

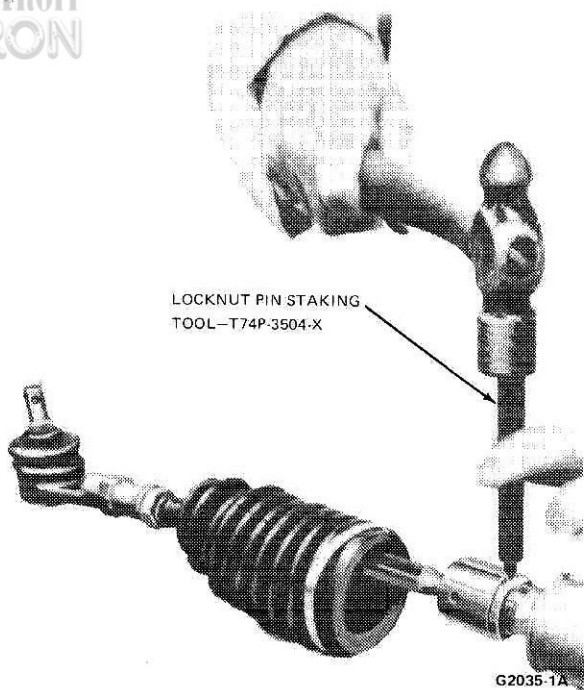


FIG. 8 Staking Locknut Pin—Pinto/Bobcat/Mustang II Only

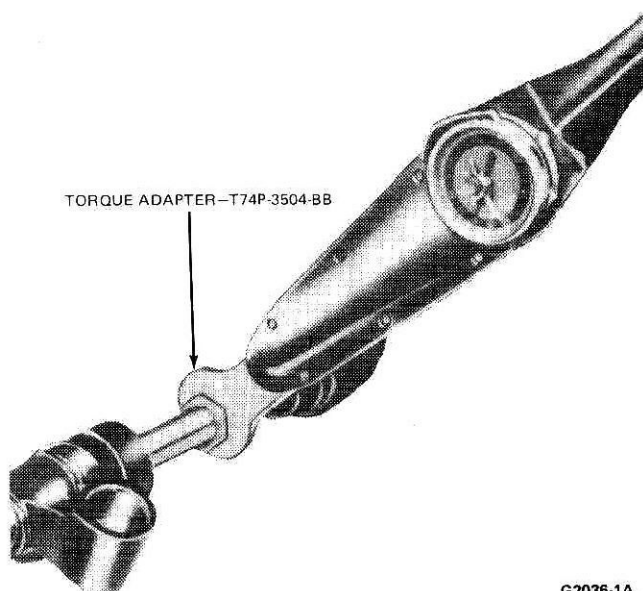
locknut. The joint must not loosen under this torque application (Fig. 9). Remove the tie rod ends.

14. Install the bellows. Install the clamps retaining the bellows to the tie rod. Install right bellows to housing clamp.
15. Install 7 ounces of D2AZ-19580-B (Spec. M2E105-B) lubricant or equivalent through the left bellows, and install the clamp retaining the bellows to the gear housing.
16. Install the jam nuts and tie rod ends on the tie rods.

FAIRMONT/ZEPHYR

Disassembly

1. Clean the exterior of the gear thoroughly and place the gear in the bench mounted holding fixture as described under "Adjustments."
2. Loosen the jam nuts on the outer ends of the tie rods adjacent to the tie rod ends.
3. Remove the tie rod ends and jam nuts.
4. Remove the four clamps, retaining the bellows to the gear housing and the tie rods. Drain the lubricant and remove the bellows. **Use care so as not to damage or contaminate the inside of the bellows.**
5. Remove spiral pin from ball housing with Tool T78P-3504-N (Fig. 10).
6. Install ball housing torque adapter, Tool T78P-3504-AA on ball housing. Locate the point of the locking screw in the large hole midway along the length of the housing and tighten firmly (Fig. 11).
7. Attach a standard 1/2 inch drive ratchet handle to the tool. Expose enough rack teeth to install an adjustable wrench over the flat formed by the tops of the rack teeth. Loosen the ball housing tie rod assembly by holding the adjustable wrench and turning the ball housing torque adapter tool T78P-3504-AA (Fig. 11).



G2036-1A

FIG. 9 Testing Locknut Pin

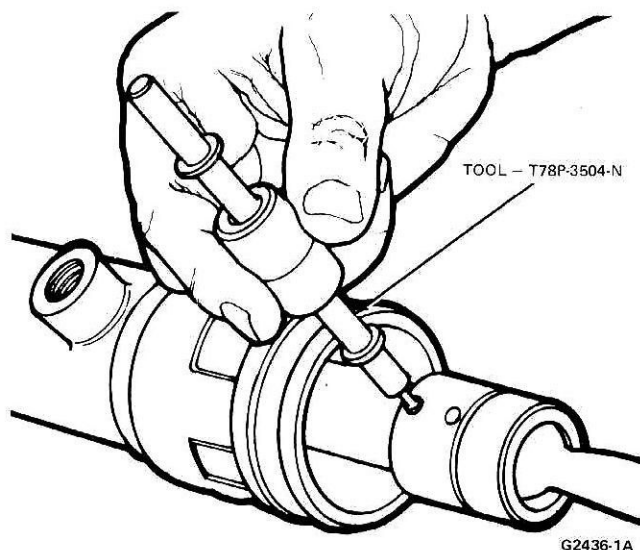


FIG. 10 Removing Spiral Pin From Ball Housing—Fairmont/Zephyr

Caution: If the rack is not restrained by the adjustable wrench, the pinion will be damaged.

