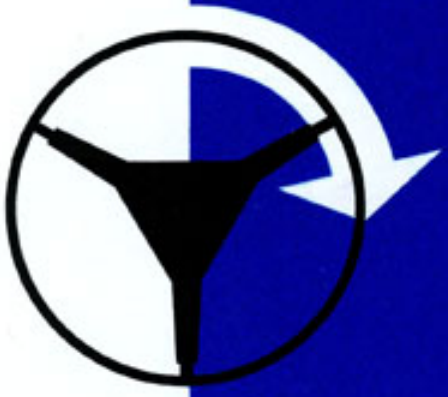
MASTER TECHNICIANS SERVICE CONFERENCE

REFERENCE BOOK 70-10

POWER STEERING FUNDAMENTALS



CHRYSLER MOTORS CORPORATION

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IT'S UP TO YOU . . .

According to the point of view, servicing power steering can be a pain or a pleasure. It can be frustrating if you just replace parts, and generally fumble around because you're not familiar with the inner workings of the power steering system. After all, it's kind of discouraging to find that a new pump will not correct hard steering if a jammed back-pressure valve is the actual troublemaker.

The pleasant part comes when you can track down trouble causes systematically instead of wasting time, effort, and customer's money with a hit and miss procedure. This ability, of course, results from experience, plus thorough knowledge of power steering operation. In short, there's real satisfaction in knowing what you're doing.

Most technicians can follow the step-by-step instructions in the Service Manuals with little knowledge of operating principles. However, the whole thing is much easier when you know, for example, that a sticky valve spool can cause self-steering. All of which is your cue to make full use of the Service Diagnosis information provided in your Service Manuals and the contents of this reference book.

TABLE OF CONTENTS:

INTRODUCTION TO POWER STEERING

To the average motorist, power steering is simply a gadget which makes turning the steering wheel easier, especially when parking. He has little or no idea of how the system works, and may not even realize that he enjoys other handling and safety benefits along with the basic power assist action.

SOMETHING FOR EVERYONE

In comparison, most technicians have a good general understanding of power steering operation, but even the most experienced can benefit from an up-to-date review of fundamentals and service procedures. For this reason, the following pages cover the currently used Chrysler Corporation power steering system – from handling characteristics to service hints, for beginner and old-timer alike.

IT'S IN THE NAME

A partial description of Chrysler Constant Control Power Steering advantages is given in the name itself. First of all, this system gives assistance in proportion to the effort exerted in turning the steering wheel. In other words, you get gentle assist in an easy turn; more forceful assist when you pull hard on the wheel.

TURNING EFFORT IS LOW

Although Constant Control steering eliminates nearly all the physical effort needed to turn the steering wheel, ten to twenty percent of the total remains to provide some steering "feel." This slight turning resistance gives the driver a better feeling of control because he can still sense road conditions and gauge his reaction as he would with manual steering.

ASSISTANCE WHEN WANTED

Constant Control is classed as "full-time" power steering because the system operates under pressure even with the steering wheel centered. This means that you get power assist without delay when the wheel is turned.

REDUCES DRIVER FATIGUE

Right- and left-turn assist pressures balance when turning force on the steering wheel is relaxed. This balance helps the wheel recenter coming out of turns and makes straight-ahead steering easier. Constant Control power assist also works in reverse to help counteract forces which cause wheel fight brought on by rough road surfaces.

THE STEERING GEAR ASSEMBLY

It's easier to remember the various parts and how they go together if you think of the whole steering gear as a group of subassemblies. For example, there is a gear housing assembly and the power train, which includes the reaction and piston assemblies; the steering valve assembly, and the sector shaft.

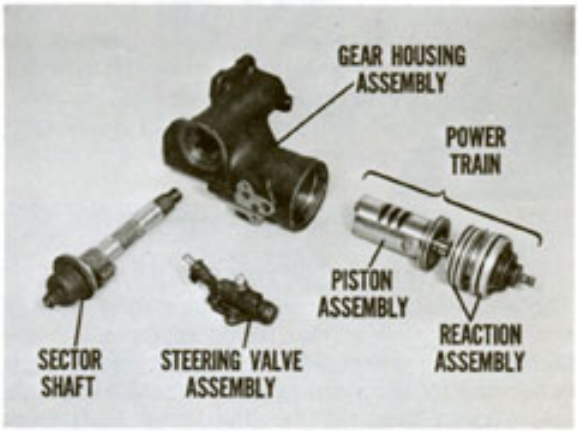


Fig. 1–Steering gear subassemblies

Fig. 2–Gear housing acts as cylinder

SIMILAR TO MANUAL UNIT

The basic mechanical parts of our power steering gear are arranged about the same as in the manual steering unit. However, in the power gear, the recirculating ball parts are built into the worm and piston assembly, and the gear housing acts as the cylinder for the piston.

PISTON MOVES LIKE BALL NUT . . .

Mechanically, the piston moves up toward the rear for a left turn, or down toward the front for a right turn, as you turn the wormshaft. In other words, the piston moves the same way the ball nut does in the manual gear.

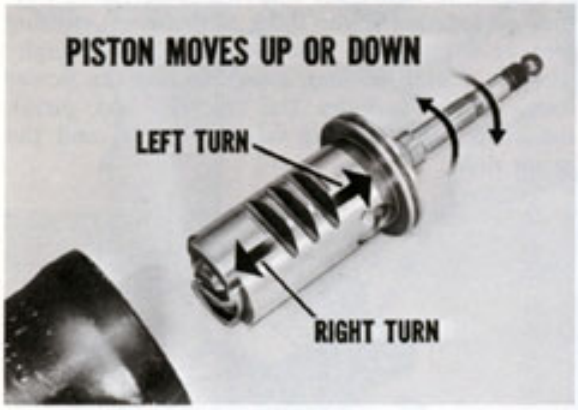


Fig. 3—Piston acts same as ball nut

. . . AND ROTATES SECTOR SHAFT

The sector shaft teeth mesh with mating teeth in the power piston so that piston movement causes sector shaft rotation. The sector shaft, of course, is connected by the steering arm to the steering linkage. Viewed from the top, the sector shaft turns counterclockwise as the piston moves upward, and clockwise as it moves downward.

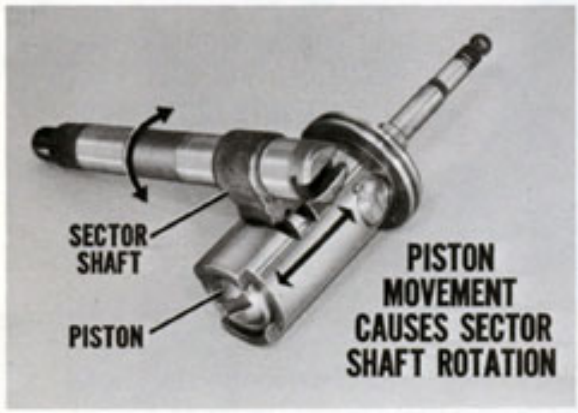


Fig. 4—Piston meshes with sector

WORMSHAFT MOVES BEFORE PISTON

As the wormshaft begins turning, it threads up or down a slight amount before the piston moves. This slight movement is transmitted to the steering valve by the valve pivot lever and the thrust bearing center race.

