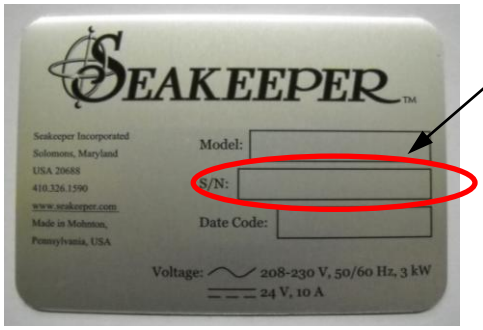
1. Purpose

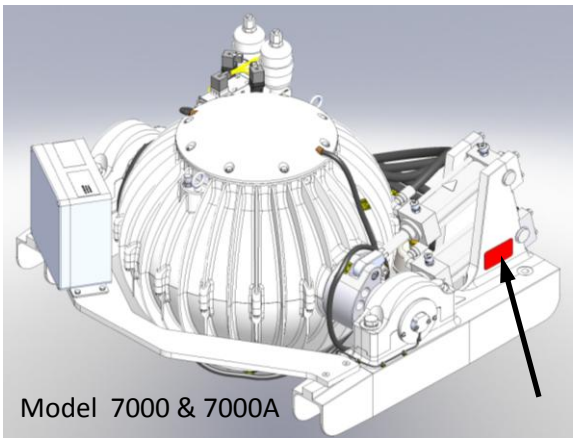
This service bulletin identifies the specific areas to check for the recommended annual inspection of the Seakeeper gyro stabilizers. Seakeeper has produced 5 different model gyros: Model 7000, 7000A, 8000, 21000 and 21000A.

2. Identify Gyro

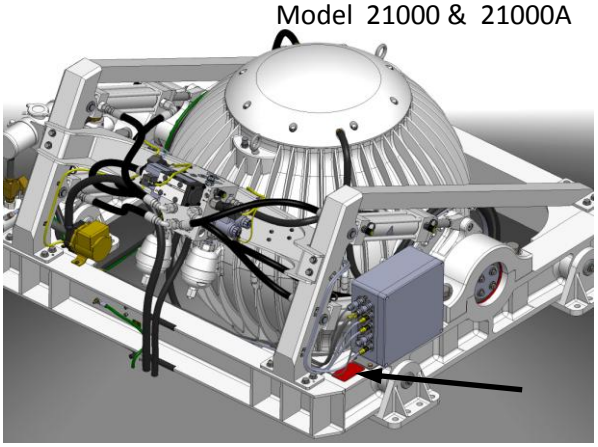


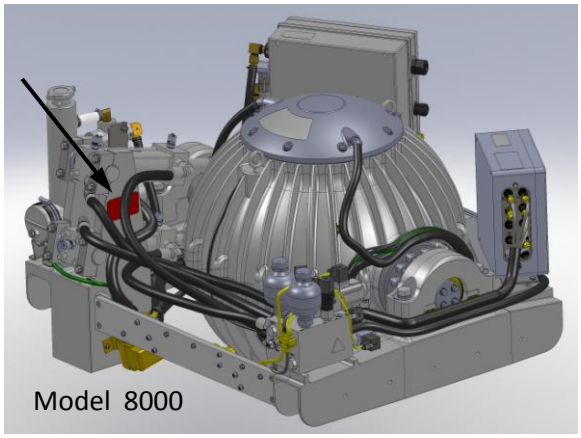
Serial Number required for all correspondence with Seakeeper

Every gyro has a product label with the model and serial number. Locate the product label and record the model number and serial number. The location of the product label on different gyro models is shown below.



Model 21000 & 21000A





For Model 7000 / 7000A, see Section 3.1, Page 2

For Model 8000, see Section 3.2, Page 7

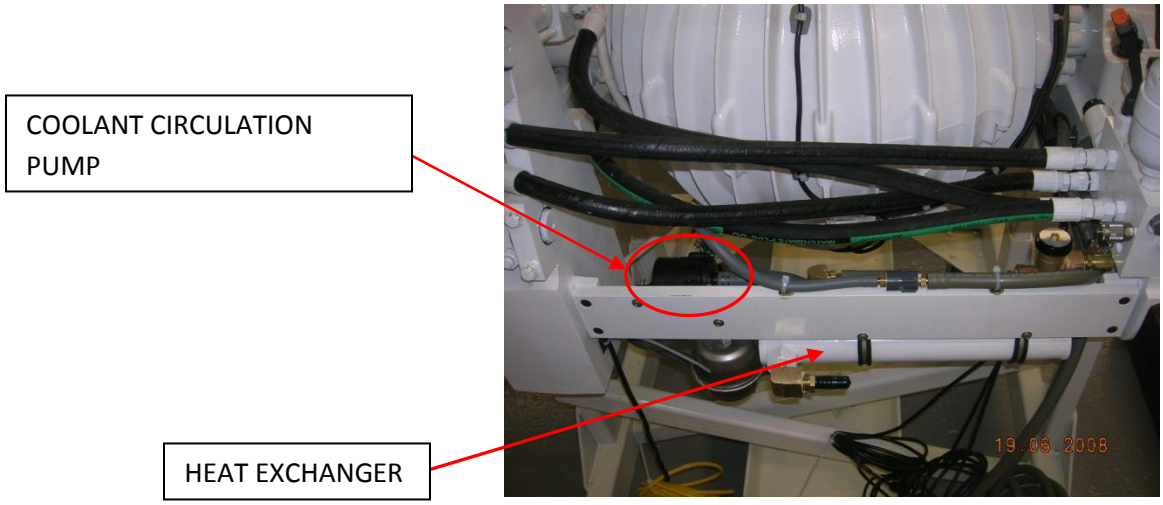
For Model 21000 / 21000A, see Section 3.3, Page 11

