

PRELIMINARY HANDBOOK OF OVERHAUL INSTRUCTIONS

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

FOR THE

MODEL O-47B CORPS AND ARMY OBSERVATION AIRPLANE

MANUFACTURED BY

NORTH AMERICAN AVIATION, INC.

INGLEWOOD, CALIFORNIA

On Contract W535 AC11994

Specification Type 98-409, Model 98-409-1



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T. O. NO. 01-60EB-3

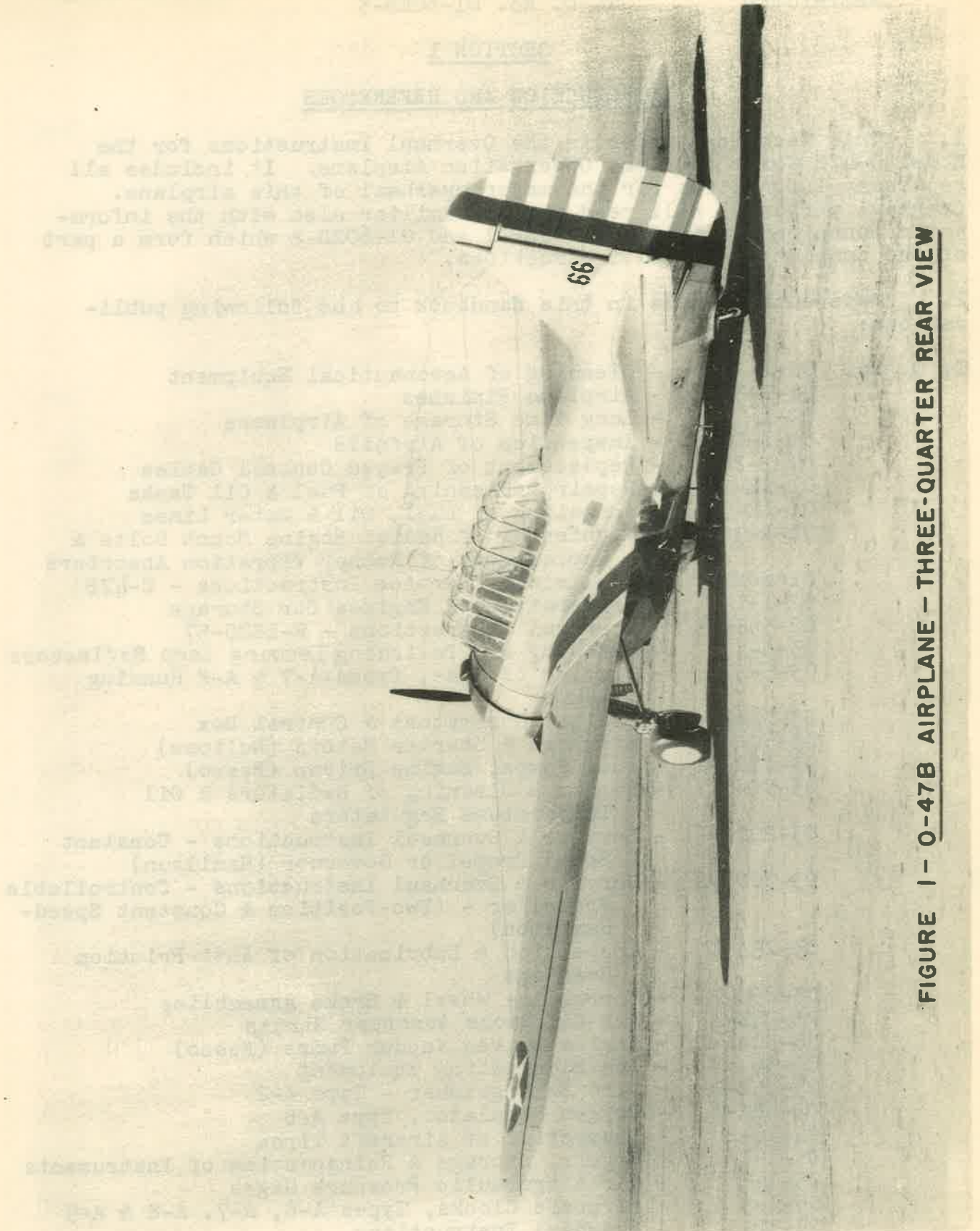


FIGURE 1 - O-47B AIRPLANE - THREE-QUARTER REAR VIEW

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SECTION IINTRODUCTION AND REFERENCES

1. This Technical Order is the Overhaul Instructions for the Model O-47B Corps and Army Observation Airplane. It includes all necessary information for the major overhaul of this airplane. Overhaul personnel will read and be familiar also with the information contained in T. O's 01-60EB-1 and 01-60EB-2 which form a part of the complete overhaul instructions.

2. Reference is made in this Handbook to the following publications:

T. O. No.	01-1-1	- Cleaning of Aeronautical Equipment
	01-1-3	- Airplane Finishes
	01-1-7	- Long Time Storage of Airplanes
	01-1-12	- Inspection of Airfoils
	01-1-26	- Replacement of Frayed Control Cables
	01-1E-26	- Repair & Cleaning of Fuel & Oil Tanks
	01-1E-31	- Annealing of Fuel, Oil & Water Lines
	01-1-58	- Tightening of Radial Engine Mount Bolts & Replacement of Rubber Vibration Absorbers
	01-60EB-2	- Preliminary Service Instructions - O-47B
	02-1-1	- Preparation of Engines for Storage
	02-35GB-3	- Overhaul Instructions - R-1820-57
	03-5-4	- Cleaning and Polishing Landing Lamp Reflectors
	03-5-5	- Plating of Base, Types A-7. & A-8 Running Lamps
	03-5AA-1	- Eclipse Generators & Control Box
	03-5CA-1	- Starters & Starter Motors (Eclipse)
	03-10EA-1	- Fuel Pumps, Engine Driven (Pesco)
	03-15-4	- Repair & Cleaning of Radiators & Oil Temperature Regulators
	03-20CA-2	- Service & Overhaul Instructions - Constant Speed Propeller Governor (Hamilton)
	03-20CB-2	- Service & Overhaul Instructions - Controllable Propeller - (Two-Position & Constant Speed- Hamilton)
	03-25A-1	- Inspection & Lubrication of Anti-Friction Bearings
	03-25C-2	- Streamline Wheel & Brake Assemblies
	03-25E-1	- Air-Oil Shock Absorber Struts
	03-30AA-1	- Engine Driven Vacuum Pumps (Pesco)
	03-35	- Ice Eliminating Equipment
	03-45B-1	- Fire Extinguisher - Type A-2
	03-50A-1	- Oxygen Regulator, Type A-6
	04-10-2	- Inspection of Aircraft Tires
	05-1-1	- Repair, Storage & Reinspection of Instruments
	05-1-3	- Air & Hydraulic Pressure Gages
	05-1-9	- Aircraft Clocks, Types A-6, A-7, A-8 & A-9
	05-3B-3.	- Overhaul Instructions
	05-5C	- Tachometers; Chronometric, Types C-2 & C-7

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T. O. No. 01-60EB-3

- T. O. No. 05-10-2 - Service & Overhaul Instructions (Airspeed Indicators)
- 05-15-2 - Service & Overhaul Instructions - Magnetic Compasses
- 05-20-2 - Bank & Turn Indicators (Pioneer)
- 05-20-3 - Flight Indicators
- 05-20-4 - Turn Indicators
- 05-20-6 - Suction Gages, Type F
- 05-20-7 - Thermometers (Free Air), Types C-3, C-5, C-6
- 05-20-10 - Altimeters, Types C-6, C-7, C-8, C-10, C-11
- 05-20-11 - Rate of Climb Indicators, Type A-5
- 05-20-19 - Drift Meter, Type A-3
- 05-40-2 - Manifold Pressure Gage, Type D-1
- 05-40-3 - Thermocouple Thermometers, Types B-6, B-7 & B-8
- 05-40-5 - Engine Gage Units, Types B-1 & B-2
- 05-40-12 - Service Instructions - Thermometers, Resistance Type
- 05-50-1 - Airspeed Tubes (Pitot Static & Power Venturi Tubes)
- 05-65A-1 - Preliminary Instructions Electrically Operated Liquidimeters
- 06-1-2 - Fluids for Hydraulic Equipment
- 06-5-1 - Use & Disposition (Fuels)
- 06-10-1 - Aircraft Engine Lubricating Oil, Grades & Use
- 06-10-3 - Prevention of Thread Seizures
- 08-5 - Aircraft Radio
- 08-10 - Signal Corps Publications
- 10-10-21 - Aircraft Camera, Type H-2
- 11-35-1 - Use & Maintenance of Flexible Gun Sights
- 11-35-5 - Installation, Inspection & Use - Type N-2 & N-2A Fixed Gun Sights
- 17-1-2 - Pressure Type Portable Cleaner
- 23-5-2 - Welding of Steel Tubular Structures
- 23-15-1 - Repair & Manufacturing Practices, Aluminum Alloys
- 29-1-3 - Cleaning, Inspection & Lubrication of Anti-Friction Bearings

SECTION IIGENERAL INSTRUCTIONSPART A - HEAT TREATED PARTS AND MATERIAL LIST1. General

Primary and secondary structural and operating parts used on the O-47B Airplane and which have been heat treated are listed below. Heat treatment processes are in accordance with A.C. Spec. No. 98-10025 and 98-10026. The engine mount is constructed of WD-4130 chrome-molybdenum steel tubing purchased to A.C. Spec. 57-180-2 in the normalized condition having a tensile strength of 95,000 lbs./sq.in.

2. Aluminum Alloy

The wings and fixed tail surfaces and the fuselage are of full cantilever and semi-monocoque aluminum alloy construction, respectively. In general, all aluminum alloy sheet (except landing gear and empennage fairing), all tubing (except fuel and oil lines) and all forgings, extruded sections and bar stock are heat treated aluminum coated (Alclad) 24S aluminum alloy purchased to A.C. Spec. 11067. Formed sheet stock which is used in the soft state to facilitate fabrication should be subsequently heat treated in accordance with A.C. Spec. 98-10026, after forming. All aluminum alloy rivets used are A-17ST.

3. Material Code

The following code simplifies the identification of materials and heat treatment processes to be used with the following parts list: -

CM-S - Chrome-Molybdenum Steel Sheet	(A.C. Spec. 57-136-8; WDX-4130)
CM-B - Chrome-Molybdenum Steel Bar	(A.C. Spec. 10083; WD-4140)
CM-R - Chrome-Molybdenum Steel Rod	(A.C. Spec. 57-107-19; WDX-4130)
CM-T - Chrome-Molybdenum Steel Tube	(A.C. Spec. 57-180-2)
CM-F - Chrome-Molybdenum Steel Forging	(A.C. Spec. 57-105)
NS-R - Nickel-Steel Rod	(A.C. Spec. 57-107-17; WD-3330)
MC-F - Mild-Carbon Steel Forging	(A.C. Spec. 57-105)
AA-T - Aluminum Alloy Tube	(A.C. Spec. 10235)
AA-F - Aluminum Alloy Forging	(A.C. Spec. 57-153)
MA-C - Magnesium Alloy Casting	(A.C. Spec. 57-74-1; Gr. 2)
	Cond. H.T.
SS-W - Spring Steel Music Wire	(A.C. Spec. 48-7)
NS-B - Nickel Steel Bar	(A.C. Spec. QQ-N-321)
CR-S - Corrosion Resistant Steel Sheet	(A.C. Spec. 57-136-9)
C-T - Copper Tube	(A.C. Spec. WW-T-799)

4. Heat Treated Parts List

<u>Part No.</u>	<u>Title</u>	<u>Material Code</u>	<u>Tensile Strength H.T. in P.S.I. or as Noted</u>
B1074	Eye-Bolt - Ball Bearing	CM-F	125-145,000
B1132	Lug - Engine Mount Vibration Absorber Cushion	MC-F	Normalize
B1173	Eye-Bolt - Ball Bearing	CM-F	125-145,000
B1190	Ring - Airplane Mooring	CM-F	125-145,000
19-33447	Wrench - Special	CM-S	180-200,000
19-52305	Link - Aileron Control Rod	CM-F	Normalize
23-53070	Plunger - Seat Adjusting	CM-R	125,000
25-11026	Plate - Center Wing Front Spar	CM-F	150,000
25-11026-1	Plate - Center Wing Front Spar	CM-F	150,000
25-11027	Plate - Center Wing Rear Spar	CM-F	150,000
25-11028	Fitting - Center Wing Rib 49-3/8 Front Spar Attaching	CM-F	160-180,000
25-11029	Fitting Assem. - Center Wing Rib 28-3/8 Rear Spar Attach.	CM-F	125-140,000
25-12023	Fitting Assem. - Outer Wing Land- ing Gear Lock Pin Socket	CM-F	160-180,000
25-12028	Fitting - Outer Wing Landing Gear Lock Pin Brace	CM-F	Normalize
25-31142	Fitting - Fuselage Engine Mount Attaching	CM-F	125-145,000
25-31143	Fitting - Fusel. Nose-Over Frame Front Leg Attaching	CM-F	Spec. H.T.
25-31902	Fitting - Engine Mount Attach.	CM-F	Normalize
25-31902-2	Fitting - Engine Mount Attach.	CM-F	Normalize
25-33105	Joint Assembly - Landing Gear	CM-F	160-180,000
25-33106	Hook - Landing Gear Retracted Retaining	CM-F	125-140,000
25-33107	Fitting Assembly - Landing Gear Rear Strut Upper Attach.	CM-F	125-140,000
25-33107-1	Fitting Assembly - Landing Gear Rear Strut Upper Attach.	CM-F	125-140,000
25-33108	Fitting Assembly - Landing Gear Rear Strut Lower Attach.	CM-F	125-145,000
25-33116	Shaft - Landing Gear Universal Joint Pivot	NS-B	160-180,000
25-33119	Bolt - Landing Gear Oleo Attach.	NS-B	125-140,000
25-33124	Spacer - Landing Gear Universal Joint	CM-T	125-140,000
51-31040	Spring - Fuselage Parachute Flare Rack Door	SS-W	*(10 Minutes)
51-31062	Bracket Assem. - Engine Ring Removable Cowl Former Support	CM-T	Normalize
51-310188	Bolt - Engine Removable Cowl Bracket Attaching	NS-B	125,000

* - Heat treat spring at 500-550°F for period noted.

<u>Part No.</u>	<u>Title</u>	<u>Material Code</u>	<u>Tensile Strength H.T. in P.S.I. or as Noted</u>
51-318174	Spring - Cockpit Encl. Gunner's Hood Control Release Operating		*(20 Minutes)
51-318248	Finger - Cockpit Enclosure Movable Panel Release	CM-S	160-180,000
51-42012	Shaft - Carburetor Air Mixing Chamber	CM-T	125,000
51-42018	Stack Assembly - Engine Exhaust Front	CR-S	Normalize
51-44023	Spring - Propeller Control Stabilizer		*(10 Minutes)
51-47032	Stud - Oil Tank Sump	NS-R	125,000
51-48070	Fitting - Fuel Tank Upper Retainer Adjusting	CM-B	125,000
51-48825	Line Assembly - Fuel Engine Pump Drain	C-T	Anneal
51-53011	Tube - Gunner's Seat Adjusting	CM-T	125-140,000
51-53018	Plunger - Gunner's Seat Adjusting Locking	CM-B	125-140,000
51-53021	Spring - Gunner's Seat Adjusting Lever Tension		*(10 Minutes)
51-53033	Spring - Gunner's Back Rest Lock		*(10 Minutes)
51-53044	Spring - Aux. Pilot's Back Rest Lock		*(10 Minutes)
51-53118-2	Tube Assembly - Observer's Seat Support	CM-T	160,000
51-54071	Spring - Landing Gear Warning Switch		*(10 Minutes)
51-54147	Spring - Throttle Switch		*(10 Minutes)
51-55018	Ring Assembly - Towing Bar	CM-B	125,000
51-55019	Tongue Assembly - Towing Bar	CM-T	180,000
51-55021	Jaw - Towing Bar Fixed	CM-B	180,000
51-55022	Jaw - Towing Bar Adjustable	CM-B	180,000
51-55025	Screw - Towing Bar Jaw Adjusting	CM-B	125,000
51-58102	Spring - Hydraulic Pressure Control Valve One-Way Valve Disc		*(10 Minutes)
51-58107	Spring - Hydraulic Pressure Relief Valve		*(20 Minutes)
51-62047	Spring - Flexible Gun & Gun Camera Stowage Latch		*(20 Minutes)
51-65025	Spring - Parachute Flare Release Lever		*(10 Minutes)
19-33416	Spring - Master Brake Cylinder Valve		*{ 5 Minutes }
19-33457	Spring - Brake Cylinder External		*(20 Minutes)

* - Heat treat spring at 500-550°F for period noted.

SECTION II (Cont.)GENERAL INSTRUCTIONS

PART B - FINISH SPECIFICATIONS

1. General

Protective coatings, finishes, colors, markings and insignia have been applied in conformance with A.C. Spec. 3-100 with approved deviations listed below. Refer to T. O. 01-1-3.

2. Finish Code

To facilitate the identification of finishes specified on North American Aviation, Inc., drawings, the following code is given:

F - Finish, prefix designation	G - General
A - Aluminum and aluminum alloys	S - Steel
C - Copper and copper alloys	T - Textile
M - Magnesium and magnesium alloys	W - Wood

Example: FS-20 - Finish No. 20 for Steel

3. Deviations

Overhaul personnel should become familiar with the following approved deviations from A.C. Spec. 3-100, before applying finishes to repaired or replaced parts.

a. Fuselage Frames and Ribs and Spars for ailerons, flaps, horizontal and vertical stabilizers, and outer wing panels may be anodized as assemblies, in which case same shall be primed by dipping.

b. Cockpit Enclosure (53S and corner block castings) shall not be anodized or primed. Finish entire frame by buffing. Parts in view over cockpit trim two coats of clear lacquer (A.C. Spec. 3-158) containing a minimum of four ounces aluminum paste (A.C. Spec. TT-A-466, Type B) per gallon of spraying material.

c. Internal Steel Parts contacting hydraulic fluid, excepting corrosion resistant steel, shall be hard chromium plated.

d. Internal Brass and Bronze Parts contacting hydraulic fluid shall not be cadmium plated.

e. Internal Brass and Bronze Parts contacting anti-icing fluid (i.e., shaft assembly, float assembly, strainer assembly, head) shall not be cadmium plated.

f. Seal Retainers and Plates made from Alclad may be installed without prime coat.