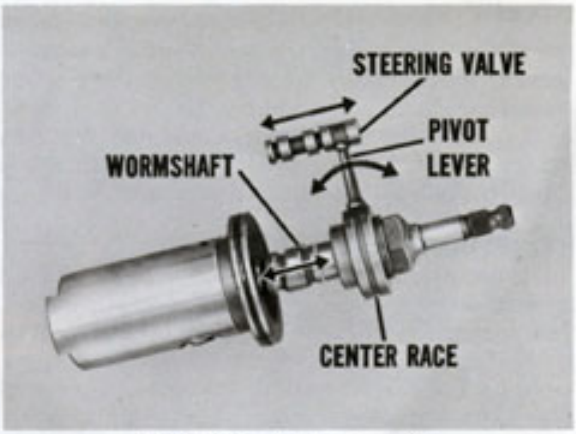


Fig. 5—Wormshaft moves valve

IT'S CALLED THE REACTION ASSEMBLY

The cylinder head and the housing head hold the reaction spring washers and reaction rings in place against the center race and spacer. The reaction operation is both mechanical and hydraulic, but it's the hydraulic reaction that provides the proportional feel in our power steering.

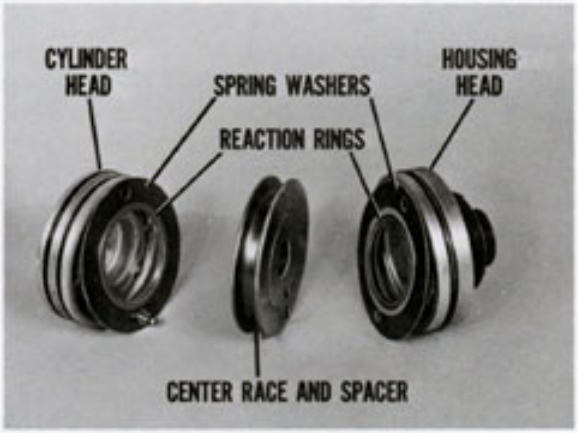


Fig. 6—Heads retain reaction members

STEERING HYDRAULIC BASICS

To properly explain the hydraulic side of the power steering story, we can start with the basic power assist and control functions, and then go on to details of control and reaction operation.

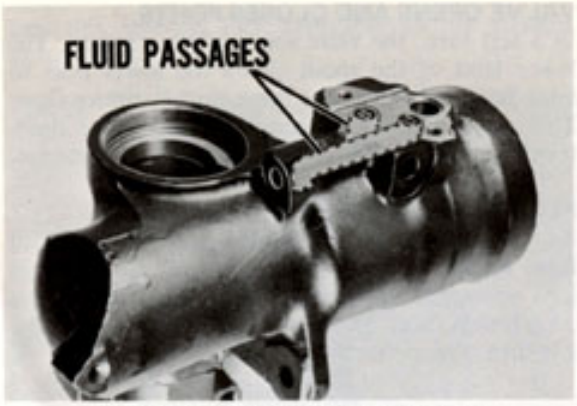


Fig. 7—Passages lead to power chambers

THE UPPER GOES TO THE LOWER . . .

Beginning at the gear housing, you will note that there are two fluid passages extending from the steering valve mounting surface to the interior of the cylinder. The upper port connects to the lower end of the cylinder, and the lower port to the upper end.

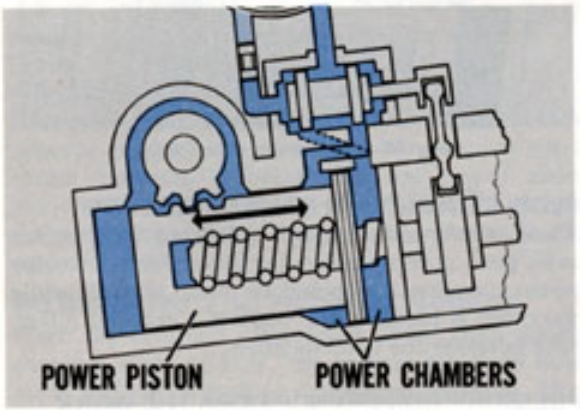


Fig. 8—Piston divides cylinder

IT'S IN THE MIDDLE

The power piston divides the cylinder into two separate power chambers. Under pressure, the piston moves upward to assist in left turns and downward for right turns. As a result, the effort needed to turn the wormshaft is reduced.

BEGINNING AT THE PUMP

A belt-driven oil pump provides the hydraulic pressure and flow which operates the steering system. Input to the steering valve is at pump pressure, which is relatively low when the steering wheel is in the straight-ahead position. The fluid returns to the pump reservoir through the back-pressure valve located at the outlet side of the steering valve.

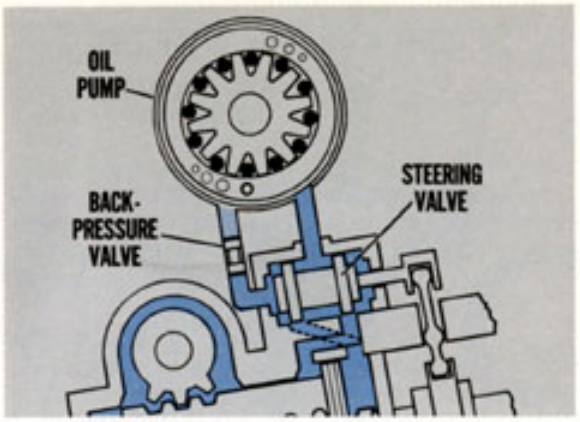


Fig. 9—Pump provides system pressure

THE VALVE CONTROLS FLOW

To control fluid flow to the power chambers, the steering valve has a sliding spool with lands which open or close the power chamber fluid ports. This spool reacts to the thrust bearing center race, which moves in proportion to the effort exerted at the steering wheel. In other words, light turning force at the steering wheel produces small movement of the valve spool and steering assistance in proportion. Heavy turning force displaces the spool farther and gives greater steering assist.

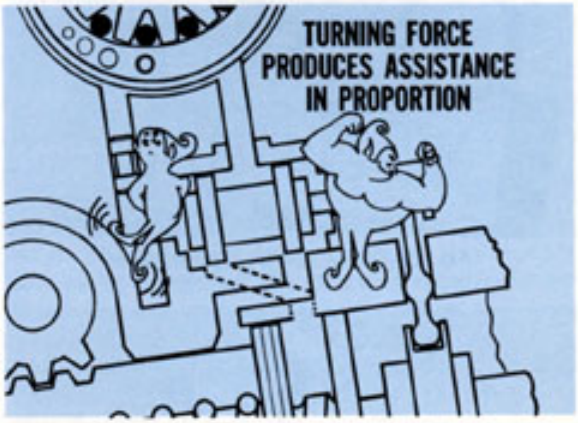


Fig. 10—Turning force regulates assistance

CENTERING IS AUTOMATIC

The steering valve centers automatically when there's no turning force at the steering wheel, as in the straight-ahead position. Under these conditions, the reaction system keeps the center race and valve spool balanced in the centered position.

