

STEERING SYSTEM - POWER RACK & PINION

1994 Mitsubishi 3000GT

1994 STEERING

Chrysler Corp./Mitsubishi - Power Rack & Pinion

Dodge; Stealth

Mitsubishi; Diamante, 3000GT

DESCRIPTION & OPERATION

Power-assisted rack and pinion steering system consists of a vane pump, flow control valve and an oil reservoir. Belt-driven vane pump supplies fluid through hoses to flow control valve. Flow control valve regulates fluid pressure to assist rack and pinion steering gear.

On some Diamante models, steering force is controlled electronically. See STEERING SYSTEM - ELECTRONIC POWER article in the STEERING section. On Stealth and 3000GT models with 4-Wheel Steering (4WS), a rear oil pump, flow control valve and power cylinder are included in power-assisted steering system and communicate with the electronically-controlled suspension system. Refer to the appropriate SUSPENSION - ELECTRONIC article in the SUSPENSION section. Refer to the following menu:

- * Diamante, see: SUSPENSION - ELECTRONIC
- * Stealth & 3000GT, see: SUSPENSION - ELECTRONIC

TROUBLE SHOOTING

Refer to TROUBLE SHOOTING - BASIC PROCEDURES article in the GENERAL TROUBLE SHOOTING section.

LUBRICATION

CAPACITY

On 4WS models, fluid capacity is approximately 1.6 qts. (1.5L). On all other models, fluid capacity is approximately .95 qt. (.9L).

FLUID TYPE

Use Dexron or Dexron-II ATF type fluid.

FLUID LEVEL CHECK

Start engine, and let it idle. Turn steering wheel several times to bring steering fluid to normal operating temperature. Turn steering wheel left and right several times while checking fluid for foaming and clouding. Fluid level should be between MIN and MAX marks on filler cap dipstick. Fill to MAX mark with Dexron or Dexron-II ATF.

HYDRAULIC SYSTEM BLEEDING

CAUTION: DO NOT hold steering wheel to left or right lock for longer than 10 seconds, or oil pump damage may occur.

WARNING: Use caution when bleeding system on 4WS models. All 4 wheels will be rotating during testing.

All Models (Front Steering)

1) Lift and support vehicle. Disconnect coil high tension wire. Crank engine 10-15 seconds while turning steering wheel left and right. Connect coil high tension wire. Start engine, and let it idle. Turn steering wheel left and right until no air bubbles appear in oil reservoir.

2) Check fluid level, and ensure fluid is not milky. Turn steering wheel left and right, and ensure fluid level does not change. If fluid level changes more than .25" (6.3 mm) or if pump is noisy, fill with fluid to MAX mark on dipstick again. Repeat procedure until air bubbles are no longer present in fluid and fluid level stabilizes.

4WS (Rear System)

1) Bleed air from power steering system. See ALL MODELS. Have an assistant enter vehicle. Raise and support vehicle. Start engine, and let it idle. Loosen bleed screw on left side of rear control valve, and install a bleed hose to bleed screw.

2) Have assistant turn steering wheel to full left position, and then immediately return wheel halfway. Ensure air and fluid is discharged from hose. Repeat step several times. Ensure all air has been bled from system. Repeat step for right side bleed screw, turning steering wheel to full right position, and then immediately returning wheel halfway.

3) Turn engine off. Loosen bleed screws on power cylinder. Install a bleed hose to power cylinder bleed screws. Have assistant start engine and run vehicle to 43-50 MPH to circulate fluid. Reduce vehicle speed to 19-25 MPH, and maintain speed while turning steering wheel to full left and right positions.

4) When steering wheel is turned to full left or right positions, pressure will rise and air will circulate through bleed hose. Ensure air is discharged into oil reservoir. Repeat step several times until all air has been bled from system.

