



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



**SERVICE MANUAL  
AND  
INSTRUCTIONS FOR  
CONTINUED AIRWORTHINESS  
FOR THE  
WIPLINE MODEL 2100/2350  
AMPHIBIOUS AND SEAPLANE FLOATS**

**Revision T**

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## LOG OF REVISIONS

Rev	Pages	Description	Date
A	12, 23	Added an inspection time limit and tolerances for the Nose Block Track wear.	4/18/2006
B	5-7, 38-40	Added table of contents and renumbered all pages. Added keel splice repair and figures.	6/30/20/06
C	17-19	New instructions to checklist and changed format to include mechanic signature and right and left float.	10/5/2006
D	28-30, 23, 46-53	Altered Checklist format with INSP. Sign-off. Added hydraulic actuator rebuild instructions to pg 23. Added weighing info.	5/1/2008
E	12, 13, 20, 27, 28	Sections 5.2 instructions, 6.1 instructions, 7.4 instructions.	6/25/2008
F	All	Reformat of entire document. Add green grease as approved grease.	4/12/2013
G	24, 25	Added Shear Torque chart, PR 1440 C Sealant and Tef-Gel. Removed Warranty Claim Form.	5/26/2015
H	11, 24, 25	Added Dow Corning DC4, Corrosion X, and Mobil Aviation Grease SHC 100 to approved product list. Modified torque limits section.	12/4/2015
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K	8	Added reference for Structural Repair Manual part number 1008274 in introduction.	5/1/2019
L	51	Added part numbers 21A01321-001 and 21S01321-004 for amphib and seaplane main keels in Keel Splice Repair section.	11/4/2019
M	11, 25, 35, 42-44	Added information about corrosion limits. Added note about STA-Lube. Added STA-Lube to Brake Caliper Grease. Removed inspection column on Maintenance Checklist.	8/3/2020
N	All	Reformatted manual in new software. Added sections 4.0 through 4.4. Removed Comet Industries GP-730A. Removed content in Chapter 10 and replaced with note about SRM. Created Chapter 12 for Inspection Checklist and Troubleshooting.	2/3/2021
P	All	Removed references to Figures 6-1 through 6-12 as figures were removed in prior revisions.	9/22/2021
R	29, 42	Updated Figure 5-5 title. Updated instructions in section 7.7 Main Wheels and Brakes.	1/24/2023
T	7	Added note to introduction about parts manuals.	7/11/2023

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## INTRODUCTION

This manual describes the general service and maintenance for the float, hull, gear systems, installation, and control parts. For service and repair not covered by this manual, contact Wipaire Customer Service.

When performing standard repairs for Wipline Aluminum Floats, please refer to the “Structural Repair Manual For Wipline Aluminum Floats” part number 1008274. It is available free of charge online at [www.wipaire.com](http://www.wipaire.com).

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

**Note:** For approved design data parts, reference 2100 float parts manuals 1003868 for Cessna 170, 1002164 for Cessna 172 & 175, 1002165 for Aviat Husky, 1002166 for Piper PA-12 & PA-18, and 1002167 for American Champion Scout. For 2350 float part manuals, reference 1002168 for Cessna 172 & 175, and 1002169 for Maule.

To contact Wipaire for technical support or parts sales, call, write or email:

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CHAPTER 1 GENERAL INFORMATION

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## 1.0 GENERAL

The model 2100/2350 seaplane or amphibious float is an all aluminum-constructed float with watertight compartments. The actual displacement in fresh water for each float is 2323 pounds (model 2100) and 2570 pounds (model 2350) buoyancy for the seaplane and 2185 pounds (model 2100) and 2432 pounds (model 2350) buoyancy for the amphibian. The amphibian float is geometrically the same as the seaplane except for the addition of landing gear and internal structure for the gear.

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

The main landing gear has a 5.00 x 5 6-ply tire and the nose landing gear has a 2.50 x 4 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 casting. 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.

CHAPTER 2 FLOAT HULL MAINTENANCE

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## 2.1 GENERAL

The float structure side and top skins are 6061-T6 and forward and aft bottom skins are 2024-T3 aluminum sheet and 6061-T6 extrusions. Skins are alodined and primed after being cleaned and acid-etched. Exterior is finished with an enamel 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 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.

## CHAPTER 3 CORROSION

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### 3.0 CORROSION

Reference the Wipaire Structural Repair Manual (SRM) for allowable corrosion/material loss limits. 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 paraketone. Under saltwater conditions, bolts should be removed at least once a year and grease reapplied to the shafts, heads and nuts.

## CHAPTER 4 FLOAT HANDLING, JACKING, AND AIRCRAFT TOWING

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## 4.0 TOWING

When towing the amphibian aircraft, 2 lugs are provided on the lower forward side of the nose spring.

On land, a rigid "V" frame can be fabricated to attach to these lugs for towing the aircraft with a tractor. Lake & Air Training and Pilot Shop has this tow bar available for purchase.



On water, a rope bridle arrangement can be used to tow the aircraft from the lugs described above.

## 4.1 HOISTING

Hoisting the aircraft can be performed using a lifting rig that attaches to the aircraft with lifting rings that are installed at the wing attach points. If the lifting rings are not installed, reference applicable aircraft maintenance/service manual for additional hoisting specifications. Lake & Air Training and Pilot Shop has this hoisting rig available for purchase. Contact Wipaire Customer Service for additional guidance in removal or installation of floats.

### CAUTION!

**Make sure nothing is under or above the airplane or floats when hoisting the aircraft**

1. Raise aircraft high enough to place float cradle under floats as shown in Figure 4-4.
2. Lower aircraft onto float cradle as shown in Figure 4-4.
3. Place fore and aft supports as shown in Figure 4-3 and Figure 4-4.

## 4.2 LEVELING

See applicable aircraft maintenance/service manual.

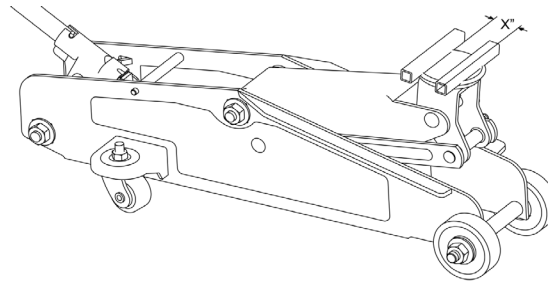
## 4.3 JACKING PROCEDURES

### CAUTION!

**Make sure nothing is under or above the airplane or floats when jacking the aircraft.**

1. Turn off fuel.
2. Place weighted bags above the nose gear (approximately 100 lbs. on each float to start, more may be added as needed).
3. Position 1 person at each fore and aft of each float, and 3 people at the jacking location of one float.
4. Modify jack saddle of a 3 ton minimum jack by welding as shown in Figure 4-1.





(X = WIDTH OF CRADLE)

**FIGURE 4-1 JACK CRADLE RECOMMENDED MODIFICATION**

**NOTE:** This is not required and Wipaire does not have the parts for modification. It is recommended a similar modification be performed to the jack saddle to prevent the slippage of the cradle.

1. Center cradle on saddle and position so cradle is as far aft on the main keel as possible without interfering with main gear as it decompresses as shown in Figure 4-2.

