

STEERING SYSTEM

GROUP
11
(3000)

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SECTION 11-00 Steering System—Service

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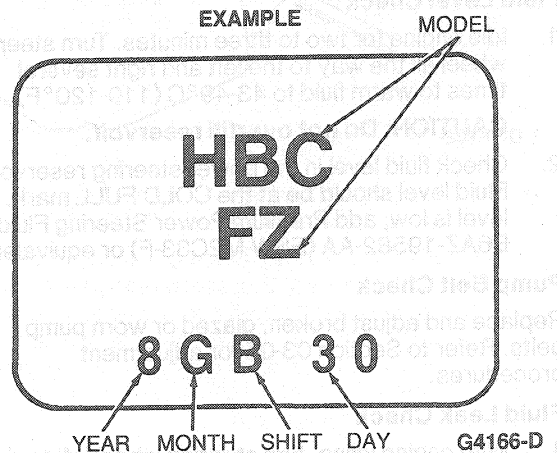
VEHICLE APPLICATION

Taurus / Sable and Taurus SHO.

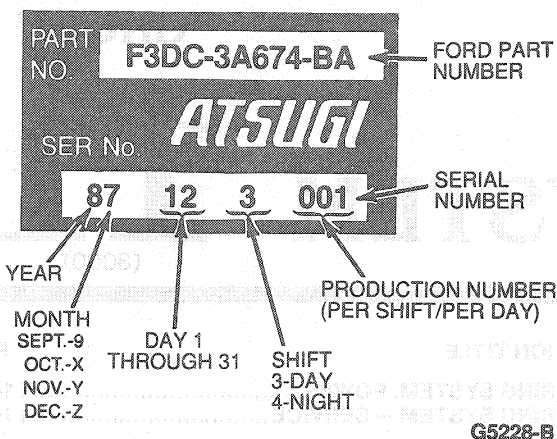
DESCRIPTION

The power steering pump has a service identification tag to identify assemblies for service purposes. The tag is located on reservoir body and contains information as shown below.

Power Steering Pump Model Identification



DESCRIPTION (Continued)



3. Check hoses for cut O-rings.

Turning Effort Check

Ensure front wheels are properly aligned and tire pressure is correct before checking turning effort.

1. Park vehicle on dry concrete and set parking brake.
2. Idle engine for two to three minutes. Turn steering wheel to the left and right several times to warm fluid to 43-49°C (110-120°F).
3. With engine running, attach a pull scale to rim of steering wheel. Measure pull required to turn wheel one complete revolution in each direction. Refer to Specifications at end of this Section for acceptable measurements.

TESTING

Preliminary Tests

Make the following preliminary tests before power steering disassembly.

Air Bleeding

If bubbles are present in the power steering fluid, bleed the system as follows:

1. Fill reservoir.
2. Run engine until fluid reaches normal operating temperature of 74-79°C (165-175°F).

CAUTION: Do not hold wheel in the far left or right position, or damage to power steering pump may result.

3. Turn steering wheel all the way to the left and right several times.
4. Check fluid level.
5. If air is still trapped in system, refer to Purging Power Steering System of Air.

Fluid Level Check

1. Idle engine for two to three minutes. Turn steering wheel all the way to the left and right several times to warm fluid to 43-49°C (110-120°F).

CAUTION: Do not overfill reservoir.

2. Check fluid level in the power steering reservoir. Fluid level should be at the COLD FULL mark. If level is low, add Premium Power Steering Fluid E6AZ-19582-AA (ESW-M2C33-F) or equivalent.

Pump Belt Check

Replace and adjust broken, glazed or worn pump belts. Refer to Section 03-05 for adjustment procedures.

Fluid Leak Check

1. With engine idling, turn steering wheel left to right several times. Check all possible leakage points.
2. Tighten all loose fittings. Replace damaged lines and seals.

Pump Flow and Pressure Test

Before performing pump flow and pressure test, complete the following checks for conditions which could cause loss of power assist. Take corrective action if necessary.

1. Check pump reservoir for proper fluid level.
2. Check tires for correct air pressure.
3. Check pump belt for proper tension.
4. Check pump for correct model and vehicle application.
5. Check for correct size pulleys on pump and engine.
6. Check entire system for damage. Replace parts, if necessary.

If the above items are correct, or have been corrected, and the loss of assist still exists, test power steering pump flow and pressure to determine whether the trouble is in the pump, power steering gear or hoses.

Test Equipment

1. Engine tachometer.
2. Thermometer: -17.8° to 148.9°C (0° to 300°F).
3. Rotunda Power Steering System Analyzer 014-00207 or equivalent.
4. Set of adapter fittings.

The test procedure used in conjunction with the Rotunda Power Steering System Analyzer or equivalent provides a method for checking the complete power steering system. This analyzer can be used to determine the cause of hard steering and/or lack of assist concerns.

