Most TorqueFlite service jobs boil down to correcting shift pattern or shift quality irregularities. By comparison, failures that are purely mechanical in nature are few and far between. What's more, most mechanical failures could be avoided if minor shift and performance problems were properly diagnosed and corrected early enough. That's why this reference book is pretty much confined to understanding and troubleshooting TorqueFlite transmissions.

Don't ever underestimate the importance of checking the obvious things first. After all, there are only five important service adjustments in the entire transmission—

- Fluid Level and Condition
- Shift Control Cable
- Transmission Throttle Linkage
- Kickdown Band
- Low and Reverse Band

... if these adjustments were properly maintained, considerably fewer TorqueFlites would have to be overhauled or rebuilt.

Road-testing to identify the exact nature of the transmission problem is also mighty important. It will help you narrow the trouble down to one of the clutches or bands and you'll have the diagnosis part of the problem half licked. You can then concentrate on the things that might cause that one band or clutch to act up. Here's where it is important to have a practical working knowledge of TorqueFlite hydraulics.

Understanding what each hydraulic unit is designed to do will help you use road and pressure test clues to pinpoint the most probable cause of trouble. So take time to read this reference book. You'll have a better understanding of TorqueFlite hydraulics after the reading of it, Lad!
PRELIMINARY TESTS AND ADJUSTMENTS

UNDERSTAND IT AND THINK!

Understand the operation of the TorqueFlite transmission. *Think* about what's going on while you're testing it out. These are the keys to TorqueFlite diagnosis. This doesn't mean that you have to know which way each pinion gear is turning, or how the power is flowing, or what's going on in every fluid passage every second. From a practical standpoint, you're primarily interested in understanding what happens to cause the kind of problems you'll be called on to troubleshoot.

Most TorqueFlite problems involve slippage, shift quality, or shift timing. If a band or clutch doesn't hold, you have slip. If the valves controlling shift timing and shift quality don't do their jobs properly, you have shift problems. So what do you really have to understand? Just which friction members are applied in the different gears and *generally* what part each hydraulic system component plays in applying the friction members.

NO SHORT CUTS, PLEASE

You'll save time and improve your troubleshooting batting average if you follow a logical and orderly diagnosis plan. *Don't* try short cuts and *do* cover your diagnosis steps in the right order:

- Fluid level and condition
- External adjustments
- Road test
- Pressure tests (and possibly air tests)

And most important of all, *think!* Think about what's happening in the hydraulic system, and what each diagnosis step is telling you.

FLUID MAINTENANCE

Many hydraulic system problems are caused by improper fluid maintenance. You may find this hard to believe, so let's see just what kind of trouble poor fluid maintenance can get you into, remembering that the fluid has two important functions — *transmitting force* and lubrication.

LOW FLUID LEVEL

If the fluid level is low, the pumps are starved, and air can be taken in with the fluid. Starving the pumps causes a condition called cavitation, and its characteristic is a whining pump noise. Cavitation also can actually erode away metal in the pump—metal that can get into the valves and cause sticking and wear.

The most noticeable thing about starving the system is that pressure doesn't build up rapidly enough. So you have slow engagement in drive and reverse, and on upshifts there is slip, followed by a bump as the shift is completed. Slip leads to friction material wear of the band and clutches. In addition, a starved pump can't provide proper lubrication, so wear is accelerated.

HIGH FLUID LEVEL

High fluid level is just as bad. The gear train churns the fluid up and mixes air in it, causing foaming. Some symptoms of this condition are pump noise, governor buzz, and fluid blowing out of the transmission. The foam is compressible, so again pressure buildup is delayed, resulting in slow engagement and "slide-bump" shifts.

Fig. 1—Systematic diagnosis

MyMopar.com
Air in the fluid speeds up oxidation or breakdown of the fluid. If it isn’t detected and corrected soon enough, varnish is formed. *This can happen on a low-mileage transmission.*

**FLUID LEVEL AND CONDITION**

The first step in troubleshooting is to check the fluid level, and the condition of the fluid. *Always* do this before you do anything else with an ailing transmission. As a matter of fact, on every routine fluid level check, examine the fluid for any signs of breakdown or foreign material. While the factory fill is good for car life under normal use, severe conditions or neglect are another story. If the fluid looks like it needs changing, tell the customer and correct the condition before any real damage is done.

