MASTER TECHNICIANS SERVICE CONFERENCE 66-9

REFERENCE BOOK

THE 1966 TORQUEFLITE

CHRYSLER CORPORATION

PLYMOUTH · DODGE
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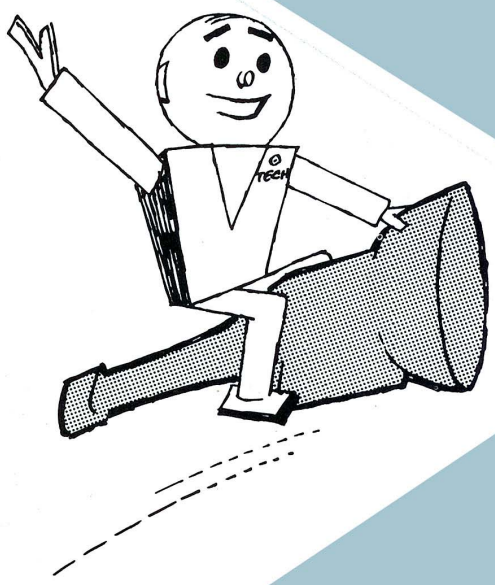
The automatic transmission has almost come to be accepted as standard equipment on modern cars. In fact, many people have never driven a car with a manual transmission. And, in terms of efficiency, ease of operation and acceptance, you'll always find our TorqueFlite at the top of the list of automatics. This was true when the first TorqueFlite was introduced, and has continued so during the years of development and improvement that have followed.

Certainly, the 1966 TorqueFlite is no exception to this rule. The design changes from the 1965 model were all aimed at making TorqueFlite an even more efficient unit. This session covers the differences between the 1965 and 1966 TorqueFlites as they affect the operation and servicing procedures. You'll especially want to know about the elimination of the rear pump, and its effect on the hydraulic circuits. Also, there's a good explanation of the new parking lock controls and the linkage adjustment.

There are a number of other tips and bits of information in the book that will be valuable to you, so read it over carefully, and add it to your library of reference books.



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There have been a number of revisions in the hydraulic system of the TorqueFlite transmission for 1966. Most of these changes are caused, either directly or indirectly, by the elimination of the rear pump from the transmission. So, let's start at the pump and look at how the changes were brought about.

REAR PUMP

As you already know, the rear pump had one primary purpose in the transmission. It provided oil flow to produce apply pressures for push-starting the car, and lubrication for the planetary gear sets until the engine was started. This has become unnecessary in our cars, for a number of reasons. For instance, our more efficient ignition systems and the alternator have greatly reduced the need for push-starting. It's something called dependability.

Fig. 1—No more push starts

THE SAFETY FACTOR

And, this dependability prevents a lot of scratched bumpers and potential accidents. Here's what we mean. Take a car with power brakes and power steering. Assume that the weather is pretty miserable, since that's when most starting problems occur. Now, the visibility is going to be pretty bad, too, especially for the person who's doing the pushing. And, even though the equipment is there, you won't have any power assist on the brakes or the steering, because the engine isn't running. Add to these factors the fact that the person being pushed is going to be preoccupied with getting the car started. Everything combined adds up to an accident, looking for someplace to happen.

NO CHECK VALVES

On previous models, two check valves prevented the front and rear pumps from bleeding out through each other when only one pump was operating. On the 1966 model, with only one pump, there is no longer any need for check valves in this part of the system.

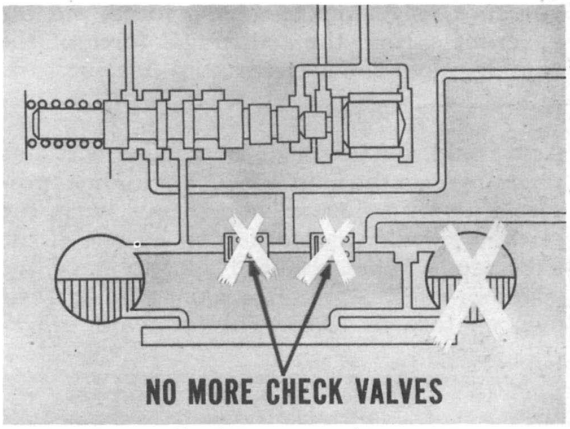


Fig. 2—No more pump check valves

GOVERNOR FEED

On all models prior to 1965, the governor was fed directly from the rear pump when the car was under forward motion. And, there was certainly nothing wrong with this situation, since governor pressure is not really needed until the car is moving. On the other hand, it does no harm to feed pressure to the governor even when the car isn't moving. So, the pressure feed to the governor in 1966 models is from the front pump, through the regulator valve and the manual valve.

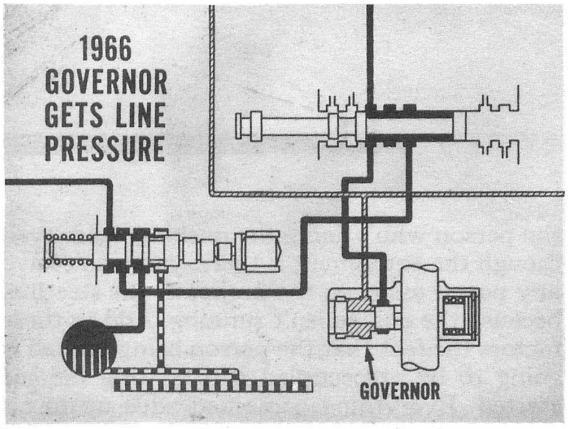


Fig. 3—New governor feed

GOVERNOR PRESSURE

The governor valve is, essentially, a pressure regulating valve. And, like any other regulating valve, it balances one force against another to reduce one pressure to another usable pressure. The balancing forces may be created by springs, hydraulic pressure, or weights. In the governor valve, the balancing forces are the governor spring, the centrifugal force of the spinning governor weights, and line pressure.

LINE PRESSURE REDUCED

As we said, the governor is supplied with line pressure from the manual valve. This line pressure enters the governor body and, when the car is stationary, is blocked off by one of the valve lands. When the car begins to move, the governor weights are thrown outward by their own centrifugal force. This outward movement of the weights carries the valve along with the weights, partially opening the reaction area to line pressure.

The outer land of the valve is larger than the inner land. So, when the pressure in the reaction area is high enough, the valve is hydraulically closed to line pressure. Then, as car speed increases, the weights pull the valve open again, admitting more line pressure. Thus, the governor pressure is a product of spring force and car speed. A variation in line pressure will not have any effect on the governor pressure, except that governor pressure can never be any higher than line pressure.

SPRINGS AND SPEEDS

There are two factors that can be changed to obtain different governor pressure. First, any change in the centrifugal force will change the pressure in direct proportion. That is, any increase in centrifugal force will increase the governor pressure. This means, of course, that the pressure rises as car speed increases. Centrifugal force could be raised either by increasing the size of the weights, or by increasing the strength of the spring. Either way, the governor pressure would be higher for any given speed, and upshifts would occur at lower speeds.