**NOTE:** If desired to prevent possible cosmetic damage to float, use material to separate cradle and float.



**FIGURE 4-2 JACKING LOCATION**

1. Jack one side at a time, taking care to check the balance of the aircraft and adding more weight to the front if needed.
2. Two people, both outboard, lift the fore and aft cradle stands up to the cradle as a 3rd person release the pressure slowly, allowing the cradle and stands to gently contact the ground.
3. Repeat previous procedure to the other float.

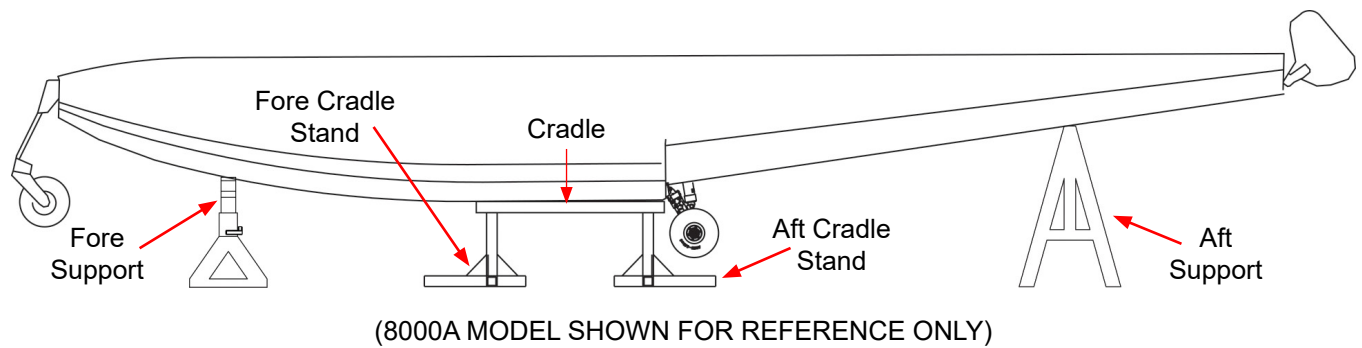
**NOTE:** A smaller jack may be needed to slightly lift the float into a high enough position for the main jack.

4. Secure floats with fore and aft supports as shown in Figure 4-3 and Figure 4-4.



**FIGURE 4-3 FLOAT SECURING LOCATIONS**





**FIGURE 4-4 FLOAT SECURING LOCATIONS OVERVIEW**

## 4.4 JACK REMOVAL

**Make sure nothing is under or above the airplane or floats when removing the jacks from the aircraft**

1. Turn off fuel.
2. Verify landing gear is in the down and locked position.
3. Verify weighted bags are still located above the nose gear.
4. Position 1 person at each fore and aft of each float, and 1 person at the jacking location of one float.
5. Remove all fore and aft supports as shown in Figure 4-3 and Figure 4-4.
6. Using modified jack saddle as shown in Figure 4-1, center jack saddle in center of cradle on 1 of the floats,
7. Lift aircraft to clear fore and aft cradle stands and remove fore and aft cradle stands of lifted float.
8. Slowly lower float to the ground, remove jack from under float, and remove cradle from jack saddle.
9. Repeat previous procedure to the other float.
10. Remove weighted bags from floats.

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## **CHAPTER 5 GEAR RETRACT SYSTEM OPERATION AND MAINTENANCE**

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## 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 face 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)