3. Annual Inspection Instructions

3.1 Model 7000 / 7000A :

3.1.1 Cooling System -

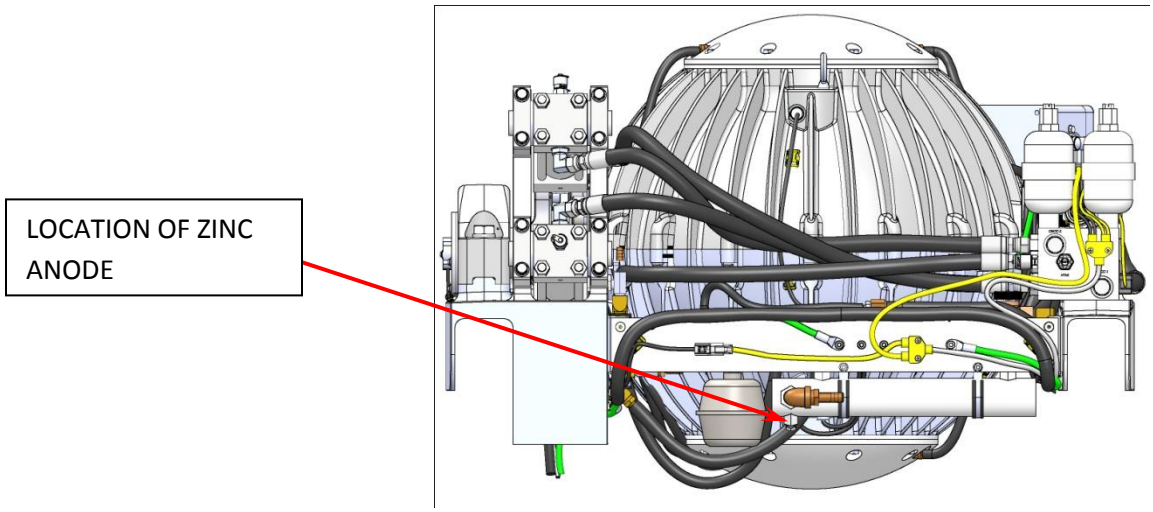
- Confirm gyro's 24 VDC breaker in ON and listen / feel coolant circulation pump to confirm it is running and operating properly. Pump is located on the port side of the aft transverse brace of the gyro frame as shown in below photo. If you hear intermittent noises (pump cavitation) , this may indicate air in the coolant plumbing and the system should be filled / purged per instructions provided in installation manual (manual is available for download at http://www.seakeeper.com/downloads_manuals.php)



Model 7000 / 7000 A COOLING COMPONENTS

- Inspect heat exchanger and fittings for any leaks or severe corrosion. The heat exchanger is located below the aft transverse brace of the gyro frame as shown in above photo. Insure seawater cooling hoses are isolated from incoming seawater (i.e: close sea-cock) and disconnect seawater inlet and outlet hoses and flush heat exchanger with fresh water to insure there are no internal blockages. Once flushing is complete , make certain to secure seawater inlet / outlet hoses to the heat exchanger with appropriate hose clamps and open the appropriate sea-cock for the water intake.

- M7000 gyros with serial numbers G067 and above are supplied with zinc anodes installed at the bottom of the heat exchanger near the end where the sea water inlets and outlets are located. For gyros with serial numbers of G067 and above, remove the plug / zinc at the bottom of the heat exchanger and inspect the zinc anode. If erosion is estimated to be more that 50%, replace anode. If zinc anode is gone, make point to inspect every 2 months until erosion rate is determined. The anode is a 3/8 inch diameter x ¾ inch long pencil in a ¼" NPT plug. Contact Seakeeper Service Dept. to obtain the replacement anodes. Apply Teflon paste pipe thread sealant or Teflon pipe thread tape to the plug threads when re-installing.



Model 7000 / 7000A ZINC ANODE LOCATION

- Inspect gyro sea water cooling pump for proper operation. Observe overboard discharge for normal flow. Minimum flow should be 2 GPM (7.6 lpm) .Obvious low flows may indicate flow restrictions.

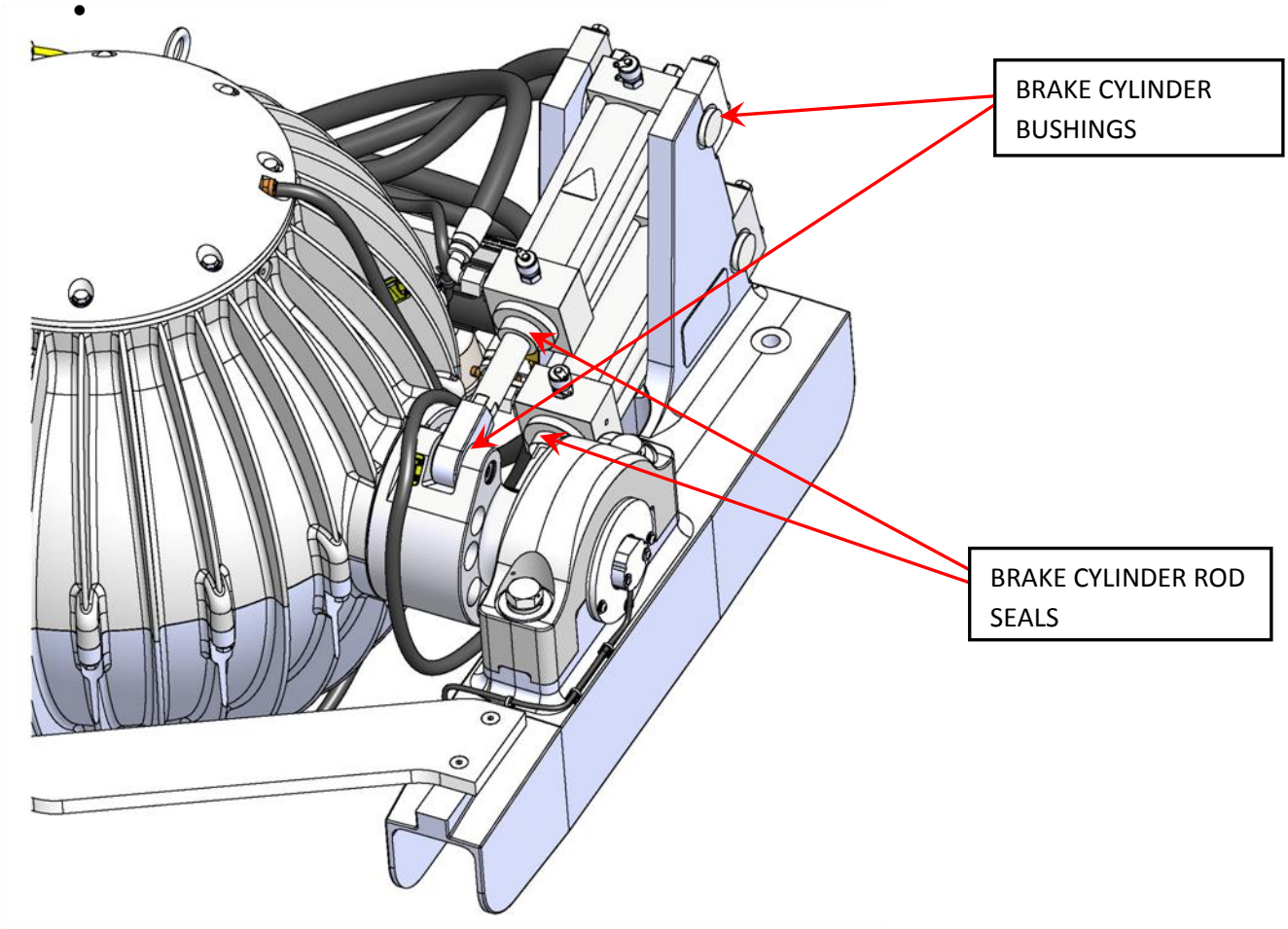
- Inspect all cooling hoses and fittings for damage / chafing including those cooling the remotely mounted motor drive box– in the event a hose needs to be replaced, contact Seakeeper Service Dept. for hose specifications and guidelines for replacing any cooling hose.