- g. Carburetor Air Scoop shall not be finished on the interior.
- h. Bolting Angle Cover Strip of Alclad, 2S, 3S and 52S shall receive no finish.
- i. Seats, two coats yellow green lacquer.
- j. Electrical and Radio Junction Boxes and Conduits, except when exposed to view in cockpits and compartments, require no finish.
- k. Washers of Alclad, 2S, 3S and 52S shall not be primed prior to installation.
- l. Screws and Nuts of brass used in proximity to compass shall not be cadmium plated.
- m. Safety Lock-Wire of brass shall not be cadmium plated.
- n. Coil and Flat Springs, except when exposed to view in cockpits and compartments, require no finish.
4. Control Markings

In addition to A.C. Spec. 3-100 and the above listed approved deviations, the following constitutes a part of the complete finish specifications. The colors designated below shall be used as the means of identification for control cables and horn or arms to which they are attached. The width of each color in the marking band shall be 1/2 inch. The cables shall be banded with cellulose tape in appropriate colors approximately 1/2 inch behind each wrap and coated with clear lacquer (Spec. 3-158). Horns and arms shall be banded with lacquer (Spec. 3-158) in appropriate colors approximately 1/2 inch below the fork to which cables attach.

Cables, Cranks, Horns

Band

Ailerons:

Cockpit - Left horn on torque tube	Red
Cockpit - Right horn on torque tube	Blue
Wing - Forward horn	Red
Wing - Rear horn	Blue

Aileron Trim Tab:

Inboard Cable (referred to cockpit drum)	Blue
Outboard Cable (referred to cockpit drum)	Red

Elevators:

Control Stick Socket	Yellow
Lower horn (nose down)	Black
Upper horn (nose up)	Yellow

Elevator Trim Tab:

Forward Cable (referred to cockpit drum)	Yellow
Rear Cable (referred to cockpit drum)	Black

SECTION II (Cont.)GENERAL INSTRUCTIONSPART C - FLOTATION PROCEDURE1. General Procedure

a. Flotation Compartment. - (1) With the exclusion of the end ribs, the following bays of the outer wing panels form the boundary of the flotation compartment: -

<u>Bay</u>	<u>Station</u>	<u>Panel</u>
Wheel	63.65 to 127.00	R.H. & L.H.
Wheel	95.50 to 127.00	R.H. & L.H.
Machine Gun	64.778 to 81.47	R.H.
Flap Cylinder	110.75 to 114.621	R.H. & L.H.
Landing Light	144.00 to 162.00	R.H. & L.H.
Bellcrank	198.00 to 216.00	R.H. & L.H.

(2) The flotation compartment is shown in Figure 2., of this Handbook, wherein the heavy contour indicates the boundary to be sealed. Refer to service instructions for method of testing flotation compartment for leakage.

(3) It is not necessary to apply compound between stiffener angles and bulkheads, ribs, skin, spar webs excepting where such angles are part of an exterior communicating seam, e.g., at the boundary of compartment, between longerons and skin or between intermediate ribs and skin.

b. Fillets. - (1) In general, filleting is employed at boundary seams only, i.e., along seams which directly communicate to the exterior of the flotation compartment.

(2) No filleting is used in joints within the boundaries of the sealed-off compartments, e.g., between stiffener angles and skin, spar webs, bulkheads, or ribs, between ribs and nose skin, between intermediate ribs and skin, etc.

c. Seams. - (1) All seams must be fabricated only while the cement is still tacky. Riveting of seams after the sealant has dried greatly reduces the area of adhesion and to such an extent that actually no seal exists.

(2) In seams consisting of more than two components, any two adjoining components are treated as a simple seam, e.g., in the case of attaching the fore and aft skins to either main spar, cement is applied between spar angles and cap, between cap and plate, between plate and aft skin, and between skins.

d. Wicking. - (1) Wicking should be utilized where joggles, skin laps, shims, radii, etc., create sizable holes or crevices, which openings communicating to the exterior of the sealed-off compartments cannot be conveniently stopped-off by filleting (due to slow drying time and fluidity of sealant).

(2) Cotton wicking dipped in the cement is either inserted into the crevice or pulled through the opening, depending upon the type of hole to be sealed.

2. Method of Sealant Application

a. Cement - (1) Use cement in the "as received" condition: Do Not Thin.

(2) Apply by flow-gun or brush.

(3) Excess cement squeezed from seams or other joints is not to be removed from sub-assemblies. All excess shall be removed from the TOP and BOTTOM surfaces of the panel exterior only after the panel is pressure tested and approved by Inspector.

b. Filletts. - (1) Apply by pencil brush or flow-gun, covering the ends of the joint, e.g., when filleting between rib flange and skin, the cement is applied completely covering the end of the flange and a small portion of the skin adjoining.

(2) One application by means of brush or gun is usually sufficient. However, if added compound is required, the first application should be allowed to set-up (free from flowing) before re-filleting.

NOTE: A completely loaded pencil brush in draining will produce a stream of cement about $3/32$ inch in diameter. Do not apply more cement than this at any one time, as the drying rate is not fast enough to handle it; the cement simply spreads out, giving the appearance of a sloppy job, adding unnecessary weight, and giving little or no sealing. If a flow-gun is used, the orifice should not exceed $1/8$ inch.

(3) Fillets are not employed for the purpose of building up castings, flange laps, joggles, etc., to contour; but only in riveted boundary seams where seals are likely to open up, due to the flexibility of the panel. Fittings and members are built up by use of wicking.

c. Seams. - (1) Apply by brush. Each component of any seam should receive two brush coats of the cement, the first coat being surface-dry before applying the second. When components of the seam are brought together, they should be riveted (or held by kalons) only while the cement is still tacky. WARNING: DRY cement pressed against DRY cement does not give a satisfactory seal.

(2) No tapes are required.

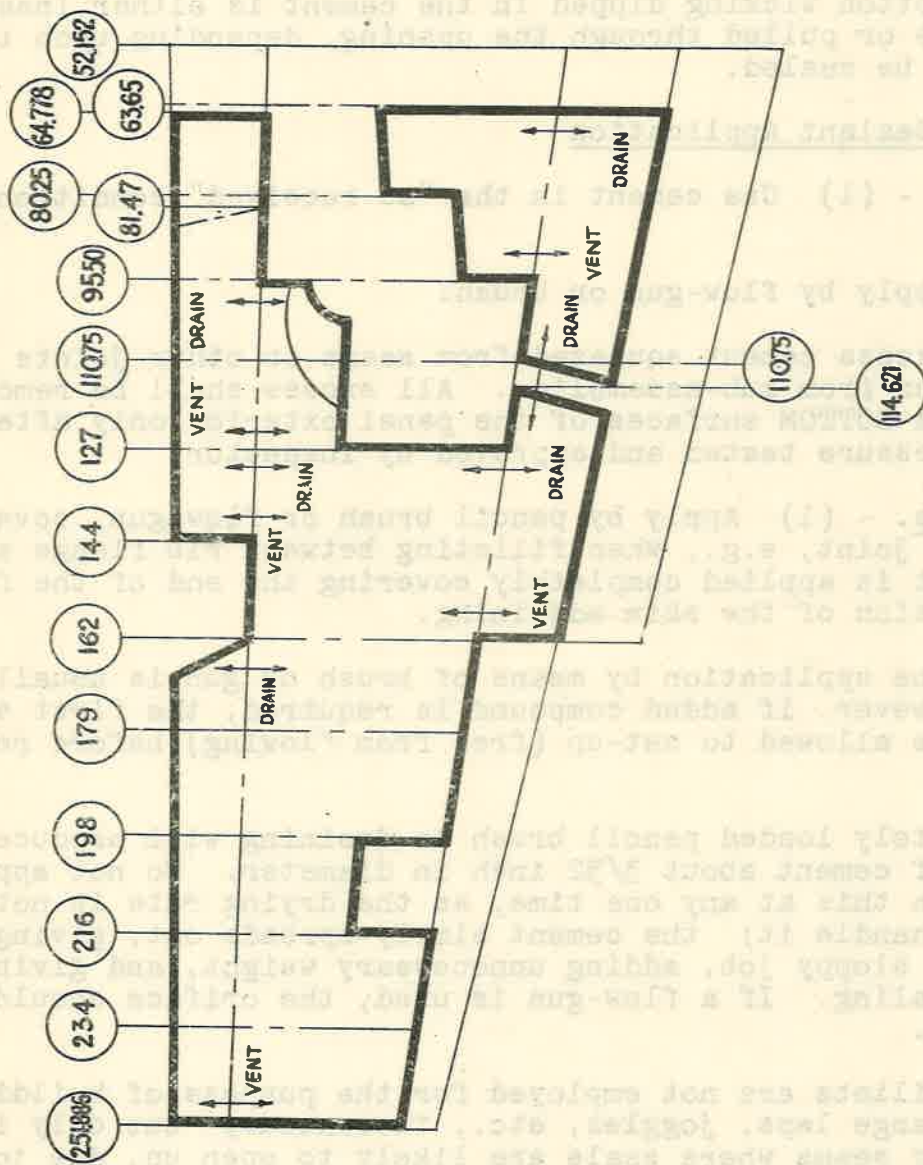


FIGURE 2
DIAGRAM-OUTER WING FLOTATION COMPARTMENT

d. Wicking. - (1) Wicking is not to be considered as a tape, but only as a quick means of cementing gaps, etc., which because of their size cannot be taken care of conveniently by the use of cement alone.

(2) Apply wicking by use of suitable caulking tool and/or by hand.

(3) Dip the cotton wicking in the cement, allowing the cement to become tacky before applying the wicking to the joint or surface.

(4) Before applying the wicking, brush the hole or crevice to be filled or surface to be covered with compound. After laying in, apply further compound to the ends of the wicking in the case of holes and over the wicking in the case of crevices and surfaces.

(5) With respect to through holes, simply pull the coated wicking through by hand and force the excess wicking back into the hole to insure tightness.

(6) In crevices formed by castings or by the heel of angles and flanges, force the coated wicking into place by means of a wooden caulking tool.

(7) In the case of skin laps, and joggles and castings covered by skin, end ribs, or bulkheads, lay the coated wicking in place by hand. Lay in sufficient wicking to extend beyond the contour line in order to allow the wicking to be compressed when the joint is riveted.

e. Access Doors. - Coat access door ring retainer seal with compound and allow to become tacky before pressing into bead. Allow to stand 24 hours before attaching doors.

f. Rivets. - It is not necessary to dip rivets in compound prior to driving.

3. Detail - Wing Panel (51-12002 &-1)

a. General Check.

Number of Access Doors (Right Hand)	23
Number of Access Doors (Left Hand)	23
Number of joints employing Fillets	18
Number of joints employing Seams	25
Number of joints employing Wicking	43

b. Fillets.

Station 63.65 AT RIB - Between Skin and Rib, interior.

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Station 63.65
127.00 WHEEL BAY - Run fillet along all seams communicating to interior compartments: Between Spar angle and Web; between Spar angle and Skin covering Cap, Plate and end of Skin; between Rib flange and Skin; and between Rib flange and Spar Web.

Station 63.65
251.886 LONGITUDINAL SKIN LAPS - Run all fillets in interior only.

Station 95.50 SKIN LAP (Bottom Only) - Run all fillets in interior only.

Station 127.00 SKIN LAP (Top Only) - Between Front and Rear Spars, run all fillets in interior only.

Station 144.00 SKIN LAP (Bottom Only) - Between Rear Spar and Access Door Skin, run all fillets in interior only.

Station 162.00 SKIN LAP (Bottom Only) - Between Front Spar and Access Door Skin, run all fillets in interior only. Between Rear Spar and Flap Spar; between Rib flange and Skin, interior only.

Station 198.00
216.00 BELLCRANK BAY - Between Rib and Skin, all around.

Station 251.886 AT RIB - Between Rib flange and Skin, all around.

c. Seams.

Station 63.65 AT RIB BETWEEN REAR SPAR AND TUNNEL (Bottom Only) - Between Skin and Rib flange; between Tunnel flange and Rib; and between Tunnel flange and Bulkhead.

Station 63.65
80.25 AT TUNNEL (Bottom Only) - Between Tunnel flange and Skin.

Station 63.65
251.886 LONGITUDINAL SKIN LAPS - Between Skin and Spar plate, and between Skins.

Station 95.50 BETWEEN REAR SPAR AND WHEEL BAY (Bottom Only)- Between Skin and Rib flange and between Skins.

Station 127.00 BETWEEN FRONT SPAR AND REAR SPAR (Top Only):- Between Skin and Rib flange and between Skins.

Station 144.00 BETWEEN REAR SPAR AND ACCESS DOOR SKIN (Bottom Only) - Between Skins.

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Station 162.00 BETWEEN FRONT SPAR AND ACCESS DOOR SKIN
(Bottom Only) - Between Skins.

Station 198.00 BELLCRANK BAY - Top: Between Skin and Rib
flange. Bottom: Between Skin and Rib flange
and between Skins.

Station 216.00 BELLCRANK BAY - Top: Between Skin and Rib
flange. Bottom: Between Skin and Rib flange
and between Skins.

Station 251.886 BETWEEN REAR SPAR AND LEADING EDGE - Between
Rib flange and Tip attaching strip, and be-
tween attaching strip and Skin.

d. Wicking.

Station 63.65 AT FRONT SPAR AND AT REAR SPAR (Bottom Only) -
Between Spar plate and Skin at skin lap.
AT TUNNEL (Bottom Only) - Between Skin and
Tunnel flange; between Bulkhead attaching
angle and corner of Tunnel.

Station 80.25 AT TUNNEL (Bottom Only) - At end of Tunnel,
between Skin and Bulkhead flange.

Station 95.50 AT REAR SPAR (Bottom Only) - In Skin lap.

Station 110.75 AT REAR SPAR - Top: Both ends of Flap
Cylinder Bay and between Skin and Plate
Bottom: In Skin lap.

Station 127.00 AT FRONT SPAR, BETWEEN FRONT AND REAR SPARS
AND AT REAR SPAR: (Top Only) - In Skin lap.
AFT OF FRONT SPAR AND FORWARD OF REAR SPAR;
(Bottom Only) - In Skin lap.

Station 144.00 AT FRONT SPAR - In Skin laps. FORWARD OF
REAR SPAR AND AT REAR SPAR (Bottom Only) -
In Skin lap.

Station 162.00 AT FRONT SPAR AND AFT OF FRONT SPAR (Bottom
Only) - In Skin lap. AT REAR SPAR - In Skin
laps.

Station 179.00 AT REAR SPAR (Bottom Only) - In Skin lap at
both sides of hinge post bay.

Station 198.00 FORWARD OF REAR SPAR AND AT REAR SPAR (Bottom
Only) - In Skin lap.

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Station 216.00 FORWARD OF REAR SPAR AND AT REAR SPAR (Bottom Only) - In Skin lap.

Station 251.886 FORWARD OF FRONT SPAR (Bottom Only - In Skin lap at Rib flange. AT FRONT SPAR AND BETWEEN FRONT AND REAR SPARS - In Skin laps at Rib flange. AT REAR SPAR - Between Spar and Skin at end of Shim, and between Rib flange and Skin at end of Spar.

4. Detail - Front Spar (51-12004 & -1)

a. General Check.

Number of joints employing Fillets 10
Number of joints employing Seams 22
Number of joints employing Wicking 8

b. Fillets.

Station 63.65 AT WEB (Left Hand Only) - Both sides, between angle and doubler covering spacer; between angle and web covering spacer and doubler; and continue fillet around ends of angle.

Station 80.257 AT WEB (Right Hand Only) - Both sides, between angle and doubler covering spacer; between angle and web covering spacer and doubler, and continue fillet around ends of angle.

Station 144.013 AT WEB (Forward Side Only) - Between angle and web covering spacer.

Station 162.014 AT WEB (Forward Side Only) - Between angle and web covering shim.

c. Seams.

Station 63.65 FORWARD SIDE (Left Hand Only) - Between web and doubler; between doubler and spacer, and between spacer and angle. AFT SIDE (Left Hand Only) - Between web and spacer; between spacer and angle.

Station 63.65 TOP AND BOTTOM (Left Hand Only) - Apply to
251.908 spar angles and to web attaching thereto; between spar angles and capstrip; and between capstrip and plate.

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Station 80.257 FORWARD SIDE (Right Hand Only) - Between web and doubler; between doubler and spacer; and between spacer and angle. AFT SIDE (Right Hand Only) - Between web and spacer, and between spacer and angle.

Station 80.257
251.908 TOP AND BOTTOM (Right Hand Only) - Apply to spar angles and to web attaching thereto. Also between spar angles and capstrip; between capstrip and plate.

Station 144.013 FORWARD SIDE ONLY - Between web and spacer, and between spacer and angle.

Station 144.013
162.014 AT WEB SPLICE - Between web and splice both forward and aft.

Station 162.014 FORWARD SIDE ONLY - Between web and angle; between web and shim; and between shim and angle.

d. Wicking.

Station 63.65 TOP AND BOTTOM (Left Hand Only) - Between spar angles three inches either way of station; and between web and angle spacer strip running through to doubler cut-out, inboard side only.

Station 80.257 TOP AND BOTTOM (Right Hand Only) - Between spar angles three inches either way of station; and between web and angle at ends of spacer running through to doubler cut-out - outboard side only.

Station 144.013 TOP AND BOTTOM - Between spar angles three inches either way of station.

Station 162.014 BOTTOM ONLY - At end of spar angle running three inches inboard, and between rib attaching angle and spar angle at edge of web, building up flush with spar angle.

Station 179.016 TOP ONLY - At end of spar angle running three inches inboard.

5. Detail - Rear Spar (25-12005 & -1)a. General Check.

Number of joints employing Fillets	6
Number of joints employing Seams	16
Number of joints employing Wicking	6

b. Fillets.

Station 64.164	FORWARD AND AFT - Between angle and web covering spacer.
Station 96.277	FORWARD SIDE ONLY - Between angle and web covering spacer.
Station 111.247	AFT SIDE ONLY - Between angle and web covering spacer.
Station 114.372	AFT SIDE ONLY - Between angle and web covering spacer.
Station 128.035	FORWARD SIDE ONLY - Between angle and web covering spacer.
Station 163.320	AFT SIDE ONLY - Between angle and web.

c. Seams.