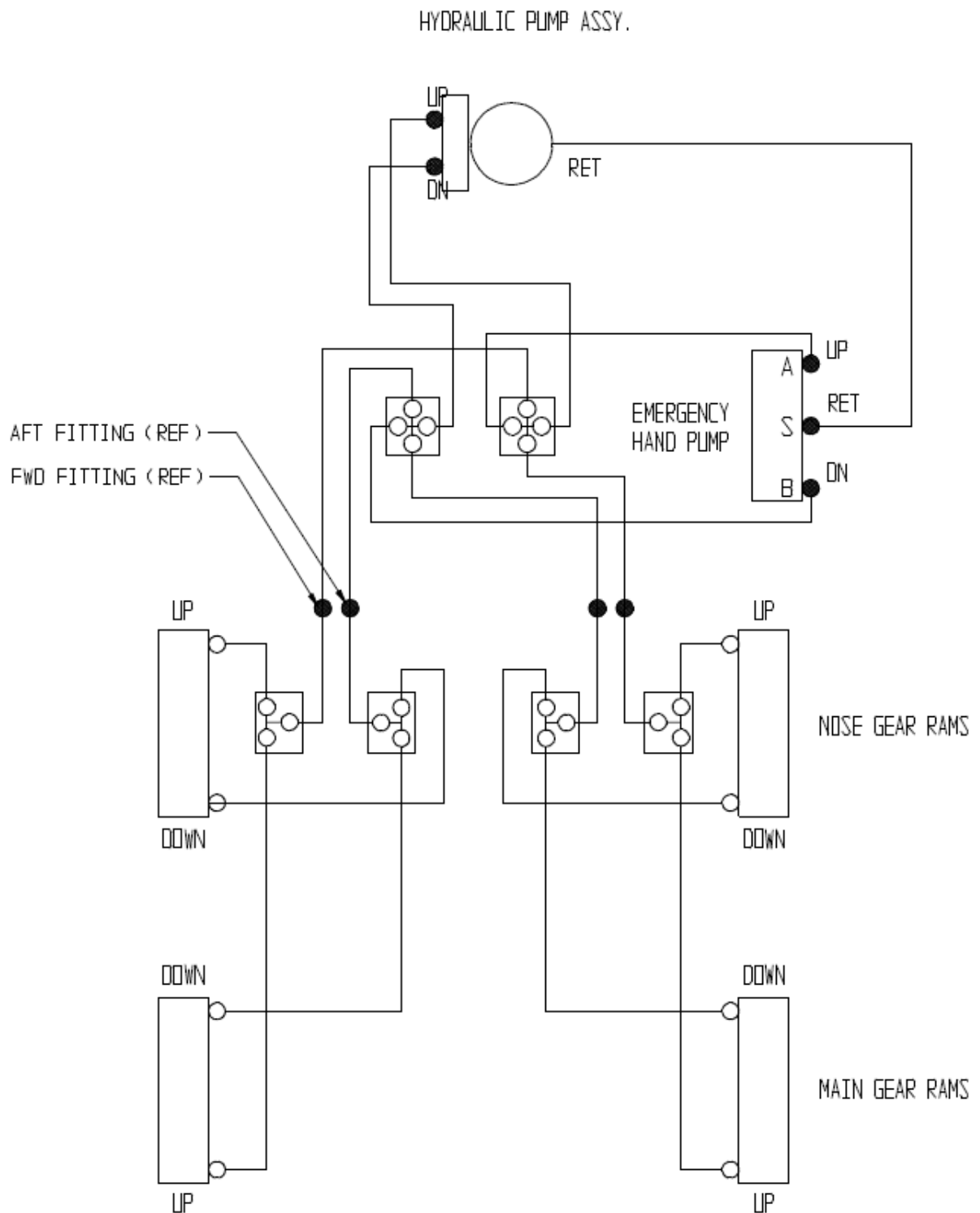
16. Gear Position – CONFIRM VISUALLY

**WARNING ! !**

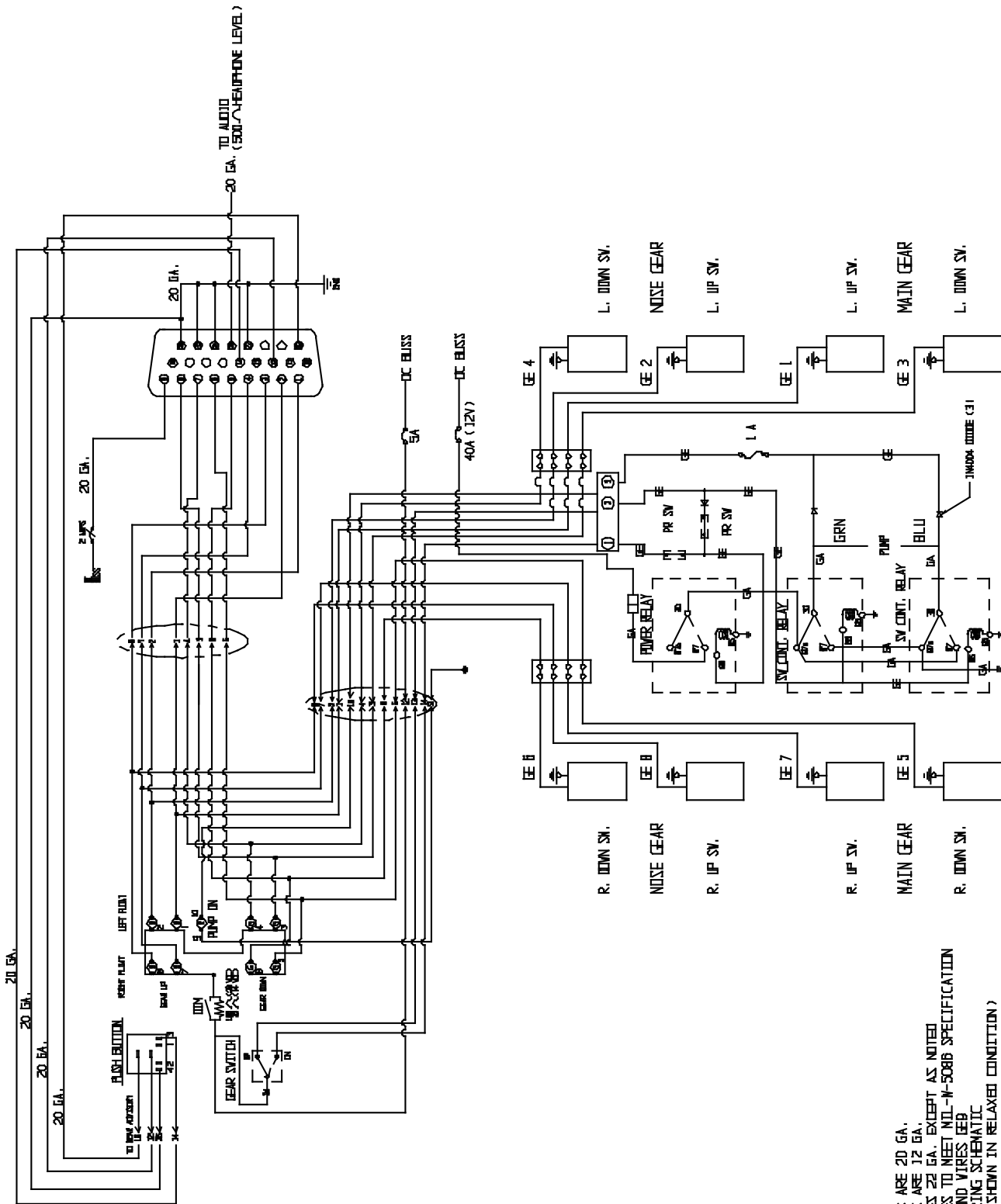
**Do not attempt to land on water unless all four wheels are fully retracted.**

