Power Steering System

Specifications

Fastener Tightening Specifications

	å æ	Specification	
Application		Metric	English
Hydraulic Pump Control Fitting-to-Power Steering Pump		75 N⋅m	55 lb ft
Power Steering Fluid Reservoir Bolt/Screw (5.7L VIN G)	i, ji	10 N·m	89 lb in
Power Steering Fluid Reservoir Bracket Nuts (3800 VIN K)		12 N⋅m	107 lb in
Power Steering Gear Bolt/Screw	Se' '6'	85 N·m	63 lb ft
Power Steering Gear Inlet Hose Fitting-to-Power Steering Gear		28 N⋅m	21 lb ft
Power Steering Gear Inlet Hose Fitting-to-Power Steering Pump)	28 N⋅m	21 lb ft
Power Steering Gear Outlet Hose Fitting-to-Power Steering Gear	ar	28 N⋅m	21 lb ft
Power Steering Pump Bolt/Screw (5.7L VIN G)	194 Y	25 N⋅m	18 lb ft
Power Steering Pump Nut (3800 VIN K)		30 N⋅m	23 lb ft
Power Steering Pump Rear Bracket Bolt/Screw (5.7L VIN G)		50 N ⋅m	37 lb ft

Fluid Specifications

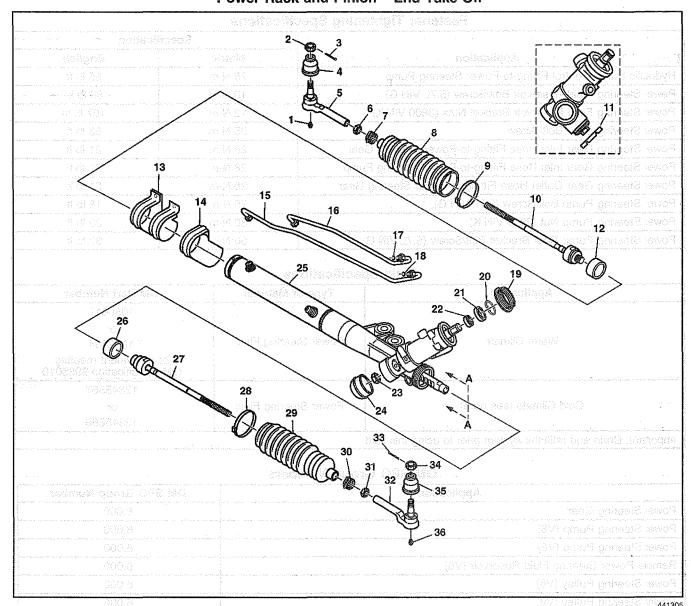
Application	Type of Material	GM Part Number
		1050017
Warm Climate	Power Steering Fluid	or 1052884
		or equivalent meeting GM Specification 9985010
	80	12345867
Cold Climate (see note)	Power Steering Fluid	or
		12345866
mportant: Drain and refill the system prior to using this fluid	d.	

GM SPO Group Numbers

Application	GM SPO Group Number
Power Steering Gear	6.000
Power Steering Pump (V8)	6.000
Power Steering Pump (V6)	6.000
Remote Power Steering Fluid Reservoir (V6)	6.000
Power Steering Pulley (V6)	6.000
Power Steering Pulley (V8)	6.000
Power Steering Pump Front Bracket (V8)	6.000
Power Steering Pump Rear Bracket (V6)	6.000
Power Steering Hose Inlet (V6)	4.51.25 4.5.46.000
Power Steering Hose Inlet (V8)	6.000
Power Steering Hose Outlet (V6)	6.000
Power Steering Hose Outlet (V8)	Christophy in the Co. (000 particle)
Power Steering Cooler (V8)	24 154 777 6.000 44 104 144 145

Visual Identification

Power Steering Gear - Disassembled View (Quiet Valve) Power Rack and Pinion - End Take Off



Legend

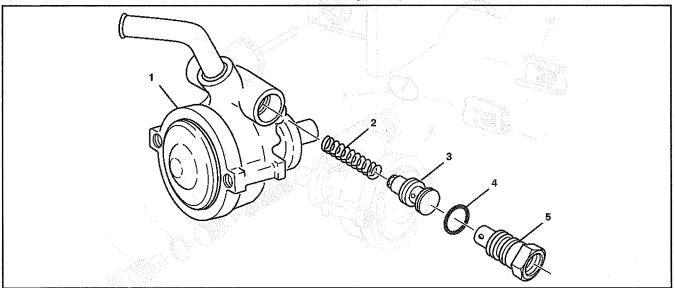
- (1) Lubrication Fitting
- (2) Hexagon Slotted Nut
- (3) Cotter Pin
- (4) Tie Rod Seal
- (5) Outer Tie Rod Assembly
- (6) Hexagon Jam Nut
- (7) Tie Rod End Clamp
- (8) Rack and Pinion Boot
- (9) Boot Clamp
- (10) Inner Tie Rod Assembly
- (11) Adjuster Plug Lock Nut
- (12) Shock Dampener Ring

- (13) Mounting Bracket Assembly
- (14) Mounting Grommet
- (15) Cylinder Line (Left Hand) Assembly
- (16) Cylinder Line (Right Hand) Assembly
- (17) O-Ring Seal
- (18) O-Ring Seal
- (19) Seal Adapter
- (20) Retaining Ring
- (21) Stub Shaft Seal
- (22) Annulus Bearing Assembly
- (23) Hexagon Lock Nut
- (24) Dust Cover

- (25) Rack and Pinion (Partial) Gear Assembly (31) Hexagon Jam Nut (32)
- (26) Shock Dampener Ring
- (27) Inner Tie Rod Assembly
- (28) Boot Clamp
- (29) Rack and Pinion Boot
- (30) Tie Rod End Clamp

- (32) Outer Tie Rod Assembly
- (33) Cotter Pin
- (34) Hexagon Slotted Nut
- (35) Tie Rod Seal
- (36) Lubrication Fitting

Power Steering Pump - Disassembled View (Return Tube) **Power Steering Pump**



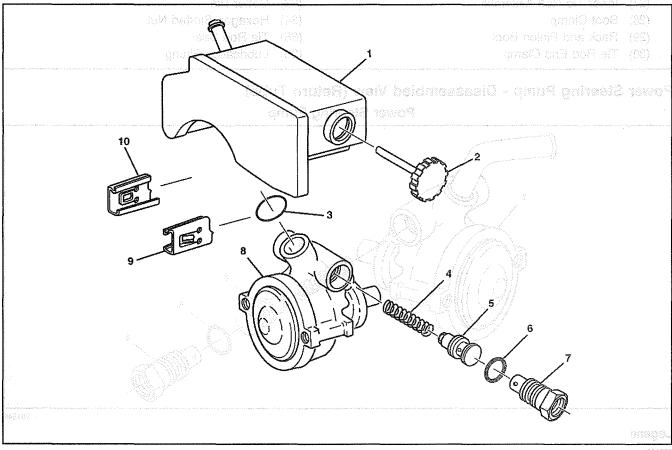
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Legend

- (1) Hydraulic Pump Housing Assembly
- (2) Flow Control Spring
- (3) Control Valve Assembly (3) (3)
- (4) O-ring Seal
- (5) O-ring Union Fitting

Power Steering Pump - Disassembled View (CB Series Pump) (65589) noint bus 1089 (85)

Power Steering Pump Assembly–CB Series (82)



Legend

- (1) Hydraulic Pump Reservoir Assembly (Typical)
- (2) Reservoir Capstick Assembly
- (3) O-ring Seal
- (4) Flow Control Spring
- (5) Control Valve Assembly

(6) O-ring Seal AdmessA svisV lottetoO

- (7) O-ring Union Fitting
- (8) Hydraulic Pump Housing Assembly
- (9) Reservoir Retaining Clip (RH)
- (10) Reservoir Retaining Clip (LH)

Diagnostic Information and Procedures

Hissing Noise In Steering Gear

Problem	W. Carrier	Action		The same of the sa
There is a hissing noise in the steering gear.	The state of the s	iate steering shaft onable, replace the		

Rattle in Rack and Pinion Steering Gear

Problem	Action	
There is a rattling noise.	Inspect for the following conditions:	
	 Contact between the outlet (pressure) hose and the frame 	
	Loose tie rod ends	
	Loose steering gear attachment	
	A loose pinion shaft	42
A rattling noise occurs when driving	Inspect the front brake linings for the following conditions:	
over bumps.	A loose fit	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	Missing antirattle clips	

Power Steering Gear and Pump Leaks

- · Determine if any of the following conditions exist:
 - The vehicle leaks fluid onto the garage floor.
 - Fluid leaks are visible on the steering gear or the pump.
 - There is a growling noise when you are parking the vehicle.
 - There is a growling noise when the engine is cold.
 - The power steering does not operate when you are parking the vehicle.
 - The vehicle requires excessive steering effort.
- Inspect for an overfilled power steering fluid reservoir.
- Inspect for fluid aeration and overflow.
- · Inspect the hose connections.
- Identify the exact point of system leakage. Refer to External Leakage Check.

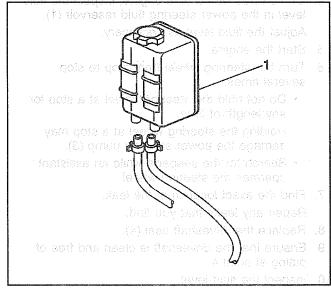
The point from which fluid is dripping is not necessarily the point where the system is leaking from.

 If you observe leakage between the torston bar and the steering gear pinion shaft, replace the pear with a partial season, sew.

External Leakage Check

Use this procedure in order to help identify the exact location of a leak. Some leaks can be easily located, but seepage type leaks may be more difficult to locate. To locate seepage leaks use the following method:

- 1. Turn the engine off.
- 2. Wipe the complete power steering system dry.

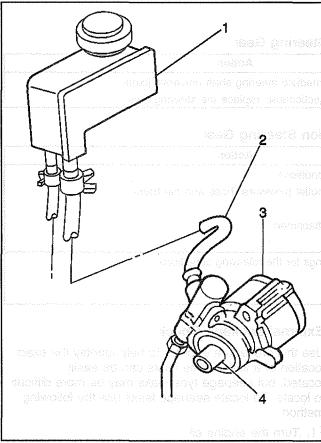


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 On vehicles with a 3800 engine, inspect the fluid level in the power steering fluid reservoir (1).
 Adjust the fluid level as necessary.

 Inspect the hydrause pump fluid reservoir for the following confidence

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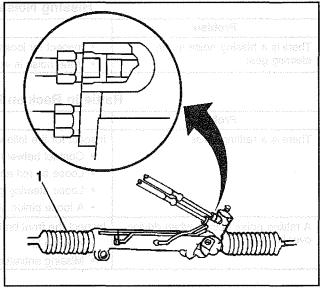
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- On vehicles with a 5.7L engine, inspect the fluid level in the power steering fluid reservoir (1).
 Adjust the fluid level as necessary.
- 5. Start the engine.
- 6. Turn the steering wheel from stop to stop several times:
 - Do not hold the steering wheel at a stop for any length of time.
 - Holding the steering wheel at a stop may damage the power steering pump (3).
 - Search for the seepage while an assistant operates the steering wheel.
- 7. Find the exact location of the leak. Repair any leaks that you find.
- 8. Replace the driveshaft seal (4).
- 9. Ensure that the driveshaft is clean and free of pitting at point 4.
- 10. Inspect the fluid level.

Determine if leakage persists under the following conditions:

- The fluid level is correct.
- The hydraulic pump reservoir cap is tight.
- 11. Replace the hydraulic pump reservoir cap if leakage persists.
- Inspect the hydraulic pump fluid reservoir for the following conditions:
 - Cracks
 - Bending

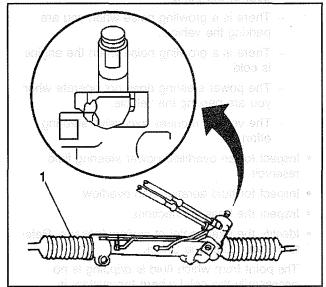
13. Replace the hydraulic pump fluid reservoir if you detect these conditions.



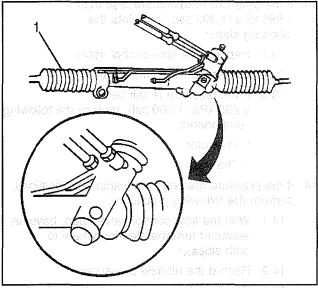
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14. Torque the steering gear (1) pipe fitting seat to specifications.

If leakage persists, replace the steering gear pipe seal (O-ring).



- 15. Replace the steering gear (1) with a partial steering gear.
- 16. If you observe leakage between the torsion bar and the steering gear pinion shaft, replace the gear with a partial steering gear.