1966 GOVERNOR PRESSURE LOWERED

In the 1966 TorqueFlite, the governor spring is lighter than in previous models. This means that the governor pressure is lower at a given speed than on previous models, so the full throttle upshifts are at higher speeds. There is a definite advantage to the higher shift speeds.

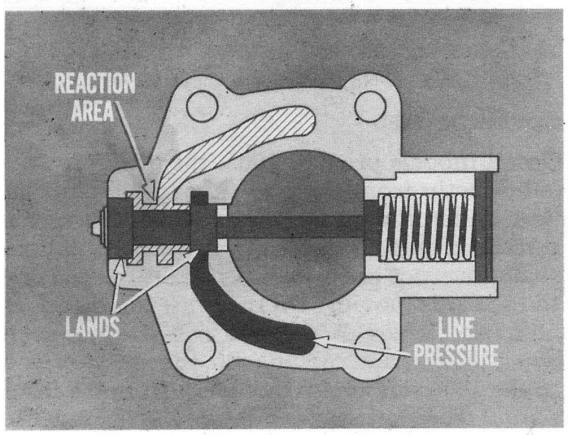


Fig. 4—Governor reduces line pressure

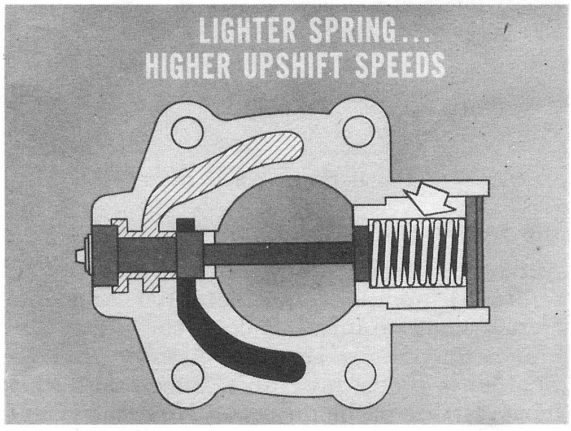


Fig. 5—New governor spring

By shifting at higher speeds, the transmission takes full advantage of the highest torque the engine can deliver, so the driver has maximum acceleration available when he needs it.

HIGHER DOWNSHIFT SPEEDS, TOO

There is also one disadvantage involved in raising the full throttle upshift speeds. Since the upshift speeds are higher, it just naturally follows that the full throttle kickdowns are going to occur at higher speeds. And, the most undesirable situation would be a 3 to 1 kickdown at a speed of, for instance, forty or more miles an hour. To prevent this possibility, another change was made in the hydraulic system.

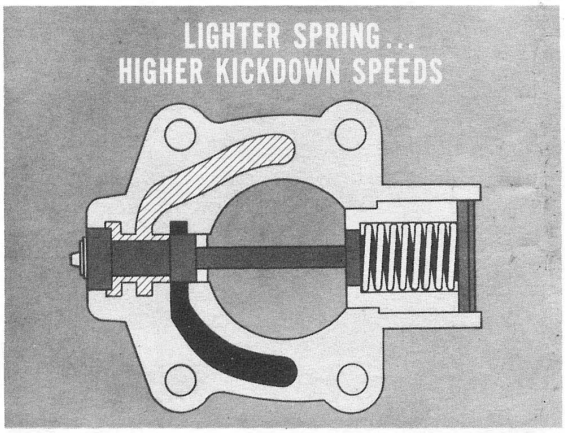


Fig. 6—Full throttle kickdown too high

1-2 SHIFT VALVE REVISED

Gear changes are based on the relative values of throttle pressure and governor pressure.

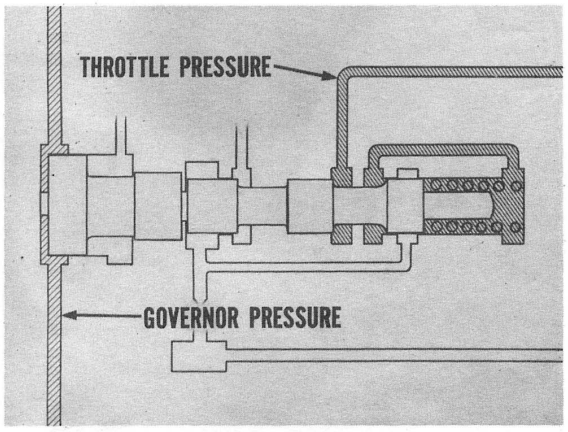


Fig. 7—Shift valve operation

When the car is standing still, and there is no governor pressure, throttle pressure, acting on the small end of the shift valves, holds the valves in Breakaway position. When the car starts to move, and governor pressure is developed, the pressure is applied to the governor plugs, where it has a larger reaction area to work against than throttle pressure has at the other end of the valve.

Each upshift occurs when governor pressure on the plugs gets high enough to overcome the combined force of throttle pressure and the spring on the shift valves.

FULL THROTTLE KICKDOWN

At full throttle, the kickdown valve opens a passage to feed 90-p.s.i. throttle pressure to the 1-2 shift valve, between the valve and the governor plug. The 90-p.s.i. throttle pressure, forcing outward on the governor plug, cancels out governor pressure, and the spring downshifts the valve. Of course, at higher speeds, governor pressure is not high enough so that it will not be cancelled out by throttle pressure, so it prevents a downshift into Breakaway.

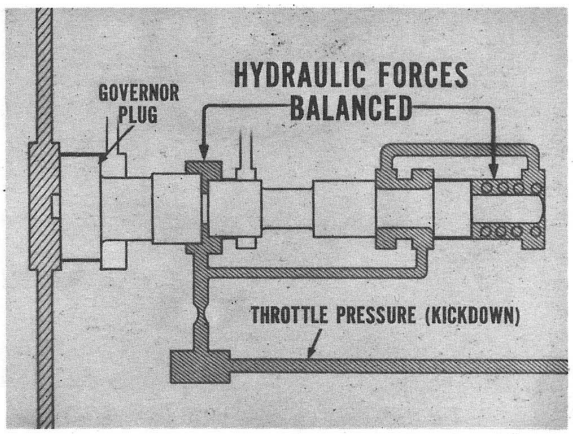


Fig. 8—Equal pressures on valve ends

PRESSURE LIMITED

To prevent a 3 to 1 kickdown at speeds of thirty miles an hour or more, the 1-2 shift valve was redesigned. An extra groove was cut into the land of the valve nearest the governor plug, and a hole was drilled through the end of the valve into the new groove. So, when the throttle valve pressure from the kickdown valve is directed to the area between the valve and the governor plug, some of the fluid is bled through