17. Refer to Section 5.4 for more detailed troubleshooting.

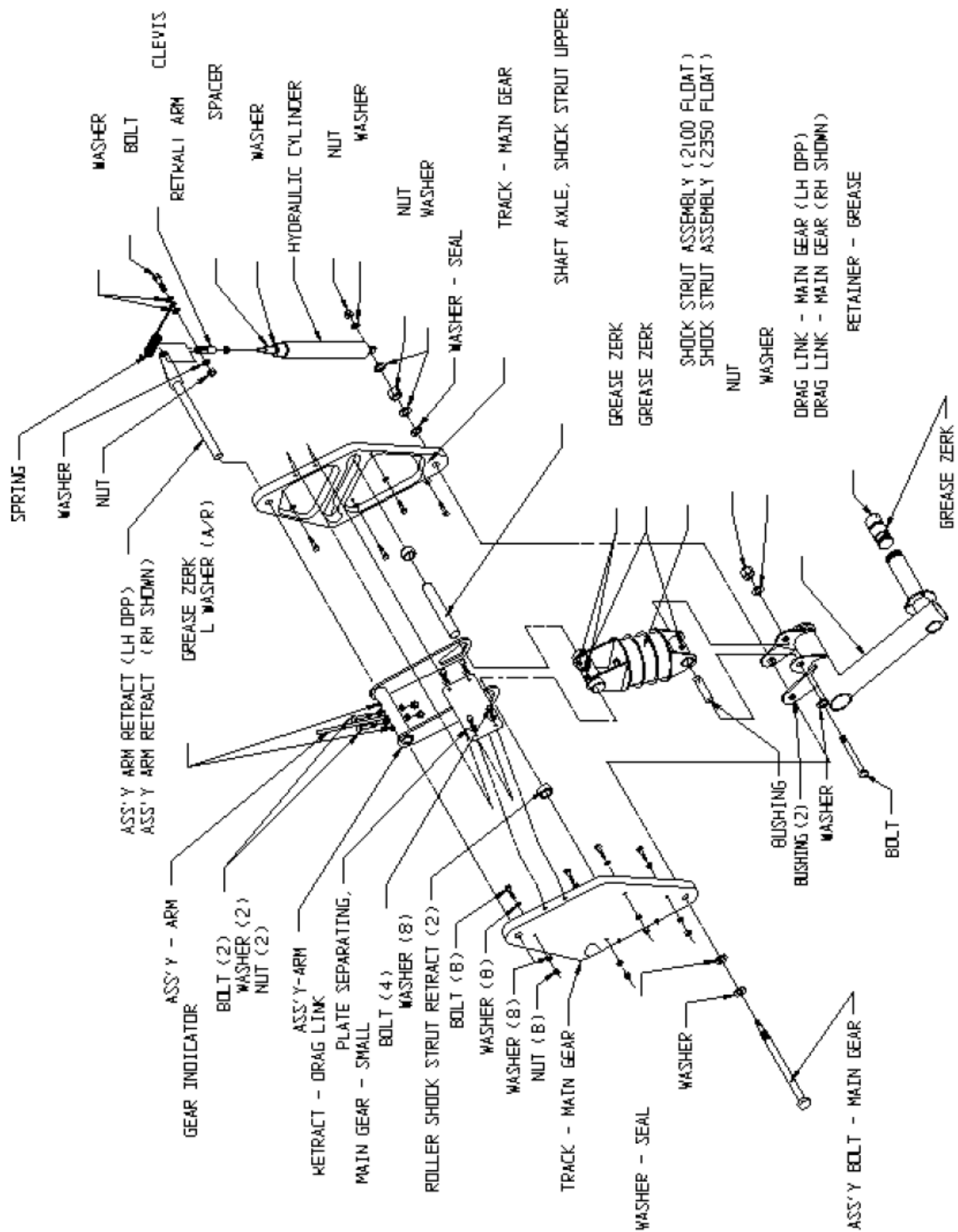




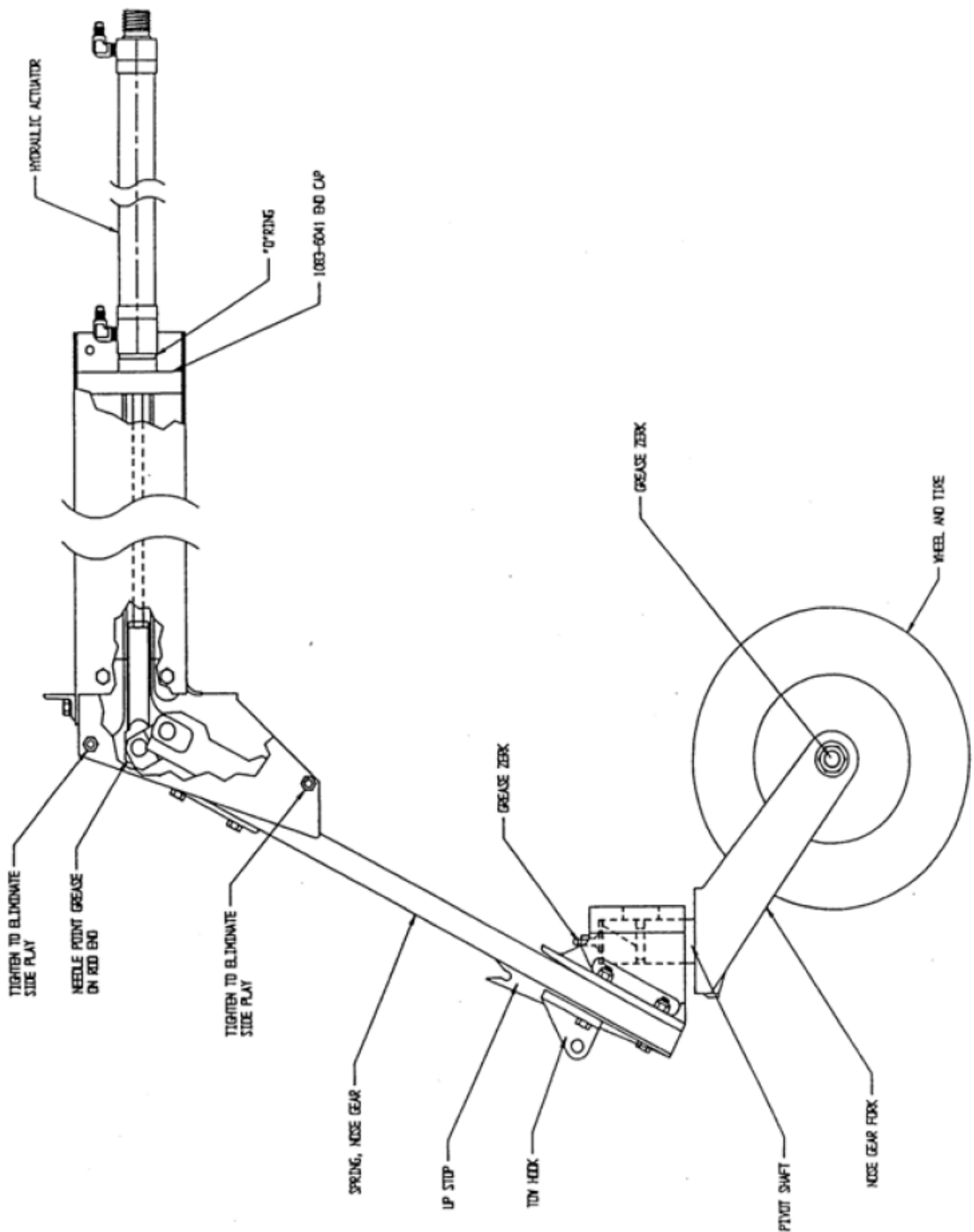
**FIGURE 5-1 SCHEMATIC HYDRAULIC SYSTEM**



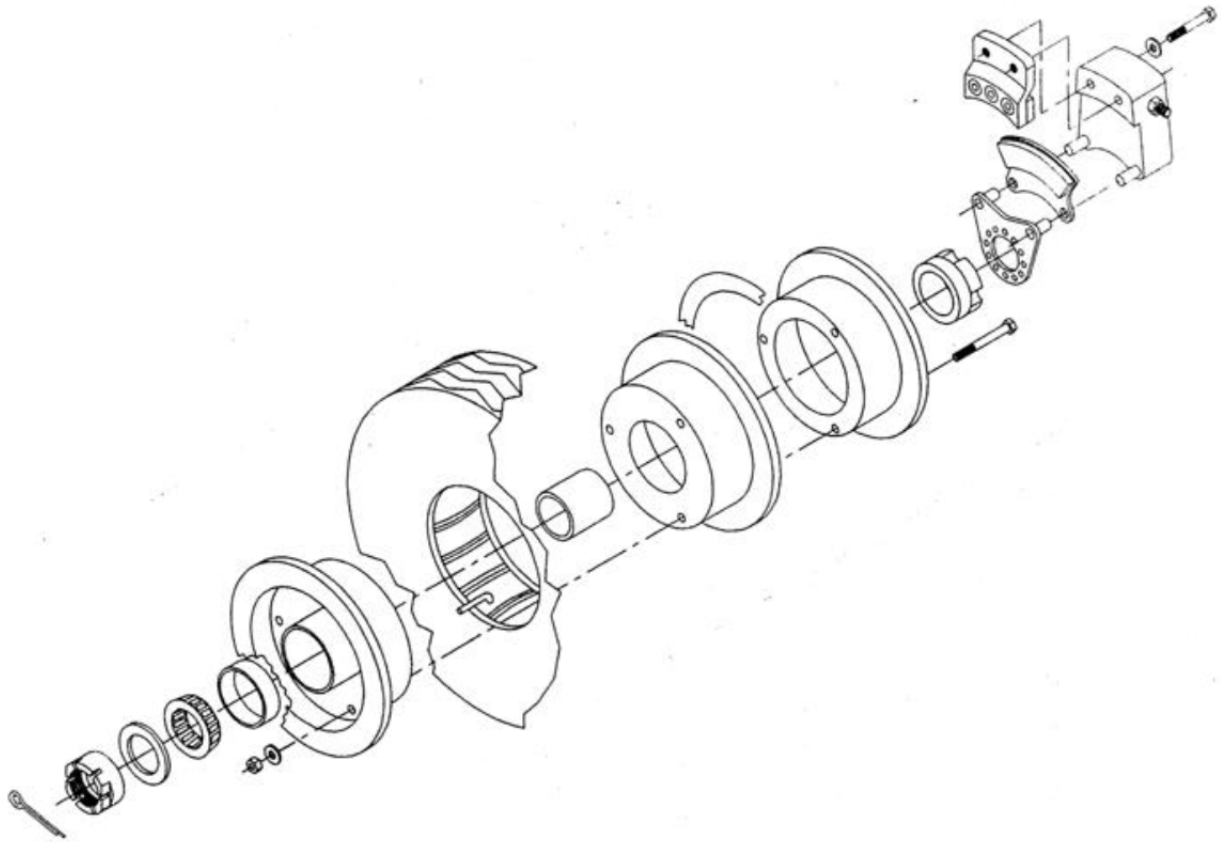
### FIGURE 5-2 SCHEMATIC ELECTRICAL SYSTEM



### FIGURE 5-3 MAIN GEAR ACTUATION



**FIGURE 5-4 NOSE GEAR RETRACTION SYSTEM**



**FIGURE 5-5 MAIN GEAR WHEEL ASSEMBLY (REFERENCE ONLY, ASSEMBLIES VARY)**

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**CHAPTER 6 GEAR OPERATION AND MAINTENANCE**

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## 6.1 DESCRIPTION AND OPERATION

Retraction and extension of the main and nose landing gear is affected by a hydraulic actuation system shown schematically in Figures 5-1, 5-1B, 5-1C, or 5-1D.