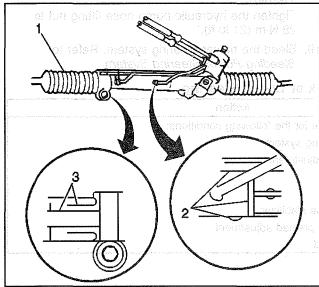


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- 17. Determine if the following conditions exist:
 - · You observe a leakage at the driver side.
 - The leakage is not affected by the direction of the turn.

 Output

 Description:
- 18. If the above conditions exist, replace the steering gear (1) with a partial steering gear.
- 19. Determine if the following conditions exist:
 - You observe a leakage at the steering gear housing end.
 - The fluid spurts when bottomed in a left turn.
- 20. If the above conditions exist, replace the steering gear with a partial steering gear.



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- 21. Determine if leakage exists (2, 3).
- 22. If the above conditions exist, replace the steering gear (1) with a partial steering gear.

- 23. Tighten the following components to specifications:
 - The hydraulic pump hose fitting.
 - The hydraulic pump hose fitting nut.
- 24. Replace the hydraulic pump seal (O-ring) if \$ 950 leakage persists.

Seal Replacement Recommendations

Lip Seals

Lip seals seal the rotating shafts. The lip seals require special treatment. Lip seals are used on the hydraulic pump shaft of the power steering pump. When the lip seals leak complete the following steps:

- 1. Inspect the sealing surfaces.
- 2. Thoroughly clean the sealing surfaces.
- 3. Replace the seal(s). Famour seasons and because

Replace the shaft if you find pitting. If there is slight corrosion in the lip seal contact zone, clean the surface of the shaft with crocus cloth. Replace the shaft only if you cannot stop the leakage by smoothing the shaft with crocus cloth.

O-Ring Seals

When you remove a part which forms a sealing surface for an O-ring complete the following steps:

- 1. Remove the original O-ring seal.
- Replace the original O-ring seal with a new O-ring seal.

Lubricate all of the new O-ring seals with power steering fluid in order to ease the installation.

Power Steering System Test Procedure Tools Required

- J 5176-E Power Steering Pressure Tester
- J 5176-92 Pressure Tester Adapter
- J 25323-D Power Steering System Analyzer
- J 29525 Steering Analyzer Adapter (18 mm)

If you suspect a hydraulic or mechanical malfunction of one of the following components, perform this procedure in order to determine the cause:

- The power steering pump
- The power steering gear
- 1. Place a drain pan under the reservoir.
- 2. Disconnect the outlet hose at the reservoir.
- 3. Connect a spare pressure hose to the reservoir.

Important: Test the power steering system using the *J 5176-E*. Testing the power steering system with the *J 25323-D* will also measure the flow rate as well as the pressure.

- 4. Connect the *J 5176-E* and the *J 5176-92* or *J 25323-D* and *J 29525* to the following hoses:
 - The outlet hose
 - The spare pressure hose
- 5. Open the valve on the *J 5176-E* or *J 25323-D*.
- 6. Start the engine and allow to reach a normal operating temperature.

- 7. Ensure that the engine is at idle and that the valve on the *J 5176-E* or *J 25323-D* is open.
- 8. Read the pressure reading.

Important: The pressure should be no more than 1 050 kPa (150 psi).

- 9. If the pressure is more than 1 050 kPa (150 psi), perform the following steps:
 - Inspect the hoses for restrictions.
 - Inspect the popper valve on the steering gear for the proper installation.

Notice: Do not leave the valve fully closed for more than 5 seconds, or the pump could be damaged internally.

10. Fully close the valve on the *J 5176-E* or *J 25323-D* three times.

Record the pressure readings each time.

The power steering pump is functioning properly when the pressure readings fall within the following range:

- Each reading is at least 6 895 kPa (1,300 psi).
- The 3 readings are within 345 kPa (50 psi) of each other.
- 11. The power steering pump control valve is sticking if the following conditions exist:
 - The pressure readings are at least 6 895 kPa (1,300 psi).
 - The pressure readings are not within 345 kPa (50 psi) of each other.
- 12. If the pressure readings indicate that there is a sticking flow control valve, perform the following steps:
 - 12.1. Remove the flow control valve.

fine hone.

- 12.2. Clean the flow control valve.

 Remove any burrs using a crocus cloth of
- 12.3. Flush the system if the system contains any contamination.

J.ESS23-D and J. 29525 to the following trosps

- 13. If the pressure readings are less than 6 895 kPa (1,300 psi), complete the following steps:
 - 13.1. Replace the flow control valve.
 - 13.2. Retest the flow control valve.
 - 13.3. If the pressure is still below6 895 kPa (1,300 psi), replace the following components:
 - The rotor
 - The vanes
- 14. If the pressure readings are within specifications, perform the following procedure:
 - 14.1. With the flow control valve open, have an assistant turn the steering wheel to both sides.
 - 14.2. Record the highest pressures.
 - 14.3. Compare the pressure with the highest pump pressures that you recorded earlier.
- 15. If the pressure at both stops is not the same as the maximum pressure previously recorded, then the steering gear is leaking internally.
 Repair the steering gear if the steering gear is
- guleaking internally. Jake anothorous vode entit. 81

 16. Turn off the engine. (*) 1820
- 17. Remove the *J 5176-E* and *J 5176-92* or *J 25323-D* and *J 29525*.

Notice: Refer to Fastener Notice in Cautions and Notices.

18. Connect the outlet hose to the remote reservoir.

Tighten

Tighten the hydraulic pump hose fitting nut to 28 N·m (21 lb ft).

22. If the above conditions exist, replace the steering

19. Bleed the power steering system. Refer to Bleeding Power Steering System.

Excessive Wheel Kickback or Loose Steering

Problem	Action Action
There is excessive steering wheel	Inspect the steering system for the following conditions:
kickback or loose steering.	7 in in the period december of coording
en under the reservols.	Loose steering gear adjustment
deviaser ent te eson initio	Loose tie rod ends
re pressure hose to the reservoir.	• A worn wheel bearing
ng the power steering system with	A loose thrust bearing preload adjustment
se etst wolf ent enuerent oats	A worn pipe fitting seat

Increase in Effort While Turning Steering Wheel

Problem	esisi	Action	网络拉拉 加斯
There is a momentary increase in		ystem for the following conditions:	erii ni selim ii see e eed ee erekii
effort when turning the steering wheel	High internal leak	age, paskita kaciol A -	tee for preference
fast to the right or left.	A sticking or dam	aged steering gear valve spool	
		pressure	
	A low fluid level	Control March of the Control of the	

Poor Return of Steering Wheel

Problem	applifondo galvatio) est sa storre est : Action: se pilosa a cue.	vio terroria en la Propriet
The steering wheel has poor	Inspect the steering system for the following conditions:	, <u>(2</u> 24 + 024 5 - 3 - 104 5 0
returnability.	Incorrect caster setting assistances.	
	A bind in the following components:	
	– The control arm ball stud	
	- The steering column as a second start and	
	- The intermediate steering shaft joints	
	A misadjusted steering gear	
	An incorrect steering gear valve spool	

Steering Wheel Surges/Jerks While Turning

Problem	govo,A.	Action	
The steering wheel surges or jerks.	Inspect the vehic	le for the following conditions:	personal relief to the control of the control
	A defective t	tirestii thoti bergitaren Aliri 🗀 🗀	
	A bad tire		
	A sluggish steering gear valve spool		
	A serpentine	drive belt which is in one of the follo	wing conditions:
	- Loose	880 800 800 886 P	
	- Soaked w	vith oilliugibael and talbatil 🔻 📗	
	Air in the po	wer steering system	

Steering Wheel Kickback

Problem	Action		
There is kickback in the	Inspect the steering system for the following cond	ditions:	
steering wheel.	Air in the power steering system	deleve sepitinger gravotiet s.F	
	A loose steering gear mounting	coffee has expected by the book of the	
wois level multeri, a regula	Loose or worn joints from the steering column	n to the steering gear	
resent, perform the foliosemy steps	firs of Loose tie rod ends at lave but had he	was en wasersky. Drope was in	
A consequence of the consequence	A worn or missing pipe fitting seat		
	A worn wheel bearing of the grade		
interviews:	Misadjusted steering gear		

Steering Effort Hard in Both Directions

Problem	svijoš.	Action	2008-30-50-
The steering is hard.	Procedure.	on the hydraulic system. Refer to ng system for the following condit	Seer privants
		eering gear in the steering gear	4
September 1, 1997 of the community of th	A loose steerinA faulty pipe fit	• •	

Too Much Play in Steering

Problem	deitjā	Action	maiden (1
There is too much play in the	Inspect the steering syste		Thee is a momentary increase
steering wheel.	 A loose steering gea 	romounting doll- « 📑 🗀 edve (effort when turning the steading
90%	 Loose or worn joints 	from the steering column to the	ne steering gear
Acceptance (Co.	 Misadjusted steering 	gear fasiofficant 🔸 🔃	

Wander or Poor Steering Stability

Proble	em	Action	
There is a wander o	r poor stability in	Inspect the vehicle for the following conditions:	areidor®
the steering.	endika	• Mismatched tires	roog asit learly: grine as aff
		Uneven tires posites relead to empont =	yfildemuter
		Worn shock absorbers and a brid A	
		A loose stabilizer shaft	
		A broken spring to be private and a series and a series and a series and a series are a series and a series are a series and a series are a ser	
		• A sagging spring	
		Misadjusted steering gear a lose A	
		A misaligned tire and wheel	

Vehicle Leads to One Side or the Other

Problem	2010A		Action	maidet F	
The vehicle pulls or leads.	Inspect the vehic	le for the follow	ing conditions:	eshing wheel surges or jerks.	ie elft.
2 S	A misaligned	front tire and v	vheel A		
	Mismatched	tires	Ni bad A •		
	Uneven tires	naeg gameste d	etogule A 🧸		
iosāng coedificas;	• Broken sprin	igs of evident	negisa A 💌 📗		
	 Sagging spri 	ings	98601 -		
	Radial tire le	ad/pull	- Soske		
	An unbalance	ed steering gea	r valve spool		
See granteed and a company of the space against a company of grants and a company the company of	A dragging f	ront brake	ongenatus ita antegrano di tameno nese a un escribi se en e	representativa (10 p. 20 metrika) kundigari (10 p. 20 metrika) perundukan perundukan bermulangan dibuntuk perundukan (10 p. 20 metrikan perundukan perundukan perundukan (10 p. 20 metrikan perundukan per	nyuener voolige ingevendus

Foaming, Milky-Appearing Power Steering Fluid Problem The following conditions exist: • The fluid is foamy or milky. • The fluid level is low. • The fluid pressure is low. • Inspect for an internal pump leak. • Extremely cold temperatures will cause air bubbles if the fluid level is low. • If the fluid level is correct and the pump still foams, perform the following steps: - Remove the reservoir. • Inspect the reservoir for cracks. If the reservoir is cracked, replace the reservoir.

Low Oil Pressure Due to Steering Gear

Problem		Action	· · · · · · · · · · · · · · · · · · ·	
There is low pressure due to the	Inspect the steering gear for	or the following conditions:	onard	fisi gahasis edi
steering gear.	A scored housing bore	Procedure	£	
enolitiondo g	Leakage at one of the	following areas:		
	- The valve rings	estaujusaisi juliasaisi		
	-The seals	ro no brild A —		
	SUBSTICAL SEAS SALES	4/2-6890 A -		
	e ilitira easa	cin vitual A		

Low Oil Pressure Due to Steering Pump

Problem	Action	
There is low pressure due to the	Inspect the steering system for the following conditions:	
power steering pump.	A stuck or inoperative flow control valve	
ta topology personagili spali sketti	A pressure plate that is not flat against the ring	
कर्म हुवांसन्दर्भ अध्यक्त करू ,स	An extremely worn ring	
	Scoring on one of the following components:	
moissean a mouseart, a teas noors	- The pressure plate	
en e		
reed son receive princers	- The rotor	
ed Johnsto galbara feakj elali s		
e ded folg the areang system.	A head of the on one of the following components:	
notaliser graep seast, yet horse a tevo spaart, graep a	그 보다가 되면 가게 하면 되었다.	
en anne et en am ambigger nach de end er	- The pressure plate	
tarif waarsteen a rudkan oo beest o		

and because live black regions and see Groan Noise in Steering Pump

Problem	Action
the pump.	Inspect the pump for the following conditions: • Air in the fluid
inste reitra vivs ripadi leni ob entar	A low fluid level A loose pump mounting

Growl Noise in Steering Pump

Problem 1080 1000 1840	Action
There is a growling noise in the power steering pump.	Inspect the system for the following conditions: • Excessive back pressure that is caused by one of the following conditions:
ugan Movadaen ger	A restricted hose
JUP and of both file vovser	A restricted steering gear
	Scoring on one of the following components:
	- The pressure plates
	- The thrust plate
	- The rotor
	• A worn ring

Whine Noise in Steering Pump

Problem	Action	
There is a whining noise in the power	Inspect the system for scoring on one of the following components:	
steering pump.	The power steering pump shaft bushing	ĺ
	The pressure plates	
	The vanes	

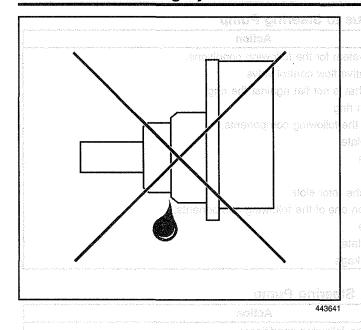
Repair Instructions

Checking and Adding Power Steering Fluid

Notice: When adding fluid or making a complete fluid change, always use the proper fluid. Failure to use the proper fluid will cause hose and seal damage and fluid leaks. Refer to Power Steering Fluid Recommendations in this section.