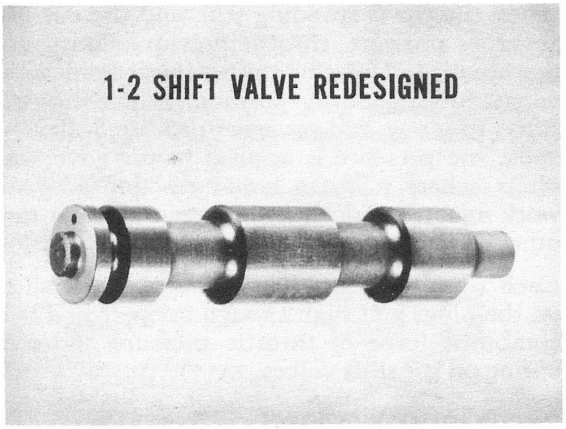


Fig. 9—1-2 shift valve redesigned

the drilled hole, into the groove and out through a vent. This limits the pressure build-up between the valve and the plug, so the governor pressure has to drop to a lower value before the transmission will kick down into Breakaway. The car has to be traveling at less than 30 miles an hour to downshift into Breakaway.

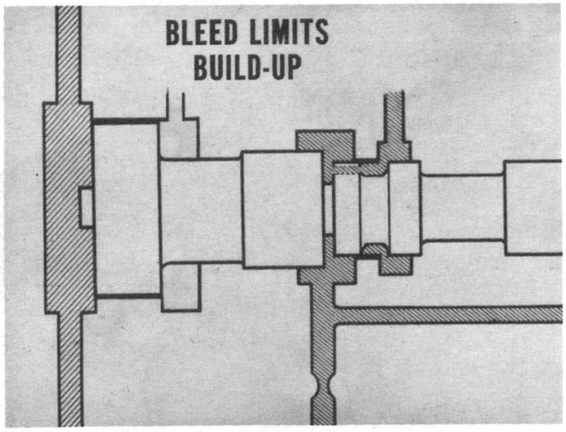


Fig. 10—Pressure build-up is limited

KICKDOWN FROM 3-2 FIRST

With the redesigned 1-2 shift valve, the transmission will not kick down from Direct to Breakaway above 30 miles an hour, even when the kickdown valve is bottomed. Let's take an example. Suppose the car is moving at forty-five miles an hour, and the driver wants to pass a truck in a short distance. He opens the throttle all the way, bottoming the kickdown valve, and increasing the throttle pressure to full line pressure. The increased throttle pressure acts on the spring end of the 2-3 shift valve, which has an area almost as large as the governor plug, so the transmission shifts down into Second. However, because vehicle speed is over 30 m.p.h., the transmission will not downshift into Breakaway.

SEPARATOR PLATE REVISED, TOO

There's another orifice in the kickdown hydraulic circuit to help limit throttle pressure at the 1-2 shift valve and the governor plug. It's located in the separator plate, between the valve body and the transfer plate. The combination of this new orifice and the new 1-2 shift valve will lower the 3-1 or 2-1 kickdown speed to 30 miles an hour.

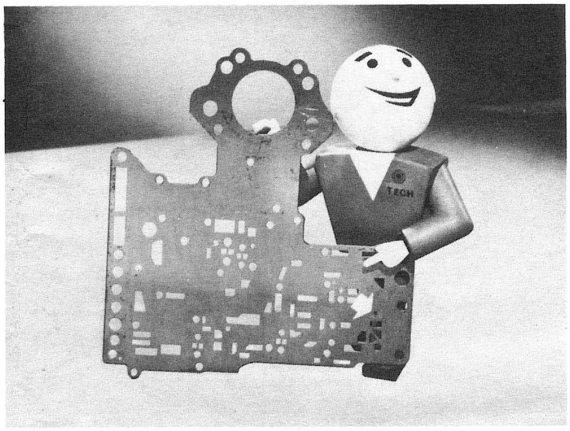


Fig. 11—Separator plate orifice

VALVE BODY SERVICE PRECAUTIONS

It probably isn't necessary (at least it shouldn't be), but the most important precaution any-

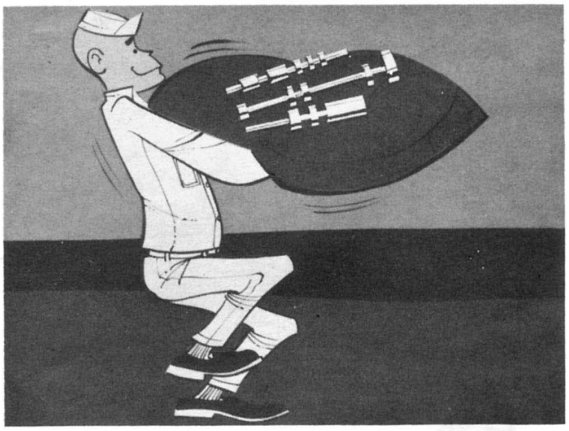


Fig. 12—Handle valves carefully

one can give about valve body service concerns handling of the valves when the valve body is disassembled. Treat them with kid gloves. Don't just dump them into a basket for cleaning. Place them in carefully. And, when they're clean, lay them on a clean cloth (lint-free, of course). If you wrap them in a shop towel, two things can happen. First of all, they'll pick up a lot of lint from the towel. But, even worse, someone might pick up the towel to wipe his hands and scatter the valves all over the shop. Whichever one happens, you're in for trouble.

THE TOPIC OF TORQUE

Keep in mind that the valve body is an aluminum casting, and that it isn't very thick. And, consider what happens to something as husky as a cylinder head when the attaching screws are tightened unevenly. This should serve to emphasize the importance of using a torque wrench when you're working on a valve body.

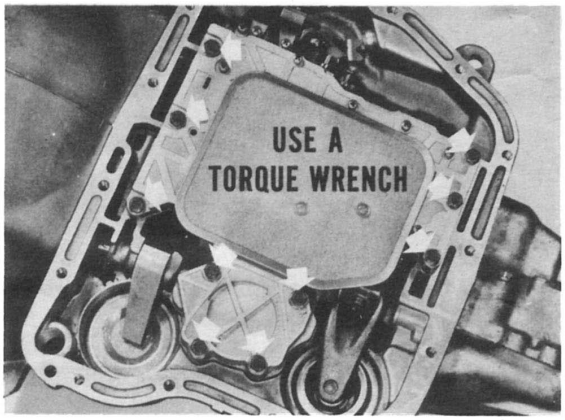


Fig. 13—Tightness is important

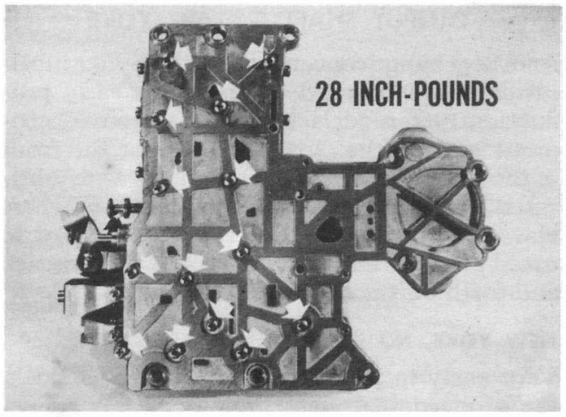


Fig. 14—Transfer plate screws

When you're assembling the valve body, use the torque specifications on the transfer plate attaching screws (28 inch-pounds). And tighten the cap screws to 100 inch-pounds when you install the valve body assembly in the assembly case. Uneven tightening or incorrect torque will cause distortion of the valve body, resulting in sticking valves as well as leakage of transmission fluid.