ADJUSTMENTS

POWER STEERING PUMP BELT SPECIFICATIONS

BELT ADJUSTMENT SPECIFICATIONS (DIAMANTE & STEALTH)

Application/ Engine	(1) Deflection		(1) Deflection	
	New Belt: In. (mm)		Used Belt: In. (mm)	
SOHC Alternator & P/S ..	.15-.19	(3.8-4.8)	.....	.23-.31 (5.8-7.8)
DOHC P/S .....	.30-.35	(7.6-9.0)	...	.41-.49 (10.5-12.5)

(1) - With 22 lbs. (10 kg) pressure applied midway on belt run.

BELT ADJUSTMENT SPECIFICATIONS (3000GT)

Application/ Engine	(1) Deflection		(1) Deflection	
	New Belt: In. (mm)		Used Belt: In. (mm)	
3000GT .....	.29-.35	(7.3-9.0)	....	.41-.49 (10.5-12.5)

(1) - With 22 lbs. (10 kg) pressure applied midway on belt run.

PINION ROTATING FORCE

NOTE: Pinion rotating force procedure is performed with rack and

pinion assembly off vehicle and supported in soft-jawed vise.

Using adapter and torque wrench, measure rotating force while turning pinion gear through one complete rotation within 4-6 seconds. Refer to both the PINION ROTATING FORCE SPECIFICATIONS as well as the PINION ROTATING FORCE ADAPTER tables. If rotating force is not within specification, adjust end plug (rack support cover), and recheck rotating force. Tighten locking nut to 36-51 ft. lbs. (49-69 N.m).

PINION ROTATING FORCE SPECIFICATIONS TABLE

Application	INCH Lbs. (N.m)
Except Diamante	5-11 (.6-1.3)
Diamante	6-10.4 (.7-1.2)

PINION ROTATING FORCE ADAPTER TABLE

Application	Tool No.
All Models	CT-1108 Or MB991006

TESTING

HYDRAULIC SYSTEM PRESSURE TEST

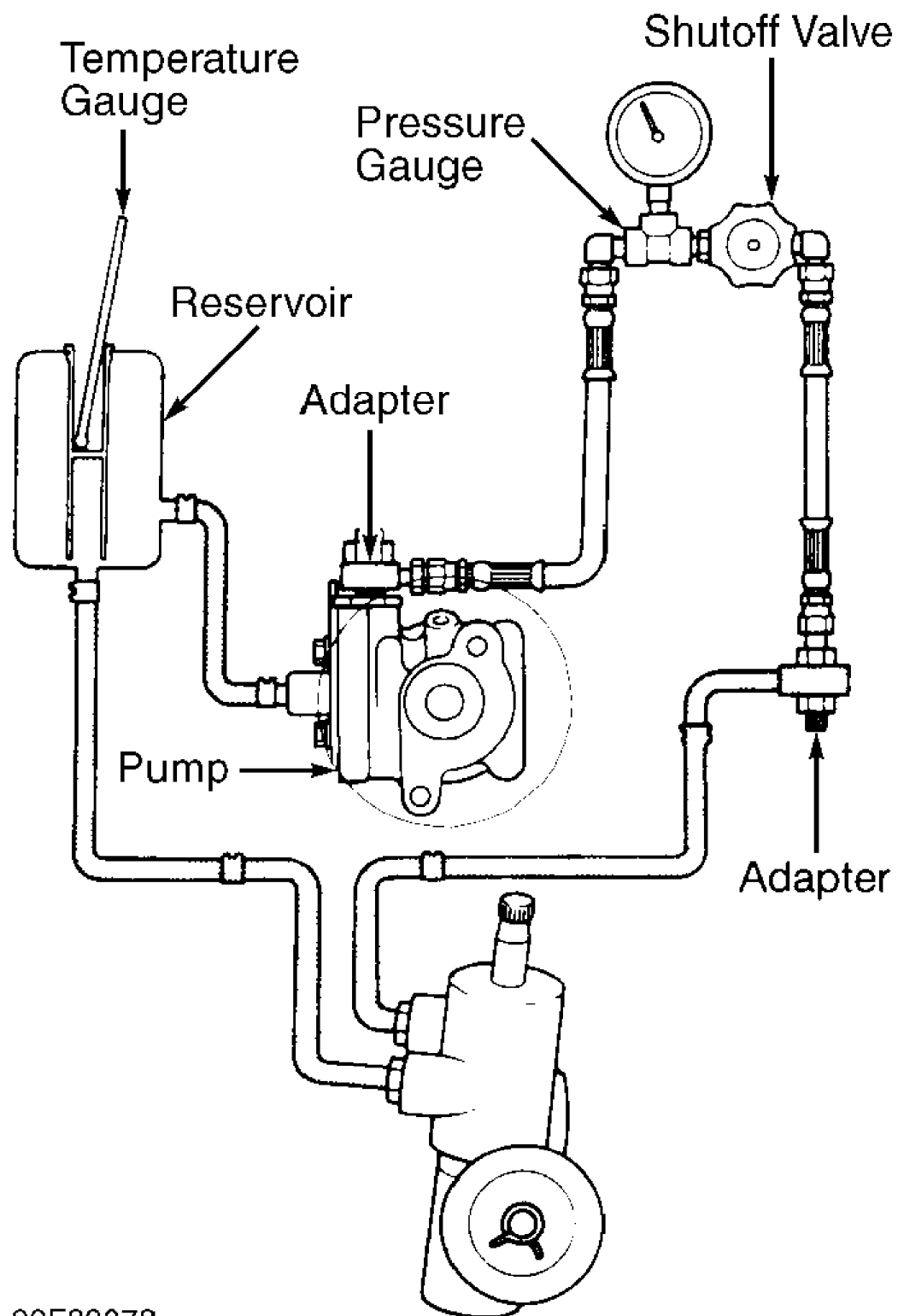
CAUTION: DO NOT leave valve on pressure gauge closed longer than 10 seconds, or damage to oil pump will result.