**CORRECT FLUID LEVEL MEASUREMENT**

Often fluid level is incorrect because someone didn’t know how to check it. So be sure you do it right. Make sure the fluid is at operating temperature. Run the transmission through all ranges to be sure the clutch and servo systems are full. Then check the fluid level. It should never be above FULL and never below ADD ONE PINT.

**DIPSTICK IDENTIFICATION**

Occasionally, there’ve been cases where someone put the wrong dipstick in a TorqueFlite, and so there was a false fluid level indication. If your road test finds symptoms of the wrong level but the stick checks okay, make sure you have the right dipstick. It’s easy to do. Just measure the length from the top of the cap to the tip of the indicator.

**THE FILTER IN THE PAN**

If you’re sure the fluid level is correct but the system seems starved, there’s one other possibility you shouldn’t overlook. Although it isn’t probable, it is possible to have a clogged filter on 1964 models. Fluid in the pan has to pass through the filter to get to the pumps, and a clogged filter just won’t let it through. Investigate this possibility if you get very slow engagement in reverse.

**HOW ABOUT FLUID CONDITION?**

If the fluid is discolored, you probably have an overhaul job. Black fluid with a burned smell means a friction member is burned. Varnish on the dipstick tells you that the fluid has broken down, and the valves, servos and clutches are undoubtedly coated with varnish, too. If you find either condition on a shifting or slip complaint, you might as well pull the pan right away to see what’s inside. Varnish or friction material throughout the system means that nothing but a complete cleaning will put the transmission back in order.

Milky-looking fluid means that engine coolant has leaked into the transmission. If you catch this before any damage is done, you might get away with fixing the cooler leak and changing the fluid. But glycol attacks the band and clutch friction material, and some seals, so if it’s been in very long, an overhaul is needed. You can judge what’s needed by how the transmission acts when you drive it and what you find in the pan.
Remember that any time you change the fluid, you should clean the pan, blow out the cooler lines and install a new filter.

**IDENTIFY THE COMPLAINT**

If the fluid is clean, correct the fluid level, if necessary. Then, go for a ride with the owner so he can demonstrate what his complaint is. Sometimes you will have cured the trouble by adjusting fluid level.

**ENGINE PERFORMANCE IS IMPORTANT**

Don't overlook the possibility of a poorly tuned engine causing delayed, harsh upshifts. If the engine output is low, more gas pedal travel is needed to accelerate, and this raises throttle pressure. You don't want to adjust the throttle linkage to compensate for poor engine tuning. As your old buddy Tech says, two wrongs don't make a right. If the engine needs tuning, sell the customer a tune-up. If the engine is okay, your next step is seeing if the trouble can be corrected by external adjustments.

**THROTTLE LINKAGE**

Correct throttle linkage adjustment is a must on all shifting complaints. A lot of people who wouldn't consider taking their automatic transmissions anywhere but the dealership for service think nothing of having their engines tuned at the corner gas station. The transmission throttle linkage should be adjusted after every engine tune-up, but unfortunately, it often gets misadjusted instead.

If the misadjustment raises throttle pressure, upshifts are delayed and harsh. If it lowers throttle pressure, upshifts are early and there is liable to be slip, resulting in a burned front clutch or kickdown band.

So do adjust the throttle linkage before you get into other tests; otherwise further tests won't mean anything.

**SHIFT CABLE**

The shift cable adjustment has to be right, too, or all kinds of strange things can happen. The manual valve is not a metering valve, but if it's positioned wrong, it can restrict fluid going to the system the driver selected. Or it can even direct line pressure into two systems at once.
The neutral position of the valve is between reverse and drive breakaway. If the adjustment is off far enough, line pressure in neutral may be open to one of these systems. Any time the car creeps in neutral, the cable is badly misadjusted.

Usually the adjustment isn’t off that far. It can be off just a little and meter just enough pressure to delay engagement of a clutch, which will slip and burn out if the condition isn’t corrected.

**TESTING SHIFT CABLE ADJUSTMENT**

You can see if the shift cable adjustment is okay without putting the car on a hoist.

*Push-button models:* Put a good right foot on the brake pedal and push the DRIVE button. Hold the ignition key in the START position.

