

CHAPTER 5**LANDING GEAR**

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CHAPTER 5

LANDING GEAR

5.000 Landing Gear

5.001 Introduction

This section covers removal and reinstallation of the landing gear assembly, cross tubes, skid tubes, skid shoes, and ground handling wheel supports.

5.002 Description

A skid-type landing gear is used. Most hard landings will be absorbed elastically. However, in an extremely hard landing, the struts will hinge up and outward as the crosstube yields (becomes permanently bent) to absorb the impact. Slight crosstube yielding is acceptable. However, yielding which allows the tail skid to be within 34 inches (24 inches for R22 Standard or HP) of the ground when the helicopter is sitting empty on level pavement requires crosstube replacement.

Abrasion-resistant wear shoes are mounted on the bottom of the skids. These shoes should be inspected periodically, particularly if autorotation landings with ground contact have been performed. Have skid shoes replaced whenever the thinnest point in the wear area is less than 0.06 inches (1.5 mm).

R22 Mariners have permanently inflated utility floats mounted to skid tubes and incorporate aft skid extensions to support the floats.

5.100 Landing Gear Assembly

5.110 Landing Gear Removal

1. Remove forward cross tube cover.
2. Two methods may be used to hoist or jack helicopter for gear removal:
 - a. Place a foam-covered contour block under the vertical firewall (see Figure 5-1). Install skid stand under tail. Using a jack under each end of contour block, raise helicopter until skids clear ground by approximately 4 inches.

CAUTION

Contour block must be directly under vertical firewall to support weight of the helicopter.

- b. Hoist helicopter by main rotor hub per § 1.210 until skids clear ground by approximately 4 inches.
3. Disconnect A936 ground wire at aft-right elbow.
4. Remove four landing gear attach bolts. Slide landing gear clear of helicopter.

NOTE

When using method 2a, remove one skid tube to move landing gear clear of helicopter.

