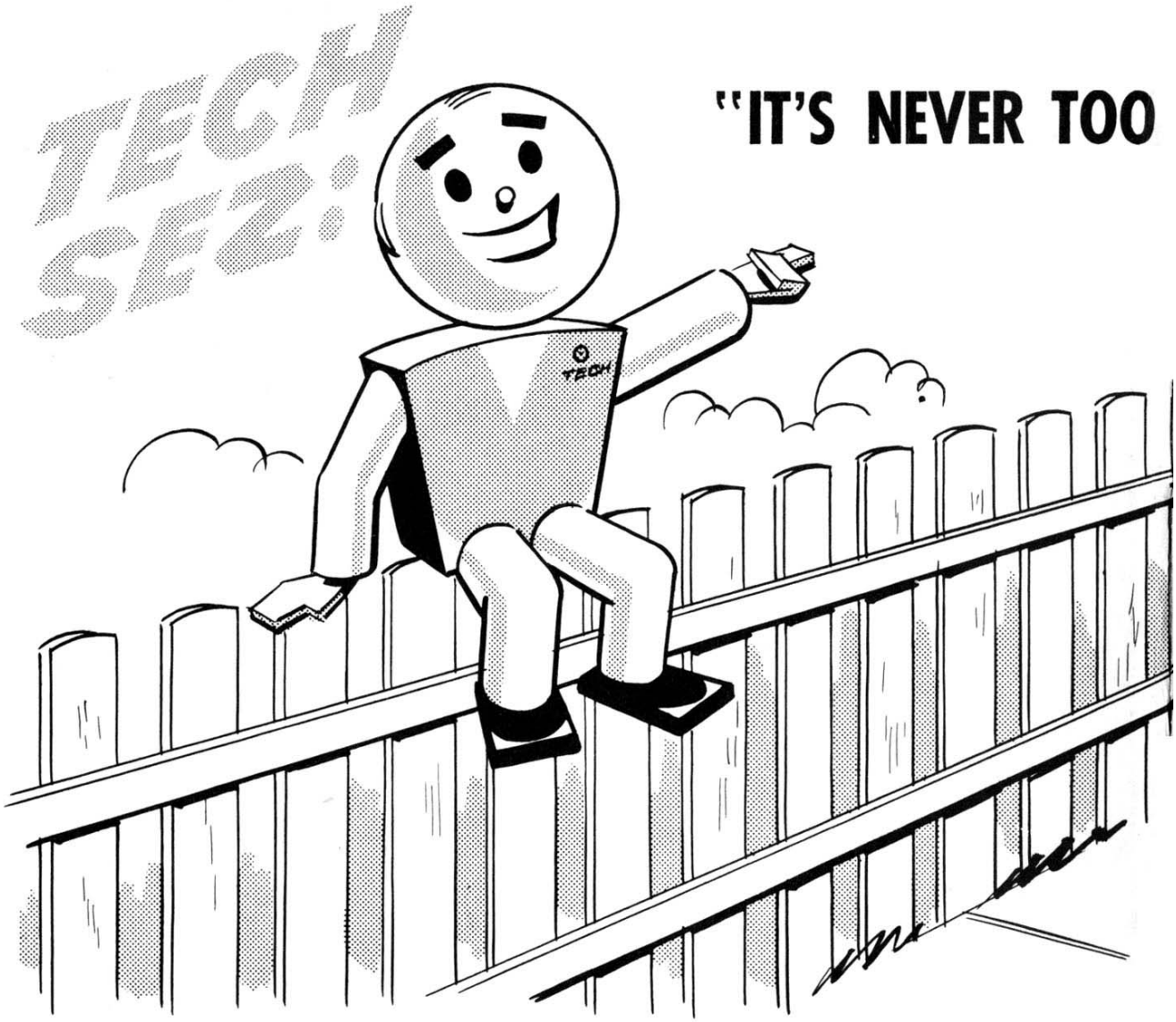
service reference book
session no. 105

POWERFLITE,
POWER STEERING
and
BRAKE SERVICE

PREPARED BY
CHRYSLER CORPORATION
PLYMOUTH • DODGE • DE SOTO • CHRYSLER



Some of us have been servicing PowerFlite Transmissions, Coaxial Power Steering and Center-Plane Brakes for some time now. And we've been doing a pretty good job!

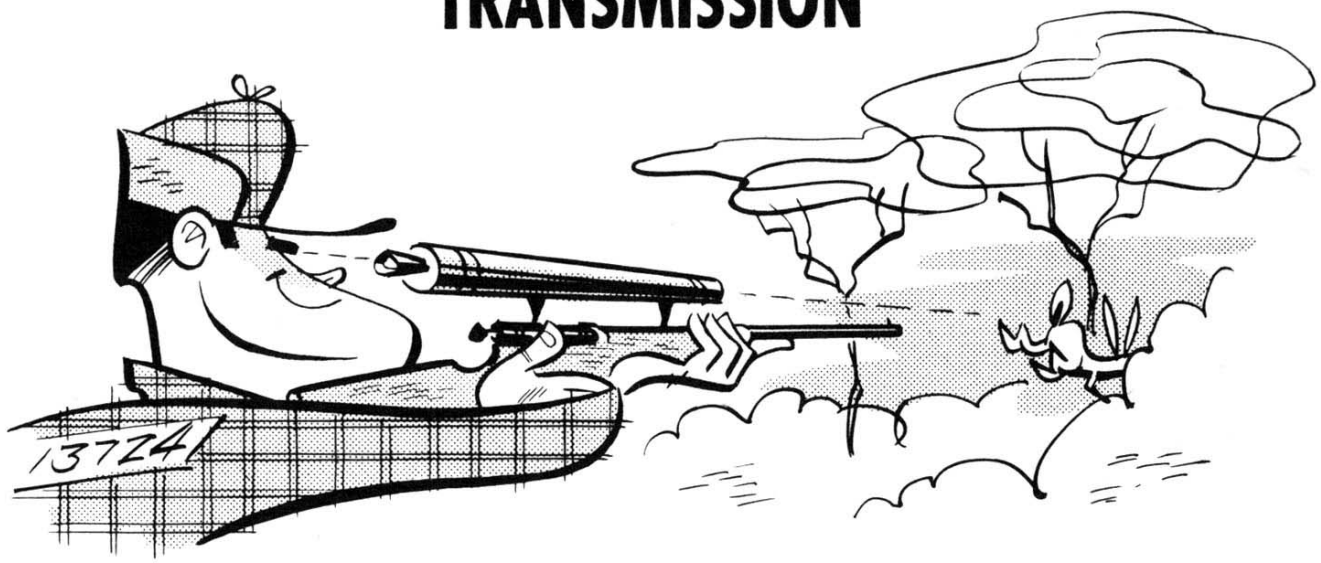
But, while visiting dealers, I've found certain conditions some fellows have had a little difficulty in correcting. They're not entirely new, and they're not particularly tough to correct.

In any event, the information in this Reference Book will serve as a good reminder to many technicians. It will also help those fellows who run across one of these conditions for the first time.

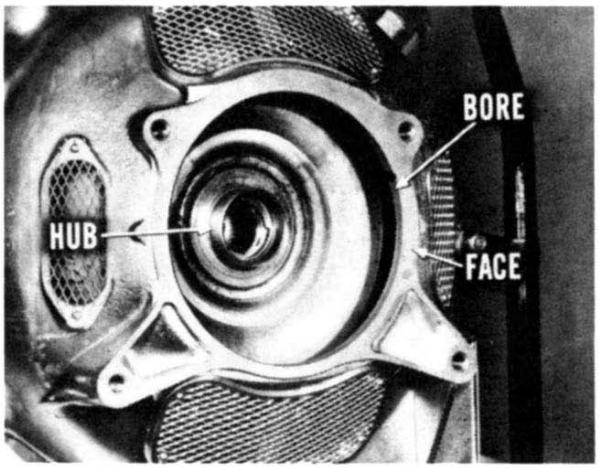
Here's an index of the conditions you'll find discussed in this book:

LATE TO LEARN"

ALIGNING THE POWERFLITE TRANSMISSION



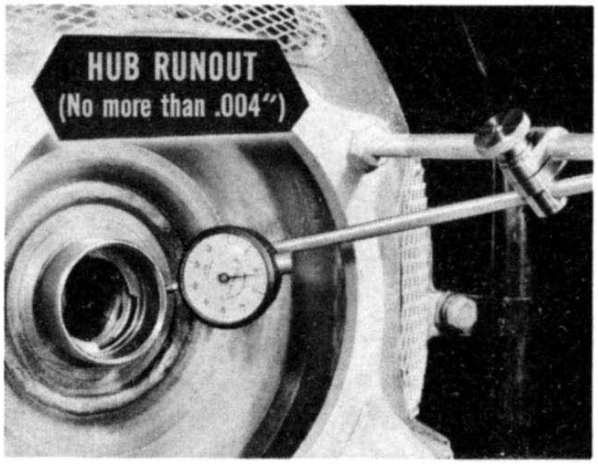
An oil leak at the front of the PowerFlite transmission, regardless of the make or model of the car, could be due to a worn front pump housing seal. Before installing a new seal, it is wise to check the cause of the leak first. It could be due to misalignment, or to a rough surface on the converter hub.