1) Disconnect pressure hose from oil pump. Install Pressure Gauge (MB990662-01). See Fig. 1. Bleed air from system. Refer to HYDRAULIC SYSTEM BLEEDING under LUBRICATION. Start engine, and let it idle. Turn steering wheel several times until temperature reaches 122°F (50°C). Set engine idle speed to 1000 RPM.

2) Close and open valve to measure oil pump pressure. Replace the power steering pump if pressure is not within specification. Refer to the OIL PUMP PRESSURE SPECIFICATIONS table. Install pressure hose. Bleed system. Refer to HYDRAULIC SYSTEM BLEEDING under LUBRICATION.

OIL PUMP PRESSURE SPECIFICATIONS TABLE

Application	psi (kg/cm ²)
Valve Closed	1067-1166 (75-82)
Valve Open	114-142 (8-10)



93F82078

Fig. 1: Connecting Pressure Gauge & Shutoff Valve
 Courtesy of Mitsubishi Motor Sales of America

STEERING WHEEL TURNING FORCE

Place vehicle on level surface with steering wheel in straight-ahead position. Attach a spring scale to steering wheel. With engine running at idle, measure turning force by turning the steering wheel left and right within a range of 1 1/2 turns. Refer to the STEERING WHEEL TURNING FORCE table.

STEERING WHEEL TURNING FORCE TABLE

Application	Lbs. (kg)
Except Diamante	8 (3.6)
Diamante	7 (3.2)

REMOVAL & INSTALLATION

CAUTION: On vehicles equipped with Supplemental Restraint System (SRS), ensure steering wheel is straight ahead and locked (key removed from ignition switch) before removing steering rack and pinion, to prevent damage to clockspring.

POWER STEERING PUMP

Removal & Installation

Disconnect pressure and suction hoses from pump. Drain fluid into container. Remove oil pump mounting bolts, belt and oil pump. Remove reservoir hoses and retaining bolts. Remove reservoir. To install, reverse removal procedure. Fill and bleed system. See HYDRAULIC SYSTEM BLEEDING under LUBRICATION.

POWER RACK & PINION

Removal & Installation

1) Raise and support vehicle. Remove coupling bolt from pinion shaft joint. Remove hydraulic lines from steering gear. Drain fluid. Remove tie rod end cotter pins and nuts. Using Puller (MB991113), separate tie rods from steering knuckles. Remove left and right crossmember.