While keeping finger-pressure on the DRIVE button, gradually shift out of drive into NEUTRAL. The engine shouldn’t crank until the neutral button is all the way in. Repeat the procedure, shifting from REVERSE to NEUTRAL. If you have to push the NEUTRAL button the same distance both times, the cable adjustment is okay. If not, put the car on a hoist and correct the adjustment.

*Console models:* This test is even easier. Just move the shift lever slowly from DRIVE to NEUTRAL and then from REVERSE to NEUTRAL. The engine should crank when you feel the shift detent bottom. And don’t forget—if you have to adjust the cable on a console model, it must be adjusted with the transmission in LOW. Push-button models must be adjusted with the transmission in REVERSE.

**ROAD TEST AND INTERPRETATION**

After you’ve made sure the fluid level, throttle linkage and shift cable adjustments are okay, you’re ready to road-test the car. Even though you’ve already found and corrected the cause of the trouble, you want to test the transmission to be sure the cause of the complaint has been eliminated. If you haven’t found the trouble, the road test will help point you in the right direction.

The road test can tell you which friction members slip, and whether the shift timing and quality are okay. A little thought about what goes on in the transmission in each gear and during each shift will go a long way toward identifying the trouble. So let’s review what does go on and what the road test can tell us.

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**BAND AND CLUTCH APPLICATION CHART**

<table>
<thead>
<tr>
<th>LOW (Breakaway)</th>
<th>LOW (Manual)</th>
<th>SECOND</th>
<th>DIRECT</th>
<th>REVERSE</th>
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<tbody>
<tr>
<td>REAR CLUTCH</td>
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<td>REAR CLUTCH</td>
<td>FRONT CLUTCH</td>
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<tr>
<td>OVERRUNNING CLUTCH</td>
<td>LOW AND REVERSE BAND</td>
<td>KICKDOWN BAND</td>
<td>FRONT CLUTCH</td>
<td>LOW AND REVERSE BAND</td>
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BAND AND CLUTCH APPLICATION

Look at the band and clutch application chart. Notice that except for the kickdown band, each of the friction members is applied in at least two gears. If a band or clutch has burned out or lost its friction material—or if its hydraulic circuit hasn’t enough pressure for application—the member will slip in every range it’s supposed to apply in. Then there’ll be no drive, but just engine runaway. At other times, there’s slip only on engagement and then the friction member applies with a bump as pressure builds up. We call this “slide-bump” engagement or “slide-bump” shifting. Engine runaway or “slide-bump” are valuable diagnosis clues if you note where and when they occur.

An important thing to remember here is that where engagement is good in some gears, you can eliminate the friction members that are applied in those gears and their hydraulic circuits from further consideration. So you really begin to narrow down the problem area with a good road test.

REAR CLUTCH

The rear clutch is applied in all forward gears. When you shift from neutral into drive, you should feel a smooth but firm engagement of the rear clutch immediately. If you do and can drive off in breakaway, the rear clutch and its hydraulic circuit are fine because the rear clutch and overrunning clutch are the holding members.

If you don’t get engagement after a few seconds, the problem is worn or burned clutch plates or a hydraulic leak. So gradually increase engine r.p.m.’s to get more volume from the pump. If the increased volume is enough to compensate for the leak, the clutch will engage and you can drive off. You should feel some engagement even in a very worn clutch, though it may slip too badly to drive. This is because the accelerator signal to the throttle valve is increasing line pressure. Later on, your line pressure tests will tell you more about why the rear clutch slips.

If you get no drive at all in breakaway, shift into manual low to be sure your problem isn’t the overrunning clutch. In manual low, the low-reverse band takes over from the overrunning clutch. If there’s still no drive, the rear clutch is your problem.

KICKDOWN BAND

If the rear clutch holds, you can drive in breakaway low and check out the kickdown band on the 1-2 upshift. A slipping kickdown band gives you a “slide-bump” 1-2 upshift. If the band doesn’t hold at all, you get no 1-2 shift. The overrunning clutch continues to hold and the transmission stays in low. At a higher road speed you get a 1-3 shift.

An indication of a slipping kickdown band calls for an adjustment (this one’s outside the case) and a re-try on the road. If the adjustment doesn’t work, it usually means the band has failed. On low-mileage jobs, though, there may be a hydraulic leak from a broken servo piston seal. You can tell easily which it is when you get the pan off.

