WIPAIRE, INC.

WIPLINE FLOATS • SKIS • MODIFICATIONS • AIRCRAFT SALES
AVIONICS • INTERIOR • MAINTENANCE • PAINT REFINISHING

SERVICE MANUAL
and
INSTRUCTIONS FOR CONTINUED AIRWORTHINESS
for the
WIPLINE MODEL 3000/3450 AMPHIBIOUS AND SEAPLANE FLOATS

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LOG OF REVISION

REV. NO.	PAGES	DESCRIPTION	DATE
A	30, 44	Added an inspection time limit and tolerances for the Nose Block Track wear.	4/18/06
B	29	Added information and a picture of new serviceable hydraulic cylinders.	10/1/07
C	50-52 63-68	Checklist changed format. Added weighing information.	5/1/08
D	11,12,13, 22,23,24	Section 5.1 & 5.2 information has changed. Instructions in 6.2. Instructions changed for 6.4.	6/25/08
E	ALL	Reformat of entire document, incorporated new aluminum main gear procedures, add green grease as approved grease	4/12/2013
F	22-23, 29-33, 59	Replaced Electrical Schematic figure, revised instructions for disassembly and re-assembly of aluminum main gear, Added Shear Torque chart, PR 1440 C Sealant, Tef-Gel and full contact info. Removed Warranty Claim Form.	5/26/2015
G	6, 12, 59	Added Dow Corning DC4, Corrosion X, and Mobil Aviation Grease SHC 100 to approved product list. Modified torque limit section.	12/4/2015

NEW CUSTOMER INFORMATION

Customer Name	
Billing Address	
Shipping Address	
Phone Number	Fax Number
Purchasing Contact	Phone Number
E-Mail	Fax Number
Accounts Payable Contact	Phone Number
E-Mail	Fax Number
Type(s) of Aircraft Owned or Maintained	
Model(s) of Floats and Skis Owned or Maintained	
FedEx and/or UPS account number (if applicable)	

Please return to Wipaire Customer Service:

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INTRODUCTION

This manual describes the general servicing and maintenance for the Model 3000/3450 float, hull landing gear systems, installation, and control parts. For services and repairs not covered by this manual contact Wipaire Customer Service Department.

The service products referred to throughout this manual are described by their trade name and may be purchased from the Wipaire Parts Department.

To contact Wipaire for service assistance or parts sales, call, email or write:

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1.0 GENERAL

The Model 3000/3450 seaplane or amphibious float is an all aluminum-constructed float with watertight compartments. The actual displacement in fresh water for each float is 3301 pounds (Model 3000) and 3776 pounds (Model 3450) buoyancy for the seaplane and 3125 pounds (Model 3000) and 3600 pounds (Model 3450) buoyancy for the amphibian. The amphibious float is geometrically the same as the seaplane except for the addition of landing gear and internal structure for the landing gear.

The water rudder steering and retract system is cable-operated with ball bearing pulleys. Water rudder cables tie into the existing aircraft rudder system.

The main landing gear has a 6.00 x 6 8-ply tire and the nose landing gear has a 10 X 3.50 4-ply tire. The gear system is hydraulically actuated and driven by one reversible electric pump. Brakes are hydraulic and have a caliper on each main wheel.

Steering on land is accomplished by differential braking. The nose wheels are full castering.

Access to the float interior is accomplished by removing covers on the top deck, side skins and two covers inside the wheel well. When necessary, water inside the float hulls may be removed through pumpout cups located on the outboard edge of each float top skin.

2.0 FLOAT HULL MAINTENANCE

2.1 GENERAL

The float structure side, top skins, and bottom skins are 6061-T6 aluminum and extrusions are 6061-T6 aluminum, (keel, chine, etc.). Skins are alodined and primed after being cleaned and acid-etched. Exterior is finished with a urethane color paint or equivalent.

2.2 CLEANING

The outside of the float should be kept clean by washing with soap and water, with special care taken to remove engine exhaust trails, water line marks, and barnacle deposits as these are all linked to corrosion. After saltwater operation, washing with fresh water should be done daily with special attention to hard-to-reach places, such as seams, wheel well, etc. The float interior should be flushed if salt water enters the compartments; it's easy to tell by the smell inside the float lockers. At night or when the floatplane is in storage, the inspection and/or baggage covers should be opened so the interior has a chance to dry out.

THE ABOVE CLEANING TECHNIQUES ARE VITAL FOR KEEPING CORROSION TO A MINIMUM. SALTWATER OPERATIONS ARE STRONGLY LINKED TO CORROSION AND MUST BE ADDRESSED PROACTIVELY.

2.3 HARD LANDING AND DAMAGE INVESTIGATION

After a thorough cleaning of the suspected damaged area, all structural parts should be carefully examined to determine the extent of damage. Frequently the force causing the initial damage is transmitted from one member to the next causing strains and distortions. Abnormal stresses incurred by shock or impact forces on a rib, bulkhead or similar structure may be transmitted to the extremity of the structural member, resulting in secondary damage, such as sheared or stretched rivets, elongated bolt holes or canned skins or bulkheads. Points of attachment should be examined carefully for distortion and security of fastenings in the primary and secondary damaged areas at locations beyond the local damage.

3.0 CORROSION

Corrosion is a reaction that destroys metal by an electrochemical action that converts metal to oxide. Corrosion is accelerated when in contact with dissimilar metals such as aluminum and steel, or any material which absorbs moisture like wood, rubber, or dirt.

The primary means of detection of corrosion is visual. The most obvious sign is a corrosive deposit of white powder. Other signs are discoloration of the metal surface or bubbles and blisters under the painted surface. Light corrosion may be removed by light hand sanding or chromic acid. Moderate and severe corrosion (blistering, flaking, and pitting) may be removed by heavy sanding or grinding, and applying chromic acid. No more than 1/3rd the thickness of skin material should be removed before complete replacement or reinforcement of an area is necessary

.

After removing the corroded area, restore area to original finish (prime and enamel). BOESHIELD T9, Corrosion X, or ACF-50 may also be applied to stop corrosion. Refer to manufacturer's instructions for application instructions.

Maintaining the float inside and outside finishes by washing after saltwater operations will help protect the float from corrosion. Periodically, all hardware should be covered with a waterproof grease, or paralketone. Under saltwater conditions, bolts should be removed at least once a year and grease reapplied to the shafts, heads and nuts

4.0 FLOAT HANDLING, JACKING, AND AIRCRAFT TOWING

To jack the floats for servicing tires, brakes, or doing retraction tests, it is recommended that a floor type jack (one ton minimum.) be used. These jacks are commonly used for auto repair. The jack should be positioned on the keel centerline on the first bulkhead forward of the step. Example is shown to the left of this text. The jack should contact the keel squarely and if room permits, slip a board between the jack and keel. Raise the float slowly; making sure the aircraft stays balanced. After raising, block up the keel in several places and lower the jack. Raise only one float at a time with the opposite float landing wheels chocked. Position a sawhorse under main and after body keel to keep aircraft from tipping fore and aft.

For raising the aircraft for float installation and removal, use the lifting rings if provided or lift at front wing attach points. Aircraft may be lifted by spreader bars with a launching dolly. **WITH CAUTION** lift on both spreader bars as close to float hull as possible.

When towing the amphibian aircraft, tow lugs are provided on the lower forward side of the nose spring. A rigid “V” frame can be fabricated to attach to these lugs and aircraft towed with a tractor. Wipaire Parts has this tow bar available.

A lifting apparatus that will pick the aircraft up by the lifting rings at wing attach points from a ceiling hoist, to be fabricated. Contact factory for details if necessary.

5.0 RETRACT SYSTEM OPERATION AND MAINTENANCE

5.1 DESCRIPTION AND OPERATION

Retraction and extension of the main and nose landing gear is effected by a hydraulic actuation system shown schematically in figure 5-1.

The gear system is hydraulically actuated and driven by one reversible electric pump.

A pressure of between 500 psi and 700 psi in the up and down position is maintained in the supply line. When the pressure falls below 500 psi in the up and down position, the pressure switch activates the pump solenoid, providing power to the pump. When the pressure reaches 700 psi in the up and down position, the pressure switch deactivates the solenoid and the pump motor stops. Figure 5-2 shows the electrical schematic of the system. A check valve on the output side of the pump retains pressure in the system while the pump is off. The pump has an interval relief valve that directs oil back to the pump reservoir when the line pressure exceeds 800 psi. The system also has an internal relief valve to protect against thermal expansion when line pressure exceeds 1100 psi.

The selection of gear up or gear down is accomplished by a cockpit mounted control panel. Each float gear has individual indicator lights on the control panel allowing the pilot to confirm that each gear has fully retracted or extended.

At the top of each float deck just forward of the step, a visual indicator is provided for the main gear. Nose gear up and down may be determined visually for position.

An emergency hand pump is provided in case of total electric pump failure or loss of fluid. The reservoir has additional hydraulic fluid available only to the hand pump.

The main gear has an over-center lock in both up and down positions. Retraction takes place when pressure is exerted on the actuator piston driving the actuating arm along the slide track (see Figure 5-3). A reverse process effects extension. Gear position light proximity switches are closed when the cylinder piston (containing the magnetic material) is adjacent to the switch.

The nose gear has an over-center down lock. Retraction occurs when pressure is applied to the forward fact of the actuator piston and the carriage is drawn along the tracks in the nose box as shown in Figure 5-4. Gear position light proximity switches are closed when the piston containing the magnetic material has reached either end of its travel.

5.2 ADJUSTMENT/TEST

Adjustment of the hydraulic actuator stroke is provided at the ends of the piston rods on the nose and main gear.

Nose:

The “gear down” position is set by adjusting the cylinder rod end so the over-center knuckle (brass) rollers bottom out in the Nose Fork Tracks without preload on the cylinder rod. The gear up position does not require adjusting as long as the Up Stop has engaged the Up Stop Pin.

Mains:

With the Retract Arm disconnected from the Rod End, move the cylinder to the “gear up”(retracted) position using the aircraft pump. Then position the gear in the “gear up” position and hold in place through the top access hole in the float.

Align the hole in the Rod End Clevis with the hole in the Retract Arm. The hole in the clevis should be 1/32-1/16” below the hole in the retract arm. This adjustment must be accomplished by adding or removing washers under the rod end lock nut. The in and out adjustment of the rod end on the threads is not critical at this time as long as the lock nut is snug against the Rod End Clevis.

Again, using the aircraft pump, move the piston rod to the “gear down”(extended) position. Then position the gear in the “gear down” position and hold in place through the top access hole in the float.

Align the hole in the Rod End Clevis with the hole in the Retract Arm. Adjust the Rod End Clevis so that the hole in it is 1/32-1/16” above the hole in the retract arm and tighten the lock nut.

Nose and main gear proximity switches are set by sliding the mounting clips on the cylinders to a position such that the light goes out when the cylinder piston is about 1/8 inch from the bottomed position while traveling in the up direction. It should come on about 1/8 inch from the bottomed position while traveling in the down direction.

The system automatically bleeds, provided sufficient oil is maintained in the reservoir. To check the fluid level, fill the reservoir with hydraulic oil and cycle the gear. If the reservoir empties (i.e., fluid disappears in sight glass), stop the cycle by pulling the circuit breaker on the control panel. Fill the reservoir again and complete the cycle. Continue this procedure until the fluid level in the reservoir stabilizes (it will vary in level between up and down positions). If the fluid level continues to decline during gear cycles, check for external leaks. If pump cycles on and off during gear cycle, it may be necessary to select hand pump to “UP.” Cycle gear up with electric pump. Then select to gear “DOWN” on hand pump and cycle gear down with electric pump. Repeat if necessary. This manually bleeds system. NOTE: Fluid level in reservoir in “UP” position is full. “DOWN” position reservoir is half full. Don’t over fill in “DOWN” position.

5.3 LANDING GEAR MALFUNCTION PROCEDURES

Landing Gear Fails to Retract or Extend:

1. Battery Switch – ON
2. Landing Gear Switch – RECHECK IN DESIRED POSITION
3. Landing Gear Motor Circuit Breaker – CHECK IN
4. Hand Pump Position Selector – CHECK in NEUTRAL POSITION
5. Gear Lights – 4 BLUE for gear UP
   4 GREEN for gear DOWN
6. Gear Position – CHECK VISUALLY

If gear still in improper position:

7. Landing Gear Switch – RECYCLE
8. Landing Gear Motor – CHECK RED LIGHT ON
9. Airspeed – REDUCE to minimize airloads on gear

If pump is running intermittently, or gear is not moving:

10. Hand Pump Position Selector – PLACE IN SAME POSITION as Landing Gear Switch.

NOTE

Hand Pump Position Selector must be aligned for the same position as the Landing Gear Switch.

11. Gear Operation – VISUALLY VERIFY

If above procedure still fails to position landing gear as desired:

12. Landing Gear Motor Circuit Breaker – FULL.
13. Landing Gear Switch – DESIRED POSITION
14. Hand Pump Position Selector – PLACE IN DESIRED POSITION
15. Emergency Hand Pump – PUMP until resistance becomes heavy (may be 100 or more cycles)
16. Gear Position – CONFIRM VISUALLY

WARNING ! !

Do not attempt to land on water unless all four wheels are fully retracted.

