapping and rotary movement to avoid "ringing" the seat. If this work is done at an Air Depot, the simple tool shown in Sketch C of Figure 30 will assist in maintaining the proper alignment between piston and rod while lapping.

7. Thoroughly wash off all traces of grinding compound, especially from the drilled passages in the rod.

8. Insert the rod into the piston. Hold the rod against the seat of the piston and fill the piston with high-test gasoline, observing the drilled passages for traces of leakage past the lapped seat. Refer to Sketch D of Figure 30.

9. If no traces of leakage are detected after several minutes, the assembly is satisfactory for use.

(c) Worn or Damaged Sealing Cups or Cylinder Walls

1. Deteriorated sealing cups should be replaced according to the instructions in relevant paragraphs of P-66 Service Handbook.

NOTE: Use only sealing cups with a red dot marking. Cups marked with a yellow dot are for use with Fluid, Spec. 3586 only, and must not be used with the P-66 brake master cylinders.

2. Scored cylinders must be replaced, since lapping out will remove the protective surface treatment of the material.

(2) Complete Overhaul of Brake Master Cylinder. - If it is desired to overhaul or recondition a brake cylinder completely, rather than to remedy specific trouble, the following general procedure should be followed:

- (a) Remove cylinder from airplane.
- (b) Completely disassemble the cylinder.
- (c) Recondition compensating valve seat, or replace "lapping assembly", consisting of piston and rod, if seat is badly worn.
- (d) Replace cylinder if badly scored.
- (e) Replace sealing cups.
- (f) Replace transfer valve fiber disc and aluminum gasket.
- (g) Reassemble and test.

(3) Replacement of Parts - For replacement orders, the correct part number can be found in Figure 10, Sect. 4, Chap. 2, P-66 Service Handbook. It will be noted that the piston and rod are lapped together and replacements should, therefore, be ordered as "Lapping Assembly #3705". It further will be noted that the cylinder and the upper end fitting are machined together and form "Cylinder Machining Assembly #3697", and that the housing and the lower end fitting form "Housing Machining Assembly 3695". Should an end fitting fail, with the cylinder and housing still in serviceable condition, new end fittings may be installed only by the factory or by a machine shop.

d. Assembly

(1) General. - Assembly operations up to the point of installing the piston rod AN310-6 nut at the lower end of the housing assembly must be carried out with the cylinder and piston rod assemblies in a vertical position with the housing assembly end up. This is necessary to prevent the "horseshoe" retaining washer #3233 from dropping out during assembly of piston to cylinder and housing. In general, the assembly procedure is the reverse of disassembly, with the following additional instructions regarding assembly of the "Housing Assembly".

- (a) Before assembling, grease the entire inside of the housing with grease of a high melting point -- preferably rocker arm lubricant -- for lubrication and corrosion protection.

(b) When re-installing the yoke, by reversing the procedure for disassembly, be careful not to let the spring snap against the light bridge on the casting as this will cause damage.

(2) Adjustment of Brake Master Cylinder - If a new piston rod lapping assembly, cylinder assembly, or housing assembly has been installed, or if the piston rod nut location marking has been lost (Refer to relevant paragraph, P-66 Service Handbook), the piston rod nut must be adjusted according to the instructions in paragraphs just referred to.

