

# PREVOST

## Instruction Sheet

## IS-20913A

### POWER STEERING 20 ft STAINLESS STEEL PIPE REPAIR PROCEDURE

This instruction sheet is applicable to the following:

DOB Bus Number Series 1300 – 1606: power steering pipe #160089

Revision A

Addition of ORS plug in Other Material

Apr-24-2020

### MATERIAL

Abutment repair:

| Part No. | Description  | Qty |
|----------|--|-----|
| 501157   | ORS-TF REPAIR KIT FF90146-10S<br>1x ORS-TF NUT FC1851-10S<br>1x ORS-TF FERRULE FF90102-10S<br>1x ORS-TF SLEEVE FF90103-10S | 1   |
| 501156   | ORS-ORS ADAPTER #10 MALE/#10 MALE FF2000T-1010S  | 1   |
| 507023   | O-RING, HIGH TEMP (spare)  | 2   |


Along the pipe repair:

| Part No. | Description   | Qty |
|----------|---|-----|
| 501157   | ORS-TF REPAIR KIT FF90146-10S<br>1x ORS-TF NUT FC1851-10<br>1x ORS-TF FERRULE FF90102-10<br>1x ORS-TF SLEEVE FF90103-10 | 2   |
| 501156   | ORS-ORS ADAPTER #10 MALE/#10 MALE FF2000T-1010S   | 1   |
| 507023   | O-RING, HIGH TEMP (spare)   | 2   |











#### NOTE

Material can be obtained through regular channels.

**OTHER MATERIAL**

|  |   |             |
|--|---|-------------|
| EATON AEROQUIP ORS PLUG FF9767-10S                 |  | Qty: 2      |
| TORQUE SEAL  |   |             |
| OIL DRAIN PAN                                      |   |             |
| MOBIL DEXRON-VI ATF (AUTOMATIC TRANSMISSION FLUID) |   | As required |

**TOOLS TO BE USED**

|   |  |
|---|--|
| <b>HACKSAW or CUTTING WHEEL &amp; POWER TOOL</b>                                    |  |
|    |     |
| <b>ADJUSTABLE HEAVY-DUTY WRENCH</b>   | <b>RATCHET AND SOCKET SET – METRIC/SAE</b>   |
|   |    |
| <b>TORQUE WRENCH</b>  | <b>1-1/8 TORQUE WRENCH CROWFOOT ADAPTER</b>  |
|  |   |
| <b>OPEN END WRENCH SET<br/>1-1/8, 1-1/16</b>  | <b>PAIR of LOW PROFILE JACK STANDS with<br/>POSITIONING HANDLE</b>                   |
|  |  |
| <b>STAINLESS STEEL PIPE REAMER –<br/>INNER/OUTER</b>                                | <b>CARBIDE BURRS &amp; POWER TOOL</b>  |
|  |  |

# PREVOST

## PERSONAL PROTECTIVE EQUIPMENT

Wear your personal protective equipment, including but not limited to the followings:



**Safety shoes**



**Safety goggles**



**General purpose gloves**



**DANGER**

Wear eye protection and remove rings, metal jewelry and watches with metal bands.



**DANGER**

Wear protective glasses when striking objects to avoid injury to your eyes. Chips or other debris can fly off objects that are struck. Make sure no one can be injured by flying debris before striking any objects.

# PREVOST

## PROCEDURE



### DANGER

Park vehicle safely, apply parking brake, stop the engine. Prior to working on the vehicle, set the ignition switch to the OFF position and trip the main circuit breakers equipped with a trip button. On Commuter type vehicles, set the battery master switch (master cut-out) to the OFF position.

Lock out & Tag out (LOTO) must be performed during set-up, maintenance or repair activities. Refer to your local procedure for detailed information regarding the control of hazardous energy.

The ORS-TF tube fitting utilizing the ORS-TF nut, ferrule and sleeve can be joined directly to steel tubing. It provides the advantage of repetitive use. It is a compression type fitting.