17. Refer to Section 5.4 for more detailed troubleshooting.

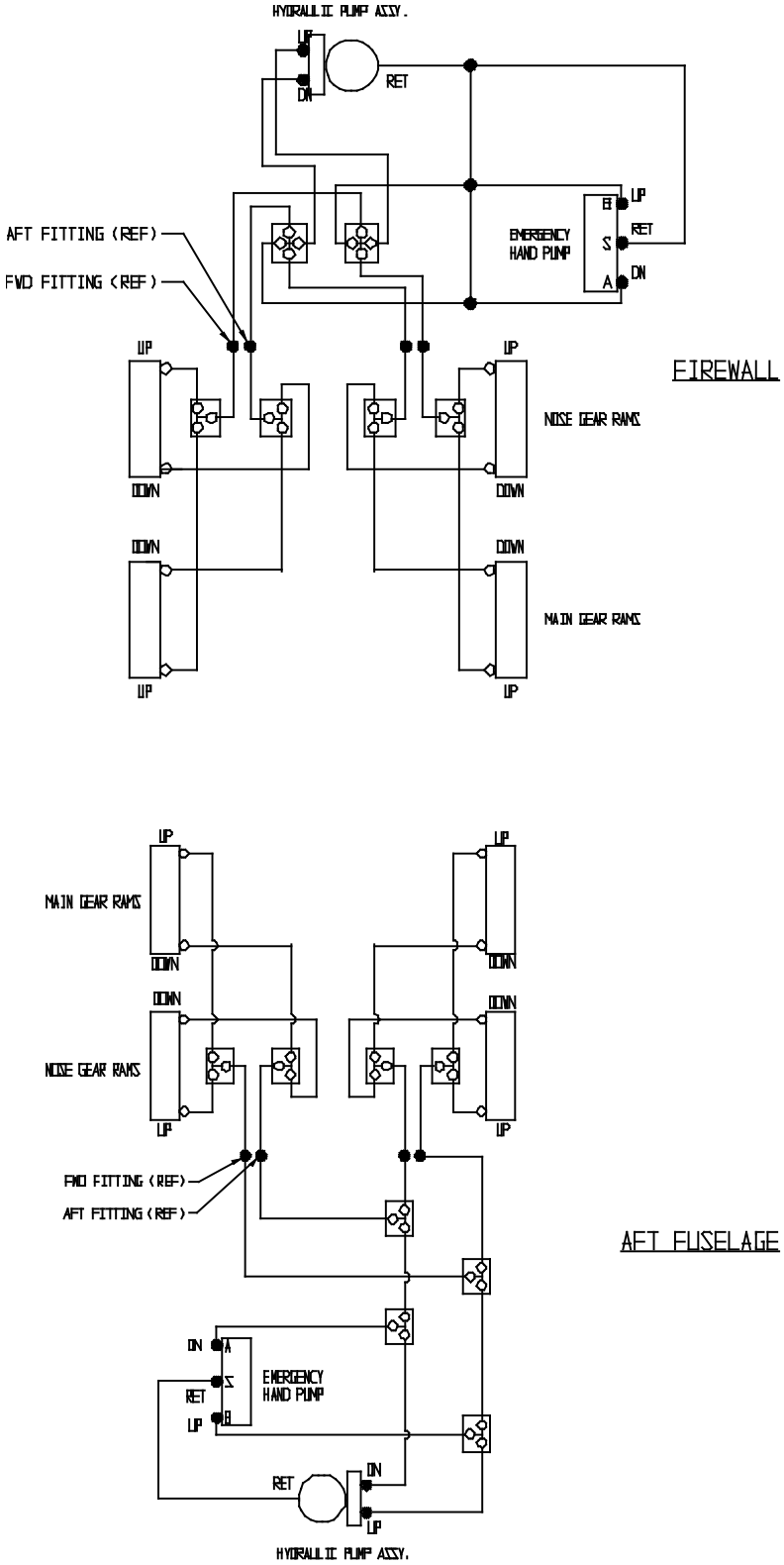

FIGURE 5-1A. SCHEMATIC HYDRAULIC SYSTEM CESSNA 182

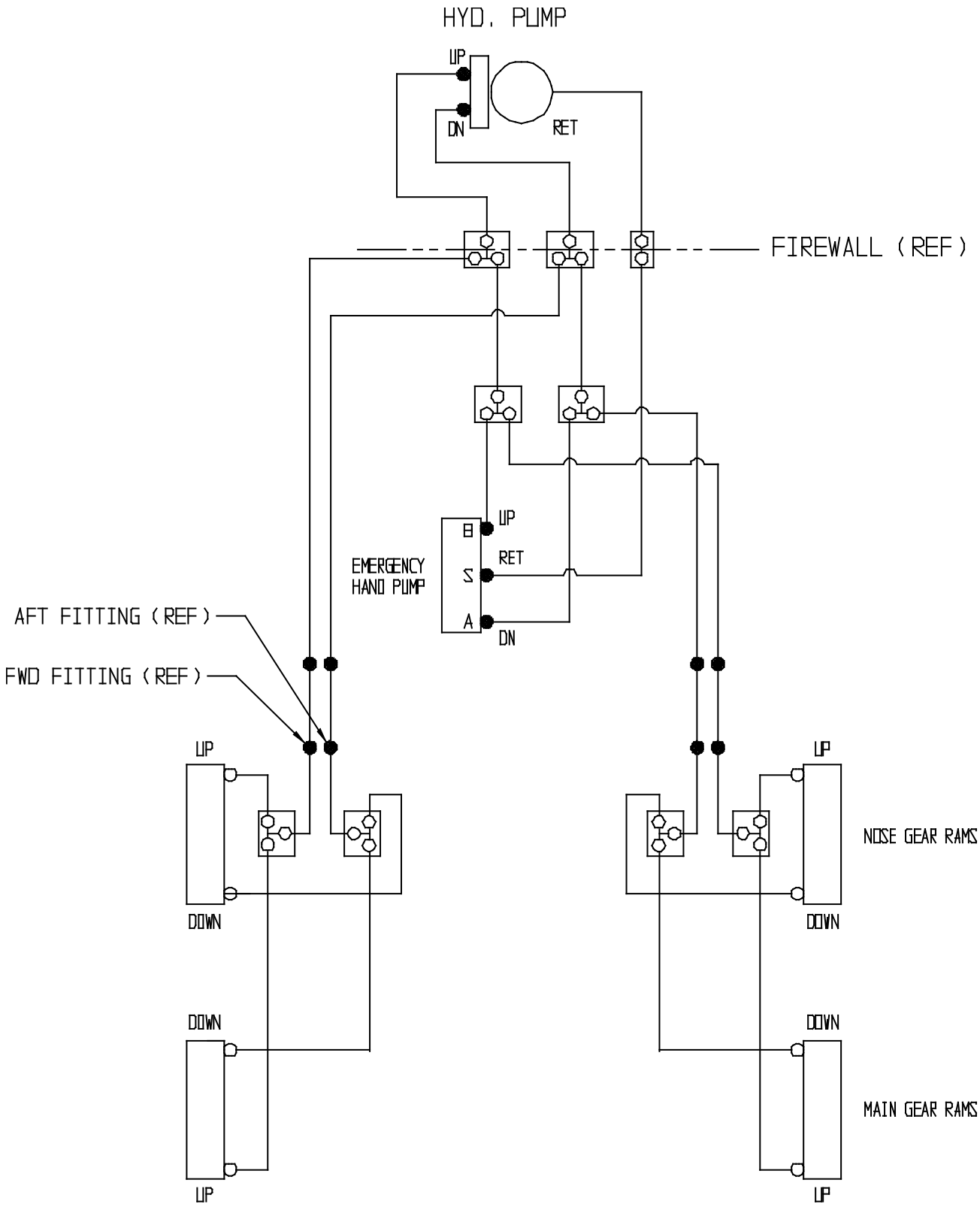

FIGURE 5-1B. SCHEMATIC HYDRAULIC SYSTEM CESSNA 180 / 185

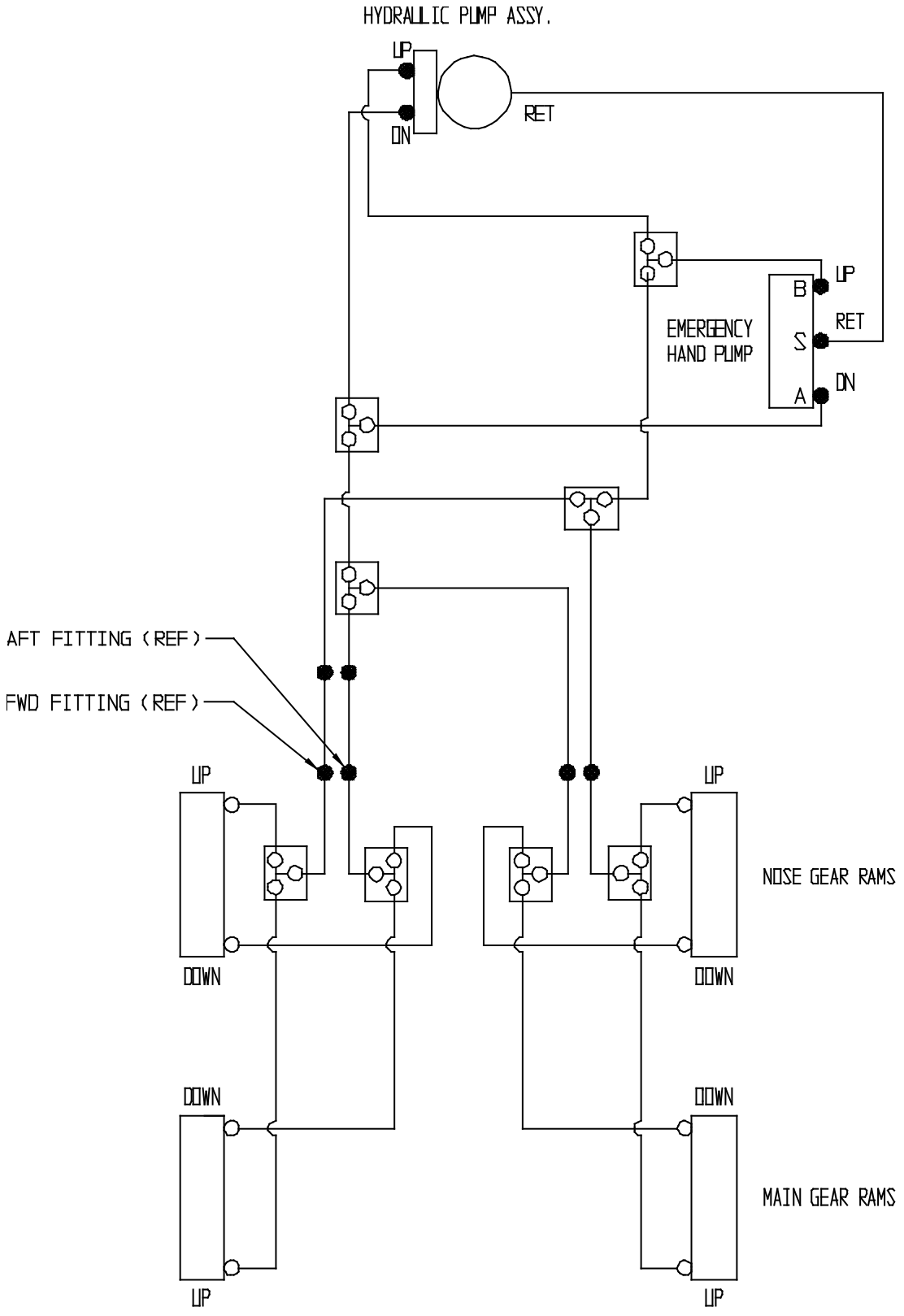

FIGURE 5-1C. SCHEMATIC HYDRAULIC SYSTEM CESSNA 206

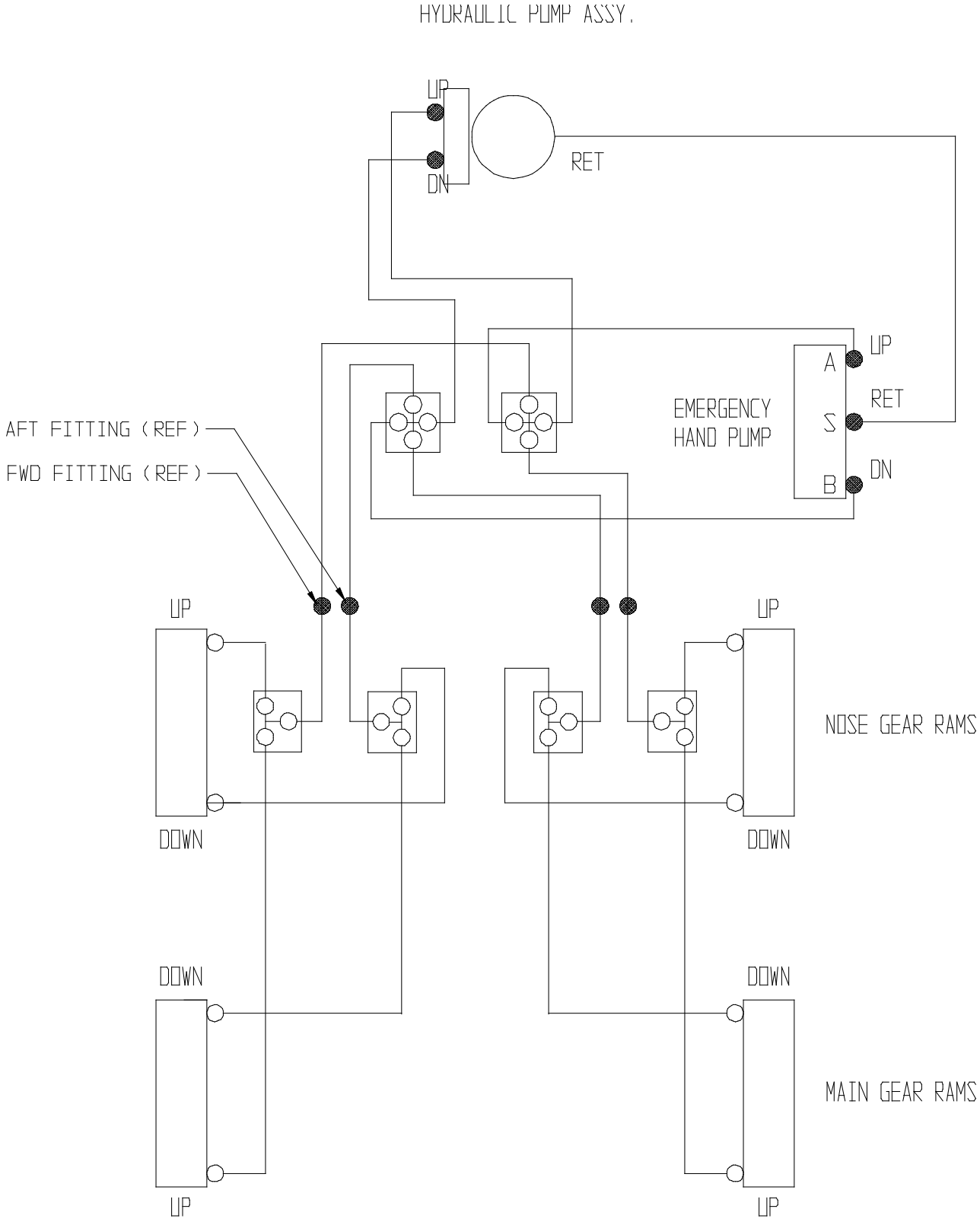

FIGURE 5-1D. SCHEMATIC HYDRAULIC SYSTEM MAULE AIRCRAFT

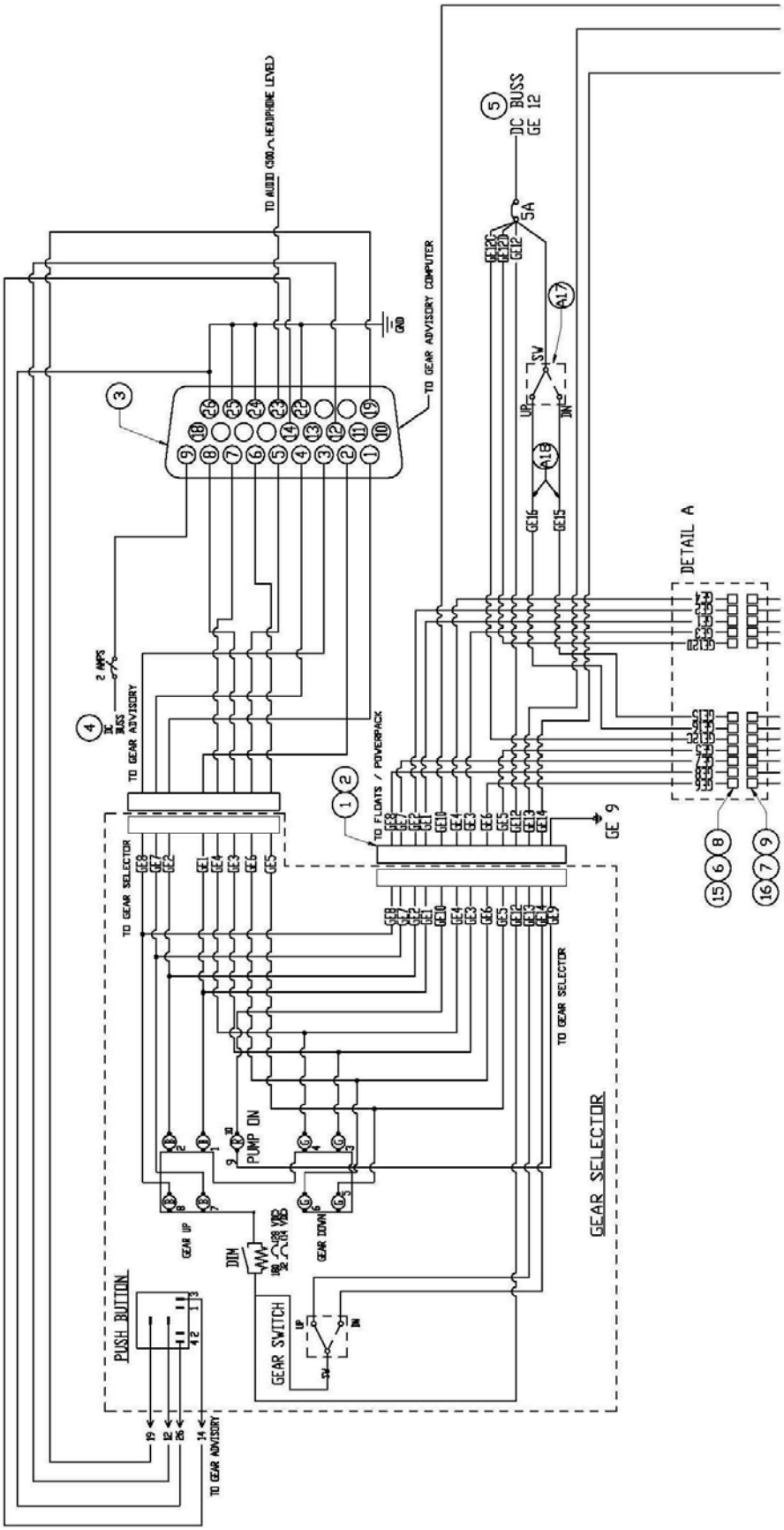

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FIGURE 5-2 SCHEMATIC ELECTRICAL SYSTEM

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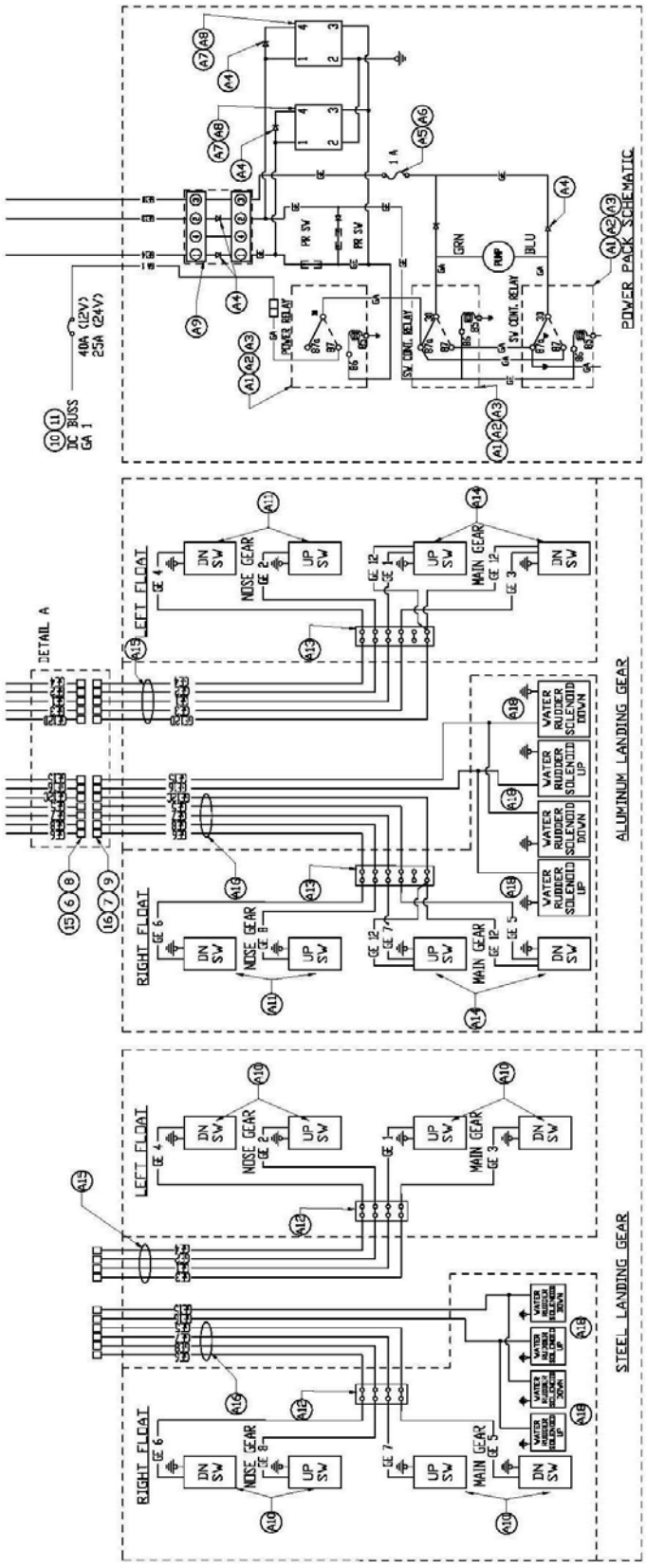


FIGURE 5-2 SCHEMATIC ELECTRICAL SYSTEM

6.0 MAIN GEAR REMOVAL AND OPERATION

6.1 REMOVAL AND DISSASSEMBLY OF MAIN GEAR

1) Jack and block aircraft per Section 4. You may do one gear at a time or both if float is properly blocked
2) After load is off landing gear, pull circuit breaker and move hand pump selector to up, then to down and back to neutral to relieve hydraulic pressure.
3) Remove all three (3) access covers: 1 top and 1 each side of wheel well area.
4) Remove putty around side access jambs.
5) Remove brake caliber. Do not disconnect hydraulic lines so it's not necessary to bleed on reinstall.
6) Remove axle cotter pin, wheel nut and tire (refer to Figure 6-3).
7) Through top access, remove gear indicator shaft and cable.
8) Through outboard side access, remove upper bolt on hydraulic cylinder.

NOTE
Position of tension spring (refer to Figure 6-4).

9) Remove ground electrical wire screw.
10) Remove bolt on lower end hydraulic cylinder.
11) Use tie strap to tie cylinder forward for ease of bolt removal of gear.
12) Through top access, bring gear to the up lock position by moving gear by hand.
13) Under the float, remove cotter pin on coupling nut (2).

NOTE
Before removing, mark nut inboard or outboard for ease of reinstalling (refer to Figure 6-5).

14) Hold coupling nut with 1 inch wrench while removing bolt on outboard side, then inboard side.

NOTE
Just remove coupling nut, leave bolts through gear tracks for now.

15) Through top access, unlock gear and by hand move to the down position.
16) Under the float remove bolt on drag link holding the lower shock strut end.
17) Through side access finish removing main drag link 5/8-inch bolts and remove drag link.
18) Through top access, remove two (2) ¼ inch diameter bolts on retract yoke (refer to Figure 6-9).
19) From outboard access remove retract arm by pulling outboard.
20) From outboard and top access, remove four (4) 3/16 inch diameter bolts holding track to side panels.
21) From inboard access, remove four (4) 3/16 inch diameter bolts holding track to side panels.
22) From under float, slide out the entire track assembly. Position on bench. (Refer to Figure 6-7.)

23) Remove shock strut assembly from track assembly by spreading track panels apart. (Leave track spreader plate intact.)
24) Clean and inspect track.
25) To remove shaft from upper shock strut, remove the two (2) outside grease zerk fittings (refer to Figure 6-8).
26) For shock strut service, shock strut must be compressed before disassembly.

NOTE
Shock strut maybe returned to the factory for service.

27) Clean and inspect all parts.

6.1.1 INSTALLATION AND ASSEMBLY OF MAIN GEAR

1) Assemble track assembly before installing in float (refer to Figure 6-7).
2) Lay shock strut on bench with grease zerk facing up.
3) Install retract yoke to shock strut upper end with roller shaft.

NOTE
Holes in shaft to match holes in shock strut bushing. Grease zerks position shaft to shock strut bushing (refer to Figure 6-8).

4) Install bushing to lower shock strut. Grease.
5) Grease shaft and install rollers to each end.

NOTE
Radii on bushings to be on outboard side.

6) Install tracks over this assembly.

NOTE
Position of tracks, retract yoke and shock strut with each other is important. Refer to Figure 6-7 for positions.

7) Before installing track assembly clean out wheel well area of dirt, excess grease, etc.
8) Reinstall track assembly from bottom of float.

NOTE
Position of track spreader plate. It goes to the up position (refer to Figures 6-6, 6-9).

9) Position track assembly in wheel well area and start lower 5/8-inch diameter removed in step 16, one (1) each side.

NOTE
This positions track assembly. Do not install coupling nut or tighten at this time (refer to Figure 6-6).

10) Pivot track around 5/8-inch bolts to align 3/16-inch bolt and each side to wheel well. Do not tighten.
11) Temporarily install retract arm through to 5/8-inch hole in tracks **without** going through retract yoke.
12) Tighten all 3/16-inch bolts four (4) each side on tracks.
13) After tightening 3/16-inch side bolts eight (8) remove retract arm and install through retract yoke, upper bushing.
14) Reinstall two (2) ¼-inch diameter bolts in retract yoke to retract arm and tighten (refer to Figure 6-9).

NOTE

Temporarily tie shock strut to the up position so it's not in the way when reinstalling drag link clean and inspect drag link. Install drag link so shock strut lugs are up. Install one (1) 5/8-inch diameter bolt on each side.

15) Untie shock strut and attach to drag link 5/8-inch bolt.

NOTE

Do not over tighten, lugs will bend.

16) Position by hand gear to the "Up" lock.
17) Install coupling nut.

NOTE

Nut must be installed in same position as removed or cotter keyholes will not line up.

18) Tighten outboard nut first and align cotter keyhole. Tighten inboard bolt and align cotter keyhole. Install two (2) cotter keys.
19) Cycle by hand from top access up to down. Inspect and feel for any binding and rollers going to each stop (end of track).
20) Reinstall tire and brake.

NOTE

Cotter key axle and safety wire brake bolts.

21) Through access holes clean out bottom of float.
22) Grease all zerk fittings and head of nuts on all bolts exposed.
23) Install lower cylinder 3/8-inch bolt.

NOTE

Position of washers (one (1) each side of cylinder) and remove any excess Loctite from hole in 5/8-inch bolt head before installing 3/8-inch bolt. Apply to Loctite 3/8-inch bolt before installing. Visually inspect bolt for proper installation.

24) Reconnect ground wire screw.
25) If cylinder was replaced, cylinder must be re-indexed at this time. Using the aircraft pump, move the cylinder to the "gear up" position.
26) From the top access hole, hold the gear in the "gear up"(retracted) position by hand. Adjust the rod end clevis so the hole in it is 1/32-1/16 inch below the hole in the retract

arm. (refer to figure 6-11) This adjustment must be accomplished by adding or removing washers under the rod end lock nut. The in and out adjustment of the rod end on the threads is not critical at this time as long as the lock nut is snug against the Rod End Clevis.

27) Again, using the aircraft pump, move the piston rod to the “gear down” (extended) position. Then position the gear in the ‘gear down” position and hold in place through the top access hole in the float. Align the hole in the Rod End Clevis with the hole in the Retract Arm. Adjust the Rod End Clevis so that the hole in it is 1/32-1/16” above the hole in the retract arm and tighten the lock nut. (refer to figure 6-10)

NOTE

Add spacer, washers under jam nut as necessary to achieve 1/16-inch cushion (see Figure 6-11).

28) Install upper cylinder bolt to attach cylinder rod end to retract arm, attach tension spring (refer to Figure 6-4).
29) Check retract for operation by aircraft hydraulic system.
30) Set gear position switch by sliding bracket on outside of hydraulic cylinder body by running gear to down position, slide switch bracket up so lights (green) are illuminated on selector head (refer to Figure (6-12).
31) By running gear to up position, slide switch bracket down so lights (blue) are illuminated on selector head.

NOTE

If lights have a double flash (on-off-on) move switch brackets further to outer ends so lights come on just once.

32) After switch brackets are positioned, apply bead of RTV silicone to secure bracket to cylinder body.
33) Install indicator rod and cable through top access.
34) Grease all zerk fittings, bolt heads, nuts, bolt shafts that are exposed. Grease wheel bearings.
35) Final gear check and inspection.
36) Caulk and replace side access covers.
37) Install top indicator cover.

6.1.2 DISSASSEMBLY OF SHOCK STRUT

Shock strut requires no maintenance except if urethane blocks seem sloppy or spin around easily, or on unloaded aircraft it seems to “squat” excessively. To dissemble, remove cotter pin in top retaining pin and remove pin. If replacing urethane blocks, pressure must be applied by a press to compress strut and install retaining pin. Assemble in reverse order of removal of Figure 6-1 and Section 6.1. Shock strut may be returned to the factory for maintenance

6.1.3 REPLACING AND SERVICING HYDRAULIC CYLINDERS

Wipaire, Inc. has created a new design to replace the previous, unserviceable main and nose gear actuators for the 2100, 2350, 3000 and 3450 amphibious floats and is detailed in Service Letter 97 available on our website or from our customer service department. The actuators are fully serviceable.