Assembly

1. Clean and inspect the condition of the threads on the rack and in the ball housing socket.
2. Thread the tie rod assembly onto the end of the rack.
3. Install ball housing torque adapter tool on the ball housing. Locate the point of the locking screw in the large hole midway along the length of the housing and tighten firmly.
4. Hold rack with an adjustable wrench on the flat of the rack teeth, as near the end of the rack as possible. If pinion has not been removed, use care not to load the pinion during torquing. Holding the rack with the adjustable wrench, torque ball

housing to 45-60 ft-lb by turning the torque adapter tool with a 1/2 inch drive torque wrench (Fig. 11).

5. Rotate the tie rod at least 10 times before measuring the articulation effort. If articulation effort is not to specification, replace with a new tie rod. See procedure for articulation effort check described earlier in this Part.
6. Insert the spiral retaining pin into the small hole in the ball housing and tap lightly with a hammer until seated. Do not tap hard enough to deform the pin as this would make it difficult to remove the pin should it become necessary to do so.
7. Apply specified lube to the tie rods in undercut where bellows will be clamped. This will prevent the bellows from twisting during toe adjustment. Install the small bellows clamps. Install the large bellows clamp on the right side only (opposite end from pinion).
8. Place gear in a vertical position with the pinion end of gear up. Fill housing with 5 oz. of the specified fluid lubricant. Install left large bellows clamp, fastening the bellows to the gear housing.
9. Install jam nuts and tie rod ends on the tie rods.

INPUT SHAFT SEAL

Disassembly and Assembly

1. Clean the input shaft and seal area thoroughly. Do not scratch or damage the pinion shaft. Pry the pinion seal from its bore and discard.
2. Lubricate a new pinion seal with C1AZ-19590-B lubricant or equivalent and install the seal over the shaft.
3. Use a piece of tubing to engage the outer flange of the seal, and press or tap the seal into its bore until flange is flush with the shoulder of the bore. **If the outer edge of the seal is not engaged when assembling, the seal will be damaged.**

RACK SUPPORT YOKE, SPRING, GASKET, SHIMS AND COVER

Disassembly

1. Clean the exterior of the gear thoroughly and place the gear in the bench mounted holding fixture as described under Adjustments earlier in this Part.
2. Remove the yoke cover, shims, gasket and yoke spring.
3. Discard the gasket.

Assembly

1. Clean the cover and cover flange areas thoroughly.
2. Assemble the yoke and yoke spring.
3. Assemble a new gasket next to the housing flange. If necessary, adjust the yoke to rack spring tension or if new shims are to be installed, see Adjustments earlier in this Part.
4. Assemble the shim pack and cover.
5. Add sealant ESW-M46-132-A or equivalent to the cover bolt threads and torque the bolts to specification.

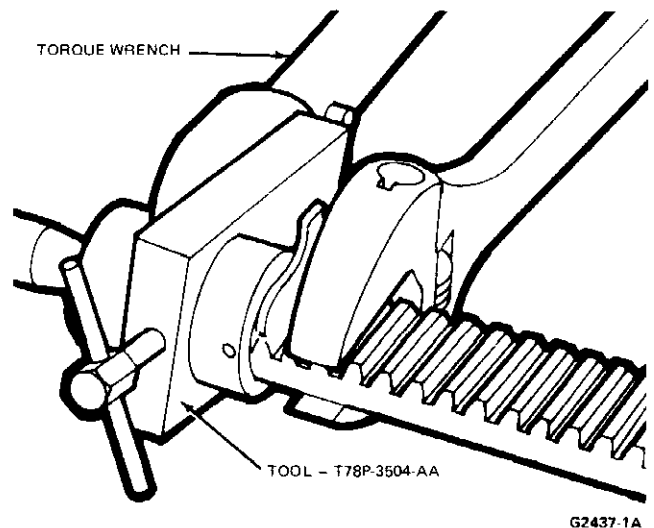


FIG. 11 Removing or Installing Tie Rod Ball Housing Assembly—Fairmont/Zephyr

PINION COVER, GASKET, PINION SHAFT, SPACER, SHIMS, UPPER BEARING, RACK, LOWER BEARING AND HOUSING

PINTO/BOBCAT/MUSTANG

Disassembly

1. Clean the exterior of the gear thoroughly.
2. Place the gear in the bench mounted holding fixture as described under Adjustments.
3. Remove the bolts, yoke cover, gasket, shims, spring and yoke from the bushing.
4. Remove one or both tie rods and sockets from the ends of the rack as described earlier.
5. Move the rack to either lock and note the position of the flat on the input shaft. It is important that when subsequent assembly of the pinion shaft is made, that the flat be aligned in this same position. **If the pinion is not assembled in the same position, the steering wheel will not be in the straight ahead position.**
6. Remove the pinion cover bolts, pinion cover, gasket, pinion shaft, spacer, shims and upper bearing.
7. Remove the rack from the housing.
8. Remove the lower bearing through the pinion shaft bore. Access to the bearing is easiest through the support yoke bore.