NO ASSIST WITH BALANCED VALVE

There's no power assist when the valve spool is centered because both power chamber ports are

Fig. 11–Valve in balanced condition

open an equal amount. While the spool remains balanced, fluid circulates through the valve and maintains relatively low pressure in both the upper and lower power chambers.

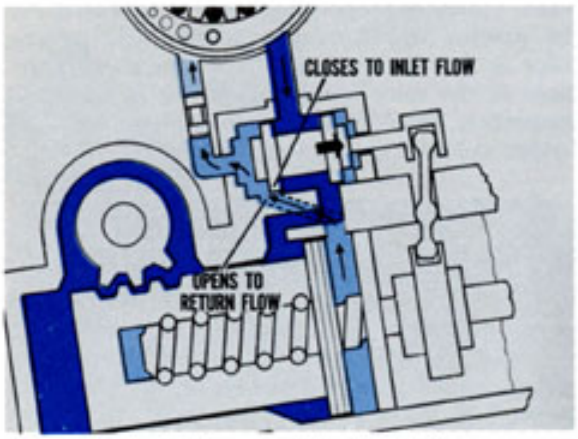


Fig. 12–Lower land blocks inlet flow

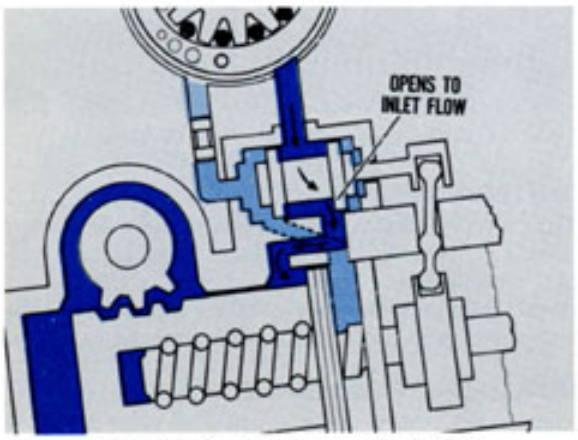


Fig. 13–Upper land admits inlet flow

VALVE OPENS AND CLOSES PORTS

In a left turn, the valve spool moves upward. The lower land of the spool closes the lower port to inlet flow and opens the same port to return flow. This action blocks off pump pressure to the right-turn power chamber as it opens the return passage.

FLOW IS REDIRECTED

As the action of the lower spool land changes fluid flow in the right-turn power chamber, the upper land opens the upper port to inlet flow and closes it to return flow. This admits pump pressure to the left-turn power chamber but blocks return flow.

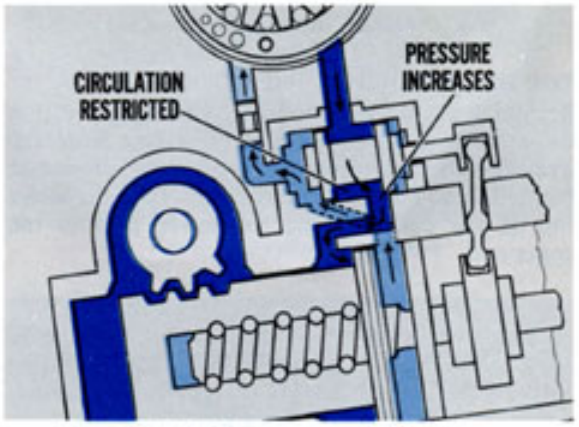


Fig. 14–Pump pressure builds up

FLOW RESTRICTION RAISES PRESSURE

When system circulation is restricted by a closed valve port, pump pressure increases. And, since one power chamber is exposed to pump pressure while the other is blocked off, there is a pressure difference between the two chambers.

PRESSURE DIFFERENCE DOES THE WORK

The pressure difference between the chambers moves the piston upward as more fluid enters the lower chamber. As it moves, the piston forces fluid out of the upper chamber into the return line.

VALVE HOLDS BACK PRESSURE

The return line connects to the pump reservoir, which is normally at atmospheric pressure. However, this is lower than the desired minimum return pressure, so a spring-loaded control valve is included at the outlet end of the steering valve.

BACK PRESSURE KEEPS ACTION SMOOTH

The control valve maintains some return pressure regardless of steering valve or power piston position. Back pressure on the return side keeps piston movement smooth and helps to provide the

desirable steering feel, especially in the straight-ahead driving position.

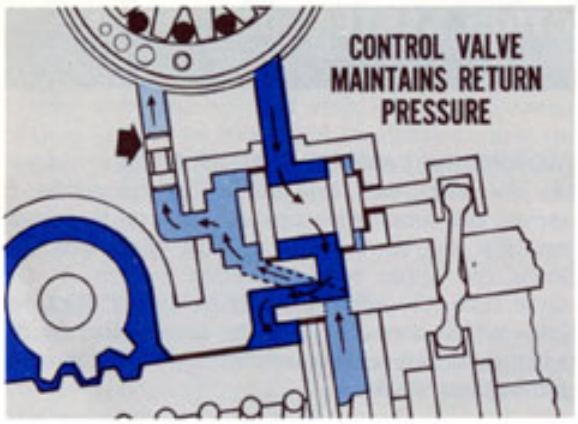


Fig. 15–Back pressure balances assist action

IT'S THE SAME BUT OPPOSITE

For a turn in the opposite direction, the same hydraulic assist action takes place but the steering valve and power piston movements are reversed. The power assist, of course, continues as long as turning force is applied to the steering wheel.

VALVE RECENTERS AFTER TURN

When the turning force on the steering wheel is relieved coming out of a turn, the steering valve spool recenters automatically and power assist movement stops. With the spool centered, pump pressure drops and is again equal in both of the power chambers.

NO RESISTANCE TO PISTON MOVEMENT

Since the centered valve spool opens both power chamber ports equally, mechanical force can now move the piston back to its balanced position. This allows the effect of steering geometry to return the steering gear to the straight-ahead position without hydraulic resistance on the piston.

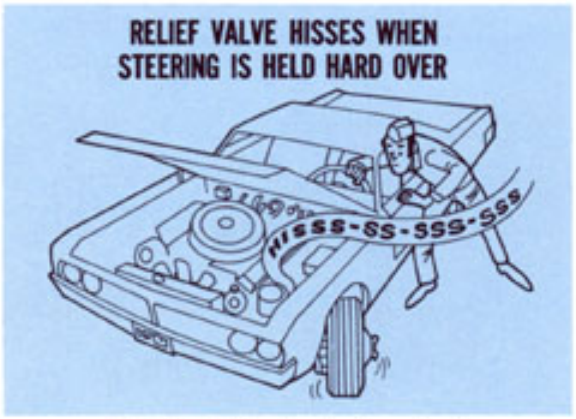


Fig. 16–Relief valve signals overload

IT'S ALL ONE WAY

If the steering wheel is held hard over against the stops, the continued turning force on the worm-shaft overpowers the centering action of the reaction system. This closes one power chamber port and opens the other, causing the pump to build up maximum pressure.