## ABUTMENT TUBE REPAIR

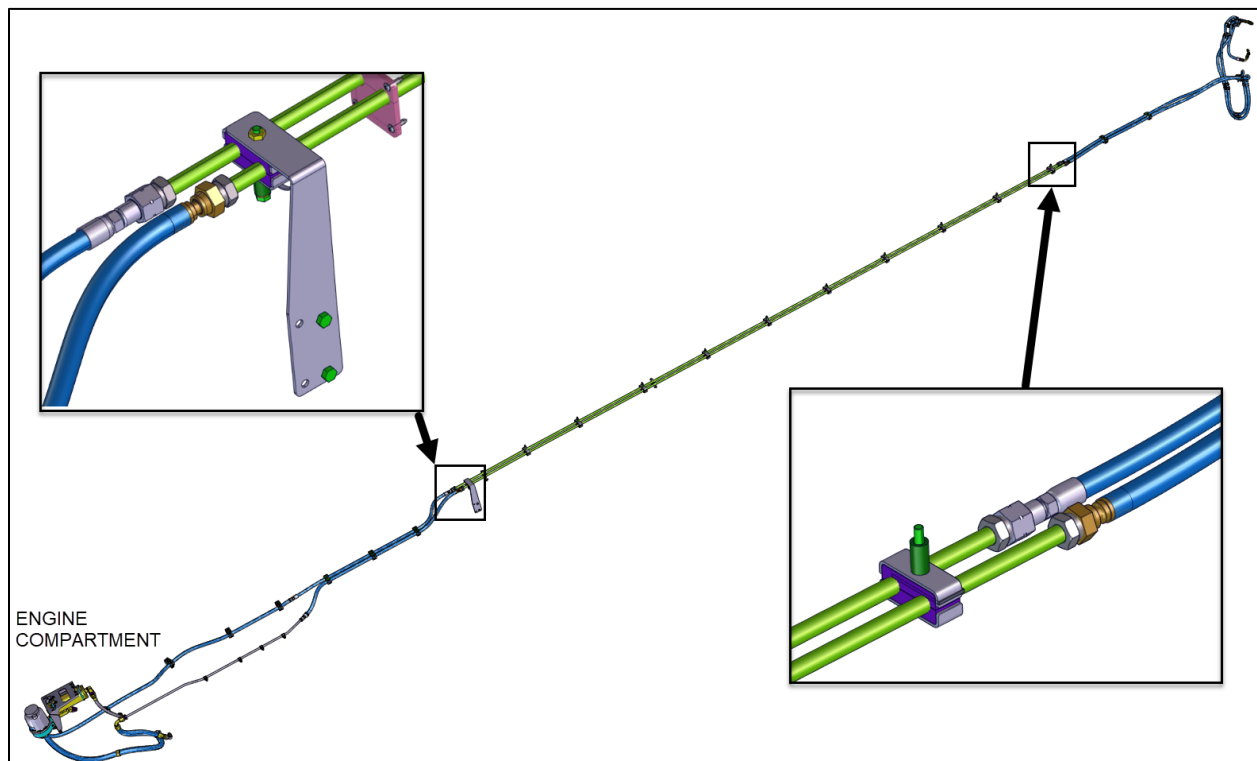


FIGURE 1

1. The power steering pressure and return pipes (green pipes on Figure 1) measure 20 ft long and are made of stainless steel. They are 5/8 OD.
2. To prevent skin burns, make sure that steering fluid has sufficiently cooled before starting the next steps.

3. Disconnect the blue power steering hoses at each end of the defective pipe. Have a container, as power steering fluid will drip from the pipe and hose.
4. Plug each blue hose with an ORS plug FF9767-10S.
5. Purge the stainless steel pipe using pressurized air.
6. Locate the defective fitting at the end of the pipe. Cut the tubing squarely ( $\pm 1^\circ$ ) close to the fitting. Use a hacksaw or abrasive cutting wheel.