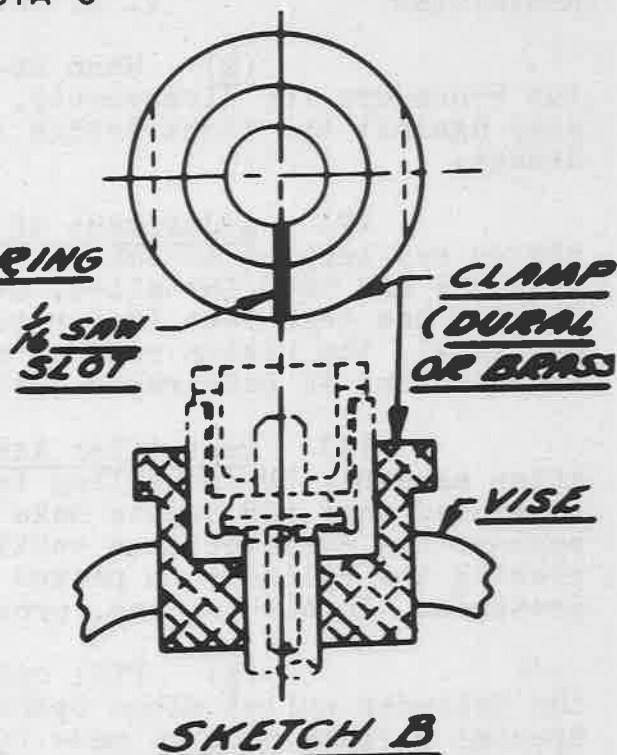
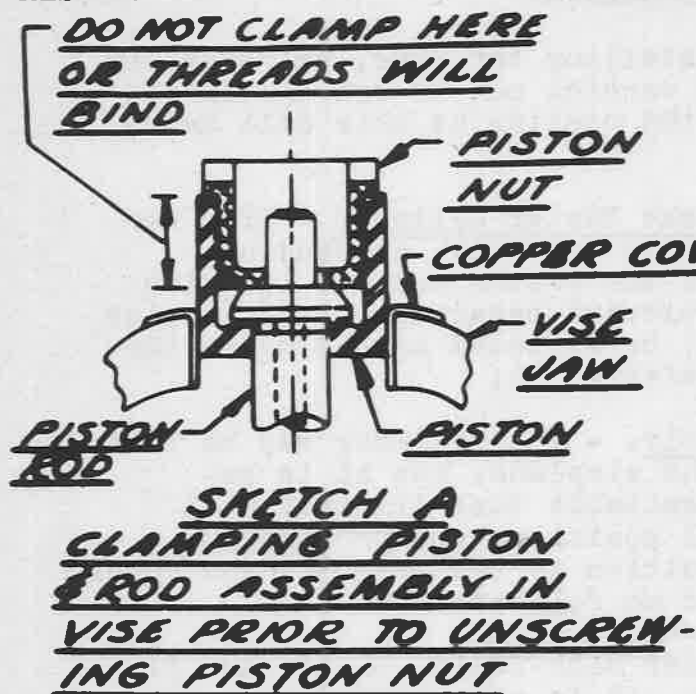
(3) Test after Assembly. - The cylinder may be tested after assembly by installing in the airplane, but it is recommended that Air Depots make a suitable test jig that will support the cylinder in a vertical position, and provide for placing the cylinder in parked position to test for leakage under pressure. In either case, proceed as follows:

(a) Fill cylinder with fluid, bleed, and plug the cylinder outlet elbow opening. It is recommended that a special bleeder plug be made by machining a special adapter that will receive an AN771-1 Drain Cock at one end and the cylinder outlet elbow at the other. This is used in the same manner as the wheel brake bleeder for filling the cylinder prior to test.

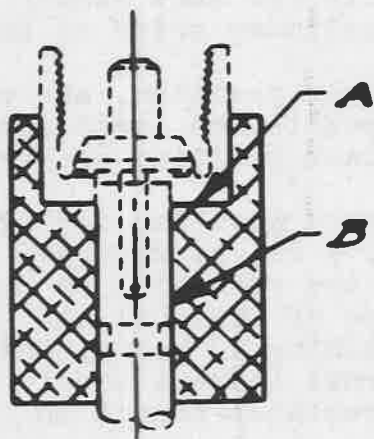
(b) Place brake in parked position, and place a pencil mark on the housing assembly opposite the lower surface of the parking spring yoke, to indicate position of yoke.

(c) Leave brake in parked position for 12 hours. If cylinder is in good condition, a slight downward movement, not in excess of $3/32$ inch, of the yoke will be noticed within 2 hours. This is due to the escape of residual air trapped in the cylinder. During the remaining 10 hours, the additional downward movement due to internal leakage should not exceed $1/8$ inch -- providing that no appreciable change in atmospheric temperature has taken place.

(d) Excessive movement of the yoke during test indicates internal leakage; either through the compensator valve, or past the transfer valve aluminum gasket or sealing cups. This should be checked as outlined under sub-paragraph b., (1), (a), preceding, and the indicated repairs accomplished.



PISTON & ROD
ASSEMBLY CLAMP
TO FACILITATE
DISASSEMBLY

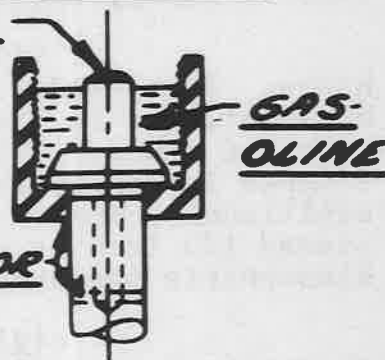


SKETCH C
HOLD PISTON AGAINST
SHOULDER "A" WHILE
HOLE "B" IN TOOL LINES
UP PISTON ROD.