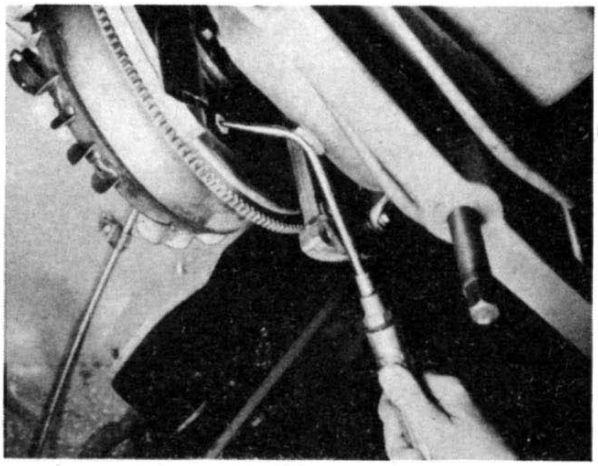
In other words, in addition to inspecting the surface of the hub, you'd want to check for excessive runout of the torque converter hub. Misalignment could result in excessive runout at the bore of the converter housing, or at the rear face of the housing.

Check Hub Runout—You have to remove the transmission to install a new front pump housing seal anyway, so while the transmission is out, check runout of the converter hub. Screw the dial indicator

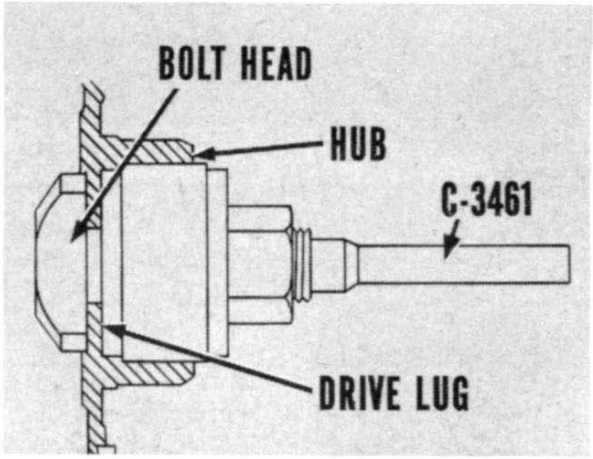
rod in the converter housing, and place the anvil of the indicator on the hub. Turn the converter one complete revolution two or three times, and watch the indicator. Hub runout shouldn't be more than four thousandths. If it is, drain the converter. Then, mark the low spot and turn the converter until the mark is directly down. Use an acetylene torch with a No. 3 tip set at maximum heat to heat the front of the converter. Do this through the opening in the adapter plate.



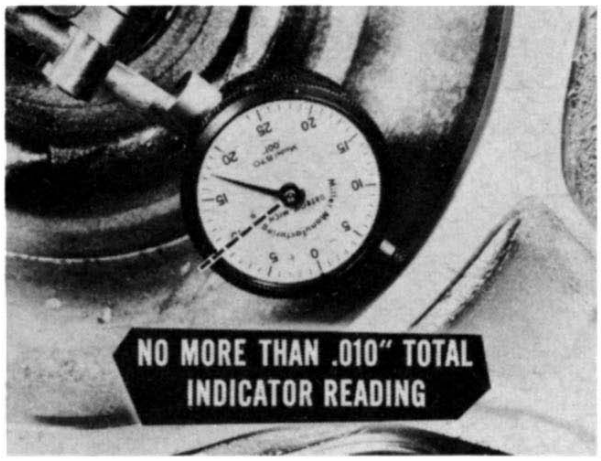
Usually, you'll heat a spot about ½" in diameter until it is a dull red. Next, quench the area quickly with wet rags to shrink the hub back into line. Recheck hub runout with the dial indicator when the converter returns to a uniform room temperature.

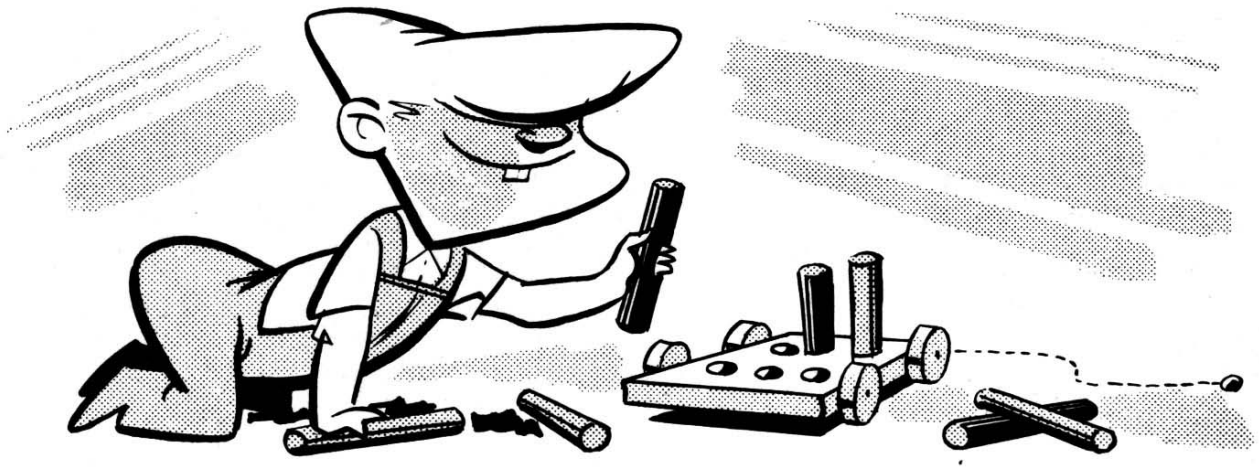


Check Bore Runout — Once you're sure hub runout is within limits, you can go ahead and check runout at the bore. To check bore runout, use a fixture and a dial indicator. Mount the fixture inside the converter so the head of the bolt is behind the converter pump drive lugs.



With a wrench, hold the flat end of the fixture bolt and tighten the nut. Then, mount the indicator on end of the bolt. Set the dial anvil so it bears on the transmission pilot bore of the converter housing. Then, turn the converter a full turn two or three times and take your readings. There should be no more than .010″ *total* indicator reading. If it is more . . . say about .018″ total reading, you'll have to shift the housing on the adapter plate in a direction opposite the point you noticed the maximum runout indication. Shifting the housing is done by first replacing the two steel dowels.