The analyzer provides readouts for the following:

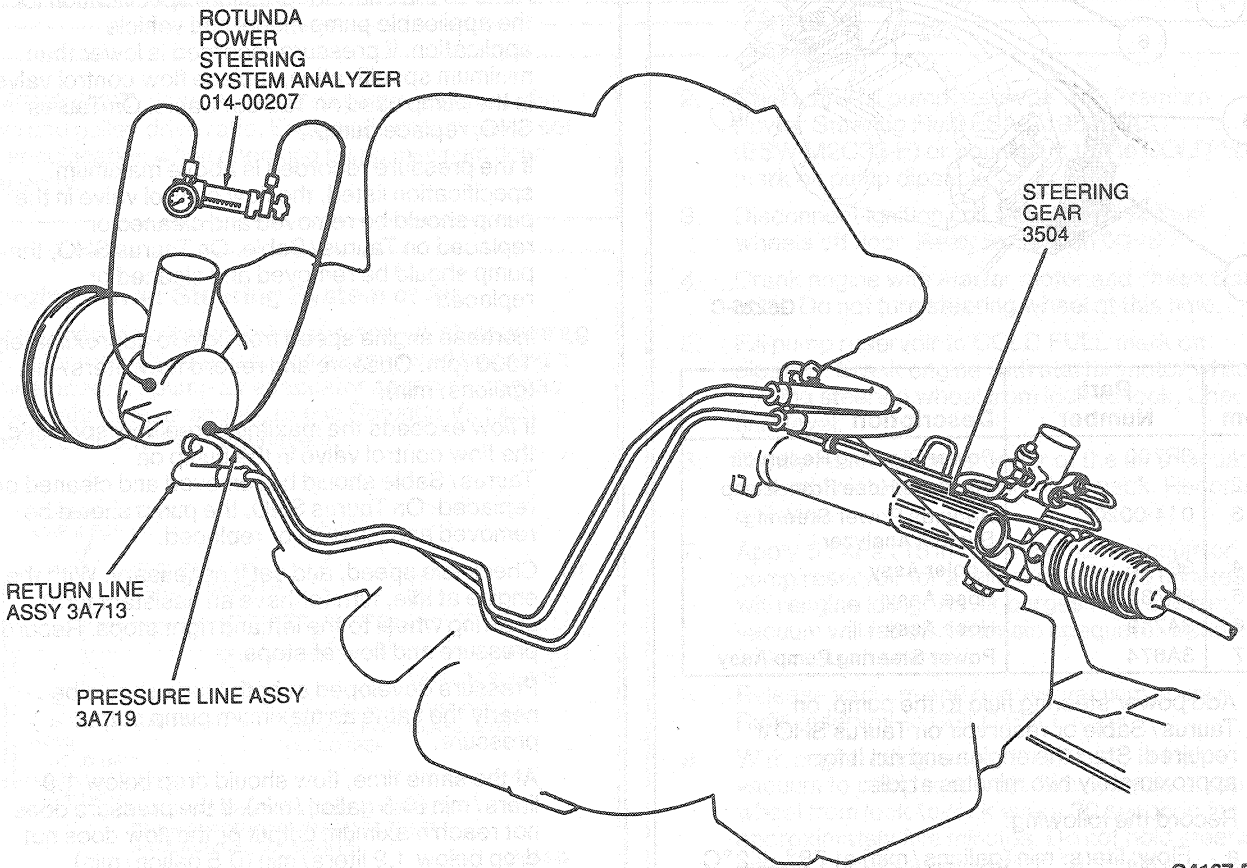
- System Back Pressure
- Pump Flow
- Steering Gear Internal Leakage
- Pump Relief Pressure

TESTING (Continued)

The interpretation of the above readouts will determine which of the following conditions or components are the cause of the concern:

- Restriction in Hoses or Fittings
- Sticking Gear Valve
- Inefficient Pump Cam Pack
- Sticking Relief Valve
- Binding in Suspension

Taurus/Sable



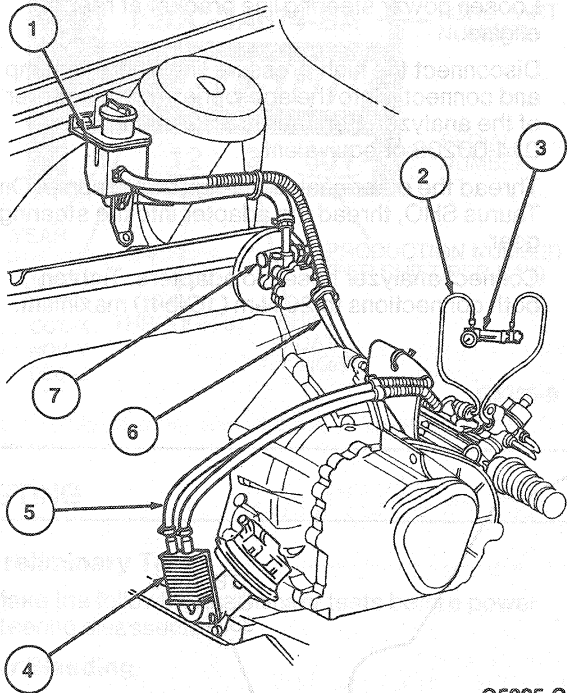
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Test Procedure

1. Loosen power steering line bracket at rear of engine.
2. Disconnect the high-pressure line from the pump and connect it into the appropriate hose adapter of the analyzer. For Taurus SHO, fitting 014-00208 or equivalent.
3. Thread the other analyzer adapter into pump. On Taurus SHO, thread the adapter into the steering gear.
4. Connect analyzer hoses to adapters. Tighten both connections to 20 N-m (15 lb-ft) maximum.

