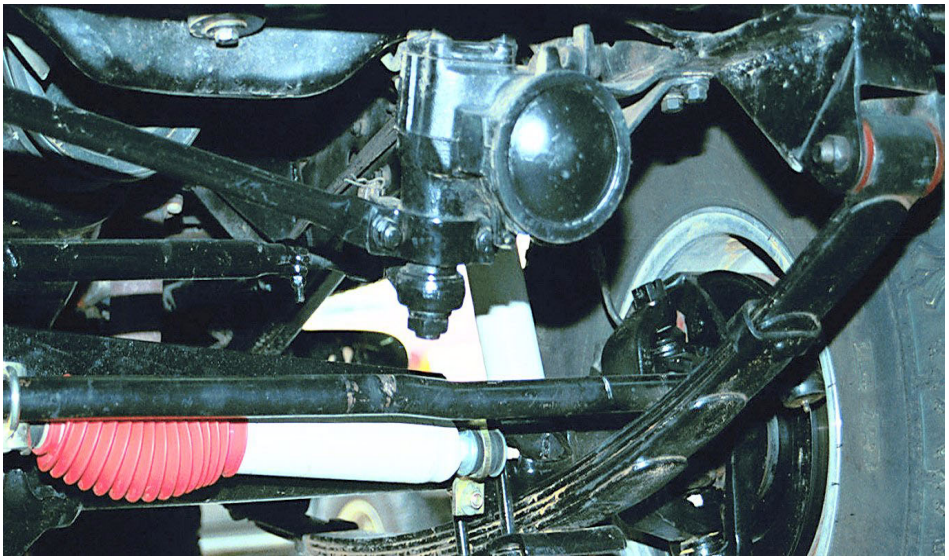
GEARBOX INSTALLATION INSTRUCTIONS

WARNING

Failure to read and follow these instructions will void any warranty and possibly cause severe damage to your power steering and/or hydro boost brake components. If you have any questions please contact your dealer.

Removing the Old Gearbox

Removing the steering gearbox from the vehicle is very similar in most applications.



Step 1 Remove the bolt from the coupler that couples the intermediate shaft to the input shaft of the steering gearbox.

Step 2 Remove the power steering hoses from the steering gearbox.

TIP

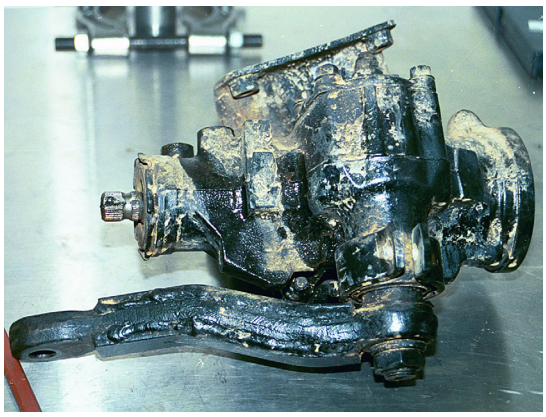
In some vehicles it is easier to loosen the lines while the gearbox is still mounted and then remove the lines after the gearbox is unbolted from the chassis.

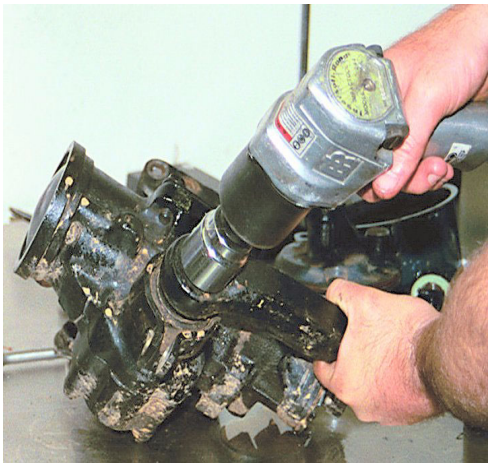
Step 3 Remove the cotter key and nut retaining the tie rod end.

Step 4 Using a tie rod puller, separate the tie rod end from the pitman arm.