- Insure that the coolant thermostatic valve knob is turned all the way in the clockwise direction as shown below.

- Inspect bilge area under gyro for any indication of coolant leaks .

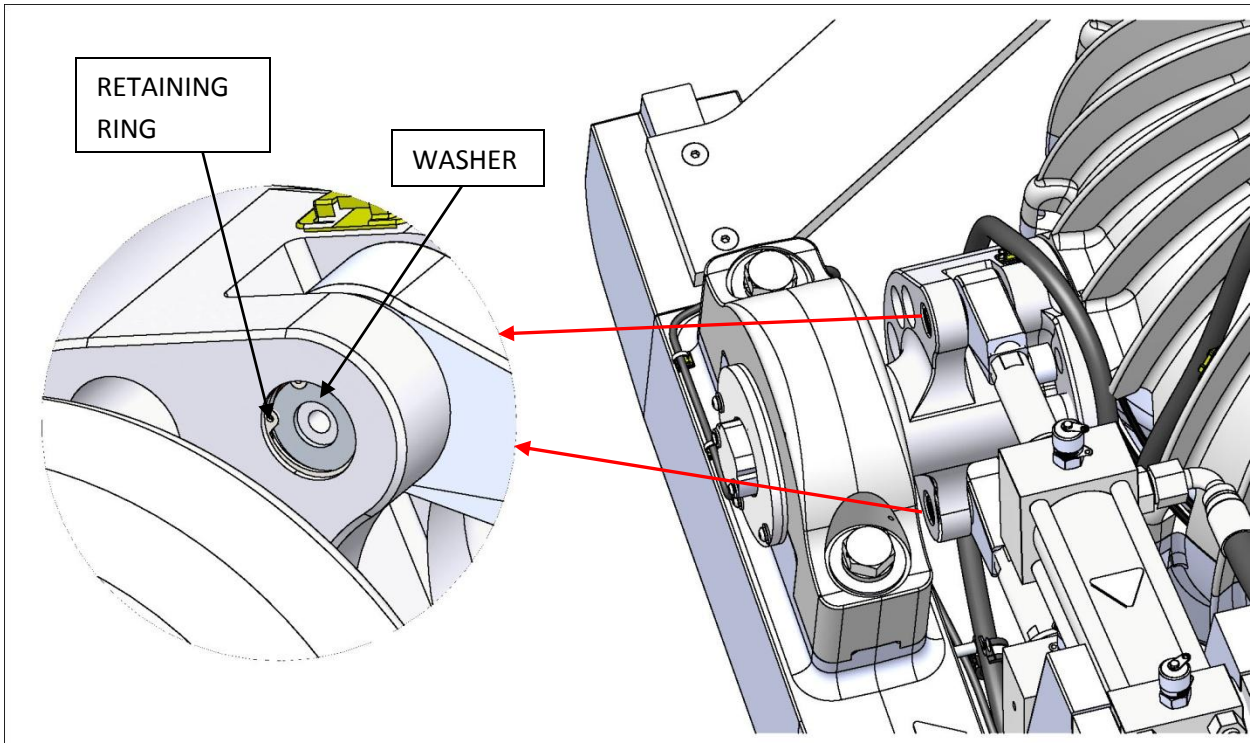
3.1.2 Brake System –

- Inspect area under brake cylinders for any indication of oil leaks from the cylinder rod seal shown below. Some oil residue under the rod seals on the bottom of the cylinders is normal but any drips showing below the cylinders in the bilge should be investigated further. If a cylinder seal is showing signs of a significant leak, replace suspect cylinder – contact Seakeeper service for part identification and replacement procedure. Leaks will eventually result in a "Low Brake Pressure" alarm condition which will not allow operation of the gyro. Note that a brake service kit is required for any brake system component replacement – contact your local representative or Seakeeper Service Department for details.



- Observe gyro during operation in Sea mode while in some swells / waves to cause the gyro to precess back and forth. Visible play or wear between the brake cylinders and their mount and/or the brake cylinder rod-end and the crank arm on the gyro as shown above merits replacing the composite brake linkage bushings. The expected life of the brake linkage bushings is 2000 hrs of SEA time . The bushings may need replacing sooner if operated in heavy sea conditions more often where the loading is higher. Contact Seakeeper service for parts and replacement procedures.

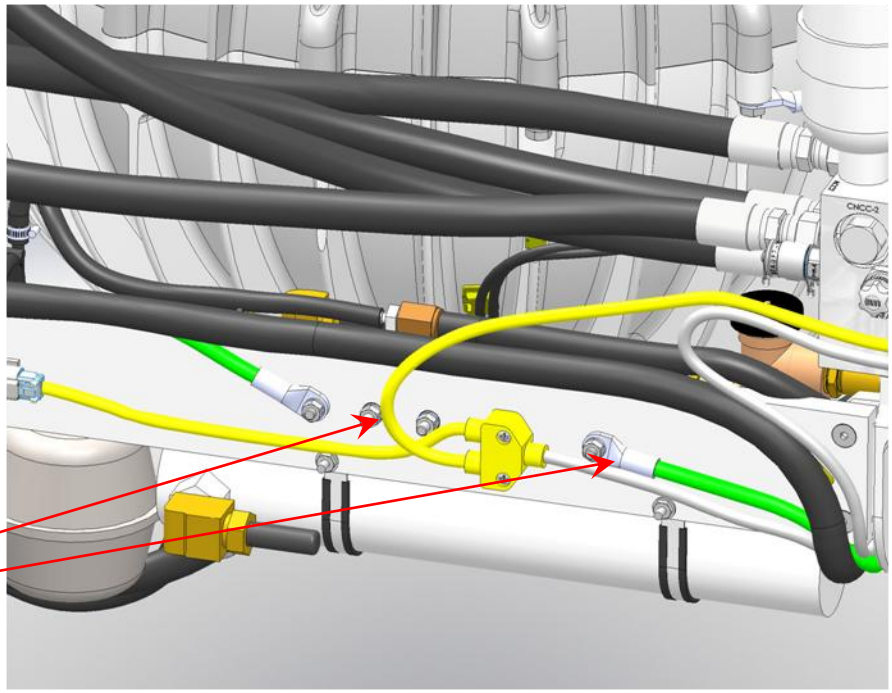
- Inspect brake hoses for any significant chafing through the outer jacket of the hose.
- Inspect all hose and manifold fittings for any significant corrosion or leaks and contact Seakeeper service for replacement parts if required.
- For those models with exposed pin retaining clips for brake rod-end as shown below, inspect condition of retaining ring and washers. Clean away any excess corrosion and pack area with small amount of waterproof grease to aid in preventing corrosion.