TESTING (Continued)

Taurus SHO



G5225-C

Item	Part Number	Description
1	3R700	Power Steering Reservoir
2	—	Pressure Hose From Pump
3	014-00207	Rotunda Power Steering System Analyzer
4	3D746	Cooler Assy
5	3F731	Hose Assy
6	3A719	Hose Assy
7	3A674	Power Steering Pump Assy

5. Add power steering fluid to the pump, on Taurus/Sable or reservoir on Taurus SHO if required. Start the engine and run it for approximately two minutes at idle.
6. Record the following:
 - a. Flow: liters / min (gallons / min) at $78^{\circ} \pm 2^{\circ}\text{C}$ ($172^{\circ} \pm 5^{\circ}\text{F}$).
 - b. Pressure: kPa (psi) at $78^{\circ} \pm 2^{\circ}\text{C}$ ($172^{\circ} \pm 5^{\circ}\text{F}$) at idle with the gate valve fully open.
 - If flow is below 5.7 liters / min (1.5 gallons / min), Taurus/Sable, or 8.3 liters / min (2.2 gallons / min) Taurus SHO, the pump may require service. However, at this point, continue the diagnosis. Check flow and relief pressure against the model pump being tested.
 - If pressure is above 1034 kPa (150 psi), check hoses for restrictions.

7. Partially close the gate valve to build up 5100 kPa (740 psi). Observe and record flow, liters / min (gallons / min) at $78^{\circ} \pm 2^{\circ}\text{C}$ ($172^{\circ} \pm 5^{\circ}\text{F}$).

If flow drops to a level lower than the value, disassemble the pump and replace the cam pack. If the pressure plates are cracked or worn, replace them. Continue with diagnosis.

On Taurus SHO, if flow drops to a level lower than 3.4 liters / min (0.9 gallons / min) replace pump.

8. Completely close and partially open gate valve three times. (Do not allow valve to remain closed for more than five seconds.) Observe and record pressure, kPa (psi).

Refer to the chart for pressure specification for the applicable pump model and vehicle application. If pressure recorded is lower than minimum specification, replace flow control valve in the pump used on Taurus/Sable. On Taurus SHO, replace pump.

If the pressure recorded is above maximum specification listed, the flow control valve in the pump should be removed and cleaned or replaced on Taurus/Sable. On Taurus SHO, the pump should be removed and cleaned or replaced.

9. Increase engine speed from idle to approximately 1500 rpm. Observe and record flow, liters / min (gallons / min).

If flow exceeds the maximum free flow specified, the flow control valve in the pump on Taurus/Sable should be removed and cleaned or replaced. On Taurus SHO, the pump should be removed and cleaned or replaced.

10. Check idle speed, and set if necessary. With the engine at idle, turn (or have an assistant turn) steering wheel to the left and right stops. Record pressure and flow at stops.

Pressure developed at both stops should be nearly the same as maximum pump output pressure.

At the same time, flow should drop below 1.9 liters / min (0.5 gallon / min). If the pressure does not reach maximum output or the flow does not drop below 1.9 liters / min (0.5 gallon / min), excessive internal leakage is occurring. Remove and disassemble steering gear. Replace damaged or broken. Pay particular attention to rack piston and valve seals for damage.

11. Turn (or have an assistant turn) steering wheel slightly in both directions, and release quickly while watching the pressure gauge. The needle should move from the normal back pressure reading and snap back as the wheel is released. If it comes back slowly or sticks, the rotary valve in steering gear is sticking or the column is binding. Ensure that the column is not binding before replacing the rotary valve.

NOTE: If concern still exists, check ball joints and linkage. Refer to Diagnosis.

TESTING (Continued)

- Remove, disassemble and clean the steering gear. Refer to Section 11-02 for disassembly. Also, flush power steering hoses and power steering pump before installing steering gear.

- Disconnect and remove analyzer and connect lines.
- Secure pressure line bracket at engine.

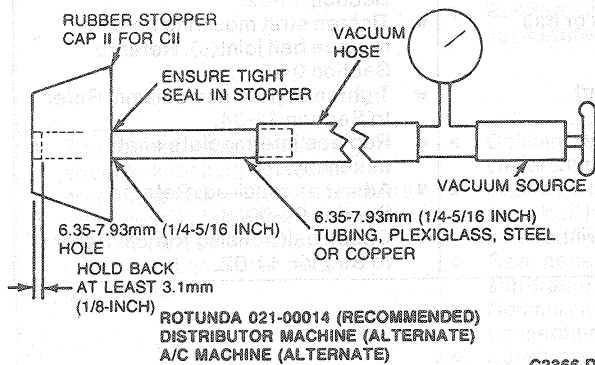
POWER STEERING PUMP SPECIFICATIONS

Engine	Pump Model	Minimum Flow @ 5100 kPa (740 psi)		Minimum Relief Pressure		Max. Relief Pressure		Maximum Free Flow @ 1500 Rpm	
		Liters/Min. 78°C (172°F)	Gal./Min. 78°C (172°F)	kPa	psi	kPa	psi	Liters/Min.	Gal./Min.
3.0L and 3.8L Police	HBC-KE	3.4	.9	9650	1400	10550	1530	9.8	2.6
3.0L/3.2L SHO	F3DC-3A674-BA	3.4	.9	9650	1400	10550	1530	9.8	2.6

***IMPORTANT:** Flow depends on pump model, engine rpm and pulley drive ratio. Engine idle rpm must be set to specification when checking pump minimum flow capacity.