The fluid level is indicated by marks on the fluid level indicator. The fluid level indicator is located on the reservoir cap.

- If the fluid is about 77°C (170°F), the fluid level should be at the H mark.
- If the fluid is about 21°C (70°F), the fluid level should be at the C mark.



Bleeding Power Steering System

Tools Required

- J 35555 Mity Vac
- J 43485 Power Steering Bleeder Adapter

Important: Use clean, new power steering fluid type only.

• See the Maintenance and Lubrication subsection for fluid specifications.

Notice: If the power steering system has been serviced, an accurate fluid level reading cannot be obtained unless air is bled from the steering system. The air in the fluid may cause pump cavitation noise and may cause pump damage over a period of time.

Notice: When adding fluid or making a complete fluid change, always use the proper power steering fluid. Failure to use the proper fluid will cause hose and seal damage and fluid leaks.

Important: Hoses touching the frame, body, or engine may cause system noise.

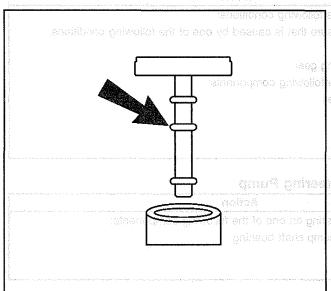
 Verify that the hoses do not touch any other part of the vehicle.

Important: Loose connections may not leak, but could allow air into the steering system.

· Verify that all hose connections are tight.

in Important: Maintain the fluid level throughout the and bleed procedure.

- 1. Remove the pump reservoir cap.
 - 2. Fill the pump reservoir with fluid to the "FULL COLD" level.



White Noise in Steering Pump

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eservor cap. • If the fluid is about 77°C (170°F). the fluid leve

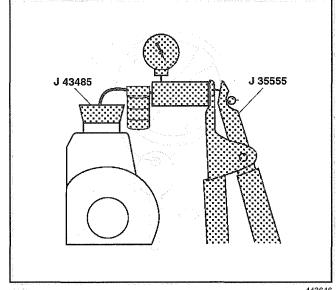
level bluit and no salmon yo balsolikel at level bluit 143644.

 If the fluid is about 21°C (70°F), the fluid level should an et the C spale. i Partikinā bas vatišaesi)

Notics: When adding fluid or majong a complete fluid disapp. Always use the proper fluid Paltime to use me proper hold will cause hose and seal damage and fluid tooks. Pater to Power Steeling Fluid.

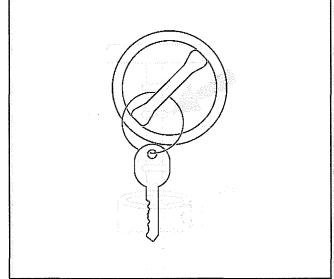
- 3. Attach *J* 43485 to *J* 35555 or equivalent.
- 4. Place J 43485 on or in the pump reservoir filler neck.
- 5. Apply a vacuum of 68 kPa (20 in Hg) maximum.
- 6. Wait 5 minutes.

Typical vacuum drop is 7-10 kPa (2-3 in Hg). If the vacuum does not remain steady, refer to Excessive Vacuum Drop Diagnosis at the end of this procedure.



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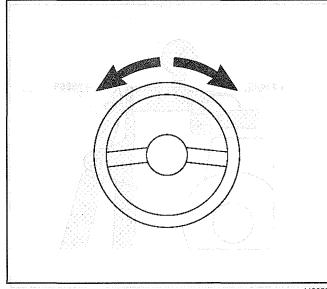
- 7. Remove the *J 43485* and the *J 35555*.
- 8. Reinstall the pump reservoir cap.
- 9. Start the engine. Allow the engine to idle.
- 10. Turn off the engine.
- 11. Verify the fluid level. Repeat steps 9 through 11 until fluid stabilizes.

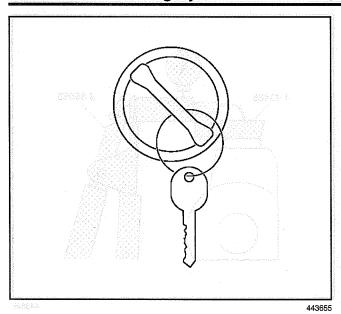


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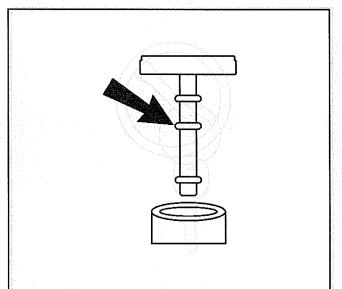
Important: Do not turn steering wheel to lock.

- 12. Start the engine. Allow the engine to idle.
- 13. Turn the steering wheel 180-360 degrees in both directions 5 times. S) 652 66 to musc av a yloga 6

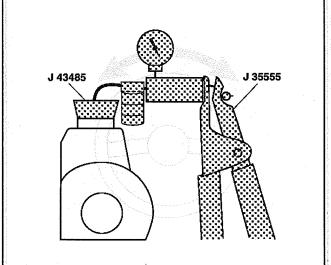




- 14. Switch the ignition off.
- 15. Verify the fluid level. If the no case is a soul as
 - 5. Apply a vacuum of 65 kPa (20 in Hg) maximum
 - Partenion B Said
 - Typical vacuum drop is 7-16 kPa (2-3 in Fig). If the vacuum does not remain steady, rafer to Excessive Vacuum Drop Diagnosis at the end of this procedure.

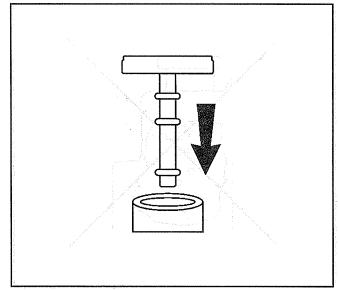


- 16. Remove the pump reservoir cap.
 - ageo viovineer amuq sitt hateologi. 3-
 - Start the engine. Allow the engine to little
 - scione sell the muT. . Q?
 - th uding in a social reacht reacht and the Allica to Allica to the Allic



- 17. Attach *J* 43485 to *J* 35555 or equivalent.
- 18. Place *J 43485* on or in the pump reservoir see that filler neck.
- 19. Apply a vacuum of 68 kPa (20 in Hg) maximum.
- 20. Wait 5 minutes.
- 21. Remove the *J 43485* and the *J 35555*.
- 22. Verify the fluid level.

23. Reinstall the pump reservoir cap. To ayare of pariodic bubbles that indicate a loose



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Excessive Vacuum Drop Diagnosis

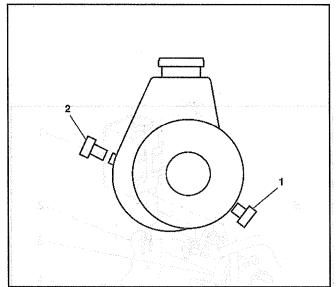
Tools Required

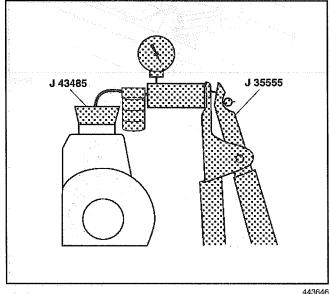
- J35555 Mity Vac
- J43485 Power Steering Bleed Adapter
- 1. If the vacuum continues to drop, remove the pressure and return hose from the pump.
- 2. Install the plugs (1) (2) supplied with J 43485 into the pressure and return port.

- 4. Place *J 43485* on or in the pump reservoir filler neck.
- 5. Apply a vacuum of 68 kPa (20 in Hg) maximum.

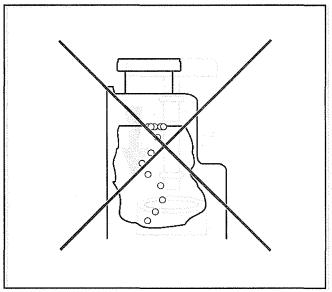
3. Attach *J 43485* to *J 35555* or equivalent.

6. If the vacuum drops again, repair or replace the pump. If the vacuum holds steady, continue to check the other parts of the steering system.

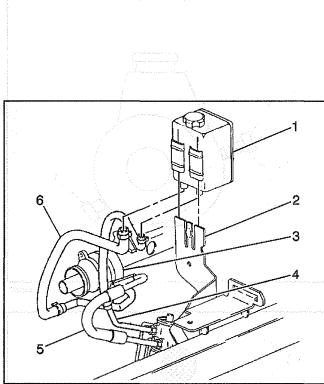


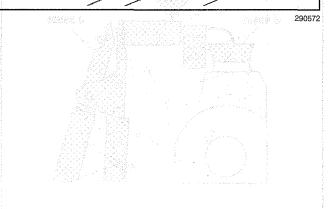


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Important: Fluid must be free from bubbles and foam. Be aware of periodic bubbles that indicate a loose connection or leaking O-ring seal in the return hose or the pressure hose.

Fluid must be free from discoloration.

- 7. Observe the fluid.
- 8. If condition persists, replace the following parts:
 - · The return hose clamps
 - The return hose O-rings
 - The pressure hose O-rings
 - The gear cylinder line O-rings
 - The reservoir to pump O-ring
- 9. Repeat the bleed procedure from the beginning.
- Drive the vehicle approximately 16 kilometers (10 miles) to warm the system to operating temperature. Evaluate vehicle on a smooth flat surface.
- 11. Verify the following conditions:
 - There is smooth power assist.
 - The vehicle operates quietly.
 - The pump maintains the proper fluid level.
 - There is no leaking in the steering system.
 - The fluid is free of foam or discoloration.

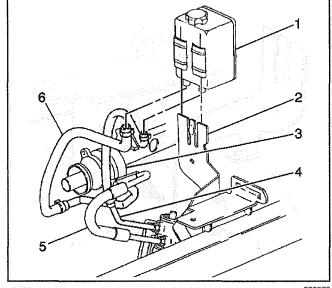
Remote Power Steering Fluid Reservoir Replacement

Removal Procedure

- 1. Place a drain pan under the reservoir (1).
- 2. Remove the cap from the reservoir (1).
- 3. Remove the reservoir (1) from the bracket (2).
- 4. Disconnect the reservoir and outlet hoses (4, 6) from the reservoir (1).
 - 3. Altach J. (RASA to d. 36565 or contivatore
 - Place J 43495 on or in the pump reservoir.
 Electronics.
 - Apply a vaccum of 66 kPa (20 in Not maximum
 - i. If the vacuum drops again, repair or replace the pump, if the vacuum holds steady, continue to check the other parts of the steamy system.

Installation Procedure

- 1. Connect the reservoir and outlet hoses (4, 6) to the reservoir (1).
- 2. Install the reservoir (1) to the bracket (2) assect
- 3. Refill the reservoir and Install the cap to the reservoir.
- 4. Remove drain pan.
- 5. Bleed the power steering system. Refer to Bleeding Power Steering System.

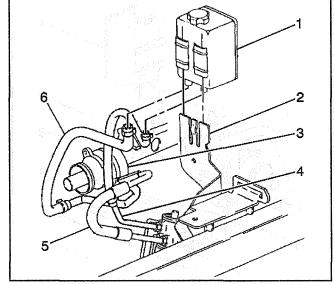


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Remote PS Fluid Reservoir Bracket Replacement

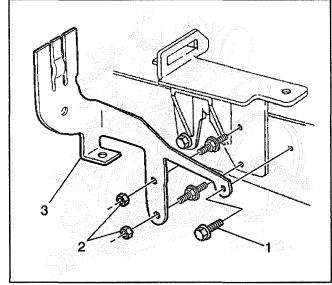
Removal Procedure

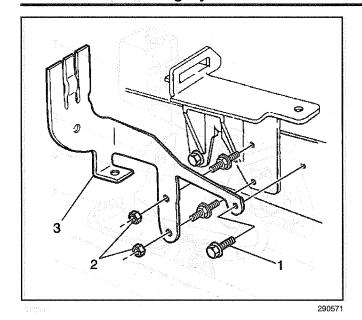
- 1. Remove the reservoir (1) from the bracket (2).
- 2. Use a wire, or an equivalent, in order to secure the reservoir (1) in an upright position.
 - An upright position will prevent leakage.
- 3. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle in General Information.
- 4. Remove the electrical harness from the bracket (2).