GOVERNOR BODY VENT

On some of the early production 1966 TorqueFlites, you may run into a condition of improper closed throttle downshift. If you do, check the governor body venting. The vent slot in the governor body must provide a passage from the weight area to the mounting face of the body. If this slot is restricted, there will be a build-up of pressure behind the governor weights, because of normal leakage of line pressure between the governor support and the output shaft. This pressure behind the weights will hold the governor valve open, and there will be too much pressure on the shift valve governor plugs in relation to car speed. So, the downshifts will occur at lower than normal downshift speeds. In extreme cases, the transmission may not downshift at all.

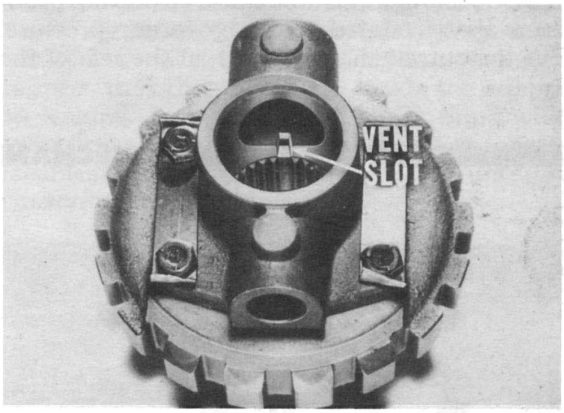


Fig. 15—Vent bleeds off residual pressure

GOVERNOR SUPPORT CLEARANCE

A condition which will aggravate the restricted vent problem concerns the clearance between the governor support and the output shaft. Specified clearance is .003 inch or less. If the clearance is greater than this, then the transmission will upshift at lower than normal speeds, and probably will not downshift at all.

A DO-IT-YOURSELF VENT

You can correct the governor venting problem by drilling a one-eighth-inch hole in the governor body hub. This will allow any build-up of pressure to vent into the extension housing and back to sump. Just be sure to remove the governor from the transmission before drilling. You don't want to get any chips inside the transmission case.

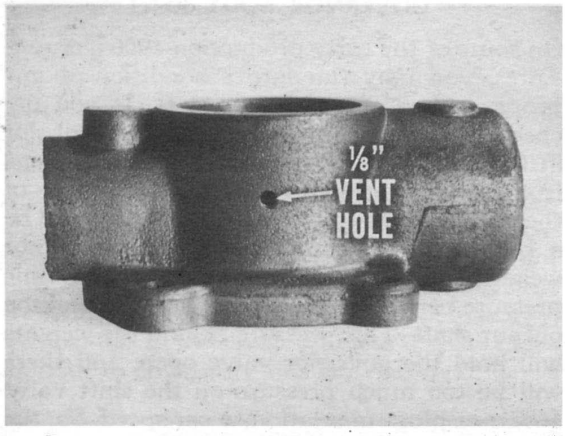


Fig. 16—A drill-it-yourself vent

A CASE FOR SHRINKAGE

There's another possible cause of shifting problems that's related to the governor pressure. It's the output shaft support, at the rear of the transmission case. The support is a very tight fit in the case. In fact, it's what is called an interference fit. That is, when it's installed in the transmission, the support must be shrunk, and then driven in. So, when you're getting ready to install the support, pack it in dry ice for a few minutes. If dry ice isn't readily available, put the support in the freezing compartment of a refrigerator, or in the soft drink cooler. Just don't try to install it without shrinking it first. If you do, the passages to and from the governor will leak, because of distortion in the case or output shaft support, and the transmission won't shift properly. And, don't try to expand the case by heating it. If you do, you'll warp it out of shape.

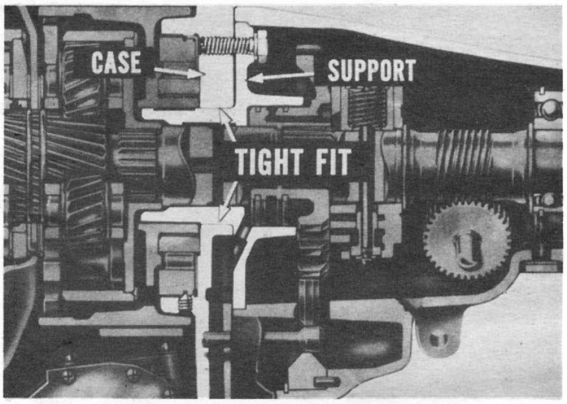


Fig. 17—Shaft support must be chilled

MECHANICAL CHANGES

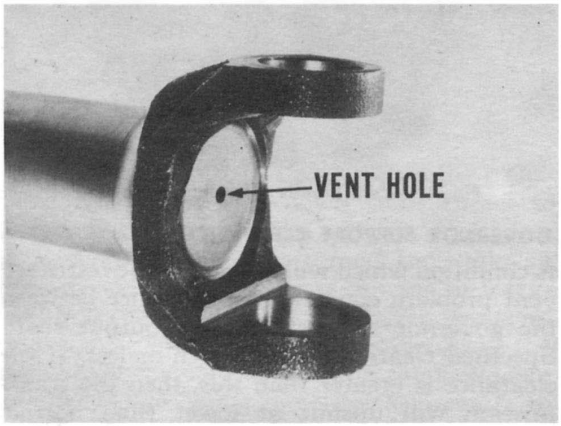


Fig. 18—Shaft with seal requires vent hole

OUTPUT SHAFT SLIDING YOKE

Another change concerns the sliding yoke lubrication. On 1965 models, and some early production 1966 models, there was a grooved neoprene seal on the output shaft near the front of the sliding yoke. The yoke splines were lubricated with multi-mileage lubricant, and there was a vent hole in the rear of the yoke to avoid pressure inside the yoke as it moved back and forth on the output shaft splines.

NEW YOKE, NO HOLE

Very early in production of the 1966 models, the grooved seal was eliminated. The splines are now lubricated with transmission fluid, and

there is no longer a hole in the rear of the yoke. The "pocket" at the rear of the yoke is vented back into the transmission case through a blank spline in the yoke.

