SERVICING THE SWIVEL
The swivel seals and bearings require periodic replacement. This document describes how to determine which service procedure to use to service the swivel assembly, part number 101110.

Two service procedures are provided:

- **Replacing the Shaft Seal** is a procedure that is used frequently. When water leaks from the swivel assembly it is time to replace the shaft seal. The shaft seal is typically replaced every 40 hours of use.

- **Replacing the Bearings and Seals** is a procedure to overhaul the entire swivel assembly (bearings and seals). The bearings can last 50–300 hours.
Special tools are designed to make the service procedures easier to perform, they also prevent damage to the swivel.

- Dowel kit (part number 28588) includes six plastic dowels with diameters of \( \frac{3}{16} \), \( \frac{1}{4} \), \( \frac{3}{8} \), \( \frac{1}{2} \), \( \frac{3}{4} \) and 1". All dowels are six inches long.

- Seal removal tool (part number 37153)

- Swivel bearing tool kit (part number 29667) includes
  - a bearing removal disc (part number 37216)
  - a bearing removal fork (part number 37259)
  - an adjustable spanner wrench (part number 28614)

Metal tubes (hardened aluminium or brass) are used to replace the swivel bearings. These tubes are not available from Jet Edge; they need to be acquired or fabricated if the bearings are to be replaced in the field.

The following tubes are needed:

1 inch I.D. x 8 inches long—pushes the swivel shaft assembly out of the swivel body and it clears the 0.75 inch diameter when removing a bearing.

7/8 inch I.D. x 8 inches long—clears the 0.75 inch diameter of the swivel shaft when installing a bearing.

1/2 inch I.D. x 5 inches long—clears the 0.32 inch diameter and does not exceed the 0.6 inch diameter of the swivel shaft when removing a bearing.
Ultra high pressure water is connected to the swivel. Ultra high pressure water can penetrate skin and can cause severe injuries to personnel.

Ensure ultra high pressure is removed before disconnecting any ultra high water connection. Turn off the ultra-high pressure water source and operate the device connected to the swivel until the UHP water pressure is depleted before attempting any service procedures.

1. Disconnect the UHP water source connection from the swivel. Remove the UHP water collar from the swivel.

2. Remove the manifold attached to the swivel shaft. Use two wrenches, one on the flats of the swivel shaft and the other on the flats of the output manifold. Loosen the connection.

3. Remove the swivel assembly from its mounting as required.

4. Move the swivel to a clean workbench. Keep the swivel components clean during service to extend the amount of time between service procedures.

5. Proceed as follows: Hold the swivel body and rotate the swivel shaft to determine if the bearings need replacement.

- If there is excessive play in the swivel shaft perform “Replacing the Bearings and Seals” on page 8.
- If the swivel shaft has any roughness when the swivel shaft is rotated perform “Replacing the Bearings and Seals” on page 8.
- Otherwise perform “Replacing the Shaft Seal” on page 4.
REPLACING THE SHAFT SEAL

Water leakage from the swivel body indicates the swivel high pressure shaft seal is leaking and should be replaced.

• The shaft seal is located in the seal housing, this seal is replaced more often than the seal in the front retainer cap.

• The seal located in the front retainer cap prevents debris from entering the swivel assembly, this seal is replaced when the bearings are replaced.

Note: Refer to the figure “Component Identification” on page 1 during the following procedure.

REQUIRED EQUIPMENT

• Shaft seal (part number 36943)
• O-ring (part number 45887-010)
• Spanner Wrench (part number 28831, part of the swivel bearing tool kit)
• Seal removal tool (part number 37153)
• Two 8-32 x 3 inch machine screws
• Dowel Kit (part number 28588)
• Precision Lube (part number 25750) - used on threads, blue color
• High pressure lubricant (part number 28339) - used on high pressure seals, white color
• Degreaser (such as brake cleaner)
• General purpose grease (such as wheel bearing grease) - used as a general lubricant, black color
• 3M Scotch-Brite™ pad or 1000 grit emery cloth. Use an ultra fine, light gray Scotch-Brite pad for light cleaning.
Task 1: Disassemble the Swivel

Note: Be careful when clamping the swivel body when removing the end caps. The swivel body can be deformed if it is clamped too tight which will decrease the life of the swivel.