PRESSURE OPENS RELIEF VALVE

The pump relief valve produces a hissing noise when the steering is held hard over. This condition puts maximum pump pressure against the power piston when it can't move and should not be continued more than a few moments, because the system may overheat.

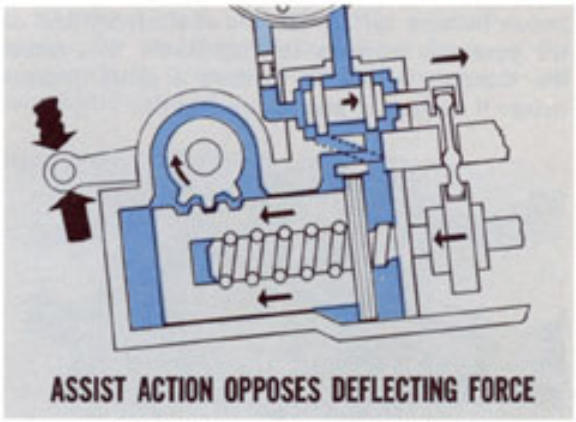


Fig. 17–Power reduces wheel fight

POWER ASSIST FIGHTS BUMPS

As mentioned earlier, power steering also works in reverse to counteract the effects of rough road surfaces on the steering system. When the front wheels hit ruts, bumps, or holes, the wheels try to reverse the normal steering action. In a car with manual steering, this reverse action can cause noticeable wheel fight.

ASSIST WORKS LIKE A BUFFER

In a car with power steering, rough road surfaces cause a different reaction. When the deflecting force from the front wheels acts on the sector shaft and power piston, it also moves the steering valve. Since the source of turning force is reversed, the steering valve movement reverses and causes a power assist action which opposes the front wheel deflecting force. This opposing action is one of the reasons why power steering makes driving less tiring and safer.

CONTROL AND REACTION SYSTEM OPERATION

Operation of the power steering control and reaction systems is basically the same in either direction, so an explanation of what happens when the steering wheel is turned to the right should tell the story.

THEY MOVE IN OPOSITE DIRECTIONS

In a right turn, the wormshaft screw tries to thread upward, out of the power piston, as it produces a downward force on the piston. However, the sector shaft resists the downward force of the power piston because surface friction of the front tires on the pavement opposes steering force. As a result, the wormshaft threads upward a short distance before it moves the piston downward.

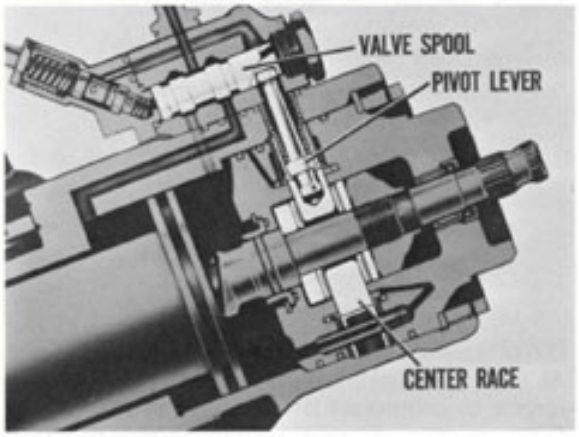
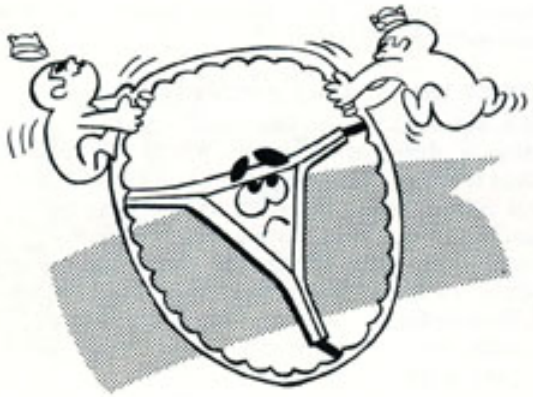


Fig. 18–Valve and race movement is opposite



WORMSHAFT MOVES CENTER RACE

As the wormshaft threads out of the piston, it moves the center race upward as far as the upper reaction ring allows. This upward movement also loads the upper reaction spring washer. At the same time, the valve spool is moved by the pivot lever which connects it to the center race. As the wormshaft and center race move upward, the spool moves downward.

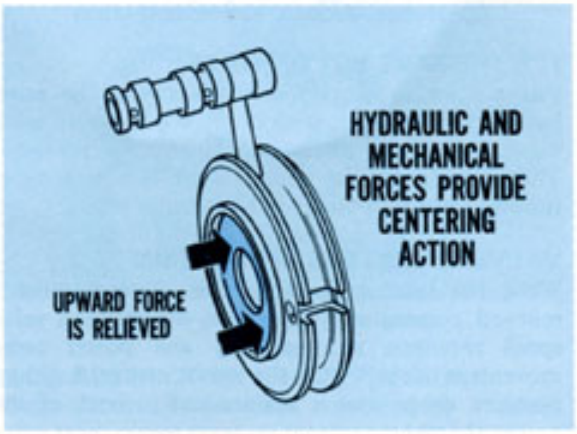


Fig. 19–Center race allows centering action

CENTERING IS COMBINED ACTION

When turning force on the steering wheel is relaxed, hydraulic and mechanical reaction forces pro-

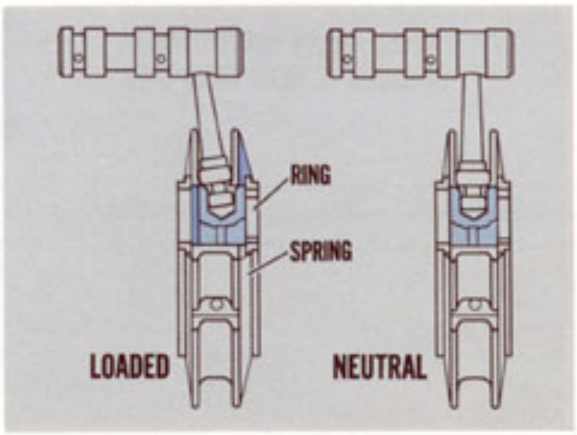


Fig. 20–Race movement loads reaction spring

vide spool centering action. The upward force of the center race against the upper reaction ring is now relieved so the ring, under power chamber pressure, applies a downward centering force.

RING AND SPRING WORK TOGETHER

Along with the reaction ring, the loaded spring washer returns to its neutral condition to help the centering action. When the reaction members reach a balanced position, they keep the center race and valve spool centered until they are displaced by steering force.