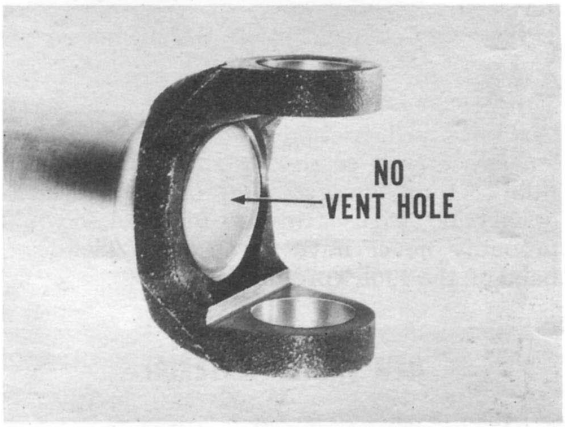


Fig. 19—Transmission fluid lubricates

NO MIXING, PLEASE

If you have to replace a sliding yoke on a 1966 TorqueFlite, be sure to see whether there is a grooved seal on the output shaft. If there is a seal, use a vented yoke and lube it with multi-mileage lubricant. Otherwise, the yoke will slide on the output shaft without any lubrication, and it won't be long before the yoke, and probably the output shaft, too, will be ruined. If there is no grooved seal on the output shaft, be sure you use a non-vented yoke. If a vented yoke is installed, you're liable to lose some transmission fluid through the vent hole.

SPEEDOMETER GEAR ADAPTER

One of the outstanding features of the 1966 TorqueFlite is the highly accurate speedometer drive. As you know, the number of gear teeth has been approximately doubled on both the worm drive gear and the pinions. And, there are a lot more pinion sizes available, even though there are only three basic pinion diameters. To accommodate the three diameters, an eccentric adapter adjusts the center-to-center distance between the drive gear and the pinion. One adapter serves all three pinion diameters.

KEEP IT CLEAN

One of the most important servicing precautions on the speedometer gear adapter concerns cleanliness. A small chunk of dirt between the adapter and its seat in the extension housing can throw the pinion out of alignment. Whether the gear teeth mesh too tight, too loose, or at an angle, it won't take long to chew them off the pinion. And, if the adapter is not properly seated, there could be a transmission fluid leak past the "O"-ring seal.

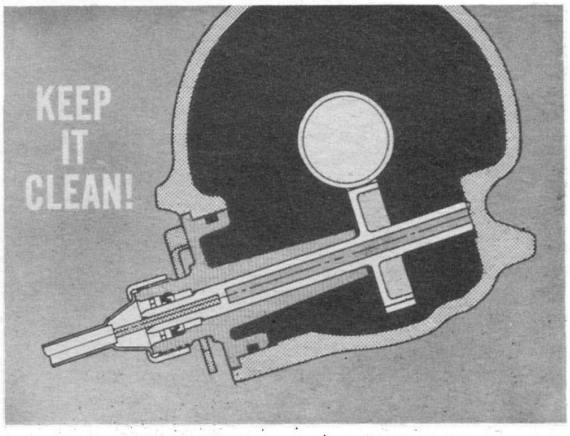


Fig. 20—Dirt causes misalignment

THE CASE OF THE HIDDEN LEAK

A leak at the adapter "O"-ring seal can sometimes be misleading. It doesn't take much driving to accumulate dirt around the adapter and the speedometer cable coupling. And, if the "O"-ring should develop a leak, the fluid will run down and drip off the coupling, making it appear that the pinion seal inside the adapter is leaking. Just keep one thing in mind when you find a leak in this area. Even if the pinion seal leaks, it probably won't show up until you unscrew the coupling.

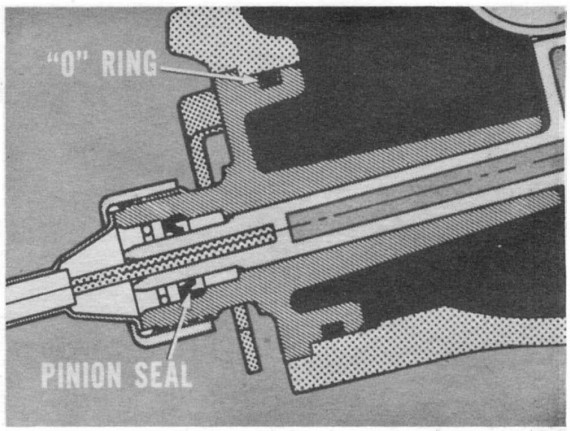


Fig. 21—Leaks sometimes travel

PINION SEAL INSURANCE

One way to make sure the pinion seal won't leak is to use the special seal-installing tool which is part of the essential tool kit released at the beginning of the model year. Tool C-4004 sets the seal exactly at the correct depth, so it won't be crimped.

Fig. 22—Essential installing tool

ADAPTER POSITION

When you're installing the speedometer gear adapter in the extension housing, check the number of teeth on the pinion. Then, be sure to set the adapter with the correct range of gear teeth numbers at the bottom. If you get the wrong range, the pinion won't mesh properly with the output shaft, and the gear teeth will soon be chewed off the pinion.

CLAMP POSITIONS ADAPTER

The adapter doesn't have to be very far out of position to ruin the gear teeth. To be sure of correct positioning, set the right range number at the bottom of the adapter and then install the adapter clamp, with the clamp tangs in the slots in the adapter housing.

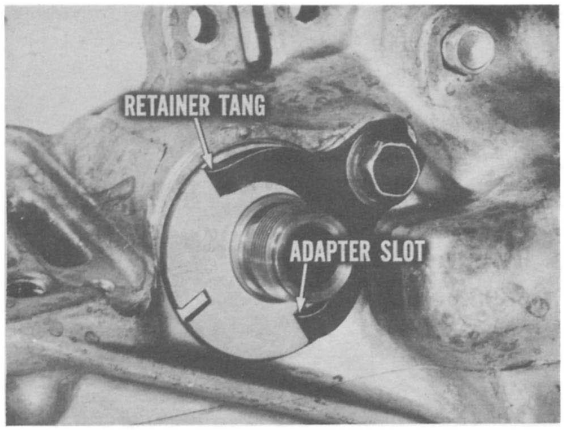


Fig. 23—Proper alignment insurance

CLUTCHES AND BANDS

A new friction material was developed for the TorqueFlite rear clutch discs. The new material has improved friction characteristics and is longer wearing, so the clutch discs are much thinner than on previous models. The kickdown band also uses this new material, so you'll probably never have to adjust a kickdown band on the 1966 TorqueFlite.