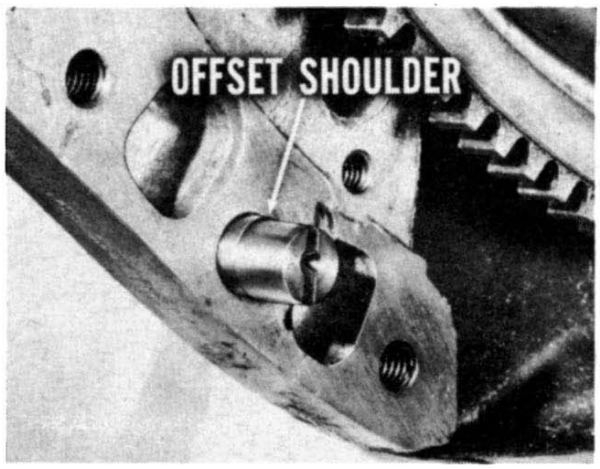




When selecting the new eccentric dowel to be used for a particular job, take the dowel closest to *one-half the total indicator reading.* For example:

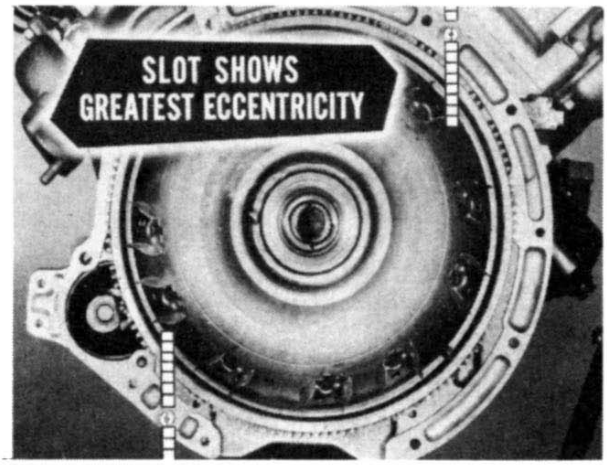
Total Indicator Reading	One-Half Total Indicator Reading	Size Dowel to be used	Dowel Part Number
.012″ to .020″	.006″ to .010″	.007″	1736347
.022″ to .034″	.011″ to .017″	.014″	1736348
.036″ to .052″	.018″ to .026″	.021″	1736353

Install Eccentric Dowels – To install the new dowels, first loosen the intake manifold bolt that holds the throttle linkage bracket in position. Remove the housing. Then, with a vise-grip pliers, remove the two old dowels. In their places, install the pair of eccentric dowels, driving them in up to the offset shoulder.

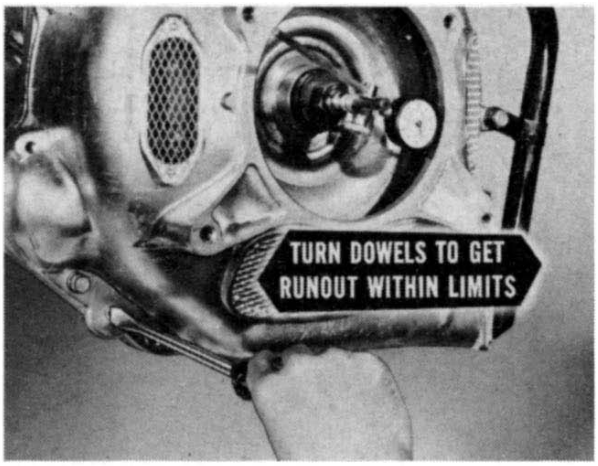


CAUTION: Remember to support the adapter plate when you install the *lower* dowel. Without support, you might damage the adapter plate.

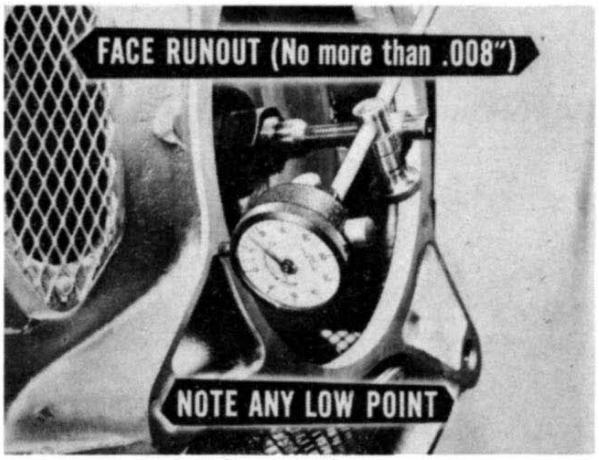
Here's another point to keep in mind. The position of the slot shows where the dowel has its greatest eccentricity. So, keep the dowel slots parallel, and the high side of the eccentric in the direction of the point where you noticed the minimum runout reading.



Make sure the mating surfaces of the plate and housing are free from nicks and dirt. Then, install the housing and torque the screws from 25 to 30 foot-pounds. Mount the indicator and check bore runout again.



If necessary, loosen the housing screws. With a screwdriver, turn the dowels until they shift the housing to get runout within the limits. This may take some adjusting and readjusting. Again, tighten the housing screws 25 to 30 foot-pounds.



Check Face Runout — You'll have to mount the indicator differently to check runout on the face of the housing. Set the anvil so it bears on the rear face, ¼" beyond the bore. Then, rotate the converter a full turn two or three times and check your readings.

Face runout shouldn't be more than .008". Make a note of any low points because you'll be using shims there to square up the transmission. What you do is slip shims over the bolt between the housing and transmission case. The thickness of shims you pick depends on the runout reading. For the correct location and shim thickness to use, refer to the following table.

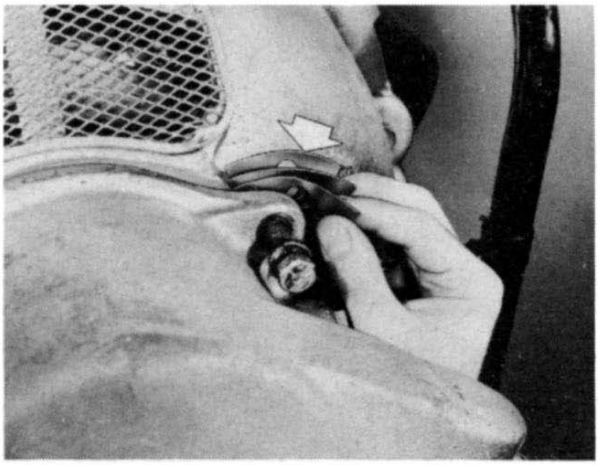


TABLE FOR SHIMMING TO CORRECT FACE RUNOUT

Location of Housing Face Low Point	Location of Shims	Total Indicator Reading Observed on Housing Face	Total Shim Thickness
Near one of the lower transmission to housing bolt holes.	Place shim on bolt which will enter this hole.	.005 to .010"	.013"
		.010 to .015"	.020"
		.015 to .020"	.026"
Near one of the upper transmission to housing bolt holes.	Place shim on bolt which will enter this hole.	.005 to .010"	.014"
		.010 to .015"	.021"
		.015 to .020"	.029"
Between the two lower transmission to housing bolt holes.	Place shims on both bolts which will enter these holes.	.005 to .010"	.010"
		.010 to .015"	.015"
		.015 to .020"	.020"
Between the two upper transmission to housing bolt holes.	Place shims on both bolts which will enter these holes.	.005 to .010"	.003"
		.010 to .015"	.012"
		.015 to .020"	.016"
Between the upper and lower transmission to housing bolt holes.	Place shims on both bolts which will enter these holes.	.005 to .010"	upper .010" lower .014"
		.010 to .015"	upper .015" lower .020"
		.015 to .020"	upper .020" lower .027"

NOTE: Shims are available in the following sizes:

Thickness	Part Number
.002"	1610442
.003"	1610443
.005"	1610444

When used in combination, these available sizes will satisfy any of the required thicknesses listed in the table. Before reinstalling the transmission, check for any leakage or damaged parts such as

seals and bushings. In most cases, the front pump housing seal should be replaced.

After installing the shims, tighten the bolts 25 to 30 foot-pounds. Also, tighten the manifold bolt that holds the linkage bracket in position. That's about it on correcting face runout.

In some cases, you many find that runout on the hub, bore, and face are all within limits. If so, just replacing the front pump housing seal will usually correct the leakage condition. Anytime you replace the seal make sure the surface of the hub is smooth and clean. Scratches at this point can cause the seal to wear.

COAXIAL POWER STEERING SERVICE

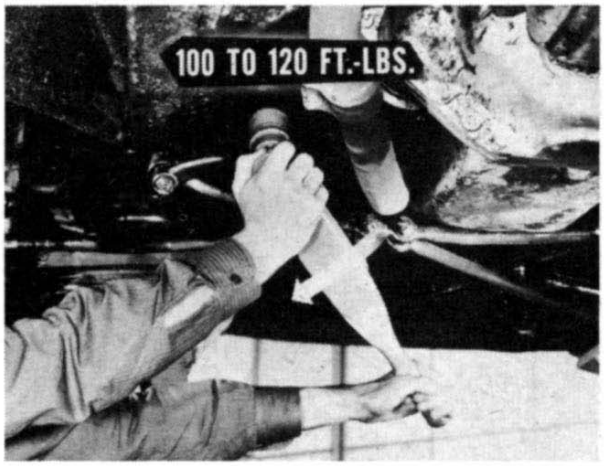
"Wandering"—On any car equipped with Coaxial Power Steering, binding or looseness in the system can cause occasional "wandering". One of the symptoms of this condition is too much steering wheel "free play". Another is the fact that the steering wheel requires constant turning to keep the car going in a straight-ahead direction.