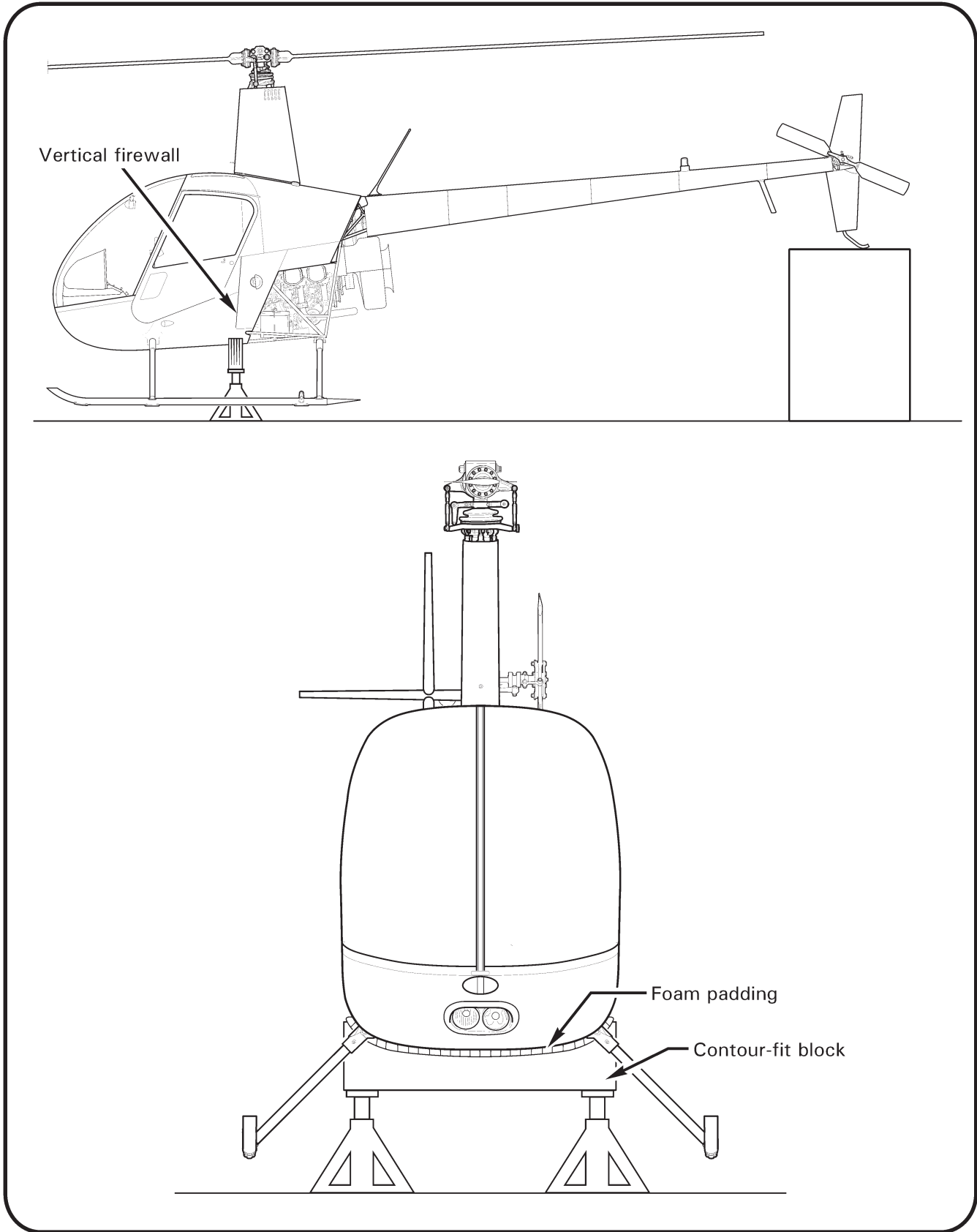


FIGURE 5-1 JACKING

5.120 Landing Gear Installation

1. Jack or hoist helicopter per Section 5.110.2.
2. Lift landing gear one side at a time, install mounting bolts, and torque per Section 1.320.

NOTE

All mounting bolts are installed from aft side. Ensure large-diameter washers are installed on both sides of strut elbows.

3. Attach ground wire to aft-right elbow lower bolt, torque per Section 1.320, and torque stripe per Figure 2-1.
4. Install palnuts, torque per Section 1.320, and torque stripe per Figure 2-1.

5.200 CROSS TUBES

5.210 Cross Tube Removal

Replace cross tube(s) if yielding results in tail skid-to-level ground dimension of less than 24 inches for a Standard or HP, 34 inches for an Alpha/Beta/Beta II, or 37 inches for a Mariner/Mariner II with float stabilizer installed (see Figures 1-1, 1-1A, & 1-1B).

NOTE

See Section 2.550 for hard landing inspection criteria.

1. Remove landing gear per Section 5.110.
2. Using a soft brass or aluminum drift, carefully tap out spacers securing cross tube in strut elbow and tap elbows off cross tube.
3. If difficulty is encountered removing strut elbow from cross tube:
 - a. Install spacer securing opposite strut elbow to cross tube.
 - b. Disconnect stuck strut assembly from skid tube.
 - c. Place a rigid support under cross tube.
 - d. Using strut on stuck elbow as handle, rotate elbow on cross tube to break paint bond.
 - e. Remove spacer installed in Step a. and remove cross tube.

<u>NUMBER</u>	<u>DESCRIPTION</u>
1	Washer
2	Washer
3	Journal
4	Bearing
5	Shackle Assembly - Right Forward
6	Washer
7	Washer
8	Bolt
9	Palnut
10	Nut
11	Washer
12	Spacer
13	Cross Tube
14	Strut Assembly
15	Rain Cap
16	Support Assembly - Aft
17	Support Assembly - Left Forward
18	Washer
19	Bolt
20	Washer
21	Bolt
22	Nut
23	Bolt
24	Nut
25	Washer
26	Washer