3.1.3 Electrical Cables / Connections –

- Inspect all cables located on the gyro frame and sphere for damage or chafing. Note that manually moving the sphere may make inspection easier. See operators manual for procedure to unlock the brake and manually rotate the spherical enclosure while the flywheel is not spinning.
- Inspect all electrical connectors on the gyro control box and motor drive box for damage or corrosion. Removing the connector is not necessary – just confirm no external connector damage or corrosion. If corrosion is present , follow Seakeeper Service Bulletin #90084 for cleaning and protecting connectors.

- Inspect ground and / or bond cable connections for corrosion and clean , re-install if required. Ground cable connection locations are shown below.



- Check gimbal angle sensor calibration. See Seakeeper Service Bulletin 90083 for procedures to perform this task.

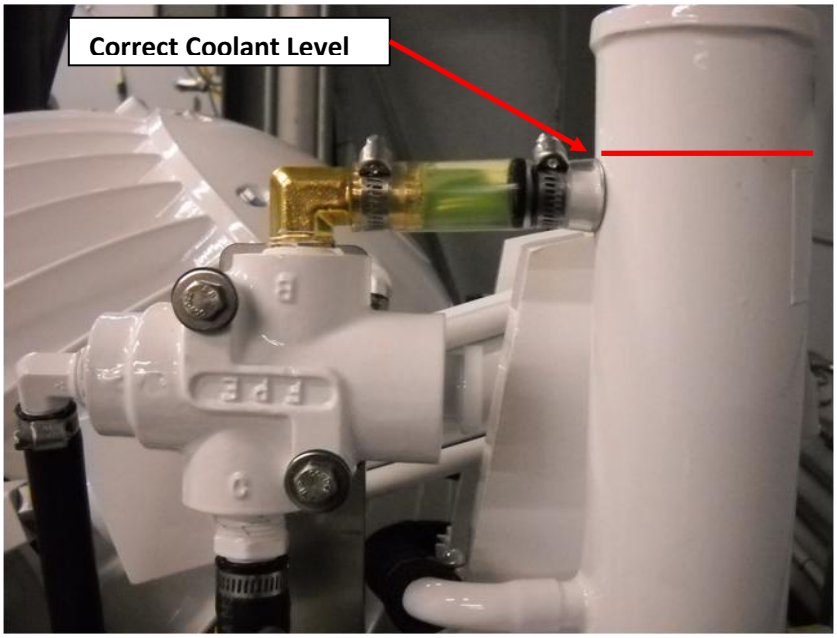
3.1.4 Gyro Enclosure / Foundation –

- Inspect enclosure, foundation frame, and hardware for corrosion and areas where paint should be reapplied. Any loose paint should be removed and cleaned back to bare metal and appropriate primer and top-coat paint system applied to seal the bare metal. See Service Bulletin 90026 for paint information.

3.2 Model 8000 :

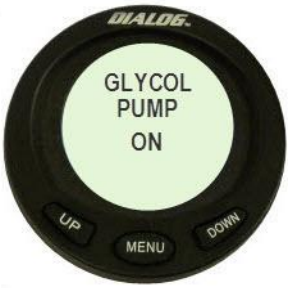
3.2.1 Cooling System -

- Remove coolant fill cap and confirm coolant level is approximately as shown in the below photo.



Model 8000 Coolant Level

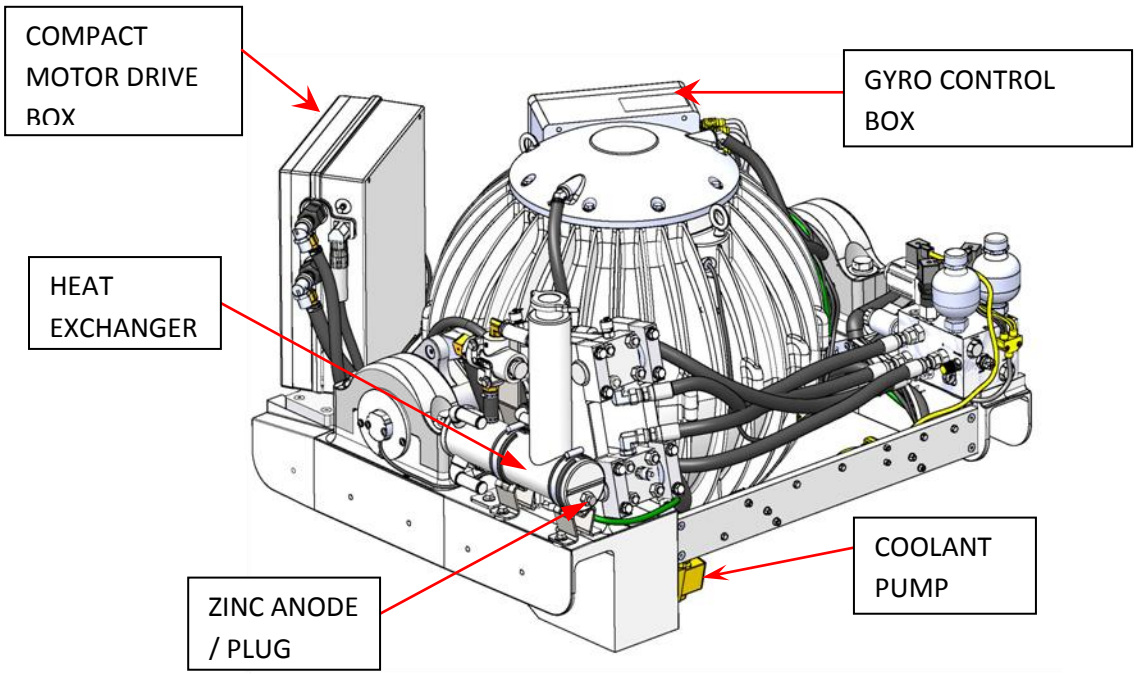
- The Model 8000 glycol coolant pump typically runs only during RUN mode. For maintenance, the glycol pump can be turned ON from the display. Press “MENU” repeatedly until the SERVICE page is displayed. Press “DOWN” repeatedly until the “GLY PUMP” is selected and press “MENU”. At the GLYCOL PUMP page press UP and DOWN to turn the pump ON and OFF. Note that there are minimum on and off times for the pump, so the pump may not immediately respond to a command.