The older style, non-repairable units can be identified by the stainless steel (shiny) outer cylinder with non-removable aluminum end caps. If these units leak or will not hold pressure they should be replaced with new units. The new units will be the repairable type. The sealed units can also be upgraded to the repairable type at any time in accordance with Service Letter #97.

Repairable units: All new products will have the repairable type cylinders. These can be identified by their all aluminum construction and grey color. These units can be disassembled and repaired according to the following instructions.

Repair Kits include all replacement O-rings and Quad-rings, and Rod Wiper

2000 Series Floats

	Cylinder Part Numbers	Repair Kit Number
Nose:	1002572	1002578
Main:	1002573	1002577

If servicing beyond the usual cleaning and inspection, use Section 6 & 7 & 8 to remove the main and nose gears respectively. Once cylinders are removed from the floats:

1. The end caps must be removed; they are secured with medium strength Loctite. Always clamp the tube in such a way as to not damage or deform the outer cylinder.
2. Once the end caps are removed, remove the rod and piston from the main cylinder.
3. Remove the two quad rings off the piston, then remove the O-rings off the end caps.
4. Remove the two O-rings from the front rod end cap located on the inside portion of the rod end cap and the plastic wiper ring. All parts must be thoroughly cleaned of any residue of Loctite and hydraulic fluid.

NOTE

Be sure to look at all seals closely so they can be re-installed correctly.

Reassembly

1. To reassemble, first make sure you are using Mil-H-5606 hydraulic fluid and pre-lubricate all the new quad and O rings (not the wiper) with it.
2. Thread the end cap onto the cylinder tube a couple threads. Waiting to add a drop of medium strength Loctite until this point helps to keep it from contaminating the cylinder. Then finish carefully tightening the end cap
3. Following that, slide the piston down into the cylinder being careful of the quad rings Check the top of the cylinder when this is done for flakes of rubber to indicate **any** damage from installation.
4. Clean the threads and install the quad rings into the rod end cap.

NOTE
Make sure that quad rings are not twisted and are Seated in the grooves. If they are compromised in Any way, they will not seal or hold pressure properly

5. Install the new seal ring and lubricate all the quad and O-rings with hydraulic fluid and insert the threaded end of the rod, making sure of the end of the rod is clean and free of any sharp edges that will damage the quad ring.
6. Once this is slid past the flats in the threaded ends, check again for any evidence of seal damage by looking for flakes of rubber. If there is **ANY** damage to any of the seals, they must be replaced.

NOTE
When sliding the rod end cap over the threaded rod, SLOWLY work the rod end cap down on the rod; You should feel the rod pass thru each quad ring

7. Thread the rod end cap into the cylinder tube. Start threads and then add a drop of Loctite on the remaining threads and tighten both ends
8. On the main gear actuators, the in and out fittings must be indexed so that they Face approximately the same direction. If adjustment, add or remove shims under the end cap

6.1.4 HAND PUMP AND SELECTOR VALVE OPERATION

For normal gear operation (electrical power pack) the handle is in the neutral position (handle pointed to the neutral position.) If electrical pump should not operate, select to gear up (handle pointed forward) or gear down (handle pointed aft). Insert stow-away handle in pump and pump gear to desired position. If pump should leak, remove snap ring under handle and pull out inner cylinder. Replace “O” rings and reinstall.

6.1.5 GEAR SELECTOR SWITCH

The gear selector is an electrical switch that changes pump direction of the electro-power pack for gear up or down. The red light on panel indicates the pump has power supplied to it. The four (4) green lights indicate the landing gear is down. The four (4) blue lights indicate the gear is up for water landing. The top two lights of each cluster refer to the nose gear position. The bottom two refer to the main gear.

BLUE - GEAR UP “WATER”

GREEN - GEAR DOWN “LAND”

6.1.6 MAIN WHEELS AND BRAKES

Grease zerks are provided on all wheels and bearings and should be greased every 25 hours or after an extended period of time in the water. Water/heat resistant grease is recommended.

The brakes need no special care other than to maintain the brake disc free of rust, which causes premature brake lining wear. Bleeding is carried out in the usual manner from the bottom up.

Main wheel tires are standard 6.00 x 6, 8-ply Type III aircraft tires, inflated to 50 +/- 5 psi (refer to Figure 6-2).

6.2 ALUMINUM MAIN GEAR RETRACTION DESCRIPTION-RACK AND PINION STYLE ACTUATOR

Retraction and Extension of the main gear is accomplished with a hydraulic rack and pinion type actuator. The actuator consists of two opposing pistons pushing a geared rack, with a rotating pinion gear in the center. The center gear housing is lubricated when assembled at the factory and also has a grease fitting for periodic lubrication of the rack gear and pinion. This actuator should only require servicing at 100 hour or annual type inspections. The housing is not sealed so seepage of grease residue is not cause for alarm. However, leakage of red 5606 hydraulic fluid from the housing indicates piston seal leakage in one or both actuator cylinders. These rack and pinion actuators are located internally on the right side of the float, on both the left and right floats. They must be accessed by removing the access cover on the sidewall of the float. The drive shaft extends into the center wet bay to actuate the gear. A single keyed actuator arm rotates approximately 192 degrees to actuate and lock the gear in both directions by traveling approximately 5 degrees past the locking position in both directions. This provides an over-center lock in both directions. The actuator arm is attached to the upper shock arm by a linkage rod with adjustable swivel rod ends.

In the gear down position there is also another over-center locking feature that provides a double locking condition and positions the shock strut to direct the landing gear forces up to the upper shock arm and transfers these forces through the side gear support plates and wheel well sidewalls.

There are two proximity sensors (P/N 1005724) that sense the position of the upper shock arm in both up and down positions. The proximity sensors have a built in LED to indicate when they are sensing the gear position. This feature greatly aids in the adjustment of their sensing positions.

6.2.1 MAIN GEAR ASSEMBLY, REMOVAL, SETUP AND ADJUSTMENT

Place aircraft on jacks to allow the free extension and retraction of the landing gear. Use safe operating practices when working around moving hydraulic components. The actuators operate at high pressures and generate high forces when repositioning the landing gear.

REMOVAL OF THE MAIN GEAR TIRE AND WHEEL

1. Disconnect battery ground terminal, or pull the circuit breaker to stop electrical power to the electrically driven hydraulic pump. Bleed pressure off the hydraulic lines by moving the emergency gear position selector to the up and down positions.
2. To remove the axle and wheel, remove the brake pads from the caliper so that the caliper can be slid from the torque plate and rotor.
3. Remove the (2) AN5 bolts that hold the anti-rotation plate (P/N 1005855) to the side arm of the landing gear drag link.
4. Remove the cotter pin from the axle retaining bolt (P/N 1005374) and remove the Castle nut so the axle retaining bolt can be removed.
5. Once the bolt is removed pry the Axle Hubs (P/N 1005378 and 1005389) from each drag link arm by inserting a screw driver in the slot provided and pry out the retaining bushings.
6. Now the Wheel and axle assembly should be free to slide out of the Drag Link Arms.
7. The Axle is removed by sliding the locking ring off (P/N 1004281) so that the bearing retention nut (P/N MS21025-24) and the seal spacer (P/N 6A04093-002) can be removed. The axle can now be slid from the wheel.

6.2.2 REMOVAL OF THE MAIN GEAR COMPONENTS

1. Remove the left and right access covers on the sidewalls of the float.
2. Remove the gear indicator (P/N 30A05000-027) to prevent damage to it, and remove the grease fitting from the hole in the upper shock arm. This fitting must be removed in order to slide the upper pivot shaft (P/N 1005733) out.
3. Unbolt the actuator linkage rod from the actuator arm (P/N 1005280).
4. Remove the cotter pin and castle nut from one end of the upper pivot shaft (P/N 1005733) (7/8” diameter rod) and slide it out. Note where washer shims are located on each side of the upper shock arm so that the gear proximity switches should not require re-adjustment after the gear is re-assembled.
5. Remove the 2 lower drag link pivot bolts (P/N 1005734). At this time you can remove the drag link, shock strut, and upper shock arm assembly as one component.
6. The shock strut can be separated from the assembly by removing the grease zerk fitting in the center of the upper and lower pivot pins. This fitting and the retainer bushing center the pivot pins. There is also a notch on the flange of the retainer that aligns with a roll pin that positions the grease fitting (zerk) so that it is accessible for periodic lubrication when the float is assembled.
7. Remove the actuator arm (P/N 1005280) from the actuator shaft (P/N 1005277).
8. Disconnect the up and down hydraulic lines from the actuator.

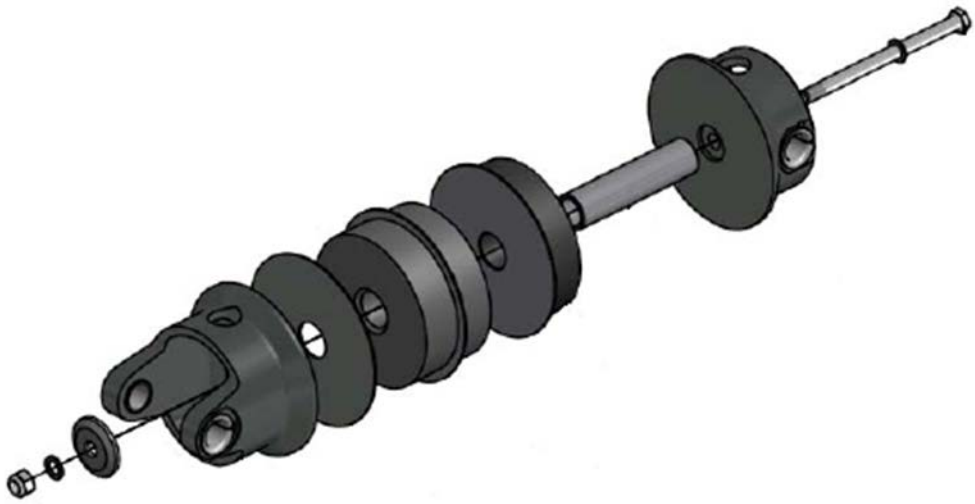
9. Remove the (3) AN4 mounting bolts that hold the actuator housing to the wheel well sidewall.
10. Now the actuator should slide out of the float.
11. If it is necessary to remove the side support plates start by removing the proximity switches (P/N 1005724).
12. Remove the (8) AN4 mounting bolts that secure the support plates to the wheel well sides, and it will slide out as a 3 piece assembly.

6.2.3 DISASSEMBLY OF THE HYDRAULIC ACTUATOR

1. The actuator cylinder tubes (P/N 1005272) can be removed by removing the internal snap ring retainer using the proper sized snap ring pliers. Note or mark the tubes so that they can be re-assembled on the side from which they were removed.
2. The end caps (P/N 1005273) can also be removed by removing the hydraulic line fitting and the internal snap ring retainer once the cylinder tube is removed from the center housing (P/N 1005275). Again, note or mark the tubes and end caps to reassemble in the same location. By marking these components you may eliminate the need to re-adjust the end stops if all the same parts are to be re-used.
3. The piston (P/N 1005276) is a free-floating piston and will simply slide out.
4. Remove the 2 screws in the face of the housing so that the housing top (P/N 1005274) can be slid off the shaft (P/N 1005277).
5. If the actuator is to be re-assembled with the same components, mark the rack gear and pinion with timing marks so that it can be reassembled without requiring adjustments to the end stops.
6. Now the shaft and pinion gear (P/N 1005282) will also slide out. The shaft and pinion have a keyway for alignment, and the pinion has a set screw that holds the pinion from sliding on the shaft.
7. The bushings in the housing should never require replacing, but if they do, they are pressed into the housing from the inside.

6.2.4 DISASSEMBLY AND ASSEMBLY OF THE SHOCK STRUT

1. With the strut removed from the gear assembly, loosen and remove the AN365-8 elastomeric self-locking nut from the center retaining bolt. The strut at this time can be slid apart.
2. The bushings should all be inspected for wear. If worn, they can be pressed out and replaced. The center tube should also be checked for wear or galling.
3. To reassemble, properly position the urethane blocks in the position as shown in figure below.



SHOCK STRUT ASSEMBLY

4. Be sure to position the aluminum plate (.04) over the head of the center bushing to act as a retainer plate.
5. Carefully slide components together over the center tube making sure that the center tube is locked into place in the counter-bore of the top shock end.
6. With both shock ends in place, install the stainless steel retainer washers and a new AN365-8 lock nut. Align both ends with the pin axis as close to parallel as possible. Ensure that both retainer locator roll pins are on the same side. Torque the AN365-8 lock nut to 120 ft pounds. It is critical in the assembly that the center tube is tightly retained between the top shock end and the stainless steel retainer.

6.2.5 ASSEMBLY OF THE ACTUATOR

1. Assemble in reverse disassembly order
2. Liberally apply grease to rack and pinion.
3. Position the keyway on the shaft correctly using template tool #1006709 by aligning the keyway with the notches in the tool in both “up” and “down” positions. If end stop adjustment is required, loosen and remove the locking nut on the end caps. Always use a new o-ring if making this adjustment. These adjustments must be made with pressure on the cylinder to be sure that the internal components are properly seated in both positions when checking the alignment. Shop air can be used if plumbed to the cylinder hydraulic fittings, or it can also be done using the aircraft hydraulic system by hooking the “up” and “down” lines to both cylinders outside of the float, and making the adjustments before re-installing them in their proper location. On newer float models, the adjustment tool #1006709 will not be required. The shaft and the gear housing will have the timing marks permanently machined at the outside end of the shaft.

6.2.6 ASSEMBLY OF THE MAIN GEAR COMPONENTS

1. If removed, re-install side support plates into the wheel well in reverse order of disassembly making sure to align upper and lower pivot points using the upper pivot shaft and lower pivot bolts to aid alignment.
2. At this point the hydraulic actuator can be bolted in place. This is the time when the mounting bolts are the easiest to access. Although the actuator can be reinstalled at any point from here on.
3. Re-assemble the drag link, shock strut, and upper arm by replacing the pivot pins, retainers, and grease fitting. Align the shock so that the center retainer flange positioning roll pins are toward the left side of the assembly.
4. Install the adjustable actuator linkage rod with the female rod end in the upper arm.
5. Reposition the assembly into the float, and insert the upper pivot pin and the lower pivot bolts. Make sure that the upper shock arm is positioned on the upper pivot so it is centered between the side support plates and shimmed so that there is less than .010 play. This is critical so that the upper shock arm cannot move away from the proximity switches more than .010 in normal use.
6. Make sure all pivots operate freely.
7. Adjust the linkage rod in the Gear Down position only. It must be adjusted so that there is approximately ¼ to ½ turn of preload in the down position. Too much preload puts high stress on the actuator components. Tighten all locking nuts.

6.2.7 ASSMEBLY OF THE WHEEL AND BRAKE

1. If the Wheel Bearings require replacement, reassemble the wheel per the wheel manufacturers' instructions.
2. Assemble the wheel onto the axle with the seal spacer and axle nut opposite of the brake rotor side of the wheel. After setting the bearing preload, install the locking ring to prevent the axle nut from rotating.
3. Slide the wheel and axle assembly into the drag link and insert the retainer bushings.
4. Insert the axle retainer bolt from the side opposite the brake, but do not tighten.
5. If the anti-rotation plate was disassembled from the brake torque plate, re-assemble them so the brake caliper is rotated as far up as it can go without hitting the drag link arm. Install and tighten the (2) AN5 bolts.
6. Tighten and install cotter pin in the axle retainer bolt.
7. Re-install brake caliper and pads. Bleed the brakes if required.

NOTE:

The Drag link is a 3 piece unit, not meant to be disassembled unless it is determined that they must be inspected for corrosion. Upon reassembly, clean thoroughly and liberally, apply sealer between the parts to prevent moisture from entering the joint, and install new hardware. In highly corrosive conditions, it is recommended that the assembly be re-primed and painted after assembly.