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- 5. Remove the bolt/screw (1).
- 6. Remove the nuts (2).





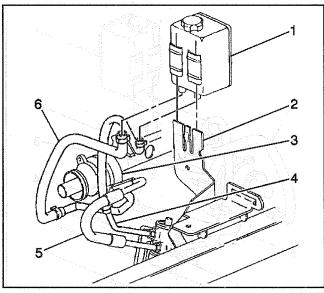
Installation Procedure

Notice: Refer to Fastener Notice in Cautions and Notices.

- 1. Install the nuts (2) at or or identees and distall in Tighten assemblished bus devised admirished. So Tighten the nuts to 12 N·m (107 lb in). November 2
- 2. Install the bolt/screw (1).

 Tighten

 Tighten the bolt/screw to 50 N·m (37 lb ft).
- 3. Install the electrical harness to the bracket (3).
- 4. Lower the vehicle.



5. Install the reservoir (1) to the bracket (2).

with a new G. Lawrence

- Sumove the reservoir Outweeths bracket (2)
- Use a viris, or an equivalent, in order to secure the reservoir (1) in an upright position.
- Reise and support the vehicle. Refer to Lifting and Jacking the Vehicle in General Information.
 - Remove the electrical harness from the bracket (2):

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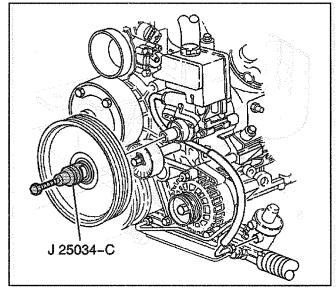
Power Steering Pulley Replacement

Removal Procedure

Tools Required

J 25034-C Power Steering Pump Pulley Remover

- 1. Remove the air intake resonator and mass airflow assembly (LS1 only).
- 2. Remove the serpentine belt.
- 3. Use the *J 25034-C* in order to remove the power steering pulley from the power steering pump.



Installation Procedure

Tools Requireds to all solidate necessary of the Hambiton's

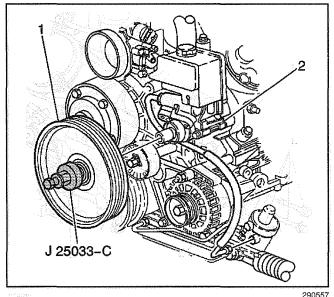
J 25033-C Power Steering Pump Pulley Installer lyne (8) eoerd incrit gmug (1) amug italent it important:

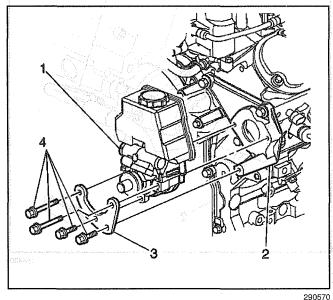
- 3.8 Liter Engine: Ensure that the face of the pulley hub is flush with the end of the pump shaft before you apply a load to the pulley hub.
- 5.7 Liter Engine: Ensure that the pulley hub shoulder bottoms out completely on the pulley shaft before you apply a load to the pulley hub.
- Ensure that the pulley goes on snug when installing the pulley with the special tool. If the pulley installs onto the pump shaft too easily, it will not relay engine power to the pump and should be replaced.
- 1. Use the J 25033-C in order to install the power steering pulley to the power steering pump.
- 2. Install the air intake resonator and mass airflow refrassembly (LS1-only) evec and beeld bas lifted . 8.
- 3. Install the serpentine belt.
- 4. Check power steering operation and visibly check pulley for any irregular wobble when operating.

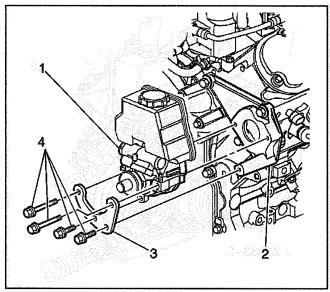
Power Steering Pump Replacement (V8) Removal Procedure

1. Place a drain pan under the power steering pump (1).

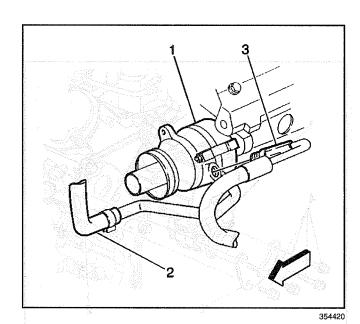
- 2. Remove the air intake resonator and mass airflow pump (1). Refer to Remote Power Styldmesses
- 3. Remove the serpentine belt.
- 4. Remove the power steering pump pulley. Refer to Power Steering Pulley Replacement.
- 5. Remove the outlet hose and the clamp from the reservoir (This allows fluid to drain from reservoir).
- 6. Remove the inlet hose fitting from the pump.
- 7. Remove power steering pump attaching bolts (4) and power steering pump front brace (3) from pump (1).
- 8. Remove pump (1) from rear bracket (2).







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Installation Procedure

Notice: Refer to Fastener Notice in Cautions and Notices, stated veltas amus private rawos G-66060.

1. Install pump (1), pump front brace (3), and attaching bolts (4) to rear bracket (2). * 3.8 Liter Engine: Sneure that the fac-

Tighten

Tighten the bolts/screws to 25 N·m (18 lb ft).

2. Install the inlet hose fitting from pump.

Tightends no ylefelomes fue americal refutuers

Tighten the fitting to 28 N·m (21 lb ft).

- 3. Install the outlet hose and clamp to reservoir.
- 4. Install the power steering pump pulley. Refer to Power Steering Pulley Replacement.
- 5. Install the serpentine belt.
- 6. Install the air intake resonator and mass airflow assembly anheats newed and of vested granaets
- 7. Remove drain pan. socret exercises entitisted in
- 8. Refill and bleed the power steering system. Refer to Bleeding Power Steering System.

Power Steering Pump Replacement (V6)

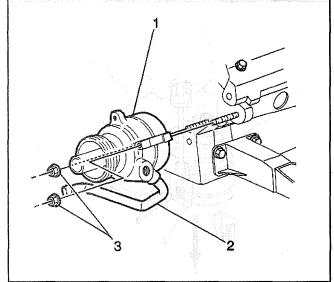
Removal Procedure

- 1. Place a drain pan under the power steering pump (1).
- 2. Remove the serpentine belt.
- 3. Remove the front air intake duct.
- 4. Remove the pulley from the power steering pump (1). Refer to Remote Power Steering Fluid Réservoir Replacement.
- 5. Disconnect the inlet hose (3) from the power steering pump (1).
- 6. Disconnect the reservoir hose (2) from the power steering pump (1).

- 7. Remove the power steering pump nuts.
- 8. Remove the power steering pump.

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- Place the hydraulic pump (1) on a fixed, flat surface, with the shall facing upward.
- (E) del gilo galassion edi ciril revisionere e neen l.f.;
 - Using the screwdriver, rome the relationing dipach (3) obvioled.
- Slide the reservoir clip (4) away from the hydraulic aump assembly (1)
- Remove the reservoir (2) from the hydrautic pump retained (1).
 - Remove the O-ring seal from the neck of the reservait (2) or the hydrapilo pump housing (1) Discard the O-ring seat



290569

Installation Procedure

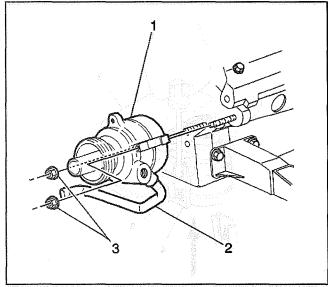
1. Position the power steering pump onto the mounting studs.

Notice: Refer to Fastener Notice in Cautions and Notices.

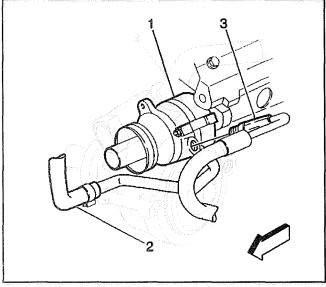
- 2. Tighten the power steering pump nuts.

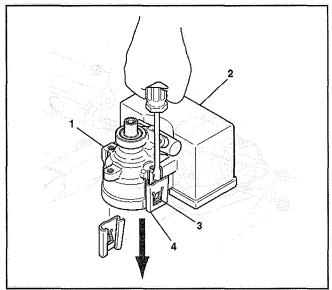
 Tighten

 Tighten the power steering pump nuts to 30 N·m (23 lb ft).
- Arigh the feet of the reservoir with the sides of the hydraulic pump frousing.
- install the new reservoir retaining clips (4)
 rsupplied with the pump). Ensure the retaining clip
 rabs (3) fully engage with the hydraulic pump
 housing (4).

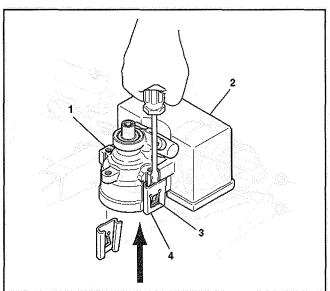


- Connect the inlet hose to the power steering pump (2).
- 4. Connect the reservoir hose (2) to the power steering pump (1).
- 5. Install the pulley to the power steering pump (1).
 Refer to Remote Power Steering Fluid Reservoir
 Replacement.
- 6. Install the front air intake duct.
- 7. Install the serpentine belt.
- 8. Refill and bleed the power steering system. Refer to Bleeding Power Steering System.

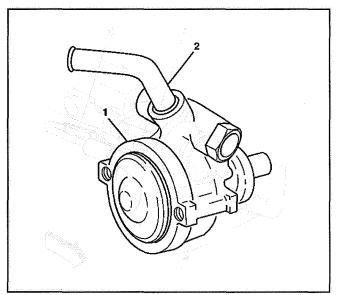




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482357



Power Steering Reservoir Replacement - Off Vehicle (CB Series)

Disassembly Procedure

- 1. Place the hydraulic pump (1) on a fixed, flat surface, with the shaft facing upward.
- 2. Insert a screwdriver into the retaining clip tab (3).
- 3. Using the screwdriver, force the retaining clip tab (3) outward.
- 4. Slide the reservoir clip (4) away from the hydraulic pump assembly (1).
- 5. Remove the reservoir (2) from the hydraulic pump housing (1).
- Remove the O-ring seal from the neck of the reservoir (2) or the hydraulic pump housing (1). Discard the O-ring seal.

Assembly Procedure

- Lubricate the new O-ring seal with power steering fluid.
- 2. Install the new O-ring seal onto the neck of the reservoir (2).
- Install the reservoir (2) onto the hydraulic pump assembly (1). Ensure the reservoir neck is completely engaged onto the hydraulic pump assembly (1).
- 4. Align the feet of the reservoir with the sides of the hydraulic pump housing.
- 5. Install the new reservoir retaining clips (4) (supplied with the pump). Ensure the retaining clip tabs (3) fully engage with the hydraulic pump housing (1).

Power Steering Pump Flow Control Valve Replacement - Off Vehicle (Return Tube)

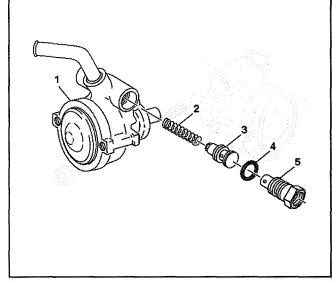
Disassembly Procedure

Important: Handle the pump with care. Do not carry the hydraulic pump housing assembly (1) by the return tube (2).

Important: Replace the hydraulic pump housing assembly (1) if the return tube (2) is cracked or loose. Do not attempt to repair the hydraulic pump housing assembly (1).

1. Inspect the return tube (2) on hydraulic pump housing assembly (1).

- 2. Remove the O-ring union fitting (5) from the hydraulic pump housing assembly (1).
- 3. Remove the O-ring seal (4) from the O-ring union fitting (5).
- 4. Remove the control valve assembly (3).
- 5. Remove the flow control spring (2).



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Assembly Procedure

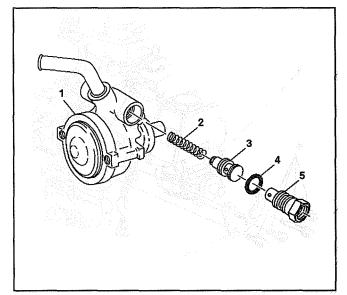
- 1. Install the flow control spring (2) to the hydraulic pump housing assembly (1).
- 2. Install the control valve assembly (3).
- 3. Lubricate the O-ring seal (4) with power steering fluid. The researches seeme his second
- 4. Install the O-ring seal (4) on to the O-ring union fitting (5).

Notice: Refer to Fastener Notice in Cautions and Notices.