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

A pressure of between 500 psi and 700 psi in the down and up position is maintained in the supply line. When the pressure falls below 500 psi in the down position and 500 psi in the up position, the pressure switch activates the pump solenoid, providing power to the pump. When the pressure reaches 700 psi in the down position and 700 psi in the up 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 +100/-0 psi. The system also has an internal relief valve to protect against thermal expansion when line pressure exceeds 1100 +100/-0 psi.

See Section 8 for disassembly, service and troubleshooting.

The system requires hydraulic oil (Mil-H-5606 Red). 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 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.**

A cockpit-mounted switch accomplishes the selection of gear up or gear down. Each landing gear has an individual indicator light on the selector head 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 may be determined visually for position.

An emergency hand pump and selector valve 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. A reverse process affects 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 face of the actuator piston and the carriage is drawn along the tracks in the nose box as shown in Figure 8-1. Gear position light proximity switches are closed when the piston containing the magnetic material has reached either end of its travel.



## 6.2 SERVICE SCHEDULE

As coded in the Inspection Time Limits 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.

When servicing float hull and amphibian components, below is list of recommended lubricants and “protection” products. This lists products used by Wipaire during assembly of the floats.

There may be equivalent products that are just as satisfactory for protection. 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**

\*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 Corporation

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

### 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.

**Hydraulic Fluid**

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

**Brake Caliper Grease**

STA-Lube

**Electrical Insulating Compound**

Dow Corning 4 (DC4)

Dow Corning Corporation

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, safe tying, 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 Area**

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 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.

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## CHAPTER 7 MAIN GEAR REMOVAL AND OPERATION

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## 7.1 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.
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**

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.**

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) 1/4 inch diameter bolts on retract yoke.
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.
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.
26. For shock strut service, shock strut must be compressed before disassembly.

**NOTE: Shock strut maybe returned to Wipaire for service.**

27. Clean and inspect all parts.

## 7.2 INSTALLATION AND ASSEMBLY OF MAIN GEAR

1. Assemble track assembly before installing in float.
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.**

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.**

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.**

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.**

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) 1/4-inch diameter bolts in retract yoke to retract arm and tighten.

**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 reindexed at this time. Retract cylinder using aircraft pump to gear down.
26. From top access hold by hand in gear down position. Adjust rod end so its 1/16-inch down from retract armhole (1/16-inch cushion).
27. Use aircraft pump to gear up. Rod end should be 1/16-inch below hole in retract arm. (1/16-inch cushion).

**NOTE: Add spacer, washers under jam nut as necessary to achieve 1/16-inch cushion.**

28. Install upper cylinder bolt to attach cylinder rod end to retract arm, attach tension spring.
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.
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.

## 7.3 DISSASSEMBLY OF SHOCK STRUT

Shock strut requires no maintenance except if urethane blocks seem sloppy or spin around easily. To disassemble, remove cotter pin in top retaining pin and remove pin. If replacing urethane blocks, pressure must be applied by arbor press or vice to compress strut and install retaining pin. Assemble in reverse order of removal or Figure 5-3.

## 7.4 SERVICING HYDRAULIC ACTUATOR CYLINDERS (NOSE OR MAIN ACTUATORS)

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
<b>Nose:</b>	1002571	1002578
<b>Main:</b>	1002574	1002578

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 adjusted, add or remove shims under the end cap.

## 7.5 HAND PUMP OPERATION

For normal 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 stowable 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.

## 7.6 GEAR SELECTOR

The gear selector is an electrical switch which changes pump direction of the electro power pack for gear up or down. The red light on panel indicates the pump is running. 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"

### CAUTION!!

**Do not land on water with gear in extended position. Aircraft will nose over.**

## 7.7 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.

At brake installation, apply STA-Lube synthetic brake and caliper grease or equivalent to brake caliper pins.

Brake discs are to be maintained free of rust and the discs/linings checked for wear. Bleeding is carried out in the usual manner from the bottom up. Manufacturer-specific references are provided below:

**Grove:** Document 13046-11 - Instructions for Continued Airworthiness for Grove Main Wheel and Brake Assemblies with FAA-TSO Approval ([www.groveaircraft.com](http://www.groveaircraft.com))

**Parker/Cleveland:** Document AWBCMM0001-12 - Component Maintenance Manual for External Design Wheels and Brakes; Document AWBTSG0001-1 - Technician's Service Guide ([www.parker.com](http://www.parker.com))

Main wheel tires are standard 5.00 X 5, 6-ply Type III aircraft tires, inflated to 50 +/- 5 psi. (Refer to Figure 5-5).

## 7.8 VISUAL POSITION INDICATORS MAIN AND NOSE GEAR

In addition to position lights on selector head, gear position should be visually inspected before landing. Check nose gear positions by looking at gear to determine position. Main gear has a position indicator rod on the float top deck. Check position of both right and left rod before landing.

CHAPTER 8 NOSE GEAR

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8.7 NOSE BOX TRACK WEAR .....45

## 8.1 DESCRIPTION

The nose gear consists of scotchply fiberglass beams that are attached at the bottom to castoring blocks. A nylon thrust washer is located on top of the castoring pin. To disassemble, remove ¼ diameter pin on side of pivot block.

## 8.2 SERVICE SCHEDULE

The nose gear pivot assembly should be cleaned and greased every 25 hours or more frequently whenever in water for extended period of time.

The nose wheels contain grease zerks for the wheel bearings. They should be greased every 25 hours.

Nose tires are standard 2.50 x 4, 4-ply, inflated to 50 +/- 5 psi.

## 8.3 NOSE TROLLEY 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 8-1).
4. With hand pump, retract gear partially so rod end of cylinder is exposed in round access cover on nose box top.
5. Loosen jam nut and unscrew cylinder rod end from end of cylinder.
6. Nose gear assembly now may be removed from nose by pulling complete nose gear down from nose box.
7. Clean and inspect nose box tracks for wear.
8. Replace or inspect trolley axles and nylon blocks on nose gear trolley.
9. Assemble in reverse order of removal and 7.3.

## 8.4 REASSEMBLE NOSE TROLLEY 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 8-3).
2. Before inserting trolley in nose box, take care to position nylon slide blocks. Position as noted on Figure 8-1 and Figure 8-3.
3. Slide trolley into nose box and reconnect to cylinder (refer to Figure 8-1).
4. After above has been accomplished, the down lock has to be adjusted by lengthening or shortening cylinder rod end. Adjust so two (2) rollers on the trolley link axle sit in the nose fork down stop slots.
5. Set jam nut on cylinder rod end.
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 8-2) are horizontal through the nose fork. Adjust to 3/32 maximum side play. Do not over-tighten bolts to avoid gear binding.
7. Reinstall cover on Figure 8-1.
8. 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.

## 8.5 REMOVAL OF NOSE BOX 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 8-1.
4. Axle bolt is modified for grease service. A special anti-rotation washer is under bolt head to keep axle from turning.