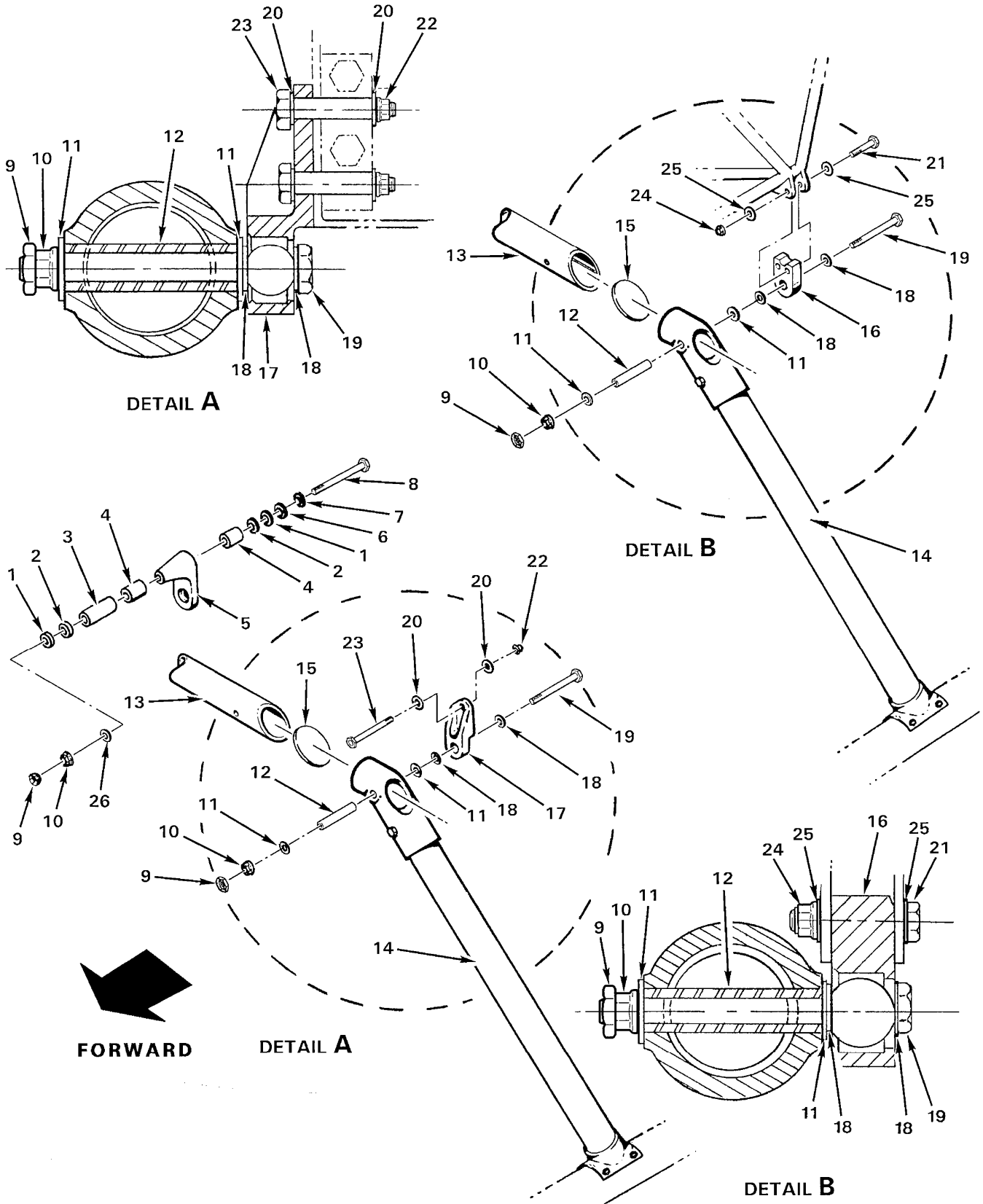


FIGURE 5-2 LANDING GEAR AND CROSS TUBE REMOVAL

5.220 Cross Tube Installation

1. Install cross tube in upper strut elbow. Place a wooden block against end of cross tube and tap as necessary to align mounting hole in cross tube with hole in elbow.
2. Install spacers by tapping them through elbows and cross tubes with a soft face hammer.

5.300 SKID TUBES

5.310 Skid Tube Removal

Replace skid tubes worn beyond 0.030-inch maximum depth (no length limit) longitudinal scratch, 0.030-inch maximum depth and 0.50-inch maximum length circumferential scratch, or 0.50-inch maximum width flat spot.

1. Raise one side of helicopter by jacking under one end of the aft cross tube, one inch inboard of fitting.
2. Remove 4 bolts at each landing gear strut. Remove skid tube.