5. Install the O-ring union fitting (5) into the hydraulic pump housing assembly (1).

Tightenga sa panesta sevos semi salii sasasaga

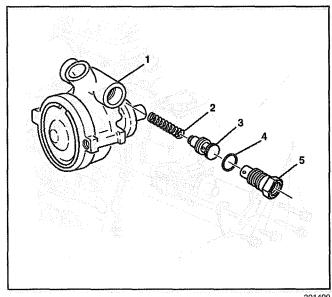
Tighten the O-ring union fitting (5) to

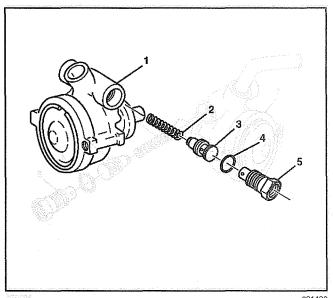


Power Steering Pump Flow Control Valve Replacement - Off Vehicle (CB Series)

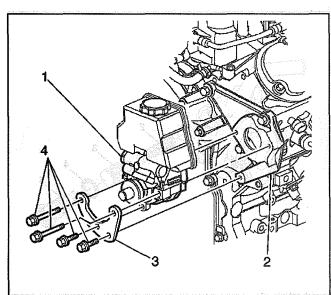
Removal Procedure

- 1. Remove the O-ring union fitting (5) from the hydraulic pump housing assembly (1).
- 2. Remove the O-ring seal (4) from the O-ring union fitting (5).
- 3. Remove the control valve assembly (3).
- 4. Remove the flow control spring (2).

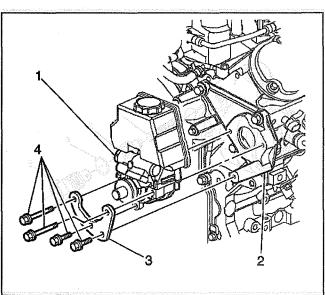








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Installation Procedure and print of systems

- 1. Install the flow control spring (2) to the hydraulic pump housing assembly (1).
- 2. Install the control valve assembly (3). (6) printing
- 3. Lubricate the O-ring seal (4) with power steering fluid.
- 4. Install the O-ring seal (4) onto the O-ring union fitting (5).

Notice: Refer to Fastener Notice in Cautions and Notices.

5. Install the O-ring union fitting (5) into the hydraulic pump housing assembly (1).

Tighten

Tighten the fitting (5) to 75 N·m (55 lb ft).

Power Steering Pump Front Bracket Replacements (2) gridge forthco wolf and listent. It

Removal Procedure

- 1. Place drain pan under pump (1), and standard g
- 2. Remove air intake resonator and mass airflow sensor assembly, no (4) less gain O entitistant is
- 3. Remove the serpentine belt.
- 4. Remove the power steering pump pulley from the pump. Refer to Power Steering Pulley Replacement (5) point figure 0 and issued (5).
- 5. Support pump assembly with twine or rope

Important: The front power steering pump bracket can be removed without the complete disconnection of the pump. The hydraulic hoses do not need to be disconnected.

6. Remove power steering pump attaching bolts (4) and front power steering pump bracket (3).

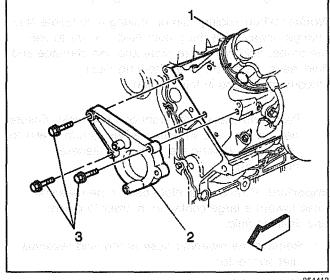
Installation Procedure

- 1. Install power steering pump attaching bolts (4) and front power steering pump bracket (3).
- 2. Remove twine or rope used for support.
- 3. Install the power steering pump pulley to the pump. Refer to Power Steering Pulley Replacement.
- 4. Install the serpentine belt.
- 5. Install the air intake resonator and mass airflow sensor assembly.
- 6. Remove drain pan and verify power steering operation.

Power Steering Pump Rear Bracket en ek semene met gretant eiene også. Franklige semene gehemme met gritasi Replacement

Removal Procedure

- 1. Remove the power steering pump (V8 only). Refer to Power Steering Pump Replacement (V8).
- 2. Remove the rear power steering pump bracket bolts (3).
- 3. Remove the rear power steering pump bracket (2) from cylinder head (1).



354413

Installation Procedure

1. Install the rear power steering pump bracket (2) to cylinder head (1).

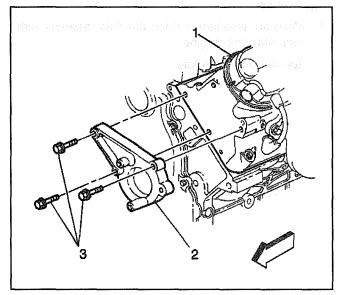
Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the rear power steering pump bracket bolts (3).

Tighten

Tighten the power steering pump bracket bolts (3) to 50 N·m (37 lb ft).

- 3. Install the power steering pump (V8 only). Refer to Power Steering Pump Replacement (V8).
- 4. Bleed the power steering system. Refer to Bleeding Power Steering System.



354413

Flushing the Power Steering System

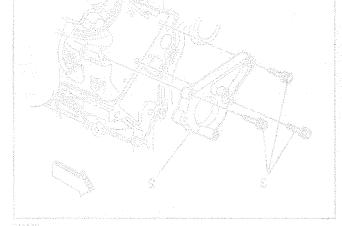
Notice: When adding fluid or making a complete fluid change, always use the proper fluid. Failure to use the proper fluid will cause hose and seal damage and fluid leaks. Refer to Power Steering Fluid Recommendations in this section.

 Raise and support the front of the vehicle. Ensure that the tires and wheels are free to turn. Refer to Lifting and Jacking the Vehicle in General Information.

Important: Position the inlet hose or the reservoir hose toward a large container in order to catch any draining fluid.

- 2. Remove the reservoir hose at the fluid reservoir inlet connector.
- 3. Plug the fluid inlet connector port on the fluid reservoir.
- 4. While an assistant is filling the fluid reservoir with fluid, start the engine.

Run the engine at idle.



Notice: Do not hold the steering wheel against the stops while flushing the power steering system. Holding the steering wheel against the wheel stops will cause high system pressure, overheating, and damage to the power steering pump and/or gear.

- 5. Turn the steering wheel from stop to stop.
- 6. Continue to drain the reservoir until all of the old fluid is cleared from the power steering system.
- 7. Add approximately 0.94 liters (1 quart) of new fluid in order to flush the system.
- Inspect the fluid that is draining while you are refilling the fluid reservoir.
 Do not reuse any drained fluid.
- 9. If necessary, perform the following steps:
 - · Replace all of the lines.
 - Disassemble and clean the system components.
 - · Replace the system components.
- Unplug the reservoir hose at the fluid reservoir inlet connector.
- 11. Turn the engine off.
- 12. Fill the fluid reservoir to the C mark on the fluid level indicator.
- 13. Bleed the power steering system. Refer to Bleeding Power Steering System.

(boits (2).

1 to 50 film (97 lb ft).

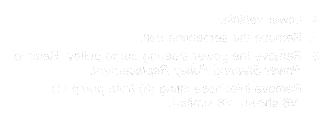
instantine power scennig punip (ye, unig), recertion Power Steering Pump Replacement (VR).

Bleed the power stearing system. Refer to:
Reading Power Steering System.

Power Steering Cooler Pipe/Hose Replacement

Removal Procedure

- 1. Place drain pan under vehicle under cooler.
- 2. Drain engine coolant from engine.
- 3. Remove power steering gear outlet hoses (3) and clips from cooler (1).
- 4. Remove hose clamps from radiator hoses at cooler (1).
- 5. Remove radiator hoses from cooler (1).
- 6. Remove cooler (1) from radiator support bracket.



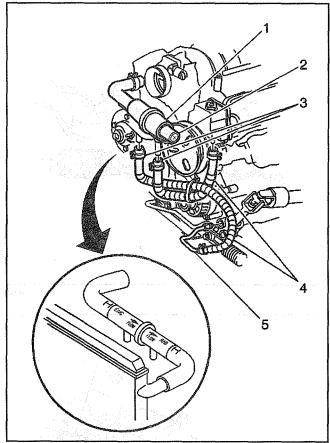


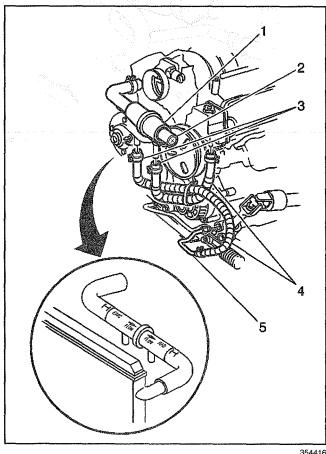
1. Install cooler (1) to radiator support bracket.

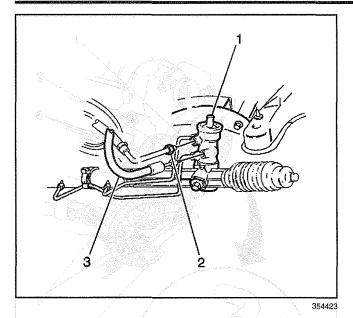
Important: Ensure that the cooler is installed with the "ENGINE" marking pointed toward the engine and the "RADIATOR" marking pointing toward the radiator (drivers side of the vehicle).

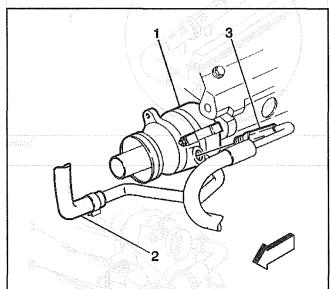
Alignment marks on cooler should align with alignment marks on radiator hoses so cooler is properly positioned (Power steering circuit outlets pointing straight down).

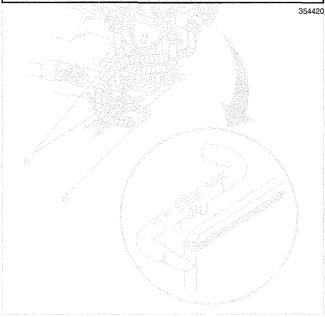
- 2. Install radiator hoses to cooler (1).
- 3. Install radiator hose clamps to radiator hoses at cooler.
- 4. Install the power steering gear outlet hoses (3) and clips to the cooler (1).
- 5. Refill engine with coolant.
- 6. Refill and bleed power the power steering system. Refer to Bleeding Power Steering System.











Power Steering Return Hose Replacement

Removal Procedure

- 1. Place drain pan(s) under vehicle under steering gear and pump.
- 2. Raise and suitably support vehicle. Refer to Lifting and Jacking the Vehicle in General Information.
- 3. Remove power steering gear inlet (3) and outlet (2) hoses from steering gear (1).
 - Remove radiator hoses from cooler (1).
- B Remove cooler (1) temperater support bracket.

- 4. Lower vehicle.
- 5. Remove the serpentine belt.
- Remove the power steering pump pulley. Refer to Power Steering Pulley Replacement.
- 7. Remove inlet hose fitting (3) from pump (1) (V6 shown, V8 similar).

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Important: Ensure that the cooler is installed with the ERICHET marking pointed toward the engine and the "RADIATOR" marking pointing toward the radiator introverse side of the vehicles.

Atigninett marks od cooler sbould align with alignment marks on radiator hoses so cooler is properly positioned (Power steering circuit outlets pointing straigns down)

- 2. Install radiator hoses to cooler (1)
- Install radiator hose clamps to radiator hosse at eapler
 - matelf (ne power steering pear outlet hoses (5) and olips to the cooler (1)
 - S. Reill engine with ecolors
- Fetili and bieset power the power steering system.
 Feter to Blueding Power Steering System.

Important: If vehicle is equipped with a power steering cooler (V8 only), outlet hose (3) and cooler hose (if replacing) must be removed from the power steering cooler (1) as the cooler is installed in the outlet hose (return back to reservoir).

8. Remove outlet hose from reservoir (V8 with cooler shown, remote-mount reservoir on V6).

maket the power steering burning pulley. Buter in Figurer Steering Pulley Repliciament.

Raise and suitably support vehicle. Refer to Unite and Jecking the Vehicle in General Information.

install (met and outlet hoses (2, 3) to steering pear (1).

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of (8) pased from will register to a 25 for the control of the con

Installation Procedure

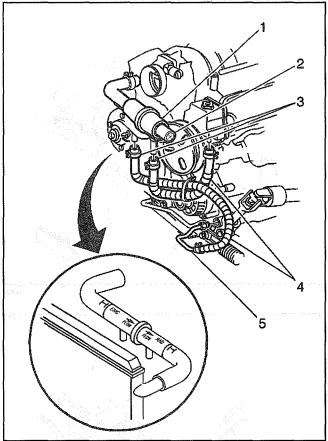
Important: Inlet and outlet hoses must be oriented so as adequate clearance is maintained between both hoses and surrounding components to prevent chafing. Use minimum clearance of 12 mm (0.47 in). The outlet hose (3) must not be twisted during installation. Do not bend or distort inlet and outlet hoses to make installation easier. Failure to follow these procedures could result in component damage.