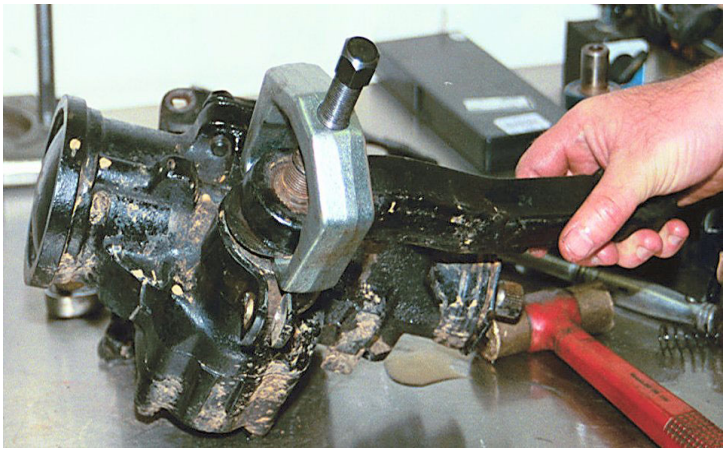
Step 5 Remove the tie rod end from the pitman arm.

Step 6 Remove the nut that retains the pitman arm to the sector shaft of the gearbox.

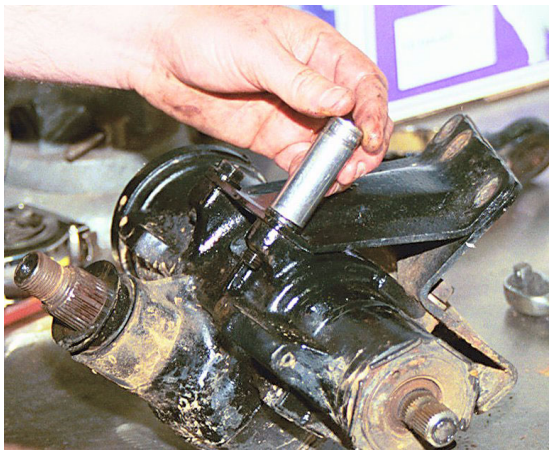




Step 7 Using a pitman arm puller, remove the pitman arm.



Step 8 Remove the mount bolts that retain the gearbox in the chassis. On some vehicles you must remove the steering gearbox with the mount brackets attached and then remove the mount brackets once the gearbox is on the workbench. As you are removing the gearbox, you can then disconnect the intermediate shaft coupler from the input shaft of the gearbox. You might have to use a mallet and tap on the coupler to get it to slide off of the input shaft.



CAUTION

Some vehicles use a bell type coupler; be careful not to separate or damage this coupler while removing it from the gearbox.

Inspecting the Steering System

While you have the steering system disassembled to this point, it is a good idea to inspect the components for wear and damage.

Step 1 Examine your intermediate shaft for wear and damage. AGR recommends installing a heavy duty intermediate shaft. One advantage to aftermarket intermediate shafts is they are collapsible, meaning you can remove or install them without removing the steering gearbox. In addition, they can be indexed to any position to help align your steering wheel spoke. The O.E. intermediate shaft is designed to collapse only when there is impact.

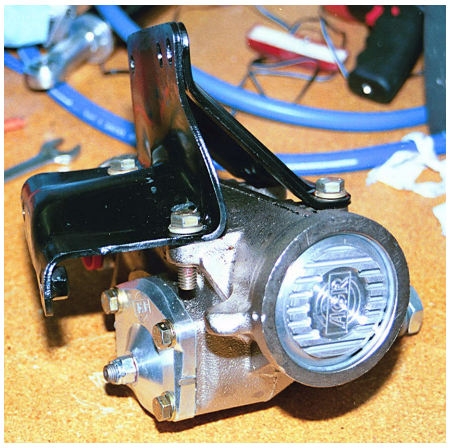
Step 2 Inspect the frame and mount brackets for cracks or damage.

Step 3 Inspect power steering hoses for damage. AGR recommends new hoses on every steering system. Most hose damage is within the hose and cannot be detected with a visual inspection. This damage would be detrimental with the increased flow and pressure sustained in the new system.

Installing the New Gearbox

For the most part, installing the new gearbox is the reverse process of removing the old one.

Step 1 If you removed the old gearbox with the mount brackets attached, attach the mount brackets on the new gearbox.



Step 2 Connect the intermediate shaft coupler to the input shaft of the gearbox.

IMPORTANT

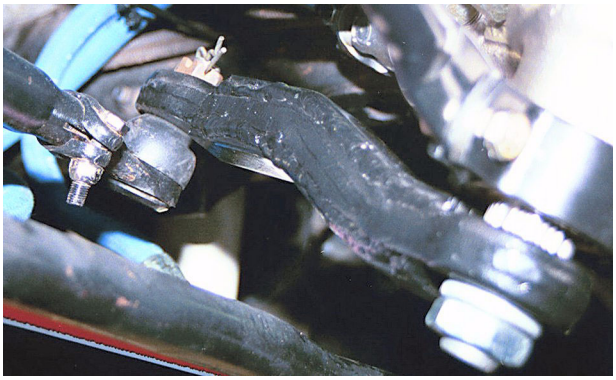
One of the more important things to watch when installing a new gearbox is to make sure your steering gearbox coupler is aligned properly when sliding it back over the input shaft of the gearbox. All mount bolts should be installed with locking washers and grade 8 or O.E. hardware. The O.E. hardware should be sufficient unless damaged. However, AGR recommends new grade 8 hardware.