5.320 Skid Tube Installation

Place skid tube under fore and aft gear struts and install attach bolts. Torque attach bolts per Section 1.320 (self-locking nutplate installed inside skid tube).

5.330 Skid Shoe Removal and Replacement

NOTE

Replace A667-5 and -6 skid shoes less than 0.050 inch thick.

1. Install ground handling wheels.
2. Push down on tail and place a wooden block approximately 4 inches ahead of intermediate skid shoes. (See Figure 5-3)
3. Remove bolts attaching forward and intermediate shoes to skids. Discard worn shoes and screws.
4. Install new skid shoes and screws. Torque screws per Section 1.320.

NOTE

Some early R22's had forward skid shoes attached using aluminum blind rivets (MS20600AD6-4). These can be removed by drilling off head and punching out shank.

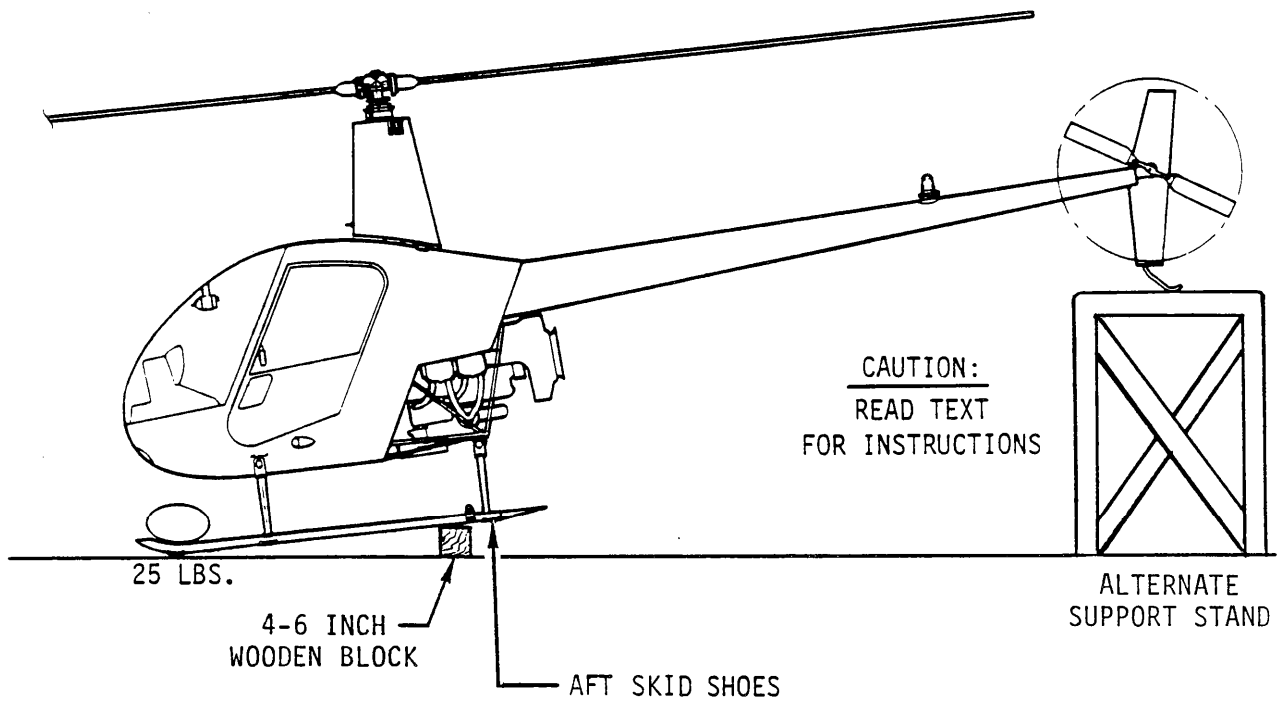
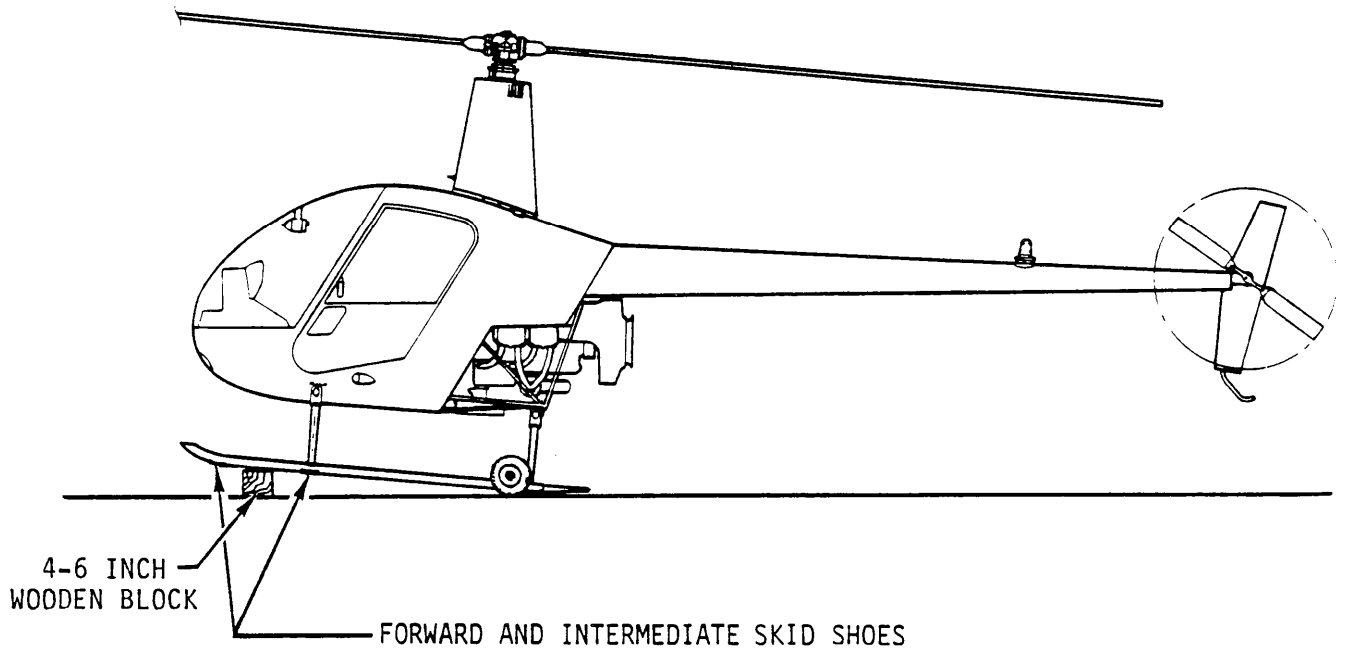