Station 64.164	FORWARD AND AFT - Between web and spacer, and between spacer and angle.
Station 64.164 163.320	TOP AND BOTTOM - Apply to spar angles and to web attaching thereto; also between spar angles and capstrip, and between capstrip and plate.
Station 96.277	FORWARD SIDE ONLY - Between web and spacer, and between spacer and angle.
Station 111.247	AFT SIDE ONLY - Between web and spacer, and between spacer and angle.
Station 114.372	AFT SIDE ONLY - Between web and spacer, and between spacer and angle.
Station 128.035	FORWARD SIDE ONLY - Between web and spacer, and between spacer and angle.
Station 136.00	AT WEB SPLICE - Between web and splice both forward and aft.

Station 163.320 AFT SIDE ONLY - Between angle and web.
 Station 163.320 TOP AND BOTTOM - Apply to spar angle and
 253.943 web attaching thereto.

d. Wicking.

Station 64.164 TOP AND BOTTOM - Between spar angles three
 inches either way of station.
 Station 111.247 TOP AND BOTTOM - Between spar angles three
 inches either way of station.
 Station 114.372 TOP AND BOTTOM - Between spar angles three
 inches either way of station.
 Station 163.320 TOP AND BOTTOM - Between rib attaching angle
 and spar angle at edge of web. Build up
 flush with spar angle. AFT ONLY - between
 spar angles, running inboard three inches.

6. Detail - Leading Edge (51-12006 & -1)

a. General Check.

Number of joints employing Fillets 21
 Number of joints employing Seams 17
 Number of joints employing Wicking 18

b. Fillets.

Station 63.65 AT FRONT SPAR (Left Hand Only) - Between
 angle and rib; between angle and spar doub-
 ler, inboard; and between angle and spar web,
 outboard. Carry fillet into ends of rib at-
 taching angle. AT RIB (Left Hand Only) -
 All around, between rib flange and nose skin,
 inboard and outboard.

Station 80.25 AT FRONT SPAR (Right Hand Only) - Between
 angle and rib; between angle and spar web,
 covering spacer between angle and web; and
 between rib and spar web, covering spacer
 and doubler between angle and web. AT RIB
 (Right Hand Only) - All around, between rib
 flange and nose skin, inboard and outboard.

Station 144.00 AT FRONT SPAR - Between angle and rib; be-
 tween angle and spar web, covering spacer
 between angle and web; and between rib and
 spar web covering spacer between angle and
 web. AT RIB - All around between rib flange
 and nose skin, inboard and outboard.

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Station 162.00 AT FRONT SPAR - Between rib stiffener plate and spar web; between angle and rib; and between angle and spar web covering shim.
AT RIB - All around between rib flange and nose skin, inboard and outboard.

Station 251.886 AT FRONT SPAR (Final Assembly Only) - Between angle and spar web; between angle and rib; and between rib and spar web. AT RIB - All around between rib flange and nose skin, inboard only.

c. Seams.

Station 63.65 AT RIB (Left Hand Only) - Apply all around rib flange and to skin attaching.

Station 63.65 STRINGERS (Left Hand Only) - Apply all along
144.00 and to skin attaching.

Station 63.65 SPAR PLATE (Left Hand Only) - Apply all
251.886 along top and bottom and to skin attaching.

Station 80.25 AT RIB - Apply all around rib flange and to skin attaching.

Station 80.25 STRINGERS (Right Hand Only) - Apply all
144.00 along and to skin attaching.

Station 80.25 SPAR PLATE (Right Hand Only) - Apply all
251.886 along top and bottom and to skin attaching.

Station 95.50 AT RIB - Apply all around rib flange and to skin attaching.

Station 110.75 AT RIB - Apply all around rib flange and to skin attaching.

Station 127.00 AT RIB - Apply all around rib flange and to skin attaching.

Station 144.00 AT RIB - Apply all around rib flange and to skin attaching. Also apply to both skins forming lap on top side aft of Landing Light Compartment.

Station 162.00 AT RIB - Apply all around rib flange and to skin attaching.

Station 162.00 STRINGERS - Apply all along and to skin
251.886 attaching.

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Station 179.00 AT RIB - Apply all around rib flange and to skin attaching.

Station 198.00 AT RIB - Apply all around rib flange and to skin attaching.

Station 216.00 AT RIB - Apply all around rib flange and to skin attaching.

Station 234.00 AT RIB - Apply all around rib flange and to skin attaching.

Station 251.886 AT RIB - Apply all around rib flange and to skin attaching.

d. Wicking.

Station 63.65 AT FRONT SPAR (Left Hand Only) - Top: Adjacent to spar between doubler and end of rib flange; at doubler cut-out between rib attaching angle and spar web; and at end of spar plate in joggle of rib flange. Bottom: Between plate and rib.

Station 80.25 AT FRONT SPAR (Right Hand Only) - Top: End of rib flange adjacent to spar; between Dzus attaching strip and rib flange, carrying wicking between spar angle and seal backing-up plate; also in joggle of Dzus attaching strip at spar plate. Bottom: End of rib flange adjacent to spar; between radius of rib and skin, carrying wicking around between spar angle and seal backing-up plate.

Station 144.00 AT FRONT SPAR (Top and Bottom) - Between end of rib flange and spar plate, carrying into joggle of seal backing-up plate; between spar plate and angle at end of shim, carrying along inboard past end of capstrip; caulk by forcing wicking between spar plate and angle after shim is installed and skin held in place. Build up stringer to plane of rib flange.

Station 162.00 AT FRONT SPAR - Top: Between end of rib flange and spar angle; build up stringer to plane of rib flange. Bottom: Between three-corner casting and rib attaching angle, building up to plane of rib flange; build up stringer to plane of rib flange; and between spar angles three inches inboard of end of angle.

Station 251.886 AT FRONT SPAR - Between ends of rib attaching angle and nose skin, carrying through between ends of spar angle and rib.

7. Detail - Trailing Edge (51-12009 & -1)

a. General Check.

Number of joints employing Fillets 17
 Number of joints employing Seams 19
 Number of joints employing Wicking 30

b. Fillets.

Station 63.65 AT REAR SPAR - Between angle and spar web, covering angle backing strip, and between angle and rib. AT FLAP SPAR - Between angle and spar, and between angle and rib.

Station 110.75 AT REAR SPAR - Between angle and spar web, covering angle backing strip, and between angle and rib.

Station 113.45 AT FLAP SPAR - Between angle and spar, and between angle and rib.

Station 114.62 AT REAR SPAR - Between angle and spar web, covering angle backing strip, and between angle and rib.

Station 118.00 AT FLAP SPAR - Between angle and spar, and between angle and rib.

Station 162.00 AT REAR SPAR - Between rib and spar web.
 AT FLAP SPAR (Left Hand Only) - Between casting (25-12289 - aileron trim tab pulley support) and rib, and between casting (25-12289) and spar. AT FLAP SPAR (Right Hand Only) - All sides and ends of spar attaching angle; and exterior fillet at junction of spar and rib.

c. Seams.

Station 63.65 AT RIB - Apply all around rib flange.

Station 63.65 STRINGERS (Two top; two bottom) - Apply all
 110.75 along.

Station 63.65 AT REAR SPAR - Apply to both top and bottom along plate. AT FLAP SPAR - Apply to both top and bottom along flange.

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Station 80.25	AT RIB - Apply all around rib flange.
Station 95.50	AT RIB - Apply all around rib flange.
Station 110.75	AT RIB - Apply all around rib flange.
Station 114.62	AT RIB - Apply all around rib flange.
Station 114.62 162.00	STRINGERS (Two top; two bottom) - Apply all along.
Station 127.00	AT RIB - Apply all around rib flange.
Station 144.00	AT RIB - Apply all around rib flange.
Station 162.00	AT RIB - Apply all around rib flange.

d. Wicking.

Station 63.65	AT REAR SPAR - Top: Between seal reinforcing plate and rib. Bottom: Between seal reinforcing plate and rib, and in joggle at skin attaching plate. AT FLAP SPAR (Top and Bottom) - Between rib flange and three-corner casting and spar; in break of rib flange adjoining spar, continuing around so as to fill radius between spar and rib attaching angle.
Station 110.75	AT REAR SPAR (Bottom Only) - Between joggle in rib flange and skin attaching plate. Also corner radii of watertight web, (Flap Cylinder Bay).
Station 113.45	AT FLAP SPAR - Top: Crevices formed by two sides of three-corner casting, rib, and spar. Carry wicking over, filling break in rib flange adjoining spar. Bottom: Break in rib flange. Carry along crevice between rib and reinforcing casting (25-12064-R) and along crevice between spar and casting to Station 118.
Station 114.62	AT REAR SPAR (Bottom Only) - Between joggle in rib flange and skin attaching plate; and corner radii of watertight web, (Flap Cylinder Bay).
Station 118.00	AT FLAP SPAR - Top: Crevices formed by two sides of three-corner casting, rib, and spar. Carry wicking over, filling break in rib flange adjoining spar. Bottom: Break in rib flange at spar. Carry along crevice between

rib and reinforcing casting (25-12064-R), and along crevice between spar and casting to Station 113.45.

Station 144.00 AT REAR SPAR - At end of capstrips.

Station 162.00 AT REAR SPAR - Between end of rib flange and spar. Build up casting to thickness of flange. AT FLAP SPAR (Right Hand Only) - Top: At end of spar attaching angle and rib flange. Use excess wicking to fill hole between spar and rib. Bottom: Behind three-corner casting at junction of spar and rib. AT FLAP SPAR (Left Hand Only) - Between spar flanges and casting (25-12289).

8. Detail - Rib Assembly Wheel Bay

a. General Check.

Number of joints employing Fillets	7
Number of joints employing Seams	13
Number of joints employing Wicking	8

b. Fillets.

Station 63.65 AT BULKHEAD (Sta's. 63.65 - 80.25) - Between angle and rib and between angle and bulkhead. Also run fillet around rib stiffener angle.

Station 80.25 AT BULKHEADS (Sta's. 63.65 - 80.25; 80.25 - 95.50) - Between angle and rib, and between angle and bulkhead.

Station 95.50 AT BULKHEAD (Sta's. 80.25 - 25.50) - Between angle and rib, and between angle and bulkhead.

c. Seams.

Station 63.65 AT RIB - Apply between attaching angle and rib, between attaching angle and bulkhead, between castings and rib, between castings and bulkhead, and between rib stiffener angle and rib.

Station 80.25 AT RIB (Both Sides) - Between attaching angle and rib, between attaching angle and bulkhead, between castings and rib, and between castings and bulkhead.

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Station 95.50

AT RIB - Between attaching angle and rib, between attaching angle and bulkhead, between castings and rib, and between castings and bulkhead.

d. Wicking.

Station 63.65

AT RIB - Between three-corner castings and rib; continue to top of angle and build up flush to rib flange. Fill space made by joggle in attaching angle.

Station 80.25

AT BULKHEAD (Sta's. 63.65 - 80.25) - Between three-corner casting and rib; continue to top of angle and build up flush to rib flange. AT BULKHEAD (Sta's. 80.25 - 95.50) - Between three-corner casting and rib flange; continue to top of angle and seat well in flange radius.

Station 95.50

AT RIB - Between three-corner casting and rib; continue to top of angle, and build up flush to rib flange.

SECTION IIIDISMANTLING, CLEANING, AND INSPECTION1. General

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

a. Engines. - Upon receipt of airplanes for overhaul, immediately after it has been checked in, precaution should be exercised in the preservation of the engines with reference to provisions of T. O. 02-1-1.

b. Draining Oil and Fuel Systems. -

(1) General: - Prior to dismantling airplane, it is desirable to drain the fuel and oil systems of the airplane as thoroughly as possible.

(2) Fuel System: - Drainage of the fuel system is accomplished by opening the drain plug on each of the fuel tanks and on the fuel system strainer. Access to the forward fuselage tank and strainer is made through a large circular access door located in the lower fuselage covering just forward of the camera doors. Access to rear fuselage tank drain cock is obtained by means of the access door under the fuselage. Access to center wing fuel tank cocks is provided by means of screw fastened access doors in the lower surface of the center wing through which each extends. Reference should be made to T. O. 06-5-1. Be assured that static is arrested.

(3) Oil System: - To drain the oil system, remove the left lower removable engine cowl and open the valve on the oil drain and dilution cock located just above the oil cooler. The oil drain line extends through the opening between the lower engine removable cowl and the lower edge of the firewall. Drain the oil temperature regulator by means of the plug located at the bottom of the oil cooler, access to which is gained through the small flanged hole in the lower engine removable cowl. Reference should be made to T. O. 06-10-1. Drainage should be accomplished while the oil is still warm.

c. Battery Removal. - Prior to dismantling airplane, remove battery located at right forward side of firewall.

d. Draining Hydraulic Systems.

(1) Hydraulic System: - Drainage of the entire hydraulic system cannot be accomplished from any single point. However, to remove a considerable amount of fluid, mainly that contained in the fluid reservoir, remove the pressure line plug at the "tee" fitting located at the right side of the firewall in the hydraulic pressure line leading from the engine driven hydraulic pump. Approximately 1-1/2 gallons of hydraulic fluid will be obtained from this point. The total capacity of the hydraulic system is approximately 17 pints, including reservoir, lines and the various units. The fluid that remains in the system may be drained from the various units as they are removed from the airplane.

(2) Brake Hydraulic System: - To drain the brake hydraulic system, remove the drain plugs located on the inboard side of the wheels near the brake line connections, and place a glass receptacle to collect the fluid. After removing plug, depress and release brake pedals several times to accelerate drainage of the fluid.

e. Cleaning. - Before any overhaul operations are performed, the airplane should be cleaned. Refer to T. O. 01-1-1 for general instructions pertinent to cleaning of aeronautical equipment. Operation instructions for the Air Corps Pressure Type Portable Cleaner are given in T. O. 17-1-2.

2. Power Plant

a. General. - The entire power plant from the firewall forward may be removed from the airplane as a unit. Engine mount attachment fittings and line disconnect blocks are conveniently located and easily disconnected. To remove engine from mounting ring, refer to Section IV, paragraph 2,a., of this Handbook.

b. Complete Power Plant Removal. - The sequence of operations necessary to remove the entire power plant from the firewall is as follows: -

- (1) Remove propeller in accordance with T. O. 03-20CB-2. A special hub nut wrench is supplied with the airplane.
- (2) Remove engine ring cowl and engine compartment cowl.
- (3) Detach exhaust trough cowl assembly from firewall and remove engine exhaust front stack assembly from exhaust collector ring and rear stack.
- (4) Free lines, wires and conduit from clamps and tie-down cords as required.
- (5) Disconnect exhaust gas analyzer inlet line at exhaust stack.
- (6) Disconnect exhaust gas analyzer outlet line at lower end of by-pass line from bottom of analyzer unit.

- (7) Disconnect all electrical wiring and conduit at main power panel located at center of firewall.
- (8) Detach left magneto wire plug from disconnect socket located on firewall, just below rear left corner of oil tank.
- (9) Disconnect the following control rods from their respective bellcranks at the firewall: -

Mixture
Throttle
Propeller
Carburetor Air Heat

- (10) Disconnect the following lines and shafts as noted: -

- (a) Oil temperature capillary bulb from thermometer well on oil tank to engine line.
 - (b) Propeller anti-icer fluid supply line from connector at lower right corner of firewall.
 - (c) Flexible fuel pump drive shaft from pump connection at firewall. Also disconnect clip attaching shaft to battery shelf.
 - (d) Hydraulic pressure and return lines from "tee" fittings located at firewall just below battery shelf.
 - (e) Tachometer shaft from connector fitting at drive assembly located at right side of engine accessory section.
 - (f) Engine cylinder thermocouple line from fitting at upper right corner of firewall.
 - (g) Instrument vacuum line from fitting at upper right corner of firewall.
 - (h) De-icer compressed air line from fitting at upper right corner of firewall.
 - (i) Oil pressure indicator line leading from oil pump at upper right corner of firewall.
 - (j) Manifold pressure line leading from top of engine at fitting at upper right corner of firewall.
 - (k) Engine primer line from fitting at upper right corner of firewall.
 - (l) Fuel pressure indicator line leading from carburetor at fitting at upper right corner of firewall.
 - (m) Fuel line leading from carburetor at top of hand fuel pump unit.
 - (n) Oil dilution line at upper left corner of firewall.
- (11) Make certain that all necessary lines, rods, wires, conduits, etc., have been disconnected and supported clear, as required.
 - (12) Remove nuts from rocker arm pin bolts at cylinders No. 2 and No. 9, and attach engine sling No. 61162 thereto, using same nuts and screwing them in the reverse position.

- (13) Take up slack in chain fall or hoist, maintaining ample chain clearances in order to avoid damage to equipment.
- (14) Detach nuts and washers from each of the four points of engine mount attachment to the fuselage.

- (15) Hoist power plant clear.

CAUTION: Rear of engine mount must be supported by personnel and care exercised to prevent its dropping downward, which is the tendency, upon disengagement of the mount from the attaching bolts. Should this occur, damage to the oil tank and fixtures on the fire-wall would result.

- (16) Fasten engine mount to overhaul stand, using four AN8 bolts.

CAUTION: Upper points of attachment must be engaged with bolts in overhaul stand prior to engagement of lower points.

c. Inspection. - Inspect the engine mount attachment terminals, bolts, bushings, nuts and washers for signs of wear and damage, and replace if necessary.

3. Wing

a. General. - The major sub-assemblies of the complete wing assembly, consisting of two outer panels, two removable tips, two landing flaps, two ailerons and a left aileron trim tab, may be removed individually or the complete outer wing panel assembly, with the exception of the flap panels, may each be removed from the airplane as a unit. For removal of the individual sub-assemblies of the outer wing panels, refer to Section IV, of this Handbook. The center wing is an integral part of the fuselage structure.

b. Outer Wing Panel Removal. - The sequence of operations necessary to remove an outer wing panel is as follows: -

- (1) Remove upper wing joint cover assembly.
- (2) Detach lower wing joint cover plate from gap at trailing edge.
- (3) Disconnect landing gear fairing door assembly from actuating link, located at top of oleo strut on inboard side.
- (4) Detach center wing fuel tank door assembly which includes landing gear fairing door and strut channel from wing, at tank and wing joint gap.
- (5) Remove wing joint nose gap cover.
- (6) Detach fresh air duct flexible tubing from casting bolted to inner surface of nose gap cover plate at right outer panel only.
- (7) Lower flaps to disconnect left aileron trim tab drum cable from trim tab cables at turnbuckles located in center wing, just outboard of fuselage.

NOTE: Tape cables in place in drum grooves for convenience of reinstallation.

