POWERFLITE
AUTOMATIC TRANSMISSION
MAINTENANCE

Prepared by
CHRYSLER CORPORATION
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AND CHRYSLER DIVISIONS
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NOW THAT POWERFLITE IS ON THE PLYMOUTH, YOU’D BETTER KNOW ALL ABOUT IT!

Now that Plymouth is offering the PowerFlite automatic transmission, just about every other car you service will be equipped with this transmission. That’s a lot of cars, man! So, you’re gonna have to be “on the ball” and find out all you can about this smooth-shifting unit.

We know that any piece of machinery requires some maintenance and adjustment occasionally to keep it operating properly. Therefore, this reference book covers some maintenance tips you’ll find very useful in taking care of PowerFlite-equipped cars.

In case you’re wondering whether the PowerFlite automatic transmission used on Plymouth is any different, you can relax. PowerFlite works the same on Plymouth as it does on our other cars. Everything you’ve learned so far still applies.

For your convenience, here’s how the maintenance information is arranged in this book:

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EARLY UPSHIFT

Let's suppose you have a transmission where the upshift occurs too soon—say it upshifts between 10 and 15 miles an hour no matter how much throttle opening you give it. This would result in poor acceleration performance. You'd start looking for the cause of this condition by checking line pressure.

You probably remember that proper line pressure (90 psi in all forward ranges; 250 psi in reverse) must be maintained at all times for proper PowerFlite operation.

**Checking Line Pressure.** To check line pressure, you first remove the 1/8” pipe plug from the line pressure take-off hole located on the front left side of the transmission case. Then install the 300-pound pressure gauge (C-3293) at this point and check the pressure.

Following are the pressures you should read when checking line pressure for all cars equipped with PowerFlite:

<table>
<thead>
<tr>
<th>GEARSHIFT POSITION</th>
<th>BRAKES</th>
<th>ENGINE SPEED</th>
<th>LINE PRESSURE</th>
</tr>
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<tbody>
<tr>
<td>Neutral</td>
<td>Off</td>
<td>800</td>
<td>85-95</td>
</tr>
<tr>
<td>Low</td>
<td>Applied</td>
<td>800</td>
<td>85-95</td>
</tr>
<tr>
<td>Drive</td>
<td>Applied</td>
<td>800</td>
<td>85-95</td>
</tr>
<tr>
<td>Reverse</td>
<td>Off</td>
<td>1600</td>
<td>225-275</td>
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If the line pressure is incorrect, check the transmission oil level first. Then clean the pressure regulator valve and install a new spring.
Chances are line pressure will check out all right. In that case, a little reasoning on your part will help point you toward the cause of the early upshift condition. For instance... remember that the transmission upshifts because governor pressure goes to one side of the shift valve... and gradually overcomes the throttle pressure on the other side of the shift valve.

Now, since the upshift is too early, the governor pressure is building up against the shift valve too strongly and too soon.

It's either that, or—the throttle pressure isn't strong enough to hold the shift valve in its downshift position until the normal upshift speed is reached.
Checking Throttle Pressure.
The next step is a check of throttle pressure to see if it is up to specifications. Just before you do this, however, it's always smart to make a visual check of the linkage to be sure it's free and not binding on anything.

Normal pressure should be 13 to 15 pounds per square inch at idle speed.

Pull down on the accelerator pedal slowly and watch the gauge. If the throttle valve's working properly there should be a sudden rise in pressure. Pressure should rise and fall as engine speed increases and decreases.

If you get that sudden rise in throttle pressure, and you already know the line pressure's okay, the next logical possibility is a governor valve stuck in the open position. Just to make sure, however, make a governor pressure check.
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Checking Governor Pressure. When checking governor pressure, the wheels should be free to turn. So, release the hand brake. Then, with the selector lever in Neutral, start the engine. Finally . . . move the selector lever to Drive.

You should read about 15 pounds pressure at a speed of fourteen to seventeen miles per hour. If the pressure is considerably higher than that it's an indication that the governor valve may be stuck open.

