

TRW Automotive
Commercial Steering Systems**Service Procedure #SRV-100****Flushing and Filling the Steering System**

December, 2008

NOTE

The steering system must be flushed every time a gear, pump, or other major component is replaced, regardless if the components are new or are remanufactured

This TRW Commercial Steering Systems service procedure has been written to help you repair commercial vehicles more efficiently. This procedure should not replace your manuals; you should use them together. These materials are intended for use by properly trained, professional mechanics, NOT "Do-it-yourselfers". You should not try to diagnose or repair steering problems unless you have been trained, and have the right equipment, tools and know-how to perform the work correctly and safely.

Flushing Procedure

1. Set parking brake on vehicle and block rear wheels.
2. Raise the front end off the ground.
3. Take vehicle out of gear and put into neutral position.
4. Raise hood and wipe down area around the steering gear and the hydraulic lines related to the steering system.
5. Place a drip pan under the steering gear to catch the oil. If the system is equipped with an assist cylinder or slave gear use a drip pan to catch any fluid that might drain from this component as well.
6. Remove both the pressure and return lines (Figure 1) from the steering gear and allow the oil to drain into the empty container. If applicable, remove the two pressure lines from the assist gear or cylinder and drain into a drip pan. Remove hoses as required to allow cooler to drain its oil tubes.
7. Remove filter (Figure 2) from the power steering fluid reservoir and discard. Disconnect the supply line from the reservoir.
8. Rinse and clean the inside of the reservoir with automatic transmission fluid. Do not use a shop rag to wipe the inside of the reservoir. If the reservoir is made from plastic inspect for cracks and damage. Replace with a new part if necessary.



Figure 1



Figure 2



Figure 3

9. Turn steering wheel from full left to full right 3-4 times. Collect the drained oil in the same container(s) as in Step 6. This will purge the oil from the steering gear(s).
10. Reconnect pressure and return lines to the steering gear(s). Connect the supply line to the reservoir and then tighten all fittings.
11. Install new filter element into the reservoir.
12. Clean reservoir filler cap with automatic transmission fluid. Inspect gasket and replace if necessary.
13. Inspect all hydraulic hoses (Figure 3) for cracks, soft or sweat spots and signs of local collapse (remove all covers/corrugated tubing from hoses to do this) and replace any that are found to be defective.
14. Check any fittings and connectors for blockages. Clear any blockages using an appropriate method or use a new fitting/connector.



Figure 4



Figure 5

Fill Procedure

1. Fill reservoir with approved power steering fluid and reinstall the filler cap (Figure 4).
2. Start engine for 10 seconds, stop, and check reservoir fluid level and top off if necessary. You may need to repeat this procedure 3 or 4 times.
3. Upon completion of filling the reservoir, start the engine and let it idle. At engine idle, steer full right and full left (Figure 5) once and return to straight ahead. Stop engine and check power steering reservoir level and top off if required.

⚠ CAUTION	Do not hold steering wheel at full turn for longer than 10 seconds as this will cause system to overheat
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4. Restart engine and steer full turns each direction 3 or 4 times.
5. Stop engine and recheck reservoir fluid level and adjust to correct level, if needed.
6. Inspect system for leaks and correct if necessary.
7. Bleed air from the system (see procedure below).
8. Remove drip pan and lower vehicle.

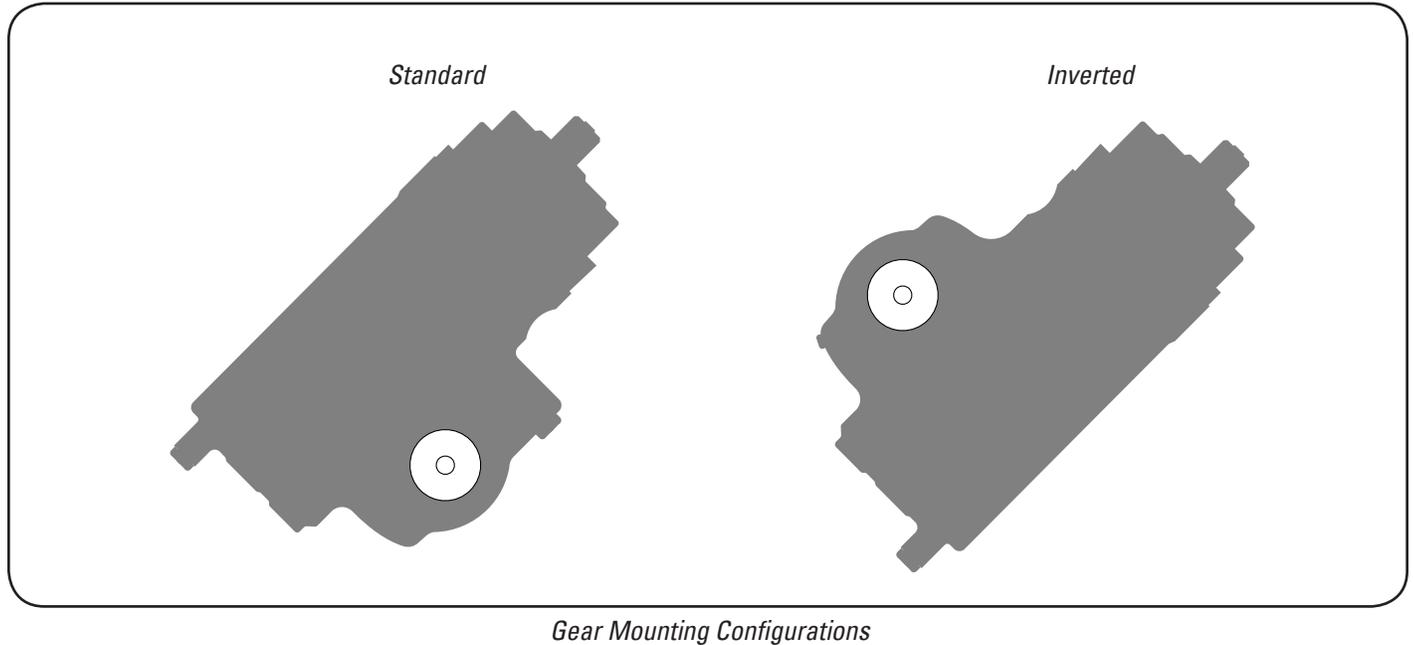
⚠ CAUTION	Recycle all used oil using an appropriate, environmentally accepted, method. DO NOT reuse used oil as its material properties and contamination levels will be unknown.
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9. Remove blocks from wheels and return vehicle for normal service.