Where to begin? Well, you should first find out if the linkage causes the "wandering", or if the power unit is at fault. And there's a quick way to check.

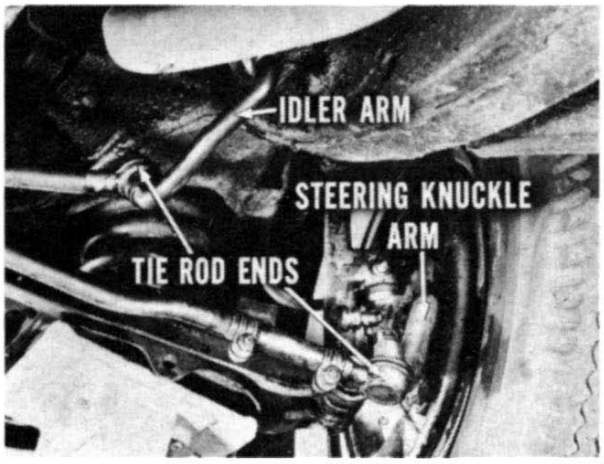
For example . . . if there's *less* than 5/8" free play at the steering wheel with the engine running . . . and you know the car wanders, the linkage is either loose or binding somewhere.

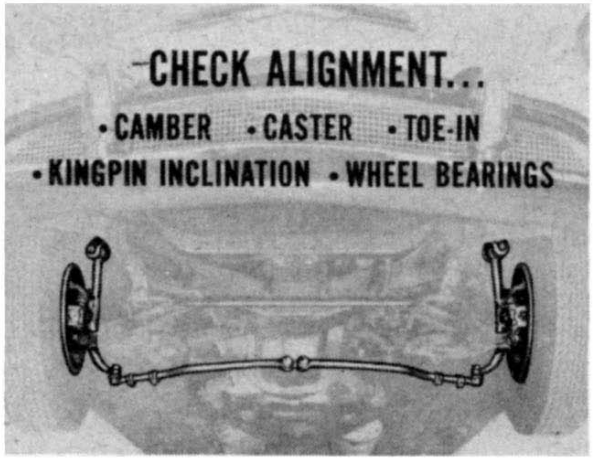
On the other hand, if free play at the steering wheel rim is *more* than 5/8", *without moving the linkage,* the power unit is at fault.

Check the Linkage—To check the linkage, raise the car. Then, visually—and by "feel"—check the entire linkage system. Look for looseness. The steering gear arm, for instance, should be tight on the gear shaft. If it isn't, tighten the nut 100 to 120 foot-pounds.

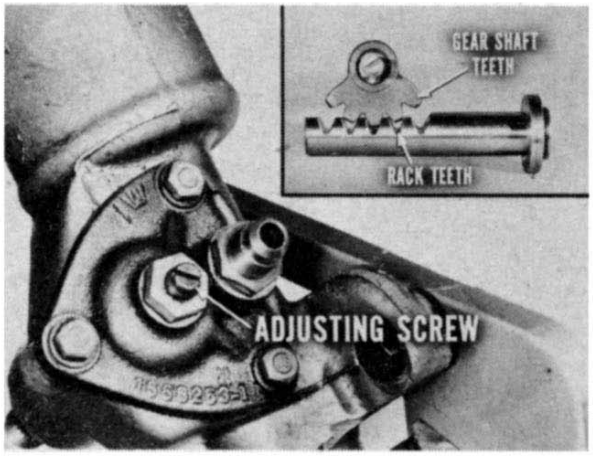


Check also for a bind or looseness at the idler arm. Besides that, look for loose or cocked tie rod ends . . . or loose steering knuckle arms. Tighten or replace any faulty parts.

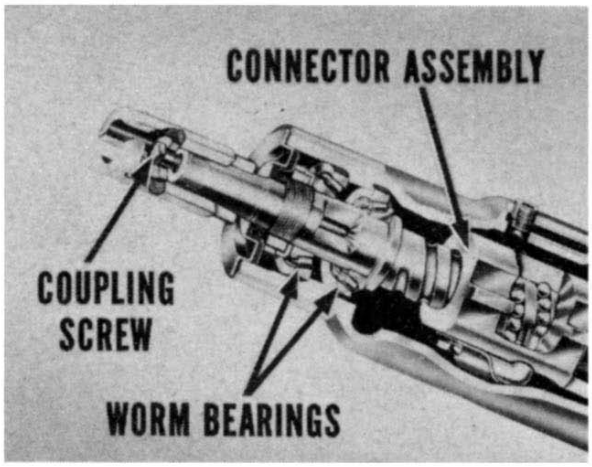




Front wheel alignment, naturally, has to be right. So, check camber, caster, toe-in, kingpin inclination, and front wheel bearing adjustment. Get all these points up to specifications for the car you're working on.

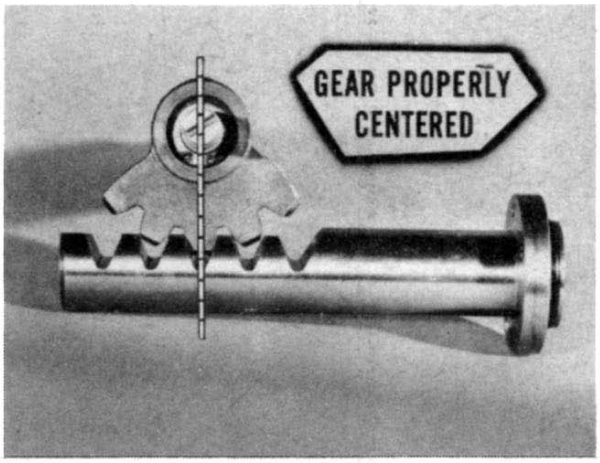


Check the Power Unit—Remember, more than 5/8" free play at the wheel, with the engine running and without moving the linkage, points to looseness in the power unit. There might be a loose *gear shaft* adjustment, for example.



Besides that possibility, the steering worm *coupling screw might be loose*. In addition, there might be a *loose worm bearing preload adjustment*. Also, the worm shaft in the connector assembly might have *too much end play*.

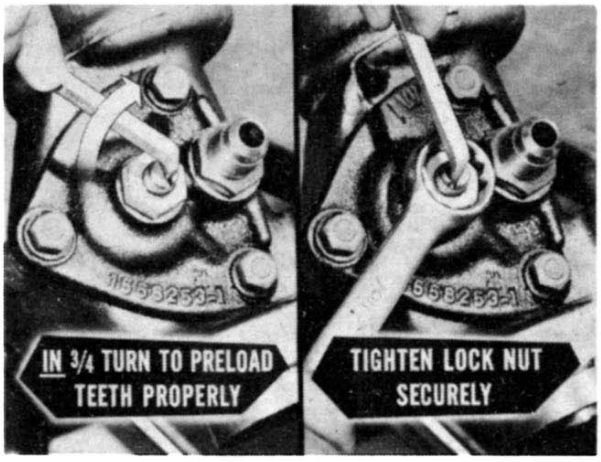
Gear Shaft Adjustment — Check the gear shaft adjustment first. You can correct it by means of the adjusting screw. It moves the gear shaft teeth into closer mesh with the rack teeth on the lower piston rod.



Before you make that adjustment, however, make sure the steering gear is properly centered to the over-all travel of the gear. You can center the gear by turning the steering wheel from one extreme to the other. Count the number of turns. Then, bring the wheel back to the half-way point.

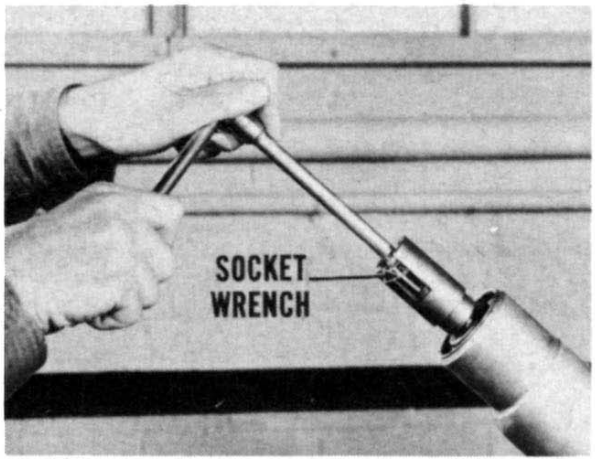
Once the gear is centered, turn the adjusting screw *out* until there's backlash at the steering arm. Next, slowly turn the screw *in* until there is *zero* backlash.