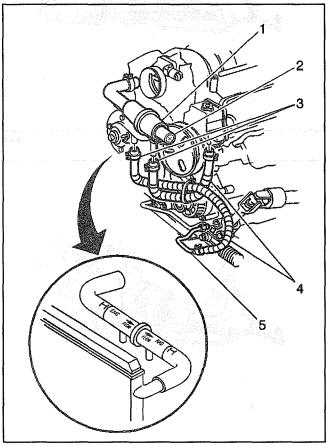
 Install outlet hose to reservoir (V8 with cooler shown, remote-mount reservoir on V6). (Pump mounted on V8, body mounted on V6)

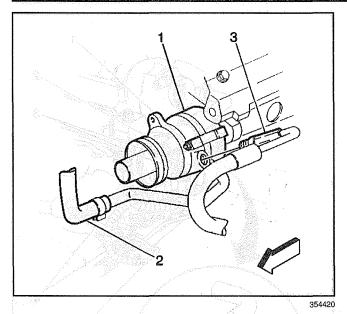
Phase dean panjet under vehicle under steering under steering

. Asses and substitute appropriate Refer to Litting

- Remove power steering geer inlet (3) and - buildt (2) hoses from steering geer (1)

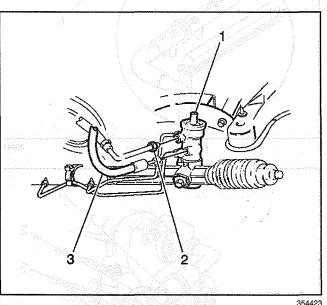






2. Install inlet hose fitting (3) to pump (1) (V6 shown, V8 similar). o (vino 8V) retoco grineets hose (if replacing) must be semoved from the

Remove qualet hose from reservoir (VS with cooler



- 3. Install the power steering pump pulley. Refer to Power Steering Pulley Replacement.
- 4. Install the serpentine belt.
- 5. Raise and suitably support vehicle. Refer to Lifting and Jacking the Vehicle in General Information.
- 6. Install inlet and outlet hoses (2, 3) to steering gear (1).

Tighten

- 6.1. Tighten the inlet hose (3) to 28 N·m (21 lb ft).
- 6.2. Tighten the outlet hose (2) to 28 N·m (21 lb ft).
- 7. Lower vehicle. shenograph problem to be seen 8. Remove drain pan. St to sonspacto mumicim esti
- 9. Refill and bleed power steering system. Refer to Bleeding Power Steering System.

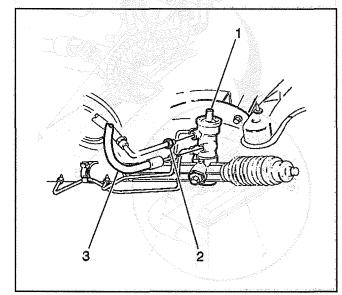
1. Install outlet hose to reservoir (VB with oppier Power Steering Gear Replacement (V6)

Removal Procedure

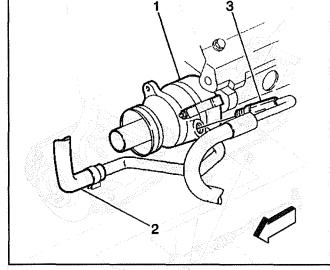
- 1. Place drain pan(s) under vehicle under steering gear and pump.
- 2. Raise and suitably support vehicle. Refer to Lifting and Jacking the Vehicle in General Information.

er efter eine eine eine State begen werten bei eine eine Katte der Re

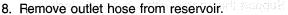
3. Remove power steering gear inlet (3) and outlet (2) hoses from steering gear (1).



- 4. Lower vehicle.
- 5. Remove the serpentine belt.
- 6. Remove the power steering pump pulley. Refer to Power Steering Pulley Replacement.
- 7. Remove inlet hose fitting (3) from pump (1).



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Installation Procedure

Important: Inlet and outlet hoses must be oriented so as adequate clearance is maintained between both hoses and surrounding components to prevent chafing. Use minimum clearance of 12 mm (0.47 in). The outlet hose must not be twisted during installation. Do not bend or distort inlet and outlet hoses to make installation easier. Failure to follow these procedures could result in component damage.

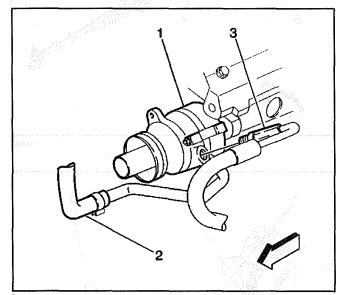
- 1. Install outlet hose to reservoir.
- 2. Install inlet hose fitting (3) to pump (1).
- 3. Install the power steering pump pulley. Refer to Power Steering Pulley Replacement.
- 4. Install the serpentine belt.
- 5. Raise and suitably support vehicle. Refer to Lifting and Jacking the Vehicle in General Information.

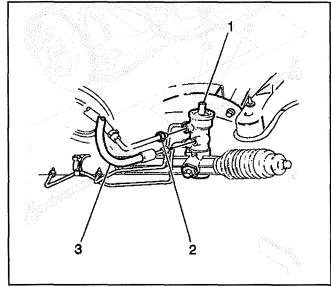
Notice: Refer to Fastener Notice in Cautions and Notices.

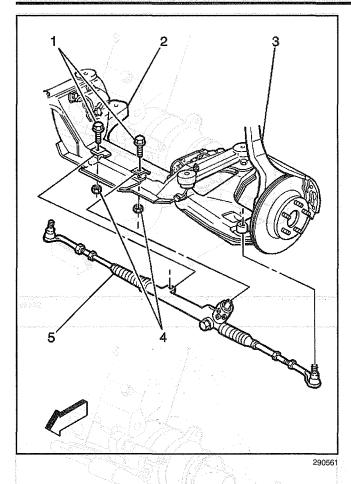
6. Install inlet and outlet hoses (2, 3) to steering gear (1).

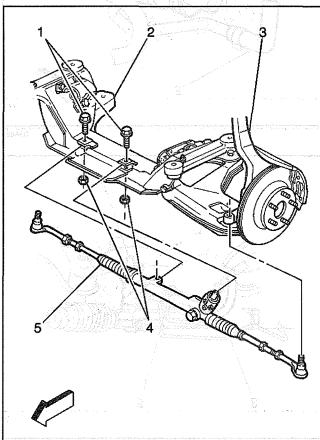
Tighten: eleterment of releft, resp, projects

- Tighten the inlet hose (3) to 28 N·m (21 lb ft).
- Tighten the outlet hose (2) to 28 N·m (21 lb ft).
- 7. Lower vehicle.
- 8. Remove drain pan.
- 9. Refill and bleed power steering system. Refer to Bleeding Power Steering System.









Power Steering Gear Replacement (V8)

Removal Procedure

- Remove the air intake resonator.
- 2. Remove the serpentine belt.
- 3. Support the engine with a hydraulic jack.
- 4. Raise and support the vehicle. Refer to *Lifting and Jacking the Vehicle* in General Information.
- Remove the tires and wheels. Refer to *Tire and Wheel Removal and Installation* in Tires and Wheels.
- 6. Place a drain pan under the steering gear (5).
- 7. Disconnect the steering gear outer tie rods.
- 8. Remove the generator.
- 9. Remove the left-side engine mount through bolt.
- 10. Lower the vehicle.
- 11. Raise the engine with the hydraulic jack.
- Disconnect the following hoses from the steering gear (5):
 - The power steering gear inlet hose
 - The power steering gear outlet hose
- 13. Remove the steering gear flexible coupling from the steering gear (5). Refer to *Intermediate Steering Shaft Replacement* in Steering Wheel and Column.

interviewer of secon telling the research

- 14. Remove the nuts (4) and bolts/screws (1).
- 15. Remove the steering gear (5).

Installation Procedure) possit seed total leafair

- Position the steering gear (5) to the crossmember (2).
- 2. Adjust the steering gear (5).

 Ensure that the steering aligns as straight as possible with the steering gear coupling shaft.
- 3. Hand start the bolts (1) and nut (4).

Notice: Refer to *Fastener Notice* in Cautions and Notices.

4. Position the back-up wrench to the nuts (4).

Tighten

Tighten the bolts to 85 N⋅m (63 lb ft).

 Install the steering gear flexible coupling to the steering gear. Refer to *Intermediate Steering* Shaft Replacement in Steering Wheel and Column.

Tighten

Tighten the bolts to 47 N·m (35 lb ft).

6. Connect the following hoses to the steering gear (5).

Tighten

- 6.1. Tighten the inlet hose to 28 N·m (21 lb ft).
- 6.2. Tighten the outlet hose to 28 N·m (21 lb ft).
- 7. Lower the vehicle. Allow the vehicle to stay slightly above the ground while the tires and wheels are not installed.

- 8. Lower the engine with the hydraulic jack.
- 9. Raise and suitably support the vehicle. Refer to Lifting and Jacking the Vehicle.
- 10. Install the left side engine mount through-bolt.
- 11. Install the generator.
- 12. Connect the steering gear outer tie rods to the steering knuckles.
- 13. Install the tire and wheels. Refer to Tire and Wheel Removal and Installation in Tires and Wheels.
- 14. Lower the vehicle.
- 15. Remove the hydraulic jack supporting the engine.
- 16. Install the serpentine belt.
- 17. Install the air intake resonator.
- 18. Refill and bleed the power steering system. Refer to Bleeding Power Steering System.

Rack and Pinion Gear Rack Bearing Preload Adjustment - Off Vehicle (Quiet Valve)

Adjustment Procedure

- 1. Loosen the adjuster plug lock nut (1).
- 2. Turn the adjuster plug clockwise until the adjuster plug bottoms in the gear assembly.
- 3. Turn the adjuster plug back 50 degrees to 70 degrees (approximately one flat).

Notice: Refer to Fastener Notice in Cautions and Notices.

4. Install the adjuster plug lock nut (1) to the adjuster plug. Hold the adjuster plug stationary while tightening the adjuster plug lock nut (1)

Tighten

Tighten the lock nut to 75 N·m (55 lb ft).

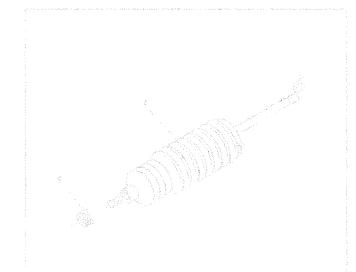
Rack and Pinion Boot Replacement - Off Vehicle (Quiet Valve)

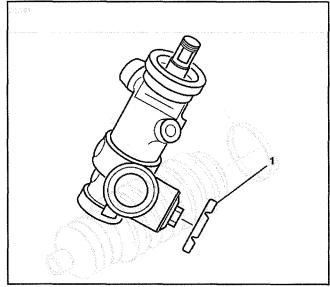
Disassembly Procedure was procedure translations

Tools Required

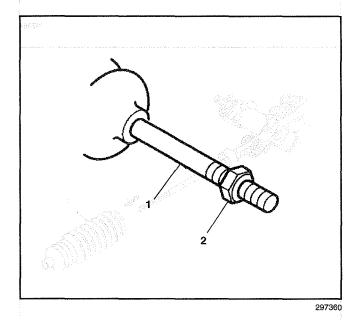
J 22610 Service Boot Clamp Installer

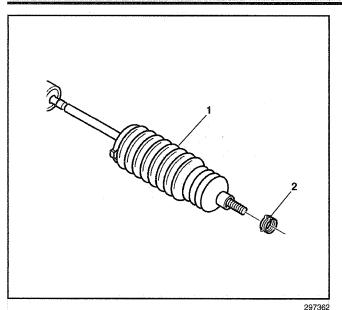
- 1. Remove the outer tie rod. Refer to Tie Rod End Replacement - Outer - Off Vehicle.
- 2. Remove the hex jam nut (2) from the inner tie rod assembly (1): I read replace bork store and page? I di

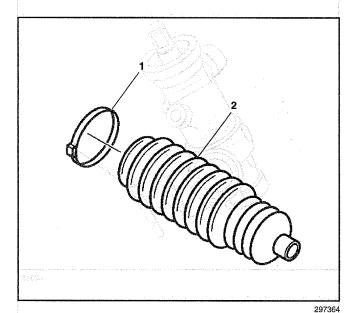


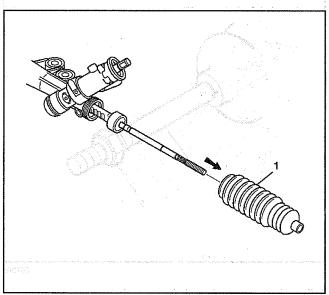


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- 3. Remove the tie rod end clamp (2) from the rack and pinion boot (1).
 - fietall the tell side engine mount inrough-bot.
 - Ti Jaskali ing generatu
 - Connect the steaming gear outer tie rods to the steering knockles.
 - Install the fire and wheels. Refer to Tire and Wheel Removal and Installation in Tires and Wheels.
 - 4. Lower the vehicle
- Remove the hyporaulic jack supporting the engine
 - 16. Install the sementine bet
 - C. Install the air unişke resonato
- Refill and bleed the power steering system. Reter to Bleeding Power Steering System.