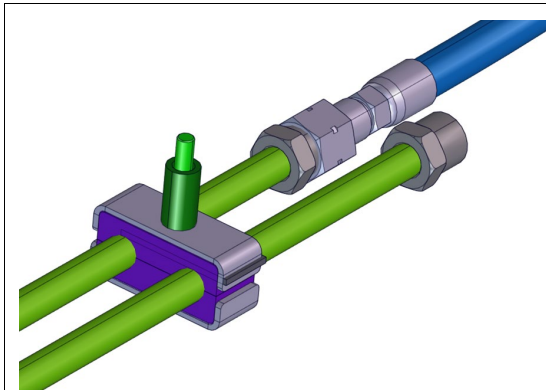


FIGURE 2: ABUTMENT REPAIR – BEFORE CUT

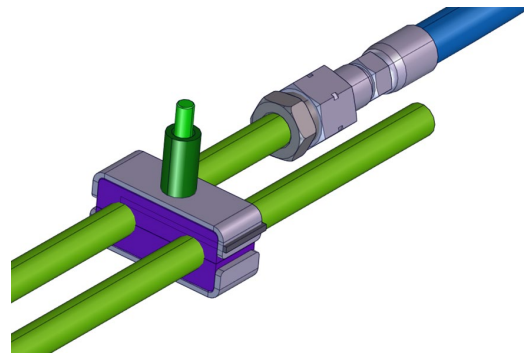


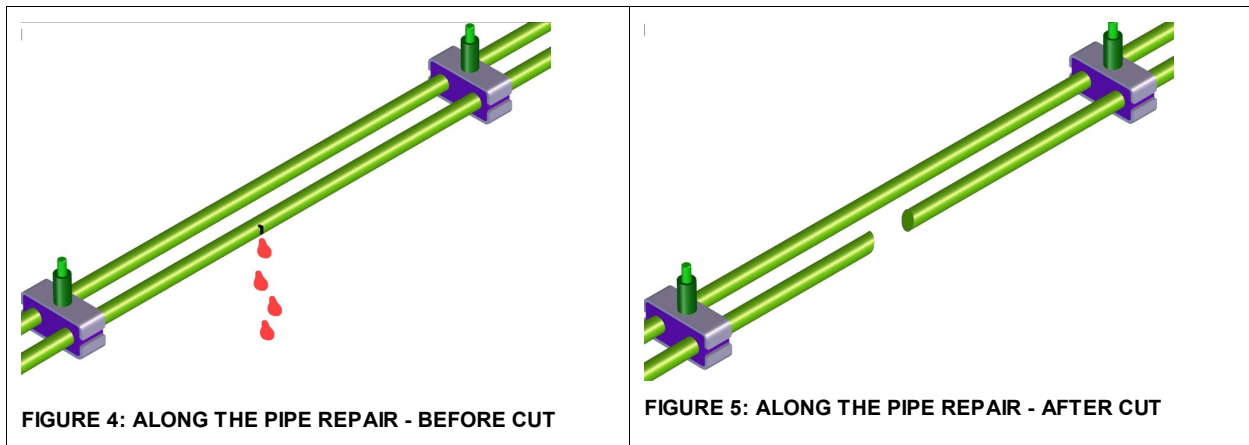
FIGURE 3: ABUTMENT REPAIR - AFTER CUT

7. Using one ORS-TF REPAIR KIT #501157 and one ORS-ORS ADAPTER FF2000T-1010S #501156, install the replacement fitting as described in section **ASSEMBLY INSTRUCTION ORS-TF TUBE FITTING**.
8. Connect the blue power steering hoses to the pipe. Tighten hose fitting to a torque of: **46-50 lbs-ft**. Apply a **torque seal** mark across the fitting.
9. Refill the power steering system and bleed. Refer to the appendix A at the end of this document.

# PREVOST

## ALONG THE PIPE REPAIR

1. The power steering pressure and return pipes (green pipes on Figure 1) measure 20 ft long and are made of stainless steel. They are 5/8 OD.
2. To prevent skin burns, make sure that steering fluid has sufficiently cooled before starting the next steps.
3. Disconnect the blue power steering hoses at each end of the defective pipe. Have a container, as power steering fluid will drip from the pipe and hose.
4. Plug each blue hose with an ORS plug FF9767-10S.
5. Purge the stainless steel pipe using pressurized air.
6. Locate the puncture on the pipe (Figure 4). Have a clean container, as power steering fluid will drip from the pipe once cut. **DO NOT REUSE** this fluid.
7. Cut the tubing squarely ( $\pm 1^\circ$ ) both sides of the puncture. Use a hacksaw or abrasive cutting wheel.