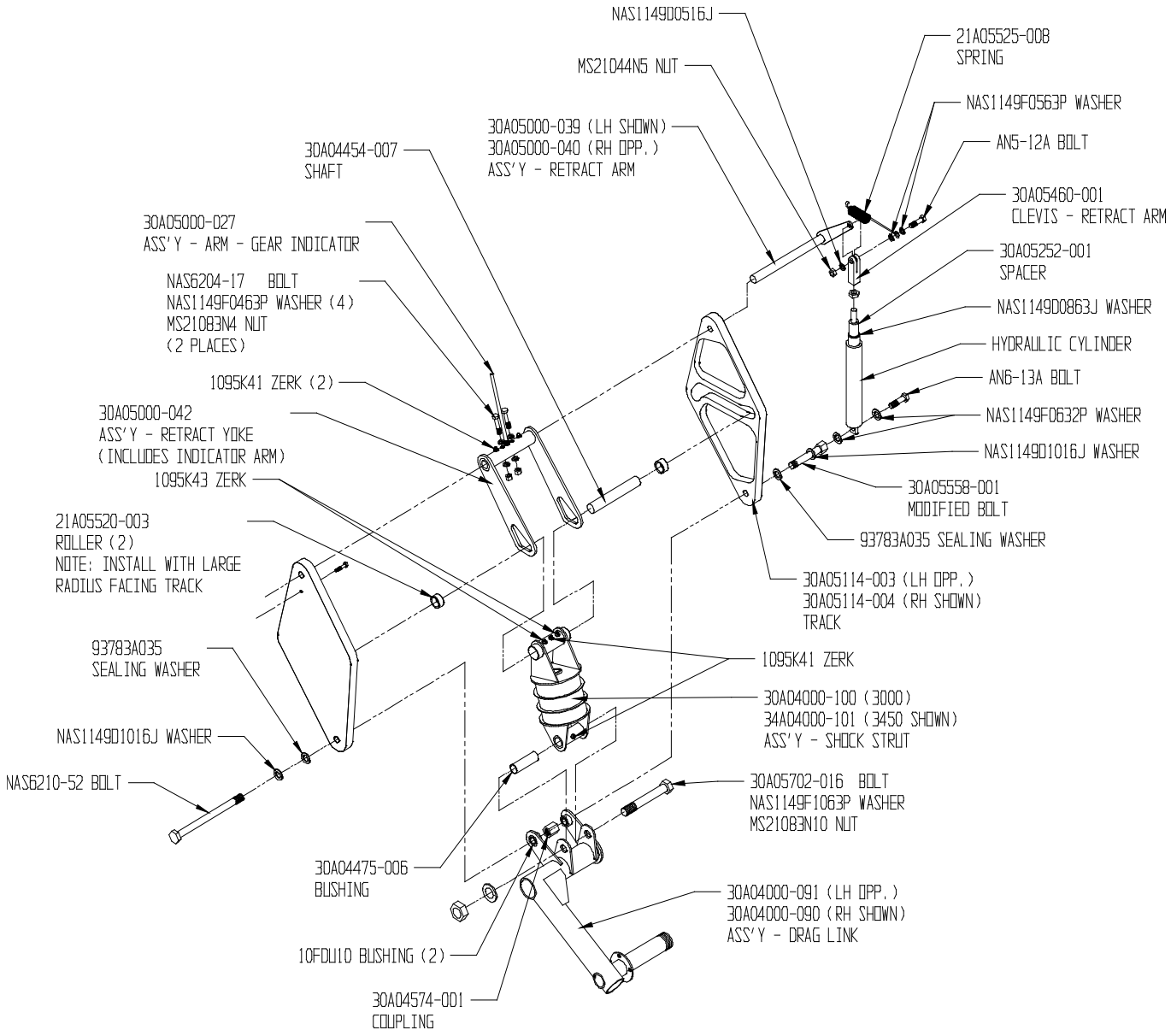


FIGURE 6-1. MAIN GEAR RETRACTION

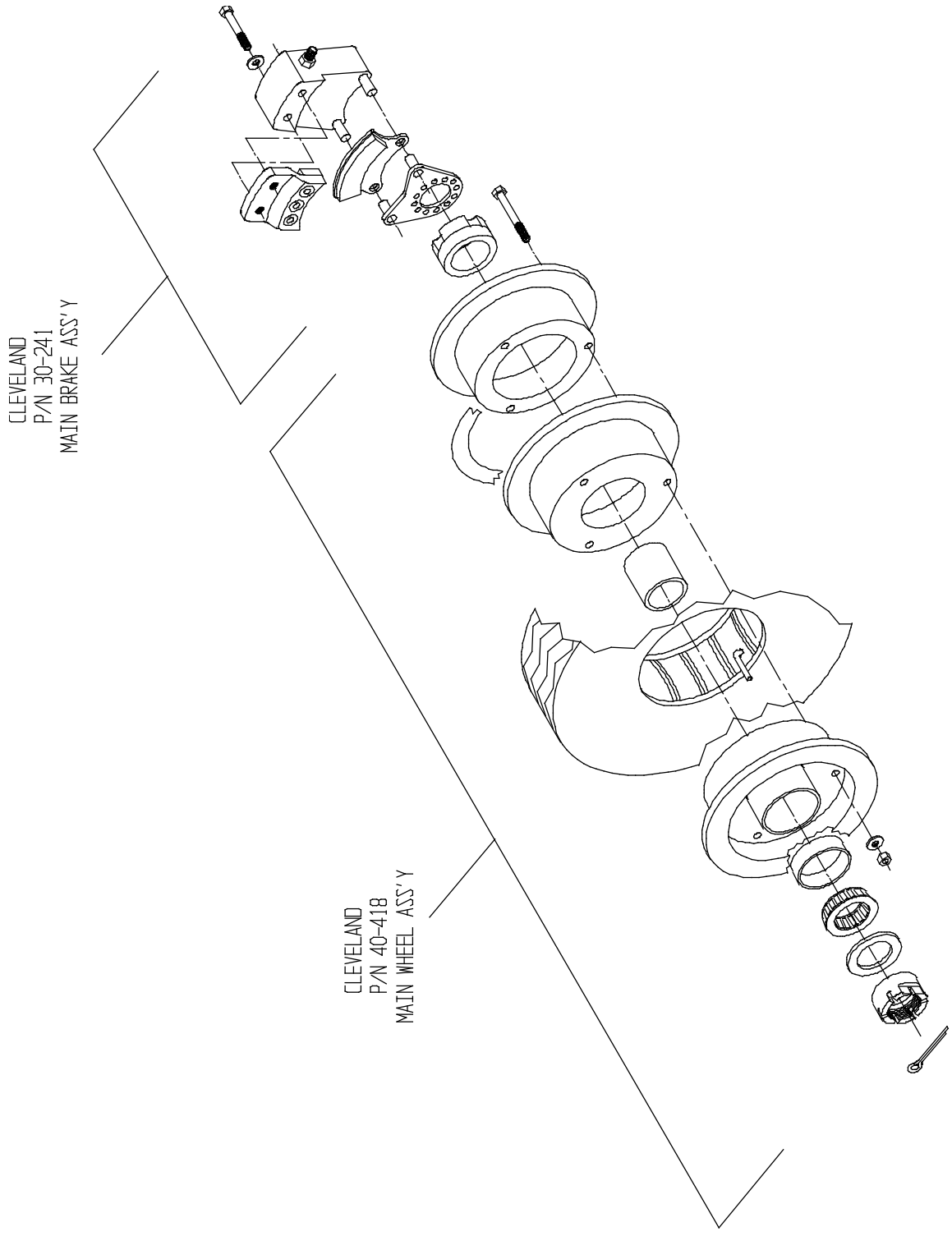


FIGURE 6-2. MAIN GEAR WHEEL ASSEMBLY

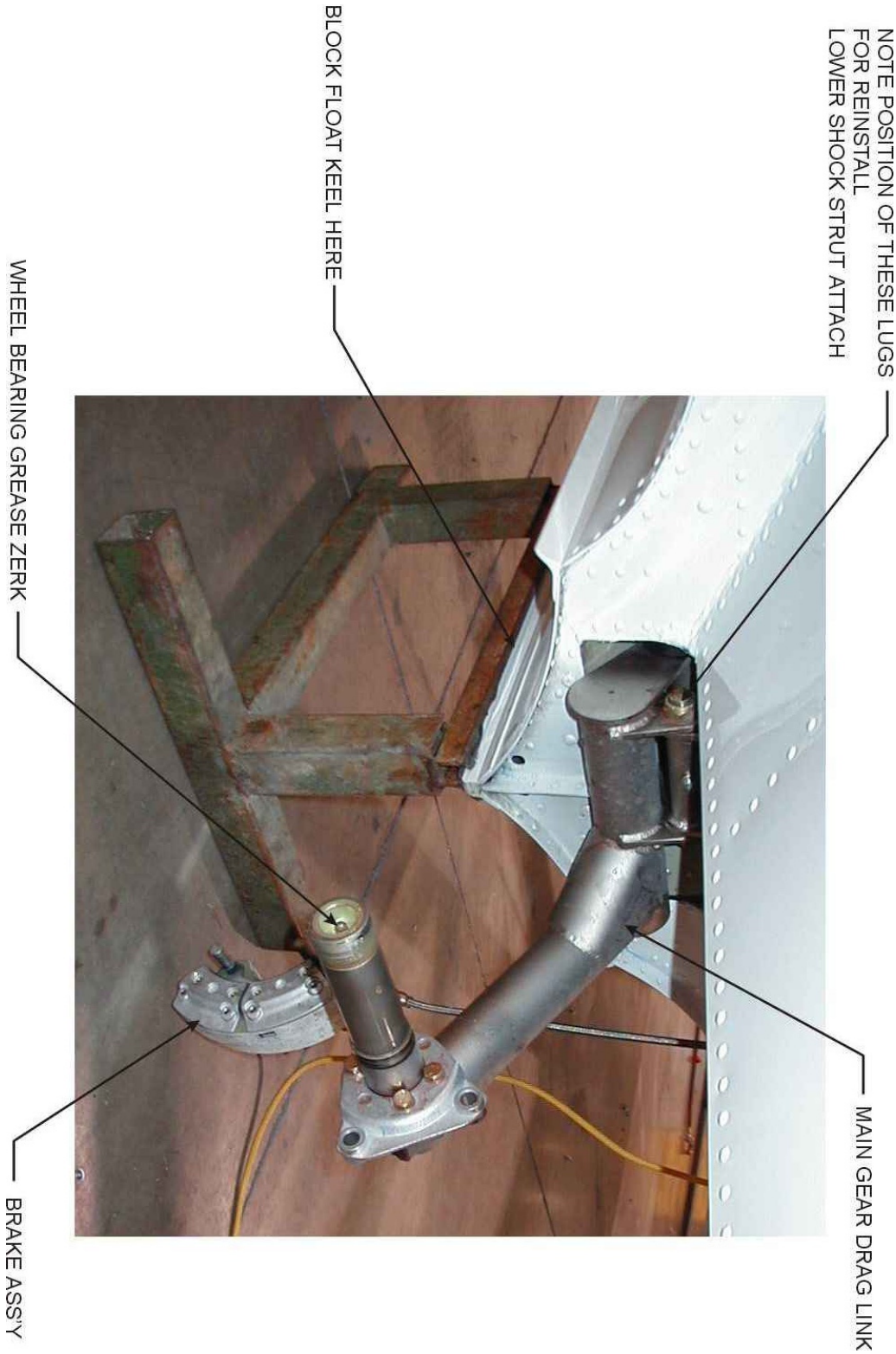


FIGURE 6-3. DRAG LINK INSTALLATION

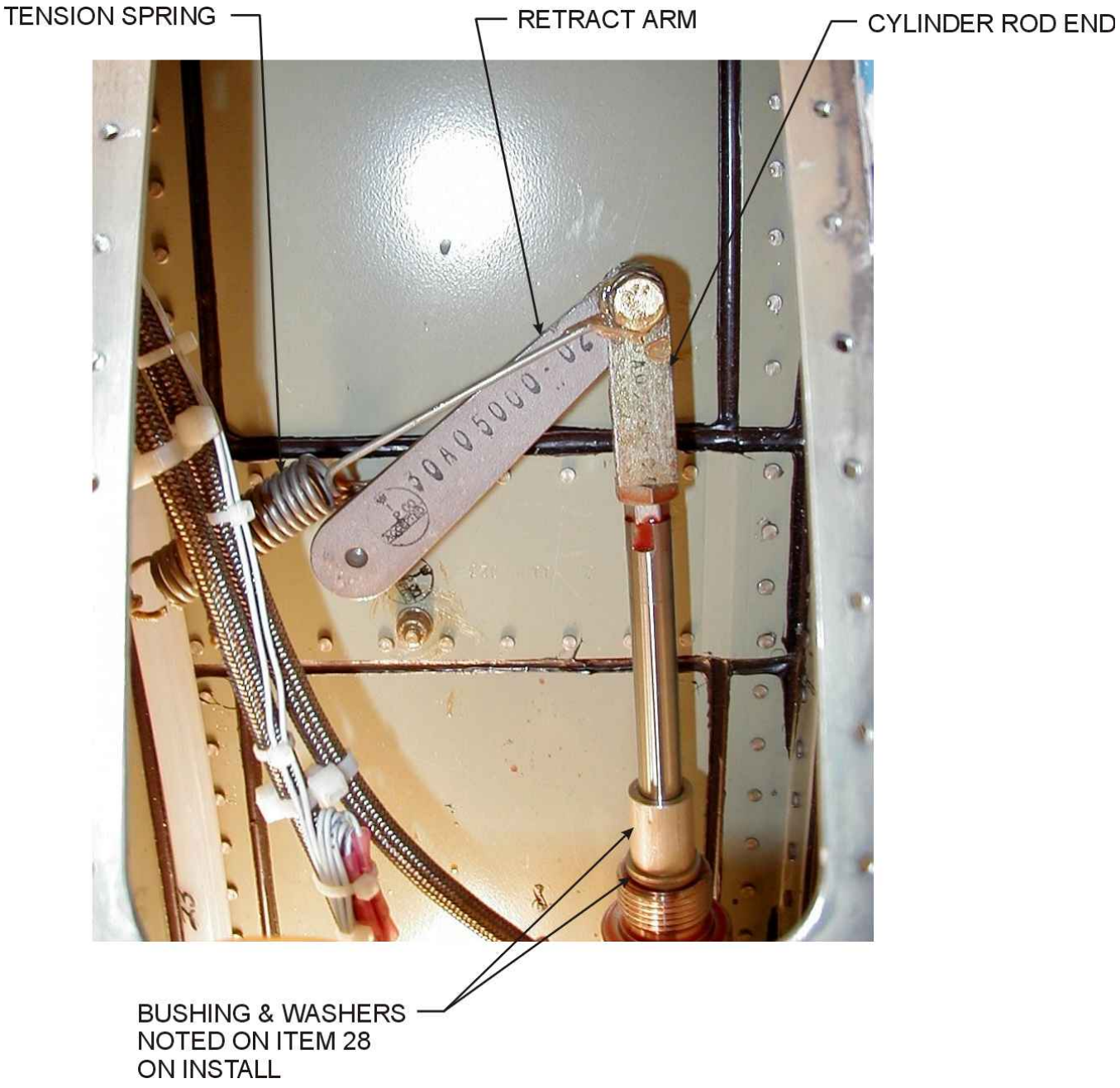


FIGURE 6-4. VIEW OUTBOARD ACCESS HOLE CYLINDER IINSTALLATION

FIGURE 6-5. OUTSIDE VIEW SHOWING DRAG LINK AND COUPLING NUT

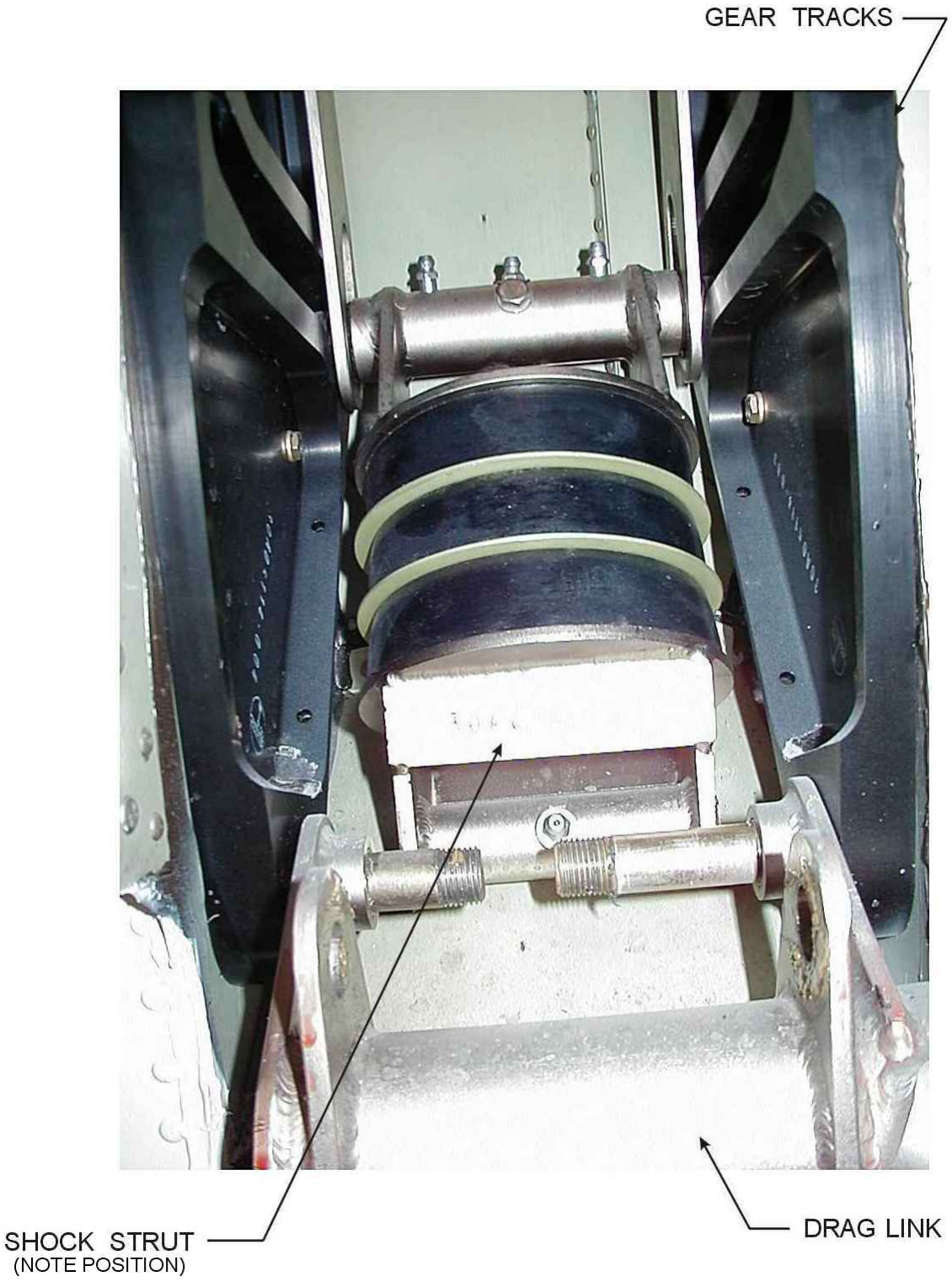


FIGURE 6-6. VIEW LOOKING UP INTO WHEELWELL FROM OUTSIDE

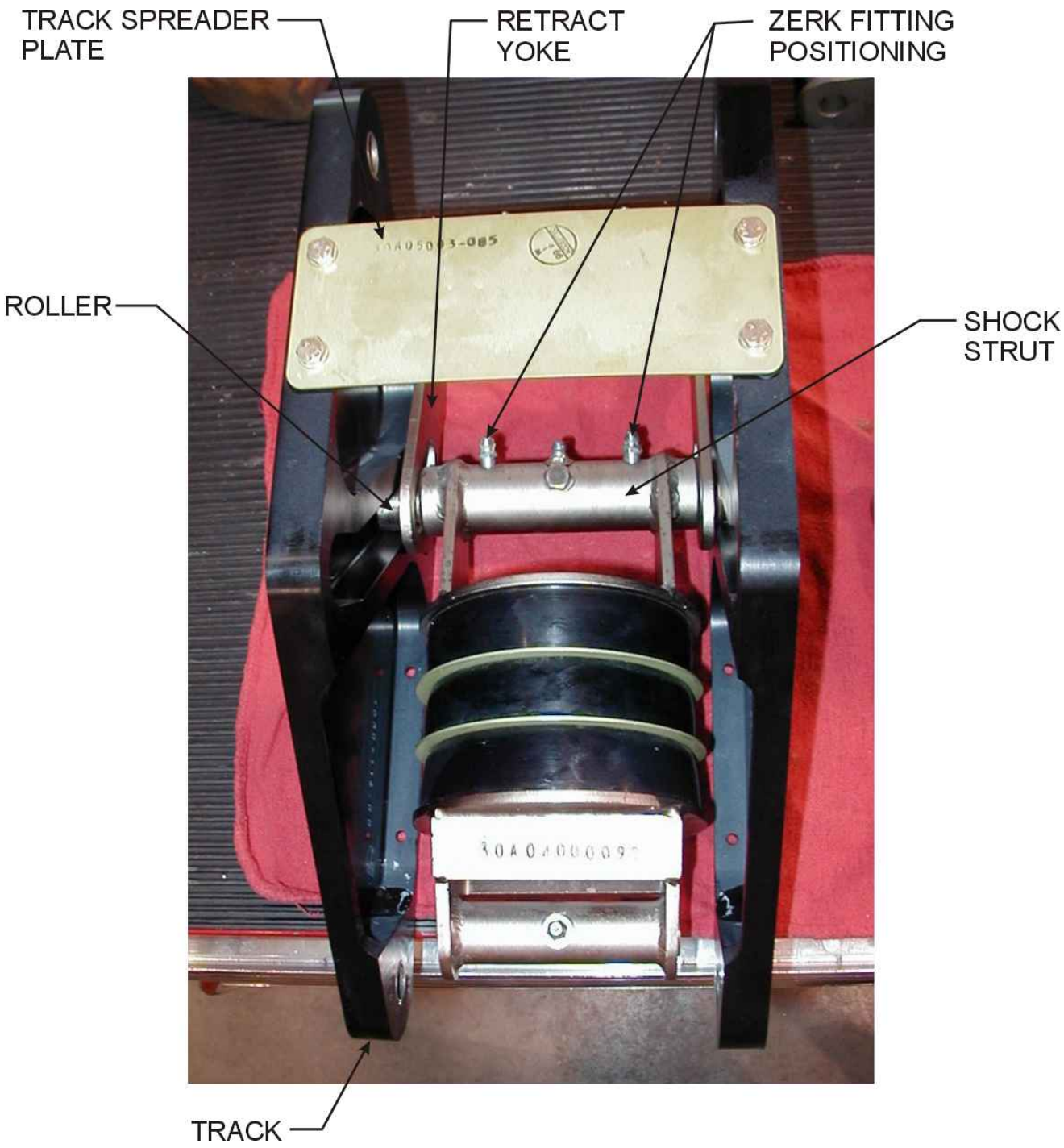


FIGURE 6-7. ASSEMBLED TRACK ASSEMBLY REMOVED FROM FLOAT

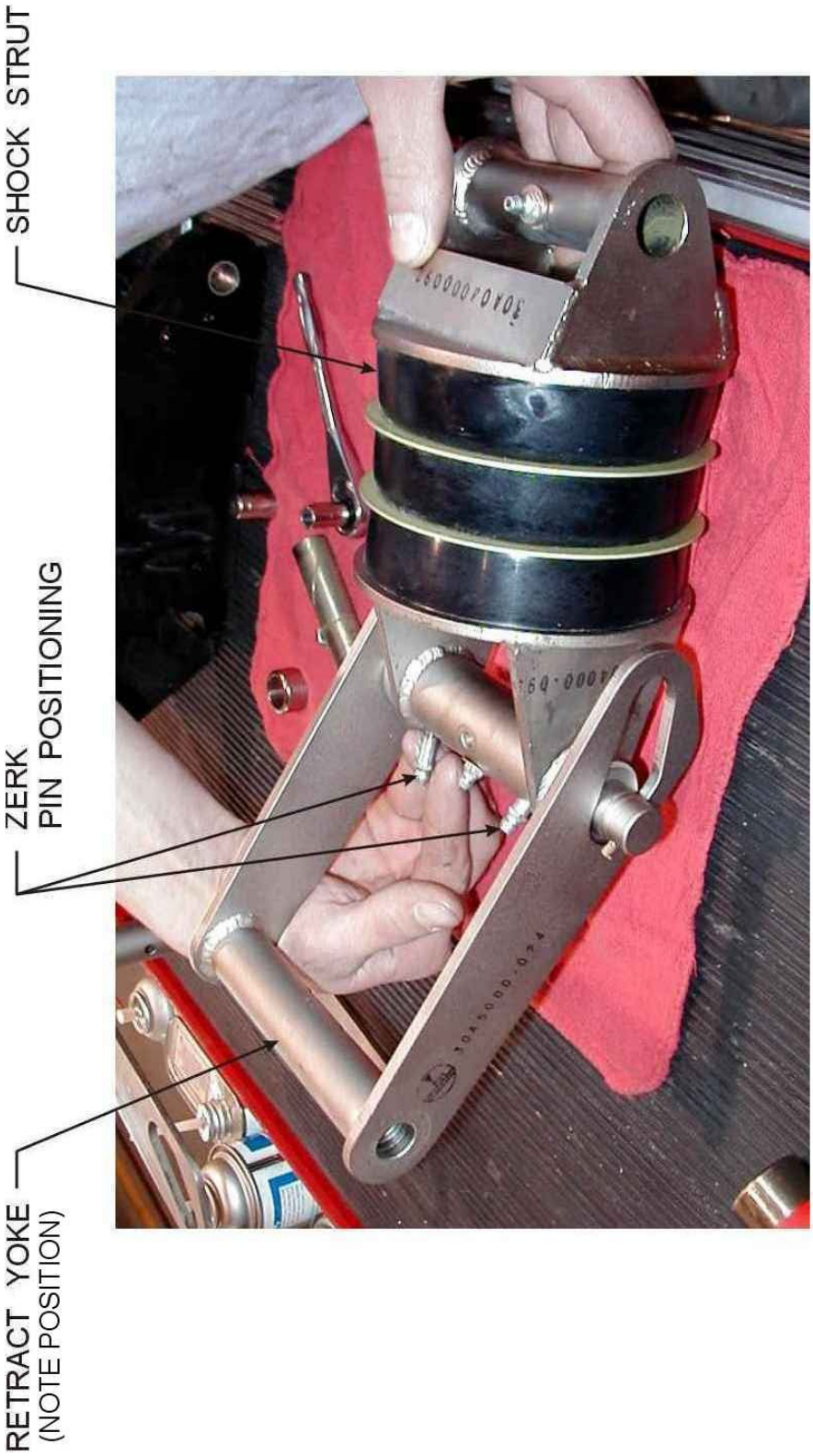


FIGURE 6-8. POSITION OF RETRACT YOKE TO SHOCK STRUT

FIGURE 6-9. VIEW LOOKING DOWN THROUGH TOP ACCESS HOLE

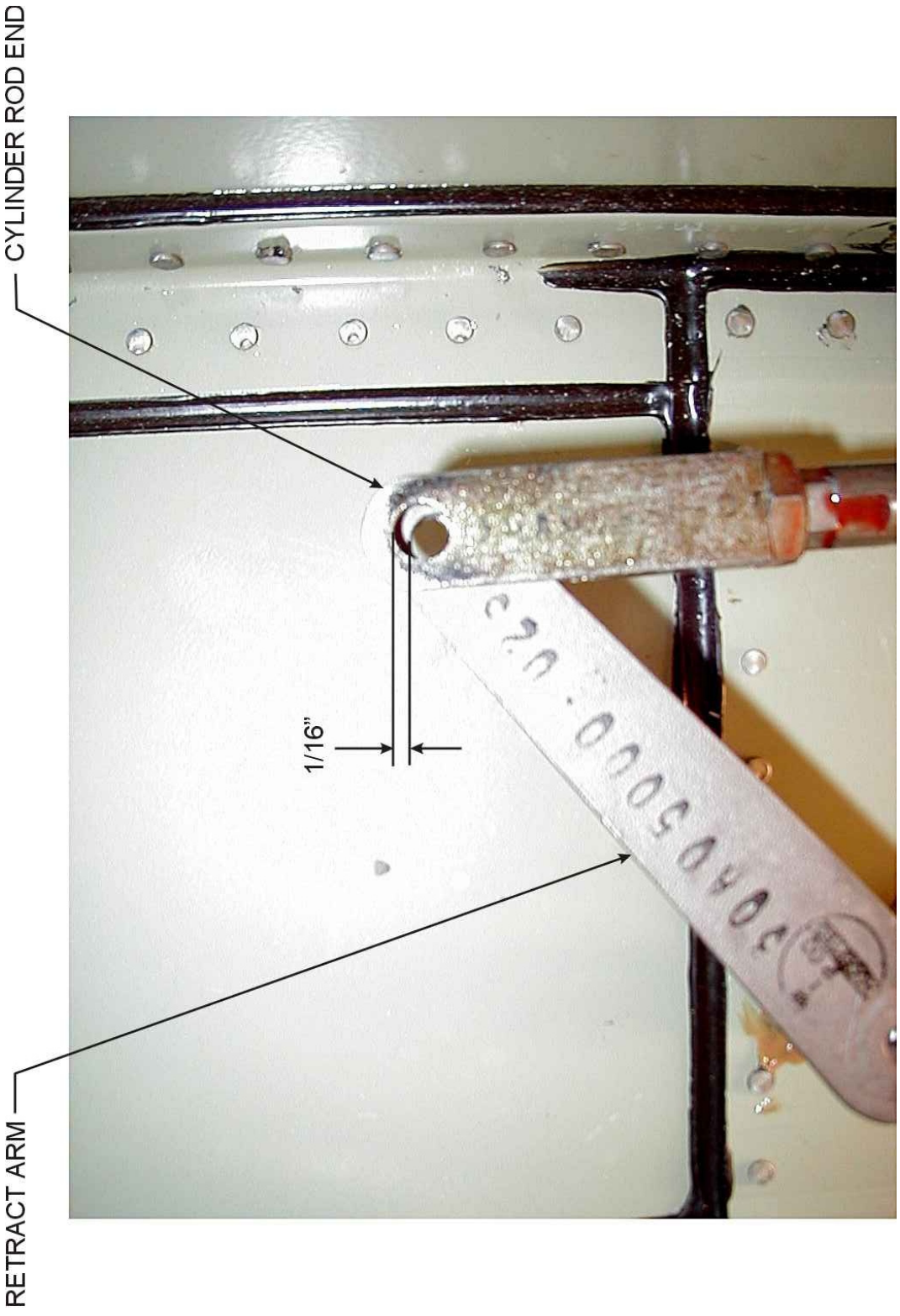


FIGURE 6-10. VIEW SHOWING 1/16” CUSHION, GEAR DOWN ROD END ATTACHMENT

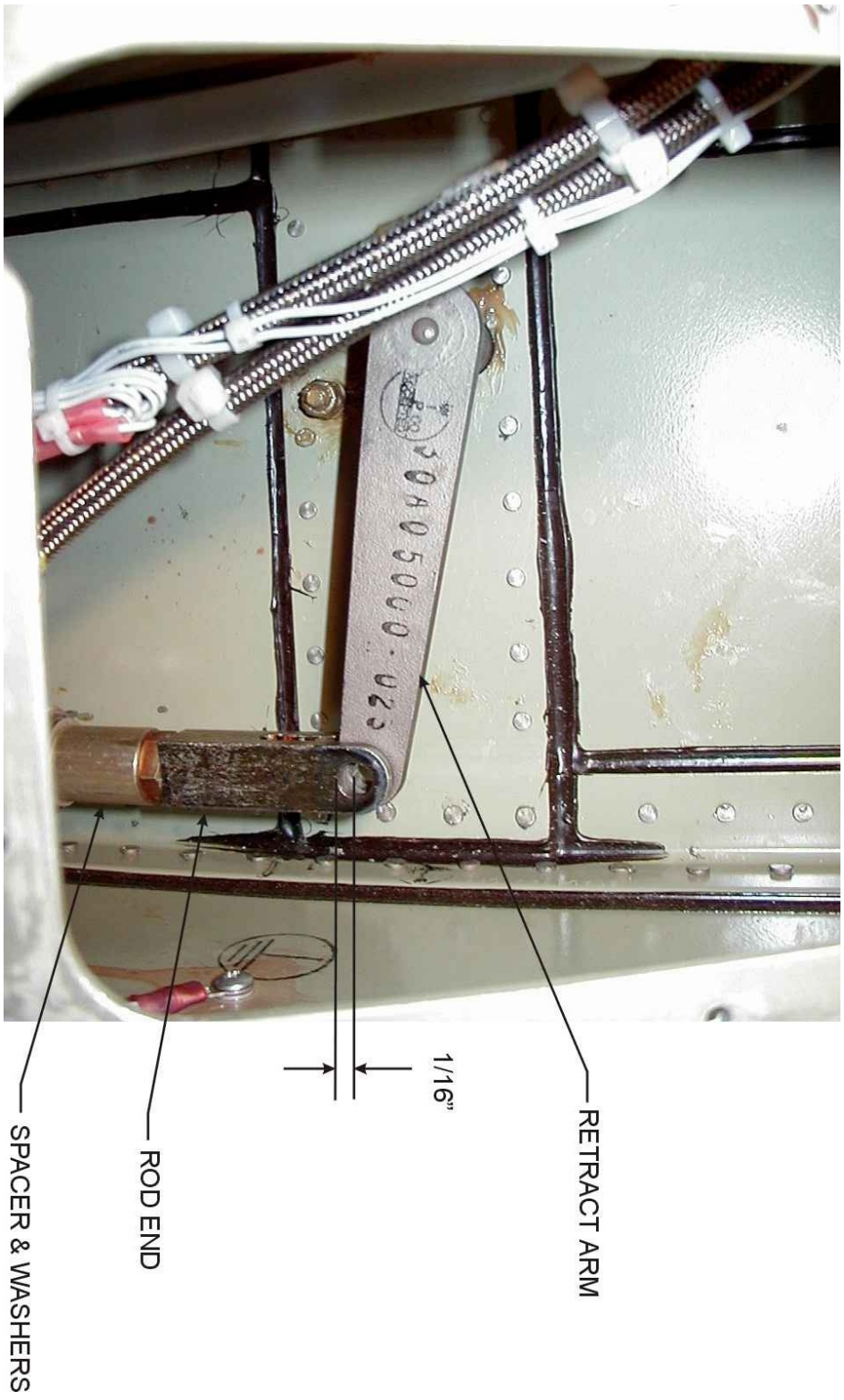


FIGURE 6-11. VIEM, 1/16" CUSHION, GEAR UP ADD SPACER AND WASHER FOR ADJUSTMENT

FIGURE 6-12. VIEW OF HYDRAULIC CYLINDER

7.0 NOSE GEAR

7.1 DESCRIPTION

The nose gear is a reinforced fiberglass spring that is attached at the upper end to a trolley block. This trolley moves fore and aft hydraulically in tracks that are part of the nose box sides. This trolley is guided in the tracks by nylon slide blocks. A down stop is located on the forward end of the trolley. The lower end of the spring is attached to a pivot block. Inside the block is a castering pin that is attached to the nose wheel fork. This pin in normal taxiing is free castering. In the air the pin is locked so wheel trails in landing position. The up lock is on the lower bearing plate (opposite side of pivot block). The slot in this plate mates in the upper ¼ inch diameter bolt near top of the nose box. A tow lug is provided on the lower end of each spring (refer to Figure 7-1).

Nose tires are standard 10 X 3.50, 4-ply, inflated to 50 +/- 5 psi.

CAUTION !!
Tow on hard surface only.

7.2 NOSE GEAR REMOVAL FROM BOX ASSEMBLY

1) Jack and block aircraft per Section 4.
2) Remove top most forward access cover.
3) Remove round inspection cover on nose box top from above access (refer to Figure 7-2).
4) Remove nose bumper by removing attaching screws.
5) With hand pump, retract gear partially so rod end of cylinder is exposed in round access cover on nose box top.
6) Loosen jam nut and unscrew cylinder rod end from end of cylinder.
7) Remove long ¼ inch diameter bolt on lower end of nose gear fork (refer to Figure 7-3).
8) Nose gear assembly now may be removed from nose by pulling complete nose gear forward from nose box.
9) Clean and inspect nose box tracks for wear.