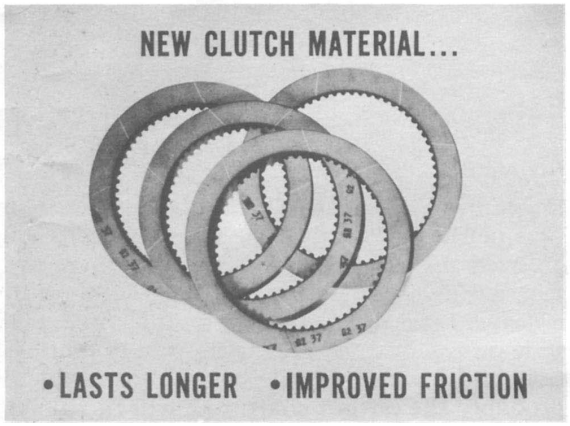


Fig. 24—Clutch plates are thinner

440 FRONT CLUTCH

When a TorqueFlite is used with the 440-cubic-inch engine, the front clutch has only 8 return springs, instead of the usual 10. With fewer springs, the clutch applies more quickly and more solidly. The clutch housing is the same as is used on the other A-727 transmissions, so don't look for two more springs when you only find eight there.

CUSHIONED REAR CLUTCH

On the A-727 transmission, a cushioning feature was added as a running change during 1965 production, and was carried over into 1966 production. The cushion consists of a wave spring and spacer ring, which were added between the clutch piston spring (Belleville washer) and the clutch pack. The cushion softens the clutch application when the transmission is shifted from Neutral to Drive.

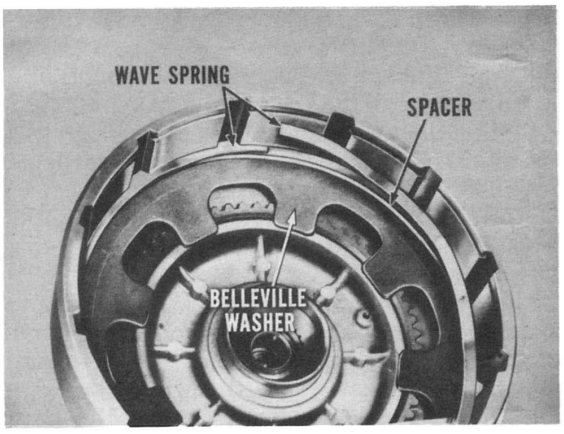


Fig. 25—Rear clutch cushioners

INTERCHANGEABILITY

Because of the different thicknesses and clearances involved in the cushioned clutch parts and the previous, non-cushioned clutch parts, the individual parts are not interchangeable from one type of clutch to another. However, the complete clutch assemblies are interchangeable. In other words, it is possible to replace a non-cushioned clutch *assembly* with a cushioned *assembly*. Incidentally, this cushioned clutch improvement was recently incorporated in the A-904 transmission, also.

VENTED CLUTCH RETAINER

Another change was made in the A-727 rear clutch, effective with transmissions built after February 8, 1966, to eliminate a "creeping" tendency. When the transmission fluid was cold, the car had a tendency to creep in Neutral. Oil trapped in the rear clutch pack created enough fluid drag between the plates and the discs to transmit some torque to the rear wheels. To eliminate this condition, the rear clutch retainer on all A-727 transmissions built since the above date were vented, by drilling twelve equally spaced holes 3/8-inch in diameter around the rim of the retainer. These holes allow the trapped oil to escape by centrifugal force and return to sump.

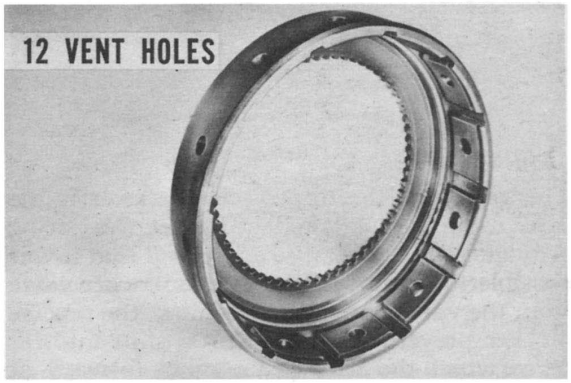


Fig. 26—Rear clutch retainer vented

SHIFT LINKAGES

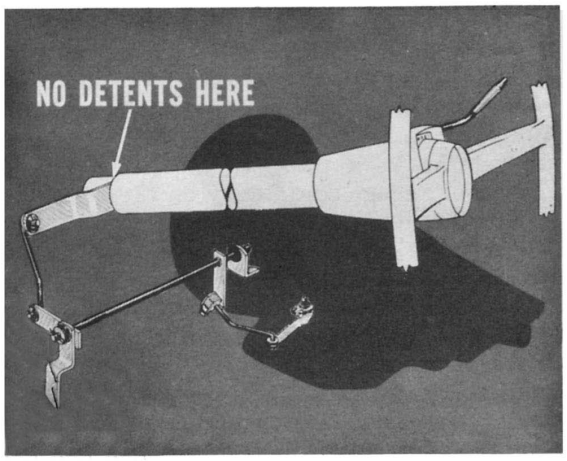
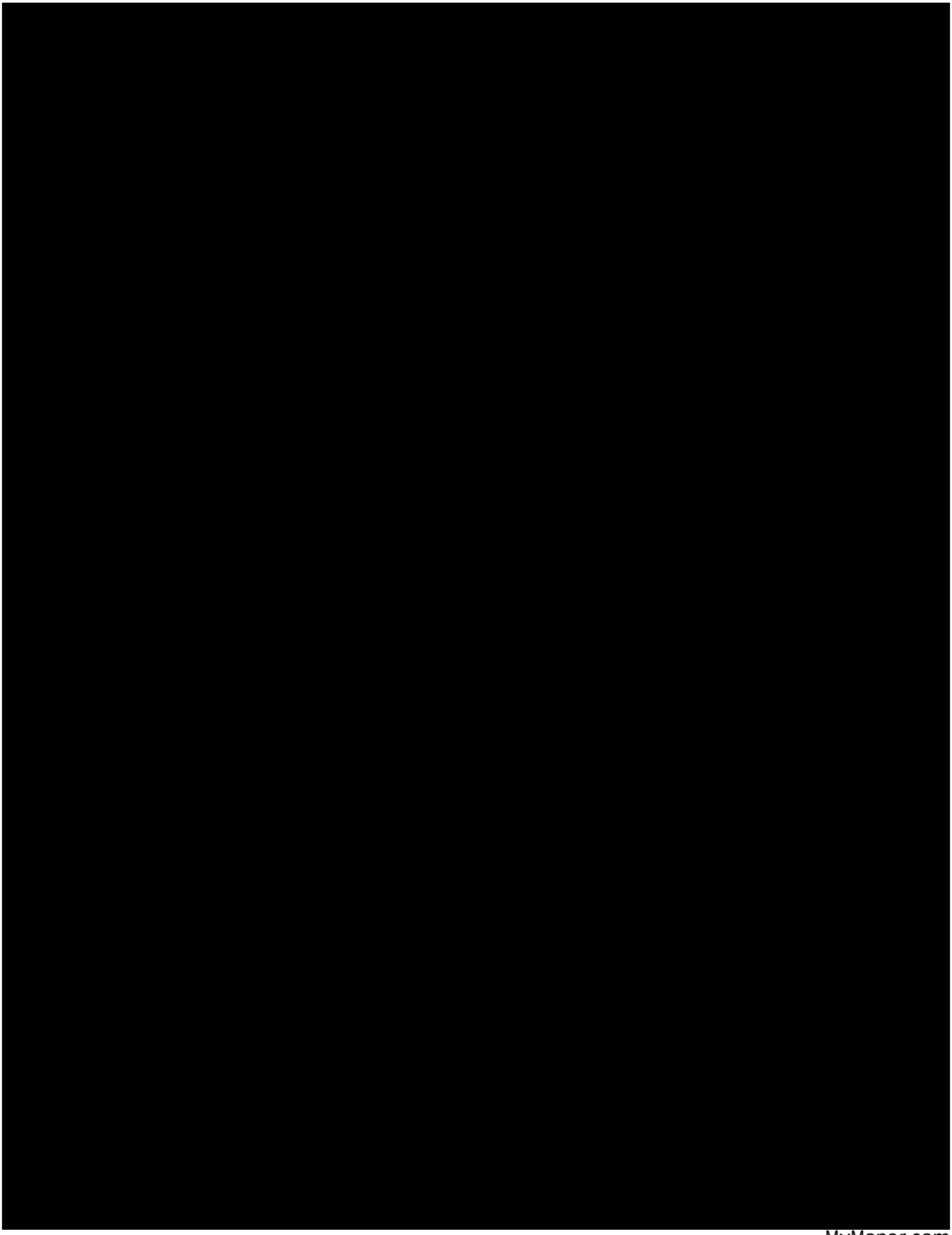