## 8.6 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: This cylinder does not need to be removed to remove the nose box assembly from the float.**

**NOTE: Keep washers on cylinder for reinstallation.**

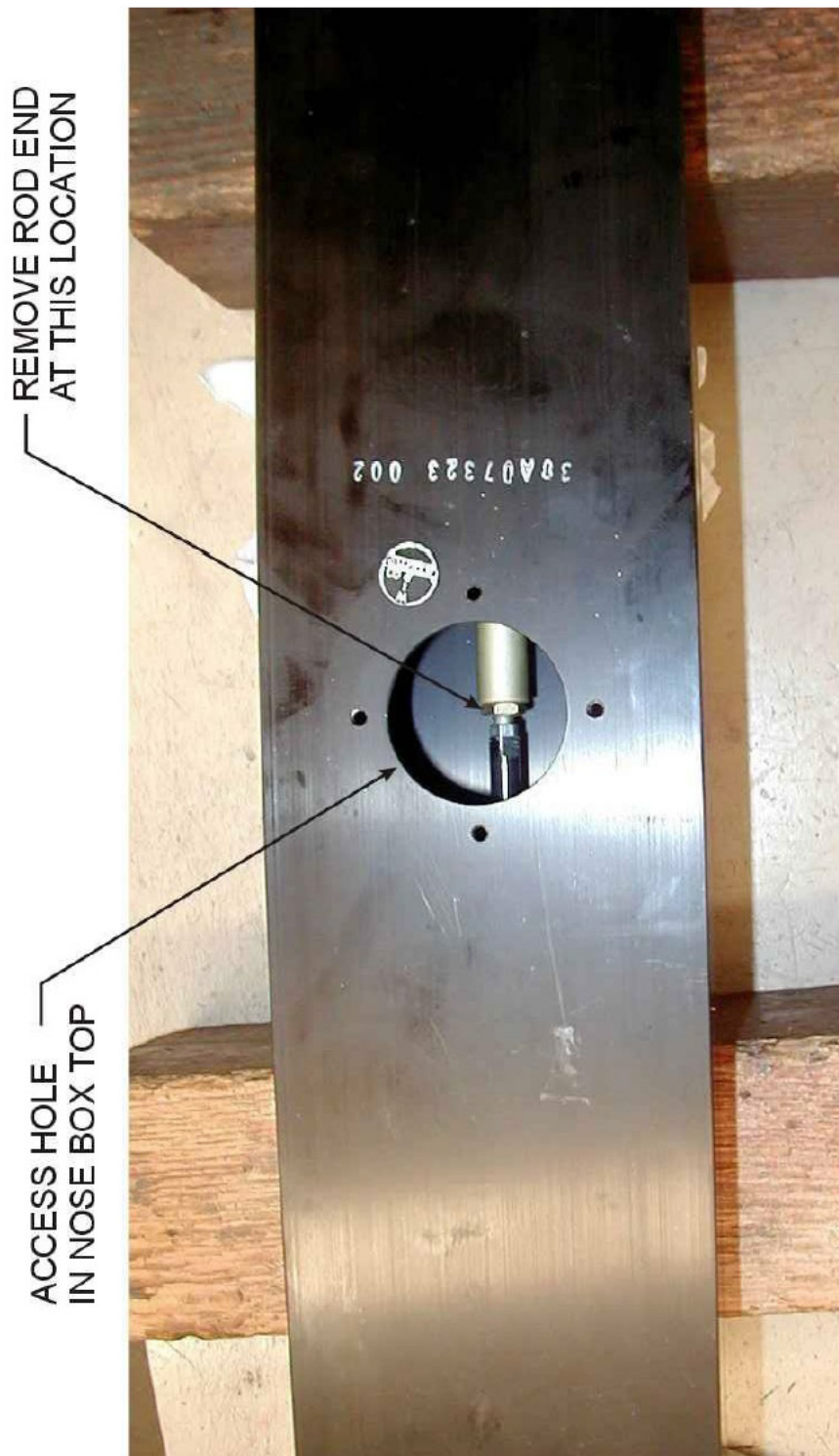
4. Remove two (2) bolts holding nose box to float bulkhead angles.
5. Slide entire nose box forward.

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

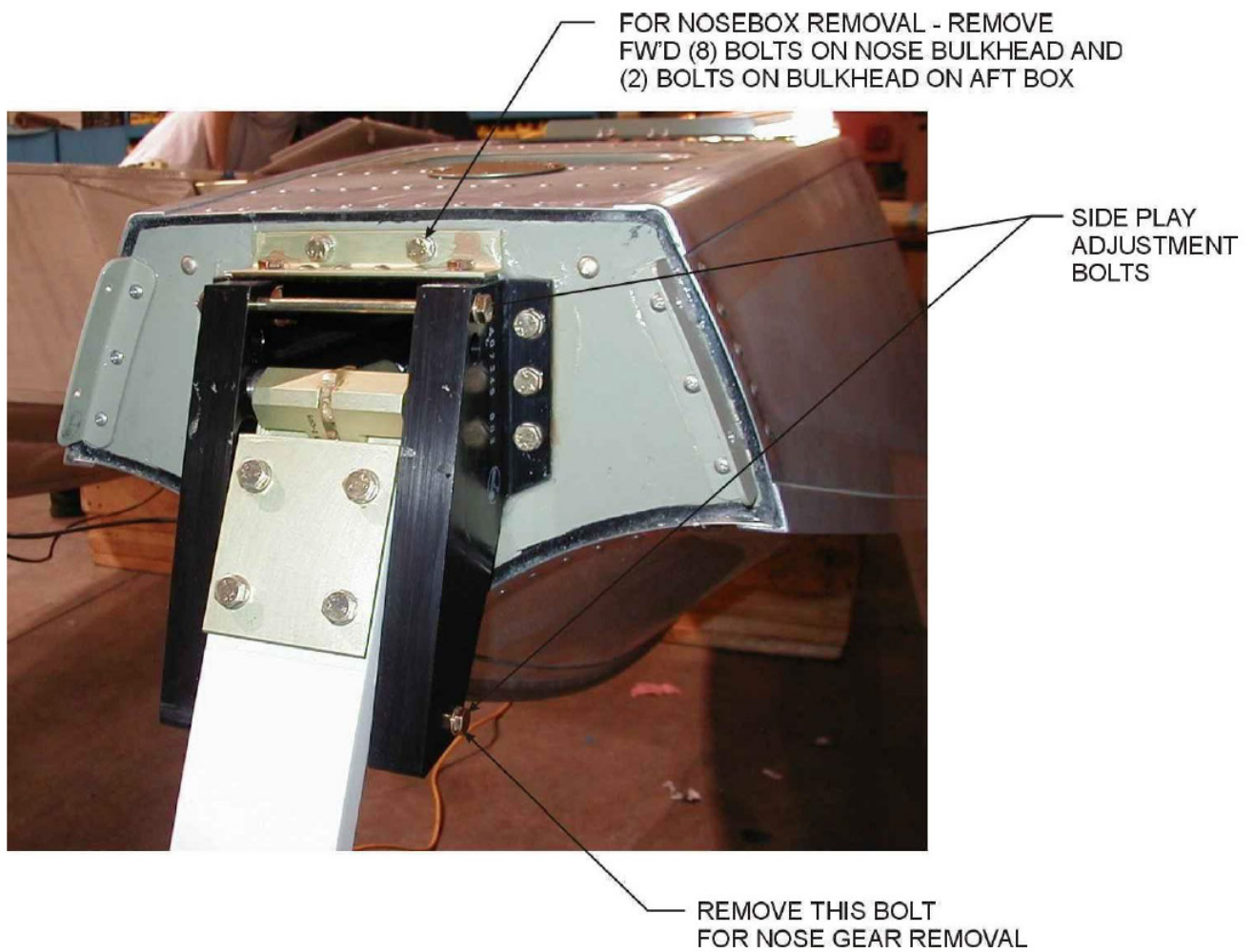
## 8.7 NOSE BOX TRACK WEAR

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 is to be done every 200 hours and is part of the maintenance checklist.