Incidentally, if your road test shows that everything is okay except the kickdown band, skip the pressure tests. They don’t tell you anything conclusive about the kickdown servo.

FRONT CLUTCH

The front clutch is applied in direct and reverse. If drive is good in direct and reverse, the front clutch is good. If you have slip on the 2-3 upshift (or in direct) and slip or no engagement in reverse, the front clutch isn’t holding. (A “slide-bump” 2-3 shift can also be caused by throttle valve problems, but in that case reverse would be okay. More on this under pressure tests.) The pressure tests and what you find in the pan tell you whether front clutch problems are worn plates or a hydraulic leak.

LOW-REVERSE BAND

A slipping low-reverse band shows up in reverse slip only. The band is on in manual low, too, but if it slips you still get drive because of the overrunning clutch. To double-check for a slipping low-reverse band, shift from direct drive to manual low at closed throttle at about 20 m.p.h. If there’s no engine braking, the band isn’t holding.

The low-reverse band adjustment is inside the pan. So you’ll check the adjustment and whether the band has failed after you take the pan off. Pressure tests will tell you if the slipping is from a hydraulic leak.

SHIFT PROBLEMS

Shift quality problems are often tied in with
slip, but shift timing problems come from entirely different sources. If shifts don’t occur at the right time, something has happened to upset the proper balance between governor pressure and throttle pressure on the shift valves. So on the road test, pay close attention to when the upshifts and downshifts occur.

And if you have shift timing problems, follow up with governor and line pressure tests to see where the problems originate. Also make note on the road test of any shifts that appear harsh. Harshness on the 1-2 shift only, for instance, may mean that the accumulator isn’t cushioning kickdown band application.

**UNDERSTANDING THE PRESSURE TESTS**

Pressure tests are valuable to you because they are used to further narrow down the problem after the road test. Suppose your problem is slip, and you’ve determined which friction member isn’t hanging on. The line pressure tests then tell you whether the trouble is mechanical or hydraulic.

The force that applies the friction members comes from pressure against a piston area. The pressure is sealed by metal rings on the kickdown servo piston; by lip seals on the clutch pistons; by metal rings on the shafts that pressure is routed through; by seal rings on the low-reverse servo piston; by smooth mating surfaces of the valve body and case; and by close fits of the valves in their bores. Leaks at any of these points can cause low pressure in different systems.

If the problem is poor shift timing, the tests usually point to the governor, valve body or accumulator.

**LINE PRESSURE TESTS**

The three tests generally related to slip are

(1) the accumulator line pressure test,

(2) front servo release pressure test and

(3) low-reverse servo (reverse line) pressure test. The names of these tests might fool you since they're named for where the test plug is located, rather than the circuits they check out. So let's get it clear right now which circuit each of the tests is made in:

- **Accumulator Line Pressure** — Rear Clutch Circuit
- **Front Servo Release Pressure** — Front Clutch Circuit
- **Low-Reverse Servo Pressure** — Low-Reverse Servo Circuit

Before we actually get into these circuits, let's get the matter of the pressure source out of the way.

**THE PUMP AS A PRESSURE SOURCE**

It is common practice to refer to the pump as the source of pressure. Perhaps it would be more correct to say that the pump and regulator valve together form the pressure source, since to develop pressure, we must have resistance to flow. If the system is hydraulically tight, fluid coming from the pump is confined. Most of the pump delivery is metered back to the sump by the regulator valve. If the regulator valve sticks open, it can let the pump volume go back to sump without resistance. But if the regulator valve is doing its job, the flow to sump is resisted by an orifice at the regulator valve, and the back pressure that’s created is line pressure.

The point is that even though the pump is referred to as the pressure source, it usually
is not the reason for low or lost pressure. In fact, if there's any output at all from the pump, consistent low pressure can only be caused by a leak somewhere.

Now the pump itself can leak internally if it's old and worn, or if it becomes scored from foreign material or lack of lubrication. If the problem is sudden wear and scoring, you're going to have plenty of other troubles, too. If it's normal wear, efficiency decreases gradually, and the symptom is slow engagement, particularly in reverse. (But watch out for this! A clogged filter in a 1964 model can give you the same indication.)