2) Remove front exhaust pipe mounting nuts and lower pipe. On AWD vehicles, remove bolts from transfer assembly, and remove transfer assembly from transaxle. Remove and support drive shaft from transfer assembly. Remove stabilizer bar (if necessary).

3) Remove power rack and pinion assembly by moving assembly completely to right and off crossmember. Tilt power rack and pinion assembly downward, and remove from left side.

4) To install, reverse removal procedure. Fill and bleed the hydraulic system. Check wheel alignment and adjust as necessary. See the WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES article in WHEEL ALIGNMENT section.

REAR OIL PUMP

Removal & Installation (4WS)

1) Raise and support vehicle. Remove muffler. Support differential case using transmission jack. Remove rear strut assembly lower mounting bolts. Remove crossmember brackets at front of suspension.

2) Remove crossmember mounting nuts on differential (rear) side of suspension. Disconnect pressure and suction hoses from rear oil pump. Drain fluid. Slightly lower rear suspension. Remove rear oil pump. To install, reverse removal procedure. Fill and bleed system.

POWER CYLINDER

Removal & Installation (4WS)

1) Raise and support vehicle. Remove muffler. Support differential case using transmission jack. Remove rear strut assembly lower mounting bolts. Remove crossmember brackets at front of suspension.

2) Remove crossmember mounting nuts on differential (rear) side of suspension. Disconnect pressure hoses and "O" rings from power cylinder. Drain fluid. Slightly lower rear suspension. Remove tie rod nuts and power cylinder mounting bracket bolts. Remove power cylinder. To install, reverse removal procedure. Fill and bleed system. Check wheel alignment.

OVERHAUL

POWER STEERING PUMP

NOTE: Manufacturer does not supply information on rear oil pump overhaul.

Disassembly

1) Remove pump rear cover, cam ring, "O" rings and vanes from rotor. See Fig. 2. Remove snap ring from pulley assembly. Remove rotor.

2) Tap pulley assembly using plastic hammer to remove it from pump body. Remove suction connector and oil seal from pump body. Remove connector, flow control valve and spring from pump body.