Fig. 27—New selector shift linkage

The improved 1966 shift linkages provide a solid, positive shift movement, even though they are much simpler than the two-cable set-up on previous models. And, the simpler arrangement means that the adjustments are also much simpler.

STEERING COLUMN SHIFT

There's a single connection at the lower end of the steering column, instead of the two cable connections on the 1965 models. From the lower selector lever, a short rod goes to a torque shaft, which in turn moves the control rod and the manual valve lever. There are no detents at the lower selector lever. The manual valve detent spring is much stronger than before, so the steering column detents are not necessary.



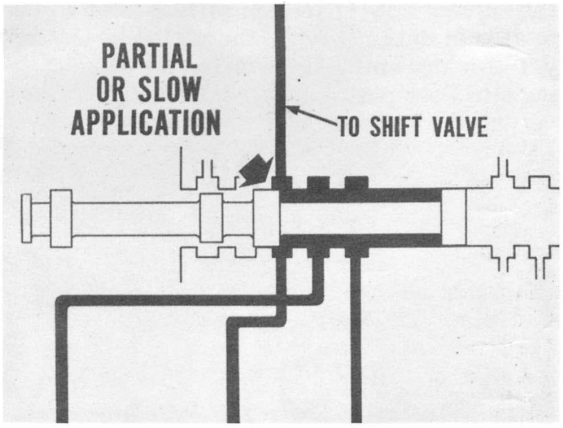


Fig. 31—Manual valve off location

NO START

The most likely difficulty that can come about as a result of incorrect linkage adjustment is inability to start the engine. The Neutral starting switch arm is located on the manual valve lever. The cranking circuit is closed when the neutral starter switch in the transmission case is grounded through the manual valve lever. The lever has two "fingers", one of which contacts the switch plunger in Neutral and the other in Park. The fingers have narrow rounded ends—so narrow that, if the manual valve lever is not accurately positioned in Park and Neutral, the engine cannot be cranked.

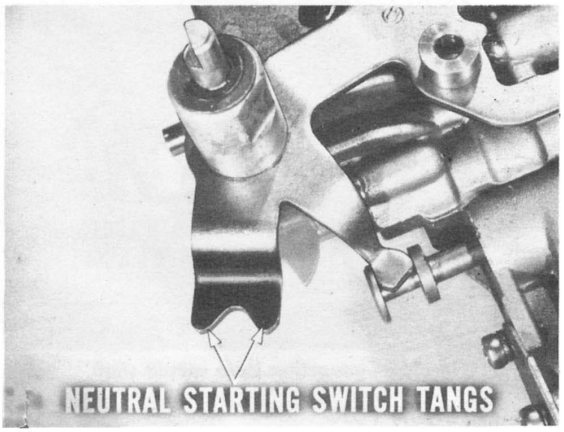


Fig. 32—Must contact switch in N and P

IANT AND DART CONSOLE

Valiant and Dart console-shift cars, no swivel clamp. Instead, at the lower he torque shaft, there's an adjusting ttaches to the transmission control rod. So, to make the adjustment, loosen the screw on the adjusting lever, place the transmission manual valve lever and console lever in Park position and tighten the screw. Incidentally, you don't have to hold the console shift lever against the Park gate when you're making the adjustment. The console gating has a positive stop in both directions when the lever is in Park.

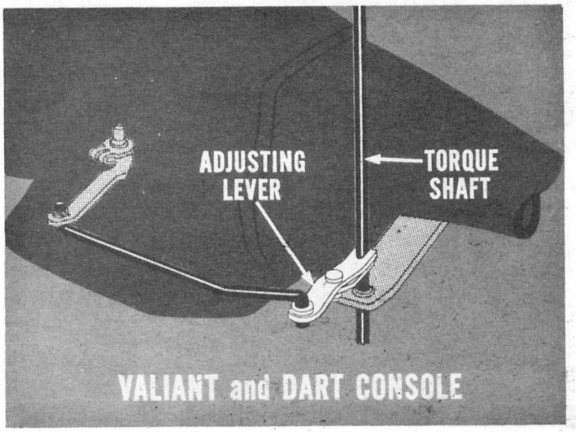


Fig. 33—Valiant and Dart console models

CONSOLE RELEASE BUTTON

On all TorqueFlite cars with console shift, the gating is cleared by depressing a push button on the top of the selector lever. The release button threads onto a release cable, which moves the gating latch. The gating is such that it is necessary to push the release button to get out of the Park position. This prevents anyone accidentally bumping the lever out of Park and into Reverse. You must also push the button to

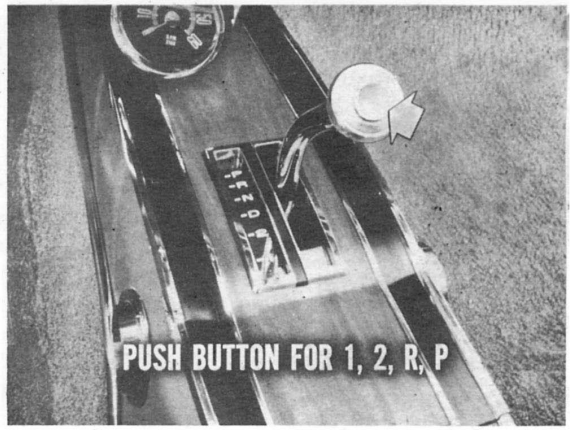


Fig. 34—Console, all models

get from Neutral to Reverse, Reverse to Park, Drive to "2", and "2" to "1". There is no gating between Neutral and Drive.