TESTING THE PRESSURE SOURCE
Suppose you put a voltmeter across a taillight and read 12.6 volts. There's nothing between the battery and the taillight that boosts voltage, so you know there's at least 12.6 volts at the battery, too. The same thing is true in the TorqueFlite control system. We don't have a pressure test plug at the pump or regulator valve because we don't need it. If pressure tests to specifications at the accumulator, at the kickdown servo release plug, or at the low-reverse servo, the pump and regulator valve are doing their jobs. A good pressure at any one of the three should tell you not to worry about the pressure source.

One more word on testing pumps. You'll probably never be concerned with checking out a pump except on a reconditioning job. If the pump isn't worn and if it rotates, it will pump. So measure the rotor clearances. If they're good and the pump isn't scored, it's okay.

DIRECT-DRIVE PRESSURE TESTS
The accumulator line pressure test and front servo release test are made together in direct drive. Your service manual tells you that front servo release pressure should follow a few p.s.i. behind accumulator line pressure, if there are no leaks. Remember this, though: the two systems are separated from each other and from the pressure source by orifices. An orifice creates back pressure when there is flow through it, so a leak causing low pressure in one system does not lower pressure in the other system.

ACCUMULATOR-REAR CLUTCH SYSTEM
The accumulator line pressure can be low from a leak in the rear clutch apply circuit or in
the accumulator. If you diagnosed rear clutch slip on the road test, this test is important. Low pressure means the trouble is hydraulic. You’ll want to check the accumulator seals before you open the transmission to get at the clutch seals. (If the accumulator leaks, you may have noticed a harsh 1-2 upshift on the road test.) And you won’t want to overlook the possibilities of warped valve body mating surfaces, or leaks caused by foreign particles between mating surfaces.

![Diagram of Accumulator Line Pressure Test](image1)

**Fig. 11—Accumulator line pressure test**

On the other hand, if the rear clutch slipped on the road test but accumulator line pressure tests okay, you’ll probably find clutch friction material in the pan. This means you’ll have a reconditioning job to do.

**FRONT CLUTCH SYSTEM**
The front clutch apply system is tied in with kickdown servo release. We test front clutch pressure at the kickdown servo. The story on the front clutch is pretty much the same as the rear clutch. If pressure is low, the trouble is hydraulic; probably in the front clutch piston seals. One other possibility is a leaking seal on the kickdown servo piston rod guide.

Again, if the clutch slipped on the road test, but pressures are okay, the trouble is mechanical. Pull the pan and verify this by the clutch friction material you’ll find there.

**KICKDOWN SERVO SYSTEM**
There really isn’t anything conclusive about the kickdown servo to be found from pressure tests, because both sides of the piston are pressured during the test.

But don’t worry about it. In the first place, the piston seals are metal rings and it is very unlikely that they will leak excessively unless they are broken as a result of improper installation. Furthermore, access to the servo for visual checking is real easy.

![Diagram of Pressures on Kickdown Servo Piston](image2)

**Fig. 13—Pressures on kickdown servo piston**

If a band adjustment doesn’t fix kickdown band problems, you can check the band with the pan off. If the band is good, the servo needs repair. It’s as simple as that.

**LOW-REVERSE SERVO SYSTEM**
In this test, you measure reverse line pressure at the low-reverse servo. Reverse line pressure is also directed to the front clutch. If the front clutch system is hydraulically okay (you just checked it), low pressure means a leak in the
servo. Of course, if the front clutch leaks, you can just as well skip the reverse servo test because pressure will never build up.

If low-reverse servo pressure is good but the band slipped on the road test, pull the pan. Check the band and the adjustment.

**ERRATIC PRESSURES**

Suppose you get low or erratic pressures in all three line pressure tests. Assuming the pump is okay, there are several possible valve body troubles. Usually valve body troubles won't clearly indicate a particular clutch or servo system. Instead, they foul up several systems. Remember what the valving does— it directs fluid under pressure to actuate clutch pistons and servos; it regulates pressure; and it vents the systems that aren't applied. So let's see what kind of valve troubles you might encounter. *We're still talking about interpreting the results of the three line-pressure tests.*

**CHECK VALVES**

Check valves are simple one-way valves. They are used to seal pressurized passages from other passages that are vented or at lower pressure. Nothing much can happen to a check valve except dirt preventing it from seating. This would leave a leakage path for pressurized fluid, so pressure could be lost.