You see, with the governor valve stuck open, oil pressure would build up against the shift valve too soon . . . and zingo! The transmission would upshift too soon in relation to car speed and throttle opening.
To understand the hydraulic operation when the governor valve is stuck open, go back in your mind to what happens when the car gets under way. That’s when the rear pump begins to supply oil and build up the pressure. Now . . . the governor allows pressure against the shift valve to increase gradually. It’s the gradual build-up that’s important. At the proper car speed, then, enough pressure develops in the hydraulic system to move the shift valve.

Moving the shift valve, in turn opens a passage that channels oil under line pressure to the direct clutch and to the “off” side of the front servo. That, of course, causes the up-shift to take place.

You can see, therefore, that if the upshift comes in too early after the car starts forward, governor pressure is being applied too quickly through the governor. A governor valve stuck open could be the cause.
Clearing The Stuck Valve. When you're fairly sure the governor valve is sticking, the usual procedure is to remove the transmission extension housing and take the governor out for cleaning. But, you can often save time by using an “air-pressure” shortcut. In other words, just clean off the area around the governor pressure take-off plug and remove the plug. Also, cover the oil filler tube with a cloth to prevent loss of oil since you're going to blow air through the transmission.

Next . . . screw a piece of 1/8” pipe into the hole to help direct the air into the unit. And then put the compressed air nozzle at the other end of the pipe. As you apply short bursts of clean, filtered air to the passage, use a rubber hammer to tap the parking drum very lightly several times, just enough to jar the governor. Don’t use anything but a soft hammer!

After using this “air-pressure” shortcut, check the governor pressure again and see if you shook loose whatever was causing the governor valve to stick.

In case you’re rusty on governor pressure specifications, here’s a chart for your reference:
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<tr>
<th>CAR MODEL</th>
<th>GEARSHIFT POSITION</th>
<th>BRAKES</th>
<th>CAR SPEED</th>
<th>GOVERNOR PRESSURE</th>
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<tr>
<td>Chrysler Imperial</td>
<td>Drive</td>
<td>Off</td>
<td>14-17</td>
<td>15</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>24-27</td>
<td>45</td>
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<td></td>
<td></td>
<td></td>
<td>58-65</td>
<td>60</td>
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<tr>
<td>Chrysler New Yorker and New Yorker Deluxe</td>
<td>Drive</td>
<td>Off</td>
<td>14-17</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>25-28</td>
<td>45</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>60-67</td>
<td>60</td>
</tr>
<tr>
<td>De Soto V-8</td>
<td>Drive</td>
<td>Off</td>
<td>14-17</td>
<td>15</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>24-27</td>
<td>45</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>56-63</td>
<td>60</td>
</tr>
<tr>
<td>De Soto 6 and Chrysler 6</td>
<td>Drive</td>
<td>Off</td>
<td>12-14</td>
<td>15</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>22-26</td>
<td>48</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>46-53</td>
<td>60</td>
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<tr>
<td>Dodge V-8</td>
<td>Drive</td>
<td>Off</td>
<td>14-16</td>
<td>15</td>
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<td>23-27</td>
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<td>52-59</td>
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<tr>
<td>Dodge 6</td>
<td>Drive</td>
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<td>60</td>
</tr>
<tr>
<td>Plymouth</td>
<td>Drive</td>
<td>Off</td>
<td>12-14</td>
<td>15</td>
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<td></td>
<td></td>
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<td>19-23</td>
<td>45</td>
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<td></td>
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<td></td>
<td>41-48</td>
<td>60</td>
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Even if the governor pressure check shows that the compressed air freed up the governor valve, it’s wise to road-test the car for a few miles. That way you’ll be sure that whatever the air blew out doesn’t work itself back into the governor valve.

After all, the compressed air treatment is not a sure cure. It usually works in more than half the cases, however, and can be a time-saver. If it doesn’t work every time, all you’ve lost is the short time it took to do this compressed air job.
REMOVING THE GOVERNOR

If the air pressure method didn't free up the governor valve you'll have to remove the governor for cleaning. That calls for removing the transmission extension housing. To do that, first disconnect the propeller shaft and remove the parking brake. You'll find that the Flange Holding Tool (C-3281) and the Drum Puller (C-432) are two tools which make this job easier.
If the air pressure method didn’t free up the governor valve you’ll have to remove the governor for cleaning. That calls for removing the transmission extension housing. To do that, first disconnect the propeller shaft and remove the parking brake. You'll find that the Flange Holding Tool (C-3281) and the Drum Puller (C-432) are two tools which make this job easier.
But before you pull the transmission extension housing, be sure to remove the speedometer pinion. Otherwise, the nylon teeth on this pinion might be stripped as you pull the housing.