FIGURE 5-3 SKID SHOE REPLACEMENT

5.330 Removal and Replacement of Skid Shoes (cont'd)

- e) Tilt the helicopter until the tail skid touches the ground. Place a 4-6 inch wooden block as far aft as possible under each skid tube. (See Figure 5-3).
- f) Press down on each skid tip or lift on the tailcone until the helicopter tips forward. Ballast each skid at the tip with approximately 25 pounds, or place a support under the tail skid.
- g) Remove and replace the skid shoes per Steps c) and d) above.

5.340 Removal and Replacement of Ground Handling Wheel Support

- a) Remove the two attach bolts and pull the support free of the skid.
- b) Align the mounting holes of the support with the holes in skid tube. Install the mounting bolts and torque to 50 in.-lb plus nut drag.

5.400 PREVENTIVE MAINTENANCE

1. Ensure drain holes in bottoms of skid tubes are not plugged (two per skid), located just aft of forward two skid shoes.
2. Touch up skid tubes, cross tubes and struts to prevent corrosion. Use paints and primers obtained from approved materials list per Section 1.400.
3. Daily or preflight inspection of skid shoes (Rotorcraft heavy usage).
4. Install lost or loose raincaps with structural adhesive per the manufacturer's instructions. (See approved materials list, Section 1.400).

5.500 FLOAT SHIP LANDING GEAR

The Robinson R22 Mariner Helicopter may be flown with or without the float landing gear installed. If the floats are to be removed from the helicopter, it is necessary for a complete standard landing gear to be installed. Do not remove the float tubes from the landing gear skid tubes.

