TORQUEFLITE TRANSMISSION:
PRE-REMOVAL DIAGNOSIS

MASTER TECH
SERVICE
CONFERENCE

SERVICE AND PARTS SALES DIVISION

CHRYSLER CORPORATION
PRE-REMOVAL DIAGNOSIS . . .
YOUR ROLE IN THE TORQUEFLITE STORY

Throughout the years Chrysler's TorqueFlite transmission has maintained a reputation as one of the best transmissions in the automotive industry. This reputation of excellence still holds true today. Precise engineering, design features, fine workmanship, and effective quality control are combined to produce TorqueFlite excellence.

But where do you enter the story? We've termed it "pre-removal diagnosis." It consists of the few simple checks and adjustments you perform to a TorqueFlite when investigating a transmission complaint. This pre-removal diagnosis determines if the transmission must be removed from the vehicle for either exchange or reconditioning. Therefore it's important that your diagnosis be correct in order to avoid any unnecessary and costly exchanges or repairs.

The pre-removal diagnosis procedure covered in this session concerns transmissions which are fully operable but with the owner having a shift quality, shift timing, or transmission slip-page complaint.

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PRE-REMOVAL DIAGNOSIS PROCEDURE

POOR SHIFT QUALITY
Poor shift quality can result from a variety of conditions, internal or external. For example, you may find the fluid level too high or too low, throttle linkage improperly adjusted, a clogged filter, sticky spool valves or governor valve, and so on. In all cases, it is good practice to correct any external conditions before you get inside the transmission. Remember that, if not corrected, any condition which causes poor shift quality will lead to clutch or band failure.

POOR SHIFT TIMING
Poor shift timing includes conditions like delayed upshift, runaway upshift, and no kickdown or coasting downshift. Here again the cause may be internal or external, but improper throttle linkage adjustment should be high on the suspect list. Early upshifts tend to feel mushy, while late upshifts are harsh. Like poor shift quality, poor timing can also shorten part life.

TRANSMISSION SLIPPAGE
This complaint usually has an internal cause and can be solved by either adjusting the kickdown band or the low and reverse band. But transmission slippage may also be tied in with poor shift timing and quality, and can be remedied by solving those complaints. This is where proper testing becomes a factor.

IMPORTANCE OF TESTING
When you receive any of these complaints, the remedy can sometimes be as simple as a fluid level adjustment or as involved as a teardown. Experience shows that external checks and tests before a teardown often save time and help to pinpoint the problem. Testing can also check out your corrections to help you avoid comebacks.

YOU'RE THE EXPERT
Unfortunately, repair order instructions are sometimes vague and may not give any clues as to the probable cause. Discussing the complaint with the owner is usually helpful but at times it can be misleading. This is especially true when a transmission performance complaint is actually caused by the excessive throttle opening required by a poorly tuned engine. In many instances you may have to depend entirely on your own trouble-shooting procedure to determine the problem.

FOLLOW A REGULAR PROCEDURE
At times you may recognize the complaint condition from past experience and probably guess the cause and its cure. But when there is any doubt, the general procedure should be to properly check the fluid level and condition, and the adjustment of both the gear selector and throttle linkage. Then run a road test to see if the condition is corrected. If it still exists, run a governor pressure test before you decide to remove the transmission for either exchange or reconditioning.
FLUID LEVEL CHECK

Always check fluid level with the engine at idle speed and the transmission at operating temperature so the fluid will be fully expanded. And to be certain of an accurate level reading, make sure all circuits are filled by momentarily moving the selector to each drive position, with the brake applied, of course. Check the level with the selector in Neutral, because the converter fills more slowly when in the Park position.

The fluid level is OK if it is between the FULL and ADD ONE PINT marks on the dipstick. Always be careful to avoid getting any contaminant into the fluid through the fill tube.

FLUID LEVEL AFFECTS OPERATION
Proper fluid level is essential in providing the correct hydraulic pressure needed to operate the clutches and bands. If the level is low, the pump draws in air which produces a spongy fluid, resulting in low hydraulic pressure. This condition allows clutches and bands to slip, causing overheating and premature wear.