10) Replace or inspect trolley axles and nylon blocks on nose gear trolley. Assemble in reverse order of removal and 7.3.

7.3 REASSEMBLE NOSE GEAR TO NOSE BOX

1) If installing rod end and trolley link to trolley, note position of grease hole, it has to be positioned up (refer to Figure 7-4).
2) Before inserting trolley in nose box, take care to position nylon slide blocks. Position as noted on Figure 7-1 and Figure 7-4.
3) Slide trolley into nose box and reconnect to cylinder (refer to Figure 7-2).
4) The “gear down” position is set by adjusting the cylinder rod end so that the over-center knuckle (brass) rollers bottom out in the Nose Fork Tracks without preload on the cylinder rod. Tighten lock nut.
5) The gear up position does not require adjusting as long as the Up Stop has engaged the Up Stop Pin.
6) Bring gear to down and locked position and set side play adjustment. These are the two (2) long ¼ inch bolt that (refer to Figure 7-3) are horizontal through the nose fork.
7) Reinstall cover on Figure 7-2.
8) Reinstall nose bumper.

9) Set proximity switches (or check) so when gear is down green lights on selector head are on. When gear is up blue lights are on. Set by sliding switch brackets on cylinder shaft. When set apply RTV silicone to secure to cylinder.

7.4 REMOVAL OF NOSE WHEEL FORK FROM PIVOT ASSEMBLY

1) Remove ¼ inch bolt.

NOTE

This is a heat-treated bolt.

2) Entire pivot shaft on nose fork will drop down for service.
3) Assemble per Figure 7-1.
4) Axle bolt is modified for grease service. A special anti-rotation washer is under bolt head to keep axle from turning.

7.5 NOSE BOX REMOVAL FROM FLOAT

1) Nose gear must be removed 7.2.
2) Remove the eight (8) ¼ inch bolts from nose bulkhead. (Plate nuts are on inside of nose bulkhead.)
3) Hydraulic cylinder to be removed by unscrewing from back nose box flange.

NOTE

Keep washers on cylinder for reinstallation.

4) Remove two (2) bolts holding nose box to float bulkhead angles.
5) Slide entire nose box forward.

NOTE

Nose box may be removed by just removing hydraulic lines, elbow fittings, and proximity switches. Then slide box out with cylinder attached.

7.6 NOSE BOX TRACK WEAR

Due the wear over time the roller/slide block places on the track as the gear are retracted, the block needs to be measured for the amount of wear. The tolerance for wear is .020 inches. If the wear is, or is less than the limit, it can still be used. If the wear in the track is greater than .020 inches, the block must be replaced.
This check should be done every 200 hours and is part of the maintenance checklist.

On the 3000 & 3450 Series Floats Gear Track P/N 21A07349 (-003 LT -004 RT)