After that, turn the screw *in not more than ¾ths turn* to preload the gear properly. Secure this position by tightening the lock nut. Finally, check free play at the steering wheel again. If it is gone, adjusting the gear shaft will probably correct the "wandering" condition.



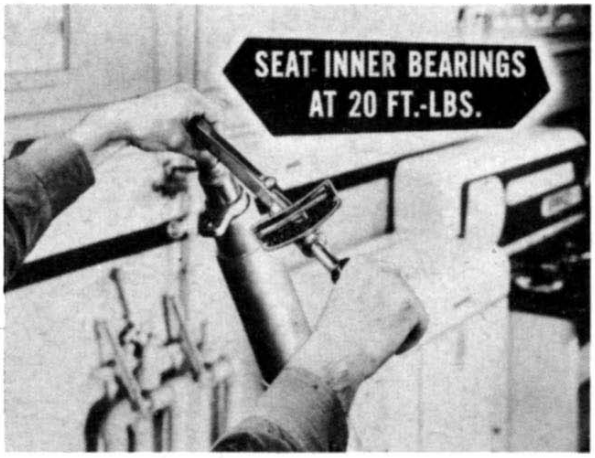
If you still find free play at the wheel, remove the power unit and mount it on the body holding bracket for further work at the bench.

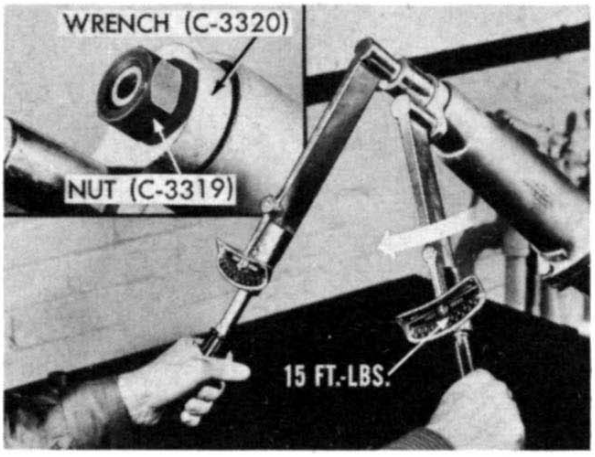
CAUTION: Use a puller to remove the steering gear arm from the shaft.



Check the steering worm coupling screw next. If it had worked loose, there would be too much backlash in the tube and coupling. In this case all you have to do is use a socket wrench and make sure the screw is snugged down good and tight.

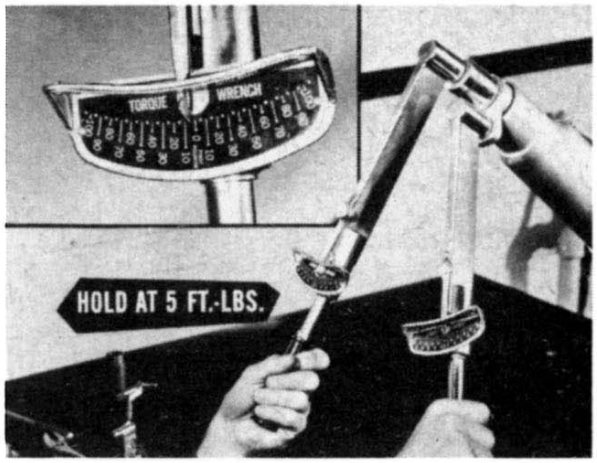
Worm Shaft Bearing Preload Adjustment—On a power unit with tapered roller bearings, it's wise to check the worm shaft bearing preload adjustment. To do this, you have to seat the inner bearings under a load of 20 foot-pounds. Hold the worm shaft against the bearing at 20 foot-pounds to seat the bearing races.



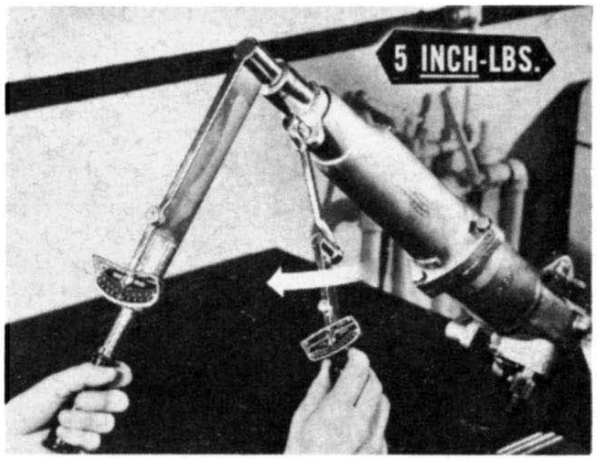


Then, using the special wrench (C-3320) and another torque wrench, tighten the adjusting nut *clockwise* to 15 foot-pounds. Turn the worm shaft several times, next, to seat the bearings. Then, loosen the adjusting nut.

Following that, use a torque wrench and the special Adjusting Nut tool (C-3319) to hold the worm shaft *counter-clockwise* against the inner bearing at 5 foot-pounds.



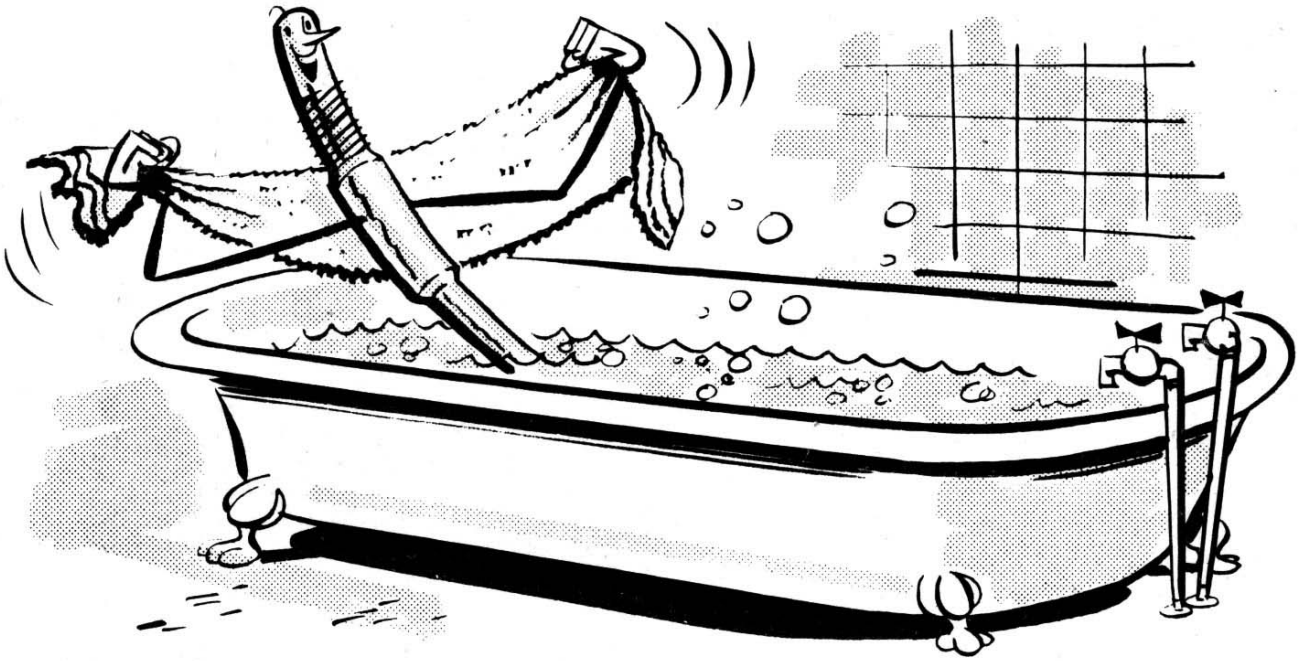
Then, retighten the adjusting nut *clockwise* to *5 inch-pounds*. Finally, stake the nut to index with the slot in the worm shaft.



Worm Shaft End Play in Connector—If you find too much worm shaft end play in the connector assembly, replace the worm and connector as an assembly.

NOTE: Remember . . . after a new car with Coaxial Power Steering has been driven 1000 miles, it's always wise to check free play at the steering wheel. In this way, you may be able to prevent a "wandering" condition before it shows up to annoy an owner.