Too high a fluid level causes the gears to churn up foam, which results in the same sponginess and slipping produced by too low a fluid level. In either instance, air in the fluid, causing clutch slipping and overheating, can produce a sticky varnish coating which can gum up valves, pistons, and other moving parts.

CHECK BELLHOUSING COVER FOR FLUID
When the level is high, fluid can pass through the pump housing vent and down to the bellhousing cover where it can be mistaken as the result of a front pump seal or gasket leak.

In these cases, make sure the bellhousing cover is the only place where fluid is leaking by carefully inspecting the transmission for any other leaks.

When you have what appears to be a bellhousing leak, use the following for correct diagnosis. First, properly check the transmission fluid level, then raise the vehicle on a hoist and remove the bellhousing cover.

OVERFILLED TRANSMISSION MUST BE DRAINED
If the fluid level was too high when you checked it, now is the time to lower it. With the bellhousing cover off, rotate the crankshaft until the converter drain is at its lowest point.
Fig. 4 — Improper fluid level allows clutches and bands to slip.

Remove the drain plug and allow between one and two quarts of fluid to drain into a clean container. After you’ve drained this portion of the fluid, reinstall the drain plug and torque it to 90 inch-pounds.

CLEAN INSIDE THE BELLHOUSING
Wipe the inside of the bellhousing to remove the remaining fluid and reinstall the bellhousing cover. After lowering the vehicle on the hoist, check and adjust the transmission fluid level as necessary. If you drained out too much fluid, you may reuse the drained fluid, providing it is clean and not contaminated.

CHECK DIPSTICK LENGTH
Although it doesn’t happen often, a short dipstick may have been inadvertently installed on a transmission during production. This will cause a low fluid level reading because the dipstick does not extend into the oil pan properly. If fluid is added to reach the correct level on the short dipstick, we have an overfill condition, which results in fluid accumulation in the bellhousing. Compare the suspected dipstick with one known to be correct, and replace if necessary.

FLUID CAN INDICATE PROBLEMS
When checking the fluid level, be sure to examine the fluid condition. A sticky residue on the dipstick is an indication of varnish in the system, especially inside the valve body. Sludge deposits on the dipstick can be formed by water, glycol, or by other contaminants which have entered the transmission. Milky fluid on the dipstick is usually a sign of a coolant leak. If you decide to drop the pan to investigate or perform a cleanout job, be sure to change the filter to avoid further problems.
Fig. 5 — Use only Dexron® type fluid.

USE ONLY DEXRON®-TYPE FLUID
When adding or refilling a transmission, be sure to use only Chrysler-approved Dexron®-type fluid. Using other types of fluid may result in premature transmission failure.

3 GEAR SELECTOR LINKAGE ADJUSTMENT

Assuming the fluid level is okay, check the gear selector linkage setting and adjust if necessary. In Neutral, the selector lever should position the manual valve so that both the Drive and Reverse ports in the valve body are cut off from line pressure.

VALVE MUST BE CENTERED
When the linkage is not properly adjusted, it positions the manual valve off-center, opening one of the ports to line pressure. This can cause creeping or clutch slipping, depending on how far the valve is misadjusted.

SLIPPING WITHOUT CREEPING
Remember that only a slight variation in the selector linkage setting can displace the manual valve far enough to cause partial clutch engagement when in Neutral, which allows slipping without causing the vehicle to creep initially. Because this condition can go undetected, unnecessary wear of friction material will occur if this slipping continues. You can minimize this problem by checking the selector linkage adjustment when the vehicle is in for periodic servicing.

IT'S EASY TO CHECK
Checking the gear selector linkage adjustment is easy because normal operation of the starter safety switch coincides with correct positioning of the manual valve. With the selector lever in Park, check to see if the starter cranks. Then move the lever to the Neutral position and again try to crank the starter.

Fig. 6 — Off-center manual valve causes creeping.
**MOVE THE SHIFT LEVER TO THE REAR**

If an adjustment is needed, position the selector lever in Park and then loosen the adjustment swivel lock screw. Make sure the swivel block slides freely on the shift rod by moving it. If excessive friction hampers free swivel movement, clean or repair the swivel so preload spring action can properly take up free play in the linkage.