Air Bleeding the Steering System

Visual Identification

When you air bleed a steering system, you are simply allowing air trapped in the cavities of the steering gear to escape. As a general rule, if your steering gear is a "standard mount", you should use the Automatic Bleed method. If your gear is an "inverted mount", you will need to use the Manual Bleed method to purge the trapped air from the gear.



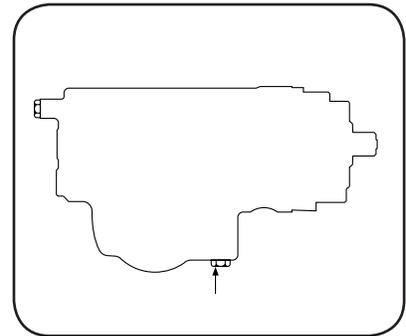
Automatic Bleed Gears

1. Fill the reservoir.
2. Start the engine, let it run for 10 seconds - without steering, then shut it off.
3. Check the reservoir, and refill if the fluid level has dropped.
4. Repeat at least three times, checking and refilling the reservoir each time if necessary.

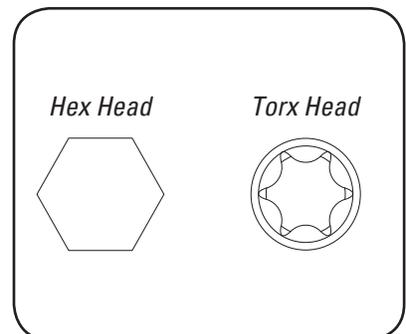
NOTE

Do not allow the fluid level to drop significantly or run out of the reservoir. This may induce air into the system.

5. Start the engine and let it idle for 2 minutes - without steering. Shut off the engine and check the fluid level in the reservoir. Refill if required.
6. Start the engine again. Steer the vehicle from full left to full right several times. Automatic bleed systems should now be free from trapped air.
7. Finally, be sure to check the fluid level in the reservoir. Refill if necessary before returning the vehicle to service.



Auto Bleed Plug Location



Auto Bleed Plug Styles

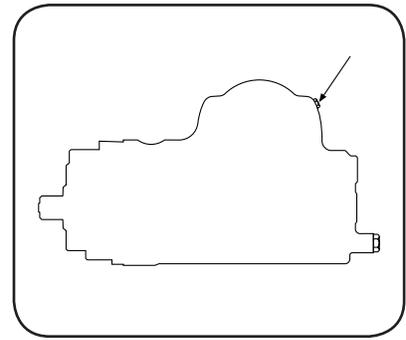
Manual Bleed Gears

1. Fill the reservoir.
2. Start the engine, let it run for 10 seconds - without steering, then shut it off.
3. Check the reservoir, and refill if the fluid level has dropped.
4. Repeat this process at least three times, checking and refilling the reservoir each time if necessary.

NOTE Do not allow the fluid level to drop significantly or run out of the reservoir. This may induce air into the system.

5. Start the engine and let it idle for 2 minutes - without steering. Shut off the engine and check the fluid level in the reservoir. Refill if required.
6. Start the engine again. Steer the vehicle from full left to full right several times.
7. Again, check the fluid level in the reservoir.
8. With the engine idling, steer from full left turn to full right turn several times. Stop steering with the wheels pointed straight ahead and loosen the manual bleed screw 2-3 turns.
9. Allow air and aerated fluid to "bleed out" until fluid appears without bubbles.
10. Close the bleed screw, refill the reservoir if required.
11. Repeat steps 8, 9 and 10 three or four times until all the air is discharged. Torque manual bleed screw to 45 in•lb.

CAUTION Do not turn steering wheel with bleed screw loosened.



Manual Bleed Screw Location



Figure 1



Figure 2



5/16" Hexagon Screw

Manual Bleed Screw Style

TRW Commercial Steering Systems

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