- (8) Detach flap panel shaft from center connecting rod universal sleeve by extracting the two attaching AN24-25 clevis bolts.
- (9) Detach free air temperature bulbs from attaching clamps at lower surface of left outer panel and unthread bulbs and capillary tubing through holes at that point and through lightening hole in end rib.
CAUTION: Do not bend or pinch capillary tubes.
- (10) Disconnect bilge lines, located in lower rear portion of wing joint gap directly under inboard flap actuating cylinder, from rubber connecting hose. Bilge lines are identified by a single band of light blue.
- (11) Disconnect hydraulic lines from "tee" fittings on inboard flap actuating cylinder, located in lower rear portion of wing joint gap. Hydraulic lines are identified by bands of light blue and yellow.
- (12) Disconnect aileron control cables at turnbuckles reached through landing gear wells and remove them from their pulleys. Pull the shorter cables into the center wing. The aileron cables should be identified for convenience of assembly, and their ends tied together to prevent them from slipping into the wing structure.
- (13) Disconnect passing light wires at left outer panel junction box only.
- (14) Disconnect fixed gun solenoid and pitot heater wires, and conduit at right outer panel junction box only.
- (15) Disconnect landing and running light wires, landing gear warning switch wires, and conduit at junction box located in leading edge of outer panel, just outboard of wing joint bolting angle.
- (16) Detach rubber de-icer connecting tubes at wing joint nose gap. De-icer lines are identified by bands of blue and green.
- (17) Disconnect airspeed static and pressure lines at drain wells located in right wing joint nose gap. Static lines are identified by a letter "S" stamped on the connecting fittings and by bands of light green and black painted on the tube. Pressure lines are identified by a single band of black, and by the letter "P" stamped on the connecting fittings.
- (18) Disconnect fixed gun charging cable at turnbuckle, located at inboard end of fixed gun compartment in leading edge nose gap of right outer wing panel only.
- (19) Disconnect landing gear catch release cable. Access to connecting link is provided through Dzus fastened door located on lower side of center wing near leading edge.
- (20) Install landing gear jury strut, 25-55008, to support landing gear when wing panel is removed. Attach clevis end of jury strut to attachment fitting located at center wing rear spar, next to wing joint fitting, and secure with an AN30-23 clevis bolt and nut. Attach

offset clevis end of strut to attachment fitting located at lower end of landing gear rear strut, and secure with an AN30-23 clevis bolt and nut. Adjustment of strut length may be obtained by loosening locknut at lower end and rotating strut as required.

- (21) Attach outer wing hoisting sling assemblies, 25-55015-2 and 25-55015-3. Two sockets for inserting the sling assemblies are provided on the upper surface of each outer panel. The shorter outboard sling assembly screws into socket located just aft of the landing light. The longer inboard sling assembly bolts through the rear spar at the intersection of the spar with the first outboard rib.

(22) Take up slack in chain fall or hoist.

(23) Extract bolts from the bolting angle.

(24) Extract hinge bolts from the front and rear spar hinge fittings.

(25) Pull panel clear, making certain that all cables, wires, lines, etc., are permitted to slip easily out of the panel.

NOTE: The panel is designed to balance at the points of hoisting attachment. However, the support of personnel at the inboard leading edge may be necessary.

(26) Place panel on suitable supports, amply padding such supports as required to prevent damage to the alclad panel covering.

c. Inspection at Outer Panel Attachment. - Inspect wing joint bolting angle and spar hinge fitting holes for evidence of elongation, attachment bolts for signs of shearing, and attaching nuts for general condition. Inspect bolting angle for evidence of cracks and damage in general. Inspect neoprene channels on edges of wing joint cover for general condition and for evidence of deterioration.

4. Landing Gear

a. Landing Gear Removal. - The sequence of operations necessary for the removal of each landing gear strut assembly is as follows: -

- (1) Jack the airplane by means of center wing jacking points.
- (2) Remove temporary jury strut which was installed to support the landing gear when the outer wing panel was removed.
- (3) Disconnect flexible brake line on strut from rigid line in center wing, gaining access to coupling through square door in lower surface of center wing, inboard of fairing door hinge. Detach end of flexible line from clips attaching it to center wing.
- (4) Detach fairing door actuating link from strut.
- (5) Detach clevis end of lock pin operating link from lock pin.
- (6) Detach clevis end of landing gear operating strut from guide fitting located on lock pin.

- (7) Detach both ends of landing gear drag strut.
- (8) Extract oleo attaching bolt.

b. Inspection of Landing Gear Attachment. - Remove lock pin from top of strut and inspect holes at that point for elongation and for cracked or broken edges. Inspect holes at the hinge fitting at the top of the strut and at the point of oleo attachment in the center wing for elongation and for cracked or otherwise damaged edges. Inspect oleo attaching bolt for evidence of shearing and attaching nut for general condition.

5. Empennage Dismantling

a. General. - Prior to dismantling the empennage, it will be necessary to open the access door located on the left side of the fuselage just forward of the horizontal stabilizer, and to detach all removable fairing and fillets about the empennage.

b. Rudder Removal. - Detach rudder trim tab control cables at turnbuckles reached through access door, and pull shorter cables back through holes in rear fuselage bulkhead. Tape cables to drum grooves for convenience of reinstallation. Detach rudder control cables at control horn and tie them together to prevent their slipping into the fuselage structure. Remove nuts from the two ball bearing eye-bolt hinges through the apertures provided aft of hinge point centers at left side of rudder. Turn rudder to one side and remove bolt at lower hinge point. Remove rudder, allowing eye-bolts to remain with vertical stabilizer.

c. Vertical Stabilizer Removal. - Detach antenna wires from mast at top of vertical stabilizer. Detach leading edge access door and disconnect running light wiring at junction box located in leading edge fillet. Extract all screws securing lower edge of stabilizer to fuselage tail and remove stabilizer.

d. Elevator Removal. - Remove four (4) AN210-2A pulleys and guides at rear spar of horizontal stabilizer. Detach elevator trim tab control cables at turnbuckles reached through access door and pull shorter cables through holes in fuselage tail. Tape cables to drum grooves for convenience of reinstallation. Detach elevator control cables at control horn and tie them in such a manner as to prevent their slipping into fuselage structure. Extract two bolts securing control horn assembly to rear spar of horizontal stabilizer. Remove nuts from ball bearing eye-bolt hinges, disconnect bonding braid at each eye-bolt and remove assembly, allowing hinges to remain with horizontal stabilizer. The elevator sections may be detached from the control horn assembly by extracting the three bolts securing the torque tube flanges of each.

e. Horizontal Stabilizer Removal. - Extract the eight bolts securing the stabilizer rear spar to fuselage tail and the bolt and spacer securing the front spar to fuselage tail. The stabilizer halves may be separated by extracting the four bolts securing their rear spars.

f. Inspection of Empennage Attachment. - Thoroughly inspect empennage attachment fittings, hinge assemblies, attachment bolts and bushings for dents and cracks, and for evidence of wear and damage. Inspect fairing and fillets for signs of dents, cracks, wear and damage.

g. Inspection of Elevator and Rudder Replacements. - Inspect per T. O. 01-1-12.

SECTION IVDISASSEMBLY, INSPECTION, REPAIR AND ASSEMBLY1. General

This section contains the general instructions for restoring this airplane to as near as possible its condition when new, such work being the normal function of the Air Depots. All anti-friction bearings should be removed, cleaned, inspected and lubricated with reference to and in accordance with the instructions outlined in T. O. 29-1-3. For the replacement of frayed control cables, refer to T. O. 01-1-26. All lines shall be annealed at overhaul in accordance with the provisions of T. O. 01-1E-31.

a. Cleaning. - As the various assemblies are removed from the major sub-assemblies, they should be cleaned with reference to and in accordance with the instructions outlined in T. O. 01-1-1.

b. Inspection. - In addition to the periodic inspection procedure outlined in the "Handbook of Service Instructions", T. O. No. 01-60EB-2 which is equally applicable to overhaul, specific instructions pertinent to overhaul inspection are outlined in this section when they are directly concerned with overhaul and when inspection cannot be accomplished other than at this stage of disassembly.

2. Power Plant

a. Engine Removal. - The following sequence of operations is necessary to remove the engine from the mount after the complete power plant, from the firewall forward, has been removed from the airplane: -

- (1) Remove oil tank to increase accessibility.
- (2) Remove starter crank extension bracket and shaft.
- (3) Remove magneto distributor housing, taking out two bolts and being very careful not to break carbon point. CAUTION: Place cloth over magneto in order to avoid accidental dropping of small parts or foreign matter into the magnetos.
- (4) Remove magneto condenser housing, taking out one bolt.
- (5) Detach the following control rods at their respective engine units: -

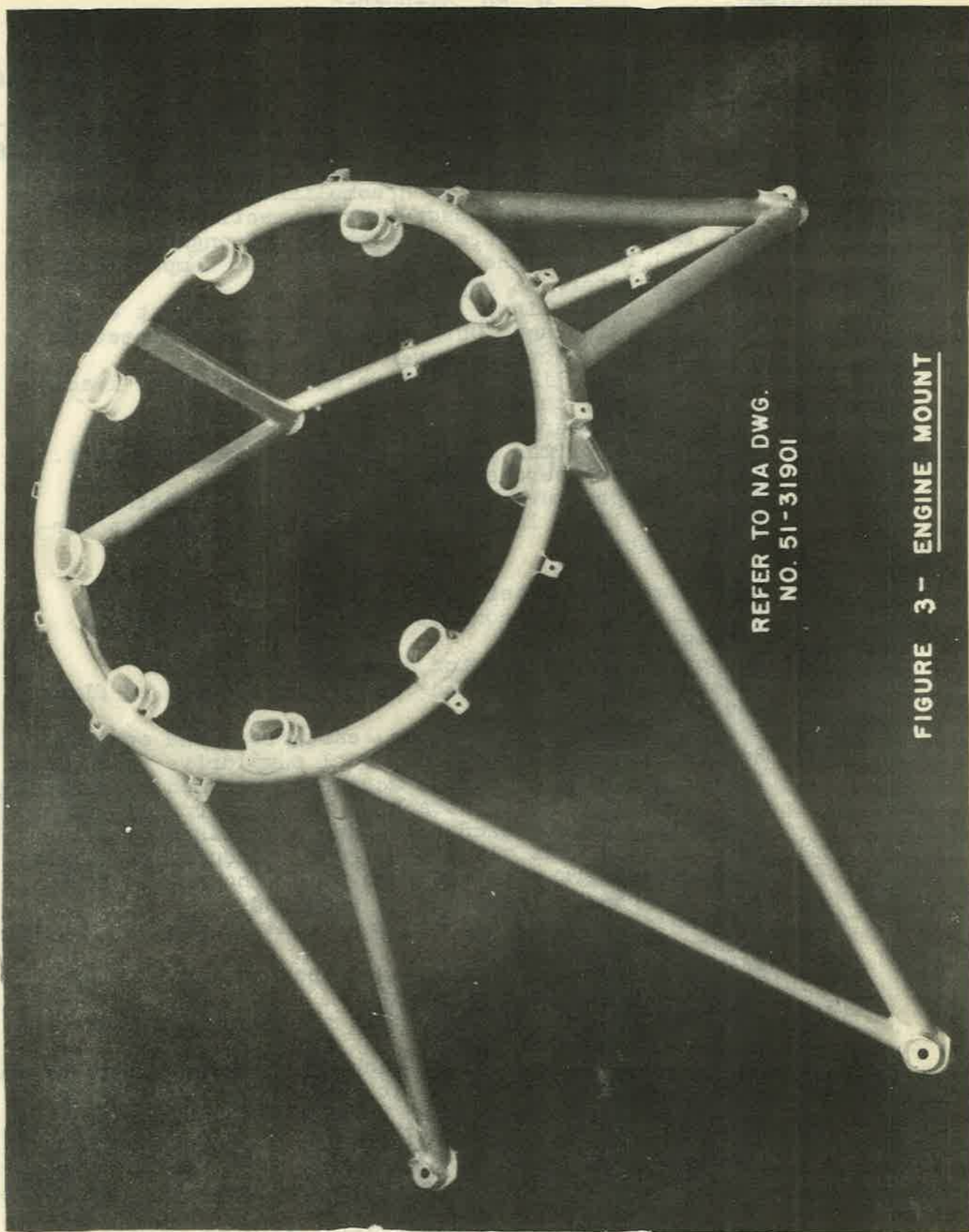
Mixture
Throttle
Propeller
Carburetor Air Heat

- (6) Disconnect the following lines from engine and respective engine units, as noted: -

(a) Anti-icer fluid supply line at connector fitting

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T. O. NO. 01-60EB-3



REFER TO NA DWG.
NO. 51-31901

FIGURE 3- ENGINE MOUNT

located near lower right side of engine mounting ring and at clamp to lower bolt of engine nose case.

- (b) Remove vacuum pump.
 - (c) Hydraulic pressure and return lines and "tee" fitting; also hydraulic pump line connecting fittings.
 - (d) Thermocouple wires from cylinder No. 1. This can be more expediently accomplished by removing tape from wires and unscrewing connections.
 - (e) Manifold pressure line at top of engine.
 - (f) Oil return line, leading from oil temperature regulator, at engine.
 - (g) Oil inlet line, leading to drain cock at engine.
 - (h) Turn "IN" and "OUT" engine oil line connecting fittings toward center of engine.
 - (i) Oil vent lines at either side of engine, leading from oil tank.
 - (j) Oil pressure indicator line at oil pump.
 - (k) Engine primer line at primer distributor unit.
 - (l) Engine supercharger drain line.
 - (m) Fuel pressure indicator line at carburetor.
 - (n) Fuel line, leading from hand fuel pump, at carburetor.
-
- (7) Remove magneto blast tubes.
 - (8) Cap oil pump line connector fittings to avoid oil leakage.
 - (9) Detach exhaust collector ring from tail pipe.
 - (10) Detach oil separator and remove top section of fixed cowling.
 - (11) Remove carburetor air scoop, carburetor and adaptor.
 - (12) Remove tachometer shaft and fuel pump drive assemblies from right side of engine accessory section by removing nuts from stud bolts attaching tachometer shaft drive assembly. Remove stud bolts and move assembly aft.
 - (13) Make certain that all lines, rods, conduit, etc., that might interfere with the removal of the engine have been detached or removed, as required.
 - (14) Disconnect exhaust gas analyzer exhaust nipple from exhaust collector ring.
 - (15) Attach engine hoisting sling to engine and take up slack in chain fall or hoist.
 - (16) Maintain proper hoisting chain clearances in order to avoid damage to equipment.
 - (17) Remove nuts from bolts at each of the nine points of engine attachment, starting at the bottom and working around sides so that upper bolts are removed last.
CAUTION: Two men are required to remove the engine from the mount, one to remove the nuts from the attaching bolts, the other to operate the chain fall or hoist.
 - (18) Pull engine clear, removing left side of engine first. Carefully guide accessory section through engine mounting ring. Care should be exercised in order to prevent damage to accessories.

b. Engine Compartment Disassembly.

(1) General: - Disassemble engine compartment, removing items of equipment, brackets, supports, cowling, ducts, lines, rods, etc., as necessary to facilitate inspection and accomplish overhaul.

(2) Oil Tank Removal: - To remove the oil tank, detach the three lines at top of tank and the outlet line at tank sump. Detach three bonding braids, two on the right side and one on the left. Disconnect turnbuckles at upper tank straps and lift tank clear.

(3) Oil Temperature Regulator Removal: - To remove regulator, disconnect oil lines at top of assembly. Detach rear bracket of oil cooler from engine mount step support tube. Detach forward support from clamp lugs located on the two lower engine mount tubes. Remove oil temperature regulator by disengaging forward end of cooler from duct. For repair of regulator, see T. O. 03-15-4.

c. Inspection of Complete Power Plant. - (1) Inspect engine mount vibration absorber for damage, cracks and evidence of deterioration. For replacement of vibration absorbers, see T.O. 01-1-58.

(2) Inspect carburetor air scoop screen and gaskets, making certain screen is in good condition and has not pulled away from inner side of frame where each wire is soft soldered.

(3) Inspect exhaust manifold for cracks at welds, particularly at the holding lugs which may have been welded on a slight angle, producing tension on the metal behind the lugs.