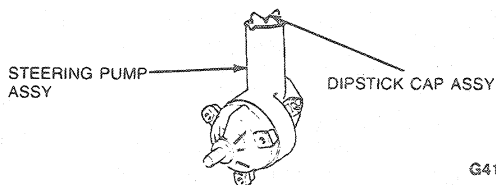
Purging Power Steering System of Air

Air trapped in power steering system, which causes a whine or moan-type noise, can be removed by using a power steering pump air evacuator assembly (devac tool). Fabricate as shown, or use Rotunda Vacuum Tester O21-00014 or equivalent.



CAUTION: Under no circumstances should engine vacuum be utilized.

- Remove pump dipstick cap assembly.



- Check and fill pump reservoir with Premium Power Steering Fluid E6AZ-19582-AA (ESW-M2C33-F) or equivalent to the COLD FULL mark on pump dipstick.
- Disconnect ignition coil wire and raise front wheels off floor. Refer to Section 00-02.
- Crank engine with starter motor and check fluid level. Do not turn steering wheel at this time.
- Fill pump reservoir to COLD FULL mark on dipstick. Crank engine with starter motor while cycling steering wheel from lock-to-lock. Check fluid level.
- Tightly insert rubber stopper of the air evacuator assembly into pump reservoir fill neck. Reconnect coil wire.
- Apply 51 kPa (15 in-Hg) maximum vacuum on pump reservoir for a minimum of three minutes with engine idling. As air purges from system, vacuum will fall off. Maintain adequate vacuum with vacuum source.
- Release vacuum and remove vacuum source. Refill reservoir to COLD FULL mark.
- With engine idling, apply 51 kPa (15 in-Hg) vacuum to pump reservoir. Slowly cycle steering wheel from lock-to-lock every 30 seconds for approximately five minutes. Do not hold steering wheel on stops while cycling. Maintain adequate vacuum with vacuum source as air purges.
- Release vacuum and remove vacuum equipment. Add fluid if necessary. Install dipstick.
- Start engine and cycle steering wheel slowly. Check for fluid leaks at all connections. In severe cases of aeration, it may be necessary to repeat Steps 5 through 10.
- Lower front wheels.

TESTING (Continued)

Start-Up Procedure

After Power Steering Pump or Gear Overhaul

After engine start up, follow these steps to eliminate excessive steering system noise due to air trapped in the system during service:

1. Disconnect ignition coil wire.
2. Fill reservoir and raise front wheels off floor.
3. Crank engine with starter and add fluid until level remains constant.

NOTE: Front wheels must be off the floor during lock-to-lock rotation of steering wheel.

4. While cranking the engine, rotate steering wheel from lock-to-lock.
5. Check fluid level and add fluid if necessary.
6. Connect ignition coil wire and lower front wheels.
7. Start the engine, and allow it to run for several minutes.
8. Rotate steering wheel from lock-to-lock.
9. Turn engine off and check fluid level. Add fluid if necessary.
10. Purge system of air as outlined, if air is still present.

DIAGNOSIS

Drive vehicle to determine exactly what condition exists. Refer to the Steering System Diagnosis charts and service as required.

NOTE: The following diagnosis chart applies to a non-variable assist steering system.

STEERING SYSTEM

CONDITION	POSSIBLE SOURCE	ACTION
<ul style="list-style-type: none"> ● Front End Wander—Condition where the vehicle wanders back and forth on the roadway when it is driven straight ahead while the steering wheel is held in a firm position. 	<ul style="list-style-type: none"> ● Check tire size and pressure (front and rear). ● Check if vehicle is unevenly or excessively loaded. ● Loose tie rod ends. ● Gear assembly loose on sub-frame. ● Loose suspension struts or ball joint(s). ● Column intermediate shaft connecting bolts loose. ● Column intermediate shaft universal joints loose/worn. ● Improper toe adjustment. ● Loose tie rod inner ball joints. 	<ul style="list-style-type: none"> ● Be sure tire sizes are correct, and adjust tire pressures. ● Adjust load. ● Replace tie rod end assembly. Refer to Section 11-02. ● Tighten mounting bolts. Refer to Section 11-02. ● Tighten strut mounting bolts or replace ball joint(s). Refer to Section 04-01. ● Tighten at gear and column. Refer to Section 11-04. ● Replace intermediate shaft assembly. ● Adjust as required. Refer to Section 04-00. ● Check ball housing torque. Refer to Section 11-02.

DIAGNOSIS (Continued)