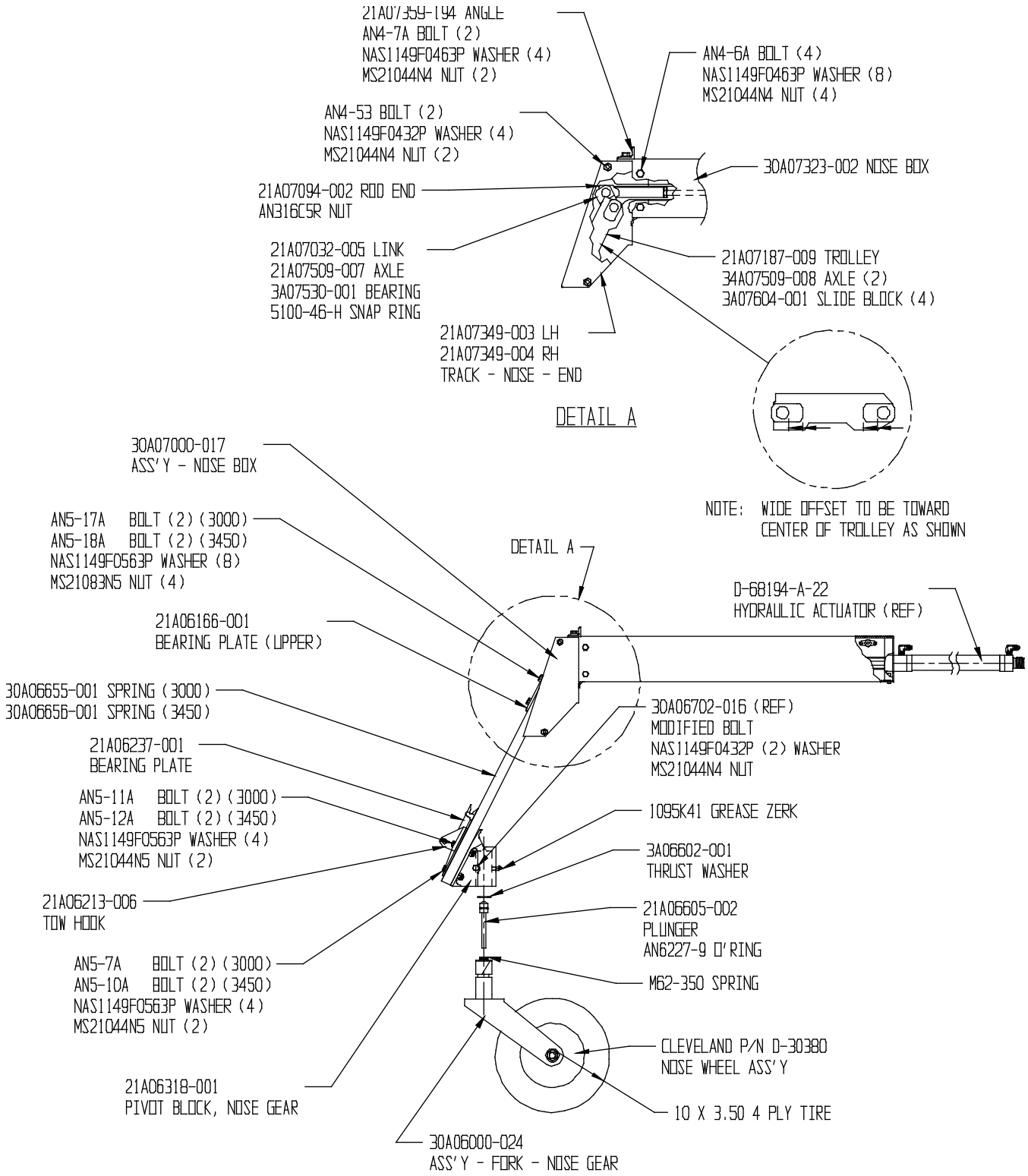


FIGURE 7-1. NOSE GEAR RETRACTION SYSTEM

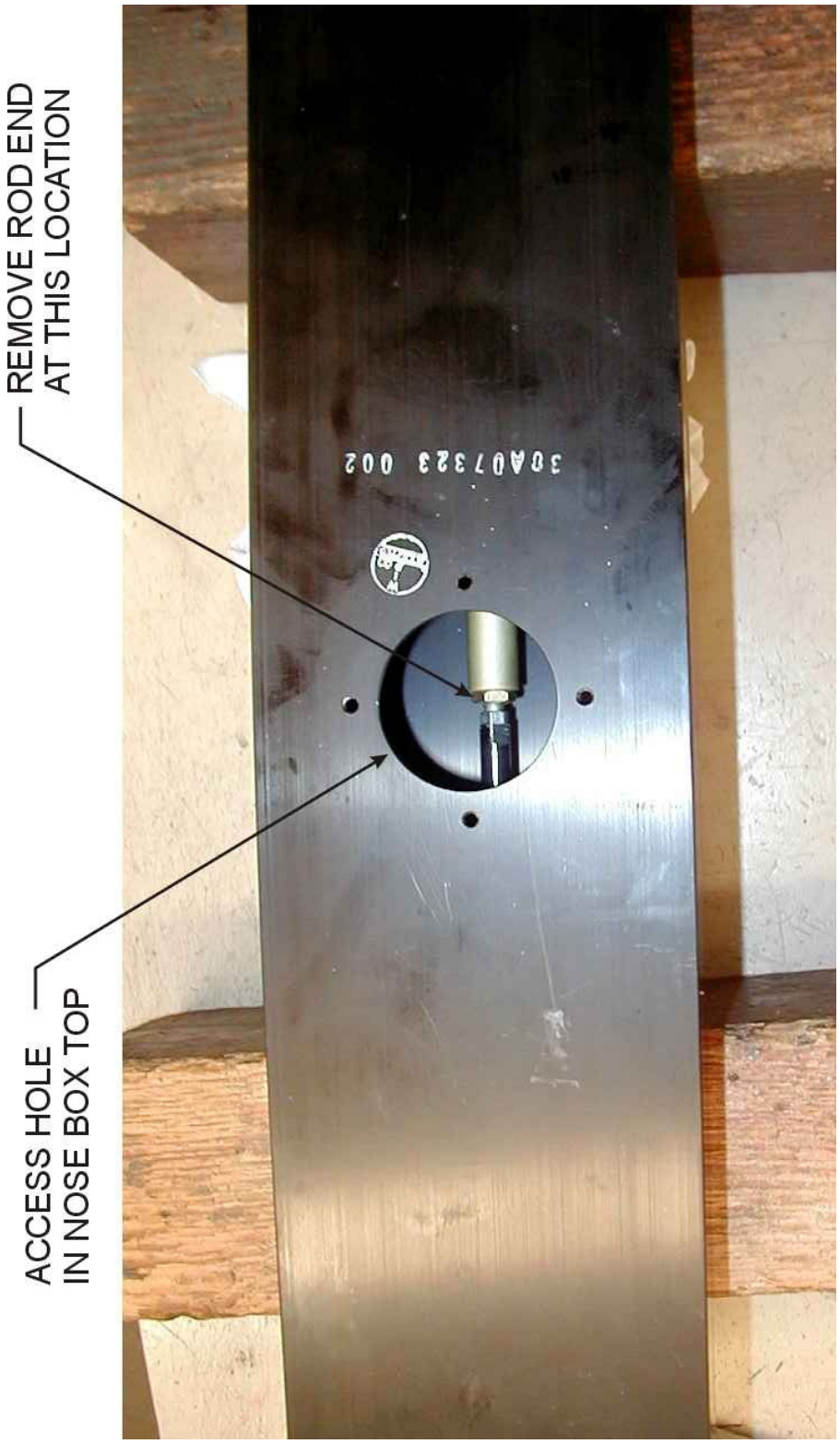


FIGURE 7-2. NOSE BOX ACCESS LOCATION

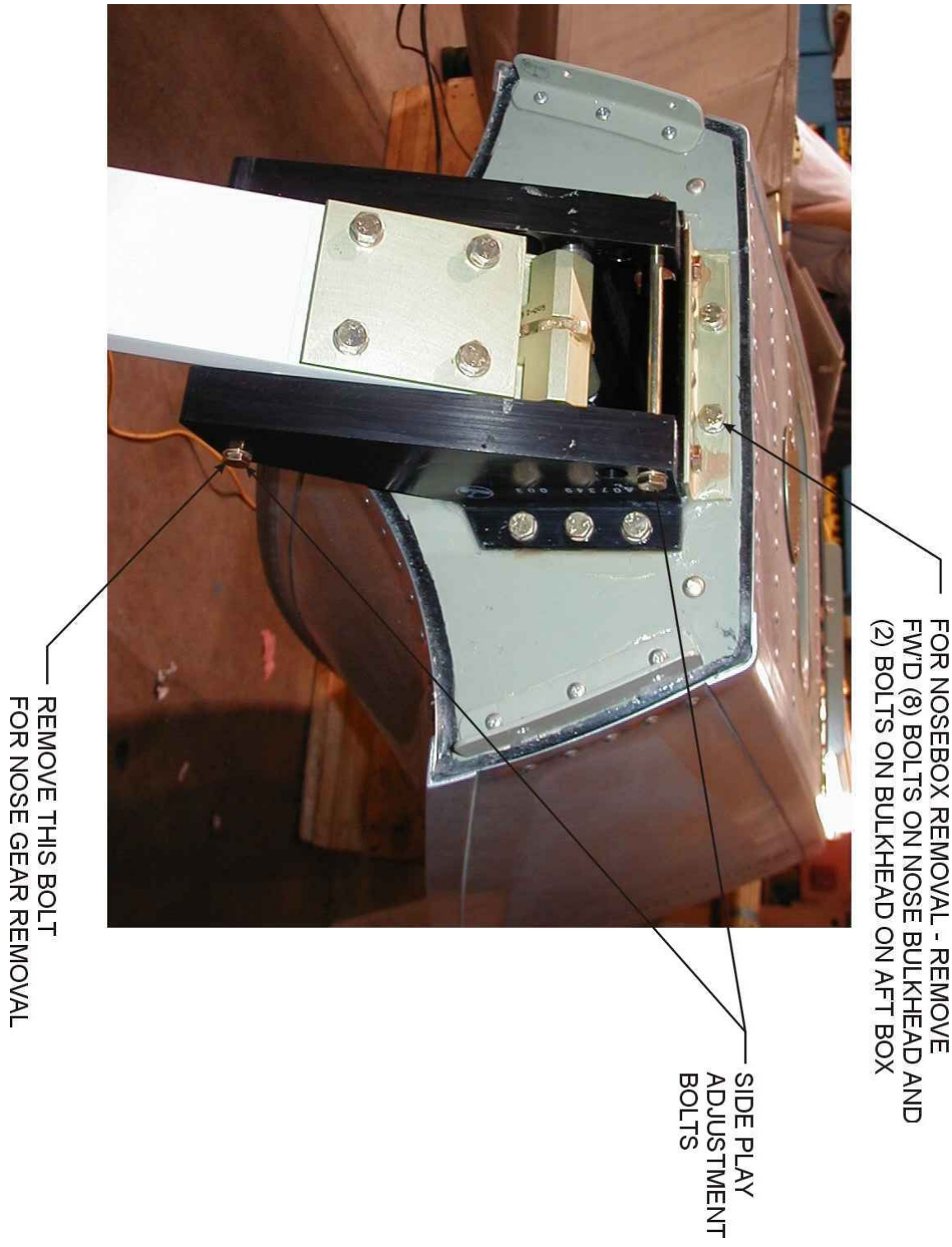


FIGURE 7-3. FRONT VIEW NOSE BOX

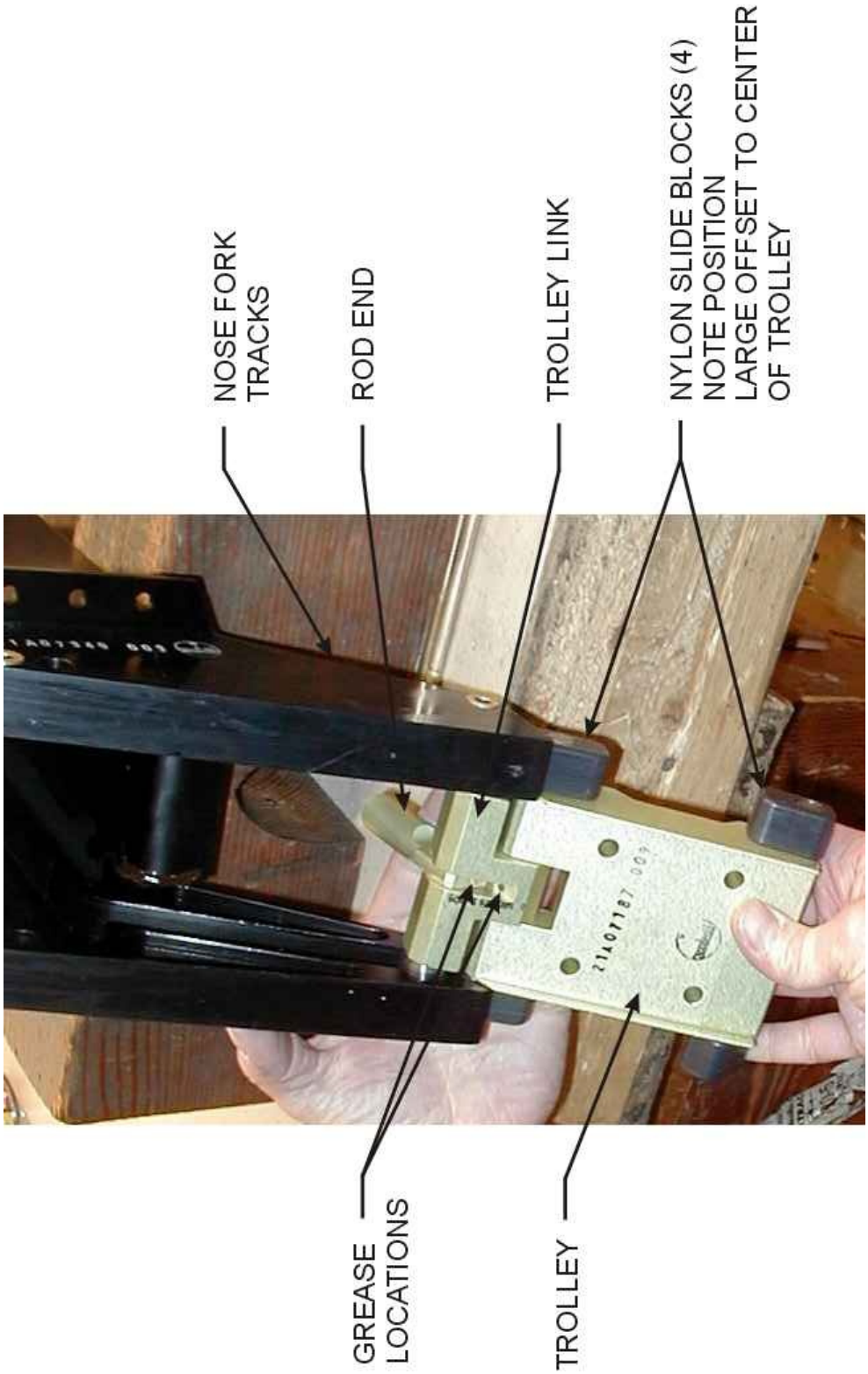


FIGURE 7-4. POSITION OF TROLLEY TO NOSE BOX

8.0 HYDRAULIC PUMP DISASSEMBLY AND SERVICE

Pump may be returned to factory for service. Electric pump motor may be returned to factory for service.

1) Remove return line on lower reservoir and drain oil.
2) Remove screw on bottom of reservoir for tank removal.
3) After tank removal, pick up filters to be pulled off (friction fit) and cleaned. (Refer to Figures 8-1 & 8-2.)
4) Replace tank, reinstall lower hose and fill with clean hydraulic oil (Mil-H-5606).
5) Fill by removing breather and filler stand pipe.

8.1 SETTING THERMAL AND PRESSURE RELEIF VALVES

1) These are preset at the factory. Thermal relief is set at 1100➡ +100/-0 PSI and pressure relief at 800➡ +100/-0 PSI.
2) If adjusting, refer to Figure 8-2 for location of relief valves.
3) Loosen jam nut on relief valve to be changed. Turn clockwise to increase and C' clockwise to lessen.
4) Do not exceed factory settings noted above.

8.2 TROUBLESHOOTING HYDRAULIC SYSTEM

1) PROBLEM – Power pack does not run after gear selection.

RED pump light **OFF**

Probable cause:

a. Circuit breaker has tripped.
b. Pressure switch not pulling in at low cut in.
c. Solenoid switch not pulling in.
d. Motor not properly grounded.
e. Pressure buildup on both sides of up and down lines.

PROBLEM – Power pack does not run after gear selection.

RED pump light **ON**

Probable cause:

a. Faulty pump motor.

Verification and Remedy:

a. Reset circuit breaker.
b. Short across pressure switch leads and see if motor runs. If motor operates, replace pressure switch.
c. Short across solenoid pressure switch leads and see if motor runs. If motor operates, replace solenoid pressure switch.
d. If c. above does not produce results and it is verified that voltage was actually applied to motor, it can be assumed motor is bad or not properly grounded.
e. Check motor ground.
f. Select hand pump to up and down position to relieve pressure. Return to center and select gear

2) PROBLEM – Power pack does not shut off after gear reaches position.

a. Faulty pressure switch.
b. Faulty or dirty pressure relief valve allowing insufficient pressure buildup.

Remedy:

a. Replace pressure switch.
b. Clean and check relief valve.

3) PROBLEM – Power pack shuts off before gear reaches position.

Probable Cause:

a. Binding or jammed gear retractor, which causes pressure to build up (and stay up), and pressure switch shuts off power pack.

Remedy:

a. Repair retractor.

4) PROBLEM – Power pack cycles on and off after gear is in position.

Probable Cause:

a. Internal hydraulic leak.
b. External hydraulic leak.

Remedy:

a. Verify leak is not external by checking fluid level in reservoir and looking at couplings for oil leaks. If no external leaks are found, disconnect and cap off the hydraulic actuators one at a time and find the leaky one by process of elimination.
b. If isolating entire system still indicates internal leak, power pack check valve (located in pressure port of pump) is bad and needs replacement or reseating.
c. Visually inspect lines, cylinders, and hoses and replace as necessary.

5) PROBLEM – Power pack cycles on and off during gear cycle.

Probable Cause:

a. Binding in retraction unit.
b. Pressure switch cut off limit too low.

Remedy:

a. Investigate for free operation. Check gear that retracts last.
b. Replace pressure switch.

6) PROBLEM – Slow gear operation cycle (considerably longer than 30 seconds).

Probable Cause:

a. Plugged oil screen.
b. Poor electrical connection to motor. Check ground.
c. Poor motor.
d. Worn pump gears.

Remedy:

a. Clean intake screen located inside reservoir tank.
b. Connect motor direct to 12/24-volt source and note operation poor, motor needs overhaul.
c. Covered in (b) above.
d. Replace pump.

7) PROBLEM – Circuit breaker pops during cycle.

Probable Cause:

a. Wire connections bad or corroded.
b. Bad motor brushes.
c. Bad circuit breaker.

Remedy:

a. Clean and protect terminal with grease.
b. Overhaul motor.
c. Replace circuit breaker.

8) PROBLEM – Power pack does not cycle up or down.

Probable Cause:

a. Pressure build-up in both sides of up and down lines.

Remedy:

a. Select hand pump to up and down position to relieve pressure. Return to center and select gear.

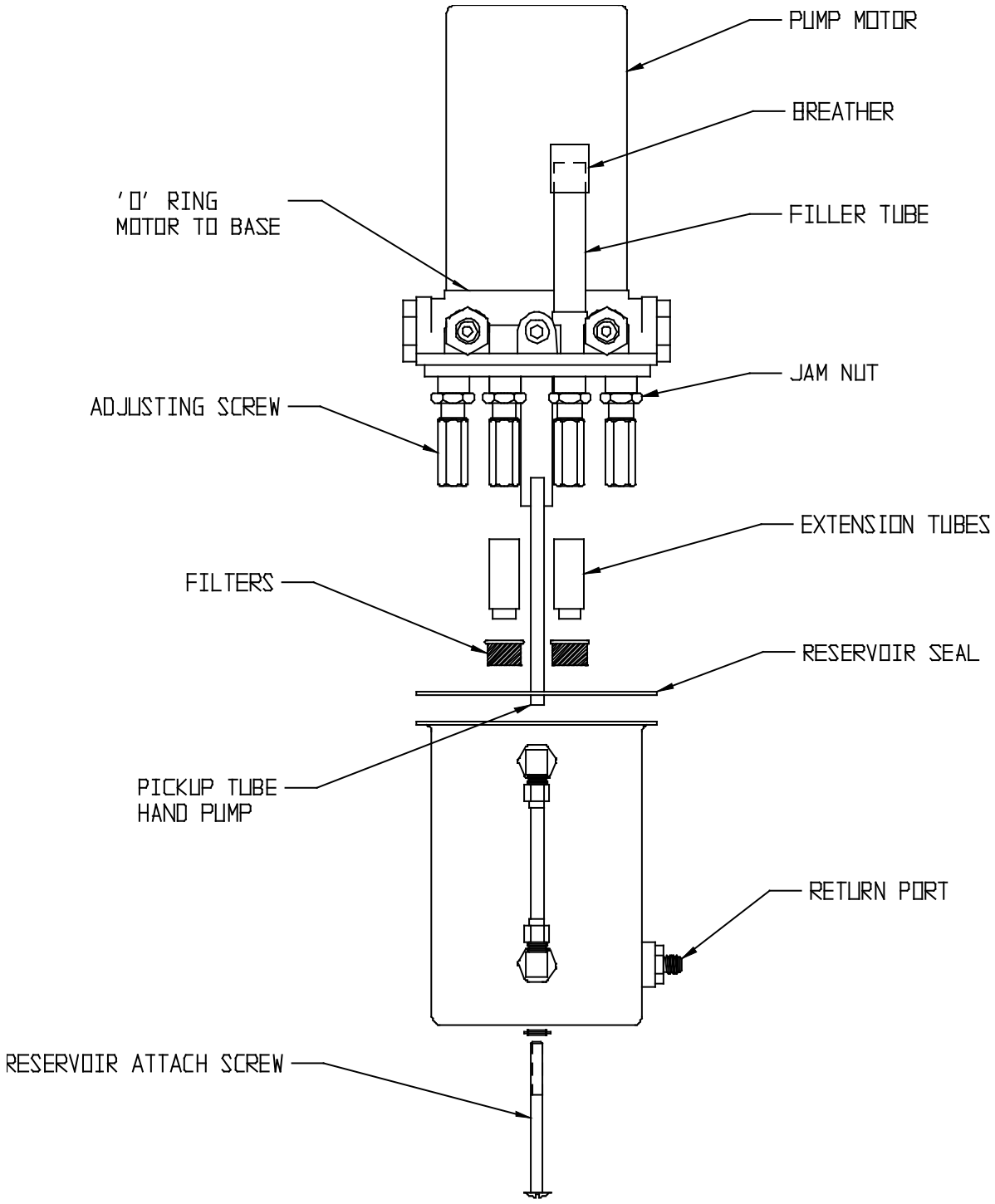


FIGURE 8-1. HYDRAULIC PUMP

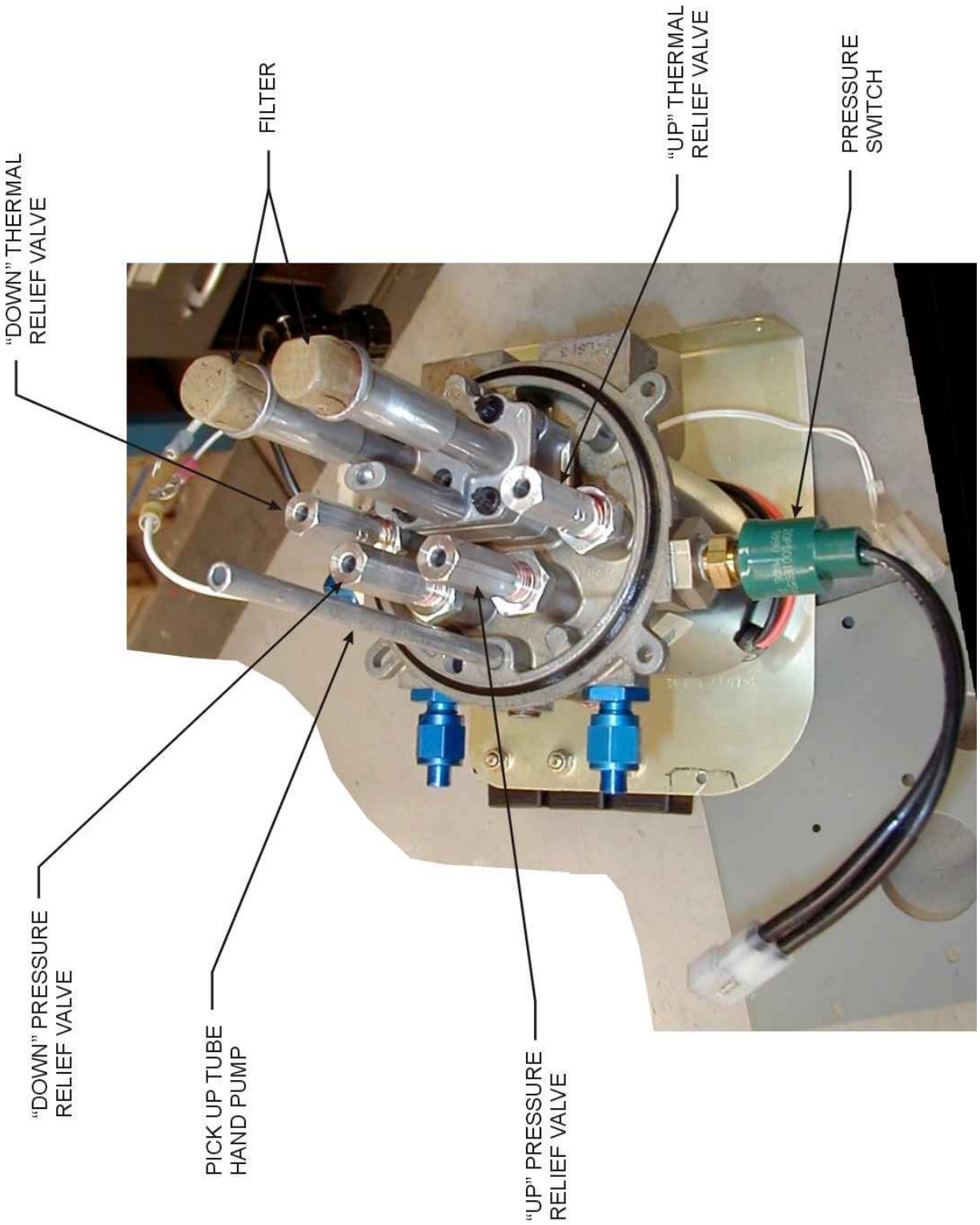


FIGURE 8-2. INTERNAL VIEW HYDRAULIC PUMP

9.0 CONTINUED AIRWORTHINESS

As coded in the Inspection Time Intervals chart in this section, there are items to be checked each 25, 50, 100, and 200 hours. Also there are notes on special items which may require servicing at more frequent intervals.

- When conducting an inspection at 25 hours, all items marked for 25 hours would be accomplished.
- When conducting an inspection at 50 hours, the 25 and 50-hour items would be accomplished.
- When conducting an inspection at 100 hours, the 25, 50, and 100-hour items would be accomplished.
- When conducting an inspection at 200 hours, the 25, 50, 100, and 200-hour items would be accomplished.
- A complete inspection (Annual Inspection) would include all 25, 50, 100, and 200-hour items.

Below is a list of recommended lubricants and “protection” products when servicing float hull and amphibious components. This lists products used by Wipaire during assembly of the floats.

There may be equivalent products just as satisfactory for protection. However, it is recommended if trying different products, to inspect them frequently so as to determine their effectiveness.

Protection of nuts, bolts, hydraulic lines or metal surfaces

Zip D-5029NS Corrosion Inhibiting Compound
Zip Chemical Company

CRC – SP400 Soft Seal
CRC Industries

General Lubricants

LPS 1, LPS 2 and LPS 3
LPS Industries

Wheel Bearings, Main Gear Retract Mechanism, Nose Gear Pivot and Rod Ends
*HCF Grease, P/N 605
HCF Industries

*Aeroshell 22
Shell Global Solutions

*Green Grease, Multi-Purpose
Green Grease Inc.

*Aviation Grease SHC 100
ExxonMobil Aviation Lubricants

* If existing grease cannot be identified you must lubri-flush all float grease fittings until visibly exhausting all old grease and new grease is coming out. Additionally if you cannot determine existing grease in wheel bearings, completely clean and repack bearings with new grease.

Rust Protection
Boeshield T9 Rust Protection
Boeing Company

ACF-50 Rust Protection

Corrosion X
Corrosion Technologies Corp.

Tef-Gel
Ultra Safety Systems, Inc.

Float Sealant
890 B2 or B4
Pro Seal Company

PR 1440 C
PPG Aerospace

1422 B2, B4 or B6
Pro Seal Company

RTV Silicones
General Electric

SIKAFLEX 201 or 252
Sika Manufacturing

Telflon Spray
6P-730A
Comet Industries

Electrical Insulating Compound
Dow Corning 4 (DC4)
Dow Corning Corporation

Hydraulic Fluid
Mil-H-5606

Bolt Torque
Bolts in Critical Areas - For common, correct torque when installed, or when visual inspection indicates a need for a torque check.

Nut torque should be applied depending on the hardware application, unless the torque is specified for a certain joint in this manual or installation drawings.

****Tension Application**

Nut-Bolt Size	Torque Limits (in-lbs)	
	Min.	Max.
8-36	12	15
10-32	20	25
1/4-28	50	70
5/16-24	100	140
3/8-24	160	190
7/16-20	450	500
1/2-20	480	690
9/16-18	800	1,000
5/8-18	1,100	1,300
3/4-16	2,300	2,500
7/8-14	2,500	3,000
1-14	3,700	4,500
1 1/8-12	5,000	7,000
1 1/4-12	9,000	11,000

****Shear Application**

Nut-Bolt Size	Torque Limits (in-lbs)	
	Min.	Max.
8-36	7	9
10-32	12	15
1/4-28	30	40
5/16-24	60	85
3/8-24	95	110
7/16-20	270	300
1/2-20	290	410
9/16-18	480	600
5/8-18	600	780
3/4-16	1,300	1,500
7/8-14	1,500	1,800
1-14	2,200	3,300
1 1/8-12	3,000	4,200
1 1/4-12	5,400	6,600

** A Torque of 80% should be used when Tef-Gel is applied to the bolt.

INSPECTION TIME INTERVALS			HOURS				RT	LT	INSP.
	General	**Details**	**25**	**50**	**100**	**200**			
General	Placards					X			
Hulls & Struts	Float Installation.	Float exterior – Inspect for damage, wrinkled metal, corrosion, paint loss, etc.		X					
		Struts & attach fittings			X				
		Spreader bars			X				
		Float Structure (interior)				X			
	Baggage Compartment Covers and Seals – Inspect for condition, security operation, excessive wear.				X				
	Pumper Tube Installation – Inspect for condition, security, routing of hoses.					X			
Water Rudder System	Water Rudder Hinges – Inspect freedom of rotation.	Clean and Inspect Lube with LPS#2	X						
	Water Rudder Steering and Retract Systems – Inspect the following: cables for broken wire; cable fittings for cable slippage, cracks and distortion; cable pulleys for freedom of rotation; and cable guard pins for presence; rigging.				X				
	Water Rudder Blades and Posts – Inspect for damage, security of attachment, corrosion, paint, rigging.	Clean and Inspect Lube with LPS#2			X				
Electrical System	Pump and Indicator Light Wiring – Inspect for chafing, broken or loose terminals and general condition.				X				
	Solenoids – Inspect wiring, mounting and general condition.				X				
	Pressure Switches – Inspect wiring, mounting and general condition.				X				
	Pump Motors – Inspect wiring, mounting and general condition.				X	X			

INSPECTION TIME INTERVALS			HOURS				RT	LT	INSP.
	General	Details	25	50	100	200			
Landing Gear Systems	Main and Nose Gear Tracks – Lubricate.		X						
	Nose Gear Pivot Blocks and Forks – Inspect for condition, lubrication, corrosion and paint.	Clean Fork for Inspection, Check Fork Tension 8-10 lbs	X						
	Nose Gear Box/Block Tracks measured at slide route for wear, .020 inches or less wear tolerance.					X			
	Nose and Main Wheel Bearing – Grease zerk fittings.		X						
	Hydraulic Fluid Level			X					
	Wheels and Tires – Inspect for wear, pressure, condition.			X					
	Brake Assemblies – Inspect for wear, corrosion, leakage.	Clean and Inspect		X					
	Hydraulic Fluid Screen – Clean and inspect. Note: If floats sit for extended periods of time (i.e., if removed during winter months), screen should be cleaned before putting floats back into service. Hydraulic fluid in reservoir should be checked for moisture or other contaminates and changed if necessary.				X				
	Main and Nose Gear Actuator, Assemblies – Inspect for condition, lubrication, leakage, corrosion and cleanliness.	Clean and Lube Nose and Main Gear Tracks.			X				
	Nose Gear Springs – Scotchply springs, inspect for cracks, delamination and paint.				X				
	Main Gear Drag Link – Inspect for condition, lubrication, corrosion, check attach bolts for wear.				X				
	Main Gear Shock Strut – Inspect for evidence of corrosion, pitting, cleanliness and security. Check lower attach bolt for wear.			X					
	Hydraulic Lines and Fittings – Inspect for leaks, condition and security.	AV-30 or Grease Fittings				X			
	Hydraulic Manifolds (if equipped) – Inspect for condition, security and leaks.					X			
			HOURS				RT	LT	INSP.