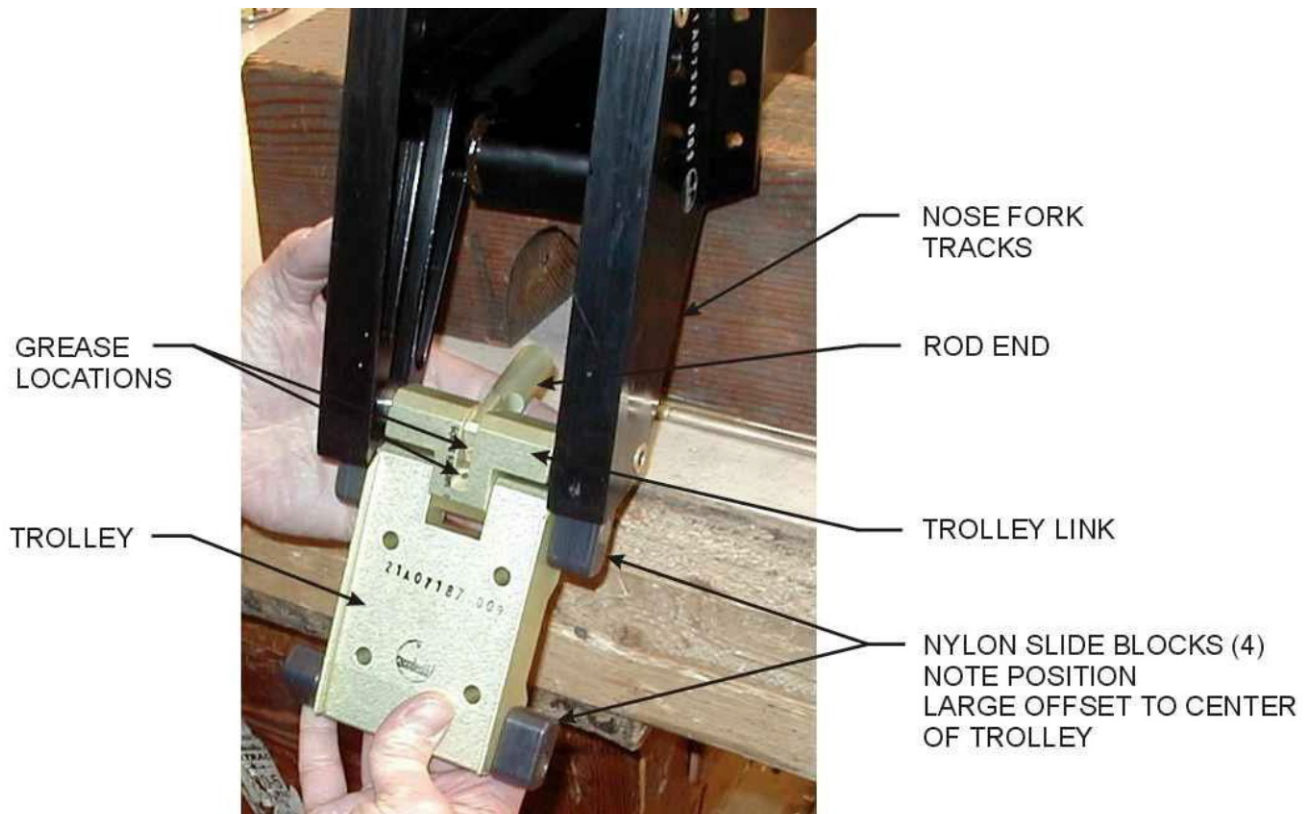
On the 2100 & 2350 Series Floats Gear Track P/N 21A07349 (-003 LT -004 RT)



**FIGURE 8-1 NOSE BOX ACCESS LOCATION**



**FIGURE 8-2 FRONT VIEW NOSE BOX**



**FIGURE 8-3 POSITION OF TROLLEY TO NOSE BOX**



# CHAPTER 9 WATER RUDDER RETRACTION AND STEERING SYSTEM

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## **9.0 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.

## **9.1 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.

## **9.2 SERVICE SCHEDULE**

Cables – inspect for fraying annually. Pulleys – inspect and lubricate annually.

## CHAPTER 10 REPAIRING FLOAT HULL SKINS & EXTRUSIONS

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## **10.0 REPAIRING FLOAT HULL SKINS & EXTRUSIONS**

For all float skin and extrusion structural repairs, refer to Wipaire's Structural Repair Manual (SRM) part number 1008274.

## CHAPTER 11 WEIGHT AND BALANCE

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## 11.0 WEIGHING PROCEDURES FOR PIPER PA-18 FLOATPLANE

Level aircraft per manufacturer's instructions.

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

Drop plumb bob from the wing leading edge to the floor and mark a line to establish station 0.0, the datum.

Measure the distance from 0.0 to each nose wheel center. This is X1 and X2.  
Measure the distance from 0.0 to each main wheel center. This is Y1 and Y2.

Use this table for the calculations:

	Scale Reading <b>Weight</b>	Distance from 0.0 <b>x Arm</b>	<b>=</b>	Weight x Arm <b>Moment</b>
Left Front	+	- X1	-	-
Right Front	+	- X2	-	-
Left Rear	+	+ Y1	+	+
Right Rear	+	+ Y2	+	+

Totals

### Notes:

1. Zero out or deduct tare weights at the Y arms.
2. If using an overhead hoist and load cell, pick up aircraft at the center line of the front spar wing butt fittings. The center line of the front spar is +9 inches from the datum.
3. Level the aircraft by placing weight on the float deck where it is needed. Record the tare weight and arm.

## 11.1 WEIGHING PROCEDURES FOR PIPER PA-12 FLOATPLANE

Level aircraft per manufacturer's instructions or drop a plumb bob from the machine screw at the door frame channels at rear upper corner of the door to a hole in the plate near the rear seat. When these meet the plane is level.

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

Drop plumb bob from the wing leading edge to floor and mark 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 X1 and X2.

Measure the distance from 0.0 to each main wheel center. This is Y1 and Y2.

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 <b>Weight</b>	Distance from 0.0 <b>x Arm</b>	<b>=</b>	Weight x Arm <b>Moment</b>
Left Front	+	- X1	-	
Right Front	+	- X2	-	
Left Rear	+	+ Y1	+	
Right Rear	+	+ Y2	+	

Totals

### Notes:

1. Zero out or deduct tare weights at the Y arms.
2. If using an overhead hoist and load cell, pick up aircraft at the center line of the front spar wing butt fittings. The center line of the front spar is +9 inches from the datum.
3. Level the aircraft by placing weight on the float deck where it is needed. Record the tare weight and arm.