1. Use the spanner wrench to remove the rear retainer cap.

2. Remove the seal housing from the rear retaining cap.

3. Insert the seal removal tool through the center of the seal inside the seal housing. Hook the tool lip over the inner edge of the seal and pull outward to extract the seal. Discard the seal.

4. Thread two machine screws into the seal backup disc. Pull the seal backup disc out of the valve body. Remove the screws.

Note: If possible, check the swivel shaft runout with a dial indicator. The runout should be no more than 0.0005 inches. If not, replace the backup disc.

Note: Inspect the seal where it contacts the backup disk. A thin sleeve of seal material is extruded into the backup disk. This is normal, check to see if the seal material is a uniform thickness. If the thickness is not uniform it indicates the swivel shaft has a side load, typically the bearings might need replacement.
Task 2: Clean the Components

Clean the disassembled parts, the thread of the valve body, and the end of the swivel shaft with degreaser. Dry the parts. Inspect the parts for damage and replace any parts as needed.

- Clean the bore of the backup disc and remove any remnants of the seal, seal residue in this area is normal. Ensure the bore of the backup disc is not worn or elongated.
- Clean any remnants of the seal in the weep hole of the valve body, seal residue in this area is normal.
- Ensure the inside of the seal housing is smooth with no scratches.
- Component threads are coated with Precision Lube, they do not need to be cleaned but they do need a uniform coating of Precision Lube to prevent galling. If water leaked past the threads the lubrication might be washed away in places.

Inspect the stem of the swivel shaft.

**Note:** The stem of swivel shaft is coated with an anti-wear material.

- If the stem has water deposits, use light duty scotch-bright to clean the water deposits. Very lightly rotate the lapping paper around the stem (never clean the stem lengthwise).
- If the swivel shaft is worn, the anti-wear coating on the stem is worn, or the swivel shaft is scratched (you can detect a scratch using your fingernail), replace the swivel shaft. See “Replacing the Bearings and Seals” on page 8 to replace the swivel shaft.

Task 3: Install the Shaft Seal

1. Apply a light coat of high pressure lubricant to the new shaft seal. Place the O-ring on the shaft seal (notice the orientation of the O-ring on the seal). Use a 1 inch dowel to press the swivel seal into the seal housing.
2. Apply a light coat of general purpose grease to the backup disc. Place the backup disc into the seal housing.
3. Apply a light coat of general purpose grease to the seal housing. Slide the seal housing into the rear retainer cap. Do not force the parts together.
4. Apply Precision Lube on the threads of the rear retainer cap. Thread the rear retainer cap onto the swivel body and tighten the rear retainer cap with the spanner wrench.

**Note:** Do not overtighten the rear retaining cap. It only needs to be tight enough to hold the internal components in place.
Task 4: Install the Swivel into the Equipment

1. Mount the swivel on the equipment as required.

2. Thread the output manifold onto the swivel shaft and tighten the connection. Use two wrenches, one on the flats of the swivel shaft and the other on the flats of the output manifold. Tighten the connection.

3. Connect the UHP water source connection to the swivel.
   A. Slide the UHP water collar over the end of the seal housing.
   B. Ensure there is a coat of Precision Lube on the threads.
      Do not over-torque the UHP tubing connection.
   C. Make the UHP water connection as shown below.