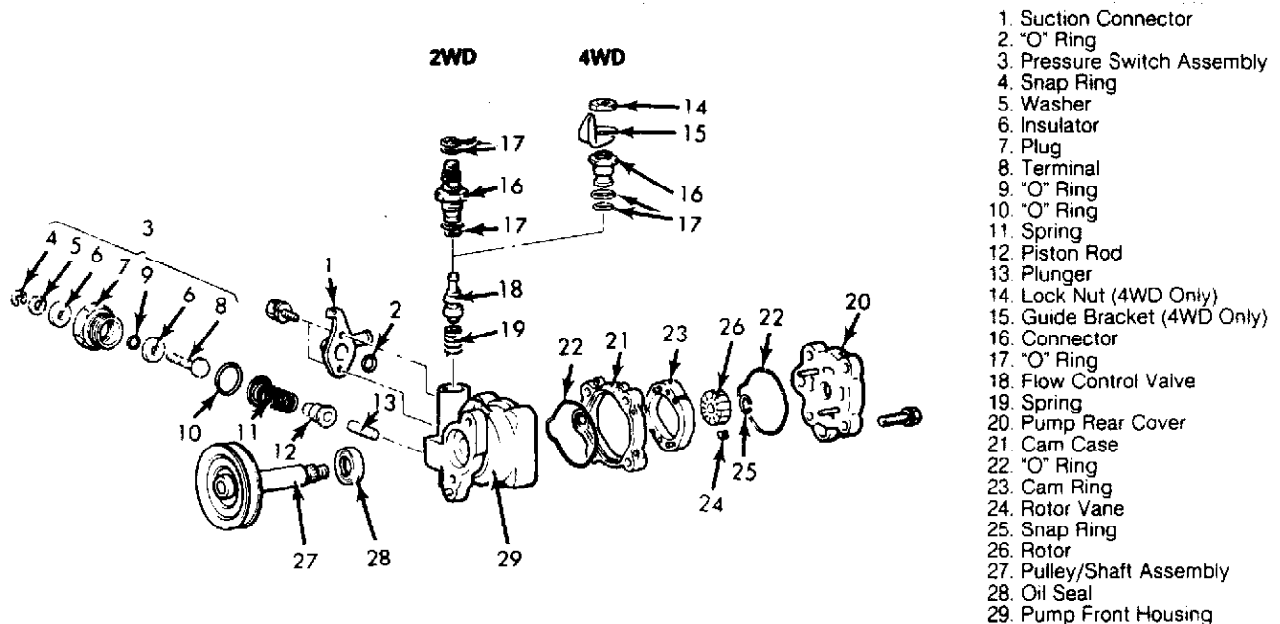


Fig. 2: Exploded View Of Power Steering Pump (All Models)
Courtesy of Mitsubishi Motor Sales of America

Inspection

Check pulley assembly, cam ring, rotor and vanes for wear. Check pump cover and pump body for abrasion. Check flow control valve for clogging.

Reassembly

Apply Dexron-II ATF fluid to "O" rings and vanes. To reassemble, reverse disassembly procedure. Install oil seal into pump body using Installers (MB990925-01 and MB990938-01). Install vanes into rotor in right direction. See Fig. 3.

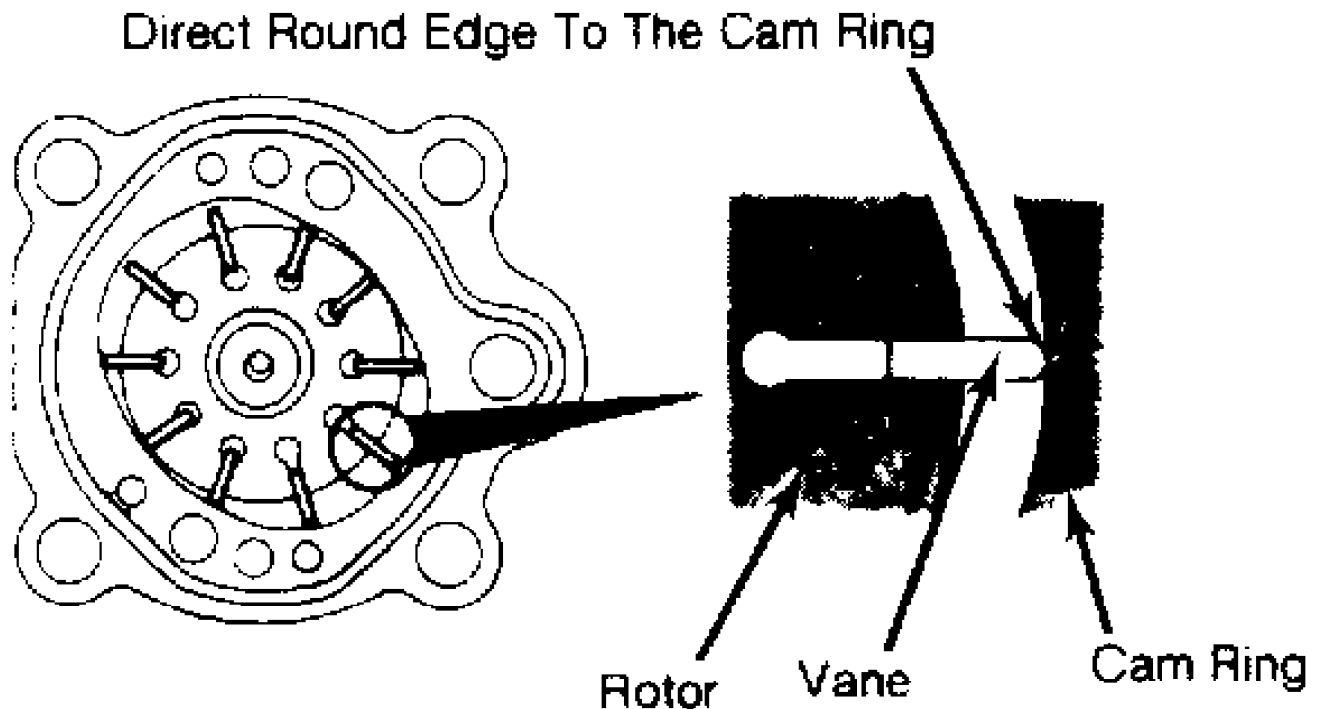


Fig. 3: Installing Vanes Into Rotor Of Power Steering Pump
Courtesy of Mitsubishi Motor Sales of America

POWER RACK & PINION

NOTE: Some Diamante models are equipped with Electronic Power Steering. For exploded view of electronic power rack and pinion assembly, see STEERING SYSTEM - ELECTRONIC POWER article.