Assembly

1. Install the lower bearing in the pocket at the bottom of the housing.
2. Install the rack in the housing.
3. With the rack moved to one lock (Step 5 under Disassembly), install the pinion shaft. Be sure the pinion shaft gear end is engaged in the lower bearing I.D.
4. Install the upper pinion bearing, shims, spacer, gasket and pinion cover and bolts. Torque the bolts to specification.

If bearing preload needs to be altered, or a new shim pack is to be installed, see Adjustments earlier in this Part.

5. Install one or both tie rods and sockets on the ends of the rack as described earlier.
6. Install the support yoke, spring, shims, gaskets, yoke cover and bolts, using sealant ESW-M46-132A or equivalent on the bolt threads. Torque the bolts to specification. Adjust the yoke preload as described under Adjustments.

FAIRMONT/ZEPHYR

Disassembly

1. Clean the exterior of the gear thoroughly.
2. Place the gear in the bench mounted holding fixture as described under Adjustments.
3. Remove the bolts, yoke cover, gasket, shims, spring and yoke from the bushing.
4. Remove the right ball housing/tie rod assembly from the rack as described earlier in this Part.
5. Move the rack to the right turn stop and note the position of the D-shaped groove in the input shaft (Fig. 3). It is important that the groove be in the same position in subsequent assembly. Otherwise, the steering gear will not be centered (i.e; unequal number of turns in right and left directions).

6. Remove the pinion cover bolts, pinion cover, gasket, pinion shaft, spacer, shims and upper bearing.
7. Remove the rack from the housing.
8. Remove the lower bearing through the pinion shaft bore. Access to the bearing is easiest through the support yoke bore.

Assembly

1. Clean the interior of the gear thoroughly.
2. Install the lower bearing in the pocket at the bottom of the housing.
3. Install the rack in the housing.
4. With the rack moved to one lock (Step 5 under Disassembly), install the pinion shaft. Be sure the pinion shaft gear end is engaged in the lower bearing I.D.
5. Install the upper pinion bearing, shims, spacer, gasket and pinion cover and bolts. Torque the bolts to specification. If bearing preload needs to be altered, or a new shim pack is to be installed, see Adjustments earlier in this Part.
6. Install the right ball housing/tie rod assembly on the end of the rack as described earlier in this Part.
7. Install the support yoke, spring, shims, gaskets, yoke cover and bolts. Torque the bolts to specification. Adjust the yoke preload as described under Adjustments.

SPECIFICATIONS

RACK AND PINION STEERING GEAR SPECIFICATIONS AND TORQUES—PINTO/MUSTANG II/BOBCAT

Type	Rack and Pinion
Gear Ratio	24.2 At straight ahead position and 18.34 at full turn
Number of Turns (Within Gear)	4.15
Lubricant Capacity	7 oz. (Approx. 0.44 pts.)
Effort Required to Sustain Input Shaft Rotation (Gear Filled with Lubricant)	Pinto/Bobcat 5-15 in-lbs. Mustang II 7-17 in-lbs.
Weight (Dry)	14.0 Lbs. approx.
Tie Rod Articulation Effort (As measured on Pull Scale)	4-6 lbs.

① Tighten to nearest cotter pin slot after torquing to specification.

SPECIAL SERVICE TOOLS

Tool No.	Description
T74P-3504-AA	Lock Pin Drill Fixture
T74P-3504-BB	Lock Pin Torque Adapter
T74P-3504-CC	Ball Housing Wrench

Type	Rack and Pinion
Steering Gear Lubricant	D2AZ-19580-B
Pinion Seal Lubricant	C1AZ-19590-B
Bolt and Lockwasher . . . Support Yoke Cover to Cover Housing	15-20 ft-lbs.
Bolt and Lockwasher . . . Pinion Cover to Gear Housing	15-20 ft-lbs.
Steering Gear to Crossmember	80-100 ft-lbs.
Connecting Rod End to Spindle Arm	35-47 ft-lbs. ①
Connecting Rod End to Inner Tie Rod	35-50 ft-lbs.
Pinion Shaft to Flex Coupling Bolts	20-37 ft-lbs.

Tool No.	Description
T74P-3504-X	Locknut Pin Staking Tool
T74P-3504-Y	Pull Scale
T74P-3504-Z	Drill Fixture with Depth Gauge

RACK AND PINION STEERING GEAR SPECIFICATIONS AND TORQUES – FAIRMONT/ZEPHYR

Type	Rack and Pinion
Gear Ratio	24.9 At straight ahead position and 21.7 at full turn
Number of Turns (Within Gear)	4.15
Lubricant Capacity	7 oz. (Approx. 0.44 pts.)
Effort Required to Sustain Input Shaft Rotation (Gear Filled with Lubricant)	5-17 (In-Lb)
Weight (with Lube)	13 Lbs. Approx.
Tie Rod Articulation Effort (as measured on Pull Scale)	1-5 Lbs.
Steering Gear Lubricant	ESA-M1C175-A
Pinion Seal Lubricant	C1AZ-19590-B

Type	Rack and Pinion
Bolt and Lockwasher . . . Support Yoke Cover to Cover Housing	15-20 Ft-Lb
Bolt and Lockwasher . . . Pinion Cover to Gear Housing	15-20 Ft-Lb
Steering Gear to Crossmember	80-100 Ft-Lb
Connecting Rod End to Spindle Arm	35-47 Ft-Lb ①
Connecting Rod End to Inner Tie Rod	35-50 Ft-Lb
Pinion Shaft to Flex Coupling Bolts	20-37 Ft-Lb
Ball Housing to Rack	40-60 Ft-Lb

① Tighten to nearest cotter pin slot after torquing to specification.