This sort of problem can be an on again, off again, thing. Owners often tell us about "a funny thing" that happened a week ago last Tuesday and hasn't happened since. As road speed changes and the transmission is operated in different gears, the dirt may wash out.

**SPOOL VALVES**

Spool valves can get stuck from dirt, burrs or varnish. It's possible for the regulator valve or the converter control valve to stick. Pump delivery then is bypassed to sump. This would lower line pressure. If all three line pressure tests are not to specs, your problem is probably the valve body.

**SHIFT POINTS**

Upshifts are accomplished by having governor pressure (dependent on road speed) overcome combined spring force and throttle pressure.
on a shift valve. Throttle pressure, of course, depends on engine torque. Downshifts occur when the combination of throttle pressure and spring force overcomes governor pressure.

Correct shift points, then, depend on the proper balance at all times between throttle and governor pressure on the shift valve. There are three things that can upset this balance:

- Incorrect throttle pressure
- Incorrect governor pressure
- Sticking shift valve

Let’s deal with throttle pressure first.

**THROTTLE PRESSURE**

The throttle valve is just a simple regulator valve, controlled by a spring and reaction pressure. Remember from the hydraulics fun-

Now this is important to remember: if the throttle valve sticks, the pressure advance won’t be smooth. You’ll still get maximum pressure, because the kickdown valve will butt against the throttle valve and force it over at maximum travel. So **maximum line pressure alone isn’t enough.** It has to go from minimum to maximum smoothly.

Let’s see how the governor operates now.
GOVERNOR PRESSURE

The governor valve is a simple metering valve. It is positioned by a balance between spring force and centrifugal force. When the transmission output shaft isn’t turning, springs hold the valve in the OUT position. The line pressure connection from the rear pump is blocked by a valve land and the governor pressure circuit is vented, so governor pressure is zero.

As the output shaft begins to turn, centrifugal force on the weights pulls the valve spool in and meters line pressure to the governor pressure circuit. As road speed increases, the valve moves farther in and the line pressure port is uncovered more and more. When the valve is in the full IN position, governor pressure equals line pressure.

So if the governor is stuck OUT, its output is too low and upshifts are delayed or do not occur. If the valve is stuck IN, pressure is high, causing early shifts.

TESTING GOVERNOR PRESSURE

There are two important indications when you test governor pressure. First, governor pressure must increase smoothly as road speed increases. Second, when the prop shaft stops, governor pressure must vent so the transmission can downshift. The gauge should read \( \frac{1}{2} \) p.s.i. or less at standstill as an indication that the circuit is vented.

If you don’t get these indications, the governor needs servicing.

SHIFT VALVES

If the governor and throttle valve pressures test okay, the only other thing that can cause bad shift timing is a stuck shift valve. If there’s a burr on the shift valve or dirt in the bore, it takes more governor pressure for upshifts, so upshifts are delayed. And on downshifts, more throttle pressure is needed. In fact, with a stuck shift valve, you may not get a coasting downshift. Then when you step on the gas to take off again, the downshift can come in with a thump. Or if it doesn’t come in, you take off in direct drive, so acceleration is sluggish.

SHUTTLE VALVE

The shuttle valve can be difficult to understand if you try to follow all its circuitry. So don’t bother. Just remember that the shuttle valve connects or bypasses orifices to control shift quality. If you have harsh shifts and know
the governor and accumulator aren't at fault, you have to clean the valve body anyway. You service the shuttle valve just like any other spool valve.

**ACCUMULATOR**

About all you need to know about the accumulator is that it cushions the 1-2 upshift. If a harsh 1-2 upshift is part (or all) of your problem, check whether the accumulator is sticking.

**AIR PRESSURE TESTS**

You probably won't use air tests as a diagnosis tool very often. Let's face it, it's kind of messy getting underneath the car and blowing air into the servo and clutch passages. And you're going to avoid showers in red fluid whenever possible.

But there will be times when your road test and pressure tests don't point conclusively to anything inside the transmission, and you're pretty sure all you need is valve body service. To be positive the clutch and servo circuits are tight, you may want to test them out with air pressure. Or you may suspect that a piston is hanging up and not letting the friction member release. (This condition wouldn't affect pressure.) So put on the largest raincoat you can find, clear the decks, pull the valve body and blow air in the apply passages. If the clutches and bands apply immediately, and you don't see evidence of excess leakage, there shouldn't be any hydraulic problems there. If a piston hangs up, you'll be able to tell that the spring isn't releasing it.