8. Loosen all the pipe and hose clamps (Figure 6) from the cut up to the front of the vehicle.

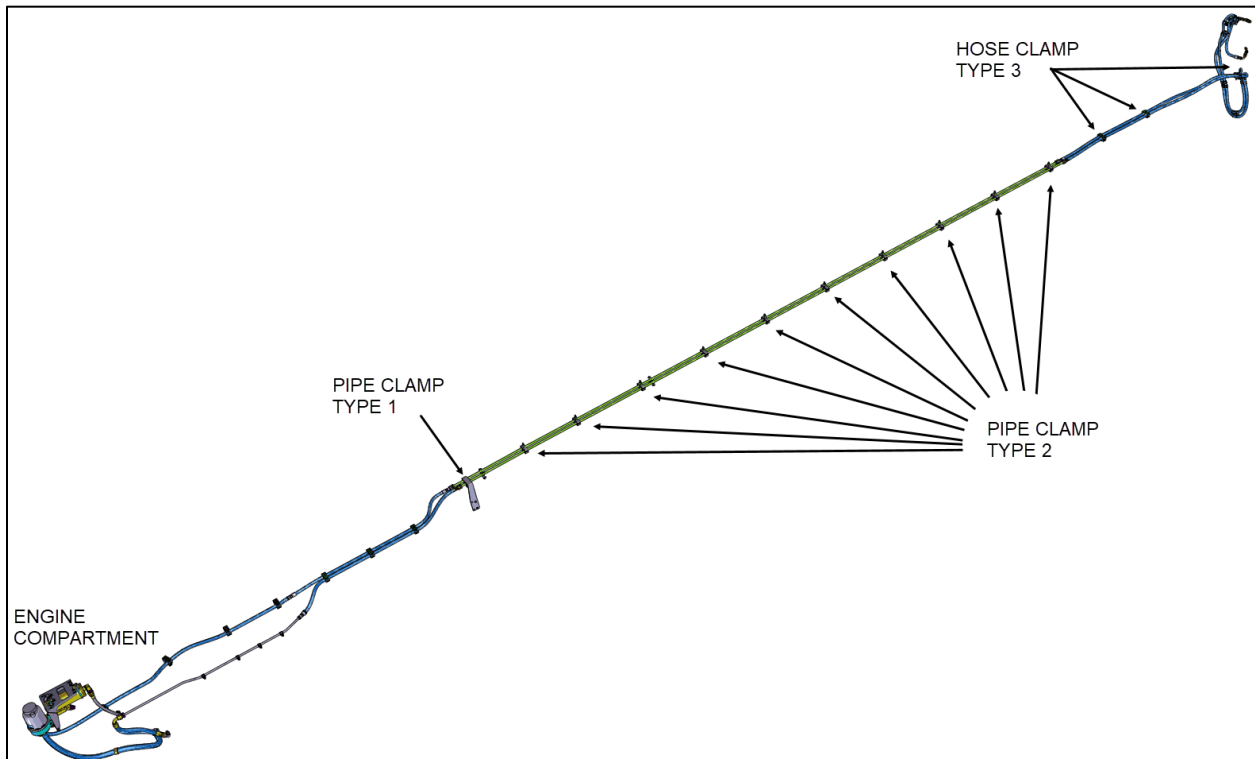


FIGURE 6: PIPE CLAMPS LOCATION & TYPE

9. Using two ORS-TF REPAIR KIT #501157 and one ORS-ORS ADAPTER FF2000T-1010S #501156, install the repair fittings as described in section **ASSEMBLY INSTRUCTION ORS-TF TUBE FITTING**.
10. At the front of the vehicle, pull on the blue power steering hose to take up the slack as the ORS-ORS adapter adds 43 mm to the total length of the line.
11. Tighten all the pipe & hose clamps previously loosen. See Figure 7 to Figure 9 for appropriate torque. Add a **torque seal** mark once properly tighten.