SPECIAL SERVICE TOOLS

Tool No.	Description
T78P-3504-AA T78P-3504-N	Ball Housing Torque Adapter Spiral Pin Remover

Tool No.	Description
T74P-3504-Y	Pull Scale

CG2438-2A

Non-Integral Power Steering System—Ford

PART
13-40

Applies to Granada/Monarch/Versailles

SUBJECT	PAGE	SUBJECT	PAGE
ADJUSTMENTS		REMOVAL AND INSTALLATION (Cont'd.)	
Control Valve Centering	40-2	Control Valve to Power Steering	
		Cylinder Hose	40-6
DESCRIPTION		Power Cylinder	40-5
Non-Integral Power Steering System	40-1	Power Cylinder Seal	40-6
DISASSEMBLY AND ASSEMBLY		Power Steering Pump to Control	
Control Valve	40-7	Valve Hose	40-6
REMOVAL AND INSTALLATION		SPECIFICATIONS	40-10
Control Valve	40-4		

CG2409-2A

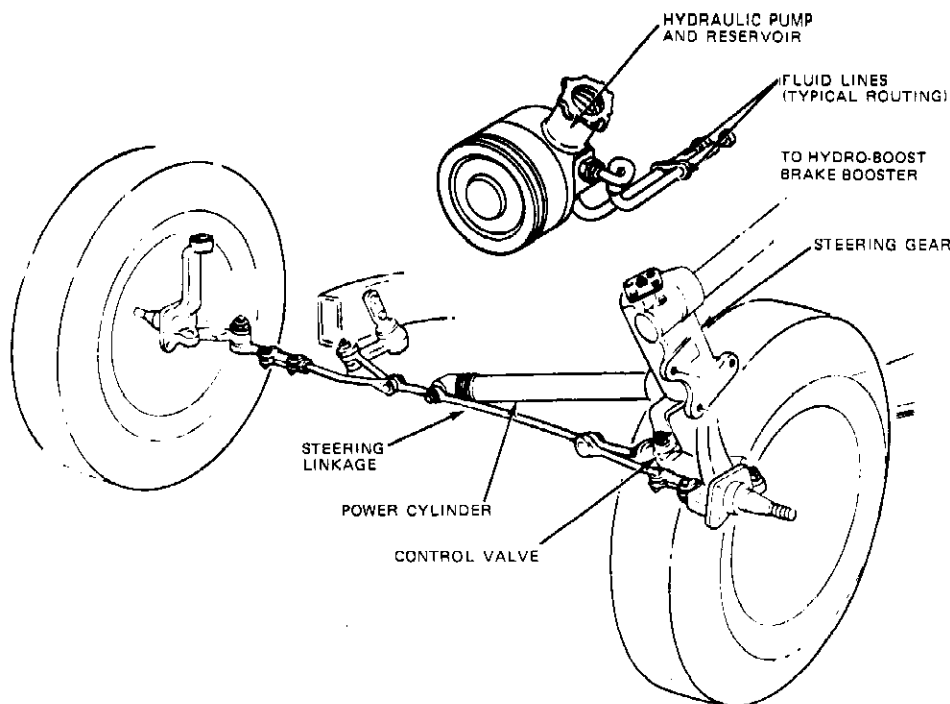
DESCRIPTION

NON-INTEGRAL POWER STEERING SYSTEM

The Non-Integral Power Steering System (Fig. 1) is a hydraulically controlled linkage-assist type steering system which includes an integral pump and fluid reservoir, a control valve, a power cylinder, connecting fluid lines, and the steering linkage. The hydraulic pump, which is belt driven from the engine crankshaft, draws fluid from the reservoir and provides pressure for the system. A pressure relief valve regulates the system

in the pump according to the varying conditions of operation. Once fluid has passed from the pump to the control valve and the power cylinder, it returns to the reservoir.

Refer to Volume 5—Maintenance and Lubrication for hoisting instructions. For Removal and Installation of the steering gear and power steering pump, refer to the appropriate Part.