The air tests have their greatest value after you've rebuilt a unit. Then you can test for clutch and band operation on the bench before you button the transmission up. This time you won't need a raincoat.

**DIAGNOSIS SUMMARY**

After you've had some experience servicing TorqueFlite, you won't want to re-read this book every time you start a troubleshooting job. But you may want to have a condensed guide of what to look for during diagnosis—perhaps to check yourself that you don't miss anything. So here's a quick summary of the preceding pages. If there's anything you don't understand, just turn back. It's all in the book.

**FLUID**

The fluid must be at the proper level, must have no foreign material in it, and must not be broken down.

- **High or low fluid level** causes aeration—results in slow engagement, slip, poor shift quality, pump noise, governor buzz. Aerated fluid deteriorates rapidly—can cause varnish in low-mileage units.
• **Checking fluid level**—be sure the fluid is at operating temperature; fill the clutches and servos; check—never above FULL, never below ADD ONE PINT.

• **Discolored fluid** usually calls for reconditioning.
  Black with burned smell—friction member burned out.
  Milky emulsion—engine coolant leaked from radiator.
  Varnish on dipstick—fluid breakdown—varnish will be throughout transmission—must be cleaned.

**EXTERNAL ADJUSTMENTS**

If fluid checks okay, or after adjusting fluid level, go for a ride with the customer to identify the complaint. Check external adjustments before additional tests.

• **Engine performance**—low engine output affects shift quality. Don’t adjust throttle linkage to compensate for engine illness.

• **Throttle pressure**—check linkage adjustment on all shift problems and when there is slip in forward gears.

• **Manual valve cable adjustment**—if the car creeps in neutral the adjustment is way off. Check the adjustment using the starter switch with drive-to-neutral and reverse-to-neutral shifting. If it’s off, adjust it.

**ROAD TEST**

Road-test the car only after fluid level is adjusted and external adjustments checked. Test for proper engagement, smoothness of shifts and shift timing. Slipping points to the guilty friction member depending on what ranges it occurs in.

• **Rear clutch slip**—slip or no engagement on breakaway. (Double check against overrunning clutch by trying in manual low.)

• **Front clutch slip**—slip on 2-3 upshift and in reverse.

• **Kickdown band slip**—slide-bump 1-2 upshift or skipping second gear. This band has an external adjustment.

• **Low-Reverse band slip**—slip in reverse only, no engine braking in manual low.

**PRESSURE TESTS**

Three line pressure tests check out two clutch circuits and one band circuit, plus the pressure source.

• **Pressure source**—if any of the three line pressure tests is low, the pump and regulator valve are okay. Symptom of worn pump is slow reverse engagement.

• **Rear clutch circuit**—check at accumulator line pressure plug. If pressure is low, accumulator or rear clutch seal leaking. If pressure is okay and clutch slips, it is burned out.

• **Front clutch circuit**—check at kickdown servo release plug. If pressure is low, front clutch seal leaking. If pressure is okay and clutch slips, it is burned out.

• **Kickdown servo circuit**—no conclusive pressure test. If kickdown band slips and adjustment doesn’t cure, visually check band and servo piston and seals.

• **Low-Reverse servo circuit**—check at reverse line pressure plug. If pressure is low, piston seal or cover seal leaks. If pressure okay and band slips, pull pan for adjustment and visual inspection of band.

• **Valve body problems**—generally give erratic pressure—pressure tests don’t agree with road test.

Shift problems are related to throttle valve, governor, shift valves, shuttle valves and accumulator.

• **Throttle valve**—check that line pressure advances smoothly to maximum as throttle lever is moved. If it does, throttle valve is okay.

• **Governor valve**—governor pressure should advance smoothly as output shaft speed increases. Pressure should vent to 1½ p.s.i. or less at standstill.

• **Shift valve**—if governor pressure and throttle pressure check good, wrong shift timing due to stuck shift valve.

• **Shuttle valve**—controls shift quality. Rough shifts not caused by governor, throttle valve or accumulator point to shuttle valve.

• **Accumulator**—check whenever 1-2 shift is harsh.