Disassembly

1) With power rack and pinion assembly mounted in soft-jawed vise, remove tie rod ends, bellows boot clamps and boots. See Fig. 4. Using a chisel, move tie rod tab washer. Remove tie rod assemblies. Remove steel fluid lines. Remove pinion end plug and nut.

2) Remove adjusting plug lock nut. Using Socket (MB990607-A), remove rack support cover. Remove rack support spring and rack support. Remove valve housing. Remove oil seals and pinion valve assembly. Turn rack stopper clockwise to align circlip with slot in gear housing for removal.

3) When circlip comes out of housing, turn rack stopper counterclockwise to remove circlip. Remove rack stopper, rack bushing and rack from rack housing. Remove "O" ring and oil seal from rack bushing.

4) Use brass drift to remove ball bearing, needle bearing and oil seal from pinion side of rack housing. Use a pipe to remove back-up washer and oil seal from rear of rack housing. Using a screwdriver, remove resin ring from pinion valve assembly.

Inspection

Check bearings, rack bushing and rack teeth for damage and

wear. Check pinion valve assembly for damage to teeth and wear to bearing. Inspect valve housing for damage or wear from sealing rings. Replace all oil seals, "O" rings and sealing rings.

Reassembly

1) Apply Dexron-II ATF fluid to all "O" rings. Lubricate rack teeth, bearings and teeth on pinion valve assembly with lubricant supplied by manufacturer. Reassemble rack in reverse order of disassembly.

2) Using Drivers (MB991097 and MB9901098), install back-up washer and oil seal in rack housing. Using Drivers (MB991100 and MB991102), install needle bearing in rack housing. Using Socket (MB990607-A), install adjusting plug.

3) Install rack support spring, rack support cover and rack support. Install adjusting plug lock nut. Using Driver (MB99100), install pinion oil seal in rack housing. Using Drivers (C-4637-1 and MB990927), install "O" ring into rack bushing. Adjust pinion rotating force. See PINION ROTATING FORCE under ADJUSTMENTS.

- | | |
|----------------------------|--|
| 1. Tie Rod End | |
| 2. Dust Cover Clip | |
| 3. Dust Cover | |
| 4. Boot Clamp | |
| 5. Boot Clamp | |
| 6. Boot | |
| 7. Tie Rod End | |
| 8. Tab Washer | |
| 9. Hydraulic Feed Tube | |
| 10. Hydraulic Return Tube | |
| 11. End Plug | |
| 12. Self Locking Nut | |
| 13. Locking Nut | |
| 14. Rack Support Cover | |
| 15. Rack Support Spring | |
| 16. Rack Support | |
| 17. Valve Housing Assembly | |
| 18. Valve Housing | |
| 19. Pinion/Valve Assembly | |
| 20. Seal Rings | |
| 21. Bearing | |
| 22. Oil Seal | |
| 23. Cylinder Assembly | |
| 24. End Housing | |
| 25. Circlip | |
| 26. Oil Seal | |
| 27. "O" Ring | |
| 28. Cylinder | |
| 29. Rack Assembly | |
| 30. Steering Rack | |
| 31. Piston Ring | |
| 32. Oil Seal | |
| 33. Circlip | |
| 34. Circlip | |
| 35. Lower Bearing | |
| 36. Upper Bearing | |
| 37. Oil Seal | |
| 38. Rack Housing | |