G1968-2A

FIG. 1 Non-Integral Power Steering System

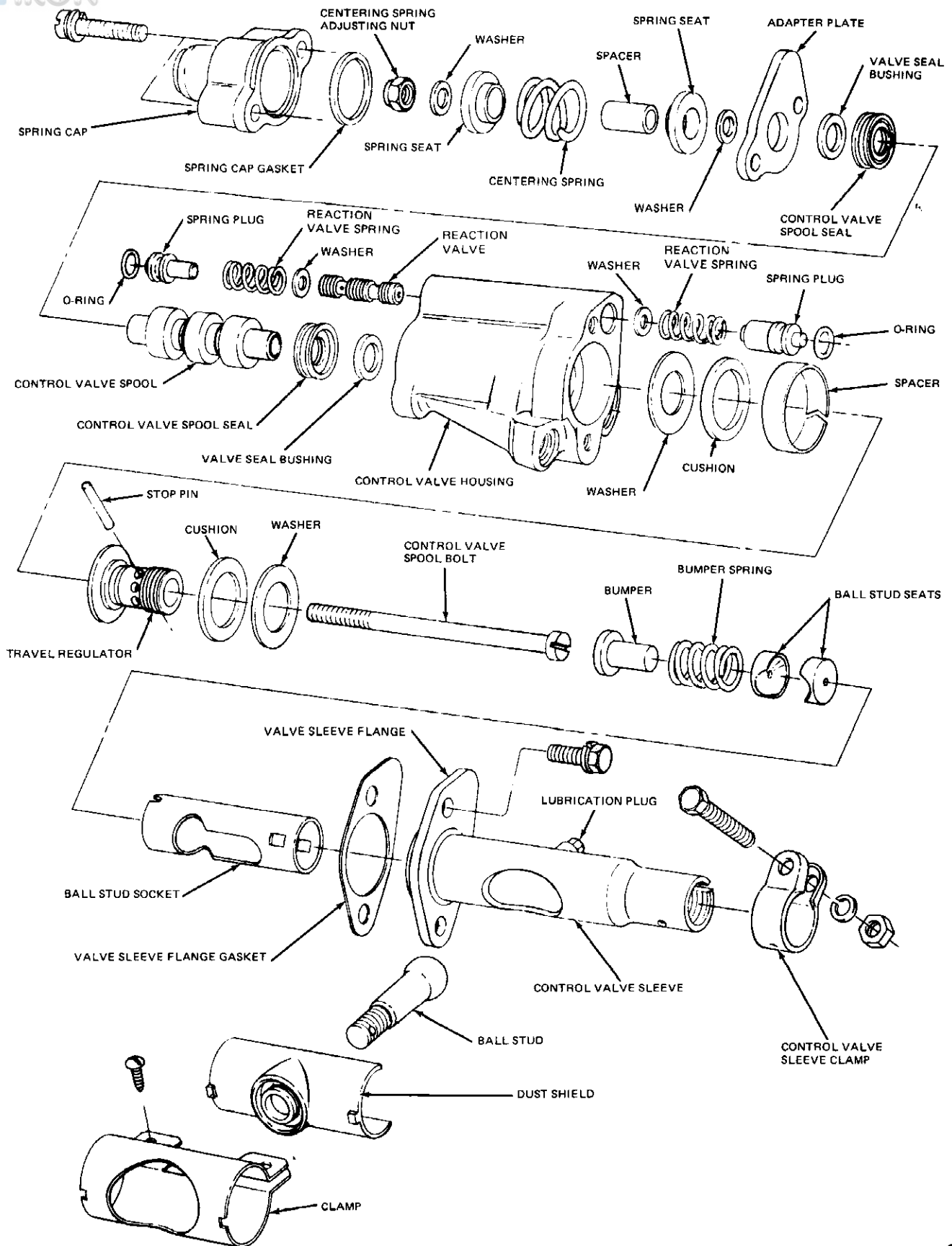
ADJUSTMENTS

CONTROL VALVE CENTERING

1. Raise the vehicle and remove two spring cap attaching screws and lock washer assemblies (Fig. 2). Remove the spring cap and discard the spring cap gasket. **Never start the engine with the spring cap removed.**
2. Torque the centering spring adjusting nut to 90-100 in-lb. **Do not tighten beyond specification.** Loosen the same spring adjusting nut 1/4 turn.

NOTE: Because the control valve spool bolt and nut may turn together slightly, be sure that only the nut-relative-to-bolt movement is counted.

3. Lubricate spring cap and gasket and position on valve housing. Lubricate and install the two screw and washer assemblies. Torque to 72-100 in-lb.
4. Lower the vehicle.



G1989-2C

FIG. 2 Control Valve Disassembled—Granada/Monarch/Versailles

REMOVAL AND INSTALLATION

CONTROL VALVE

Removal

1. Raise the vehicle and remove the worm-screw hose clamp that secures the fluid lines to the outside of the control valve body.
2. Disconnect the four fluid line fittings at the control valve and drain the fluid from the lines. Turn the front wheels to the left and right several times to force all of the fluid from the system.
3. Loosen the clamping nut and bolt at the end of the control valve sleeve.
4. Remove the roll pin from the steering arm-to-center link through the slot in the control valve sleeve.
5. Remove the cotter pin and the control valve ball stud nut. Remove the ball stud from the sector shaft arm (Pitman Arm). **When removing the ball stud from the sector shaft arm, it is necessary to use the control valve ball stud removing tool, No. 3290-C (Fig. 3). Use of other tools will result in damage to the control valve assembly.**
6. Remove valve assembly from the centerlink by turning counter-clockwise until the valve assembly is free of the centerlink.

Installation

1. Thread the valve onto the center link until approximately four threads are still visible on the link.
2. Position the ball stud in the sector shaft arm.