Check flow by removing coolant fill cap and looking in the top of the heat exchanger surge tank.

- Inspect heat exchanger and fittings for any leaks or severe corrosion. The heat exchanger is located alongside the brake cylinders on the units foundation as shown in below image. Insure seawater cooling hoses are isolated from incoming seawater (i.e: close sea-cock) and disconnect seawater inlet and outlet hoses. Remove plug containing zinc anode on the heat exchanger and inspect. If erosion is estimated to be more that 50%, replace anode. If zinc anode is gone, make point to inspect every 2 months until erosion rate is determined. The anode is a 3/8 inch diameter x ¾ inch long pencil in a ¼" NPT plug. Contact Seakeeper Service Dept. to obtain the replacement anodes. Apply Teflon paste pipe thread sealant or Teflon pipe thread tape to the plug threads when re-installing.

  Flush heat exchanger with fresh water to insure there are no internal blockages. Once flushing is complete , make certain to secure seawater inlet / outlet hoses to the heat exchanger with appropriate hose clamps and open the appropriate sea-cock for the water intake.



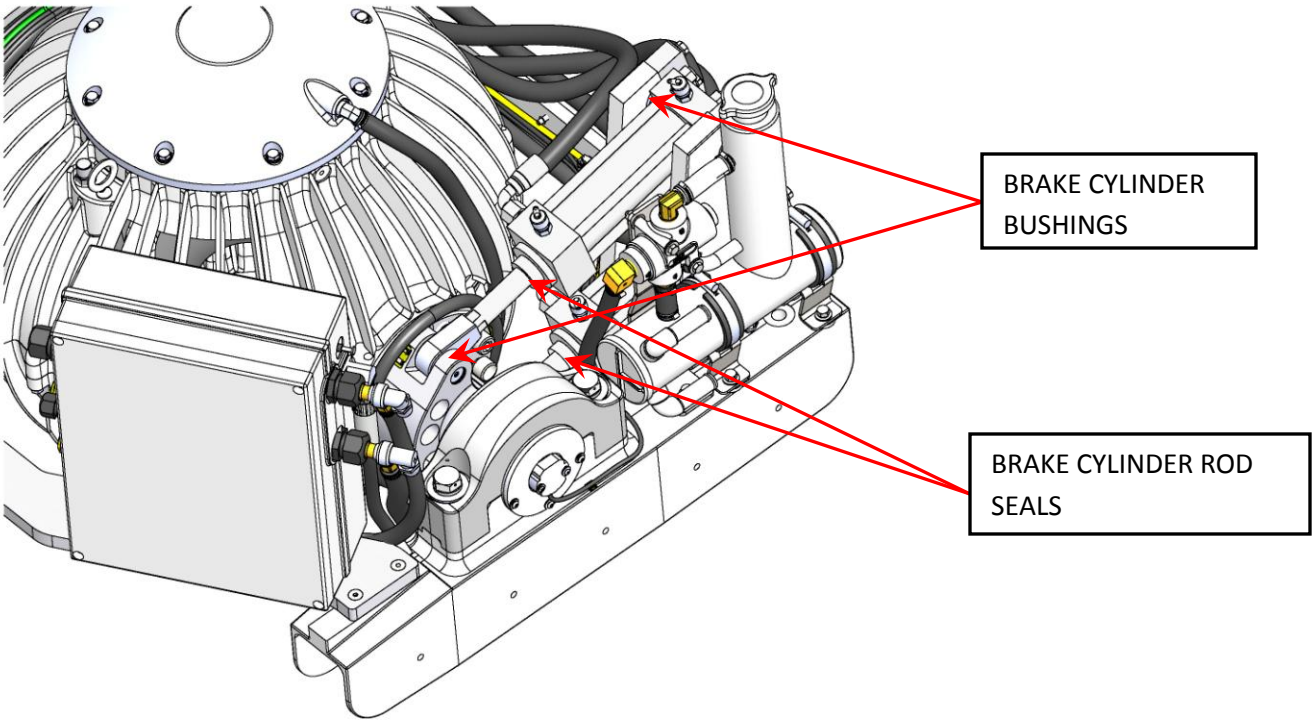
- Inspect gyro sea water cooling pump for proper operation. Observe overboard discharge for normal flow. Minimum required flow is 4 GPM (15.1 LPM) Obvious low flows may indicate flow restrictions.

- Inspect all hoses and fittings for damage / chafing – in the event a hose needs to be replaced, contact Seakeeper Service Dept. for hose specifications and guidelines for replacing any cooling hose.

- Inspect bilge area under gyro for any indication of coolant leaks .