Now you're ready to set the linkage. Move the selector lever fully to the rear, or Park, position and then torque the adjustment swivel lock screw to 90 inch-pounds. Recheck your adjustment by cranking the starter in Park and then in Neutral.
THROTTLE LINKAGE ADJUSTMENT

A REVIEW OF THE BASICS

Before we discuss the actual procedure for setting the transmission throttle linkage, let's quickly review the effects of transmission throttle pressure and governor pressure on the shift valves.

In normal upshifting operation, transmission throttle pressure increases as the carburetor throttle is opened. Throttle and spring pressure hold the shift valves to the left prior to upshift movement.

As governor pressure increases with vehicle speed, it overcomes spring pressure and/or throttle pressure and moves the 1-2 and 2-3 shift valves to the right, in turn, to cause the upshifts at the proper time and correct sequence.

In normal coasting downshifts, governor pressure gradually drops as the vehicle slows. This allows spring pressure to move the shift valves to the left, causing the transmission to downshift.

The balance between governor pressure and throttle pressure on the shift valves is a very important factor in controlling shift timing, as is the free movement of the valves. All the valves, incidentally, must be clean and free of foreign material to operate properly.

LINKAGE SETTINGS PLAY AN IMPORTANT ROLE

Another important factor to consider is line pressure — the pressure which applies the clutches and bands. At closed throttle, line pressure ranges between 54 and 60 PSI, and at wide-open throttle, line pressure is between 90

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Fig. 12 — Governor pressure moves shift valve to the right.

Fig. 13 — Throttle pressure moves shift valve to the left.

Fig. 14 — Line pressure increases with throttle opening.
Fig. 15 — Throttle pressure is too high for a given car speed.

Fig. 16 — Throttle pressure is too low for a given car speed.
and 96 PSI. Line pressure increases with carburetor throttle opening because more force is required to keep the clutches and bands from slipping as more engine torque is applied to the transmission.

For proper shift timing and shift quality, it is essential that both the accelerator linkage and throttle linkage settings be accurate to keep line pressure and, in turn, throttle pressure correct for any given car speed.

**HIGH PRESSURE DELAYS UPHIFTS**

If the throttle linkage is set too long, it opens the transmission throttle valve more than it should for a given car speed. Throttle pressure at the shift valves is then higher than normal, so more governor pressure is needed to cause upshifting. As a result, upshifting is delayed.

Because higher vehicle speeds are required to increase governor pressure, upshifts will be delayed and harsh.

Since the upshifts take place at higher car speeds, the resulting higher than normal pressures also make part-throttle kickdown operation very sensitive and annoying to the driver.

**PRESSURE VARIES WITH TRAVEL**

Where linkage is set too short, the transmission throttle valve opens less than it should for a given car speed. The lower than normal throttle pressure permits early upshifts which occur at relatively low speeds and tend to be mushy. The low throttle pressure may permit slippage and some engine speed flare-up during the 2-3 upshift. A short linkage setting can also prevent full-throttle kickdown action.

![Image of vehicle engine with a man adjusting settings](image)

**Fig. 17 — Adjust curb idle speed to specifications.**
DRIVEABILITY IS ALSO AFFECTED
Early and mushy transmission upshifting can be mistaken for an engine surge condition. Although surging usually results from lean mixtures, don’t overlook throttle linkage adjustment as a possible cause.

ENGINE PERFORMANCE IS VERY IMPORTANT
Engine performance is directly related to throttle linkage operation. If engine output is below par, it could have the same effect on transmission operation as improperly adjusted throttle linkage.

ADJUSTMENT OBJECTIVE
Now that we’ve covered the basics and what happens when linkage setting is incorrect, let’s cover the proper procedure for setting the linkage. The objective is to have the throttle lever in a forward position against the internal stop to establish a starting point for the adjustment. Throttle linkage must be adjusted properly so that the throttle lever at the transmission will move in unison with the accelerator linkage.

CHECK THE ACCELERATOR LINKAGE
It is essential that both the accelerator linkage and the transmission throttle linkage settings be accurate for good shifting. Check the accelerator linkage to make sure the carburetor throttle lever can move to the full open and full close positions. Check your Service Manual for details on making this adjustment.

Incidentally, if the carburetor has a curb idle solenoid, you must turn the ignition on so the solenoid stem will be extended and the throttle will actually be in the curb idle position.