CAUTION

Float landing gear can only be installed on R22 Mariner helicopters. Mariner helicopters have a "M" suffix after the helicopter serial number stamped on the aircraft data plate.

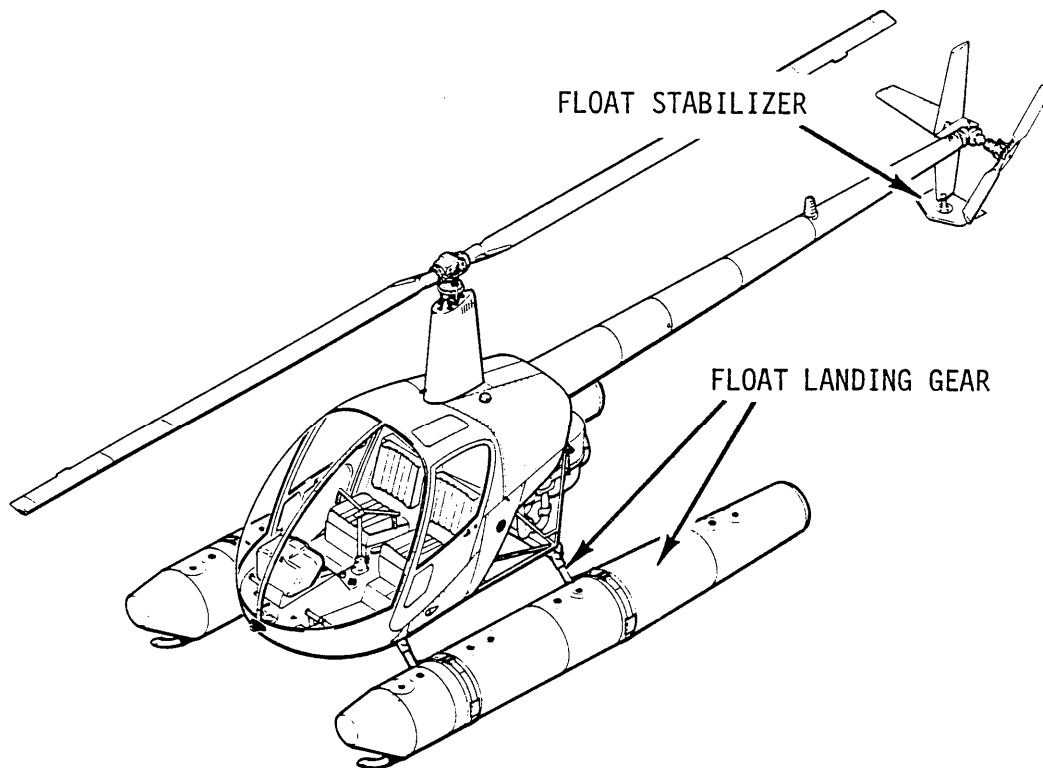
5.510 Float Landing Gear Removal

- a) Remove the complete float landing gear. Refer to Section 5.110 for landing gear removal.
- b) Install a complete standard landing gear. Refer to 5.120 for landing gear installation.
- c) Remove the float stabilizer on the lower vertical fin of the empennage. Install the standard skid tube and torque the bolts to 30 inch-pounds.
- d) Calculate the Weight and Balance using the following information and enter it into the aircraft records.

Part No.	Description	Weight (lb)	CG Arm (in)	Moment (in-lb)
A034-1	Landing Gear with Floats	+62.9	94.6	+5950
A014-1	Landing Gear without Floats	-32.5	85.5	-2779
A970 & A971	Float Stabilizer on Lower Tail Fin	+ 0.6	270	+ 162
A470-1	Standard Tail Skid	- 0.2	272.5	- 54

5.510 Float Landing Gear Removal (cont'd)

- e) Review the flight limitations of the R22 Mariner without floats installed in the Mariner Supplement 9-4 of the Pilot's Operating Handbook.
- f) Complete a Pre-flight Inspection and Run-up per the Pilot's Operating Handbook.
- g) Complete a Flight Check per Section 2.220.
- h) Check and adjust the autorotation RPM per Section 10.250 (It will usually require lengthening the pitch links approximately $\frac{1}{2}$ to 1 full turn).