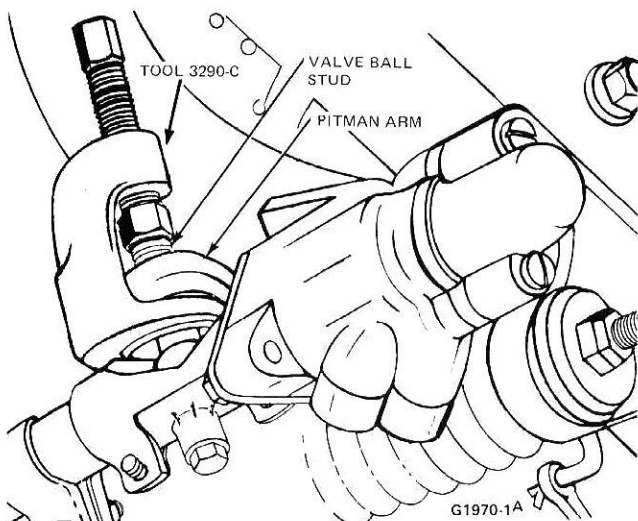


FIG. 3 Removing Control Valve Ball Stud

3. Measure the distance between the center of the left spindle connecting rod hole in the center link to the end of the control valve (Fig. 4). This distance **must** be 2.65-2.55 inches. If the distance is not correct, disengage the ball stud from the sector shaft arm and turn the valve on the center link to increase or decrease the distance.
4. Once the ball stud is correctly positioned in the sector shaft arm, align the hole in the steering arm-to-center link with the slot near the end of the valve

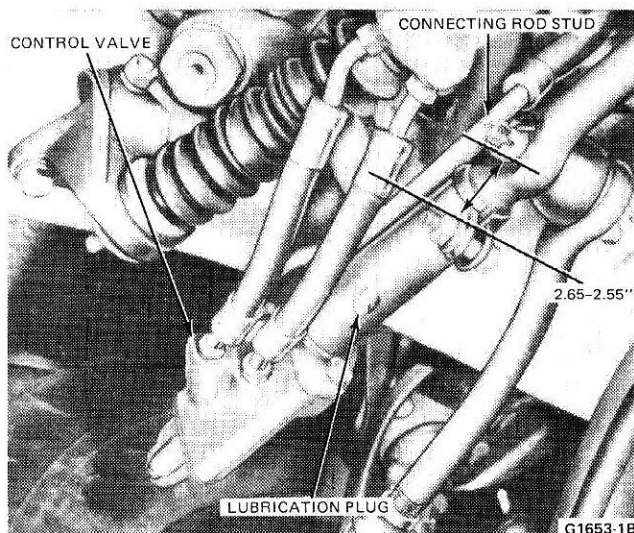


FIG. 4 Control Valve Installation Measurements

sleeve. Install the roll pin to lock the valve in position on the rod.

5. Torque the valve sleeve clamp nut to 13-17 ft-lb.
6. Install the nut on the ball stud. Torque the nut to 35-47 ft-lb. and install a new cotter pin.
7. Connect the return and pressure lines from the pump to the control valve, finger tight. Install the worm-screw hose clamp to secure the lines to the outside of the control valve. Torque the clamp to 36-60 in-lb. Torque the return line tube nut (5/8" hex) to 16-25 ft-lb and the pressure line tube nut (1/2" hex) to 15-19 ft-lb. **Do not tighten beyond specification.** Connect the unmarked end of the shorter control valve-to-power cylinder hose to valve port "C" (Fig. 5). Connect the other hose to valve port "A". Hold each tube so that the bend parallels the surface of the valve and torque each nut to 15-19 ft-lb. **Do not tighten beyond specification.**

PLANE OF TUBE BEND IN 3A714 & 3A717 TO BE PARALLEL WITH THIS SURFACE ON VALVE

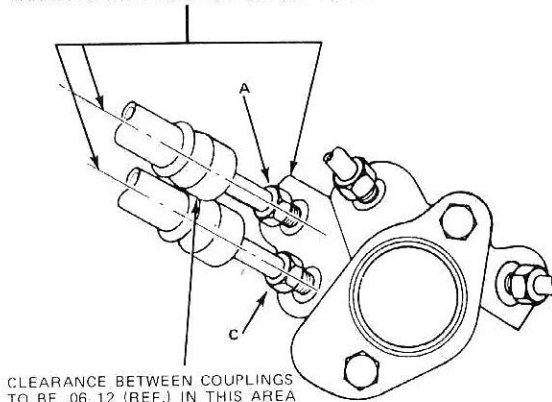


FIG. 5 Power Steering Hose Installation

8. Lower the vehicle and fill the fluid reservoir with fluid per Start Up Procedure given in Part 13-01.
9. With the engine running at idle speed, check the position of the steering wheel when the front wheels are in the straight-ahead position. **Do not make any adjustments until the toe is checked.**
10. Keep the engine running, check the toe. If either the toe or the steering wheel position is not correct, make the necessary adjustments as described in Group 14, Part 01.
11. Check the effort to turn the front wheels. It should be about equal in each direction.

POWER CYLINDER

Removal

1. Raise the vehicle and disconnect the two fluid lines from the power cylinder and drain the lines.
2. Remove the pal crimp nut, washer, and the insulator from the end of the power cylinder rod. When removing the crimp nut, cylinder rod must be held at the flat on the end of the rod to prevent rotation.