ALIGNING JIG FOR
USE IN LAPPING PISTON
ROD TO VALVE SEAT.

HOLD ROD
DOWN

OBSERVE FOR
LEAKAGE
HERE



SKETCH D
TESTING PISTON
ROD VALVE SEAT
AFTER LAPPING

FIG.30 RECONDITIONING BRAKE
MASTER CYLINDER COMPENSATOR VALVE

18. Ignition and Electrical

a. The electrical system and its components are completely described in the relevant paragraphs of the P-66 Service Handbook, together with instructions for removal of the battery. Disassembly of the majority of the components is obvious upon inspection, and detailed instructions covering the remainder will be found in the reference Technical Orders listed in the same Handbook. Circuit diagrams are provided inside the various junction box covers.

b. Check all terminals for corrosion. The application of soapstone to cables before installing is recommended. When replacing a small sized wire, it is advantageous to tape or otherwise attach the small wire to a larger wire in the same conduit, and replace both wires at the same time. This will prevent the possibility of the small gage wire breaking during removal.

c. Lamp reflectors should be cleaned and repaired in accordance with T. O. No. 03-5-4.

d. Refer to T. O. No. 08-5-1 for information regarding the shielding and bonding of aircraft.

19. Fuselage Furnishings

a. General - The disassembly, inspection, repair, and assembly procedures of the majority of fuselage furnishings items are quite obvious and do not merit detailed description here. Refer to relevant paragraphs of P-66 Service Handbook for general removal and disassembly procedure.

b. Cockpit Enclosure

(1) Inspect enclosure tracks on fuselage for cracks, dents, bends, excessive wear and security of attachment. Inspect rollers for freedom of rotation, flat spots, and misalignment. Inspect transparent plastic panels for security of mounting in frame. Inspect frame for cracks, loose or sheared rivets, and misalignment. Inspect and replace, if necessary, the rubber seal at the leading edge of the enclosure and the fiber stop blocks at the aft lower corners of the enclosure. Inspect and check operation of emergency release in side panels of enclosure.

(2) Check condition of sealing compound between enclosure track and track upper fuselage rail. (Refer to Section IV, paragraph 4, sub-paragraph c., (3), of this Handbook).

c. Safety Belt - The safety belt and attaching parts should be carefully inspected and repaired, or replaced, as required.

d. Miscellaneous - Refinish map case, data case, and airplane flight report holder.

20. Heating and Ventilating System

The heat-exchanger or "stove" extending around the exhaust collector pipe should be minutely inspected for evidences of cracks or burned spots -- and replaced, if any are found. The remainder of the heating and ventilating system ducts, and the control valve, should be removed from the airplane, carefully inspected for general condition, and repaired or replaced as necessary.

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21. Fire Extinguishing System

Refer to T.O. No. 03-45-1 for instructions regarding the fire extinguisher.

22. Communications Equipment

Refer to Fig. 20., Sect. 6, of the P-66 Service Handbook for the communications equipment connection diagram. The communication equipment components should be inspected and repaired as outlined in relevant Service Handbooks published by the manufacturers of the equipment involved; the list of these applicable Service Instructions being listed in the P-66 Service Handbook.

23. Gunnery Equipment

a. Inspect ammunition boxes and supports, and ejection chutes for cracks, dents, loose or sheared spot-welds and misalignment. Loose spot-welds may be repaired by drilling and then inserting a rivet, provided the rivet head does not destroy the smooth interior surface of the ammunition box or ejection chute. Since rivet heads on interior surfaces may cause jamming of ammunition, cases, or links, it will be necessary to make repairs in this area by spot-welding.

b. Inspect gun mounts and adjacent structure for cracks, loose or sheared rivets, elongated bolt holes, misalignment, and condition of threads.