Test For Leaks. If you get a "come-back" "O" ring replacement job, you may find that the "O" ring previously installed was damaged during installation. "O" rings can be nicked or sheared if there's a rough edge or burr on the valve operating rod, or on the upper and

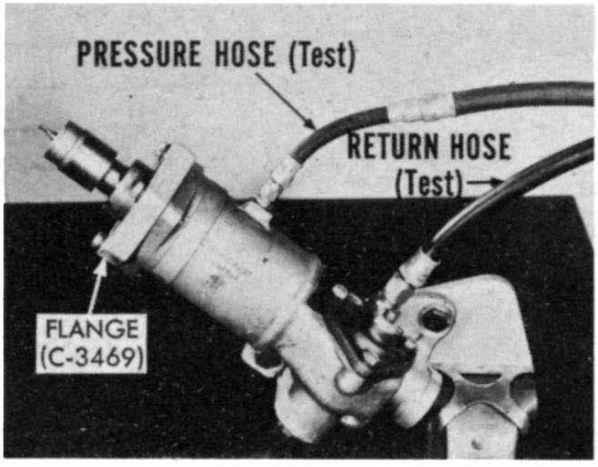


lower piston rods. Always check a ring groove carefully for this roughness.

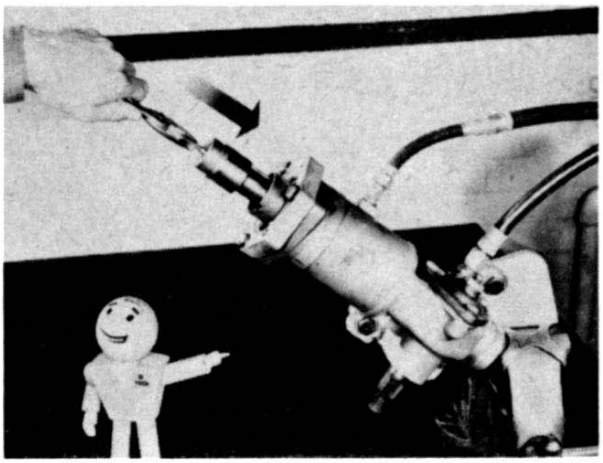
If you notice roughness, always use emery cloth or a fine file to dress it down before installing a new seal. Lubricant applied to the "O" ring will not only let you roll it into place easily, but will also help protect the seal from damage.

You can use a special housing retainer flange (C-3469) to locate outside and inside pressure leaks. It helps pinpoint possible leakage, and you can use it before completely disassembling the power unit.

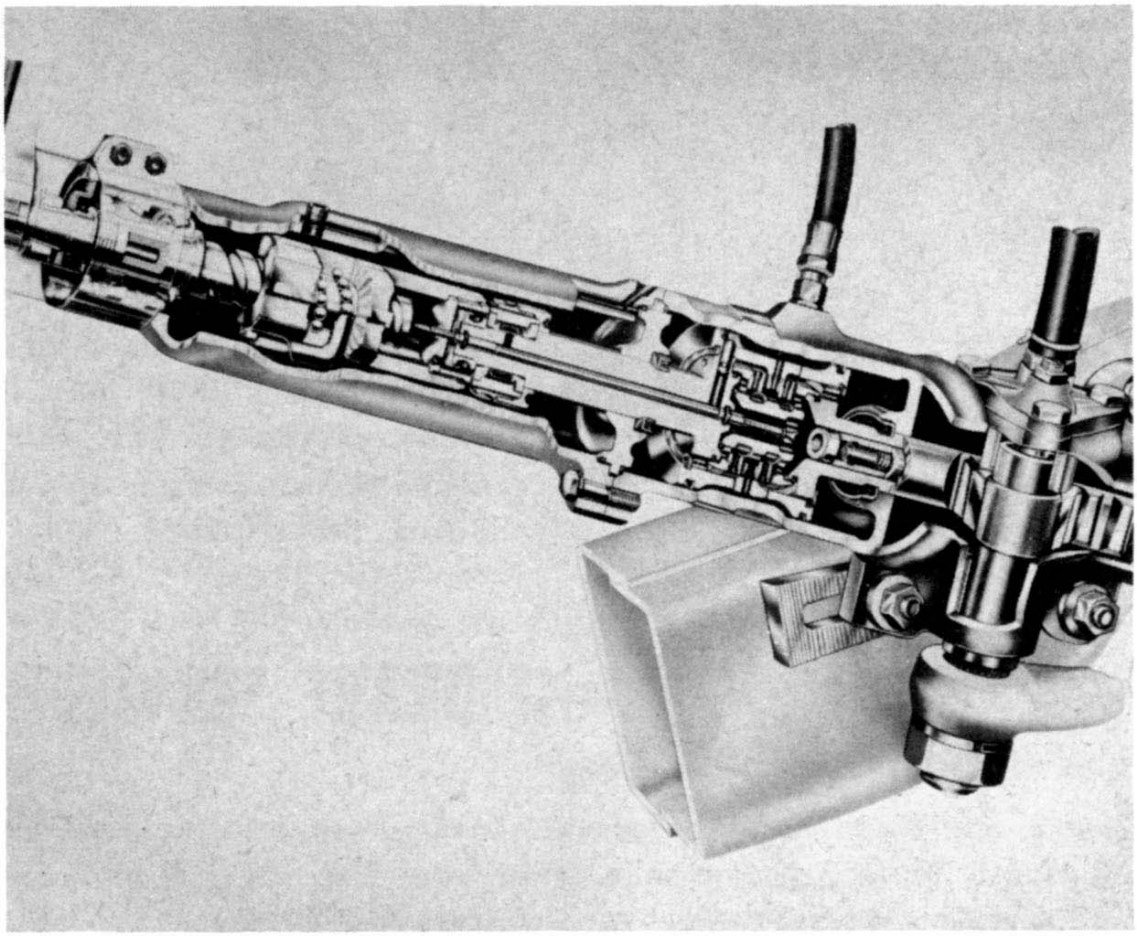
What's more, you can use this special tool to test a repaired unit for leaks before you install the unit in the car. It checks the job on the bench and saves a lot of extra time and effort. You just install it on the mating surface of the lower housing after the upper housing is removed. Next, you remove the worm connector assembly. Connect the test pressure and return hoses to the pump. With a cloth, wipe any traces of oil from the housing and upper piston rod.



Start the engine so the pump will supply normal pressure to the unit. With a pair of pliers, grip the tang of the valve rod and push the control valve down to build up pressure on the upper side of the piston.



CAUTION: Don't leave the unit operating in this position any longer than necessary as high pressure may cause overheating and damage to the pump.



Now, while the power unit is pressurized, if high pressure leaks are present, you'll notice them at one of the following locations:

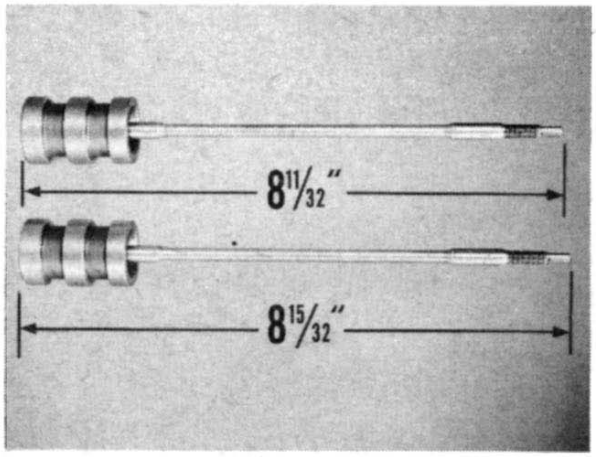
(1) At the upper piston rod, indicating that this seal is in need of replacement.

(2) At the upper end of the valve rod, which means the "O" ring seal in the upper end of the upper piston needs replacement.

(3) At the reaction seal retainer, which points to replacing the reaction control seal.