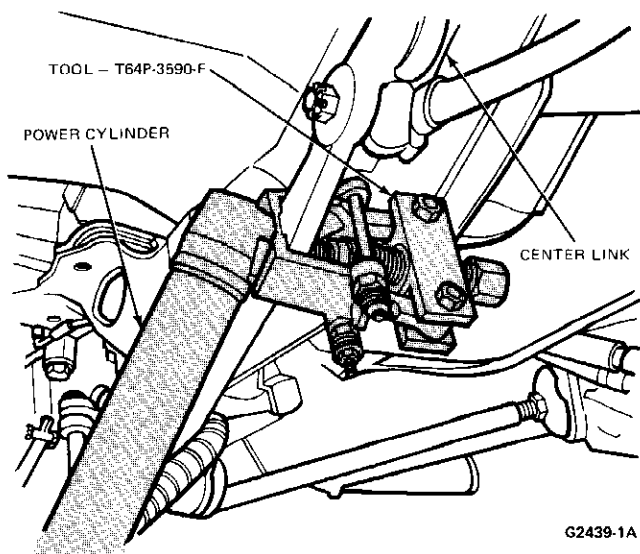


FIG. 6 Disconnecting Power Cylinder Stud

3. Remove the cotter pin and castellated nut that secures the power cylinder stud to the centerlink.
4. Disconnect the power cylinder stud from the centerlink. It is necessary to use the steering arm remover tool, No. T64P-3590-F (Fig. 6). **Use of any other tool will result in damage to the power cylinder.**

NOTE: It is necessary to lower the linkage to install the T64P-3590-F removal tool. If the control valve has been removed from the pitman arm for service, it is possible to lower the linkage as shown in Fig. 7, View A.

If only the power cylinder is to be removed, remove the nuts, washers and bolts that attach the idler arm and lower the linkage as shown in Fig. 7, View B.

5. Remove the insulator sleeve and washer from the end of the power cylinder rod. Remove the cylinder rod boot and discard the clamp.
6. Reconnect idler arm bracket to side rail, if disconnected above. Torque attaching bolts to 50-65 ft-lb.

Installation

1. Install the cylinder rod boot with a new clamp.
2. Install the washer, sleeve, and the insulator on the end of the power cylinder rod.
3. Extend the rod as far as possible. Insert the rod in the bracket on the frame and compress the rod, if necessary, to insert the stud in the centerlink. Secure the stud with a castellated nut and a cotter pin. Torque the nut to 35-47 ft-lb.
4. Secure the power cylinder rod with an insulator, washer, nut, and pal nut. Torque the hex nut to 18-24 ft-lb. and the pal nut to 3-5 ft-lb. Distance across washers must be 1-1/4-1-3/8 inches.
5. Connect the two fluid lines into the correct power cylinder ports. Position the lines so that they are parallel to each other, and tighten. Torque the tube nuts to 15-19 ft-lb.
6. Lower the vehicle and fill the fluid reservoir with fluid (C1AZ-19582-A, C, D) per Start Up Procedure in Part 13-01.

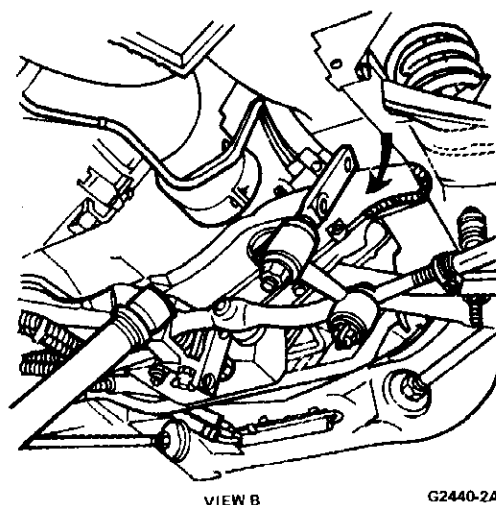
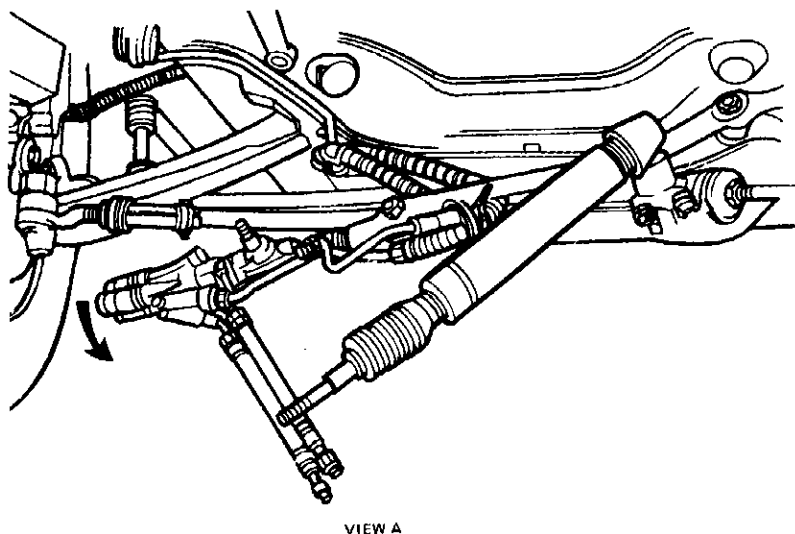


FIG. 7 Lowering Steering Linkage

CONTROL VALVE TO POWER STEERING CYLINDER HOSE

Removal

1. Raise the vehicle and disconnect the control valve-to-power cylinder hoses from the power cylinder and allow the fluid to drain.
2. Disconnect the control valve-to-power cylinder hoses from the control valve.