IT GIVES BALANCE AND FEEL

In addition to its centering function, the reaction system also balances the hydraulic pressure effect on the bottom end of the wormshaft, and provides the appropriate steering feel.

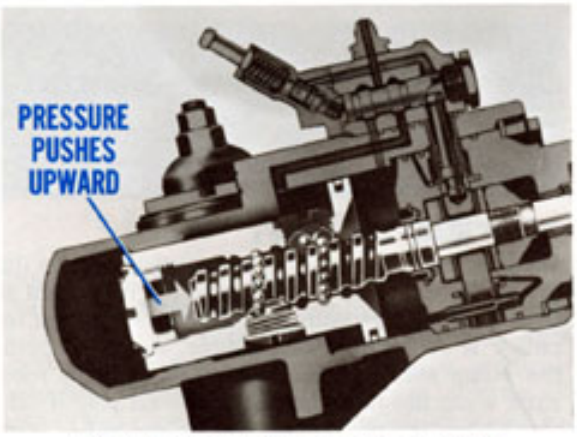


Fig. 21—Wormshaft tries to thread outward

PRESSURE MOVES WORMSHAFT

The need for wormshaft balancing is easy to understand. You see, the hydraulic surface area on both sides of the power piston is equal, so the effect of a given amount of power chamber pressure is the same on either side. Fluid in the upper chamber also fills the entire inner part of the power piston, so in any piston position, pressure in the piston interior pushes upward on the bottom end of the wormshaft. The upward pressure tries to make the shaft thread out of the piston and move the center race away from its centered position.

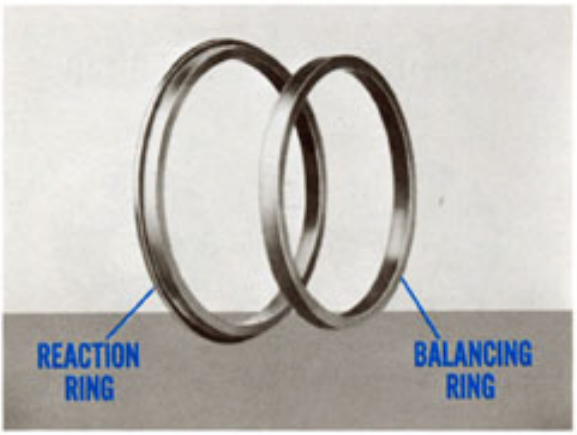


Fig. 22—Balancing ring provides added surface

RING BALANCES WORMSHAFT

As mentioned earlier, the reaction rings produce a centering force on the center race. However, the hydraulic surface area of both rings is equal, so we need some other means of counteracting the unbalancing force on the end of the wormshaft. To do this, the upper reaction ring groove also has a wormshaft balancing ring which provides additional reaction surface. In effect, the balancing ring applies the necessary compensating force on the wormshaft to prevent undesirable center race and valve spool movement.

VALVE MOVEMENT IS LESS

In addition to its balancing function, the reaction system also provides the driver with appropriate steering feel. It does this by resisting center race displacement with enough force to modulate valve spool movement.

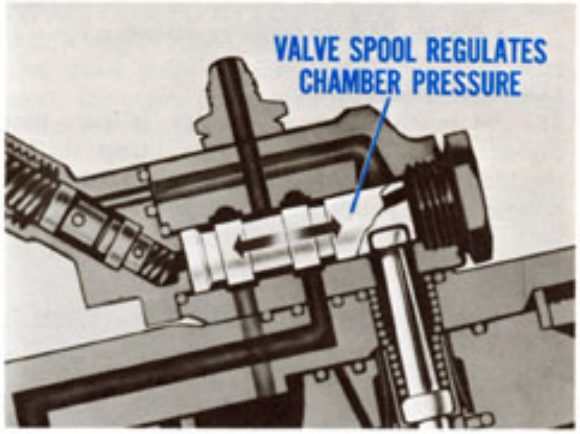


Fig. 23—Pressure level provides steering feel

SOME TURNING EFFORT IS NEEDED

Center race movement is balanced by hydraulic reaction force in a direct ratio to the pressure in the connected power chamber. As a result, the valve spool regulates power chamber pressure so that some manual steering effort is required. With this arrangement, the driver exerts ten to twenty percent of the total steering force.

POWER STEERING PUMPS

Power steering systems used on our current models may have a pump with a .94- or a 1.06-cubic-inch displacement. These pumps are designed to meet flow and pressure needs of specific applications and are not interchangeable. Both pump models are available in different pressure ratings, so be sure to use the correct unit for replacement.

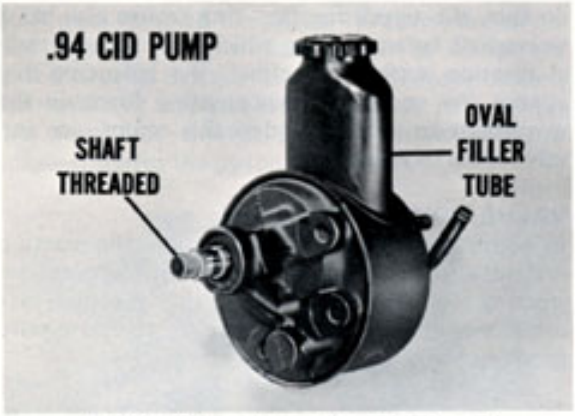


Fig. 24—.94 pump has pulley retaining nut

LOOK AT THE TUBE

The .94 pump is easy to identify. It has a long, oval-shaped filler tube and the pump shaft is threaded for a pulley retaining nut. When the nut is removed, the pulley can be tapped off the shaft with a plastic hammer.

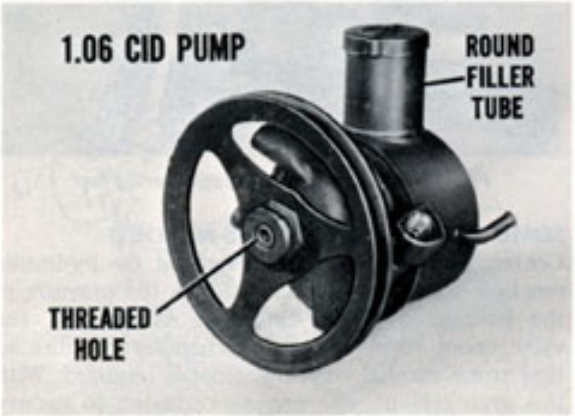


Fig. 25—Use special tool to install pulley

HAMMERING CAUSES DAMAGE

The 1.06 pump has a round filler tube which is somewhat shorter than the oval type just described. The pulley hub has an annular groove to accommodate the remover tool jaws. A threaded center hole in the rotor shaft is provided for the special tool which is required to install the pulley safely. You see, driving the pulley on with a hammer, or pressing it on without support under the inner end of the rotor shaft will push the pump pressure plate away from the cam ring.