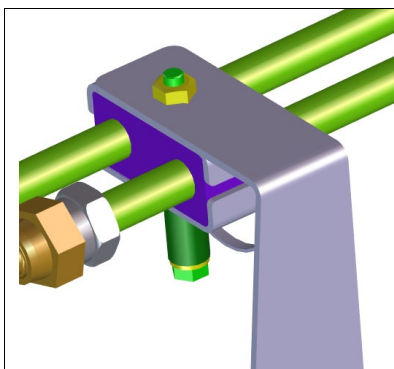


FIGURE 7: PIPE CLAMP TYPE 1  
Torque 13 lbf-ft

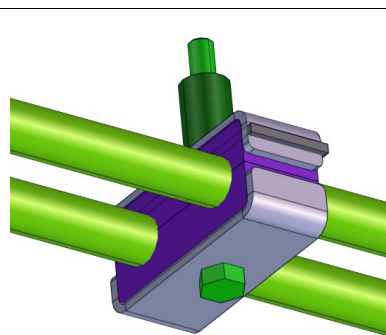


FIGURE 8: PIPE CLAMP TYPE 2  
Torque 13 lbf-ft

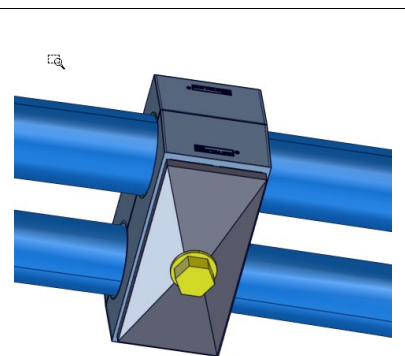


FIGURE 9: HOSE CLAMP TYPE 3  
Torque 8 lbf-ft

12. Refill the power steering system and bleed the system. Refer to the appendix A at the end of this document.

# PREVOST

## ASSEMBLY INSTRUCTION ORS-TF TUBE FITTING

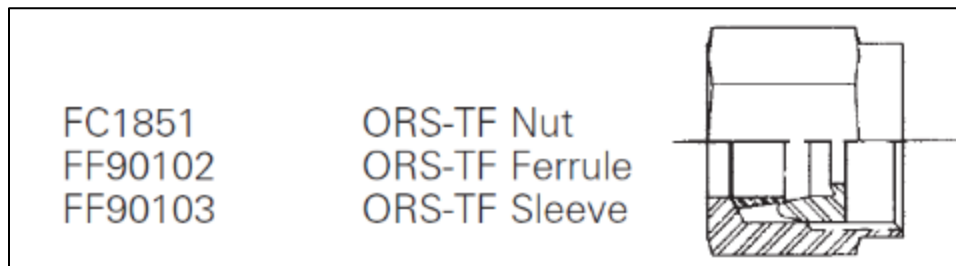


FIGURE 10

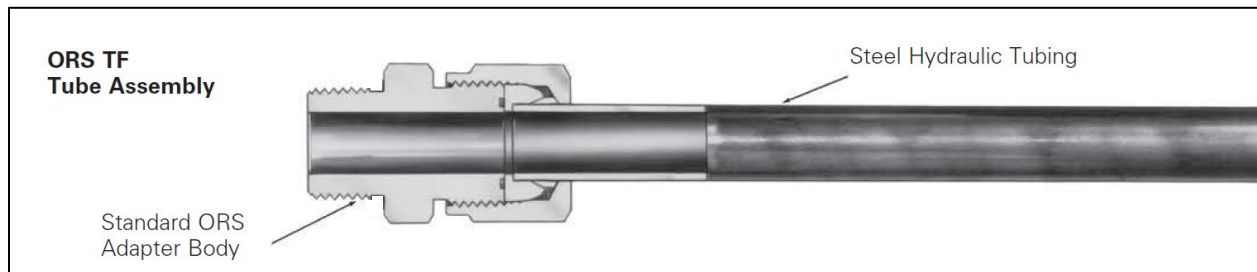


FIGURE 11: ABUTMENT REPAIR

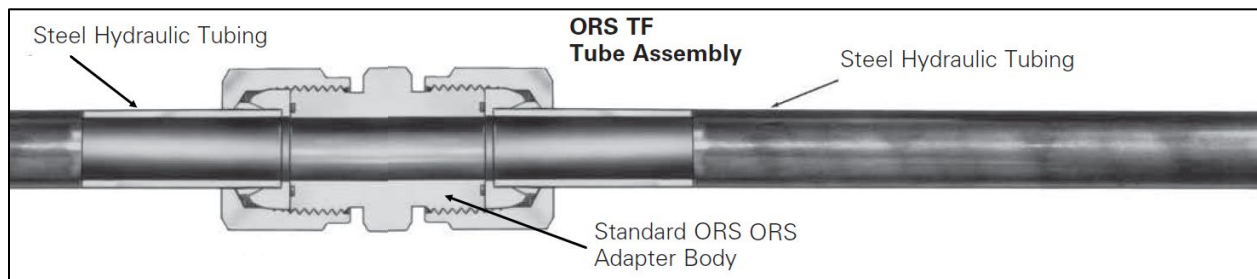


FIGURE 12: ALONG THE PIPE REPAIR

1. Inspect the tubing to insure that no scratches, gouges, burrs or other surface defects like welding bead are present.
2. Cut the tubing squarely ( $\pm 1^\circ$ ). Use a hacksaw or abrasive cutting wheel.
3. Deburr the tube end with a deburring tool or fine cut file. After deburring, be sure to remove all contaminants and dirt from the interior and exterior of the tube.