4. Add general purpose grease (black color) to the grease fitting. (two or three pumps)

5. Test the machine for proper operation. Turn on the UHP water supply to allow the high pressure seal to set, then operate the swivel. Verify that there are no water leaks at the weep holes in the swivel assembly.
REPLACING THE BEARINGS AND SEALS

Bearing alignment is extremely critical. If proper tools for rebuilding the swivel assembly are not available, keep a spare swivel assembly on hand and return the faulty unit to the Jet Edge Service Department for repair.

REQUIRED EQUIPMENT

- Swivel bearing removal kit (part number 29667), the kit includes a spanner wrench, bearing fork, and bearing disc.
- Adjustable wrench (to remove the grease fitting)
- Dowel kit (part number 28588)
- Seal removal tool (part number 37153)
- Hand press
- Tubing for use with the hand press (hardened aluminium or brass): 1 inch I.D x 8 inches long, 7/8 inch O.D. x 8 inches long, 1/2 inch I.D. x 5 inches long
- Two 8-32 x 3 inch machine screws
- Degreaser (such as brake cleaner)
- General purpose grease (such as wheel bearing grease) - used as a general lubricant and use in a grease gun, black color
- Precision Lube (part number 25750) - used on threads, blue color
- High pressure lubricant (part number 28339) - used on high pressure seals, white color
- Ball bearing (part number 29198)
- Two angular contact bearings (part number 29199)
- Replacement seals: shaft seal (part number 36943) O-ring (part number 45887-010) front retainer cap seal (part number 101113)
**Task 1: Disassemble the Swivel**

**Note**  
Be careful when clamping the swivel body when removing the end caps. The swivel body can be deformed if it is clamped too tight which will decrease the life of the swivel.

1. Remove the grease fitting on the swivel body. The grease fitting protrudes into the swivel body and it will inhibit the removal of the swivel shaft assembly.

2. Use the spanner wrench to remove the rear retainer cap.

3. Pull the seal housing out of the rear retaining cap.

4. Insert the seal removal tool through the center of the seal inside the seal housing. Hook the tool lip over the inner edge of the seal and pull outward to extract the seal. Discard the seal.

5. Use the spanner wrench to remove the front retainer cap.

6. Remove the seal from the front retainer cap (sometimes it might stay on the swivel shaft). Discard the seal.

**Note:**  
If possible, check the swivel shaft runout with a dial indicator. The runout should be no more than 0.0005 inches. If not, replace the backup disc.

7. Thread two machine screws into the seal backup disc. Pull the seal backup disc out of the valve body. Remove the screws.
Task 2: Use a Hand Press to Remove the Bearings

Note: The Hand Press Configuration figures show the contact points for a hand press. You will need to configure your press to accommodate a base point and a press point. The base point is typically built up with blocks or jigs, the press point is where the ram of the press applies force.

Hand Press Configurations – Bearing Removal

1. Remove the shaft assembly from the swivel body.

Use a 1 inch I.D. tube as a driver (and to protect the end of the swivel shaft). Configure the press to contact the tube and the edges of the swivel body. Press the swivel shaft assembly out of the valve body.

2. Remove the ball bearing.

Use the 1/2 inch I.D. tube as a driver (and to protect the end of the swivel shaft). Slots in the bearing spacer allow the use of the bearing fork tool. Configure the press to contact the tube and the bearing fork tool. Press the ball bearing off the swivel shaft assembly.

3. Remove the bearing spacer. Set the bearing spacer aside for reuse.

4. Remove the angular contact bearings.

Use the 1/2 inch I.D. tube as a driver (and to protect the tip of the swivel shaft). The bearing removal tool has a raised surface to contact the inner race of the angular contact bearings, place the bearing removal tool on the swivel shaft. Configure the press to contact the 1/2 inch tube and the bearing removal tool. Press the angular contact bearings off the swivel shaft.
Task 3: **Clean the Components**

When cleaning the swivel components inspect them for damage, replace any damaged components.

**Note:** Ensure that all parts are clean. Any dirt or debris can severely reduce the life to the swivel components.

Clean the disassembled parts, the threads of the swivel body, and the end of the swivel shaft with degreaser. Dry the parts. Inspect the parts for damage and replace any parts as needed.