(4) Inspect engine driven hydraulic pump lines and connections for possible cracks, breaks or weakness which may have developed due to high pressure imposed on the lines.

d. Additional Power Plant Overhaul Instructions. - For additional instructions, refer to Technical Orders as noted: -

Engine, Wright R-1820-57	T. O. No. 02-35GB-3
Exhaust Gas Analyzer	T. O. No. 05-3B-3
Fuel Pump, Pesco	T. O. No. 03-10EA-1
Generator, Eclipse Type E-7	T. O. No. 03-5AA-1
Oil Tank	T. O. No. 01-1E-26
Propeller, Hamilton Controllable	T. O. No. 03-20CB-2
Propeller Governor, Hamilton Constant Speed	T. O. No. 03-20CA-2
Starter, Eclipse Type C-21	T. O. N.. 03-5CA-1
Vacuum Pump	T. O. No. 03-30AA-1

3. Landing Gear

a. Disassembly. - **WARNING:** Prior to disassembly of landing gear oleo strut, thoroughly deflate strut by depressing air valve near top of assembly until fully depressed. Remove clamps securing brake line to landing gear strut. Remove wheel fairing. Remove Dzus fastened lower plate from outboard side of wheel and hub cap from end of wheel axle. Remove axle nut and pull wheel assembly from axle. Remove tire from rim. Detach brake shoe and drum assembly by extracting the bolts securing assembly to strut. Remove air valve body,

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T. O. NO. 01-60EB-3

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REFER TO N.A. DWG. NO. 51-33001

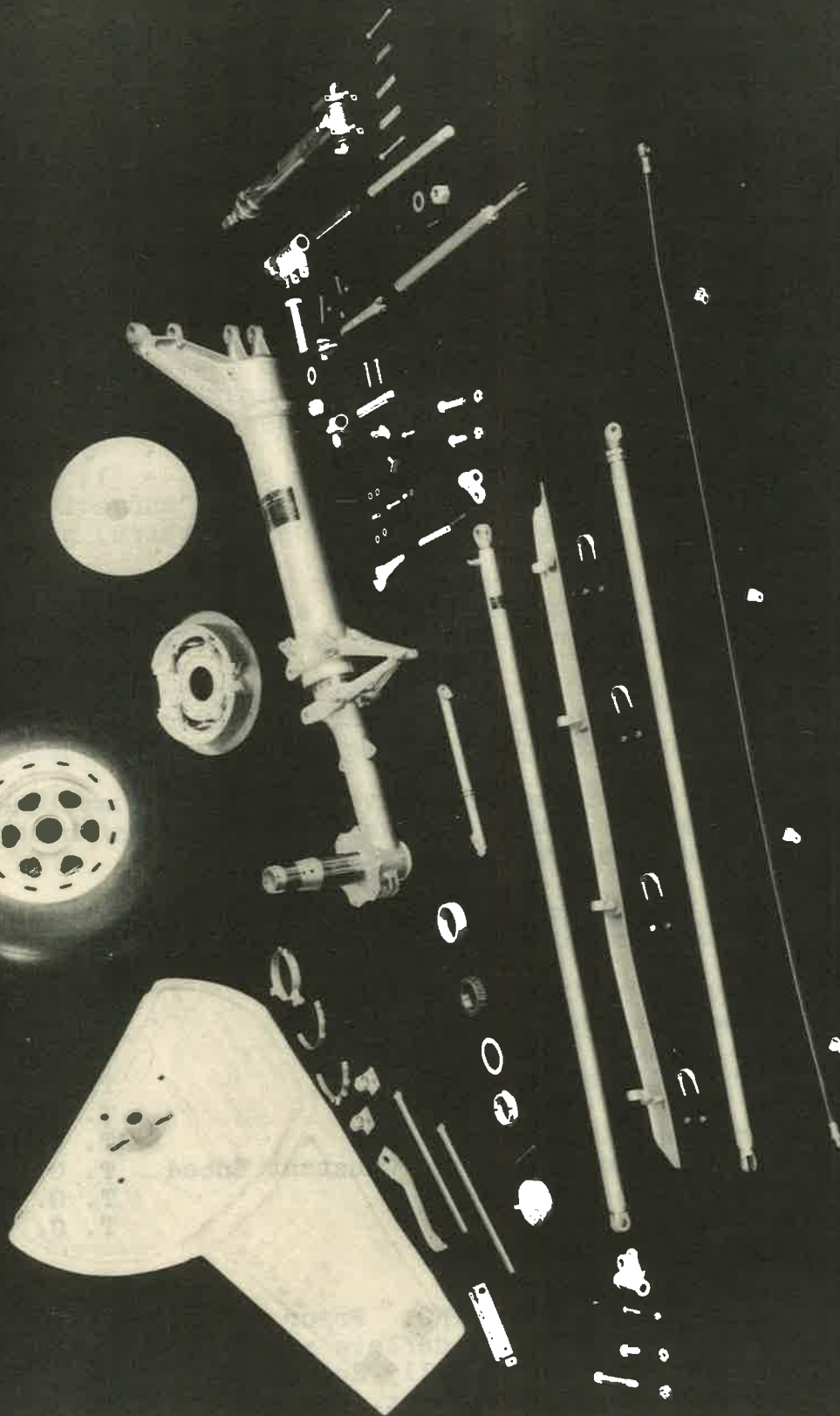


FIGURE 4- LANDING GEAR BREAKDOWN

located near top of strut. NOTE: Before reinstalling landing gear, ascertain that neoprene cover on landing gear "DOWN" position toggle switch is in good condition. Also be sure that vent hole in landing gear "DOWN" position pin socket is not in any way obstructed.

b. Inspection. - Concluding disassembly, thoroughly inspect the various units of the landing gear, with reference to Technical Orders as follows: -

Air-Oil Shock Strut

T. O. No. 03-25E-1

Wheel and Brake Assembly

T. O. No. 03-25C-2

Tires

T. O. No. 04-10-2

4. Outer Wing Panel

a. Wing Tip.

(1) Removal and Disassembly: - Extract screws securing wing tip to outer panel. Remove upper and lower covers at wing tip trailing edge gap and pull tip clear. Disconnect running light flexible conduit from rigid conduit at outer panel outboard rib. Detach soldered terminal from wire end in junction box at tip end rib, and pull wire through flexible conduit. Remove tip. Remove running light assembly covers from both surfaces of wing tip by extracting their attaching screws. Disconnect wiring from rear of each light socket and remove light assemblies.

(2) Inspection: - Inspect elastic stop nuts attached to inner edge of outer panel tip covering. Nuts having stripped and/or badly worn fiber locking collars should be replaced. It is possible to inspect a portion of the inner structure of the wing tip through the running light cut-outs, and through lightening holes in the end rib. If access to interior of wing tip is required other than that gained through cut-outs and lightening holes, it will be necessary to remove the end rib by drilling all rivets securing it to the tip assembly. Inspect general condition of light assemblies and trailing edge gap covers. Refer to T. O. 03-5-5 for information pertinent to plating of the Type A-8 running lamp bases.

b. Aileron.

(1) Removal and Disassembly: - (a) Prior to removing the left aileron, it is recommended that the trim tab operating drum and the tab control cable be removed. To remove the left aileron trim tab drum, detach aileron trim tab control cable and drum inspection covers from the lower surface of the aileron at the inboard end. Extract the three fillister head screws securing drum, and remove control cables from drum. Remove drum and pull cables through guide pulleys at inboard end of aileron. To remove an aileron, detach aileron actuating rod from bellcrank in outer panel. An access door for this purpose is located in lower surface of the panel, just forward of the rear spar. Detach ball bearing eye-bolt hinges by removing nuts attached thereto through small apertures located in lower surface of

REFER TO NA DWG.
NO. 51-12002

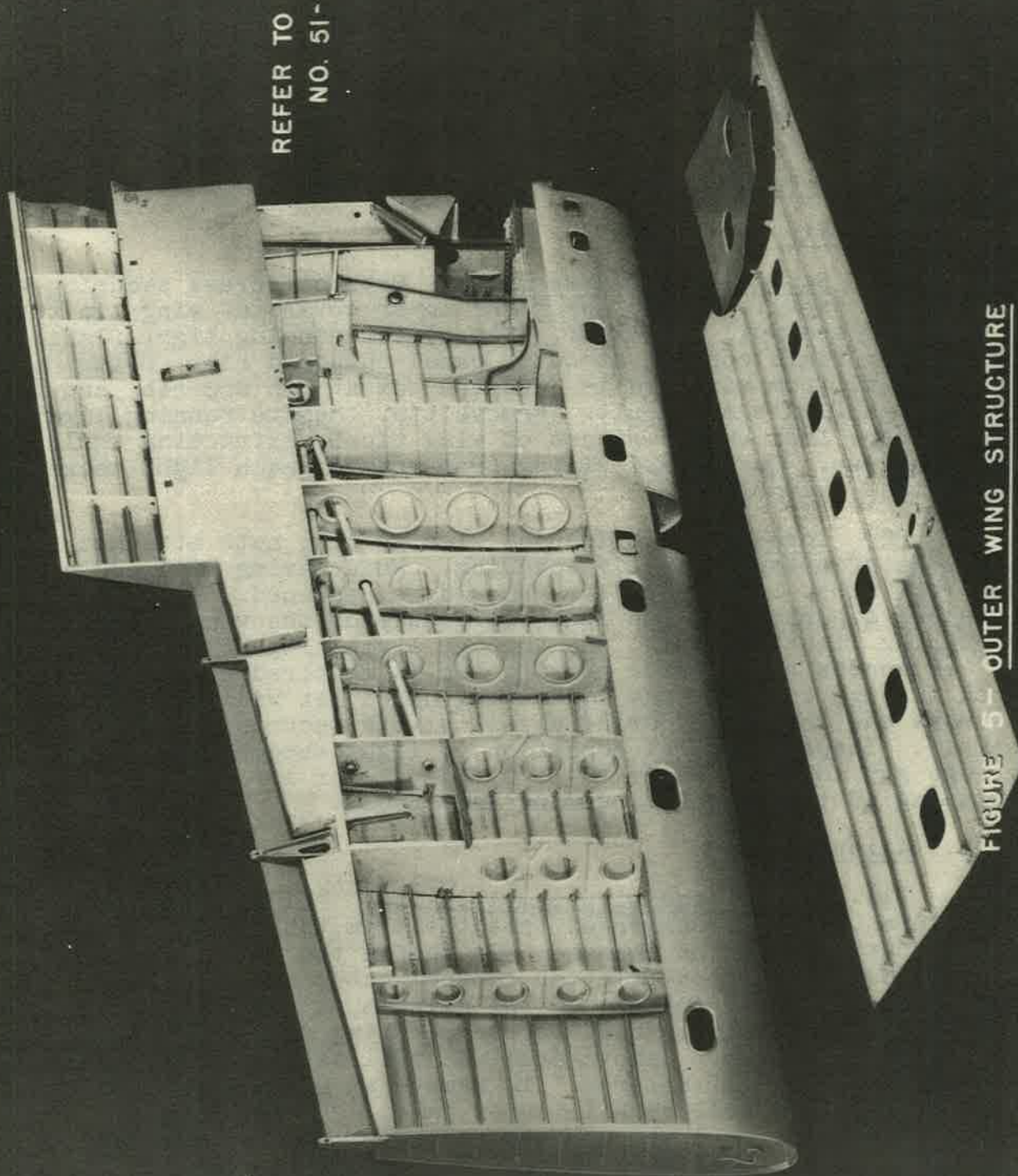


FIGURE 5- OUTER WING STRUCTURE

REFER TO NA DWG.
NO. 25-12011

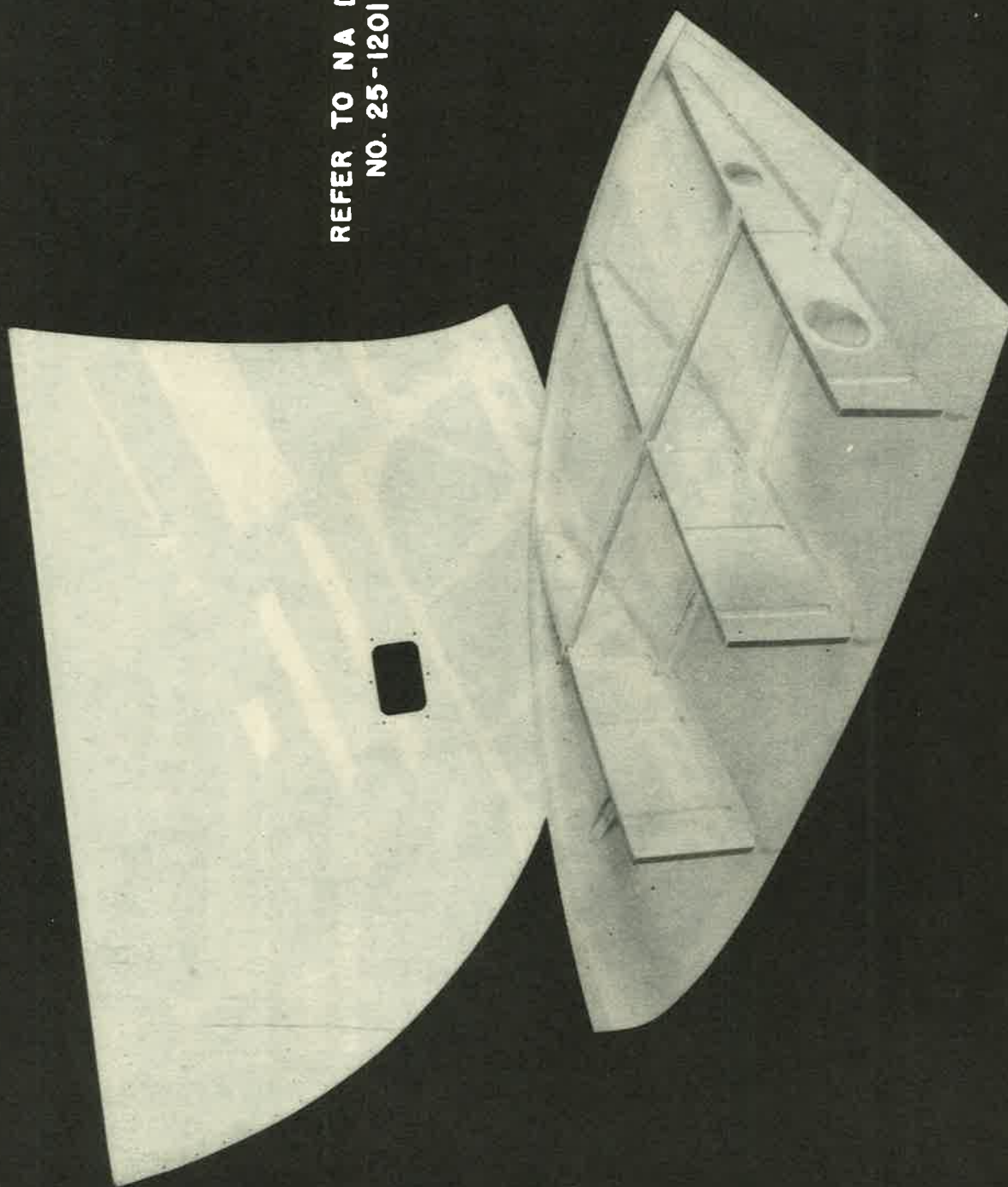


FIGURE 6 - WING TIP STRUCTURE

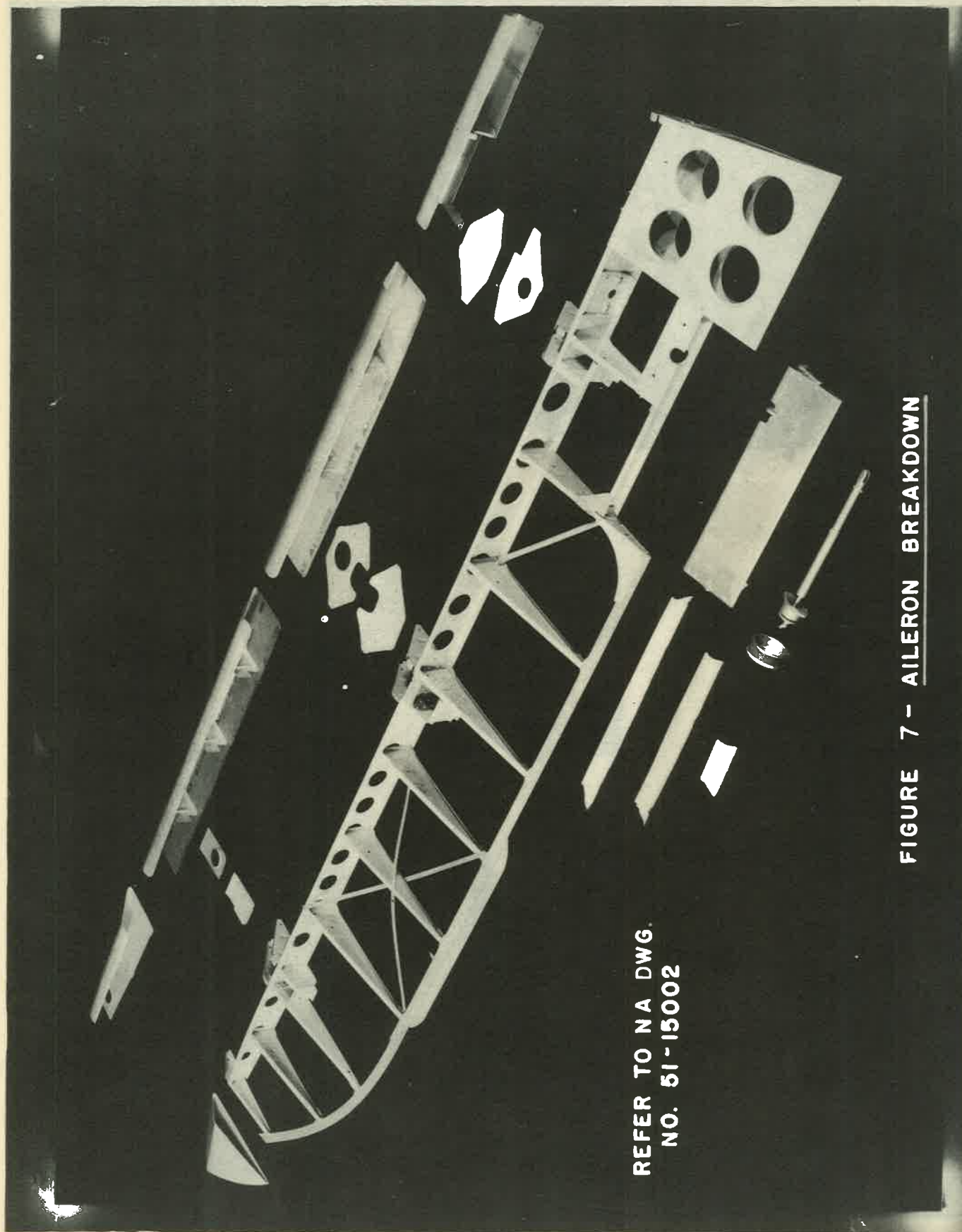


FIGURE 7 - AILERON BREAKDOWN

REFER TO NA DWG.
NO. 51-15002

aileron at each hinge. Remove aileron. To remove left aileron tab, detach push-pull tube at tab control horn, swing tab downward and extract bolt at each hinge point.

(b) Detach ball bearing eye-bolt from hinge brackets bolted to outer panel rear spar. Disconnect aileron control cables at bellcrank and at turnbuckles located in landing gear wheel well. Attach suitable lengths of cord to outer end of each cable for convenience of reinstallation and pull them through outer panel from wheel well. Cords should be kept tight to avoid possibilities of their slipping off pulleys. Extract aileron control bellcrank pivot bolt through upper surface of outer panel and remove bellcrank assembly through lower surface access opening.

(2) Inspection: - Thoroughly inspect left aileron trim tab operating drum and cable assemblies for general condition. Carefully inspect aileron fabric covering and replace, if necessary, in accordance with Spec. No. 98-24108 and with reference to N.A. Dwg. No. 51-15001. Make certain that leading edge balance weight in each aileron is secure. Thoroughly inspect bellcrank assemblies for loose, worn or otherwise damaged ball bearings. Check for evidence of race pitting. Inspect bellcrank pivot bolts for evidence of shearing. Inspect ball bearing eye-bolt hinges for race pitting and for general condition. Carefully inspect hinge brackets bolted to outer panel rear spar for cracks, dents, security of attachment and for proper alignment. The aileron replacements should be inspected as per T.O. 01-1-12.