STEERING SYSTEM (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
<ul style="list-style-type: none"> ● Pulls to One Side — Condition where the vehicle tends to pull to one side when driven on a level surface. 	<ul style="list-style-type: none"> ● Improper tire pressure. ● Improper tire size or different type. ● Vehicle is unevenly or excessively loaded. ● Improper toe adjustment. ● Damaged front suspension components. ● Damaged rear suspension components. ● Steering gear valve effort out of balance (Power Steering only). ● Check front and rear brakes for proper operation. ● Check for damaged or sagging springs on front and / or rear suspension. ● Check rear suspension for loose / worn shock absorber struts or suspension arm attaching fasteners. ● Bonded rubber outer tie rod ends not installed properly. 	<ul style="list-style-type: none"> ● Adjust tire pressure. ● Replace as required. ● Adjust load. ● Adjust toe as required. Refer to Section 04-00. ● Refer to Section 04-01 for replacement. ● Refer to Section 04-00 for replacement. ● Place transmission in NEUTRAL while driving and turn engine off (coasting). If vehicle does not pull with the engine off, replace the steering gear valve assembly. Refer to Section 11-02. ● If vehicle does drift with engine off: <ul style="list-style-type: none"> — Cross-switch front tire / wheel assemblies. — If vehicle pulls to opposite side, cross-switch tire / wheel assemblies that were on the rear to same side on the front. — If vehicle pull direction is not changed, check front suspension components and toe adjustment. ● Service as necessary. Refer to Section 06-00. ● Replace as required. ● Replace shocks and / or tighten all attaching fasteners. ● Remove outer tie rod ends from front knuckle and install by aiming front wheels straight ahead and connect outer tie rod end to front knuckle.
<ul style="list-style-type: none"> ● Feedback (rattle, chuckle, squeak, knocking noises in steering gear) — Condition where roughness is felt in the steering wheel by the driver when the vehicle is driven over rough pavement. 	<ul style="list-style-type: none"> ● Column intermediate shaft universal joints loose / worn. ● Loose tie rod end(s) and / or tie rod inner ball joints. Lack of lube in inner ball joint. ● Gear assembly loose on sub-frame. ● Column intermediate shaft connecting bolts loose. ● Loose suspension bushings / fasteners or ball joints. ● Check column conditions. 	<ul style="list-style-type: none"> ● Replace intermediate shaft assembly. Refer to Section 11-04. ● Replace tie rod end(s) and / or tie rod assemblies. Refer to Section 11-02. ● Tighten mounting bolts. Refer to Section 11-02. ● Tighten bolts at gear and column. Refer to Section 11-04. ● Tighten suspension fasteners, replace worn bushings, or replace ball joints. Refer to Section 04-01. ● Refer to Section 11-04.

DIAGNOSIS (Continued)

STEERING SYSTEM (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
<ul style="list-style-type: none"> Poor Returnability-Sticky Feel—Condition noticed when the steering fails to return to center following a turn without manual effort from the driver. In addition, when the driver returns the steering wheel to center, it may have a sticky or catchy feel. 	<ul style="list-style-type: none"> Improper tire pressure. Improper tire size or incorrect type. Column flange rubbing steering wheel and / or flange. Column intermediate shaft universal joints binding. Check for boot tears and / or evidence of binding or damage to tie rod ends or ball joints. Improper toe adjustment. Column bearing binding. System contaminated. 	<ul style="list-style-type: none"> Adjust tire pressures. Replace as required. Refer to Section 11-04. Replace intermediate shaft assembly. Refer to Section 11-04. Replace as necessary. Refer to Section 11-02. Adjust toe as required. Refer to Section 04-00. Replace bearing. Refer to Section 11-04. Flush power steering system. Refer to Flushing procedure Section 11-02.

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NOTE: The following diagnosis chart applies to a variable assist steering system.

STEERING SYSTEM DIAGNOSIS

CONDITION	POSSIBLE SOURCE	ACTION
<ul style="list-style-type: none"> High (Excessive) Steering Gear Efforts at All Vehicle Speeds is a Condition Recognized While Turning Corners and During Low Speed Maneuvers and Especially While Parking. The Assist Concerns May Occur in Both Directions or Only in One Direction, They May be Intermittent, or Consistent. <p>NOTE: Discolored steering fluid in a rack-and-pinion steering system should not be misdiagnosed as a functional or noise concern.</p>	<ul style="list-style-type: none"> Low pump fluid. Gear assembly external or internal leak. Pump external leak. Pump pressure and flow improper. VAPS (Variable Assist Power Steering) system malfunction. Improper drive belt tension. Hose external leak. Hose restriction. Pump pulley loose /warped. Power steering pump belt loose / glazed / broken or water on belt. Engine idle too low. Tires not properly inflated. Suspension bent or interference. System contaminated. Valve screen plugged. Flex coupling rubbing against housing face. Column misaligned or binding. 	<ul style="list-style-type: none"> Fill as required and check for system leaks. Replace steering gear assembly. Refer to Section 11-02. Refer to Section 11-02. Perform pump flow and relief pressure tests. Service as required. Refer to VAPS system diagnostic procedure in Section 11-02. Check for proper belt tension. Service or replace as necessary. Clean and replace as necessary. Replace pulley. Refer to Section 11-02. Inspect, adjust belt tension or replace as required. Adjust idle. Inflate. Inspect service or replace as necessary. Refer to Section 04-00. Inspect system for foreign object, kinked hose, etc. —flush system —refer to power steering pump, Section 11-02. Prior to rebuilding a pump, examine the valve screen for contamination, Replace all valves which have plugged or contaminated valve screens. Reposition flex coupling. Align column assembly.
<ul style="list-style-type: none"> High (Excessive) Efforts at Low Vehicle Speeds 	<ul style="list-style-type: none"> VAPS (Variable Assist Power Steering) system malfunction. 	<ul style="list-style-type: none"> Refer to VAPS system diagnostic procedure and service or replace components accordingly. Refer to Section 11-02.