CHECK AND ADJUST IDLE SPEED
With the engine at operating temperature and the carburetor off the fast idle cam, adjust the idle speed to the correct specifications. For 1977 vehicles, follow the propane-assisted idle adjustment procedure for setting curb idle.

LOosen THE SWIVEL
With the accelerator linkage operation checked and curb idle properly adjusted, stop the engine and raise the car on the hoist so you can loosen the linkage swivel lock screw. Slide the swivel back and forth to make sure the preload spring action moves freely. If the spring action hangs up, clean or repair the assembly so it can move freely.

MAKE THE ADJUSTMENT CAREFULLY
Now you’re ready to set the linkage. Pull the transmission throttle lever forward and hold it firmly against its internal stop while you push the rod through the swivel, letting the spring take out the free play. Torque the lock screw to 100 inch-pounds as you hold the lever in forward position.

Fig. 18 — Hold throttle lever against internal stop.

SPRING ELIMINATES FREE PLAY
With the linkage adjusted properly, all free play is removed by the preload spring and the throttle lever should move in unison with the accelerator linkage.

Fig. 19 — Throttle lever moves in unison with accelerator linkage.
ROAD TEST

After checking the fluid and linkages, road-test to see if the shift complaint has been solved. Take along a pad and pencil to jot down helpful information pertaining to shifting variations and upshift and downshift speeds.

KICKDOWN BAND ADJUSTMENT
With a customer complaint of a harsh or erratic one-two upshift check the kickdown band adjustment.

The kickdown band adjusting screw is located on the left side of the transmission case. After loosening the lock nut, back it off approximately five turns and see if the adjusting screw turns freely. Now, using Tool C-3380-A with adapter C-3705, tighten the band adjusting screw to 47-50 inch-pounds. If adapter C-3705 is not used, then tighten the adjusting screw to the true torque of 72 inch-pounds.

Back off the adjusting screw the specific number of turns as listed in the Service Manual under "Specifications" for the particular transmission you're adjusting. Hold the adjusting screw in this position while you tighten the lock nut to 35 foot-pounds.

ENGINE OUTPUT AFFECTS SHIFTS
As mentioned before, engine performance can affect both shift quality and shift timing. Low engine output usually requires the gas pedal to travel farther than normal when accelerating or cruising.

This action, in turn, moves the transmission throttle valve more than normal. As a result, the driver experiences delayed and harsh upshifting similar to that caused by an extended throttle linkage setting, even though the linkage is set correctly.

If you encounter a vehicle with a shift timing or quality complaint that has an out-of-tune engine, first do a tune-up and take it for a road test. You may find that the trouble was in the engine instead of in the transmission.

Fig. 20 — Engine performance is vital for good shifting.
If engine performance and throttle linkage adjustment are okay but shift timing is still poor, check the governor pressure. Raise the vehicle and attach a 0-100 PSI pressure gauge (Tool C-3792) to the governor pressure take-off point located at the lower left side of the extension housing near the mounting flange.

**WITH SURE-GRIP, BOTH WHEELS OFF FLOOR**

Where the vehicle has a Sure-Grip differential, make sure both wheels are off the floor and free to turn before operating the transmission. Also remember that when only one wheel of a conventional differential axle is turning, it spins at double the speedometer reading.

**RUN THE TEST**

If you find it easier, use a helper to operate the vehicle while you record the pressures. Start the engine and operate the vehicle with the gear selector in Drive. Depress the gas pedal and hold at the specified MPH ranges while you record the governor pressure.

Governor pressure tests must be made with the throttle linkage connected; otherwise, line pressure will not increase with carburetor throttle opening.

When the wheels have stopped, governor pressure should return to 0 to 1½ PSI. If govern-

**CHECK YOUR READINGS AGAINST SPECS**

Compare the readings taken at the shift speeds listed in the Service Manual for the particular vehicle you're testing. If governor pressures are incorrect, the governor valve and/or weights are probably sticking.