NOTE: The pump end cover spring normally holds the pressure plate against the cam ring, but it isn't strong enough to reseat the plate. When the pressure plate is displaced, the pump will not prime.

DON'T BUMP THE SHAFT

Because the 1.06 pump pressure plate can be displaced by rotor shaft movement, it's important to keep weight or pressure off the shaft end when the pulley is removed. For example, do not support the pump assembly on the drive end of the rotor shaft when installing the reservoir. To play it safe, avoid bumping the shaft end when the pulley is off of the shaft.

CAUTION: When assembling the pump, be sure to install a new-type fiber gasket between the pump housing floor and the brass seal

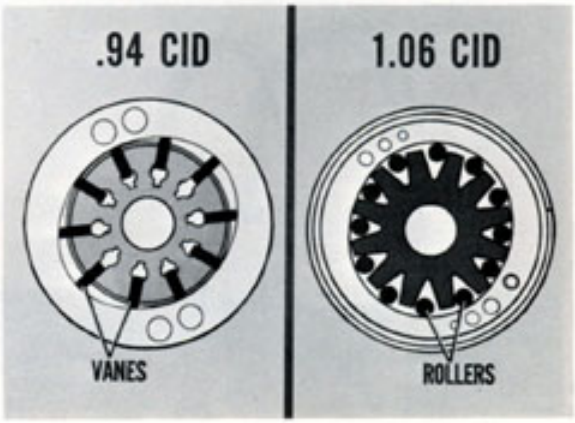


Fig. 26—Vanes and rollers do same job

plate, even if the pump originally did not have a gasket of any kind.

BOTH ARE VANE TYPES

Both of our pumps are variations of the vane-type hydraulic pump and operate on the same basic principle. Each pump model has a rotor with vanes and an eccentric cam ring to produce pumping action, however, the .94 pump uses flat vanes while the 1.06 pump uses rollers.

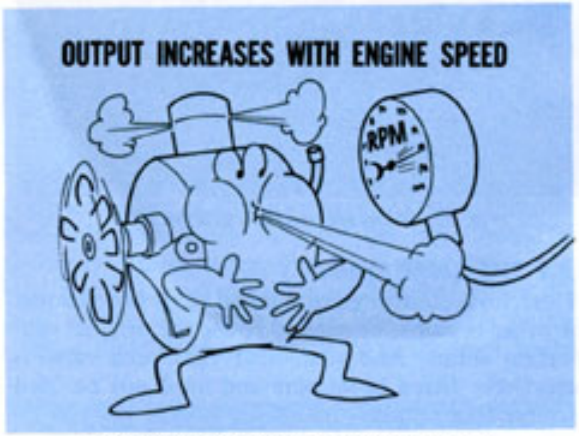


Fig. 27–Flow valve controls pump output

SYSTEM FLOW IS CONTROLLED

Our pumps have a flow control valve to regulate fluid flow in the system at all engine speeds. This control is needed because pump flow normally increases as engine speed goes up. Without a control valve, pump flow at higher speeds would be greater than the maximum needed for power steering operation. Such excessive output would waste engine power and could cause the hydraulic fluid to overheat.

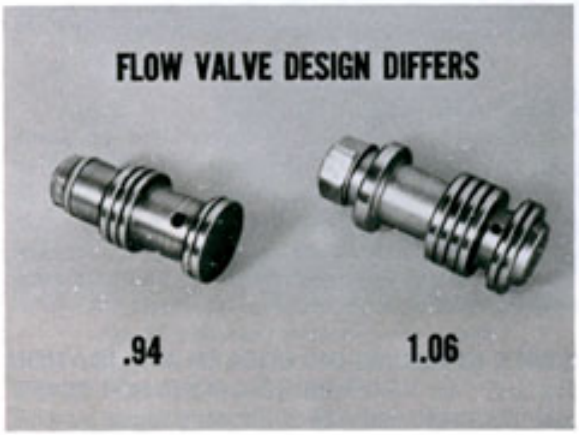


Fig. 28–Both valves produce same result

FLOW VALVES ARE SIMILAR

The flow control valve is similar in both pumps but differs in design details. Since both valves produce the same result, we can use the 1.06 pump and valve as an example to describe general flow valve operation.

TWO-STAGE CONTROL

The 1.06 pump flow control valve is basically a spring-loaded spool type. It is a two-stage valve which allows ample fluid flow at low engine speed, and then limits flow at higher speeds to the amount needed for power steering operation.

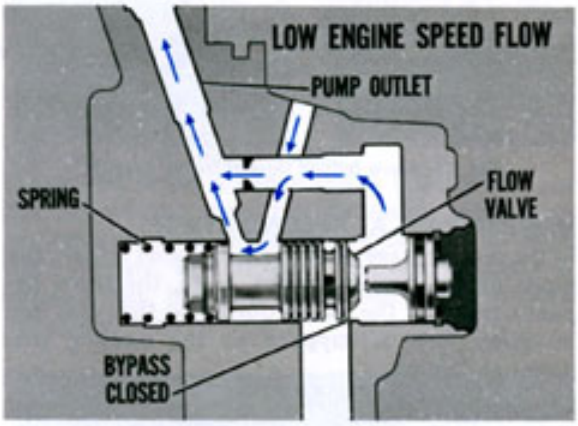


Fig. 29–Spring pressure keeps bypass closed

BYPASS CLOSED AT LOW SPEED

At low engine speed, spring pressure on the flow valve spool keeps the internal bypass closed. As a result, the entire pump output flows to the pump outlet from the pressure chamber.

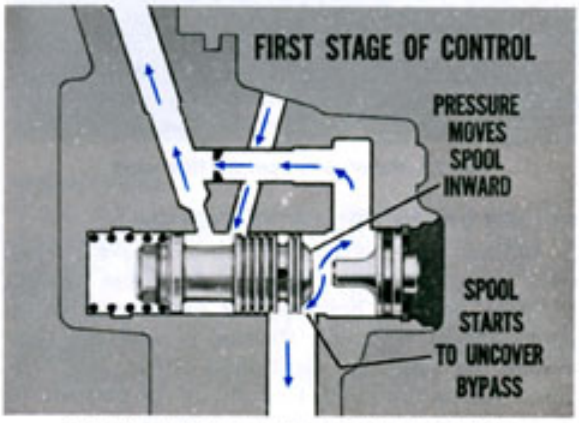


Fig. 30–Output pressure partially opens valve

PARTIAL BYPASS AT FIRST STAGE

As pump flow increases to the first stage of con-

trol, the pressure increases and moves the spool inward against the spring. At this stage, the spool starts to uncover the bypass passage and returns part of the flow to the pump inlet.