And just before you remove the rear engine support, use the Engine Support Fixture (C-3245) to hold the engine in the car.

Make This Simple Tool. Removing the governor valve involves a simple holding tool that you can make up in a few minutes. This tool keeps the reverse planet pinion carrier in place during removal operations. That prevents excessive clearance from developing in the planetary gear set which would permit the thrust washers to drop out of place in the transmission. If those washers drop out of place you'll have to disassemble the transmission to put them back in place.
All you need to make this tool is a piece of strap steel, 9" long, 5/8" wide, and 1/8" thick. Make a right angle bend in this strip about 3" from the end. Bend in the short end at about a 45° angle. In the 6" length, drill a 11/32" hole about 11/16" from the bend and elongate it slightly.

Before installing this holding tool, drain the transmission and remove the oil pan. Then, insert the 3" end of the tool at the rear end of the transmission so it will press against the reverse pinion carrier. Install and tighten the screw securely.

NOTE: Avoid excessive pressure on this holding tool as this will draw the governor body against the oil pump support housing and may damage the governor.
When you remove the extension housing retaining bolts, do not remove the output-shaft-support-to-transmission-case screw at the lower left corner. Removing this screw will let too much clearance develop between the direct clutch and kickdown planet pinion carrier. If the thrust washer were to drop out of place without your knowledge, it would cause extensive damage when the transmission was reassembled and then operated.

Use the puller (C-3282) to remove the extension housing.

Cleaning The Governor Valve Parts. Once the governor is removed from the output shaft and completely disassembled, clean all governor parts carefully in clean solvent. Blow them dry and set them on a piece of clean paper. Blow clean air through the passages in the governor body. Use short bursts of air. Avoid using a rag to wipe the parts as it's bound to leave lint on them.
Inspection comes next, so check the valve and body especially for score marks. Replace any parts that you find are scored, if you can’t polish out the marks with crocus cloth.

Check the valve lands carefully to be sure they’re not nicked or rounded. Make sure the valve works freely in the body before you reassemble the governor.

**INSTALLING THE GOVERNOR**

When installing the governor body on the output shaft and lining it up with the locating hole, tighten the locating screw to 45 inch-pounds. On the four governor body retaining screws, use a torque of 5 to 10 foot-pounds.
When you reassemble the governor weights, make sure the secondary weight moves freely in the primary weight. And, when you reassemble the governor valve and valve shaft in the body, use new valve shaft snap rings. There are two of them—one at the valve end, the other at the weight end of the shaft.

NOTE: Check the fit of the snap ring in the groove of the governor shaft before you assemble the valve to the shaft. If the ring doesn’t fit down into the groove you have a late-type ring which is .010” thicker than the original. So you’ll have to install a new shaft also, because the original size snap ring is no longer available for service.

Part numbers of these new parts are as follows:
1559114—Valve Shaft Snap Ring
1556082—Valve Shaft
Don’t forget to assemble the governor valve and valve shaft carefully. You have to be sure there are no burrs that can scratch the valve or bore. Just before you put the cleaned parts together, blow them dry with compressed air. Above all . . . never oil the governor parts. Oil picks up dirt. So, avoid it like the plague.

When you reinstall the extension housing, be sure to use a new gasket. In addition, carefully check the oil seal to be sure it is in good condition. If there’s any question about its serviceability, play it safe and replace it with a new one. Install the Guide Studs (C-3283) in the case to guide the extension into place. Use Installing Tool (C-496) and Adapter (C-3284) to draw the extension against the support. Tighten the retaining bolts 25 to 30 foot-pounds.

Apply a coating of lubricant on the teeth of the nylon speedometer pinion. After installing the pinion, tighten the retaining sleeve to a torque of 40 to 45 foot-pounds.