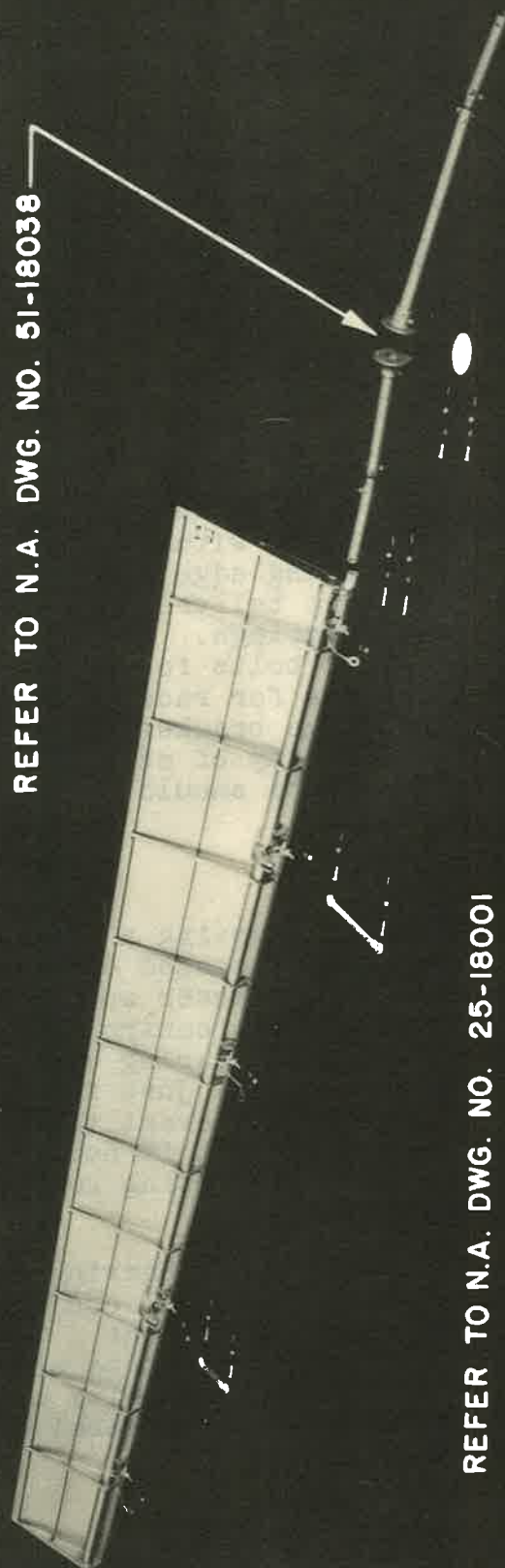
c. Flap Panel.

(1) Removal: - Prior to removing a flap panel, it will be necessary to detach the cover plate located directly below the outboard flap operating cylinder on the lower surface of the outer wing panel. Detach flap control tubes from control horns on flap torque tube. Remove the nuts from the ball bearing eye-bolt hinges through opening in lower surface of wing panel, just forward of each respective hinge. Pull panel clear. In the event that flap is removed prior to removal of outer wing panel, it is necessary to first disconnect flap panel shaft from center connecting rod universal sleeve by extracting the two attaching bolts.

(2) Inspection: - Inspect ball bearing eye-bolt hinges for race pitting and attaching nuts for general condition. Inspect metal flap covering for cracks, dents and abrasions. Check control horns for security of attachment to flap torque tube and for evidence of cracks therein. Inspect felt pads for security of attachment to lower flanges of trailing edge ribs and for general condition. Replace if necessary.

d. Landing Light.

(1) Removal: - To remove the running and/or landing light assembly, remove screws securing landing light door assembly to leading edge of outer panel and hinge assembly upward. Extract screws



REFER TO N.A. DWG. NO. 51-18038

REFER TO N.A. DWG. NO. 25-18001
FOR FLAP ASSEMBLY

FIGURE 8-WING FLAP PANEL AND SYNCHRONIZING ARRANGEMENT

securing light to mounting bracket, located at rear of light compartment and move light forward. Utilizing the space thus provided between the light and mounting bracket, detach electrical wiring and conduit at junction box located at outer panel front spar, just aft of mounting bracket. Pull light clear. A visual inspection of the light assembly will determine the procedure for its disassembly.

(2) Inspection: - Inspect all accessible elastic stop nuts, replacing those having stripped threads or damaged or loose fiber locking collars. Check condition of electrical wiring and for security of attachment of soldered terminals. Inspect for general condition of glass lenses and replace those cracked or otherwise damaged. Clean and polish lamp reflectors, if necessary, with reference to T. O. 03-5-4.

e. Pitot Static Tube.

(1) Removal: - Pitot static tube assembly components located in leading edge of right outer wing panel may be reached through access door located in lower surface of wing panel, just aft of pitot static tube. However, to improve assessability, it is recommended that the landing light compartment, located just inboard of pitot static tube, be utilized. Detach airspeed head heater electrical lines and conduit at junction box located at outer panel front spar, just aft of landing light mounting bracket. Disconnect pitot and static lines at couplings located adjacent to junction box. Detach aft end of pitot static tube assembly from bracket on front spar. Extract four screws securing pitot tube bracket to leading edge and pull assembly clear.

(2) Inspection: - Thoroughly clean and inspect pitot tube. Test pitot and static lines in outer panel leading edge by means of a water manometer. To test pitot line proceed as follows: - Securely plug outlet of static line and connect manometer to pitot line. Apply air pressure to pitot line to cause airspeed indicator pointer to fall just short of its maximum reading or to cause the manometer to indicate the ten inches of water. Close manometer valve and let it stand about ten minutes. If within this period of time there is no change in water level or airspeed reading, it will be proof that no leaks exist in pitot lines or instruments connected to them. To test static lines, follow the same procedure except that suction (ten inches of water) instead of pressure must be applied to the lines. Any change in the water level will indicate leaks in pitot static lines or the instruments connected to them. In this event, a visual inspection of pitot static lines and instruments connected to them will determine procedure for removal or repair, or both. See T.O. 01-50-1.

f. Outboard Flap Operating Cylinder.

(1) Removal: - Access to the outboard flap operating cylinder may be gained through rectangular opening in lower surface of outer wing panel, immediately below flap cylinder, and through two small, elongated holes in the wing panel upper covering, directly above cylinder. Detach flap control tube from flap operating cylinder. Disconnect hydraulic lines at cylinder. Free cylinder from clamp bracket at rear of cylinder by removing attaching "U"-bolt and from

attaching bracket at front of cylinder by extracting the single AN4-13A bolt. For disassembly and inspection of cylinder refer to paragraphs 7,a. & 7,i. of this Section.

g. Outer Panel Inspection. - Thoroughly inspect and clean external covering and internal structure of outer panel, and assemblies. Carefully inspect for general condition of all attachment fittings, bolts, hinge fittings, clevis pins and clevises, etc. Inspect lines, electrical wiring, conduit, connections, etc. Test flotation compartments for leaks in accordance with instructions outlined in T. O. 01-60EB-2, "Handbook of Service Instructions"

5. Empennage

a. Rudder.

(1) Disassembly: - Detach trim tab drum from assembly at rudder torque tube by extracting three attaching fillister head screws. Extract the two screws securing the trim tab spindle bearing housing and unscrew the tab operating screw. Detach tab operating rod from control horn. Swing tab to one side and remove the bolts securing the ball bearing hinge fittings to rudder structure. Pull tab and operating rod free.

(2) Inspection:

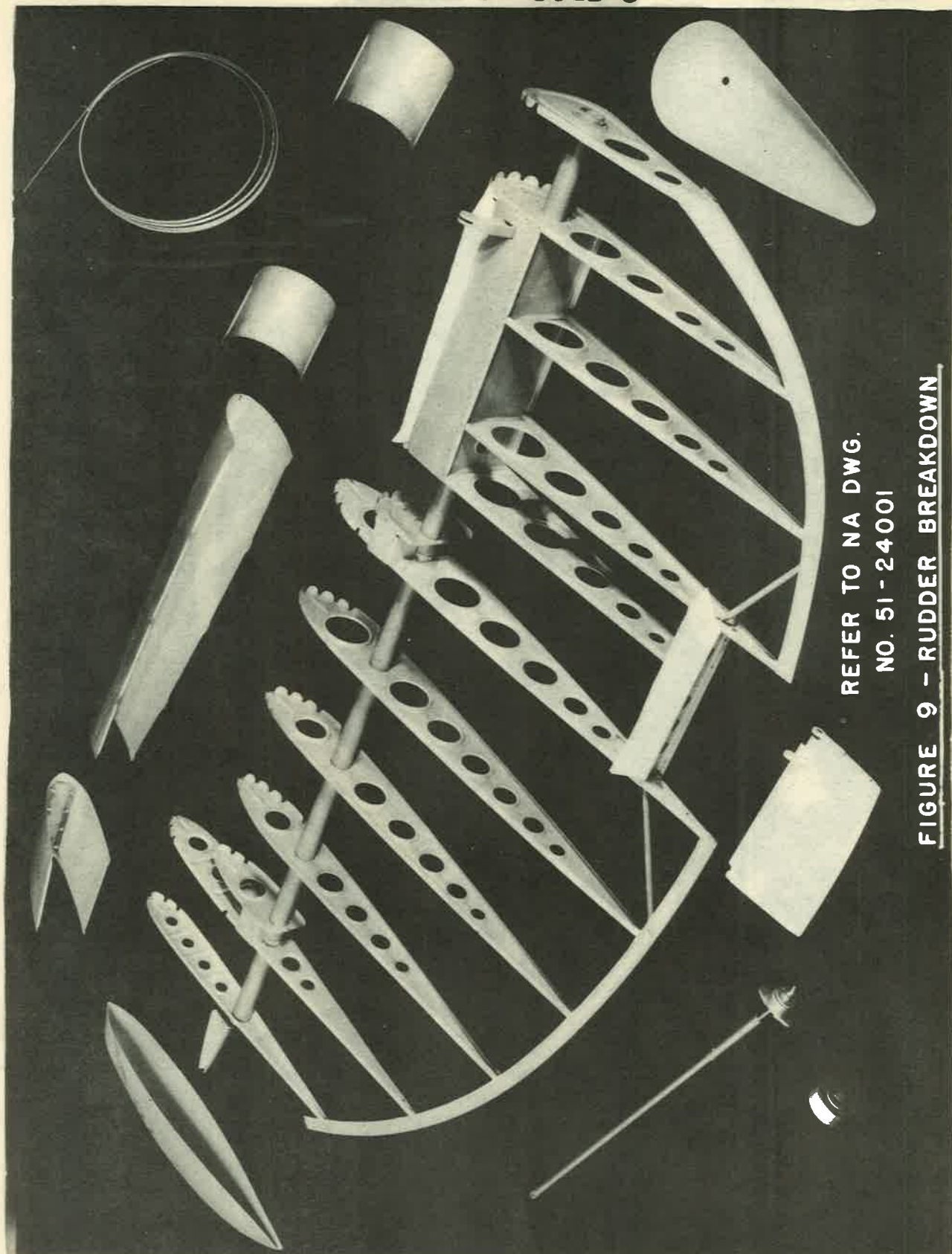
- (a) Thoroughly inspect fabric covering for general condition and, if necessary, recover according to A.C. Spec. 98-24108, dope according to 98-24100, and paint according to 98-24102. Also refer to N.A. Dwg. No. 51-24001.
- (b) Make certain that leading edge balance weight at top of rudder is secure.
- (c) Carefully inspect all component parts of the trim tab operating mechanism for wear, damage and for general condition.
- (d) Check trim tab control cables for chafing or fraying, replacing frayed cables in accordance with T. O. No. 01-1-26.
- (e) Check for elongated holes in rudder control horn, at point of control cable attachment.
- (f) Check for security of attachment of rudder horn to torque tube.

b. Elevator:

(1) Disassembly: - Free elevator sections from control horn assembly by extracting the two studs and one bolt securing attaching flanges of each. Detach leading edge trim tab drum access opening cover. Detach trim tab operating drum by extracting the three fillister head screws securing drum to assembly at elevator torque tube. Extract two screws securing spindle bearing housing to mounting collar

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T. O. NO. 01-60EB-3



REFER TO NA DWG.

NO. 51-24001

FIGURE 9 - RUDDER BREAKDOWN

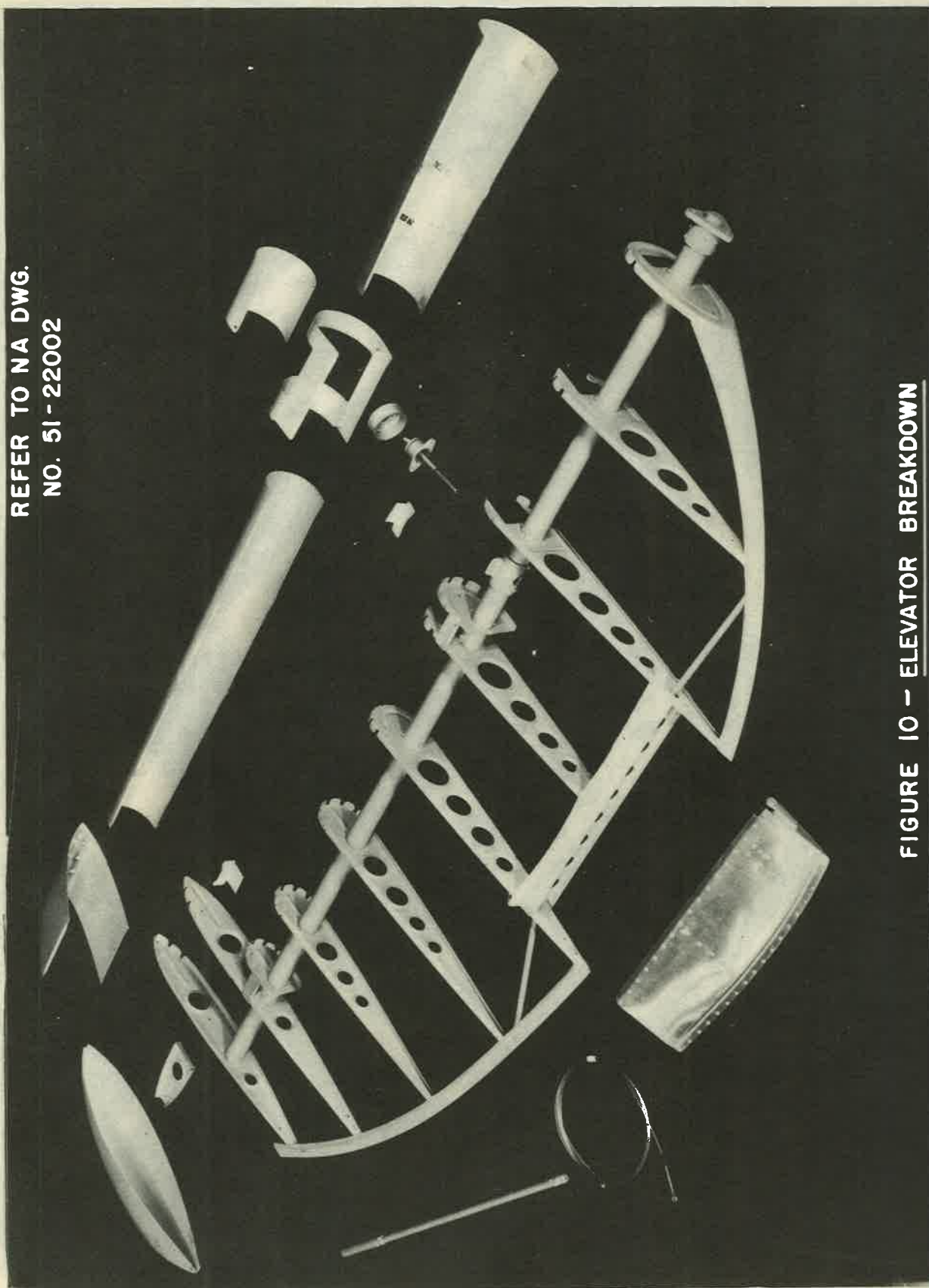
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REFER TO NA DWG.
NO. 51-22002

FIGURE 10 - ELEVATOR BREAKDOWN



and unscrew spindle and operating screw. Detach tab operating push rod from tab control horn. Swing tab to one side and remove bolt securing ball bearing hinges to elevator structure. Pull tab and push rod free.

(2) Inspection:

- (a) Thoroughly inspect fabric covering for general condition and, if necessary, recover according to A.C. Spec. 98-24108, dope according to 98-24100 and paint according to 98-24102. Also refer to N.A. Dwg. No. 51-22001.
- (b) Make certain that leading edge balance weight at outer end of elevator is secure.
- (c) Thoroughly inspect all component parts of the trim tab operating mechanism for wear, damage, and for general condition. Replace defective or excessively worn parts.
- (d) Check trim tab control cables for chafing or fraying. Replace defective control cables with reference to T. O. No. 01-1-26.
- (e) Check general condition of trim tab operating drum leading edge cover and attaching elastic stop nuts, replacing those nuts having stripped threads or damaged or loose fiber locking collars.
- (f) Inspect control horn and elevator attaching flanges for security of attachment to torque tube.

c. Vertical Stabilizer.

(1) Disassembly: - Detach ball bearing eye-bolt rudder hinge from bracket bolted to vertical stabilizer rear spar. Detach hinge bracket. Remove six attaching screws from each running light assembly, pull assembly clear and disconnect wiring at rear. Detach vertical stabilizer tip by removing attaching screws.

(2) Inspection:

- (a) Inspect interior structure through lightening holes in lower end rib.
- (b) Inspect for general condition of elastic stop nuts at stabilizer tip attachment. Replace those having stripped threads or loose or damaged fiber locking collars.
- (c) Inspect stabilizer attachment holes at upper and lower edges for elongation and for evidence of cracked edges.
- (d) Inspect stabilizer tip for broken welds, dents, abrasions, cracks, etc.
- (e) Inspect running light assemblies for general condition and replate bases, if necessary, in accordance with T. O. No. 03-5-5.