			25	50	100	200			
	Brake System Plumbing – Inspect for leaks, condition and security.					X			
	Perform Retraction Test	Main Gear – Inspect up and down for proper engagement.				X			
		Nose Gear Trolley – Inspect for proper travel				X			
		Nose Gear – Inspect for excessive side play in the down position.				X			
		Perform emergency gear Extension (hand pump).				X			
	Nose and Main Wheel Bearings – Disassemble and inspect.					X			

As general inspection guidelines, each of the following areas should be inspected for their own unique attributes:

Movable Parts – For lubrication, servicing, security of attachment, binding, excessive wear, safetying, proper operation, proper adjustment, correct travel, cracked fittings, security of hinges, defective bearings, cleanliness, corrosion, deformation, sealing, and tension.

Fluid Lines and Hoses – For leaks, cracks, dents, kinks, chafing, security, corrosion, and deterioration.

Metal Parts – For security of attachment, cracks, metal distortion, broken welds, corrosion, condition of paint, and any other apparent damage.

Wiring – For security, chafing, burning, defective insulation, loose or broken terminals, corroded terminals.

Bolts in Critical Areas – For corrosion, correct torque when installed, or when visual inspection indicates a need for a torque check.

Some additional general maintenance areas are as follows:

Nose and Main Gear Tracks – Clean and then lubricate with a dry Teflon coating spray.

Joints – Spray all joints with light penetrating oil such as LPS 3 to ensure lubrication at all times.

Electrical Connections – Apply SP-400 SOFT SEAL or LPS 500 to all electrical connections to prevent corrosion.

Hydraulic Fluid – For use in all hydraulic systems, including brakes: MIL-H-5606.

10.0 WATER RUDDER RETRACTION AND STEERING SYSTEM

Description

The water rudder retract system is manually operated by a lever through a system of cables and pulleys.

Steering is directed from the aircraft rudder steering system.

Adjustment

Rigging of the water rudder steering cables is accomplished by centering the airplane rudder and adjusting the turnbuckles such that both rudders trail with the float centerline. Cables should be tensioned to 10 pounds, +/- 5 psi.

Retraction cables should be rigged such that the rudder blade is in the up position and that the cables are just slack in the down position.

11.0 REPAIRING FLOAT HULL SKINS

The float hull is manufactured from the following aluminum alloys:

- Top skins – .025 inch thick, 6061-T6 aluminum
- Side skins – .025 6061-T6 aluminum
- Bottom skin – .040 inch thick, 6061-T6 aluminum
- Nose bulkhead – .080 inch thick, 6061-T6 aluminum
- All remaining forward bulkheads – .032 inch thick, 6061-T6 aluminum
- Afterbody skin – .025 inch thick, 6061-T6 aluminum
- All afterbody bulkheads – .032 inch thick, 6061-T6 aluminum

Damage to the skins may be repaired per Figures 11-1, 11-2, 11-3, or any acceptable repair method listed in FAA Advisory Circular 43.13.1A.

Any float hull skin or part thereof can be purchased from Wipaire to aid in repair. To simplify repairs, the skins are precut and drilled except forward bottom skins.

NOTE

Forward side skins are stretched formed and may be purchased from factory.

12.0 REPAIRING FLOAT HULL EXTRUSIONS (KEEL, CHINE, ETC.)

Refer to Figures 11-4 through 11-8 for repair schemes for repairing hull extrusions.
Outside hull extrusion may be purchased from Wipaire in any length.
Internal splices may be purchased from Wipaire or fabricated per sketches shown in figures. Any repair to hull not shown in this manual to be per FAA Advisory Circular 43.13.1A.

13.0 REPLACING SIDE SKIN STIFFENERS

Side skin stiffeners located between bulkheads are secured by a special adhesive. This adhesive and stiffeners are available from our Parts Department. Each stiffener has a specific location and contour. See parts manual for stiffener part number and location. The end stamped “T” goes to gunwall.

14.0 REPAIRING HEAT TREATED PARTS

Main landing gear drag link, shock strut and actuation parts are heat-treated. These parts are not to be welded without reheat treatment. Return to factory for repair and heat treatment.

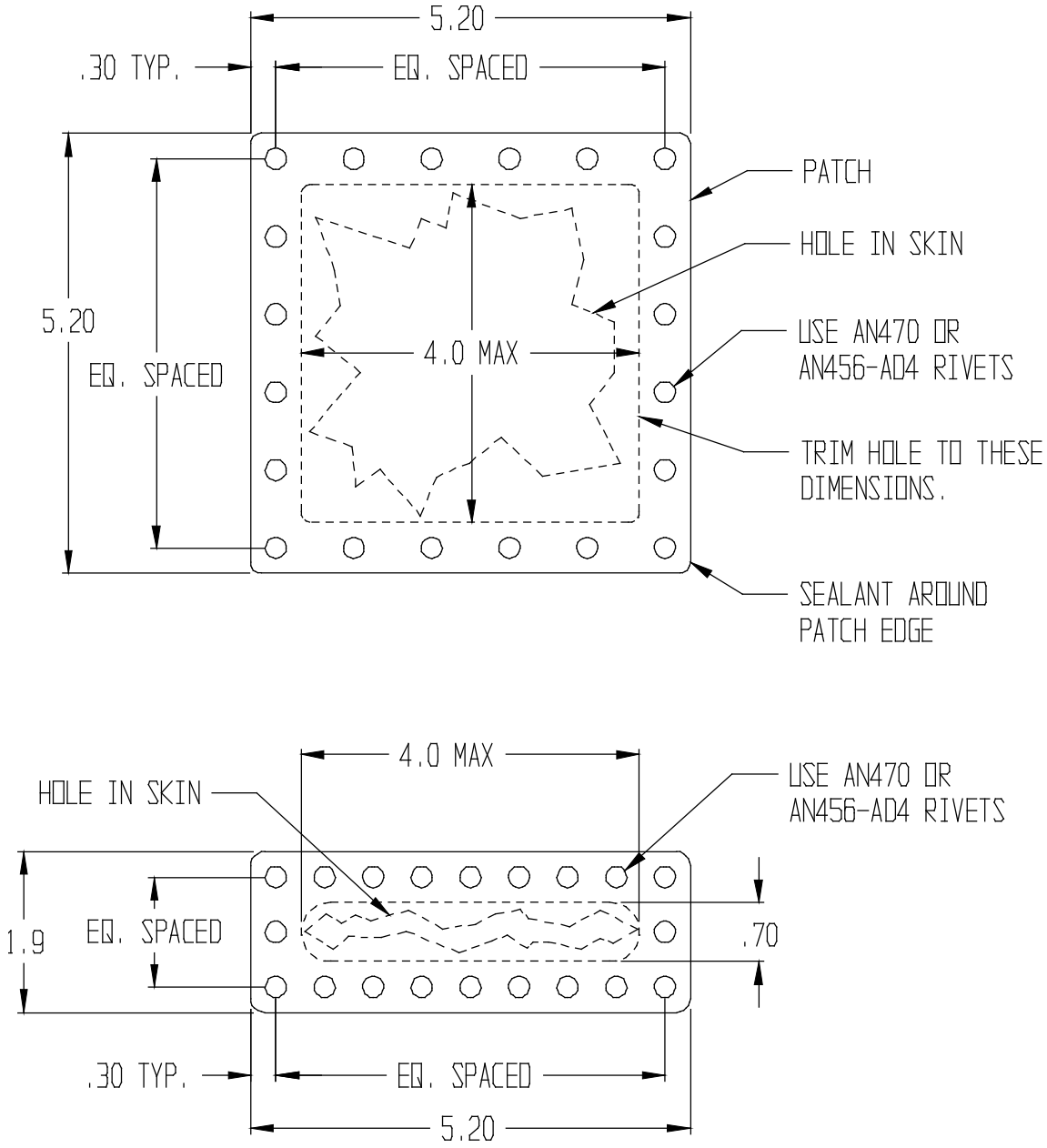
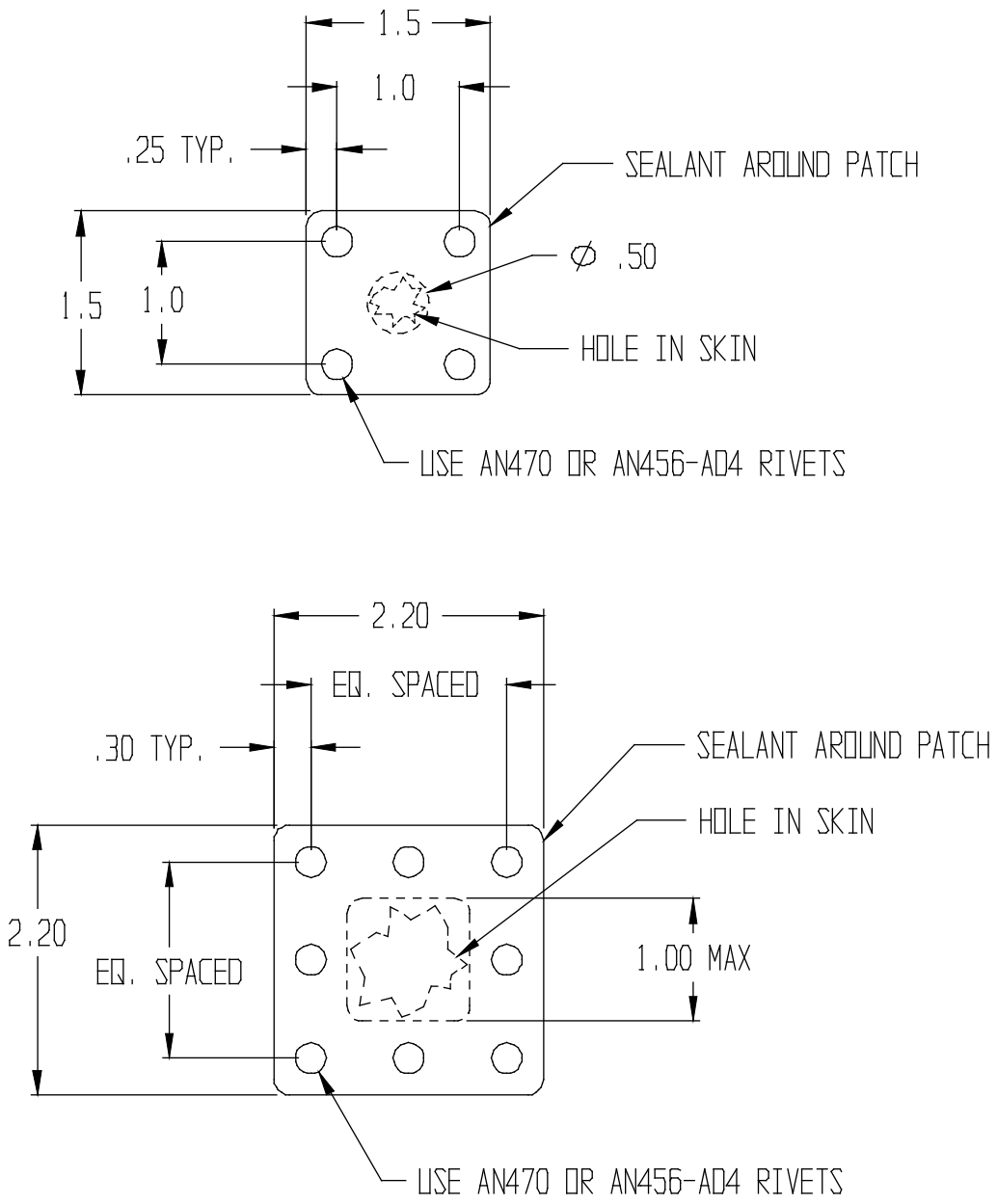
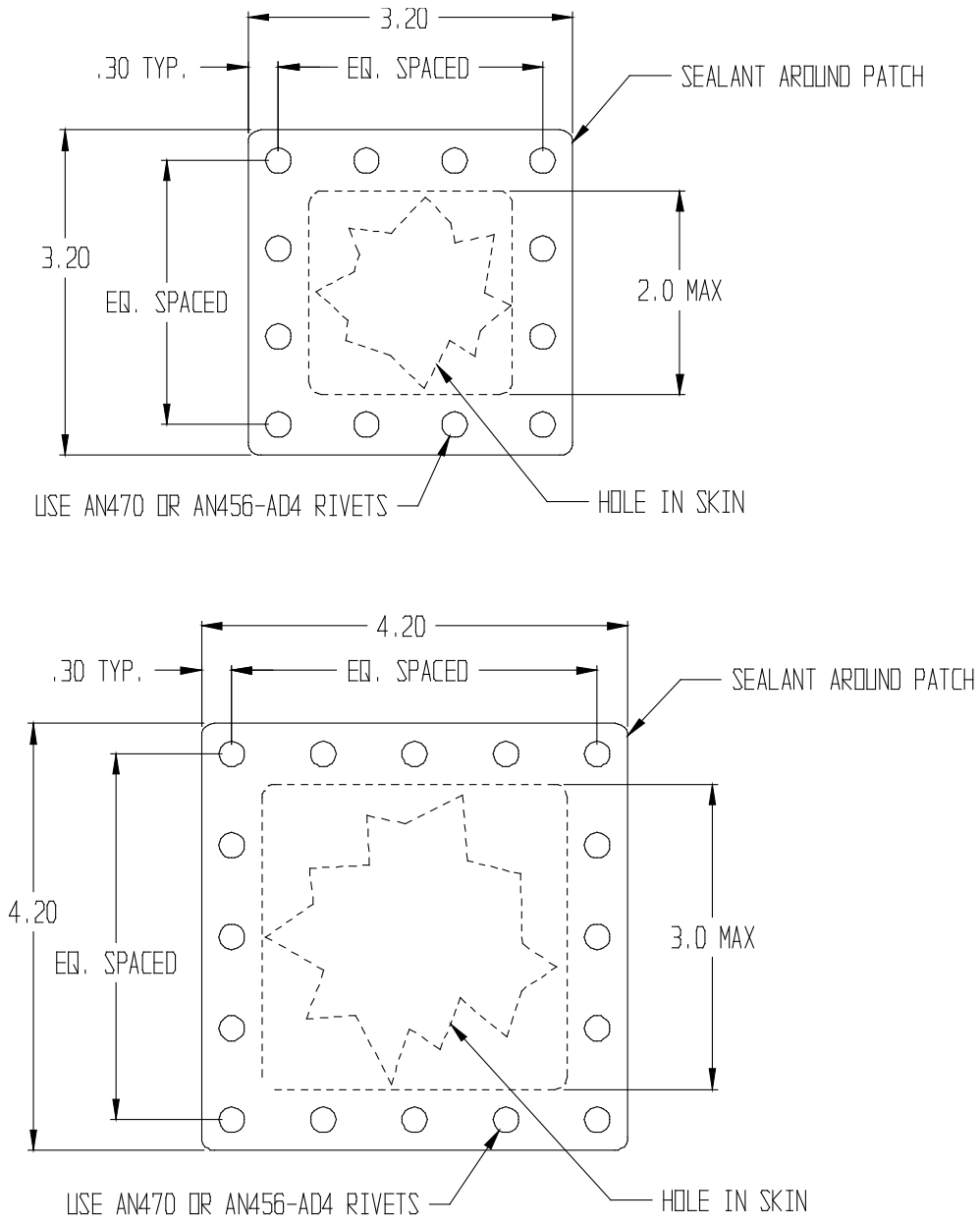


FIGURE 11-1. TYPICAL SKIN REPAIR



1. Trim hole as shown by dotted line.
2. Patch material to at least same thickness as original skin.
3. Prime all bare surfaces.
4. Seal between patch and skin.
5. Rivet in place.

FIGURE 11-2. TYPICAL SKIN REPAIR



1. Trim hole as shown by dotted line.
2. Patch material to at least same thickness as original skin.
3. Prime all bare surfaces.
4. Seal between patch and skin.
5. Rivet in place.