Step 3 Center the sector shaft of the gearbox by doing the following:

- Align the front tires pointing straight forward.
- Turn the steering wheel fully to the left or right, then turn the steering wheel in the opposite direction and count the number of full rotations until the steering wheel is in the full lock position.
- Turn the steering wheel ½ the number of rotations determined in the previous step. This locates and centers the sector shaft of the of the gearbox.

Step 4 Attach the pitman arm to the sector shaft of the gearbox. The pitman arm can only be installed in four different positions, if you installed it in the wrong position it will be fairly obvious. Torque the pitman arm retaining nut to 180 foot pounds (this is easier to do once the gearbox is mounted) and be sure to use the lock washer provided.

Step 5 Attach the tie rod end to the pitman arm, then install the retaining nut and cotter key.



Step 6 Attach the power steering hoses to the pump and steering gearbox. AGR recommends installing new power steering hoses. Hoses can deteriorate from the inside out, thus making it difficult to determine if they are worn by visually inspecting them. Be sure to use power steering return hose or 250 lb. hydraulic equivalent hose.

IMPORTANT

If not using new hoses, the o-rings on the metric type fittings should be replaced. The flared tube ends of SAE type hoses should also be examined and the hose replaced if there is damage.

CAUTION

Air can be sucked into a hydraulic system around a connection and not leak hydraulic fluid. Air in a power steering system will burn up a power steering pump in a short amount of time and will produce a very annoying whine. Make sure all hose connections are sealed well (and don't use pipe dope or Teflon tape).

Step 7 If you are installing a power steering fluid cooler, now is a good time do so. It is recommended that a power steering fluid cooler be used in all extreme duty applications.

Step 8 Attach the bolt to the coupler that couples the intermediate shaft to the input shaft of the steering gearbox.

Step 9 Once the gearbox is in place and everything is reattached, inspect around the sides of the case and be sure that there is nothing pressing up around the cylinder walls of the gearbox. There might be some installations when a mount bracket will press in on the cylinder wall of the gearbox when the mount bolts are tightened. This can prevent the piston from moving within the gearbox. If this is the case, correct the clearance problem before going forward with the installation. Jack up the front of the vehicle and be sure that when turning the steering wheel from full lock to lock, it turns freely. You will feel a little tightness as you go past center (wheels straight ahead) when turning from full lock to lock, this is normal when properly adjusted. If everything checks out, you're finished.

Step 10 Bleed the power steering system. Refer to the following Instructions for Bleeding Power Steering Systems. Failure to follow these bleeding instructions will void the warranty.

INSTRUCTIONS FOR BLEEDING AIR FROM THE POWER STEERING SYSTEM

IMPORTANT

When bleeding air from a power steering system, please follow AGR's bleeding Instructions only. AGR has found the following method is the only proper way to bleed a system.

Do not start the engine until system is fully bled. If on a Hydro Boost system, follow hydro boost bleeding procedures after bleeding the power steering system.

CAUTION

Failure to read and follow these instructions will void any warranty and possibly cause severe damage to your power steering and/or hydro boost brake components. If you have any questions please contact your dealer.

When to Bleed

- After any steering component replacement.
- If any part of the power steering system is opened for any reason.

Why Bleed

- To prevent pump damage.
- To ensure proper system operation.
- To stop steering system noise.

Before Bleeding

Carefully inspect the steering system.

- Hoses must not touch any other part of vehicle. Steering system noise could be caused by the hose touching the frame, body, or engine.

- All hose connections must be tight. Loose connections might not leak but could allow air into the system. Do not over tighten o-ring hoses as the o-ring might be crushed. Check flare seat type connections for exact fit.

How to Bleed

Step 1 Do not start the engine until the system is fully bled. Doing so may cause damage to the power steering components. Pump internals are metal on metal. Any air in the system can cause metal on metal contact and damage.

Step 2 Raise the front wheels off the ground, or remove the pitman arm or tie rod.

Step 3 Turn steering wheel fully to the left.

Step 4 Fill fluid reservoir to “full cold” level. Leave cap off.

Use only clear, name brand, premium racing synthetic power steering fluid, such as Royal Purple or Red Line. Do not use transmission fluid, as transmission fluid does not contain the same friction inhibitors/additives and tends to breakdown and overheat. Use of transmission fluid will void the warranty.