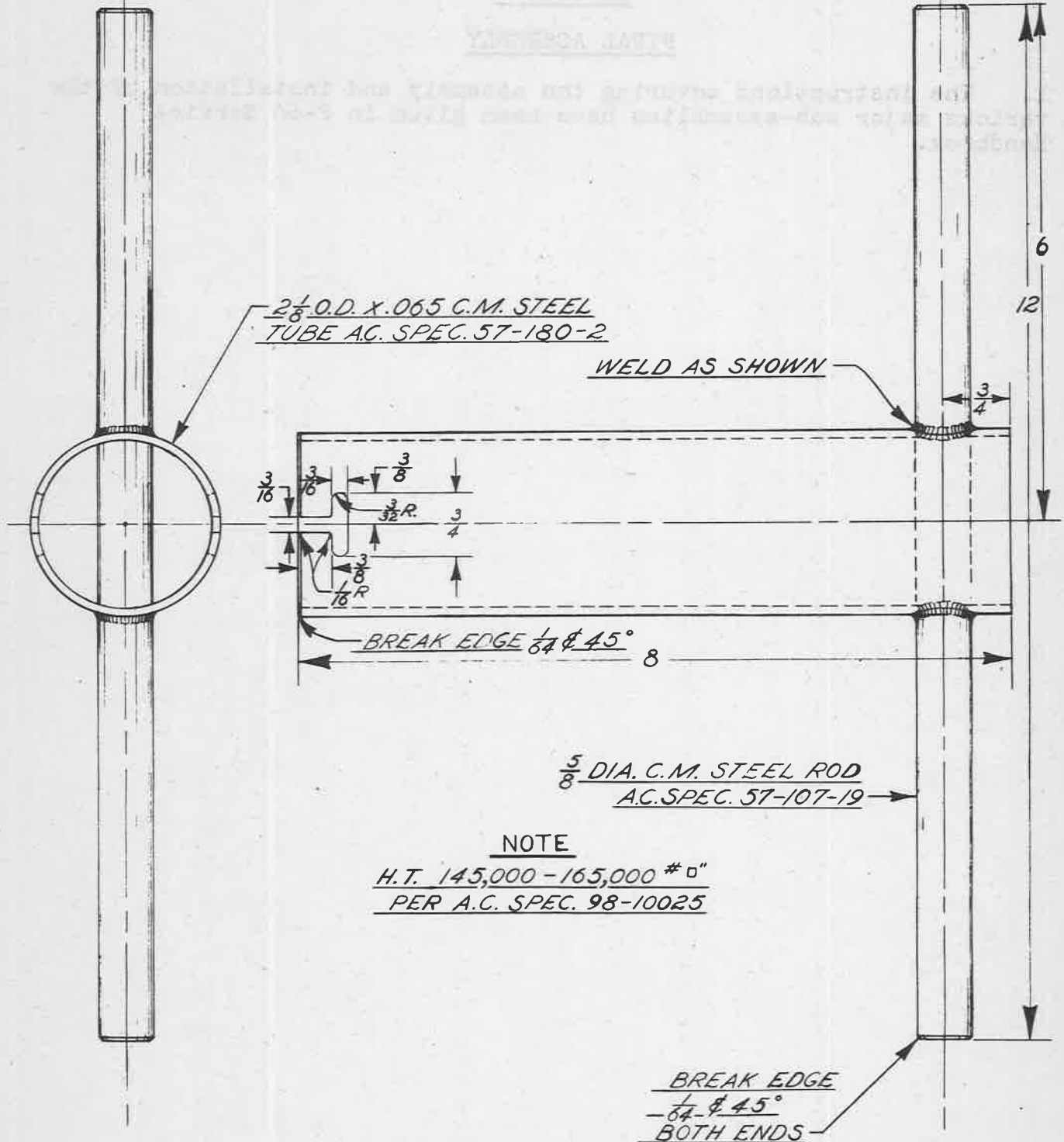
c. Inspect forward blast tube support for cracks, elongated bolt holes, misalignment, and condition of threads and serrations. A tool to assist in removing the gun blast tubes may be made as per manufacturing instructions shown in Figure 31.

d. For data applicable to type E-4 Machine Gun Synchronizer, see T. O. No. 11-20-3.

e. For data applicable to the type N-2A Gun Sight, see T. O. No. 11-35-5.

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**FIG. 31 TOOL FOR REMOVING GUN
BLAST TUBES**

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SECTION V

FINAL ASSEMBLY

1. The instructions covering the assembly and installation of the various major sub-assemblies have been given in P-66 Service Handbook.

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SECTION VI

ADDITIONAL OVERHAUL AND MAJOR REPAIR
INSTRUCTIONS ISSUED BY THE
AIR CORPS