3.2.2 Brake System –

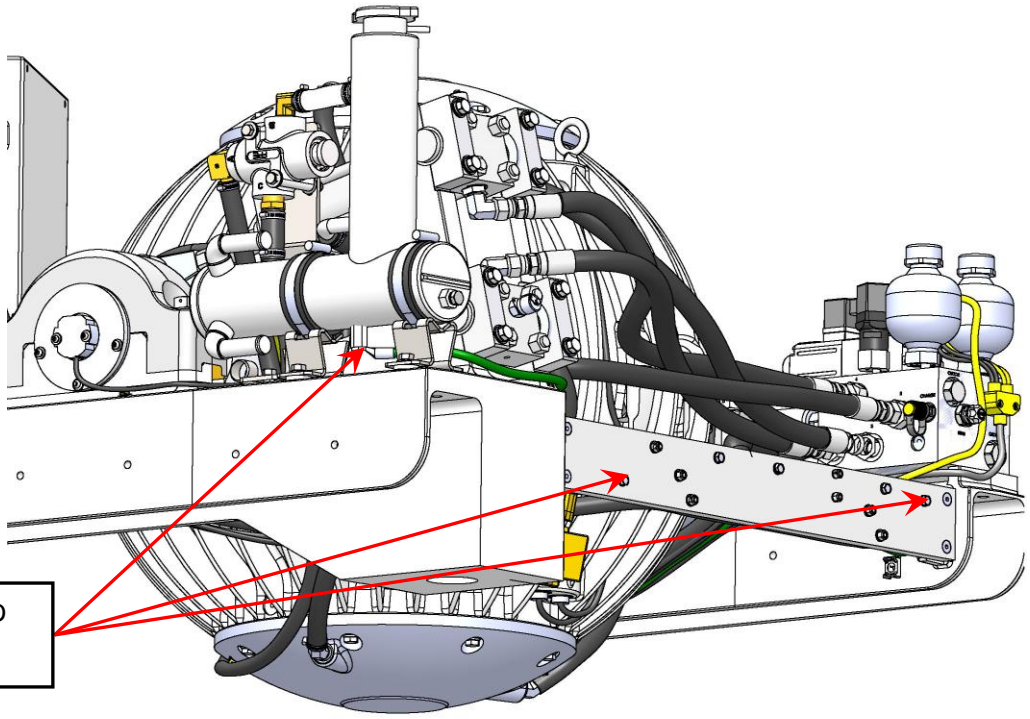
- Inspect area under brake cylinders for any indication of oil leaks from the cylinder rod seal as shown below. Some oil residue under the rod seals on the bottom of the cylinders is normal but any drips showing below the cylinders in the bilge should be investigated further. If a cylinder seal is showing signs of a significant leak, replace suspect cylinder. Leaks will eventually result in a "Low Brake Pressure" alarm condition which will not allow operation of the gyro. Note that a brake service kit is required for any brake system component replacement – contact your local representative or Seakeeper Service Department for details.



- Observe gyro during operation in Sea mode while in some swells / waves to cause the gyro to precess back and forth . Visible play or wear between the brake cylinders and their mount and/or the brake cylinder rod-end and the crank arm on the gyro as shown above merits replacing the composite brake linkage bushings. The expected life of the brake linkage bushings is 2000 hrs of SEA time . The bushings may need replacing sooner if operated in heavy sea conditions more often where the loading is more severe. Contact Seakeeper service for parts and replacement procedures.
- Inspect brake hoses for any significant chafing through the outer jacket of the hose.
- Inspect all hose and brake manifold fittings for any significant corrosion or leaks and contact Seakeeper service for replacement parts if required.

3.2.3 Electrical Cables / Connections –

- Inspect all cables located on the gyro frame and sphere for damage or chafing. Note that manually moving the sphere may make inspection easier. See operators manual for procedure to unlock the brake while the flywheel is not spinning.
- Inspect all electrical connectors on the gyro control box and motor drive box for damage or corrosion. Removing the connector is not necessary – just confirm no external connector damage or corrosion. If corrosion is present , follow Seakeeper Service Bulletin #90084 for cleaning and protecting connectors.
- Inspect ground and/or bond cable connections for corrosion and clean , re-install if required. Ground cable connection locations are shown below.



GROUND / BOND CONNECTIONS

- Check gimbal angle sensor calibration. See Seakeeper Service Bulletin 90083 for procedures to perform this task.

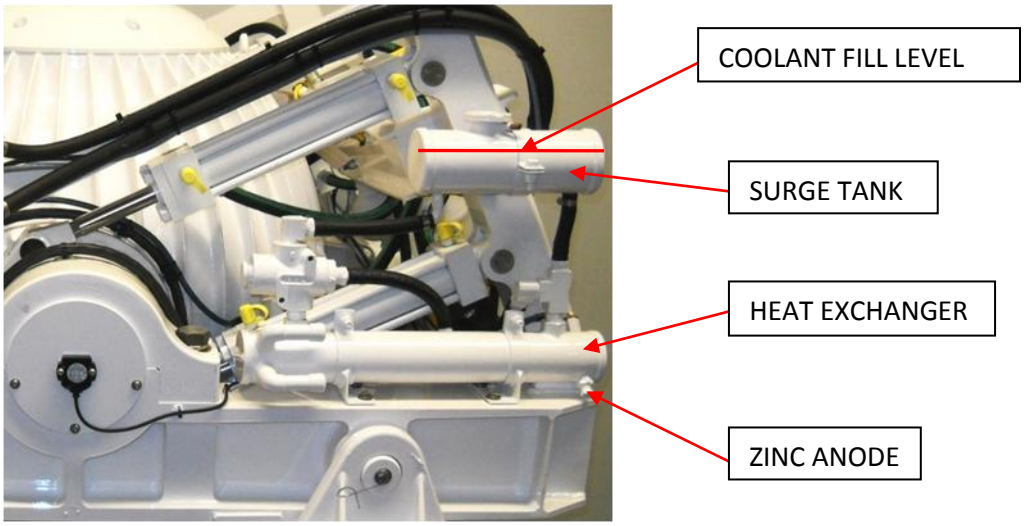
3.2.4 Gyro Enclosure / Foundation –

- Inspect enclosure, foundation frame, and hardware for corrosion and areas where paint should be reapplied. Any loose paint should be removed and cleaned back to bare metal and appropriate primer and top-coat paint system applied to seal the bare metal. See Service Bulletin 90026 for paint information.

3.3 Model 21000 / 21000A :

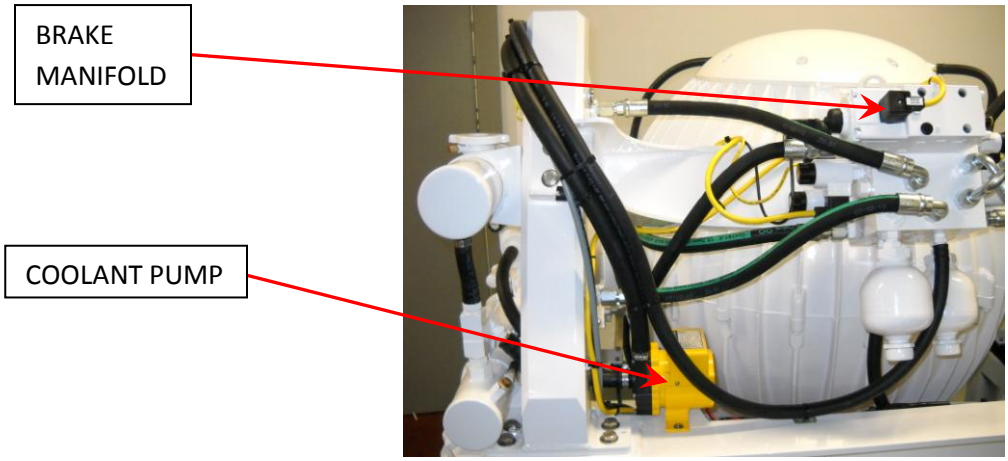
3.3.1 Cooling System -

- Remove coolant fill cap and confirm coolant level is approximately as shown in the below photo.