FIGURE 11-3. TYPICAL SKIN REPAIR

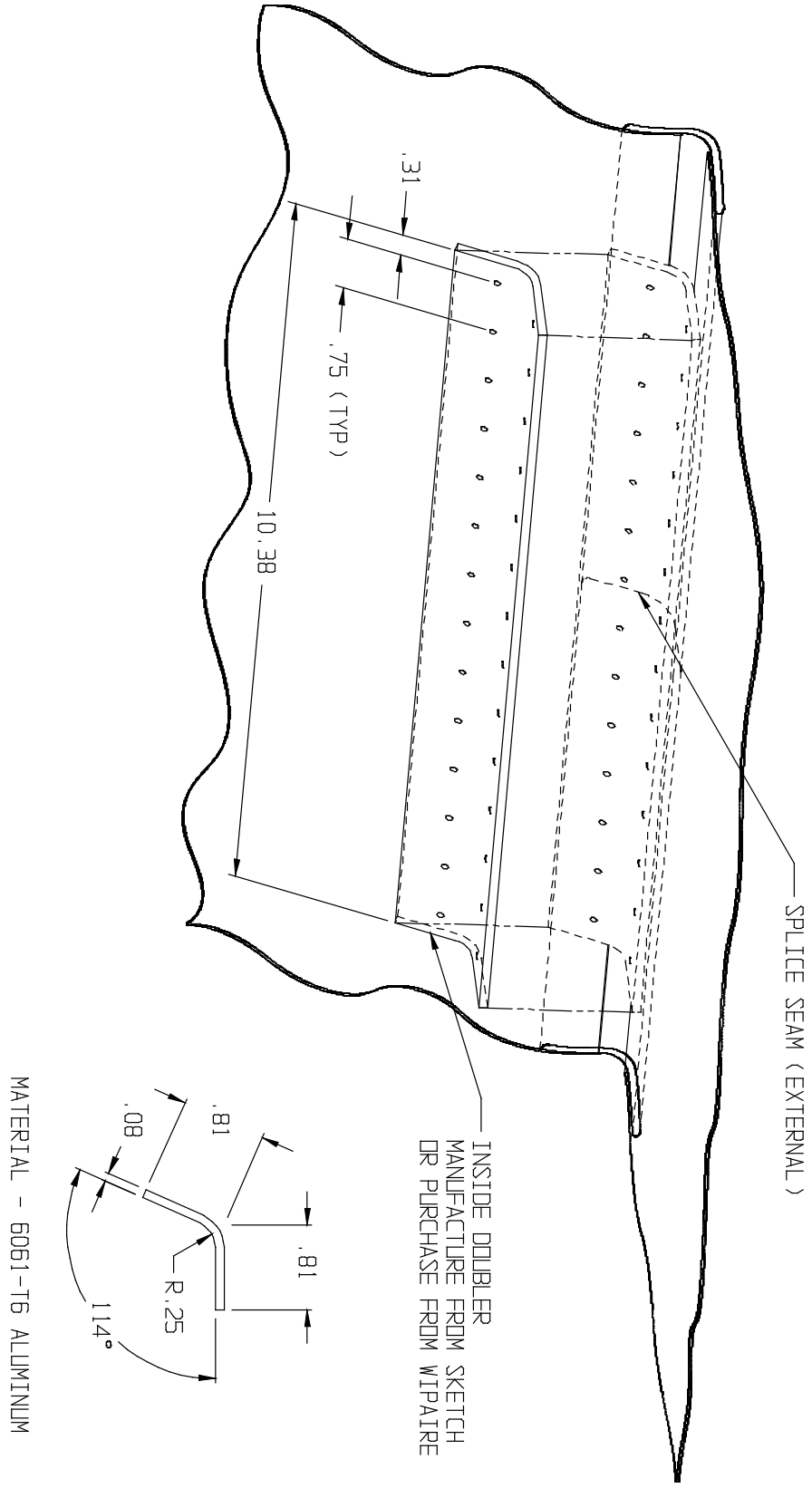


FIGURE 11-4. GUNWALL EXTRUSION REPAIR

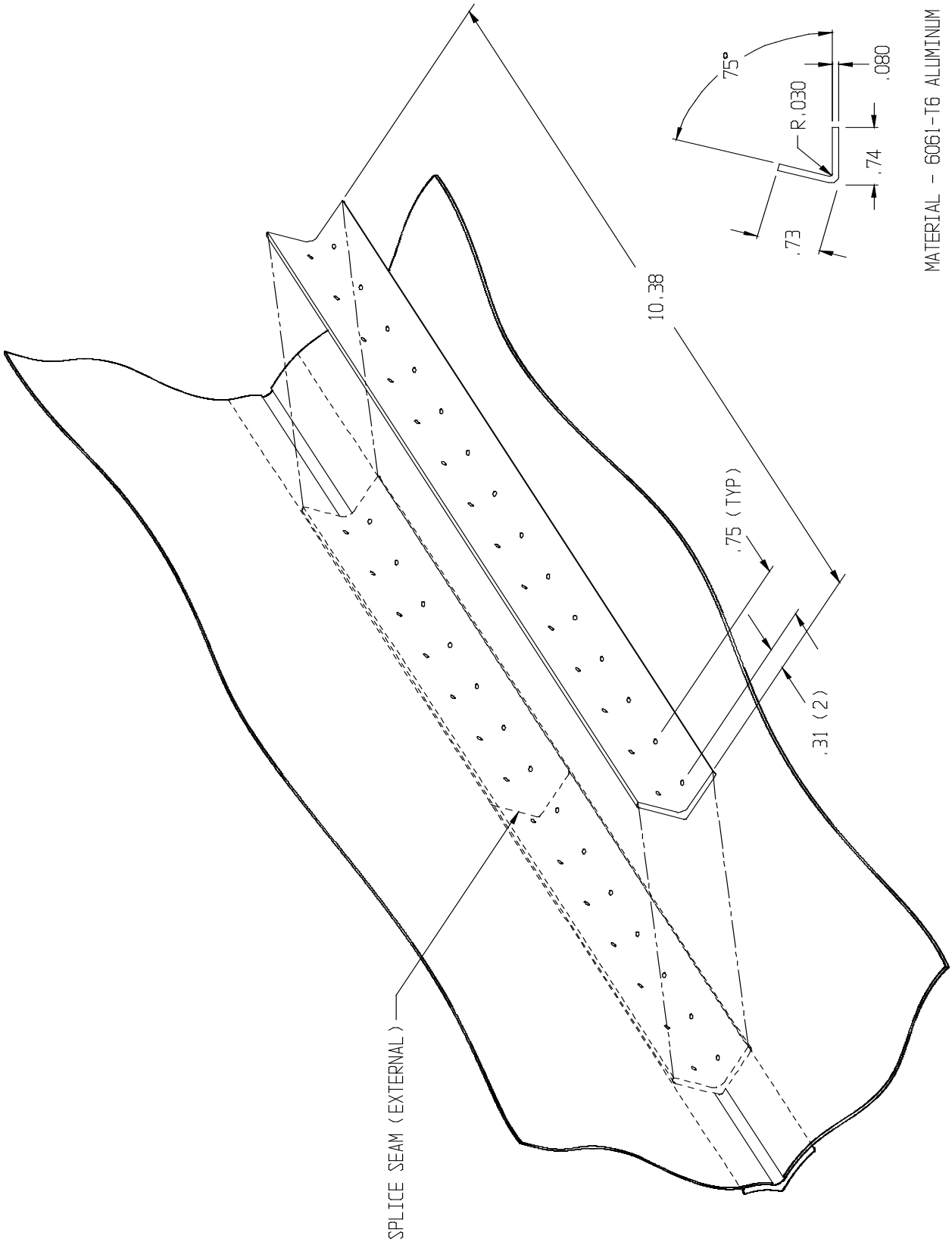


FIGURE 11-5. FORWARD CHINE EXTRUSION REPAIR

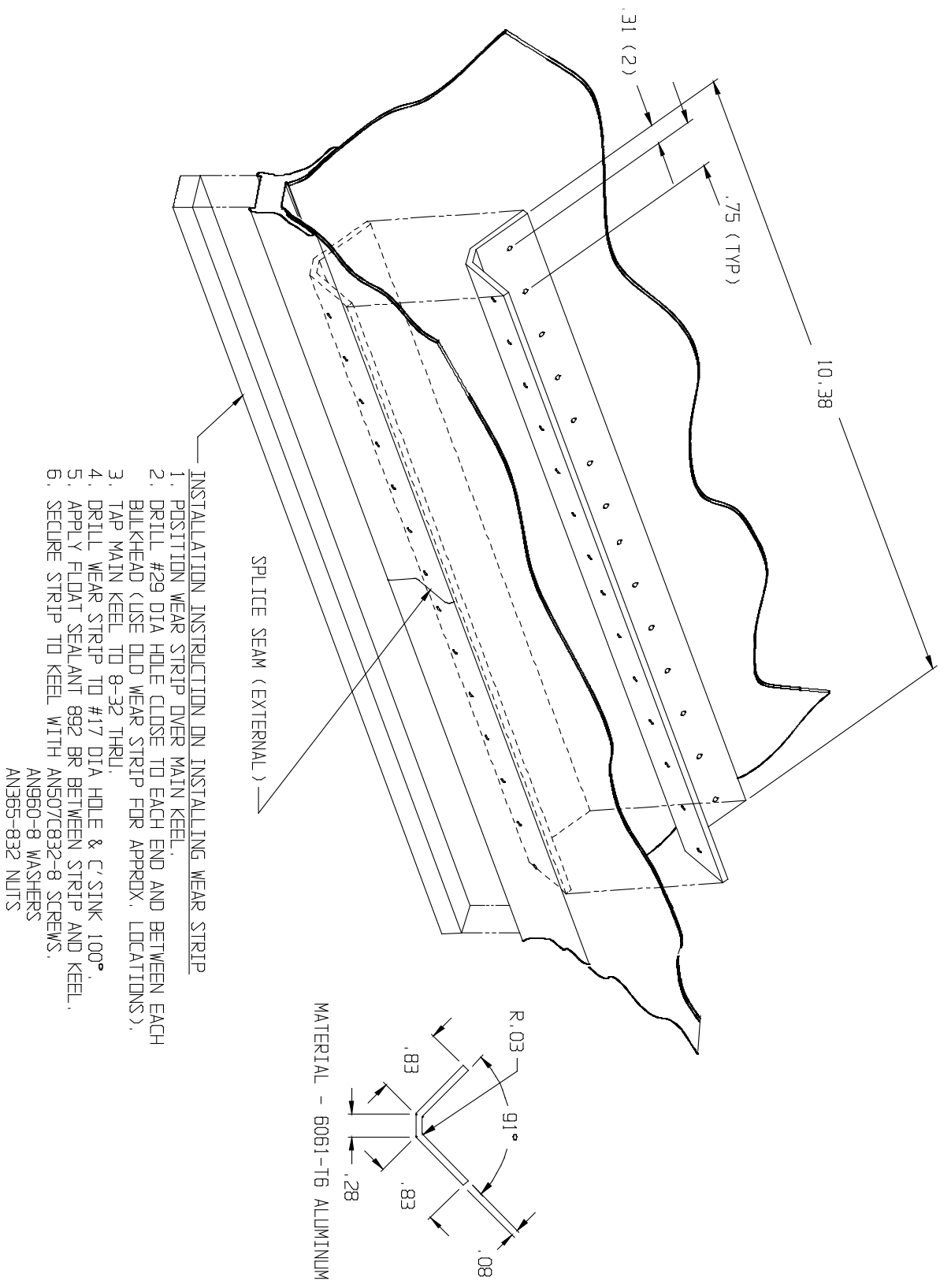


FIGURE 11-6. MAIN KEEL EXTRUSION REPAIR

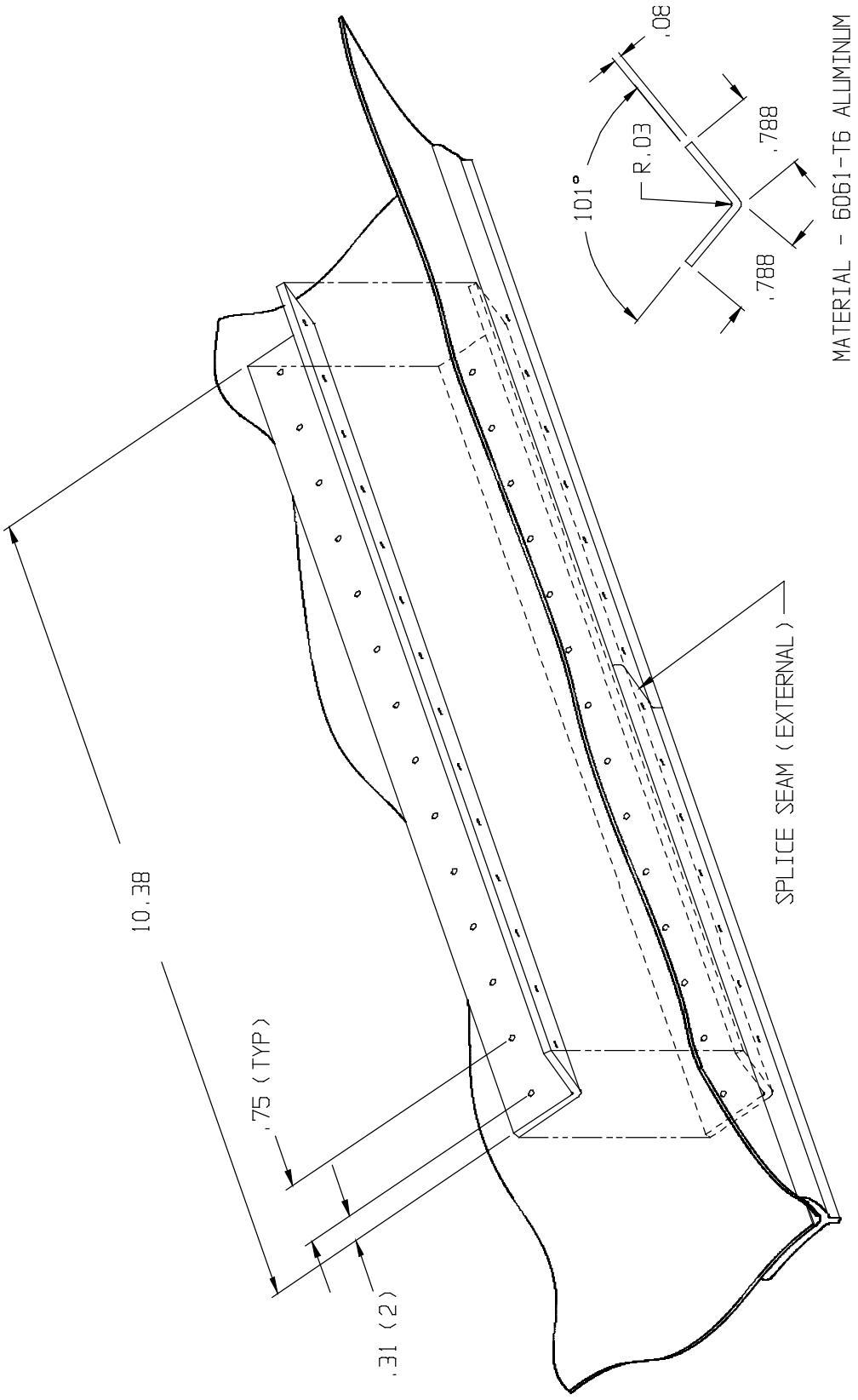


FIGURE 11-7. AFT KEEL EXTRUSION REPAIR

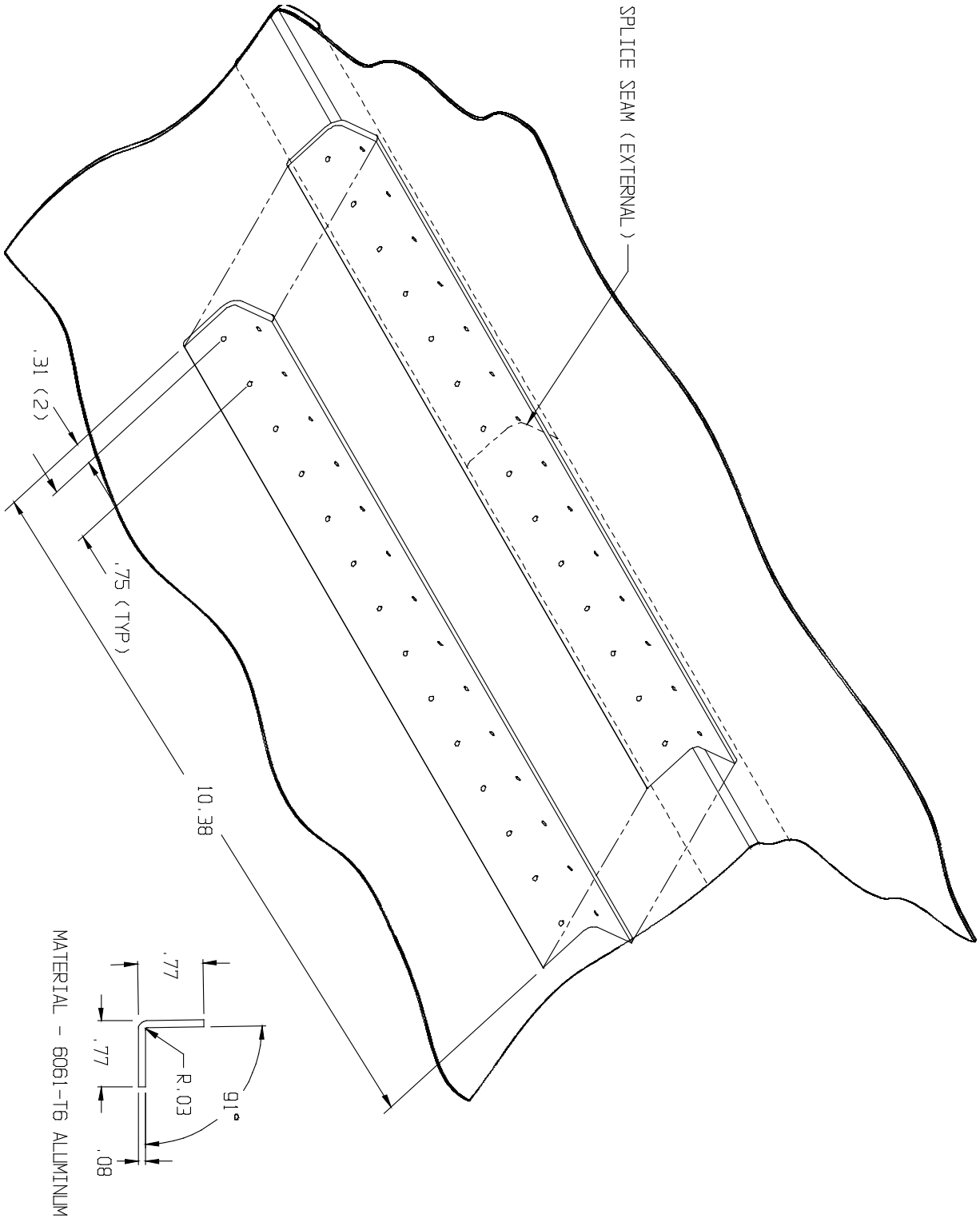


FIGURE 11-8. AFT CHINE EXTRUSION REPAIR

15.0 WEIGHT AND BALANCE

WEIGHING PROCEDURES FOR CESSNA-185 FLOATPLANE

Level the aircraft as per the weight and balance section of the landplane handbook.

Place scales under the nose and main gear wheels.
Place blocking under right and left main gear wheels to level aircraft.

Drop a plumb bob from the face of the firewall and mark the floor. This mark is the datum, station 0.0.

Measure the distance from 0.0 to each nose wheel. This is X_1 and X_2**.**
Measure the distance from 0.0 to each main wheel. This is Y_1 and Y_2**.**

If the floats are seaplane floats, the scales go under the step point in the rear and a point towards the front of the float. These distances are measured and become the same X and Y as for the amphibian.

Use this table for the calculations:

	Scale Reading **Weight**	**x**	Distance from 0.0 **Arm**	**=**	Weight x Arm **Moment**
Left Front	+		- X_1		-
Right Front	+		- X_2		-
Left Rear	+		+ Y_1		+
Right Rear	+		+ Y_2		+
Totals					

Notes:

1. Zero out or deduct tare weights at the Y arm.
2. If using overhead hoist and weight load cell, pick up aircraft at the front spar lifting rings. Arm of lifting rings at the aircraft station +33.58. Level the aircraft by placing weight on the float deck to balance. Record tare weight and arm

WEIGHING PROCEDURES FOR CESSNA-206 FLOATPLANE

Level the aircraft as per the weight and balance section of the landplane handbook.

Place scales under the nose and main gear wheels.
Place blocking under right and left main gear wheels to level aircraft.

Drop a plumb bob from the face of the firewall and mark the floor. This mark is the datum, station 0.0.

Measure the distance from 0.0 to each nose wheel. This is X_1 and X_2**.**
Measure the distance from 0.0 to each main wheel. This is Y_1 and Y_2**.**

If the floats are seaplane floats, the scales go under the step point in the rear and a point towards the front of the float. These distances are measured and become the same X and Y as for the amphibian.

Use this table for the calculations:

	Scale Reading **Weight**	x	Distance from 0.0 **Arm**	=	Weight x Arm **Moment**
Left Front	+		- X_1		-
Right Front	+		- X_2		-
Left Rear	+		+ Y_1		+
Right Rear	+		+ Y_2		+
Totals					

Notes:

1. Zero out or deduct tare weights at the Y arm.
2. If using overhead hoist and weight load cell, pick up aircraft at the front spar lifting rings. Arm of lifting rings at the aircraft station +33.58. Level the aircraft by placing weight on the float deck to balance. Record tare weight and arm.

WEIGHING PROCEDURES FOR CESSNA-182 FLOATPLANE

Level the aircraft as per the weight and balance section of the landplane handbook.

Place the scales under all 4 wheels. Place whatever blocking is required under the mail gears to level the aircraft.

Drop a plumb bob from the face of the firewall and mark the floor with a line. This datum line is 0.0 in the calculations.

Measure the distance from 0.0 to each nose wheel center. This is X_1 and X_2.
Measure the distance from 0.0 to each main wheel center. This is Y_1 and Y_2.

If the floats are seaplane floats, the scales go under the step point in the rear and a point towards the front of the float. These distances are measured and become the same X and Y as for the amphibian.

Use this table for the calculations:

	Scale Reading **Weight**		Distance from 0.0 **Arm**		Weight x Arm **Moment**
Left Front	+	-	X_1	=	-
Right Front	+	-	X_2	=	-
Left Rear	+	+	Y_1	=	+
Right Rear	+	+	Y_2	=	+

Totals

Notes:

1. Zero out or deduct tare weights at the Y arms.
2. If using overhead hoist and weight load cell, pick up aircraft at the front spar lifting rings. Arm of lifting rings at the aircraft station +33.58. Level the aircraft by placing weight on the float deck to balance. Record tare weight and arm

WEIGHING PROCEDURES FOR CESSNA-180 FLOATPLANE

Level the aircraft as per the weight and balance section of the landplane handbook or use the upper door sill.

Place the scales under all 4 wheels. Place whatever blocking is required under the mail gears to level the aircraft.

Drop a plumb bob from the face of the firewall and mark the floor with a line. This line is 0.0 in the calculations.

Measure the distance from 0.0 to each nose wheel center. This is X_1 and X_2.
Measure the distance from 0.0 to each main wheel center. This is Y_1 and Y_2.

If the floats are seaplane floats, the scales go under the step point in the rear and a point towards the front of the float. These distances are measured and become the same X and Y as for the amphibian.

Use this table for the calculations:

	Scale Reading **Weight**		Distance from 0.0 **Arm**		Weight x Arm **Moment**
Left Front	+	-	X_1	=	-
Right Front	+	-	X_2	=	-
Left Rear	+	+	Y_1	=	+
Right Rear	+	+	Y_2	=	+

Totals

Notes:

1. Zero out or deduct tare weights at the Y arms.
2. If using overhead hoist and weight load cell, pick up aircraft at the front spar lifting rings. Arm of lifting rings at the aircraft station +33.58. Level the aircraft by placing weight on the float deck to balance. Record tare weight and arm.

WEIGHING PROCEDURES FOR MAULE FLOATPLANE

Level the aircraft as per the weight and balance section of the landplane handbook.
Place the scales under all 4 wheels. Place whatever blocking is required under the mail gears to level the aircraft.

Drop a plumb bob from the wing leading edge and mark the floor with a line. This line is the datum, 0.0 in the calculations.

Measure the distance from 0.0 to each nose wheel center. This is X_1 and X_2.
Measure the distance from 0.0 to each main wheel center. This is Y_1 and Y_2.

If the floats are seaplane floats, the scales go under the step point in the rear and a point towards the front of the float. These distances are measured and become the same X and Y as for the amphibian.

Use this table for the calculations:

	Scale Reading **Weight**		Distance from 0.0 **Arm**		Weight x Arm **Moment**
Left Front	+	-	X_1	=	-
Right Front	+	-	X_2	=	-
Left Rear	+	+	Y_1	=	+
Right Rear	+	+	Y_2	=	+

Totals

Notes:

1. Zero out or deduct tare weights at the Y arm.
3. If using overhead hoist and weight load cell, pick up aircraft at the front spar lifting rings. Arm of lifting rings at the aircraft station +33.58. Level the aircraft by placing weight on the float deck to balance. Record tare weight and arms.

WEIGHING PROCEDURES FOR BUSHHAWK FLOATPLANE

Level the aircraft as per the weight and balance section of the landplane handbook or use the cabin floor laterally and longitudinally.

Place the scales under all 4 wheels. Place whatever blocking is required under the mail gears to level the aircraft.

The aircraft datum is the landing gear beam centerline. This mark is 0.0 in the calculations.

Measure the distance from 0.0 to each nose wheel center. This is X_1 and X_2.
Measure the distance from 0.0 to each main wheel center. This is Y_1 and Y_2.

If the floats are seaplane floats, the scales go under the step point in the rear and a point towards the front of the float. These distances are measured and become the same X and Y as for the amphibian.

Use this table for the calculations:

	Scale Reading **Weight**		Distance from 0.0 **Arm**		Weight x Arm **Moment**
		x		**=**	
Left Front	+	-	X_1		-
Right Front	+	-	X_2		-
Left Rear	+	+	Y_1		+
Right Rear	+	+	Y_2		+

Totals

Notes:

1. Zero out or deduct tare weights at the Y arm.
2. If using overhead hoist and weight load cell, pick up aircraft at the front spar lifting rings. Arm of lifting rings at the aircraft station +33.58. Level the aircraft by placing weight on the float deck to balance. Record tare weight and arms.