SERVICE BULLETIN 136

SUBJECT: Hydraulic Actuator Seal Damage

APPLICATION: All hydraulic actuators delivered during 1994 for Glasair Retractable Gear Aircraft. Though we feel the affected actuators are only isolated to 1994 deliveries, any hydraulic actuator could be suspect if leakage occurs.

DESCRIPTION: Hydraulic actuators may have been delivered with damaged Poly Pack (piston rod bushing) seals. A production run assembled in early 1994 was apparently put together incorrectly which resulted in tears in the seal lips. This will allow leakage of hydraulic fluid where the piston rod exits the bushing once the actuator is placed in service.

To determine if your actuators are affected requires disassembly of the actuator and visual inspection of the Poly Pack seal for defects. Severely damaged seals can be found by removing the snap ring and moving the seal retaining washer out of the way to visually inspect the exposed end of the Poly Pack seal. However, to assure that no damage exists without an actual functional leak test, complete disassembly of the actuators and examining the Poly Pack seals will be required.

RECOMMENDED ACTION: If your actuators are installed on an aircraft and they do not yet have fluid in them, it would be a good idea to remove and inspect the actuators before actually putting them in service. If they are installed in an aircraft and they have had fluid added, a visual inspection for leakage during pressurization will be adequate and further disassembly will not be necessary.

Once a seal has been determined to be defective it is simply a matter of replacement of the seal and reassembly of the actuator.

The following is an excerpt from our hydraulic actuator rebuilding instructions. They assume that the actuators being disassembled have been in use. Ignore any steps that don't apply to your situation.

STEP 1 HYDRAULIC ACTUATOR DISASSEMBLY

1. Jack the airplane up and make sure it is secure on the jacks. Disconnect the hydraulic lines from the hydraulic actuator. Plug the ends of the hydraulic lines to prevent loss of fluid and to prevent the entry of foreign material while the lines are disconnected. Remove the hydraulic actuator from the aircraft.

2. Push the piston rod into the hydraulic actuator cylinder body as far as possible so that the piston bottoms in the actuator. (Be sure to point the actuator port into a cup or jar to catch the fluid.)

WARNING: Be very careful not to have the actuator fitting pointed toward your face or eyes when depressing the piston.

3. Remove the set screw from each hydraulic actuator cylinder cap and unscrew the cylinder cap from the cylinder body. It should be possible to unthread the cylinder cap from the cylinder body by simply gripping the cap with your hands and turning it counterclockwise.

NOTE: The actuator cylinder caps and cylinder bodies are manufactured in matched sets. The caps are not interchangeable so do not mix them up.

4. With the piston still retracted all the way into the actuator cylinder body, clamp the protruding end of the piston rod (the end opposite the piston) in a padded vise.

NOTE: Later style piston rods have been manufactured with flats near the exposed end to allow a wrench to be used to hold the piston rod when removing the piston rod retaining nut. These flats are also used to adjust the distance the rod threads into the rod end bearing during gear retraction rigging.

CAUTION: Clamp only the part of the piston rod shaft that protrudes from the end of the cylinder when the piston rod is completely retracted into the cylinder. Do not clamp the rod end bearings or any other part of the piston rod. If the piston rod surface is marred or damaged on any portion that contacts the Poly-Pack seal in the cylinder bushing, leaks may result.

5. Remove the existing (MS21042-4) piston retaining nut, (AN960-D416) washer, and (620- 0101-250) Stat-O-Seal from the piston rod.

NOTE: Remove the rod end bearing and jam nut from the end of the actuator piston rod and push the piston rod and piston out of the cylinder body. Count and record the number of turns when removing the rod end bearings so they can be reinstalled in their same positions.

CAUTION: When removing or installing the piston, always do so from the cylinder cap end of the cylinder body. Pulling or pushing the piston past the sharp edges of the port in the bushing end of the cylinder body can damage the "O" ring (or "Cap") seals, resulting in internal leaks and loss of hydraulic pressure.