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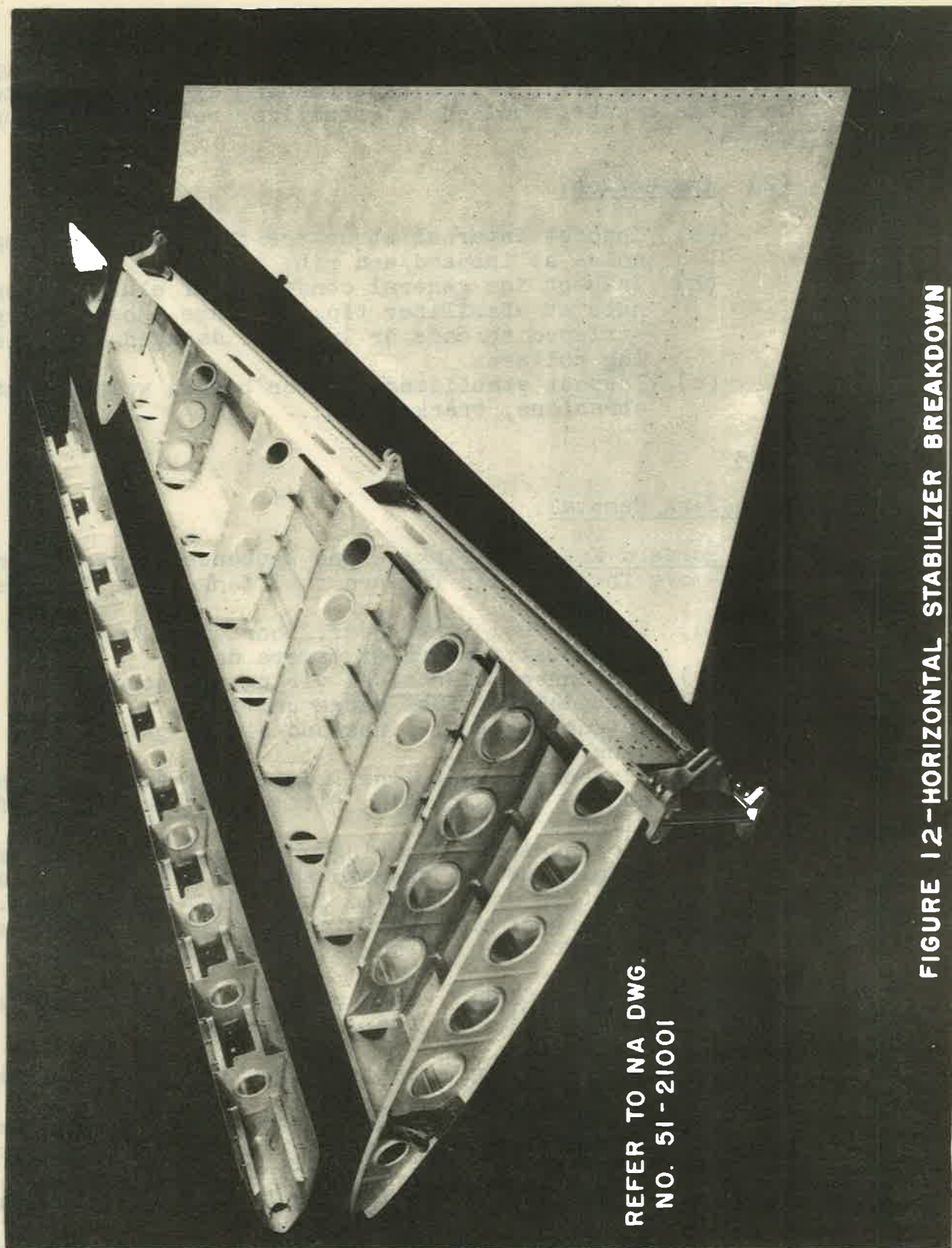
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REFER TO NA DWG.
NO. 51-23001

FIGURE 11 - VERTICAL STABILIZER BREAKDOWN

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T. O. NO. 01-60EB-3



REFER TO NA DWG.
NO. 51-21001

FIGURE 12-HORIZONTAL STABILIZER BREAKDOWN

d. Horizontal Stabilizer.

(1) Disassembly: - Detach horizontal stabilizer tip by removing attaching screws. Detach ball bearing eye-bolt elevator hinges from hinge brackets bolted to stabilizer rear spar. Detach hinge brackets.

(2) Inspection:

- (a) Inspect internal structure through lightening holes at inboard end rib.
- (b) Inspect for general condition of elastic stop nuts at stabilizer tip. Replace those having stripped threads or loose or damaged fiber locking collars.
- (c) Inspect stabilizer tip for broken welds, dents, abrasions, cracks, etc.

6. Fuselage

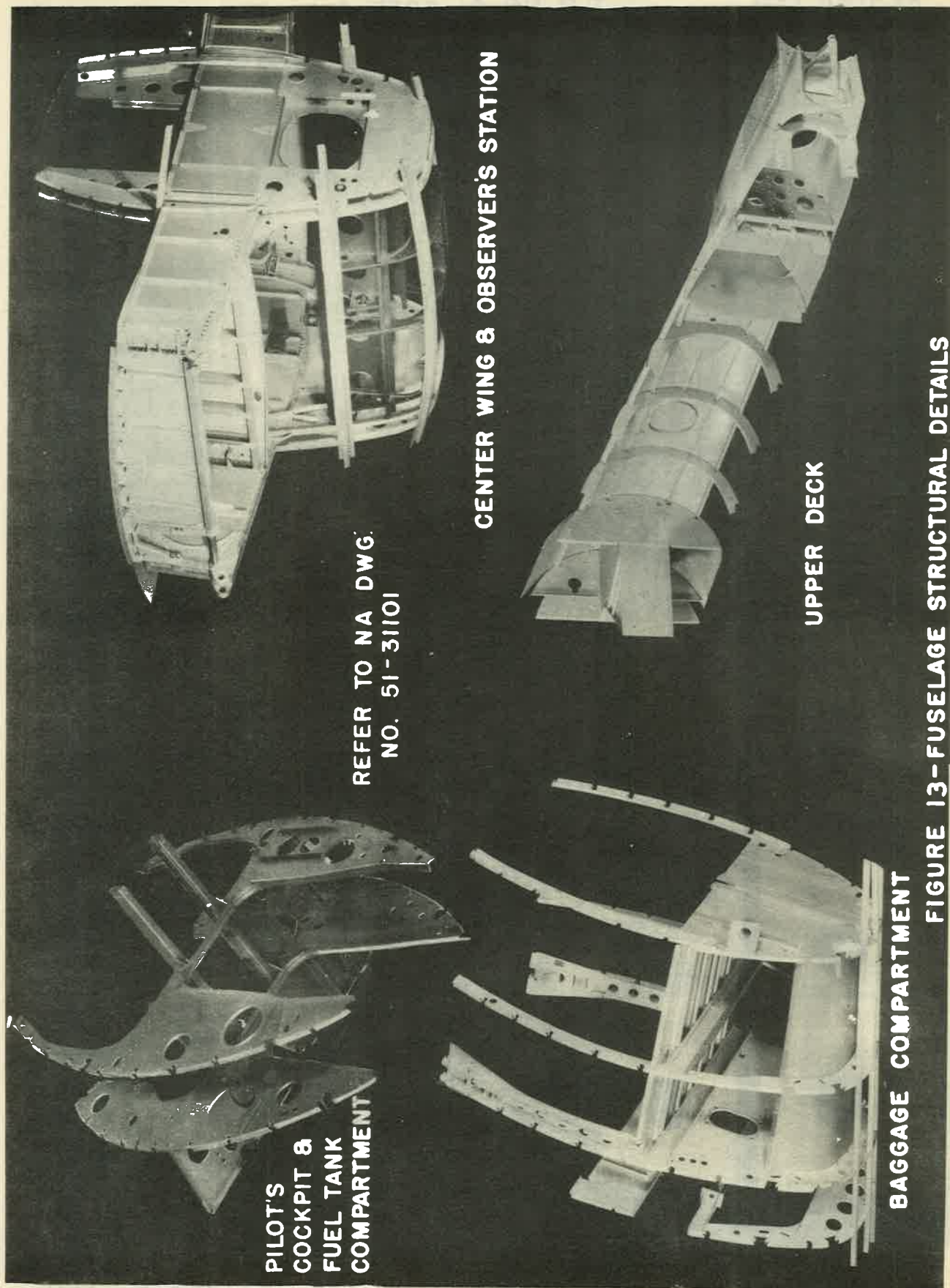
a. Fuel Tank Removal.

(1) Forward Fuselage Tank: - The sequence of operations necessary to remove the fuselage forward fuel tank is as follows: -

- (a) Detach fuel tank cover, located at bottom of fuselage just forward of camera doors.
- (b) Disconnect electrical wiring and conduit at liquidometer fuel gauge unit.
- (c) Detach two fuel lines and single primer line at tank sump.
- (d) Disconnect vent line from top of tank, gaining access to connecting fitting through floor of pilot's cockpit.
- (e) Loosen clamps securing hose to filler neck casting, gaining access thereto through elevator pulley inspection door located just below filler neck.
- (f) Disconnect turnbuckle arrangement on straps at lower left side of tank and lower tank assembly clear.

(2) Rear Fuselage Tank: - The sequence of operations necessary to remove the fuselage rear tank is as follows: -

- (a) Remove gunner's seat and gun track as follows:
 - 1. Remove AN4-14 bolt, nut, washer and cotter that attach fitting at upper end of track adjustment tube to bracket on gun track.
 - 2. Remove bolt attaching track to fitting on upper end of adjustment tube.
 - 3. Remove the AN3-13A bolts, nuts and washers, and take out 25-62026 pivot ring that secures track and seat assembly to attachment fittings on fuselage sides. Remove assembly.



PILOT'S
COCKPIT &
FUEL TANK
COMPARTMENT

CENTER WING & OBSERVER'S STATION

UPPER DECK

BAGGAGE COMPARTMENT

FIGURE 13-FUSELAGE STRUCTURAL DETAILS

RESTRICTED

T. O. NO. 01-60EB-3

REFER TO NA DWG.
NO. 51-31101

LOWER PART OF OBSERVER'S SECTION

FUSELAGE TAIL STRUCTURE

FIGURE 14-FUSELAGE STRUCTURAL DETAILS (CONT.)

- (b) Disconnect fuel line under tank through inspection door in bottom of fuselage. Disconnect line union near bulkhead in order to get it out of the tank connection. Disconnect bonding strip under tank.
- (c) Lift up tank compartment top covers and disconnect liquidometer cable from liquidometer unit. Disconnect liquidometer cable attaching clip.
- (d) Disconnect filler duct on left side of tank and push connecting hose back.
- (e) Disconnect bonding on aft side and top of tank.
- (f) Disconnect vent line.
- (g) Tank out upper tank retainer attaching nuts.
- (h) Lift tank out through front cockpit.

(3) Wing Tanks: - Prior to removing wing tank, jack airplane, remove rear landing gear strut, and install jury strut. Remove section of fuel line that connects to sump. Loosen fuel line connector fitting located inside observer's station, just above side windows and rotate line to one side. Disconnect vent line. Detach wiring and conduit at forward end of tank. Detach turnbuckles and lower tank assembly clear.

(4) Inspection: - Thoroughly inspect tanks for general condition. For cleaning and repair, see T. O. 01-1E-26. Inspect tank filler neck drain and vent lines, making certain rubber line guards are secure and in good condition. Inspect general condition of tank compartment, straps and pads. Inspect tank straps and pads for security of attachment.

b. Instrument Flying Hood.

(1) Removal: - Remove instrument flying hood, located in pilot's cockpit, by detaching hook at end of elastic cord from bracket secured to shelf at rear of pilot's seat. Detach snap fasteners at lower rear corners of hood and open slide fasteners. Free ends of hood bow extension assembly from attachment bracket secured to fuselage sides and remove hood assembly. Detach leather straps of curtain from attachment posts at outer edge of instrument panel shield and at inboard sides of fuselage former channels. Take out four storage bracket screws. Remove curtain assembly.

(2) Inspection: - Test condition of elastic cord. Inspect general condition of sateen covering, curtain, attaching straps, and posts. Check tubular bows for proper alignment and free movement of framework. Inspect all attachment points for general condition.

c. Cockpit Enclosure Dismantling.

(1) Windshield Removal: - Detach windshield tie-rod assembly from instrument panel shield by extracting two attaching screws. Extract screws securing lower edge of windshield assembly to instrument panel shield and lift assembly clear.

(2) Gunner's Hood Removal: - Remove hood track fairing at each side of fuselage. Detach pivot arms from lower rear corners of hood. Operate hood mechanism to align track rollers with hole in each track. Utilizing these holes, extract bolt securing each attaching plate and roller to hood. Lift hood assembly clear.

(3) Front Stationary Section Removal: - Operations necessary to remove the front stationary section are as follows. Free antenna mast support bracket from over-turning structure by extracting attaching bolts. Detach radio compass loop, antenna mast, antenna wire, lead wires, and conduit. Extract screws securing enclosure section to track, open rear sliding section and close front sliding section. Move front stationary section toward the rear a few inches to clear front sliding section, and lift clear.

(4) Rear Stationary Section Removal: - Operations necessary to remove the rear stationary section are as follows. Extract the screws securing the rear stationary section to the enclosure track. Close rear sliding section. Raise rear lower edges of rear stationary section to clear forward edge of gunner's hood tracks, and move section aft to clear upper rear edge of rear sliding section. Lift stationary section clear.

(5) Sliding Section Removal: - Operations necessary to remove either sliding section of the cockpit enclosure are as follows. Loosen equalizer cable turnbuckles at either side of cockpit. Extract screws securing rollers to lower edges of section. Access to these screws is gained through a hole in each enclosure track, located just forward of over-turning structure for the front section and just aft of auxiliary pilot's station for the rear section. Raise sliding section a few inches and detach equalizer cable terminals from lower ends of section by extracting attaching clevis pins. Lift section clear.

WARNING: Exercise caution in handling sliding sections to prevent misalignment of lower edges.

d. Cockpit Enclosure Inspection: - Thoroughly inspect cockpit enclosure sections for general condition. Check for condition and sufficiency of elastic caulking compound at upper center pyralin panel of the windshield. Check for security of channeled rubber strips at glass panels. Ascertain that front sliding section closing strip is in good condition. Inspect enclosure tracks, rollers, stops, etc., for excessive wear and damage. Inspect equalizer cables for fraying and pulleys for wear and damage. Replace all cracked, distorted or otherwise damaged enclosure panels. For instructions pertaining to panel replacement, refer to T. O. No. 01-60EB-2.

e. Pilot's Seat Removal. - Raise seat to uppermost position. Detach shock cords from hooks on lower seat support tube guides. Detach pulley from bracket at top of over-turning structure and free shock cord from pulley. Extract bolt securing the top of each seat

support tube to bracket welded to over-turning structure. Lift seat and support tubes from airplane as a unit. Disengage seat locking mechanism and slip seat support tubes from guides at back of seat. Thoroughly inspect seat for broken spot welds, loose rivets, buckled structure, etc. Inspect seat locking mechanism for wear, damage and for proper operation. Check seat support tubes for alignment and tube supporting sockets for general condition and security of attachment.

f. Auxiliary Pilot's Seat Removal. - Extract bolt securing top of each seat support tube to channels at center wing rear spar bulkhead. Detach both seat braces from support channels and lift seat and support tubes from airplane as a unit. Disengage seat locking mechanism and slip support tubes from guides at back of seat. Carefully inspect all seat components for wear and damage. Check seat support tubes for alignment. Inspect holes in support channels at points of seat attachment for elongation. Test seat locking mechanism for proper operation and inspect for damaged or worn parts.

g. Observer's Seat Removal. - Detach sleeves at top of each seat support tube from center wing rear spar bulkhead, extracting bolt securing each. Slip sleeves upward. Extract bolt at lower ends of support tubes and lift seat and tubes from airplane as a unit. Disengage seat locking mechanism and slip support tubes from support brackets at rear of seat assembly. Thoroughly inspect seat assembly for general condition. Inspect holes in support channels at points of seat attachment for elongation. Test seat support tubes for alignment and support brackets for cracks and damage. Inspect seat locking mechanism for damaged parts and test for proper operation.

h. Gunner's Seat and Gun Track Removal. - Extract bolt securing gun track to top of track adjusting tube. Remove bolt which locks pivot pin in place at seat and gun track attachment fittings at either side of fuselage. Extract pivot pin and lift seat and track assembly clear. Remove gun track adjusting tube. This is accomplished by removing lower end stop collar, releasing tube locking plunger at adjusting trunnion support bracket, and pulling tube upwards through support bracket. Thoroughly inspect seat assembly for general condition. Check shock cords at back of assembly for general condition. Inspect gun track for alignment, cracks and damage. Check seat back and height adjusting handle for proper operation. Check locking mechanism at adjusting trunnion support bracket for proper operation.

i. Hydraulic Units. - For instructions pertinent to the removal, disassembly, inspection and repair of hydraulic units installed in fuselage, refer to paragraph 7., of this Section.

j. Tail Wheel.

(1) Removal and Disassembly: - The sequence of operations necessary for the removal of the tail wheel assembly is as follows: -

(a) Detach Dzus fastened tail wheel gear well fairing.