By the way . . . before installing a new oil seal, lubricate the extension housing with Automatic Transmission Fluid, Type A. That provides initial lubrication. Use Driver (C-3204) to seat the oil seal.

Complete the assembly by installing the rear engine crossmember, the parking brake, and reconnecting the propeller shaft.
OTHER CAUSES OF SHIFT FAILURE

In addition to the governor valve sticking open, it could also stick in the closed position, resulting in failure to upshift at all. This condition can be corrected as already outlined for a valve stuck open.

Also, if the governor pressure checks okay, but the transmission doesn't upshift, or upshifts at incorrect speeds, you'd better take a look at the shift valve. If you find that the shift valve is sticking, you'll have to remove the valve body to clean the valve.

After the engine has operated long enough to reach normal running temperature, the oil level in the transmission will have risen to the "F" mark on the dipstick. So, when you refill this transmission you just drained, add oil only to the "L" mark.

CHECKING OIL LEVEL

There's about a one-quart expansion in transmission oil between room temperature and normal operating temperature. So, if oil were added to bring the level up to the "F" (full) mark on the oil level indicator, it would rise above the full mark when the oil reached normal operating temperature.

So, here's how to check transmission level. With the transmission at room temperature (70°) and the engine idling, the transmission oil level should be at the "L" (low) mark on the dipstick. If the oil is below this mark, add enough oil to bring it up to the "L" mark, but no higher.

THROTTLE PRESSURE

Getting back to an early upshift condition again, suppose your check of throttle pressure failed to produce that sudden rise in pressure as engine speed was increased. In short... suppose the trouble wasn't with either the governor or the shift valve, but was due to lack of throttle pressure.

This condition can be caused by interference in the linkage on the valve body which prevents the throttle valve from working properly. If you find this to be the trouble, you'll have to get the valve body out and look it over.

First, inspect the shaft, levers and linkage on the left side of the valve body for freedom of movement. Work the throttle valve cam back and forth, and see if the cam contacts the roller in the operating lever. The increase in throttle pressure comes about as the control lever rotates the throttle valve cam. The cam, in turn, operates against the roller in the operating lever.
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As the cam rotates, it moves the cupped end of the lever down. That compresses the spring against the throttle valve.

So, as you move that cam back and forth, make sure that the cam face is in constant contact with that roller.

If you find that you’re not getting that constant cam contact, sight along the outer surface of the operating lever. There’s got to be clearance between this lever and the hub of the manual valve lever assembly as the “OFF” area of the cam face touches the roller. If there’s not enough clearance at the crowned section of the operating lever, the roller will be held away from the cam. And if you find a case like this, you’d have to remove the operating lever.
To remove that lever, just unscrew the adjusting screw while you hold the other end of the lever down. Be careful as you do this or that spring and spring retainer might pop out. You sure don’t want to lose these important parts!

Now, replace the old operating lever with a new one from stock. New levers are easily identified because the roller pin has been relocated to lower that raised section that causes the interference.

If you don’t happen to have a new lever in stock, rework the old lever by grinding the crown section down enough to provide the necessary clearance.

**CAUTION:** If you find you have to grind down a manual valve operating lever, be extra-sure you clean it up carefully. Metal grindings inside the valve body can cause serious damage!
Reassembling The Valve Body. When installing either a new or reworked lever, be sure that the spring retainer is in place in the cupped part of the lever. Unless that spring is properly compressed when the lever moves down, the throttle valve won’t operate correctly.

Use the Throttle Adjusting Screw Wrench (C-3279) to install the throttle valve adjusting screw. Turn the adjusting screw into the valve body until there’s $1\frac{11}{16}$" between the end of the screw and the valve body. This is a preliminary setting. You’ll probably have to readjust the throttle valve when you button up the job.