**GOVERNOR ASSEMBLY SERVICE**

If you suspect a sticking governor assembly, remove the extension housing and clean or replace the assembly. On new vehicles you may find that thorough cleaning will take care of the problem.
UNIT EXCHANGE PROGRAM

INCLUDES VALVE BODY
After you have completed the governor pressure test and performed any necessary governor valve service, check the operation with a road test. If the shift quality problem is uncorrected, clean and service the valve body assembly. Then road-test again and if the problem remains, pull the transmission for an exchange or reconditioning. Of course, all warranty transmissions if found defective, are to be exchanged.

you are now ready to remove the transmission. After you pull a transmission, always check the converter hub for any nicks or sharp edges which may have damaged the bushing.

DRAIN IT COMPLETELY
Before you return a transmission for exchange, make sure you completely drain the fluid to prevent damage to the shipping container and other freight on the carrier. And another important reminder — be sure to properly fill out all the paperwork to avoid any delay in crediting your account. This information also makes the rebuilding job much easier for the repairmen.

Fig. 24 — Valve body assembly can be serviced or exchanged.

CHECK THE CONVERTER HUB
If you have followed the pre-removal diagnosis procedure and the shift problem still remains,

Fig. 25 — Make sure you properly fill out all the paperwork.

A FINAL THOUGHT
Following the pre-removal diagnosis procedure covered in this session can help you determine if a transmission should be removed for either exchange or reconditioning. This procedure enables you to eliminate unnecessary exchanges and costly comebacks, and saves you both time and money. And let's not forget the most important consideration — it keeps your customer's confidence.
### CLUTCH AND BAND APPLICATION CHART

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<th>LOW (D)</th>
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<th>SECOND</th>
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<th>REVERSE</th>
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<td>(Breakaway)</td>
<td>(Manual)</td>
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<td>REAR CLUTCH</td>
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<td>FRONT CLUTCH</td>
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<td>KICKDOWN</td>
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<td>REVERSE BAND</td>
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### AUTOMATIC SHIFT SPEEDS AND GOVERNOR PRESSURE CHART
(APPROXIMATE MILES PER HOUR)

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<th>Carline</th>
<th>HN</th>
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*Governor pressure should be from zero to 1.5 psi at stand still or downshift may not occur.

NOTE: Figures given are typical for other models. Changes in tire size or axle ratio will cause shift points to occur at corresponding higher or lower vehicle speeds.
Test Questions

INSTRUCTIONS: The first three questions are multiple-choice type. Circle the letter in front of the statement which you think is correct. For example, if your choice in question number 1 is C, put a circle around it, like this C. Questions 4 through 10 are TRUE OR FALSE type. Put a mark after TRUE if you think the statement is correct. Put a mark after FALSE if you think the statement is incorrect. Be sure to write your name in the space provided. After completing the quiz, turn it in to your Meeting Leader.

1. Shift timing and shift quality complaints can result from several conditions, but in all cases the first item to check should be:
   A. Throttle linkage setting
   B. Governor pressure
   C. Fluid level and condition

2. If the gas pedal is pushed down farther than normal to compensate for low engine output, the transmission throttle valve moves:
   A. More than normal causing late upshifting
   B. More than normal causing early upshifting
   C. Less than normal causing early upshifting

3. You should always check fluid level in the following manner:
   A. Engine at idle speed and selector in Park
   B. Engine off and selector in Drive
   C. Engine at idle speed and selector in Neutral

4. An out-of-adjustment gear selector linkage can cause partial clutch engagement when in Neutral, which allows slipping but without the vehicle creeping.

   TRUE □ FALSE □

5. To set the gear selector linkage properly you should move the shift lever at the transmission all the way forward and torque the adjustment swivel lock screw.

   TRUE □ FALSE □

6. Too short an adjustment of throttle linkage increases throttle pressure too much causing early upshifts, which tend to be mushy.

   TRUE □ FALSE □

7. Low engine output could have the same effect on transmission operation as an improperly adjusted linkage.

   TRUE □ FALSE □

8. Performing the throttle linkage adjustment correctly involves pulling the transmission lever forward and holding it firmly against its internal stop.

   TRUE □ FALSE □

9. Incorrect governor pressures indicate that a linkage adjustment is necessary to correct the shift complaint.

   TRUE □ FALSE □

10. Checking the gear selector linkage adjustment is simple because normal operation of the starter safety switch coincides with the correct positioning of the Manual valve.

    TRUE □ FALSE □

NAME ________________________________