## 11.2 WEIGHING PROCEDURES FOR CUB CRAFTERS CC-18 AND CC-19 FLOATPLANE

Level aircraft per manufacturer's instructions in Maintenance Manual TC10000AMM for CC-18 or XC10000AMM for CC-19.

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

Drop plumb bob from the wing leading edge and mark the floor parallel to the aircraft leading edge. Measure 60.0 inches forward of the leading edge line and mark a line. This 2nd line is the datum, 0.0.

Measure the distance from 0.0 to each nose wheel center. This is X1 and X2.  
Measure the distance from 0.0 to each main wheel center. This is Y1 and Y2.

Use this table for the calculations:

	Scale Reading <b>Weight</b>	<b>x</b>	Distance from 0.0 <b>Arm</b>	<b>=</b>	Weight x Arm <b>Moment</b>
Left Front	+		- X1		-
Right Front	+		- X2		-
Left Rear	+		+ Y1		+
Right Rear	+		+ Y2		+

Totals

### Notes:

1. Zero out or deduct tare weights at the Y arms.
2. If using an overhead hoist and load cell, pick up aircraft at the center line of the front spar wing butt fittings. The center line of the front spar is +9 inches from the wing leading edge.
3. Level the aircraft by placing weight on the float deck where it is needed. Record the tare weight and arm.



## 11.3 WEIGHING PROCEDURES FOR THE HUSKY A-1, A-1A, A-1B OR A-1C FLOATPLANE

Level aircraft per manufacturer's instructions or use the cabin door lower sill.

Place scales under the right and left main and nose gears.

Place blocking under the right and left main gears to level aircraft.

Drop plumb bob from the wing leading edge and mark the floor parallel to the aircraft leading edge. Measure 60.0 inches forward of the leading edge line and mark a line. This line is the datum, 0.0.

Measure the distance from 0.0 to each nose wheel center. This is X1 and X2.

Measure the distance from 0.0 to each main wheel center. This is Y1 and Y2.

Use this table for the calculations:

	Scale Reading <b>Weight</b>	<b>x</b>	Distance from 0.0 <b>Arm</b>	<b>=</b>	Weight x Arm <b>Moment</b>
Left Front	+		- X1		-
Right Front	+		- X2		-
Left Rear	+		+ Y1		+
Right Rear	+		+ Y2		+

Totals

### Notes:

1. Zero out or deduct tare weights at the Y arms.
2. If using an overhead hoist and load cell, pick up aircraft at the center line of the front spar wing butt fittings. The center line of the front spar is +9 inches from the datum.
3. Level the aircraft by placing weight on the float deck where it is needed. Record the tare weight and arm.

## 11.4 WEIGHING PROCEDURE FOR CESSNA 172 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 main gears to level the aircraft.

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

Measure the distance from 0.0 to each nose wheel center. This is X1 and X2.

Measure the distance from 0.0 to each main wheel center. This is Y1 and Y2.

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 <b>Weight</b>	Distance from 0.0 <b>x Arm</b>	<b>Weight x Arm = Moment</b>
Left Front	+	- X1	-
Right Front	+	- X2	-
Left Rear	+	+ Y1	+
Right Rear	+	+ Y2	+

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.

## 11.5 WEIGHING PROCEDURE FOR CESSNA 170 FLOATPLANE

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

Place the scales under all 4 wheels. Place whatever blocking is required under the main 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 X1 and X2.

Measure the distance from 0.0 to each main wheel center. This is Y1 and Y2.

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 <b>Weight</b>	Distance from 0.0 <b>x Arm</b>	Weight x Arm <b>= Moment</b>
Left Front	+	- X1	-
Right Front	+	- X2	-
Left Rear	+	+ Y1	+
Right Rear	+	+ Y2	+

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.

## 11.6 WEIGHING PROCEDURE FOR CESSNA 175 FLOATPLANE

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

Place the scales under all 4 wheels. Place whatever blocking is required under the main 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 X1 and X2.

Measure the distance from 0.0 to each main wheel center. This is Y1 and Y2.

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 <b>Weight</b>	Distance from 0.0 <b>x Arm</b>	Weight x Arm <b>= Moment</b>
Left Front	+	- X1	-
Right Front	+	- X2	-
Left Rear	+	+ Y1	+
Right Rear	+	+ Y2	+

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.

## 11.7 WEIGHING PROCEDURE FOR 8GCBC SCOUT FLOATPLANE

Level the aircraft as per the weight and balance section of the landplane handbook or draw a pencil mark on the top of the stub gear, 10 3/16" from the front face of the front lift strut attach lug. Drop a plumb bob from the wing leading edge and lift the tail until the plumb reaches this mark. Plane is now level.

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

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

Measure the distance from 0.0 to each nose wheel center. This is X1 and X2.

Measure the distance from 0.0 to each main wheel center. This is Y1 and Y2.

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 <b>Weight</b>	Distance from 0.0 <b>x Arm</b>	Weight x Arm <b>= Moment</b>
Left Front	+	- X1	-
Right Front	+	- X2	-
Left Rear	+	+ Y1	+
Right Rear	+	+ Y2	+

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 centerline of front spar wing butt fittings. The centerline of the front spar is +9.0" from the datum. Level the aircraft by placing weight on the float deck to balance. Record tare weight and arm.

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CHAPTER 12 INSPECTION CHECKLIST & TROUBLESHOOTING

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## 12.1 INSPECTION CHECKLIST

INSPECTION TIME LIMITS			HOURS				MECH INITIALS			
			25	50	100	200	RT	LT		
<b>General</b>	Placards					X				
<b>Hulls &amp; Struts</b>	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.	Remove inspection plates & baggage floor to inspect bulkhead flanges.			X					
	Pumper Tube Installation – inspect for condition, security, routing of hoses.					X				
<b>Water Rudder System</b>	Water Rudder Hinges – inspect freedom of rotation.		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.	Inspect attach bolt steering cables at water rudder pivot.			X					



INSPECTION TIME LIMITS		HOURS				MECH INITIALS			
		25	50	100	200	RT	LT		
	Water Rudder Blades and Posts – inspect for damage, security of attachment, corrosion, paint, rigging.			X					
<b>Electrical System</b>	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						
<b>Landing Gear Systems</b>	Main and Nose Gear Tracks – lubricate.	X							
	Nose Gear Box/Block Tracks measured at slide route for wear, .020 inches or less wear tolerance.				X				
	Nose Gear Pivot Blocks and Forks – inspect for condition, lubrication, corrosion, paint.	X							
	Nose and Main Wheel Bearing – grease Zerk fittings.	X							
	Hydraulic Fluid Level		X						

INSPECTION TIME LIMITS		HOURS				MECH INITIALS			
		25	50	100	200	RT	LT		
	Wheels and Tires – inspect for wear, pressure, condition.		X						
	Brake Assemblies – inspect for wear, corrosion, leakage.		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 contaminants and changed if necessary.			X					
	Main and Nose Gear Actuator, Assemblies – inspect for condition, lubrication, leakage, corrosion and cleanliness.			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 water.		X						
	Hydraulic Lines and Fittings – inspect for leaks, condition and security.				X				

[illegible]

## 12.2 TROUBLESHOOTING

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

### PROBABLE CAUSE

- a. Circuit breaker has failed.
- b. Pressure switch not pulling in at low cut in.
- c. Solenoid switch not pulling in.
- d. Faulty pump motor.
- e. Motor not properly grounded.

### 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.

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

### PROBABLE CAUSE

- 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. 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.
- b. 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.