Rack and Pinion Geer Reck Beering

4. Remove the boot clamp (1) from the rack and pinion boot (2) with side cutters.

ministrative medicinalists.

- Loosenthe adjuster plug lock not (1).
- 2. Turn the adjuster plug doctories and the adjuster
 - 3. Turn the adjuster plug back 50 degrees . . . to 70 degrees lead.

kipifoe: Refer to Pasterier Notice in Cautions and lottoes.

- Install the adjuster plug-look and (f), to stepticities plug: rhold-the adjuster plug stationery while aginering the adjuster plug look nut (1)
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Rack and Pinion Soot Replacement - Off

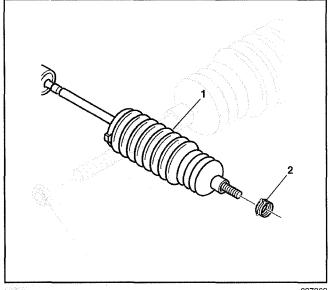
- 5. Remove the rack and pinion boot (1) from the rack and pinion gear assembly.
- 6. Discard the boot clamp.
- 7. Inspect the rack and pinion boot (1) for damage.
- 8. Look for gear oil leakage inside the rack and pinion boot (1).
- 9. Drain the oil. most (S) has mad and arb averness (S)
- 10. Clean the rack and pinion boot (1) with solvent.

Assembly Procedure (8) and and and Maleson

Tools Required

J 22610 Service Boot Clamp Installer

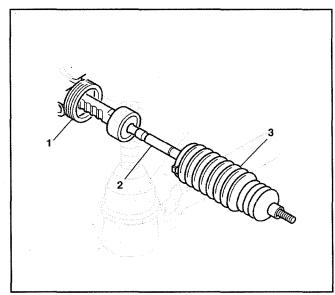
1. Install the new boot clamp (2) onto the rack and pinion boot (1).



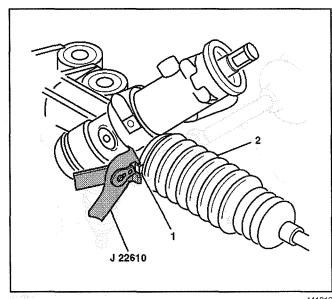
- 2. Prior to rack and pinion boot installation, apply grease to the inner tie rod assembly (2) and the rack and pinion gear assembly (1).
- 3. Install the rack and pinion boot (3) onto the inner tie rod assembly (2).

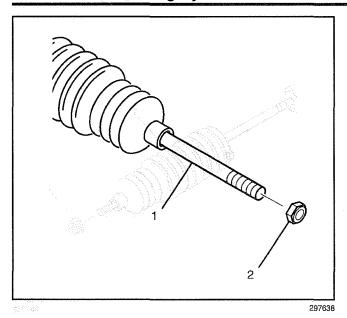
Important: The rack and pinion boot (3) must not be twisted, puckered or out of shape. If the rack and pinion boot (3) is not shaped properly, adjust the rack and pinion boot by hand before installing the boot clamp.

4. Install the rack and pinion boot onto the gear assembly (1) until the rack and pinion boot (3) is seated in the gear assembly groove.

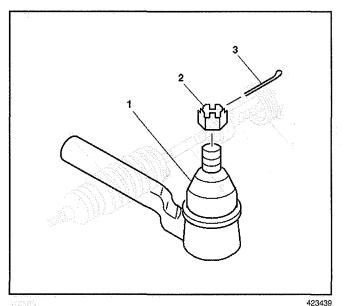


- 5. Install the boot clamp (1) on the rack and pinion boot (2) with J 22610.
- 6. Crimp the boot clamp (1).
- 7. Pinch the pliers together on the rack and pinion boot (2) in order to install the tie rod end clamp.





- Install the hex jam nut (2) to the inner tie rod assembly (1).
- 9. Assemble the outer tie rod assembly. Refer to *Tie Rod End Replacement Outer Off Vehicle*.



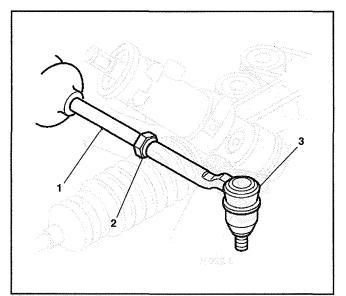
Tie Rod End Replacement - Outer - Off Sehicle (S) Identical Sehicle (S) Identical Sehicle (S)

Disassembly Procedure and those soil italiant. &

Tools Required

J 24319-01 Universal Steering Linkage Puller

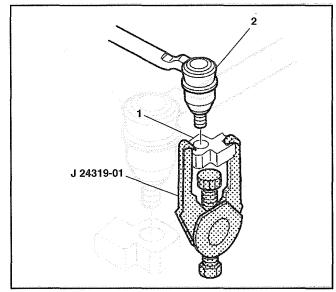
- Pull the cotter pin (3) and the hex slotted nut (2) from outer tie rod assembly (1).
 - Instell the rack and pinion boot onto the gear assembly (1) until the rack and pinion boot (3).
 Is seated in the gear assembly groove.



2. Loosen the jam nut (2) on the inner tie rod assembly (1).

8. Quarp the boot clamp(1) -- (1) -- (2) Finch the piece logarher on the rack and pinior boot (2) in order to install the de rod and clamp

3. Remove the outer tie rod assembly (2) from the steering knuckle (1) using J 24319-01.



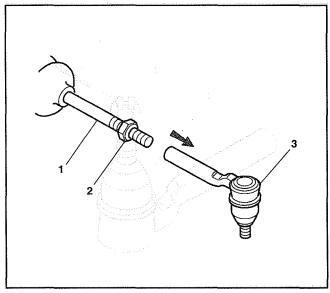
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4. Remove the outer tie rod assembly (3) from the inner tie rod assembly (1).

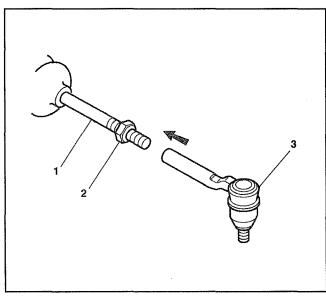
Lift of 35) in: VETA or (S) for busines were self-resident.

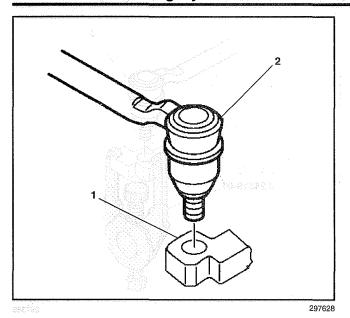
Assembly Procedure

1. Connect the outer tie rod assembly (3) to the inner tie rod (1). Do not tighten the jam nut (2).

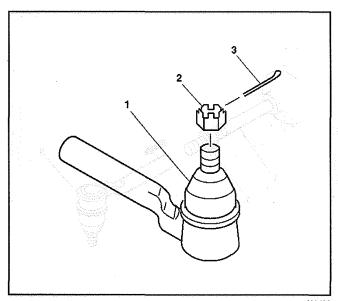


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2. Connect the outer tie rod assembly (2) to the steering knuckle (1).



3. Connect the hex slotted nut (2) to the outer tie rod stud (1).

Notice: Refer to *Fastener Notice* in Cautions and Notices.

Tighten

Tighten the hex slotted nut (2) to 47 N·m (35 lb ft). Align the cotter pin slot by tightening the hex slotted nut (2) up to 1/6 additional turn, or 70 N·m (52 lb ft) maximum. Do not back off the hex slotted nut (2) for the cotter pin (3) insertion.

 Install the cotter pin (3) into the hole in the tie rod stud.

Important: Be sure the rack and pinion boot is not twisted or puckered during toe adjustment.

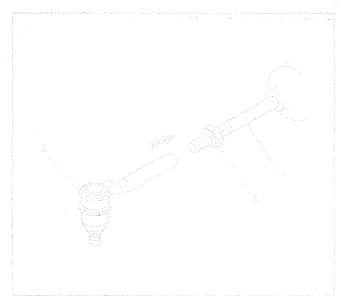
5. Adjust the toe by turning the inner tie rod. Follow recommended manufacturer specifications.

Tighten

Tighten the hex jam nut against the outer tie rod to 68 N·m (50 lb ft).

Assembly Procedure

 Connect the cuter ile rod assembly (3) to the laner tile rod (1). Oc not tighten the jam nut (2).



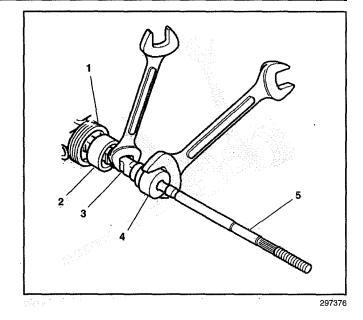
Tie Rod Replacement - Inner

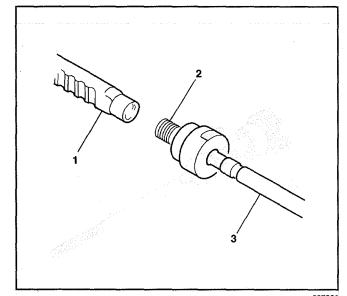
Disassembly Procedure

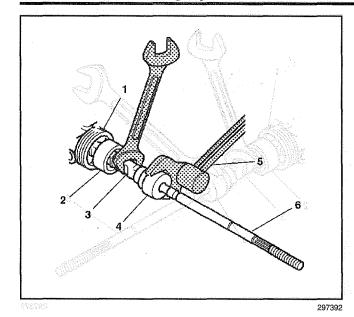
1. To remove the rack and pinion boot; refer to Rack and Pinion Boot Replacement - Off Vehicle (Quiet Valve).

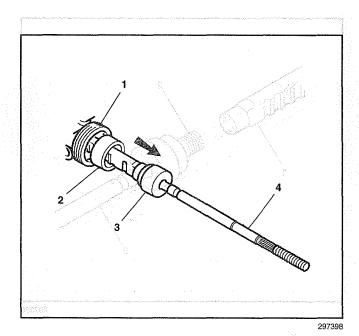
Important: The rack must be held during removal and installation of the inner tie rod to prevent damage to the rack.

- 2. Remove the shock dampener (2) from the inner tie rod assembly (5).
- 3. Slide the shock dampener (2) back on the rack (1).
- 4. Remove the inner tie rod assembly (5) from the rack assembly (1) as follows:
 - 4.1. Place a wrench on flats of rack assembly (3).
 - 4.2. Place another wrench on the flats of the inner tie rod housing (4).
 - 4.3. Rotate the inner tie rod housing (4) counterclockwise until the inner tie rod (5) separates from the rack (1).
- 5. Remove the old Loctite® from the threads (2) of the rack (1) and the inner tie rod (3).









Assembly Procedure

Important: The rack must be held during removal and installation of the inner tie rod to prevent damage to the rack

1. Slide the shock dampener (2) forward onto the rack (1).

Important: Threads must be clean prior to Loctite® application. Check Loctite® (or equivalent) container for expiration date. Use only enough Loctite® to evenly coat threads.

 Apply Loctite[®] 262 (or equivalent) to the inner tie rod threads.

Notice: Refer to *Fastener Notice* in Cautions and Notices.

- 3. Attach the inner tie rod (6) on the rack (1) as follows:
 - 3.1. Place a wrench on the flats of the rack assembly (3).
 - 3.2. Place a torque wrench (5) on the flats of the inner tie rod housing (4).

(Tightensis most satisface (3) bor

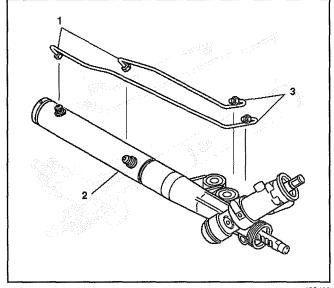
a (S) all nner tie rod to 100 N·m (74 lb ft). Ame

- 4. Slide the shock dampener (2) over the inner tie rod housing (3) until the front lip of the shock dampener (2) bottoms against the inner tie rod housing (3).
- 5. To assemble the rack and pinion boot; refer to Rack and Pinion Boot Replacement - Off Vehicle (Quiet Valve).

Steering Gear Cylinder Pipe Assemblies/O-Ring Seals Replacement -Off Vehicle (Quiet Valve)

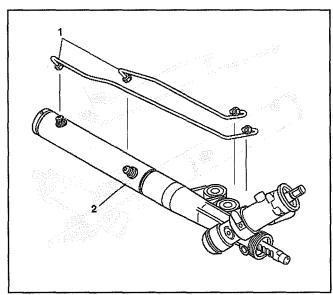
Disassembly Procedure

- 1. Loosen both cylinder line fittings (1) on the cylinder end of the gear assembly (2).
- 2. Loosen both fittings on the cylinder line assemblies (3) at the valve end of the gear assembly (2).