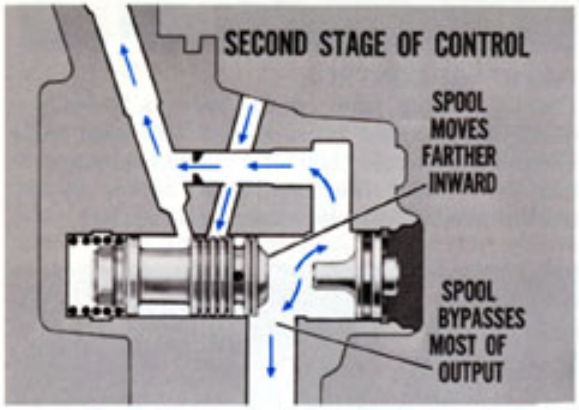


Fig. 31—More bypass flow at higher speeds

MORE BYPASS AT SECOND STAGE

In the second stage of control, at higher speeds, the spool moves farther inward. Here, the spool bypasses most of the pump output so that only the necessary flow is supplied to the steering gear power chambers.

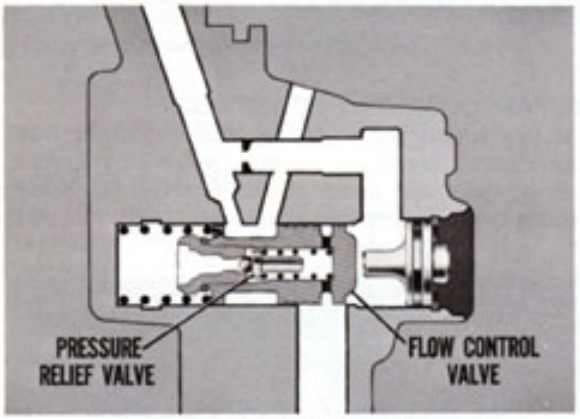


Fig. 32—Relief valve controls flow valve

RELIEF VALVE PROTECTS SYSTEM

In addition to flow control, we also have a relief valve to protect the pump and system against excessive pressure buildup. For example, it limits pump output when the steering is held hard over against the stops. As mentioned earlier, this condition causes the pump to build up the pressure to its maximum.

IT TRIGGERS THE FLOW VALVE

The pressure relief valve in the 1.06 pump is built into the flow control valve. Actually, it is a spring-loaded ball valve which causes the flow valve to limit maximum pump pressure.

Fig. 33—Shims are used to calibrate valve

USE THE SAME SHIMS

If the flow control valve is taken apart for cleaning or other reasons, be sure to re-use the original calibration shims. And remember that each valve is selectively fitted in its bore and must not be used in any other pump.

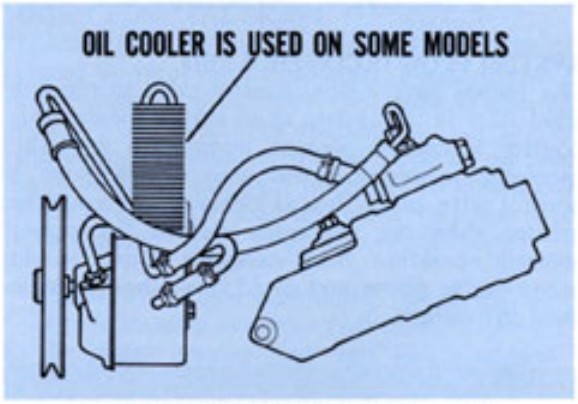


Fig. 34—Application is based on axle ratio

SOME HAVE COOLERS

A pump return line oil cooler is used on some models equipped with axle ratios which result in higher pump operating speed and temperature. In other words, oil cooler application is based on axle ratio rather than the car model or engine. The following chart lists current engine and axle ratio combinations which require an oil cooler.

POWER STEERING OIL COOLER APPLICATION

318 and 340 V-8's with 3.54, 3.55, or 3.91 axle ratio; 383, 440 and 426 V-8's with above, or 4.10 axle ratio.

TROUBLESHOOTING POINTERS

In troubleshooting, the easy, obvious things should come first. For example, if the power assist seems below par, begin by checking the fluid level and drive belt tension.

CHECK LEVEL FIRST

Fluid level should be checked at every engine oil change. In pumps without a dipstick, the fluid level when hot, should be approximately ½ to 1 inch below the top of the filler neck. At room temperature (approximately 70° F.) the level should be above the joint where the filler neck attaches to the reservoir (between 1½ to 2 inches below the top of the filler neck). The fluid level in pumps with a dipstick should come up to the level marks.

NOTE: When you add fluid, be sure to use Chrysler-Approved Power Steering Fluid, Part No. 2084329 or equivalent. Transmission fluid, or other substitutes can cause pressure hose deterioration, especially if the system is operated mostly under conditions where high temperatures predominate.

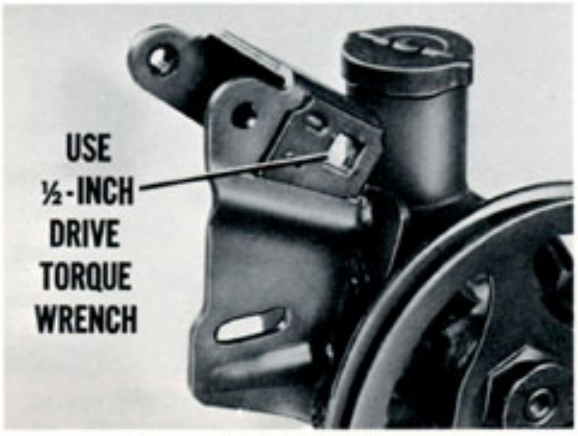


Fig. 35—Read belt tension in foot-pounds

DON'T FORGET BELT TENSION

Low pump output can result from a loose, slipping belt. Even if the belt is properly adjusted but glazed, it may produce a squealing noise when the steering is held hard over against the stops.

Use a half-inch drive torque wrench to adjust belt tension if the pump mounting bracket has a square hole for this purpose. The belt deflection method for setting belt tension can also be used, but don't guess at the belt tension, refer to the specifications given in your Service Manual.

INSTALL THE RIGHT HOSE

When you install a new pressure hose, always use the correct part number replacement. These hoses are designed both to conduct hydraulic fluid under high pressure, and to damp out system noises. In other words, installing the wrong hose can cause operating noise.

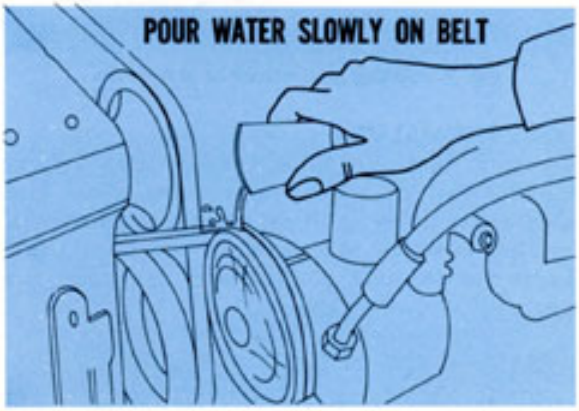


Fig. 36—Listen for sound change

POUR IT ON

If a pump seems noisy, it's easy to check out. Run the engine at idle speed and slowly pour water on the drive belt. If the water eliminates or changes the sound, you'll know that the noise is caused by the belt or a pulley. Make sure that the pulleys are aligned because belt noise and rapid wear can result if a misaligned pulley is not corrected.