### Deburring

*All cut tubes should be deburred (Figure 13 & Figure 14). However, deburring is even more important if the tubing was cut with a hacksaw or abrasive wheel. Remove any burrs, both internally and externally, with a deburring tool, emery paper or fine file. Clean the tube before assembly. Clean all dirt and grit from the I.D. and O.D. of the tube.*





FIGURE 13: DEBURR THE TUBE END - INNER



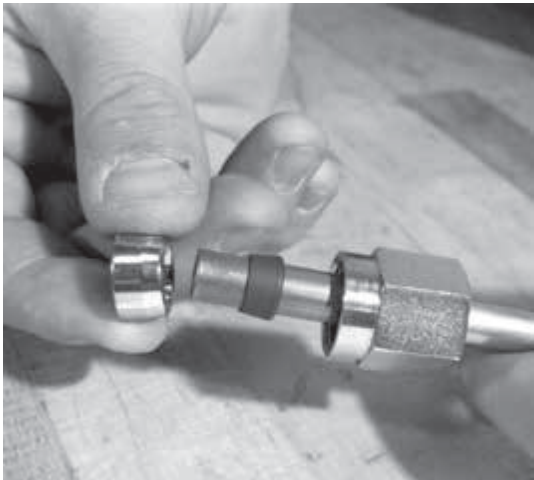
FIGURE 14: DEBURR THE TUBE END - OUTER

4. Inspect ORS-ORS adapter and ORS-TF components for damage. Assure sealing surfaces are free from all surface gouges, scratches, dirt and contaminants. Inspect O-ring to make sure that it is properly seated in the groove and is free from damage. Apply a thin film of compatible lubricant (clean power steering fluid) to the O-ring prior to installation.
5. Place a nut, ferrule and sleeve onto tubing, assuring that the identification groove of the ferrule is toward the nut (Figure 15). Assemble the nut to the ORS-ORS adapter until handtight with the tubing fully inserted into the fitting until bottomed out. Mark the nut in relation with the ORS-ORS adapter and tighten **1 ½ turns** with a wrench (Figure 16 to Figure 18). The ORS-TF sleeve cannot be used to preset multiple tube assemblies. It may be used once for presetting.