Installation

1. Connect the unmarked end of the shorter control valve-to-power cylinder hose to port valve "C" (Fig. 5). Connect the other hose to port "A". Hold the tube so that the bend is parallel to the surface of the valve. Torque the tube nut (1/2" hex) to 15-19 ft-lb. Connect the opposite end to the lower port in the power cylinder. Hold the tube while tightening to prevent the tube from twisting. Torque the nut to 15-19 ft-lb. **Do not tighten beyond specification.** Connect the other tube to port "A". Make sure the tubes are parallel and torque the nut to 15-19 ft-lb. Connect the opposite end to the upper port of the power cylinder and torque to 15-19 ft-lb. **Do not tighten beyond specification.**
2. Lower the vehicle and fill the fluid reservoir with fluid per Start Up Procedure in Part 13-01.

POWER STEERING PUMP TO CONTROL VALVE HOSE

Removal

1. Remove the fluid from the reservoir with a clean suction gun.
2. Raise the vehicle on a hoist.
3. Remove the worm-screw hose clamp that secures the fluid lines to the outside of the control valve and drain the lines.
4. Lower the vehicle and disconnect the fluid return hose from the reservoir.
5. Disconnect the fluid pressure hose from the pump outlet fitting.
6. On 5.0/5.8L (302/351 CID) only, remove the bolts and clips attaching the hoses, insulator, and retainer and remove the hoses, insulator and retainer as an assembly.
7. Remove the pressure and return hoses from the retainer and insulator.

Installation

1. On 5.0/5.8L (302/351 CID) only, install the pressure and return hoses in the insulator and retainer. The paint stripe on the pressure hose must align with the slot on the insulator. The paint or tape band on the return hose must center in insulator. Position the assembly at the original location and install the attaching bolts.
2. Place a hose clamp on the fluid return hose and install the hose on the power steering pump reservoir return fitting.
3. Torque the hose clamp to 12-24 in-lb. Connect the pressure hose to the outlet fitting and torque the tube nut to specification (16-25 ft. lbs.). **Do not tighten beyond specification.**

4. Raise the vehicle and connect the pressure and return lines to the control valve, finger tight.
5. Install the worm-screw clamp on the lines and torque to 36-60 in-lb, now torque the tube nuts in Step 4; the return hose nut (5/8" hex) to 16-25 ft-lb, and the pressure hose nut (1/2" hex) to 15-19 ft-lb. **Do not tighten beyond specification.**
6. Lower the vehicle and fill the fluid reservoir with fluid per Start Up Procedure in Part 13-01.

POWER CYLINDER SEAL

Removal

1. Remove the power cylinder and clamp it in a vise. **Be careful not to damage the cylinder in the vise and do not clamp onto the ball stud or the tube.**
2. Remove the snap ring.

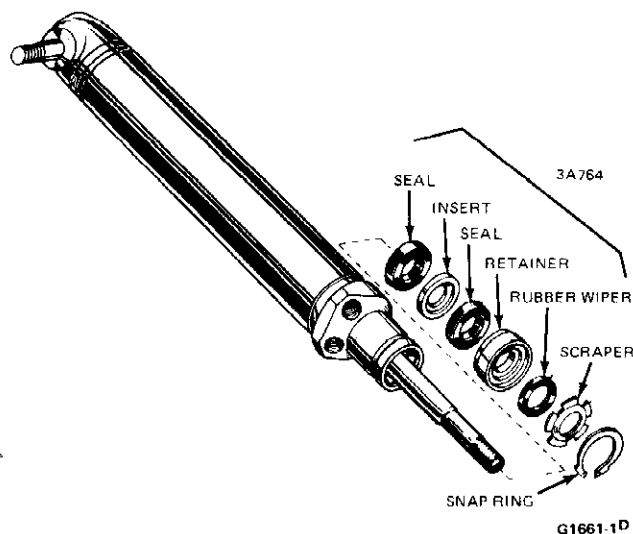


FIG. 8 Power Cylinder

3. Pull the piston rod out to remove the scraper, rubber wiper, retainer, and seals. If necessary, use a pick to remove seals. **Do not damage the shaft or seal seat with the pick.**

Installation

1. When replacing seals, use all the parts in the repair kit. Coat the new seals and the piston rod with lubricant (COAZ-19553-A) and install repair kit parts (Fig. 8). Make sure that the garter spring on the seal is toward the bottom of the seal cavity and that the flat side of the plastic retainer is toward the inner seal.
2. Push the rod all the way in and install the parts in the cylinder with a long reach socket wrench that is slightly smaller than the cylinder opening, or a piece of electrical conduit that is 15/16" OD x 6" (Fig. 9). **Exercise care, when assembling the seals on the rod, particularly at the rod shoulder.**
3. Replace the snap ring.