STOP THE PUMP

When pouring water on the belt does not change the sound, loosen the steering pump drive belt and run the engine at the speed where the noise sounds

off. If the sound still continues with the pump not operating, you'll have to look somewhere else for the cause, at the water pump or alternator for example. Of course, if the noise stops where the belt is loosened, the power steering pump is probably the source.

FLOW VALVE CAN ACT UP

If the fluid level and belt tension check out okay but there's no steering assist in either direction, the pump flow control valve may be stuck open. This condition will bypass fluid directly back to the pump inlet and thus lower the output pressure.

Fig. 37—Jolting may restore valve function

JOLT THE VALVE

To check for a stuck valve, run the engine at about 2,000 r.p.m. Then turn the steering wheel hard over a few times to hit the stops momentarily. If this treatment restores normal steering assist, you'll know that the flow control valve was stuck, and probably needs servicing.

PRESSURE TEST IS BEST

Generally speaking, pressure testing is the best way to tell whether the cause of power steering system trouble is in the pump or in the steering gear.

WARM UP THE FLUID

Remember that the specs are based on pressure tests made with the fluid temperature at 150° to 170° F. Test pressure indications may be higher than normal when the fluid is cold or lower if the fluid is hot, so be sure the temperature is within the test range. When testing, do not keep the gauge valve closed longer than needed to take test readings or you may cause the fluid to overheat.

LOW ENGINE SPEED – VALVE OPEN

Begin testing with the gauge valve wide open.

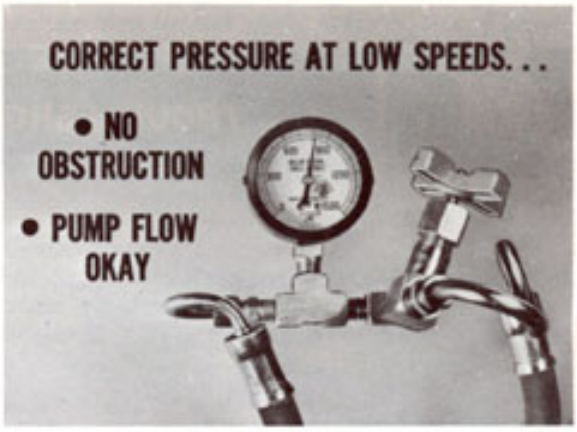


Fig. 38—Test checks system condition

Correct pressure at low engine speed tells you that there is no obstruction in the hydraulic system and the pump output is probably okay. You should get at least the minimum spec pressure when you momentarily hold the wheels all the way over against the stops.

PUMP OR GEAR?

If system pressure at low engine speed is below minimum specs, the trouble can be either in the pump or in the steering gear. To isolate the cause, momentarily close the gauge valve to block fluid circulation. With the valve closed, a gauge indication which is below the maximum pressure specified for that particular pump application points to trouble in the pump.

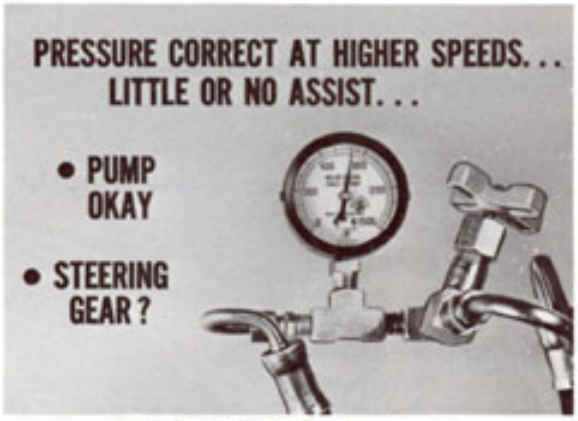


Fig. 39—Test helps to locate trouble

CHECK FOR EQUAL PRESSURES

When the pressure is low with the gauge valve open, but meets the specs with the valve closed, the cause is probably in the steering gear. You can get some idea of the steering gear hydraulic con-

dition by opening the valve all the way and noting gauge indication with the engine running at about 1,000 r.p.m. Momentarily hold the steering hard over against the right and left turn stops and note the readings. If the indications are not approximately equal in both directions, or are equal, but read much lower than the specified maximum, internal leakage is indicated, possibly past the piston ring.

DO IT THE RIGHT WAY

In diagnosing power steering problems, it's poor practice to try cutting corners by installing a new pump as a "cure-all" measure. Remember that it is difficult to explain the charge for installing a new pump when the trouble is actually in the steering gear assembly.

SERVICING HINTS

The basic rule for success in servicing power steering is KEEP IT CLEAN. Anyone who works on power steering should be careful to keep foreign material out of the system regardless of what kind of service is being performed. Keep in mind the fact that cleanliness is just as important when checking the fluid level as it is during a pump or gear overhaul.

Fig. 40–Keep dirt out of system

DON'T CUT CORNERS

When servicing any part of a car, it is good practice to do all of the operations carefully to guard against improper adjustments or accidental damage. Power steering is no exception to the rule, so it can be worthwhile to observe a few precautions.

TIGHTEN 'EM FIRST

When you adjust the steering valve to correct self-steering or unequal assist, DON'T forget to retighten the valve body screws before you turn the front wheels against their stops. If you forget, the buildup to maximum system pressure can blow the "O" rings out between the valve body and the gear housing assembly.

Fig. 41–Tap on end plug or body screws

TAP IT WITH CARE

When you adjust the steering valve to correct for self-steering or unequal assist, DON'T hammer on the back-pressure valve body because this can cause the valve piston to stick or jam. However, it's safe to tap on the end plug to move the steering valve downward – and on the valve body screws to move the valve upward.

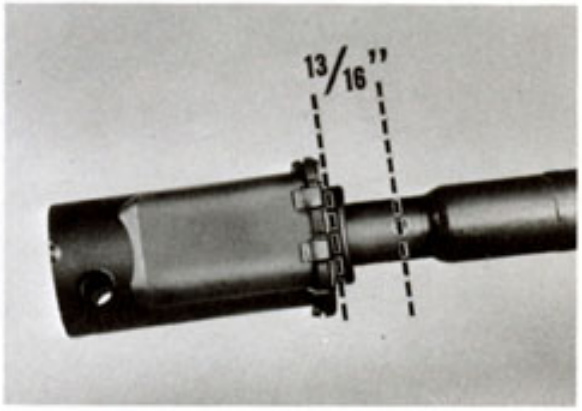


Fig. 42–Hole must be 13/16" above coupling

CENTER THE COUPLING

In checking power steering operation, remember that the lower end of the steering shaft must be centered in the coupling with the gauge hole 13/16 of an inch above the end of the coupling. If the coupling isn't centered properly, it can load the end of the wormshaft and cause steering wander, unequal assist, or returnability problems.

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