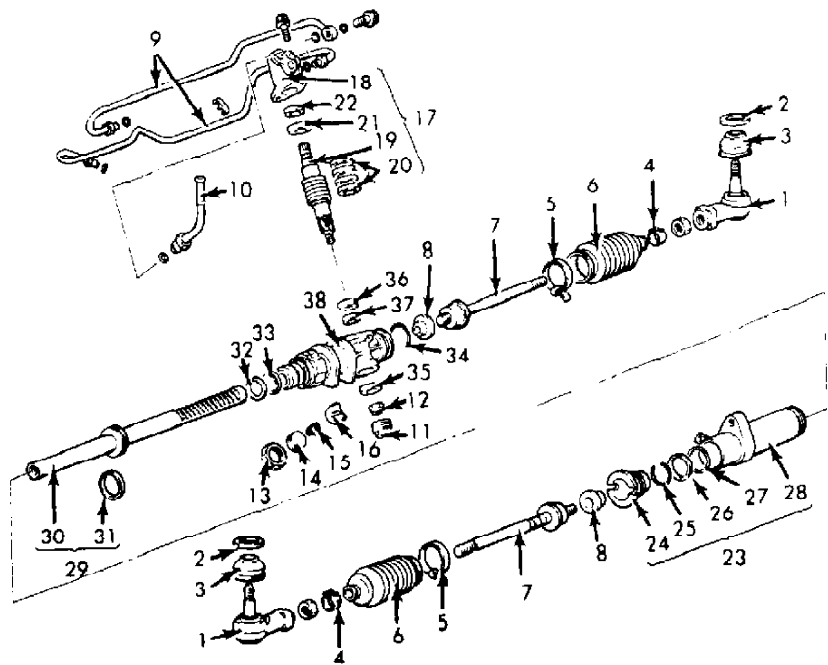


Fig. 4: Exploded View Of Power Rack & Pinion Assembly (Typical)
Courtesy of Mitsubishi Motor Sales of America

WHEEL ALIGNMENT

After performing appropriate service procedures, refer to WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES article in the WHEEL ALIGNMENT section.

TORQUE SPECIFICATIONS

DIAMANTE

TORQUE SPECIFICATIONS (DIAMANTE)

Application	Ft. Lbs. (N.m)
Centermember Mounting Bolt	58-65 (78-88)
Crossmember Bracket Bolt	56 (78)
Crossmember Bracket Nut	84-94 (110-130)
Crossmember Mounting Nut	84-94 (110-130)
Coupling-To-Pinion Shaft Joint Bolt	13 (18)
Power Cylinder Mounting Bolt	30 (42)
Power Steering Pump	
Cover Bolts	16 (22)
Mounting Bolts	16 (22)
Pressure Hose-To-Pump Nut	17 (24)
Rack Mounting Bolt	51 (70)
Rack Support Lock Nut	36-51 (50-70)
Strut Assembly Lower Mounting Bolt	72 (100)
Tie Rod End-To-Steering Knuckle	36 (50)
Tie Rod Lock Nut	36-40 (50-54)
Tie Rod-To-Rack	65 (90)

STEALTH & 3000GT

TORQUE SPECIFICATIONS (STEALTH & 3000GT)

Application	Ft. Lbs. (N.m)
Centermember Mounting Bolt	58-65 (78-88)
Crossmember Bracket Bolt	56 (78)
Crossmember Bracket Nut	84-94 (110-130)
Crossmember Mounting Nut	84-94 (110-130)
Coupling-To-Pinion Shaft Joint Bolt	13 (18)
Exhaust Pipe Nuts	36 (50)
Power Cylinder Mounting Bolt	30 (42)
Power Steering Pump	
Cover Bolts	14 (20)
Mounting Bolts	31 (43)
Pressure Hose-To-Pump Nut (Stealth)	17 (24)
Rack Mounting Bolt	51 (70)
Rack Support Lock Nut	36-51 (50-70)
Strut Assembly Lower Mounting Bolt	72 (100)
Tie Rod End-To-Steering Knuckle (Stealth)	36 (50)
Tie Rod Lock Nut	36-40 (50-54)
Tie Rod-To-Rack	65 (90)
Transfer Assembly Bolts	64 (88)