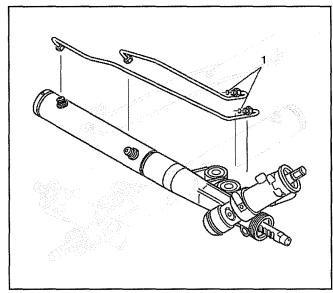


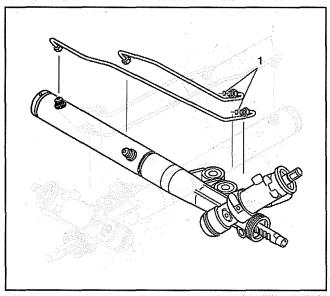
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- 3. Remove both cylinder line assemblies (1) from the rack and pinion gear assembly (2).



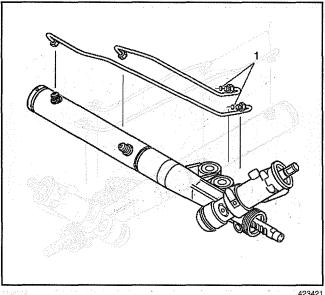
- 4. Remove the O-ring seals (1) from the valve end of line.
- 5. Discard the O-ring seals (1).
- turn GM Part #1050017 (or equivalent transling GM





Assembly Procedure

- 1. Inspect the cylinder lines (1) for the following items:
 - Cracks
 - Dents
 - Damage to the threads
- 2. Replace the parts as needed.

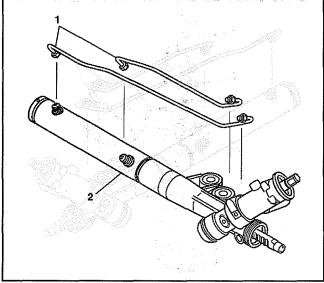


3. Install the new O-ring seals (1) to the valve end of the cylinder lines impacts used notice bus about

Important: Carefully align the threads on all of the fittings.

4. Finger tighten the fittings in order to avoid stripping and cross-threading the fittings.

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5. Install the cylinder line assemblies (1) to the gear assembly (2).

Notice: Refer to Fastener Notice in Cautions and Notices.

Valve end fittings to 16.9 N·m (12.6 lb ft). Cylinder end fittings to 27 N·m (20 lb ft).

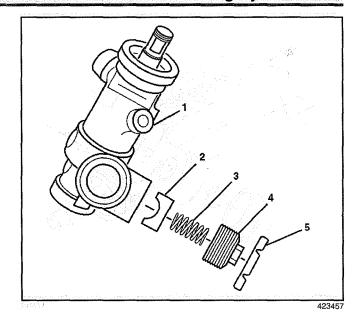
Important: Flush and bleed power steering system (hoses, reservoir and cooler lines) with power steering fluid GM Part #1050017 (or equivalent meeting GM Specification #9985010).

6. Flush and bleed power steering system. Refer to Bleeding Power Steering System.

Steering Gear Stub Shaft Seals and Bearing Replacement - Off Vehicle

Disassembly Procedure

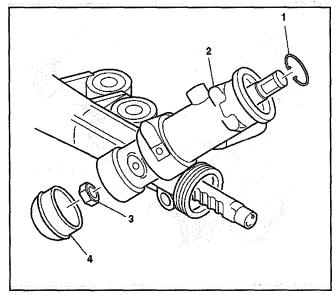
- 1. Remove the adjuster plug lock nut (5) from the adjuster plug (4).
- 2. Remove the adjuster plug (4) from the gear assembly (1).
- 3. Remove the adjuster spring (3) and the rack bearing (2).



- 4. Remove the retaining ring (1) from the valve bore of the rack and pinion gear assembly (2).
- 5. Remove the dust cover (4) from the bottom of the rack and pinion gear assembly (2).

Important: Hold the stub shaft in order to prevent damage to the pinion teeth.

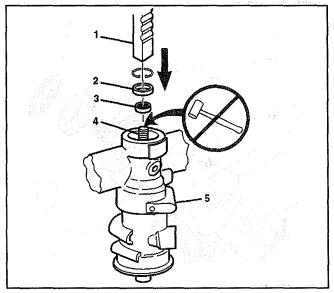
Remove the hex lock nut (3) from the lower end of the pinion and valve assembly while holding the stub shaft with a 14 mm crowfoot wrench.

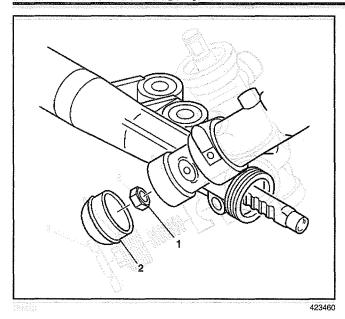


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Important: When performing the following procedure, do not remove pinion and valve assembly from the rack and pinion gear assembly (5). Press the pinion and valve assembly only far enough to allow removal of the stub shaft bearing annulus (2) and the stub shaft seal (2).

- 7. Using an arbor press (1), press on the threaded end of the pinion until removal of the following items is possible:
 - 7.1. The stub shaft (4)
 - 7.2. The stub shaft seal (3)
 - 7.3. The stub shaft bearing annulus assembly (2)





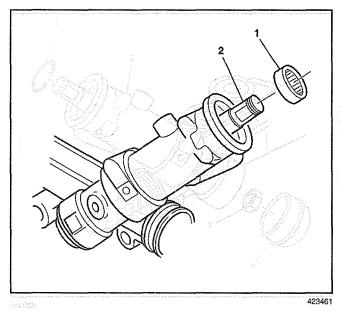
Assembly Procedure and date and principle

Tools Required

J 29810 Stub Shaft Seal Protector

Important: Hold the stub shaft in order to prevent damage to the pinion teeth.

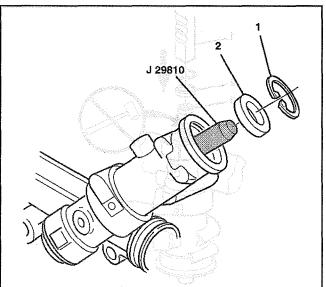
- 1. Install the hex lock nut (1) onto the pinion while holding the valve stub shaft.
- 2. Install the dust cover (2) to the rack and pinion gear assembly.



3. Install the stub shaft bearing annulus assembly (1) onto the valve stub shaft (2).

important: Hold the stub-shalf in dider to grevent damage to the pinion teeth.

6: Asmove the hex lock nut (3) from the lower and the pinion and valve assembly while holding to the stub shaft with a 14 mm provided whench.



- 4. Install the *J 29810* onto the valve stub shaft.
- 5. Lubricate the stub shaft seal (2) with grease.
- 6. Install the stub shaft seal (2) into the rack and pinion gear assembly.
- 7. Install the retaining ring (1) into the groove in the rack and pinion gear assembly.

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7.3. The stop shalt bearing annulus

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- Lubricate the following items with lithium base grease:
 - 8.1. The rack bearing (2)
 - 8.2. The adjuster spring (3)
 - 8.3. The adjuster plug (4)
- 9. Install the following items into the gear assembly:
 - 9.1. The rack bearing (2) associations continued
 - 9.2. The adjuster spring (3)
 - 9.3. The adjuster plug (4)
- Turn the adjuster plug (4) clockwise onto the rack and pinion gear assembly (1) until the adjuster plug (4) bottoms in the rack and pinion gear assembly (1), then turn the adjuster plug (4) back 50 degrees to 70 degrees.
- 11. Inspect the rotational torque on the pinion. The maximum pinion preload torque is 1.8 N·m (16 lb in).

Notice: Refer to Fastener Notice in Cautions and Notices.

12. Install the adjuster plug lock nut (5) to the adjuster plug (4).

Tighten

Finger tighten the adjuster plug lock nut (5) while holding the adjuster plug (4) stationary.

Description and Operation

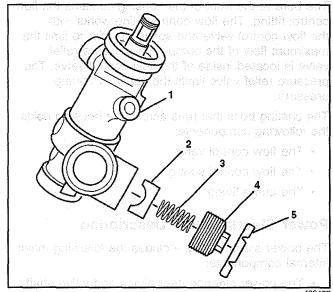
Power Steering Pump Description

A constant displacement vane-type pump provides hydraulic pressure and flow for the power steering system. The pump is located on the engine and is belt driven by the serpentine belt through the power steering pulley. The power steering reservoir is integrally mounted on the LS1 V8 system (engine mounted) and is remote-mounted (radiator support mounted) on L36 V6 systems.

The power steering pump contains the following major components:

- The drive shaft
- The pump housing
- · The pump fitting
- The flow control valve
- The flow control spring
- The thrust plates
- The pressure plates
- The pump ring
- The pump rotor
- The pump vanes

The power steering system has a remote reservoir. The reservoir cap has an attached fluid level indicator which shows the fluid level in the reservoir.



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The areat to stell the veticle is dreated by the precising difference at the piston when the following conditions exist:

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The valve relocation activation.

The bore at the front of the housing contains the flow control fitting. The flow control fitting works with the flow control valve and spring in order to limit the maximum flow of the pump. The pressure relief valve is located inside of the flow control valve. The pressure relief valve limits the maximum pump pressure.

The casting boss that runs across the housing holds the following components:

- · The flow control valve
- · The flow control spring
- · The pump fitting

Power Steering Gear Description

The power steering gear includes the following major internal components:

- The power steering gear pinion and valve shaft
- The steering gear rack and piston
- · The inner tie rods
- The outer tie rods

The steering gear rack and piston is supported at the ends in the steering gear housing. The steering gear rack and piston is sealed in order to prevent leakage across the piston. The pinion and valve intersects with the rack and piston and meshes directly with the teeth of the rack and piston.

Manual steering is always available during the following situations:

- When the engine is not running
- In the event of power steering pump failure
- In the event of serpentine belt failure

Steering effort is increased when the above conditions exists.

The power steering pump provides hydraulic pressure and fluid flow in order to move the gear components. This action occurs when the vehicle is parked or moving. The valve directs pressurized fluid during a steering maneuver. The fluid travels through the external steel cylinder lines in order to act on the rack and piston. When the vehicle is turned right, the steering valve opens and routes pressurized fluid to the left side of the piston. At the same time, the valve allows fluid to escape from the right side of the piston and return to the valve area. The fluid pressure is converted into a mechanical force which is applied to the piston. This difference in force across the piston causes the rack to move to the right. The opposite action occurs when the gear is turned to the left.

The effort to steer the vehicle is created by the pressure difference at the piston when the following conditions exist:

- The power steering pump (3) provides pressurized fluid to the gear.
- The valve is operating correctly.

Seal Replacement Recommendations

Lip Seals

Lip seals, which seal rotating shafts, require special treatment. This type of seal is used on the hydraulic pump shaft of the pump. When leakage occurs in this area, always replace the seal or seals, after inspecting and thoroughly cleaning the sealing surface. Replace the shaft if pitting is found. If corrosion in the lip seal contact zone is slight, clean the surface of the shaft with crocus cloth. Replace the shaft only if the leakage cannot be stopped by smoothing with crocus cloth first.

O-Ring Seals selbs and mu near (1) vidmesse

Whenever a part which forms a sealing surface for an O-ring is removed, the O-ring seal should also be removed and replaced with a O-ring seal. Lubricate all new O-rings with fresh power steering fluid to ease installation.

Special Tools and Equipment

Illustration	Tool Number/ Description
	ubs ent netripit repnificial retenible ent problem J 5176-E Power Steering Pressure
onnests rawon ent 101 led arons enghe edi no o 65360	A centrant displacement vi hydraulic pressure and flow system. The pump is locate desently the samentine be
steering reservoir is See S system (engine Le (radiatot support ss.	ritegrally metanted on the tangulaterms. In the tangulated and its remotes and the system of the system.
rojam palvojtoj syl /nistno	Pressure Tester Adapter
293487	The drive shaft The purhp housing The pump fitting The flow control valve
	The flow control spring
	eatsig taunn anT « aatsig erusserg anT « 3 J 22610 G anT »
60	Keystone Clamp Plier
tached fluid level indicator	metaya grifisaka jewoq edil

Illustration	Tool Number/ Description	Illustration	Tool Number/ Description
82244	J 24319-01 Universal Linkage Puller	283637	J 29810 Stub Shaft Seal Protector
676	J 25033-C Power Steering Pump Pulley Installer	444239	J 35555 Mity Vac
9 GE \ 675	J 25034-C Power Steering Pump Pulley Remover	443571	J 43485 Power Steering Bleeder Adapter
315384			Paragonal Paragonal Acceptance of the Cartesian Communication of the Cartesian Communication of the Cartesian Communication of the Cartesian Communication C
309644	J 29525 Steering Analyzer Adapter (18 mm)		Accel Spell Security Social Leading Administration Statement Options Assembly Statement Colomb Mark Mark 2001 Statement Colomb Mark 2001 Statement Colomb Mark 2001 Statement Colomb Mark 2001