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T. O. NO. 01-60EB-3

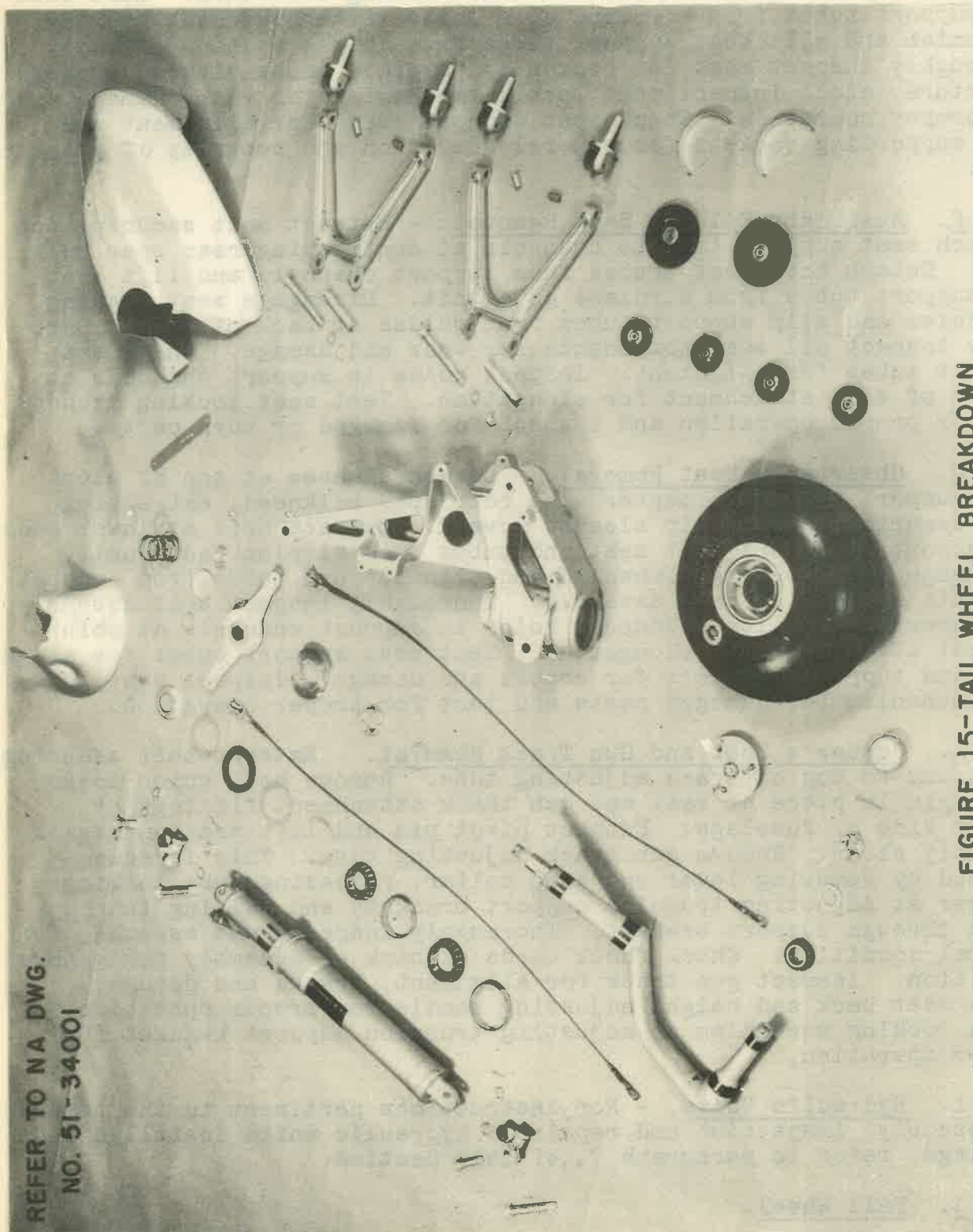


FIGURE 15-TAIL WHEEL BREAKDOWN

REFER TO NA DWG.
NO. 51-34001

- (b) Detach tail wheel link fairing from lower tail wheel link by extracting two screws.
- (c) Detach housing strap, 25-31581, from forward end of tail wheel spindle housing fairing, 25-34019.
- (d) Detach spindle housing fairing by extracting two bolts.
- (e) Disconnect tail wheel control cables from control horn.
- (f) Detach cables in fuselage tail at bellcranks and pull cables through.
- (g) Extract bolt securing lower end of oleo strut to tail wheel support and allow assembly to hinge downward.
- (h) Detach upper and lower links from fuselage bulkhead and remove assembly.
- (i) Detach upper end of oleo strut from universal joint fitting, and remove.
- (j) Completely disassemble the tail wheel post assembly, the shock strut assembly and the tail wheel assembly.

(2) Inspection: - Concluding disassembly, thoroughly inspect the various units of the tail wheel assembly, with reference to Technical Orders as follows: -

Air-Oil Shock Strut	T. O. 03-25E-1
Tire	T. O. 04-10-2
Wheel	T. O. 03-25A-1

k. General Inspection. - With the various items of equipment, furnishings, covers, etc., removed from the fuselage, cables, pulleys, lines, conduit, control rods, etc., remaining intact in the fuselage may be thoroughly inspected. In the event that the inspection of any component makes its removal necessary, a visual inspection will readily determine the procedure for the removal thereof. Thoroughly clean, and inspect for general condition of, the fuselage interior and exterior.

7. Hydraulic System Dismantling and Inspection

a. General. - Detailed instructions for the service, adjustment and maintenance are provided in T. O. 01-60EB-2, and should be referred to when accomplishing overhaul of the hydraulic system. A visual inspection of some units of the hydraulic system will readily determine the procedure for their disassembly; therefore, instructions for disassembly of those units are omitted. All units of the hydraulic system should be thoroughly cleaned and inspected upon removal and disassembly. Inspect the components of each unit for evidence of structural failure. Inspect packing cups, gaskets, etc., for wear, damage and deterioration. Prior to reassembly and installation of a unit, its component parts should be thoroughly coated

with mineral oil. For information pertinent to cleaning solvents and fluid for hydraulic systems, refer to T. O. 06-1-2 and 01-60EB-2. For removal of flap outboard operating cylinders, located in outer wing panels, refer to Section IV, paragraph 4, f. of this Handbook.

b. Fluid Reservoir. - To remove hydraulic fluid reservoir, remove access door at lower portion of left center wing stub leading edge. Detach three lines at bottom of reservoir and single vent line at top. Free padded straps securing tank at leading edge structure and lower reservoir. Remove plug, spring and strainer assembly from bottom of reservoir, inspect and clean thoroughly. Inspect fluid reservoir for broken welds, cracked edges, damaged structure, etc. Test for leaks.

c. Selector Valve. - The landing gear and flap selector valve is mounted below the control shelf at the left side of the pilot's cockpit. To remove selector valve, disconnect six hydraulic lines at valve. Detach linkage between valve operating handles and valve pistons. Extract bolt securing aft end of valve and tab control pulley to control shelf. Extract bolt securing forward end of valve to control shelf and remove assembly. Completely disassemble valve, utilizing special valve wrench, 25-58178. Thoroughly inspect and clean all component parts. Reassemble valve and test for leaks.

d. Hand Pump. - The hydraulic hand pump assembly is located at the left side of the pilot's cockpit, just aft of the floor. To remove pump, detach two hydraulic lines, one at left side of pump and one at bottom of pump. Extract four attaching bolts at pump base and lift assembly clear. Completely disassemble pump, utilizing special valve wrench, 25-58178. Carefully inspect all component parts of pump for general condition, for wear and damage and for evidence of mechanical failure. Make certain that phosphorus bronze bearing, 25-58020, is not worn excessively. Reassemble pump and test for leaks.

e. Pressure Control Valve. - The hydraulic pressure control valve is located at the aft end of the control shelf at the left side of the pilot's cockpit. It may be removed by disconnecting three hydraulic lines at the bottom of the assembly and extracting three bolts securing valve to shelf. Lower valve assembly to remove. Completely disassemble valve and inspect for worn or damaged gaskets, bushings, ball bearing, spring, etc. Work plunger up and down to determine condition of moulded rubber cup, B1113N, located within. If elasticity has diminished, absorber should be replaced. Access to absorber is accomplished by drilling out rivet securing knob to top of plunger and removing plunger from cap. Reassemble pressure control valve and test for leaks.

f. Restrictor Valve. - The landing gear restrictor valve is incorporated in a hydraulic line located below the pilot's cockpit

control shelf, just aft of elevator trim tab control wheel. To remove valve, it is necessary to disconnect it from the hydraulic line. Inspect valve for general condition and test for proper restricted operation by applying hydraulic fluid at a pressure of from 400 to 500 lbs./sq.in. to the hex end of the assembly. Two gallons per minute of hydraulic fluid should flow from valve at above mentioned pressure. If that amount is exceeded the valve pin should be replaced. When replacing the valve pin, 36-58017, it may be hand finished to obtain required flow.

g. Pressure Relief Valve. - The hydraulic pressure relief valve is mounted on the fuselage bulkhead below the pilot's cockpit control shelf, just outboard of the hydraulic hand pump. To remove valve, disconnect four hydraulic lines at lower end of assembly. Remove two bolts at valve mounting base and lift valve assembly clear. Completely disassemble valve and carefully inspect all components for damage and excessive wear. Reassemble valve and test for leaks.

h. Master Brake Cylinder. - The master brake cylinder is mounted on the forward side of the firewall, just below the battery shelf. To remove cylinder, disconnect three hydraulic lines, detach parking brake cable from links at top of assembly, disconnect operating cables from either end of cylinder, and extract three bolts securing cylinder to firewall. Completely disassemble brake cylinder, utilizing special brake cylinder wrench, 19-33447. Carefully inspect each part of the assembly for worn or damaged parts, and replace as required. Reassemble cylinder and test for leaks.

i. Flap Operating Cylinder. - The flap inboard operating cylinders are mounted at the ends of the center wing. To remove a cylinder, detach hydraulic line from two "tee" fittings at lower side of each cylinder. Free aft end of unit from bracket by removing attaching "U"-bolt. Extract single bolt securing forward end of cylinder to bracket at center wing rear spar. Completely disassemble cylinder and inspect for worn or damaged parts, replacing as required. Reassemble cylinder and test for leaks.

j. Landing Gear Operating Strut. - Access to landing gear operating struts may be gained through auxiliary fuel tank compartments and from observer's station. Operations necessary to remove each cylinder are as follows. Detach clevis end of piston rod from guide roller fitting located on lock pin. Detach two hydraulic lines at inboard end of strut. Remove four nuts at cylinder bearings and detach brace straps. Extract bolt securing forward end of cylinder bearing support reinforcing "Zee" section, and swing section downward. Slip bearings and cylinder off studs and remove strut assembly. Completely disassemble strut and inspect carefully for worn or damaged parts, replacing parts as required. Inspect bearings

for excessive wear and proper alignment on cylinder. Inspect clevis on end of piston rod for evidence of failure and for elongation of holes therein. Reassemble cylinder and test for leaks.

8. Electrical System

a. General. - An electrical wiring diagram, Dwg. No. 51-54002, is maintained in the data case of the pilot's cockpit, and individual wiring charts are mounted in box covers where practical. For shielding and bonding, refer to T. O. 08-5-1.

b. Electrical Wiring Replacement. - All electrical wiring used in the construction of the O-47B Airplane is of the cambric-covered type, conforming to A.C. Spec. 95-27273 with the exception of No. 22 (A.W.G.) wire, which conforms to Spec. 32057. Terminals are pressed and soldered in place. Each wire should be identified at both ends, in accordance with electrical wiring diagram, and identification numbers covered by a turn of cellulose tape and coated with clear lacquer. When installing wiring, adhere to the following instructions: - .

(1) All wiring replacements must be of the same gauge as called for on wiring diagram and must be installed in a workmanlike manner, free from all kinks, fraying, and ruptures.

(2) Every effort should be made to prevent undue crossing of wires inside conduit, whether the conduit be of the rigid or flexible type.

(3) Wiring should be installed so as to eliminate all tension on either wires or terminals. No electrical wire or group of wires should under any circumstances serve as a means of mechanically supporting conduits, terminals, etc.

(4) Wires should be laced together in all junction boxes when three or more wires enter a junction box from one or more conduits. In boxes such as the pilot's switch box, main power panel, main fuse panel, etc., where there are a great many wires, individual groups from each conduit should be laced separately to facilitate wire replacement. All lacing must be done in an efficient manner, so as to give the group mechanical strength and to prevent contact of wires with sharp edges of terminals.

(5) Sufficient lengths of wire should exist in all junction boxes and at all items of electrical equipment where practical, to allow reterminalling before wire replacement is necessary, in case of terminal breakage.

(6) All wires should be continuous, without splices, between terminals and equipment.

c. Conduit Replacement. - When necessary to replace conduit or ducts, either rigid or flexible, reference should be made to N.A. Dwg. No. 51-58001 in order to determine the correct diameter and gauge. These sizes have been designed to provide adequate clearance for wire replacement, and conductor heat dissipation. When installing conduit, adhere to the following instructions: -

(1) Secure conduit between junction boxes by means of standard conduit box fittings.

(2) Conduit approaching electrical equipment should be flared at the end. Make certain flare is smooth and free from all burrs.

(3) Do not support or hold in place rigid conduit of any size by means of cord bracing. Rigid conduit should be supported by means of proper size clips and clamps as required.

(4) Flexible conduit should be secured to other parts or conduit with clips or cord, or both, and tape, and taped where necessary to prevent chafing. Where parts are secured with cord and tape, the latter should be given one coat of shellac after wrapping.

(5) Care should be taken on installation of all conduit to make certain that conduit enters the fitting, box fitting or bulk-head union properly and not at an angle.

(6) Do not straighten conduit by tightening fitting nuts.

d. Junction Box Replacement. - All junction boxes should be installed as called for on N.A. Dwg. No. 51-54001 and should conform to standard practice regarding workmanship. Junction box cover screws should be of the non-losable type. Prior to placing covers on junction boxes or switch boxes, or both, the following inspection procedure should be followed: -

(1) Make certain no fittings, pieces of wire, bits of solder, pieces of tape, etc., exist inside to cause possible shorting of circuits or cause breakdown on insulation test.

(2) Inspect boxes for orderly condition of wires within, for proper coding and lacing.

(3) Check all conduit fittings in junction boxes to make certain they are tight and properly installed.

9. Instruments

a. Removal. - Instruments may be removed by detaching all lines, conduit, etc., from the rear of the instruments and by extracting the four screws securing the case of each instrument to the panel. When removing the free air temperature indicator, it is necessary to detach the bulb located under the left outer wing panel and to remove indicator, bulb and capillary cable as a unit. When removing either of the engine gauge units, it is necessary to take bulb out of the oil line and to remove engine gauge unit, bulb and capillary cable as a unit.

b. Inspection. - (1) Thoroughly inspect instruments as outlined in T. O. 05-1-1 and their respective Technical Orders, as follows: -

Landing Gear Pressure Gauge, Type E-3	T. O. 05-1-3
Fuel Mixture Indicator, Breeze A-2	05-3B-3
Airspeed Indicator, Type C-7	05-10-2
Altimeter, Type C-11	05-20-10
Bank and Turn Indicator, Type A-5	05-20-2
Carburetor Mixture Thermometer, Type F-2	05-40-12
Clock, Type A-9	05-1-9
Compass, Type B-16	05-15-2
Engine Gauge Unit, Type B-2	05-40-5
Flight Indicator, Type C-5	05-20-3
Free Air Thermometer, Type C-6	05-20-7
Manifold Pressure Gauge, Type D-2	05-40-2
Rate of Climb Indicator, Type A-6	05-20-11
Suction Gauge, Type F-2	05-20-6
Tachometer, Type C-7	05-5C
Thermocouple, Indicator, Type B-7	05-40-3
Turn Indicator, Type A-3	05-20-4
Fuel Quantity Indicator, Liquidometer, Type EA-31-239-1	05-65A-1

(2) Refer to T. O. 05-50-1 for instructions on pitot static tube.

10. Armamenta. Fixed Gun.

(1) Removal: - Prior to removal of fixed gun, it will be necessary to detach front and rear Dzus fastened inspection doors from the leading edge of the right outer wing panel. The sequence of operations for the removal of the gun is as follows: -

- (a) Extract pins securing ammunition box and link ejection chute to gun.

- (b) Loosen lower nuts of ammunition box and link ejection chute adjusting bolts and move box and chute aside.
- (c) Detach clevis at end of gun charging cable from turnbuckle barrel located at rear of charging control.
- (d) Disconnect electrical wiring and conduit from rear of solenoid mounted on left side of gun, stow conduit in clamp, and plug in stowing socket.
- (e) Turn knurled rings on both front and rear mounting post assemblies and lift gun clear.

(2) Inspection: - Thoroughly inspect fixed gun in accordance with A. C. Circular No. 15-43. Inspect gun sight in accordance with T. O. 11-35-5

b. Flexible Gun.

(1) Removal: - Raise gun to firing position by opening trough cover and pulling up and back on gun until it becomes locked in position. Free gun from Type C-12 adaptor assembly and lift clear. Refer to paragraph 6.w. of this Section, for information pertinent to gunner's seat and gun track removal.

(2) Inspection: - Thoroughly inspect flexible gun and sights in accordance with A. C. Circular No. 15-43 and T. O. 11-35-1.

c. Camera Gun. - Thoroughly inspect with reference to A. C. Circular No. 15-43 and T. O. 10-10-21.

d. Tow Target Equipment. - Thoroughly inspect with reference to A. C. Circular No. 15-43 and Technical Orders of the 11-40 Series.

11. Oxygen Equipment

a. Removal. - Three oxygen cylinders are mounted in wells located in the gunner's compartment. Prior to removing cylinders, shut off oxygen supply at cylinders and exhaust the system of oxygen at regulators. Detach all lines from cylinders, free them from clamps and lift clear. Free lines from regulators and remove regulators from brackets.

b. Inspection. - For information and instructions pertaining to oxygen regulators, refer to T. O. 03-50A-1.

12. Photographic Equipment

For information and instructions concerning photographic equipment, refer to Technical Orders of the 10-10-1 Series and A. C. Circular No. 15-45.

13. Drift Meter

For information and instructions relative to the Pilot's Type C-1 drift meter, refer to T. O. 05-20-19.

14. Communication Equipment

For information and instructions pertaining to communication equipment, refer to A. C. Circular No. 15-44, and Technical Orders of the 08-5 and 08-10 Series

a. When removing dynamotor located on left side of firewall, insert electrical conduits in dummy sockets provided on base of battery shelf.

15. De-Icer and Anti-Icer Equipment

Refer to Technical Orders of the 03-35 Series for overhaul, inspection, repair and storage of the de-icer and anti-icer equipment.

a. Fill propeller fluid metering pump up to level of plug with light machine oil, A. C. Spec. 2-27 (or substitute 3 in 1 oil) at overhaul. Access to pump may be had through inspection door located on right side of fuselage in front of wing leading edge.

16. Fire Extinguishers

Refer to T. O. 03-45B-1 for complete instructions on fire extinguishers.

17. Repair

a. General. - For information and instructions pertaining to welding of steel tubular structures, refer to T. O. 23-5-2. For manufacturing practices and repairs of aluminum alloys, refer to T. O. 23-15-1.

SECTION VFINAL ASSEMBLY1. Sub-Assembly Installation

Instructions covering the installation of the various major sub-assemblies have been given in the Handbook of Service Instructions, T. O. No. 01-60EB-2.

2. Additional Instructions for Final Assembly

a. Data Card. - Replace the airplane data card, mounted on metal plate located in map and data case at right side of pilot's cockpit. The card should be pasted in position and then given a coat of clear shellac or other transparent protective material.

b. Threaded Parts. - Install threaded fittings as outlined in T. O. 06-10-3.

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T. O. No. 01-60EB-3

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SECTION VI

ADDITIONAL OVERHAUL AND MAJOR REPAIR INSTRUCTIONS

ISSUED BY THE AIR CORPS

(To be issued when available)

Instructions covering the installation of the various engine sub-assemblies have been given in the Handbook of Service Instructions, T. O. No. 01-60EB-2.

Additional Instructions for Final Assembly

a. Data Card. - Remove the engine data card, mounted on metal plate located in wing and data card at right side of pilot's cockpit. The card should be passed in position and then given a coat of clear enamel or other transparent protective material.

b. Threaded Parts. - Install threaded fittings as outlined in T. O. No. 01-60-10-1.

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T. O. No. 01-60EB-3

SECTION VII

PREPARATION OF AIRPLANE FOR STORAGE

1. Complete instructions are contained in T. O. 01-1-7.