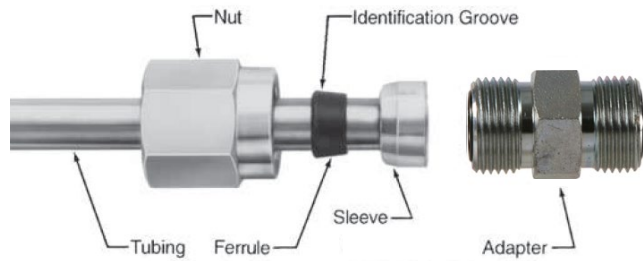


## CAUTION

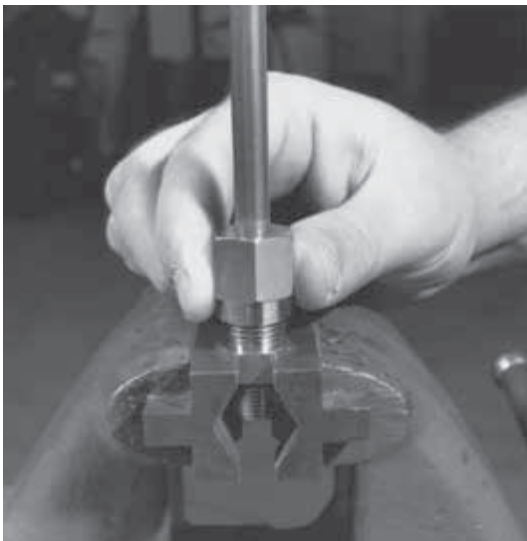
Tubing must be fully inserted into the fitting and the nut tightened as specified above to ensure performance and to prevent leakage and potential fitting blow-off. Excessive tightening of the nut beyond the recommended level may affect performance.



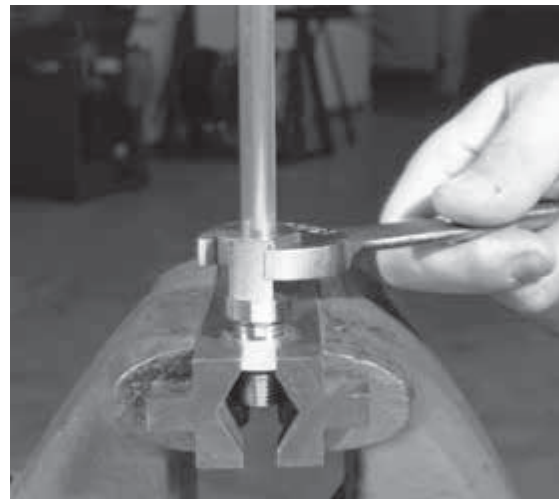
**FIGURE 15: PLACE A NUT, FERRULE AND SLEEVE ONTO TUBING**



**FIGURE 16**



**FIGURE 17: ASSEMBLE THE NUT TO THE ORS-ORS ADAPTER UNTIL HANDTIGHT (IMAGE NOT SHOWING REAL BUS CONDITION)**



**FIGURE 18: MARK THE NUT IN RELATION WITH THE ORS-ORS ADAPTER AND TIGHTEN 1 ½ TURNS WITH A WRENCH (IMAGE NOT SHOWING REAL BUS CONDITION)**

6. Add a **torque seal** mark across the fittings once properly tighten.

**NOTE**

The ORS-TF tube assemblies are designed for re-use and can be reinstalled by tightening the nut until a sharp increase in resistance is felt (approximately 1/4 turn beyond "hand-tight").

# PREVOST

## APPENDIX A

### FILLING AND BLEEDING THE SYSTEM

#### FLUID FILLING

1. In the engine compartment, on engine curbside, remove the tank cover and place the nut on the spring to maintain normal pressure on the filter in the tank.