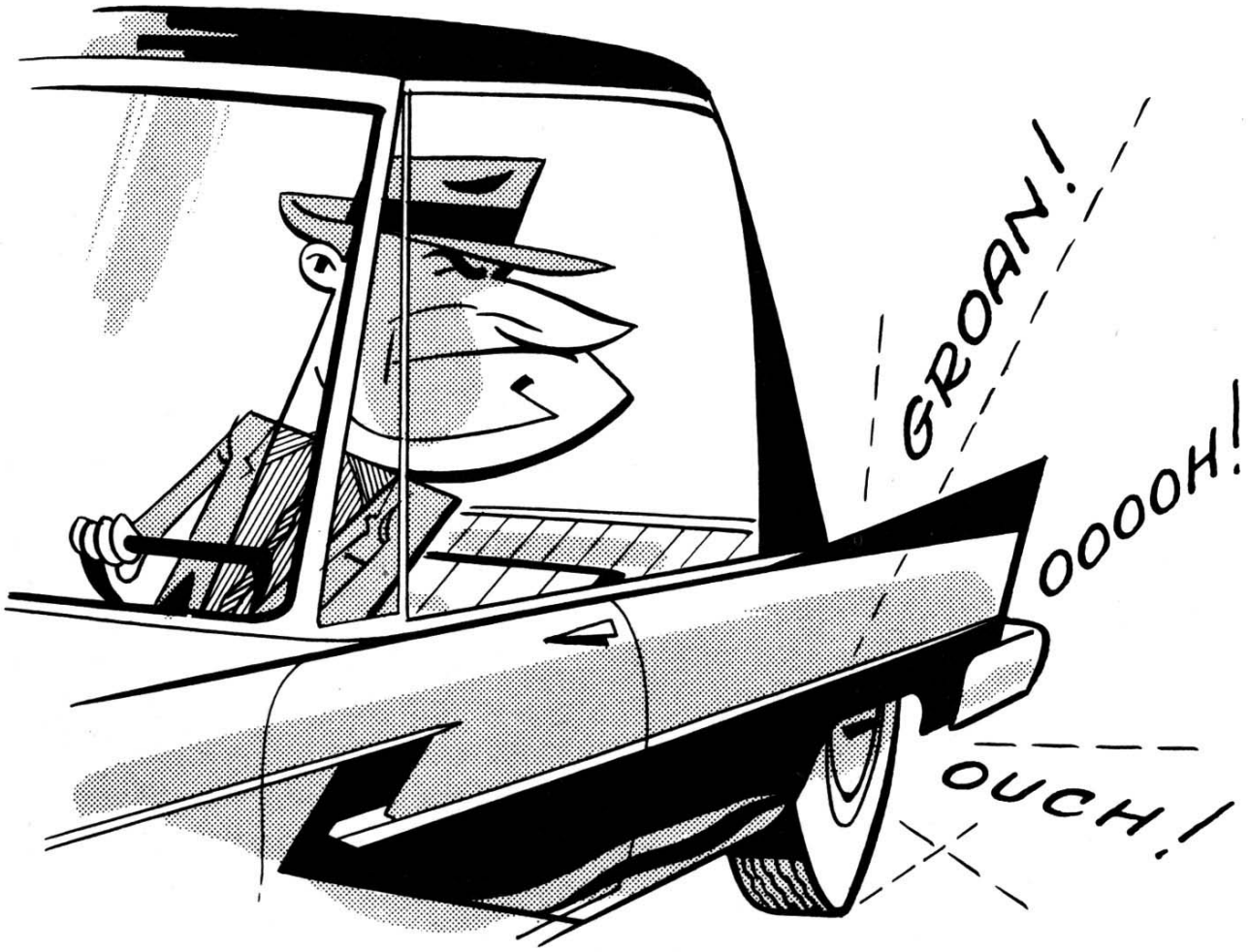
(4) At the housing cylinder head, which may show up a fine crack due to incorrect disassembly procedure or a casting that's become porous.

Check Valve Rod Length—Two different valve rods have been used in Coaxial Power Steering units. If you discover that the "O" ring has been *forced out of its groove* at the upper end of the upper piston rod, chances are that the valve rod is too short. So, *check* the *length* of the rod. The short rod is $8\frac{11}{32}$"; the long rod is $8\frac{15}{32}$" long. If necessary, replace the piston valve and rod assembly to correct this condition.

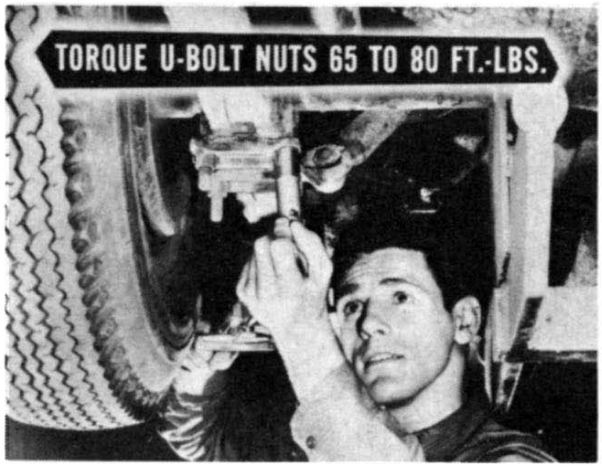


REAR CENTER-PLANE BRAKE SERVICE

Rear Brake Noise (Chrysler and De Soto)—If an owner reports an occasional *howling* or *groaning* noise from the rear Center-Plane brakes, there's a definite checking procedure to follow.

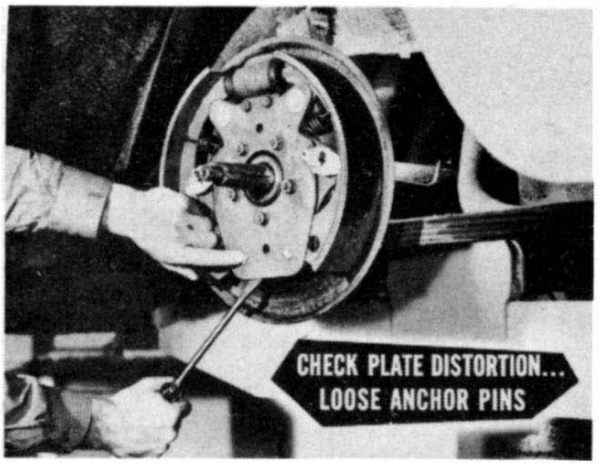


First, see that the rear spring U-bolt nuts are tightened to a torque of 65 to 80 foot-pounds. This will eliminate any possibility of the axle moving on the springs.

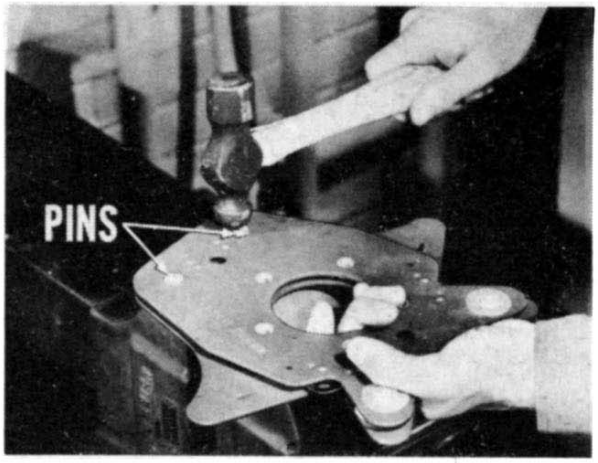


Second, pull the wheel and drum and check the brake lining wear pattern. If there's only partial contact, check for drums being out-of-round, misalignment of shoes, or a distorted support plate.

Use a reliable gauge to see if the drums are out-of-round more than .005". If they are, true them up on a lathe, and polish out any roughness. Always polish the drums if there's any roughness due to scoring, flat spots or a threading design. Use a piece of No. 60 or No. 80 grit emery cloth, and finish with a No. 200, or finer emery cloth.



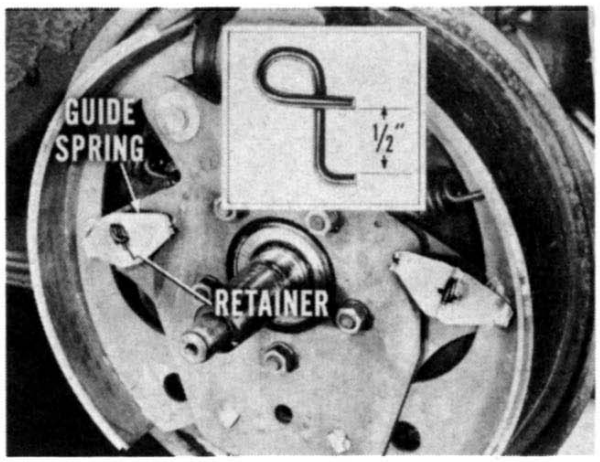
Next, inspect the support plates for distortion, and for loose anchor pins. Use a screwdriver between the plates while you press a finger against the end of the anchor pin to check looseness.