- Clean the bore of the backup disc and remove any remnants of the seal, seal residue in this area is normal. Ensure the bore of the backup disc is not worn or elongated.
- Clean any remnants of the seal in the weep hole of the valve body, seal residue in this area is normal.
- Ensure the inside of the seal housing is smooth with no scratches.
- Component threads are coated with Precision Lube, they do not need to be cleaned but they do need a uniform coating of Precision Lube to prevent galling. If water leaked past the threads the lubrication might be washed away in places.

Inspect the stem of the swivel shaft.

**Note:** The stem of swivel shaft is coated with an anti-wear material.

- If the stem has water deposits, use light duty scotch-bright to clean the water deposits. Very lightly rotate the lapping paper around the stem (never clean the stem lengthwise).
- If the swivel shaft is worn, the anti-wear coating on the stem is worn, or the swivel shaft is scratched (you can detect a scratch using your fingernail), replace the swivel shaft.
Note: The angular contact bearings are designed to accept thrust from one direction. Notice the orientation of the contact bearings, ensure they are installed properly (see the following figures). Some angular contact bearings have lettering on the face of the side facing away from the bearing spacer.

Hand Press Configurations – Bearing Installation

1. Install new angular contact bearings. Use a 1/2 inch I.D. tube a as a driver (and to protect the tip of the swivel shaft). Use a 7/8 inch I.D. tube to apply the base to the inner race of the angular contact bearings. Configure the press to contact the tubes and press the angular contact bearings onto swivel shaft assembly.

2. Install the bearing spacer.

3. Install a new ball bearing. Use a 1/2 inch I.D. tube as a driver (and to protect the tip of the swivel shaft). Use a 7/8 inch I.D. tube to contact the inner race of the ball bearing. Configure the press to contact the tubes and press the ball bearing onto swivel shaft assembly.

Over-torqued and gaulded UHP fitting
1. Install a new seal into the front retainer cap and install the front retainer cap. Apply a coat of general purpose grease to the new seal and install it into the front retainer cap. Ensure the open side of the seal faces toward the bearings. Use a 1 inch dowel to press the shaft seal into the front retainer cap.

**Note:** Be sure to tighten the front end cap before installing the rear retaining cap.

2. Apply Precision Lube on the threads of the front retainer cap. Thread the front retainer cap onto the swivel body and tighten the end cap with the spanner wrench.

3. Apply a light coat of high pressure lubricant to the new swivel seal. Notice the orientation of the O-ring on the seal. Use a 1 inch dowel to press the swivel seal into the seal housing.

4. Apply a light coat of general purpose grease to the backup disc. Place the backup disc into the seal housing.

5. Apply a light coat of general purpose grease to the seal housing. Slide the seal housing into the rear retainer cap. Do not force the parts together.

6. Apply Precision Lube on the threads of the rear retainer cap. Thread the rear retainer cap onto the swivel body and tighten the rear retainer cap with the spanner wrench.

7. Install the grease fitting.
Task 6: Install the Swivel into the Equipment

1. Mount the swivel on the equipment as required.

2. Thread the output connection onto the swivel shaft and tighten the connection. Ensure there is a coat of Precision Lube on the threads. Use two wrenches, one on the flats of the swivel shaft and the other on the flats of the output manifold. Tighten the connection.

3. Connect the UHP water source connection to the swivel.
   A. Slide the UHP water collar over the end of the seal housing.
   B. Ensure there is a coat of Precision Lube on the threads. Do not over-torque the UHP tubing connection.
   C. Make the UHP water connection as shown below.

4. Add general purpose grease (black color) to the grease fitting (two or three pumps).

5. Test the machine for proper operation. Turn on the UHP water supply to allow the high pressure seal to set, then operate the swivel. Verify that there are no water leaks at the weep holes in the swivel assembly.