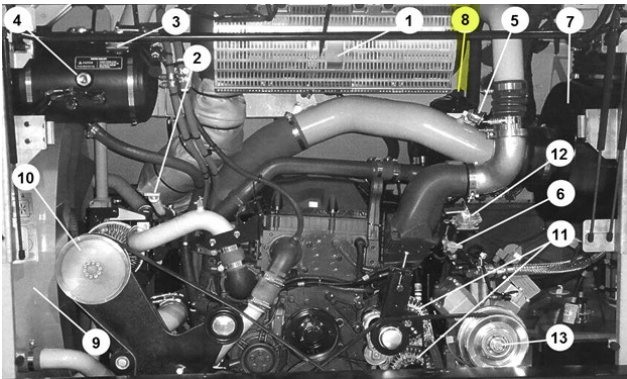


FIGURE 19: POWER STEERING FLUID TANK, ITEM 8 ON PICTURE ABOVE

2. Fill the tank with fresh Mobil Dexron-VI ATF fluid up to 2 inches from the top of the tank (only to prevent spills).



FIGURE 20: POWER STEERING FLUID TANK

3. Start the engine and have it run at idling speed to fill the steering system with fluid. During this operation, the fluid level in the tank will drop. Therefore, to avoid any suction of air, the fluid tank has to be topped up constantly.

## BLEEDING

### FOR STEERING GEAR VERSIONS WITH AUTOMATIC BLEEDING

Steering gear versions with automatic bleeding do not have any bleed screws. These steering gears automatically bleed any air remaining within the steering system. Proceed as follows :

- a) Lift the front of the vehicle from **under the axle** so that the wheels are not on the ground and **can be turned with the steering wheel**.



Use a pair of low profile jack stands to support the front axle beam.

Always place safety stands when working under the vehicle. Refer to Maintenance Instruction *MI14-01B Hoisting and Towing Procedure for NYCT X3-45 Commuter Buses* for further details on lifting procedures and safe lifting practices.

- b) Start the engine and have it run at idling speed for 2-3 minutes. Ask a colleague to turn the wheel from one knuckle stop to the other until the effort needed is constant, so the air will be evacuated by the steering fluid reservoir. Monitor the fluid level in the tank.
  
- c) After bleeding, fill the tank up to 1" from the top of the tank. Check the fluid level with the dipstick.



#### DANGER

DO NOT work near the fan with the engine running. The engine fan can engage at any time without warning. Anyone near the fan when it turns on could be seriously injured.



#### WARNING

Never attempt adjustments while the engine is running unless otherwise specified for the service procedure. To help prevent an accident caused by moving parts, work carefully around them. Guards, covers and shields should be in place whenever maintenance is not being performed. Keep objects away from moving fan blades. They will throw or cut any object or tool that falls or is pushed into them.

## STEERING GEAR WITH BLEEDER/BLEEDER SCREW

Refer to paragraph **5.4.3 Bleeding** of RB Robert Bosch Servocom Service Manual (8090) available on the Technical Publications site.

<https://techpub.prevostcar.com/en/download?id=352&type=publications>

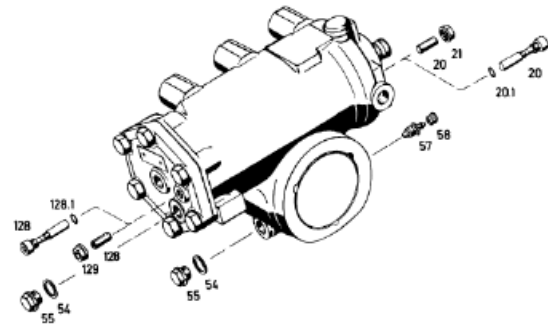
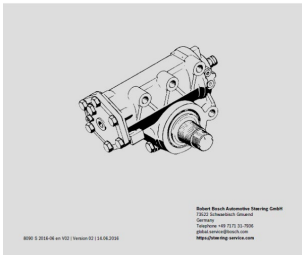
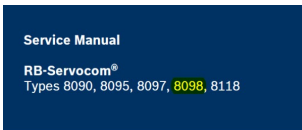


FIGURE 21 : BLEEDER (item 57) & BLEED SCREWS

1. Check the good operation of the system by performing a test drive.

## PARTS / WASTE DISPOSAL

Discard waste according to applicable environmental regulations (Municipal/State[Prov.]/ Federal)