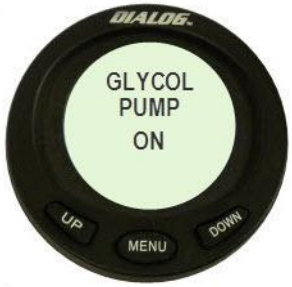


Model 21000 /21000A Coolant Level

- FOR MODEL 21000, confirm gyro's 24 VDC breaker in ON and listen / feel glycol coolant pump to confirm it is running and operating properly. Pump is located on the units frame under the brake manifold as shown in below photo. Flow can be observed by removing coolant fill cap and looking in the top of the heat exchanger surge tank.



FOR MODEL 21000A, the glycol coolant pump typically runs only during RUN mode. For maintenance, the glycol pump can be turned ON from the display. Press “MENU” repeatedly until the SERVICE page is displayed. Press “DOWN” repeatedly until the “GLY PUMP” is selected and press “MENU”. At the GLYCOL PUMP page press UP and DOWN to turn the pump ON and OFF. Note that there are minimum on and off times for the pump, so the pump may not immediately respond to a command.



Pump is located below the brake cylinders as shown in above image. Check flow by removing coolant fill cap and looking in the top of the heat exchanger surge tank.

- Inspect heat exchanger and fittings for any leaks or severe corrosion. Insure seawater cooling hoses are isolated from incoming seawater (i.e: close sea-cock) and disconnect seawater inlet and outlet hoses. Remove plug containing zinc anode on the heat exchanger and inspect. If erosion is estimated to be more that 50%, replace anode. If zinc anode is gone, make point to inspect every 2 months until erosion rate is determined. The anode is a 3/8 inch diameter x ¾ inch long pencil in a ¼” NPT plug. Contact Seakeeper Service Dept. to obtain the replacement anodes. Apply Teflon paste pipe thread sealant or Teflon pipe thread tape to the plug threads when re-installing.

  Flush heat exchanger with fresh water to insure there are no internal blockages. Once flushing is complete , make certain to secure seawater inlet / outlet hoses to the heat exchanger with appropriate hose clamps and open the appropriate sea-cock for the water intake.

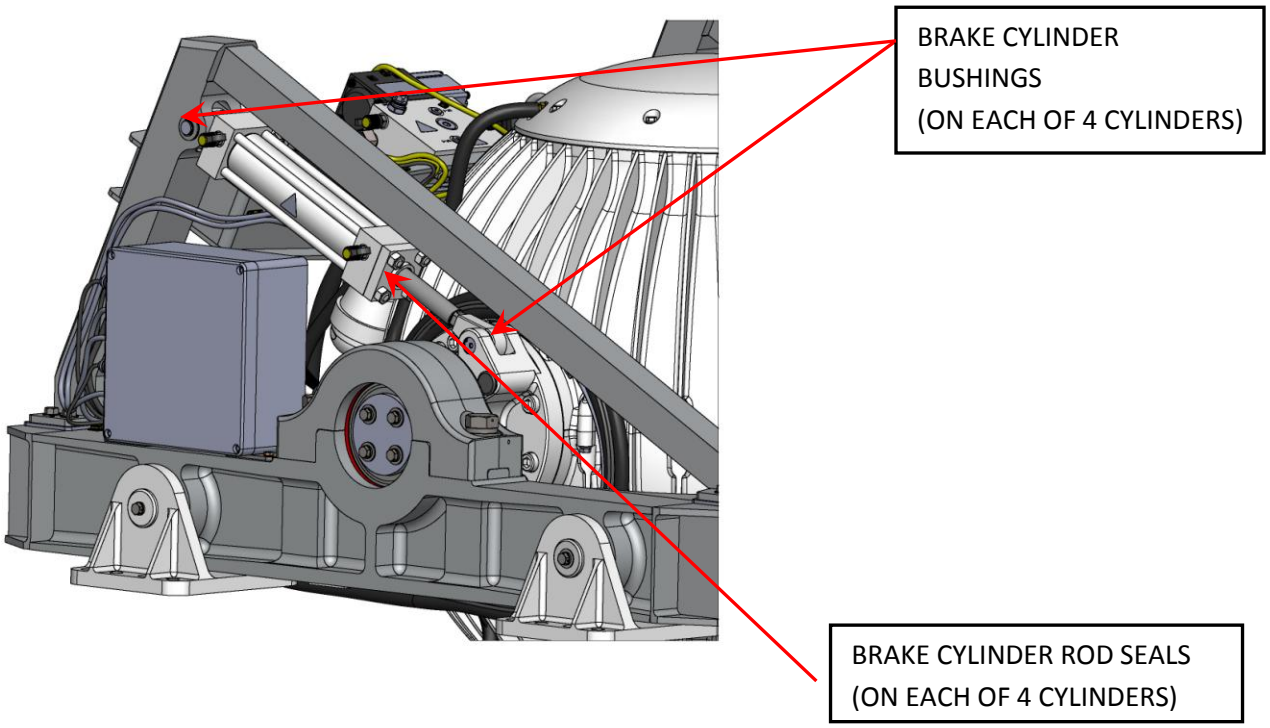
- Inspect gyro sea water cooling pump for proper operation. Observe overboard discharge for normal flow. Minimum flow is 4 GPM (15.1 lpm)Obvious low flows may indicate flow restrictions.

- Inspect all hoses and fittings for damage / chafing – in the event a hose needs to be replaced, contact Seakeeper Service Dept. for hose specifications and guidelines for replacing any cooling hose.

- Inspect bilge area under gyro for any indication of coolant leaks .

3.3.2 Brake System –

- Inspect area under brake cylinders for any indication of oil leaks from the cylinder rod seal shown below. Some oil residue under the rod seals on the bottom of the cylinders is normal but any drips showing below the cylinders in the bilge should be investigated further. If a cylinder seal is showing signs of a significant leak, replace suspected leaking cylinder. Leaks will eventually result in a "Low Brake Pressure" alarm condition which will not allow operation of the gyro. Note that a brake service kit is required for any brake system component replacement – contact your local representative or Seakeeper Service Department for details.