DIAGNOSIS (Continued)

STEERING SYSTEM DIAGNOSIS (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
<ul style="list-style-type: none"> ● Low Efforts at All Vehicle Speeds 	<ul style="list-style-type: none"> ● VAPS system malfunction. 	<ul style="list-style-type: none"> ● Refer to VAPS system diagnostic procedure and service or replace components accordingly.
<ul style="list-style-type: none"> ● Low Steering Gear Efforts Above 30 mph 	<ul style="list-style-type: none"> ● VAPS system malfunction 	<ul style="list-style-type: none"> ● Refer to VAPS system diagnostic procedure and service or replace components accordingly.
<ul style="list-style-type: none"> ● External Leakage <p>NOTE: Clean Off the Steering Gear Before Performing ANY Steering Gear External Leakage Checks.</p>	<ul style="list-style-type: none"> ● Leaks between actuator and gear. ● Leaks between actuator and actuator bolts. ● Gear fittings loose, cross threaded or stripped. ● Leaks from steering gear seals (input shaft, pinion or either rack seals). ● Housing cracked or leaking (due to a porous condition). 	<ul style="list-style-type: none"> ● Tighten actuator bolts. Refer to Section 11-02. ● Tighten actuator bolts. ● Replace two upper actuator seals. ● Inspect and tighten or replace gear assembly. ● Replace gear assembly. ● Replace gear assembly. <p>NOTE: The only serviceable components on the VAPS steering gear are the boots, tie rods, actuator, and actuator bolts and seals. All external leaks, which cannot be serviced by tightening tube fittings, are to be serviced by installing a "short rack" assembly (Part No. 3L547).</p>
<ul style="list-style-type: none"> ● Loose On Center <p>NOTE: This Condition Should be Checked on Center Only. The Loose Condition Can be Detected With Greater Reliability With the Engine Off and Steering Wheel Straight Ahead. A Very Light Touch on the Steering Wheel Should be Used in Checking for This Condition.</p>	<ul style="list-style-type: none"> ● Steering gear mounting bolts loose. ● Column intermediate shaft connecting bolt loose. ● Intermediate shaft spring loaded U-bolt distorted. ● Flex coupling clamp bolt loose. ● Gear tie rod inner ball socket loose. ● Column intermediate shaft joints loose or worn. ● Steering column shaft clips missing or broken. ● Flex coupling fractured. ● Tie rod ends loose or worn. ● Wheel loose or worn. ● Loose wheel lug nuts. 	<ul style="list-style-type: none"> ● Tighten retaining nuts to specification. Refer to Section 11-02. ● Tighten. Refer to Section 11-04. ● Replace U-bolt. ● Tighten. ● Replace gear tie rod. ● Replace intermediate shaft assembly. Refer to Section 11-04. ● Replace as required. ● Replace as required. ● Tighten or replace as required. ● Replace as required. Refer to Section 04-01. ● Tighten. Refer to Section 04-04.
<ul style="list-style-type: none"> ● Steering Wheel Not Centered Properly <p>NOTE: Groove on Steel Hub of Steering Wheel Must Be In Line With Mark on Top End of Steering Shaft With Front Wheels in Straight Ahead Position to Line Up Steering Wheel Spokes Properly. Steering Wheel Centerline Should Be Within 10 Degrees of Vertical Plane After Toe-in Is Adjusted.</p>	<ul style="list-style-type: none"> ● Incorrect toe setting. ● Flex coupling clamp bolts loose/missing. ● Pinion installed in rack off location. ● Improperly installed steering wheel. ● Steering gear loose on frame. ● Column intermediate shaft installed off location in column shaft V-block. 	<ul style="list-style-type: none"> ● Set. Refer to Section 04-00. ● Replace and tighten. ● Replace gear assembly. Refer to Section 11-02. ● Reposition steering wheel. ● Tighten. Refer to Section 11-02. ● Index shaft to correct position.

DIAGNOSIS (Continued)

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STEERING SYSTEM DIAGNOSIS (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
<ul style="list-style-type: none"> ● Smoothness/Sticky Feeling—Condition of Momentary Build Up, Hitch, Lump or Hesitation in Steering Efforts, Usually Occurring Just as the Turn is Begun. It May Occur Right or Left, and in Rare Cases, Occur in Both Directions. It May be Noticed During Parking, Low Speed Turns or at Road Speeds. If This Condition is Detected During Parking Maneuvers, It May Also be Noticed During Higher Speed Driving. <p>NOTE: Discolored Steering Fluid in Rack-and-Pinion Steering System Should Not Be Misdiagnosed as a Functional or Noise Concern.</p>	<ul style="list-style-type: none"> ● Loose or worn pulley belt. ● Front lower control arm ball joint worn. ● Column trim rubbing steering wheel. ● Binding in gear control valve assembly. ● Water or oil on pulley belt. ● Column misaligned or binding. ● Flex coupling distorted or fractured. ● Flex housing rubbing against housing face. ● Column intermediate shaft joints loose, worn or binding. ● Column intermediate shaft connecting bolt loose. ● Steering linkage, shock absorbers or struts are loose, worn or binding. ● Tight steering column bearings. ● Column shaft clips missing or damaged. ● Steering gear retaining bolts loose or damaged. ● Wheel bearing loose or worn. ● Loose wheel lug nuts. ● Bent or damaged rack assembly. ● Low tire pressure. ● Improper front end alignment. 	<ul style="list-style-type: none"> ● Tighten or replace. Refer to Section 03-05. ● Replace front lower control arm assembly. Refer to Section 04-01. ● Reposition trim on column. ● Replace gear assembly. Refer to Section 11-02. ● Clean or replace. ● Align column assembly. Refer to Section 11-04. ● Align or replace as required. ● Align or reposition flex coupling. ● Replace as required. ● Tighten. ● Lubricate, adjust or replace as necessary. ● Lubricate or replace as required. ● Service as required. ● Tighten. ● Replace as required. Refer to Section 04-01. ● Tighten. Refer to Section 04-04. ● Replace gear assembly. ● Inflate. ● Align front end. Refer to Section 04-04.