6. Use a pair of snap ring pliers to remove the snap ring from the bushing end of the actuating cylinder. Use a wooden dowel (or the equivalent) to push the cylinder bushing and rod seal washer assembly out of the cylinder body.

STEP 2 INSPECTION AND CLEANING

Clean all the hydraulic actuator components to remove any foreign material that might be present in the system. Using a strong light source, inspect the inside lips of the Poly Pack seal for distortion, cuts or tears. A good seal has smooth, consistent edges and a even, round shape. A bad seal will have a wavy appearance or have noticeable defects in the seal surface. Bad seals should be replaced, call our Order desk for new seals.

If the cylinder has been in use, inspect the inside of the actuator cylinder body for scratches, damage or noticeable wear. If highly worn, the cylinder should be rebuilt and isn't subject to this service bulletin. Call our Order desk for a rebuild kit.

STEP 3 HYDRAULIC ACTUATOR REASSEMBLY

NOTE: Always lubricate the "O" rings, back-up rings, and seals when mating them to metal components of the hydraulic actuators. Use the same hydraulic fluid as used in the landing gear hydraulic system for lubrication on the actuator parts and seals.

1. Insert the new Poly-Pack seal into the cylinder bushing with the open side of the seal facing toward the cylinder bushing.

2. Slide the rod seal washer onto the piston rod and then slide the piston rod into the cylinder bushing from the Poly-Pack side, being careful not to displace or damage the Poly-Pack seal in the bushing.

3. Push the piston rod (with rod seal washer and cylinder bushing) into the cylinder body until the flange on the bushing bottoms out on the step in the cylinder body. Press the stainless steel rod seal washer against the face of the cylinder bushing and install the snap ring into the groove in the cylinder body.

4. Push the piston rod into the cylinder body to the fully retracted position of the actuator. Clamp the protruding end of the actuator piston rod in a padded vise.

5. Slip the piston into the cylinder body and onto the end of the piston rod. Care must be taken not to damage the internal (MS28775-012) "O" ring when installing the piston assembly on the actuator rod. Install the (620-0101-250) Stat-O-Seal onto the rod so that it seats into the small countersink in the piston. Take care not to damage Stat-O-Seal when installing it over the threaded end of the piston rod.

6. Install the AN960D416 washer. Thread on the MS21042-4 piston retainer nut and torque it to between 50 and 70 inch-pounds.

7. Check the (620-2026-674) "O" ring in the groove in the cylinder cap, and wet it with hydraulic fluid. Thread the cylinder cap onto the same cylinder body that it was removed from. Hand tighten only until the set screw hole in the cap is aligned with the set screw dimple in the cylinder body threads. Install the set screw and tighten it just until it bottoms against the dimple in the cylinder body threads, using "Loctite" to secure it.

CAUTION: Do not over tighten the set screw as this can deform the bore of the cylinder body, preventing free movement of the piston inside. Run the actuator rod in and out by hand to check for smoothness and freedom of movement.

STEP 4 REINSTALLATION OF THE HYDRAULIC ACTUATORS

1. The aircraft is assumed to still be secure on the jacks. Reinstall the actuators in the proper position. Fill all the actuators and lines with the appropriate fluid on the high pressure (gear retract) side by connecting a temporary line and using the actuator like a syringe to pull the fluid in from a container. Fill the pump reservoir. Operate the pump momentarily on the UP cycle until fluid flows out of the high pressure line into the container, and then reconnect the high pressure line to the actuator.

Use the same procedure to fill the lines on the low pressure (gear extension) side. Now, after the reservoir has been replenished again, the system can be operated without trapped air in the lines. Cycle the gear two or three times. Make sure the gear is operating correctly during both the extension and retraction cycles and then check the actuators for leakage at the Poly Pack seal area.

Let the airplane down off the jacks.