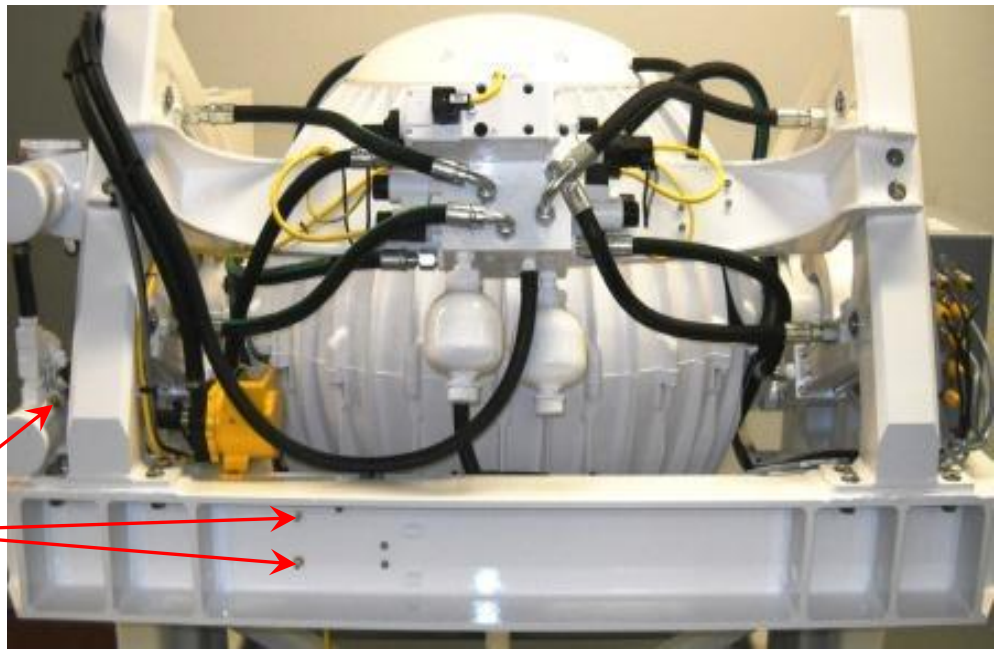


- Observe gyro during operation in Sea mode while in some swells / waves to cause the gyro to precess back and forth . Visible play or wear between the brake cylinders and their mount and/or the brake cylinder rod-end and the crank arm on the gyro shown above merits replacing the composite brake linkage bushings. The expected life of the brake linkage bushings is 2000 hrs of SEA time . The bushings may need replacing sooner if operated in heavy sea conditions more often where the loading is more severe. Contact Seakeeper service for parts and replacement procedures.
- Inspect brake hoses for any significant chafing through the outer jacket of the hose.
- Inspect all hose and brake manifold fittings for any significant corrosion or leaks and contact Seakeeper service for replacement parts if required.

3.2.3 Electrical Cables / Connections –

- Inspect all cables located on the gyro frame and sphere for damage or chafing. Note that manually moving the sphere may make inspection easier. See operators manual for procedure to unlock the brake while the flywheel is not spinning.
- Inspect all electrical connectors on the gyro control box and motor drive box for damage or corrosion. Removing the connector is not necessary – just confirm no external connector damage or corrosion. If corrosion is present , follow Seakeeper Service Bulletin 90084 for cleaning and protecting connectors.
- Inspect ground and/or bond cable connections for corrosion and clean , re-install if required. Ground cable connection locations are shown below.

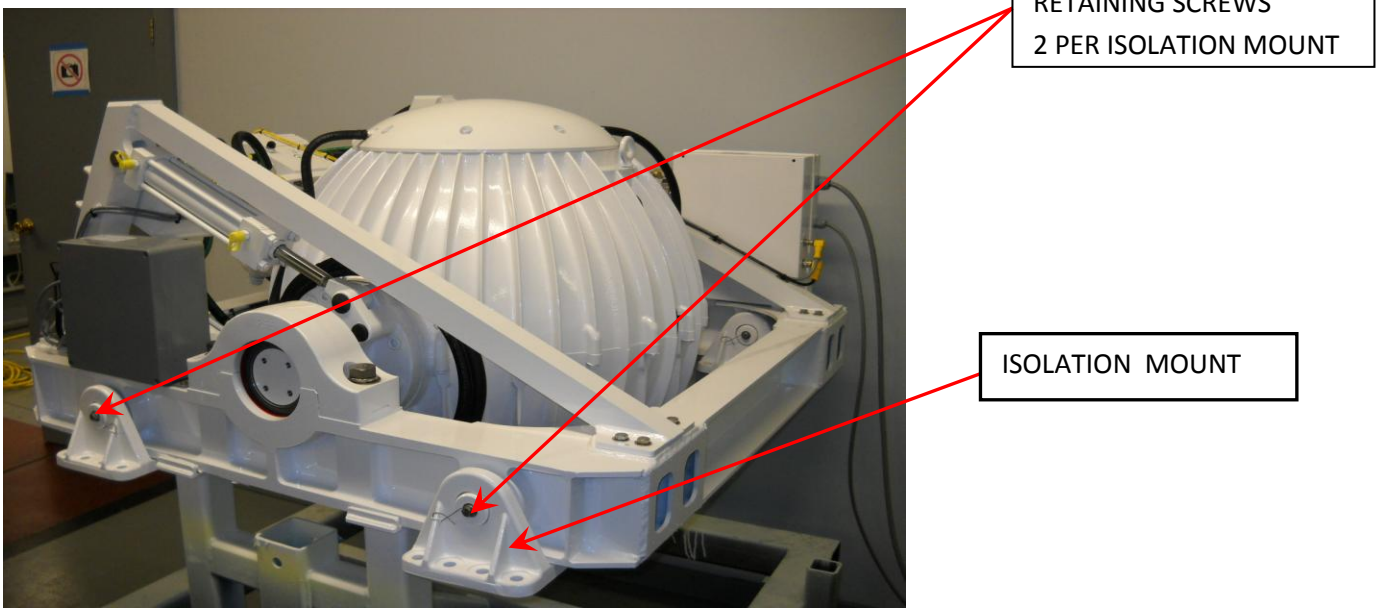
GROUND / BOND CABLE CONNECTION LOCATIONS



- Check gimbal angle sensor calibration. See Seakeeper Service Bulletin 90083 for procedures to perform this task.

3.2.4 Gyro Enclosure / Foundation –

- Inspect enclosure, foundation frame, and hardware for corrosion and areas where paint should be reapplied. Any loose paint should be removed and cleaned back to bare metal and appropriate primer and top-coat paint system applied to seal the bare metal. See Service Bulletin 90026 for paint information.
- Inspect all eight retainer screws (2 per isolation mount)shown below and confirm all are tight and safety retaining wire is in place.



REVISION HISTORY

REVISION	DESCRIPTION OF CHANGES	DATE	APPROVED
1	INITIAL RELEASE	18MAY11	BHS

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