Step 5 Whith an assistant checking the fluid level and condition, turn the steering wheel slowly and smoothly lock to lock until fluid level drops in pump reservoir. If fluid level has not dropped, no fluid has moved through the system. This normally indicates a large bubble in the reservoir or pump. Until this bubble passes, no fluid will circulate through the system.

— Do not turn the steering wheel fast as this will cause the fluid to overflow the reservoir. Trapped air may cause fluid to overflow. Thoroughly clean any spilled fluid to allow for leak checks.

— On systems with coolers, winches, or Rock Ram assist you may need to cycle in excess of 40 times or more.

Step 6 Check fluid constantly to ensure proper level and that no bubbles exist.

— If you see any signs of bubbles, recheck all connections then repeat the steps above.

— Fluid level should be steady (Rock Ram’s level will vary slightly).

Step 7 Disable engine from starting. (*Non Hydro Boost Brake Systems*)

— Crank engine several revolutions. If fluid level drops, there is compressed air trapped in the system. Repeat above steps until fluid level is stable.

— If fluid foams while cranking, wait 10 minutes or more until dispersed air has time to accumulate and purge through the reservoir.

Step 8 Continue above steps until fluid level remains constant and no air bubbles are visible.

Step 9 If you have a hydro boost brake system continue, if not skip to **Step 11**.

Hydro Boost Systems Only

These Hydro Boost specific instructions must be followed. Failure to follow these procedures can cause your new high volume pump to become damaged or fail completely. Do not turn the steering wheel while performing these procedures.

— Discharge the Hydro Boost brake unit by performing three full presses on the brake pedal.

— Watch power steering reservoir for any bubbling, foaming or burping.

— Once foam clears, crank engine until it just catches and shut off.
— Discharge Hydro Boost unit with three full presses of the brake pedal.
— Repeat these steps until no air or foam is seen in the reservoir.
— If Brake Pedal feels soft, spongy or funny, system is not fully bled.
— Repeat above steps.


TIP

It is recommended on Ford Super Dutys with Hydro Boost Brakes, that the original pressure line from the Hydro Boost Unit to the pump be replaced with the updated line. Also that the Ball Joints be checked for lubrication, stiffness or wear.

If you have excessive metal in the fluid, the hydro boost will not bleed, is noisy or the brake pedal feels funny, call AGR Tecnical Support.


NOTE

If you need to replace your hydro boost unit, AGR recommends replacing with a ported unit and not an OEM unit.

Step 10 Enable engine to start. With engine idling, maintain fluid level.

Step 11 Reinstall reservoir cap.

Step 12 Return wheels to center.

Step 13 Lower front wheels to ground or reinstall pitman arm or tie rod if removed in Step 2.

Step 14 Run engine for two minutes. Turn steering wheel in both directions.

Step 15 Do not hold steering wheel against the stops.

Step 16 Verify the following conditions:

— Smooth power assist
— Noiseless operation
— Proper fluid level
— No system leaks
— Proper fluid condition
— No bubbles, foam, or discoloration

Step 17 If all conditions are satisfied, the bleeding procedure is complete.

Step 18 If any problem exists, turn off engine and see Special Conditions below.

Special Conditions

If you experience any of the conditions listed below, there is still air in the system.

- Foam or bubbles in fluid (fluid must be completely free of bubbles).
- Power steering fluid should not rise in the reservoir when the engine is turned off. If this occurs, there is trapped air in the system.
- Be alert to periodic bubbles that could indicate a loose connection, leaky o-ring, or a bad flare seat in either the pressure or return hose.
- Discolored fluid (milky, opaque, or light tan color).

Eliminating Air in the Power Steering System

Follow the steps below to eliminate air in the power steering system.

Step 1 Turn ignition off. Wait thirty minutes. Recheck hose connections. Repeat start up procedures. If problem still exists, replace or check for possible causes including:

- — Return hose clamps
- — Return hose o-ring or flare seat
- — Pressure hose o-ring or flare seat
- — All other connections

Step 2 Fill system and repeat bleeding procedure for each possible cause.

Eliminating Noise in the Power Steering System

If you hear a whining or groaning noise originating from the pump after all air is out of the system (if air is not out, see Special Conditions), then do the following:

Step 1 Check belts for slippage.

Step 2 Mark pulley and make sure it is not slipping on the shaft.

Step 3 With the engine running, recheck hoses for possible contact with frame, body, or engine. If no contact is found, cool fluid and repressurize system.

Step 4 After cooling fluid, start engine to come up to operating temperature and recheck.