5.520 Float Gear Installation

- a) Remove the standard landing gear. Refer to Section 5.110 for landing gear removal.
- b) Install the complete float landing gear with float tubes attached to the skid tubes. Refer to Section 5.120 for landing gear installation. Use existing landing gear hardware to install the float landing gear except for the palnuts which must be replaced.
- c) Remove the lower vertical fin skid tube on the emmpenage.

5.520 Float Gear Installation (cont'd)

- d) Install the float stabilizer in place of the skid tube and torque the bolts to 30 in-lbs.
- e) Calculate the new helicopter Weight and Balance using the information given above and enter the change into the aircraft records.
- f) Check and adjust the autorotation RPM per Section 10.250 (It will usually require shortening the pitch links approximately $\frac{1}{2}$ to 1 full turn).
- g) For float pressure information See Pilot's Operating Handbook Mariner Supplement page 9-4 Section 2.

5.530 Float Tube Removal

- a) Untie and remove the lacings at each landing gear strut. Unbuckle the restraint belts.
- b) Remove the bolts and nuts that attach the float tube to the skid tube and skid extension.

NOTE

The bolts and nuts are sealed in place and may be difficult to remove.

- c) Remove the retainer strips from the girts. Carefully separate the girt from the skid tube extension.

NOTE

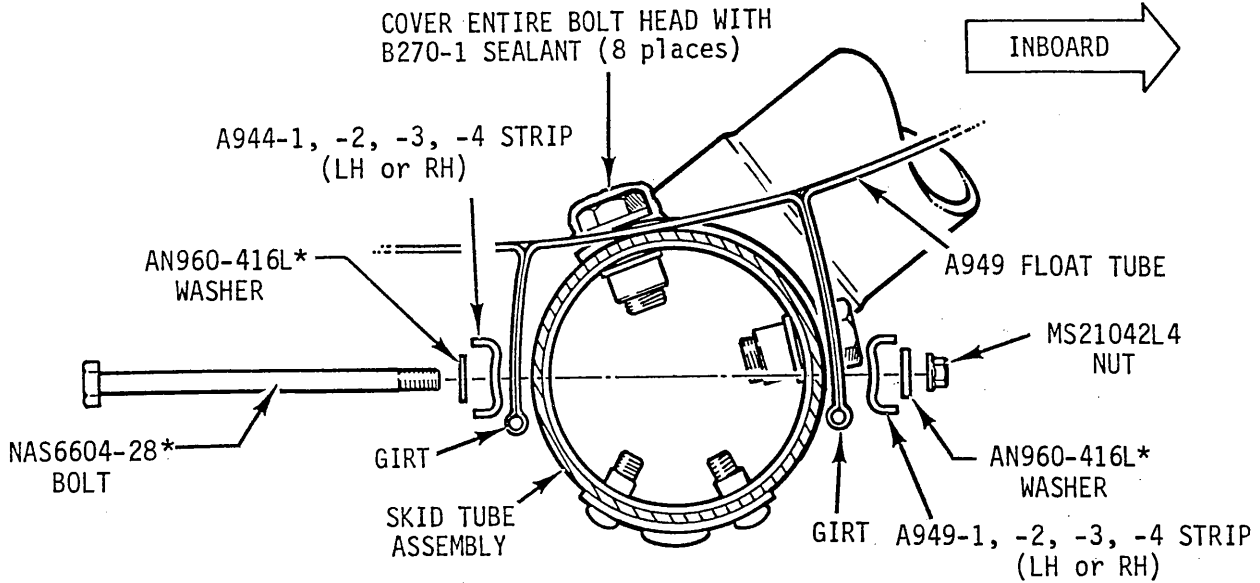
Sealant is installed between the girt and the skid tube at each bolt hole.