Finally . . . check the lever operation to be sure that the cam makes proper contact with the roller. Remember that there should be enough clearance so that the cam and roller stay in constant touch with each other when the lever is moved downward. Once you’re sure the cam and roller are in constant contact, you may put the valve body back into the transmission, install the oil pan and refill the unit.
STARTING MOTOR WON'T OPERATE

Occasionally you may have a case when the starting motor won't turn to crank the engine. This is a condition that sometimes pops up even though the selector lever is in neutral. The neutral switch may not close properly for some reason, and the starting motor won't work. This condition is apt to show up when the transmission's cold, but it could happen any time.
Now, this might be caused by an outright switch failure, but that’s a rare possibility. A possible cause is that the manual valve lever arm might be bent. Another possible cause is that the switch gasket might be too thick. Either condition would keep the lever arm from contacting and depressing the neutral switch ball enough to complete the circuit inside the switch.

In addition to those possible causes, there’s also a chance that the transmission case might not be spot-faced deeply enough. That, naturally, won’t let the neutral switch enter to its proper depth. All of these conditions are worth checking into.

What you do, of course, is check over the gearshift linkage first. You have to be sure that the manual control lever is doing what the selector lever calls for.

CAUTION: Before you do anything with the neutral switch, be sure the selector lever is in neutral! Better still, pull the high tension wire out of the coil. If the engine should start, somebody might get hurt! You can’t be too careful on this operation.

Now, pull the two neutral switch wires out and connect them together. Next, turn the ignition to “start.”
If the starting motor works, it means that when the manual valve lever moves to neutral, the ball isn’t being depressed enough to complete the electrical circuit in the neutral switch. That could mean a faulty switch.
So test the switch by putting it in the back-up switch spot. Move the selector to reverse. If the back-up lights work, the switch is okay. You’d check next for a bent manual valve lever arm.

If the manual valve lever arm is bent, it won’t contact the ball squarely and will slide to one side of the ball during operation.
A bent manual valve lever arm can slide out of position so far, the pin on the arm will slip out of the lands on the manual valve!

To check for a possible bent arm, stick your finger through the switch hole and feel if the lever is in the center. Or . . . by using a mirror and flashlight, you can see if the arm is straight and in position.

If you do happen to find a bent lever arm, you'd have to remove the valve body from the transmission and straighten the arm. One thing you want to be sure about is that the pin is *fully engaged in the lands* . . . with just enough clearance so no side thrust can be exerted to spring the manual valve.
If the lever arm is straight, and the switch just isn't going in far enough, that points to a transmission case not spot-faced deeply enough. Best thing to do in this case is to replace the gasket with a thinner one. If you don't have a thinner gasket, you can make one from brass or copper shim stock that's about .010" thick.

One word of caution, however . . . you never want to get that neutral switch into the transmission case too far. You see . . . a switch in too far will cause hard shifting. So, after installing the thinner gasket be sure to test the transmission for ease of shifting.

NEW TOOL FOR ADJUSTING KICKDOWN BAND

There's a new tool (C-3380) for adjusting the kickdown band of the PowerFlite transmission. It was designed for use on those models which have no access plate in the floor pan, but can be used on all models equipped with the PowerFlite transmission.
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USE THE NEW TECH QUESTIONNAIRE
FOR SESSION NO. 77
WHEN RECORDING YOUR ANSWERS
to these ten questions

The PowerFlite upshifts when governor pressure on one side of the shift valve gradually overcomes throttle pressure on the other side.

When throttle pressure doesn’t hold the shift valve in its downshift position until normal upshift speed is reached, there’s an early upshift.

When refilling or adding fluid to the transmission, always fill to the “F” (FULL) mark on the oil level indicator.

Incorrect throttle pressure may point to linkage interference on the valve body, which keeps the throttle valve from working properly.

Throttle pressure should increase suddenly as the control lever rotates the throttle valve cam and depresses the roller in the operating lever.

A neutral switch gasket too thick, or a transmission case not spot-faced deeply enough, won’t affect transmission operation.

To test the neutral switch, put it in the back-up switch spot, move the selector to “reverse” and see if the back-up lights work.

During rapid acceleration, automatic upshift in PowerFlite should take place between 10 and 15 mph.

Governor pressure should be about 15 pounds at an engine speed of 14 to 17 mph, with the rear wheels turning.

When assembling the governor valve, be sure the snap rings fit into the grooves on the shaft.