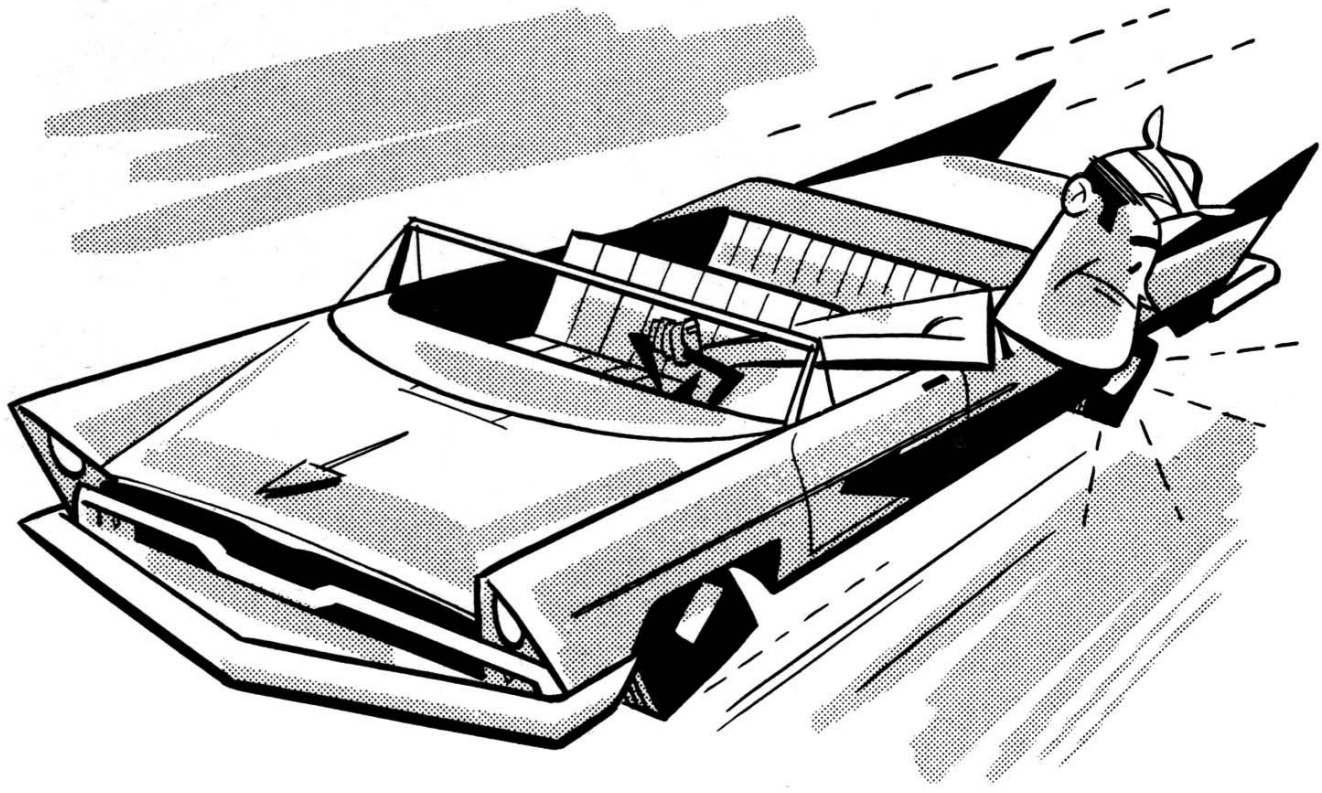
If the pins are loose, remove the support plate from the dust shield. Rest the pin on an anvil, and peen the end until the pin is tight. Be sure that both support plates are in good alignment.

When you install the support plates on the dust shield, tighten the bolt nuts to 35 foot-pounds. This will prevent the plates from vibrating.

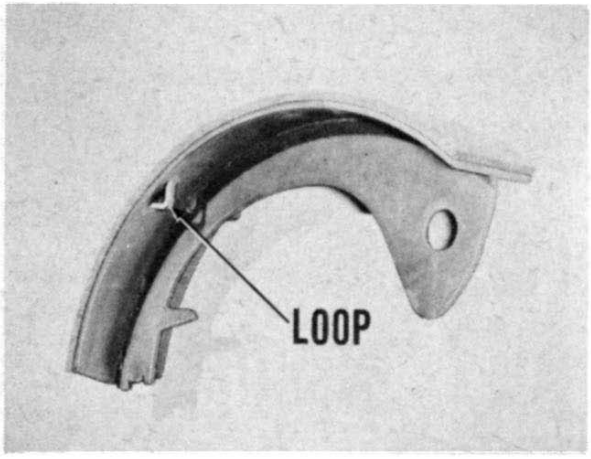
Check the two brake shoe guide springs. They hold the shoes steady, and cut down vibration, provided that they exert maximum tension against the shoe and support. Bend the springs to increase this tension, if necessary. Check the spring retainer, too; there should be about ½″ between the two spring retainer prongs. Bend the prongs to get this distance, if needed.



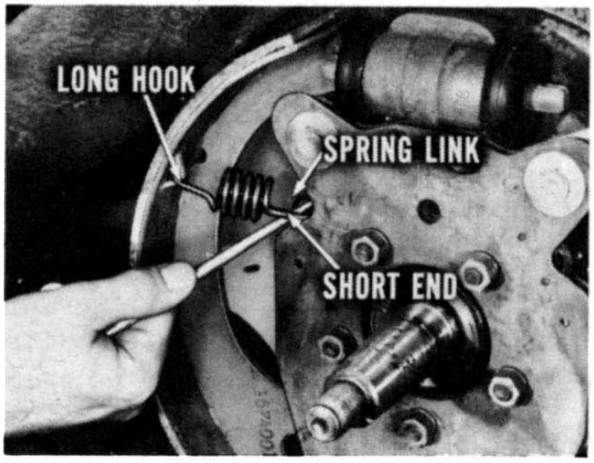
Replace any warped shoes or support plates. Finally . . . button up the brake assemblies and road-test the job.



If your road test fails to produce any improvement, then replace the rear shoes with brake shoes of the new design. Also, replace the return springs with the new, 5-coil return springs.



You'll notice that the new brake shoes have *loops* on their outside edges. The new, 5-coil return springs hook into those loops and provide the shoes with both a return force and side thrust.



Put the long hook of the return spring in the shoe, and the shorter end in the spring link. Next, install the original brake shoe guide springs and retainers. Install the wheel and drum, and road-test the job.

SUMMARY

Keep in mind that the skill of a technician rests on two things. First, you must be able to diagnose the cause of a service condition *accurately*. And, second—you need the know-how to correct the condition quickly, dependably and economically.

These service tips on the PowerFlite transmission, Coaxial Power Steering unit, and the rear Center-Plane brakes are provided so that owners of Plymouth, Dodge, De Soto, Chrysler and Imperial cars may continue to enjoy the expert service attention that is the trademark of every Master Technician.

RECORD YOUR ANSWERS TO THESE QUESTIONS ON QUESTIONNAIRE NO. 69

An oil leak at the front of the PowerFlite transmission could be due to the condition of the front pump housing seal.	RIGHT	1	WRONG
Torque converter housing bore runout shouldn't be more than .010" total indicator reading.	RIGHT	2	WRONG
To get bore runout within limits, shift the housing on the adapter plate by installing a pair of eccentric dowels.	RIGHT	3	WRONG
To select the right replacement dowel, divide the total indicator reading by three and add .010".	RIGHT	4	WRONG
When installing new dowels, keep the slots parallel and the high side of the eccentric toward the point where you noticed the minimum runout reading.	RIGHT	5	WRONG
Runout at the face of the torque converter housing shouldn't be more than .008".	RIGHT	6	WRONG
Steering wheel "free-play" of a power steering unit should be checked at the steering wheel with the engine not running.	RIGHT	7	WRONG
Some possible causes of "wandering" are a bind or looseness at the idler arm, loose or cocked tie rod ends, or loose steering knuckle arms.	RIGHT	8	WRONG
If anchor pins of the center-plane brake support plates are loose, remove the support plate and peen the ends of the pins until they are tight.	RIGHT	9	WRONG
New Center-Plane brake shoes have loops on the outside edges.	RIGHT	10	WRONG

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