5.540 Float Tube Installation

NOTE

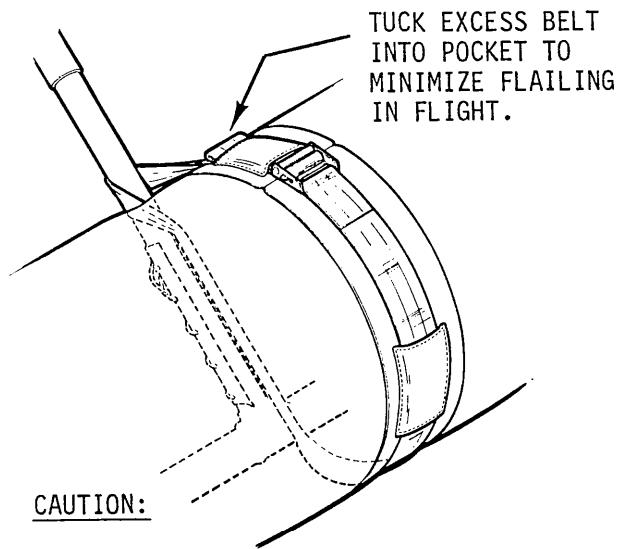
Remove the old sealant from the skid tube, float tubes and reusable hardware before installation of the float tubes.

- a) Position the float tube over the landing gear skid tube and extension. Align the holes in the girt of the float tube and the skid tube.



*BOLT LENGTH AND/OR WASHER THICKNESS MAY BE VARIED AS REQUIRED TO MAINTAIN 2-4 THREADS SHOWING BEYOND NUTS. SEAL UNDER HEAD AND NUT AND AROUND BOLT BETWEEN GIRTS AND SKID TUBE WITH B270-1 SEALANT.

FIGURE 5-4 FLOAT TUBE ATTACHMENT
(LEFT SIDE SHOWN, VIEW LOOKING FORWARD)



DO NOT WRAP BELT UNDER SKID TUBE.

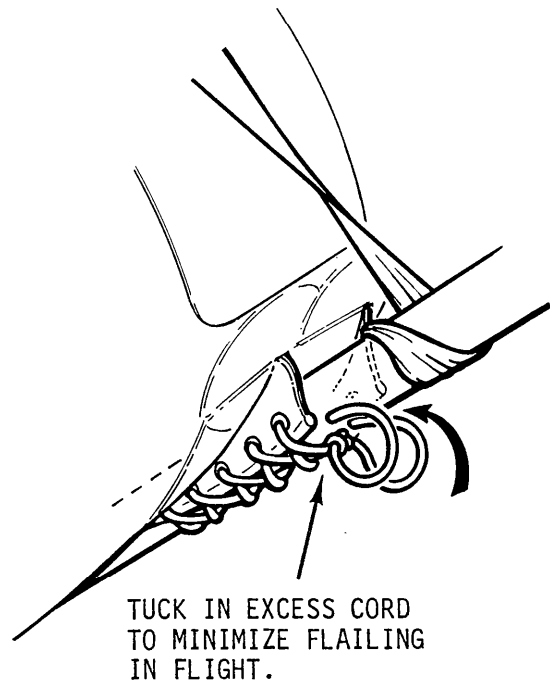


FIGURE 5-5 RESTRAINT BELT INSTALLATION

FIGURE 5-6 LACING INSTALLATION

5.540 Float Tube Installation (cont'd)

- b) Place the retainer strips in their proper positions. Temporarily install NAS6604-32 or NAS1304-32 bolts to hold the retainer strips and girts in place.
- c) Complete one girt section at a time. Using 890-B2 sealant, thoroughly seal all around the bolt holes between the girt and skid tube.
- d) Install the correct length bolts in their proper positions and seal under the bolt heads and nuts. Torque all the NAS6604 or NAS1304 bolt to 100 inch-pounds plus nut drag.
- e) After completing one girt section, move on to the next one and repeat the process. Prime all exposed bolts and nuts then paint black.
- f) Lace the float tube to the landing gear strut using a crossing pattern. Slide the restraint straps through the outside pockets. Wrap the restraint belt under the float tube making sure it passes over the skid tube. Make one wrap around the landing gear strut. Slide the strap through the pocket and into the buckle. Pull tight and tuck the excess strap material into the pocket.
- g) Slowly inflate the float tube to its proper operating pressure.

CAUTION

When inflating chambers individually (without the use of a manifold), increase pressure in each chamber in .5 psig increments.

5.550 Float Tube Repair

For float repair procedures refer to instructions included with the Float Repair Kit.