DIAGNOSIS (Continued)

STEERING SYSTEM DIAGNOSIS (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
<ul style="list-style-type: none"> ● Uneven Drive Efforts, Pulls or Leads to One Side—Condition Recognized by the Driver While Turning the Steering Wheel in a Left or Right Turn. This Condition Will Reveal Lighter Efforts in One Direction, Very Noticeable to the Driver. Vehicle Pulls or Leads to One Side. Keep in Mind Road Conditions and Wind. Pulls or Leads Refers to the Tendency of a Vehicle to Drift Consistently to One Side on a Reasonably Flat Road. It May or May Not be Accompanied by Unequal Effort Requirements at the Steering Wheel. <p>NOTE: Perform the Following Test to Determine if Concern is Related to Steering Gear or Vehicle System.</p> <p>At 15-55 mph on a flat straight surface, set vehicle in a straight line, place shift selector in NEUTRAL position and turn off ignition. If the vehicle continues to pull or drift in the same direction as the original concern, then the steering gear is not the cause. If the vehicle does not pull, but remains on a straight line this indicates a steering gear concern and steering efforts should also be noticeably light in direction of pull. This condition is normally due to an unbalanced steering gear valve assembly.</p>	<ul style="list-style-type: none"> ● Radial tires (misaligned belts). ● Front or rear end misaligned. ● Steering gear valve efforts unbalanced. (Efforts will be lighter in one direction.) ● Front suspension components damaged. ● Low tire pressure or incorrect front to rear. ● Incorrect tire size or incorrect type. ● Check front and rear brakes for proper operation. ● Check for bent rear axle housing and for damaged or sagging springs in the front or rear suspension. ● Check rear suspension for loose or worn shock absorber struts, suspension arm retaining fasteners. ● Vehicle unevenly loaded. ● Front or rear wheel bearing loose or worn. ● Steering gear retaining bolts loose or damaged. ● Column misaligned or binding. ● Halfshaft or CV joint bind. 	<ul style="list-style-type: none"> ● Replace as necessary. ● Align. ● Replace gear assembly. Refer to Section 11-02. ● Replace as required. Refer to Section 04-04. ● Check pressure and inflate/deflate as necessary. ● Correct as required. ● Adjust if necessary. Refer to Section 06-00. ● Replace if necessary. ● Tighten all retaining fasteners. Refer to Section 04-02. ● Correct as required. ● Refer to Sections 04-01 or 04-02. ● Tighten. ● Align column assembly. ● Replace CV joints. Refer to Section 05-04.
<ul style="list-style-type: none"> ● Poor Returnability is a Condition Noticed When the Vehicle Fails to Return to a Nearly Straight Ahead Position After a Corner Maneuver. The Wheel Should Return Within a Reasonable Period of Time Without Undue Help From the Driver. Returnability Concerns May Occur From Both Directions or Only From One Direction. <p>NOTE: This Condition is Accompanied By a Momentary Build Up, Hitch, Lump, or Hesitation, in Steering Efforts Usually Occurring Just Off Center Either in One Direction or Both. Concern Occurs Only During Driving, and Not During Parking Maneuvers.</p>	<ul style="list-style-type: none"> ● Column trim rubbing steering wheel. ● Front lower control arms worn. ● Brinelled or binding upper strut bearing. ● Tight tie rod and /or tie rod end ball joints. ● Steering valve assembly off balance. Efforts will be light in one direction and return will be poor in light direction. ● Improper front end alignment. ● Steering linkage, shock absorbers, struts, loose, worn or binding. ● Tilt column bearing sideloaded by spring. ● Intermediate column shaft joints binding. ● Bent or damaged crossmember. ● Column bearing binding. ● Column misaligned or binding. ● Low tire pressure or incorrect pressure front to rear. ● Steering wheel clear vision off location. ● Incorrect tire size or incorrect type. 	<ul style="list-style-type: none"> ● Reposition trim ring in column assembly slots. ● Replace lower control arms. Refer to Section 04-01. ● Replace bearing. ● Replace tie rod and /or tie rod ends. ● Replace gear assembly. Refer to Section 11-02. ● Align front end. ● Lubricate, adjust or replace as necessary. ● Remove spring. If improved, replace tilt yoke, shaft or steering wheel. ● Replace intermediate shaft assembly. ● Replace as necessary. Refer to Section 01-00. ● Replace as necessary. ● Align column assembly. ● Check pressure and inflate/deflate as necessary. ● Adjust as required. ● Replace as required.

DIAGNOSIS (Continued)

STEERING SYSTEM DIAGNOSIS (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
<p>● Noise / Rattle / Chuckle / Clicks / Pops / Squeaks / Creaks / Clunk / Squawk / Hiss</p> <p>There are Many System Noises Which Can be Misdiagnosed as Originating From the Power Steering Gear. Most System Noises are RPM Sensitive. Therefore, Turning the Steering Wheel will Vary the RPM and Consequently the Noise Pitch. Careful Diagnosis is Necessary to Prevent Unnecessary Services. Disconnecting of Belts and Re-evaluation is Essential in Many Cases, as is Partially Cycling the Steering Wheel With the Engine in OFF.</p> <p>NOTE: A Common Noise in the Rack-and-Pinion Steering Gear is a Hissing Sound. The Sound is Most Evident at Static Position or During Parking Maneuvers. There is No Relationship Between this Noise and Performance of the Steering. "Hiss" May Occur at End of Steering Wheel Travel or When Slowly Turning at Stand Still, or at a Particular Position.</p>	<ul style="list-style-type: none"> ● Column intermediate shaft connecting bolt loose. ● Column trim rubbing steering wheel. ● Loose or worn pump belt. ● Front lower control arm worn or binding. ● Brinelled or binding upper strut bearing. ● Flex coupling distorted. ● Flex coupling clamp bolt loose. ● Pump bracket loose or misaligned. ● Lack of lubricant where horn brush contacts rub steering wheel plate. ● Column shaft clips missing. ● Column U-joints loose. ● Loose tie rod ends or ball joints. ● Gear assembly loose on frame. ● Loose suspension struts. ● Flex coupling fractured. ● Loose wheel lug nuts. ● Pressure hose grounded against fender or vacuum canister. ● Front wheel bearing loose or worn. ● Column misaligned or lower bearing out of position. ● Steering shaft insulators cracked or dry. ● Kinked pressure hoses. ● Steering gear or pump external leak. ● Pulley loose or warped. ● Aerated fluid. ● Water in steering fluid. 	<ul style="list-style-type: none"> ● Tighten. Refer to Section 11-04. ● Reposition trim on column. ● Adjust or replace as required. Refer to Section 03-05. ● Replace as required. Refer to Section 04-01. ● Replace strut bearing. Refer to Section 04-01. ● Align flex coupling. ● Tighten. Refer to Section 11-04. ● Tighten and align. Refer to Section 11-02. ● Lubricate or adjust as required. ● Replace as required. ● Replace if necessary. ● Replace tie rod assembly. ● Tighten. Refer to Section 11-02. ● Adjust or replace as required. ● Replace as required. ● Tighten. Refer to Section 04-04. ● Reposition pressure hoses. ● Replace bearing. Refer to Section 04-01. ● Correct as necessary. ● Replace or lubricate as required. ● Reposition pressure hoses. Refer to Section 11-02. ● Inspect and replace or service as required. ● Replace pulley assembly. ● Purge and evacuate system. ● Purge and evacuate system.

DIAGNOSIS (Continued)

STEERING SYSTEM DIAGNOSIS (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
<ul style="list-style-type: none"> Wandering / Darting / Pointing — Condition Noticed When the Car is Driven in a Straight Ahead Position With the Wheel Held in a Firm Position, and the Vehicle Wanders to Either Side. Darting Refers to Down the Road Steering Feel, it is Not Smooth and Seems to be Sticky and the Driver Cannot Make Minor Correction With Ease. Pointing Refers to the Inability of the Vehicle to Return to a Straight Ahead Position After a Moderate to Higher Speed Lane Change. <p>NOTE: Pointing Characteristics are Normal with the Rack-and-Pinion Steering System Up to 10 Degrees Off-Center.</p>	<ul style="list-style-type: none"> Steering gear retaining bolts loose or damaged. Improper front or rear end alignment. Front lower control arm ball joint(s) worn. Brinelled or binding strut upper bearing. Steering wheel clear vision off location. Column trim rubbing steering wheel. Loose suspension struts or ball joints binding. Loose tie rod ends. Column intermediate shaft joint loose or worn. Column misaligned or binding. Gear tie rod inner ball joint loose or worn. Column intermediate shaft connecting bolt loose. Low tire pressure or incorrect pressure front to rear. Incorrect tire size or incorrect type. Radial tires (misaligned belts). Front and / or rear wheel bearing loose or worn. Loose or worn rear suspension. Loose flex coupling bolt. Improper brake operation or adjustment. Vehicle unevenly loaded. 	<ul style="list-style-type: none"> Tighten. Refer to Section 11-02. Align. Replace as required. Refer to Section 04-01. Replace bearing. Correct as required. Reposition trim on column assembly. Adjust or replace as required. Replace tie rod ends. Replace intermediate shaft. Align column assembly. Replace gear tie rods. Tighten. Refer to Section 11-04. Check tire pressure and inflate / deflate as necessary. Correct as required. Replace as required. Refer to Sections 04-01 and / or 04-02. Tighten or replace as necessary. Refer to Section 04-00. Tighten. Inspect and adjust. Correct as required. Refer to Section 06-00. Correct as required.

TG5402D

SPECIFICATIONS

STATIC STEERING WHEEL TURNING EFFORT

Vehicle	Power
Taurus / Sable, Taurus SHO with VAP	2.27 kg (5.0 Lb)
Taurus / Sable without VAP	3.18 kg (7.0 Lb)

POWER STEERING RELIEF PRESSURE

Vehicle	Min. Relief Pressure	
	kPa	psi
3.0L, 3.8L and Taurus Police 3.8L	9650	1400
3.0L / 3.2L SHO	9650	1400

SPECIAL SERVICE TOOLS

ROTUNDA EQUIPMENT

Model	Description
014-00207	Power Steering System Analyzer
021-00014	Vacuum Tester
014-00208	Taurus 3.0L / 3.2L SHO Fitting