BUTTONS AND GATES

The console shift release button must be correctly adjusted to assure that the gating will operate as it should. If the button is too high above the knob, it will probably cause a very annoying rattle. If the button is too low in the knob, you won't be able to move the latch low enough to clear the Park stop to shift into Park. In extreme cases, you won't even be able to move the lever out of Neutral and Drive.

BUTTON ADJUSTMENT

The console release button is adjusted with the selector lever in Neutral position. Just loosen the set screw in the side of the knob, turn the button in or out until the serrated portion is 1/32-inch above the knob, and tighten the screw. This 1/32-inch setting allows good seating in the gates when the button is released, yet provides ample latch clearance when shifting into Park position.

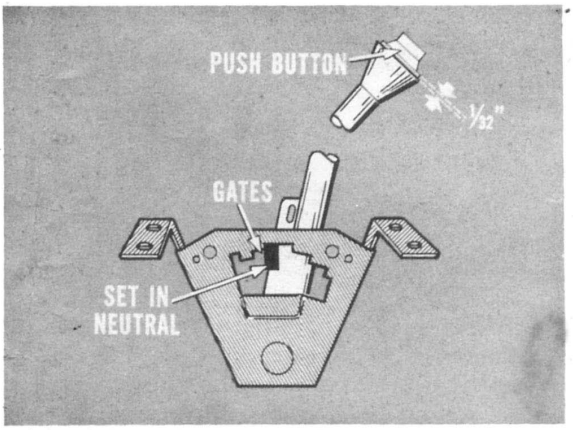


Fig. 35—Gate release button adjustment

THE NEW PARKING LOCK

The new parking lock assembly on the 1966 TorqueFlite transmissions is a positive locking mechanism. It's internally operated, through a rod, which is connected with the manual valve control lever.

CAM AND LEVER

The locking lever, which actually locks the parking lock gear, is not much different than the ones used in previous model TorqueFlite transmissions. It's held out of contact with the gear by a "mousetrap-type" spring, and forced in against the gear by the parking lock actuating linkage. In this case, the actuator is a cam-like knob on the end of the lock rod.

THE TRAVELING CAM

As long as the selector lever is in any position other than Park, the actuating cam is to the rear of the locking lever. In fact, it doesn't touch the lever at all. When the selector lever is placed in Park, the cam moves forward, between the locking lever and a reaction plug in the extension housing. This, in effect, locks the locking gear, and thus the output shaft, to the extension housing.

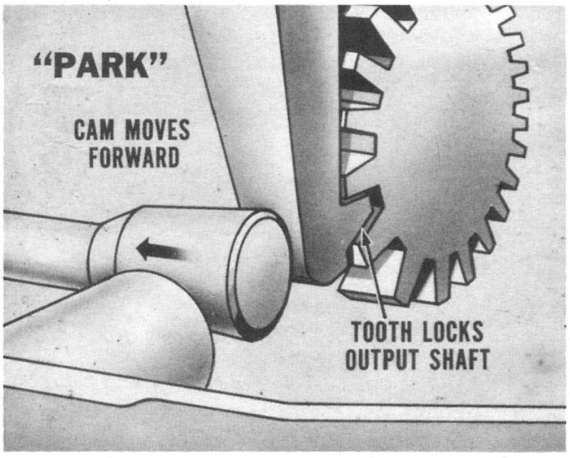


Fig. 36—Cam action locks output shaft

THE REACTION PLUG

Tech has heard some confused comments abone the reaction plug and what it does. Acen, the it's very simple. The reaction plug is opened more than a hardened steel plug that isat least into the extension housing opposite thrus this lever. Its only purpose is to give thhe transmission lever cam a hard surface to rub ag ve.

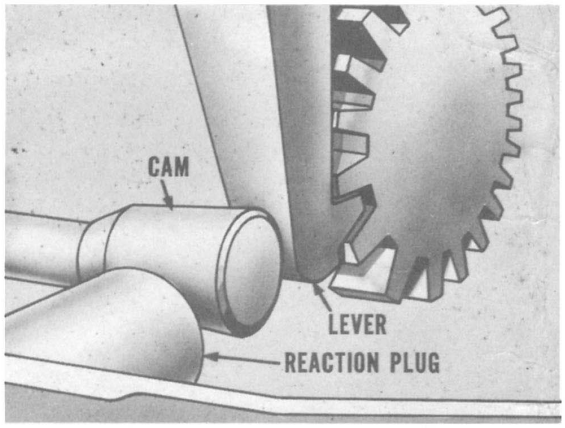


Fig. 37—Cam rubs against reaction plug

IF IT DOESN'T LOCK

Sometimes, when the selector lever is placed in the Park position, the locking lever lands on the top of one of the locking gear teeth. This means that the cam cannot be pulled between the lever and the reaction plug until the gear moves far enough to allow the lever to enter between two of the gear teeth. An overtravel spring at the front of the actuating rod allows the selector lever and the manual valve control lever to go into the Park position, even though the cam can't come forward.

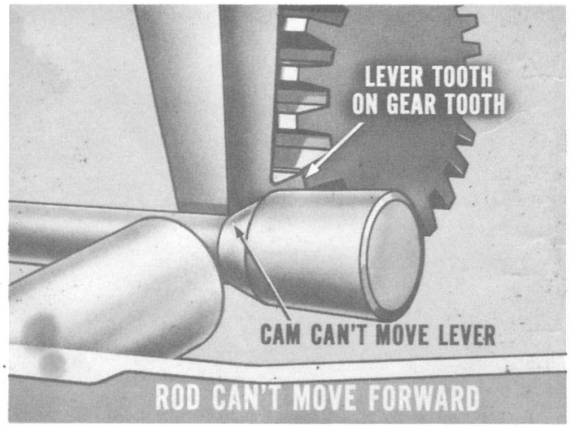


Fig. 38—No lock until gear rotates

SP NG CONNECTION

of the actuator rod is attached to the ve control lever through an attach- The rod actually goes through the has a compression-type spring and the end. When the locking lever is of one of the locking gear teeth, and 't move forward, the manual valve control lever continues to move into the Park position, compressing the overtravel spring. Then, when the gear has moved far enough so the locking lever can enter the locking gear teeth, the spring pulls the actuating rod forward, the cam goes between the locking lever and the reaction plug, and the lever is pushed into the gear.

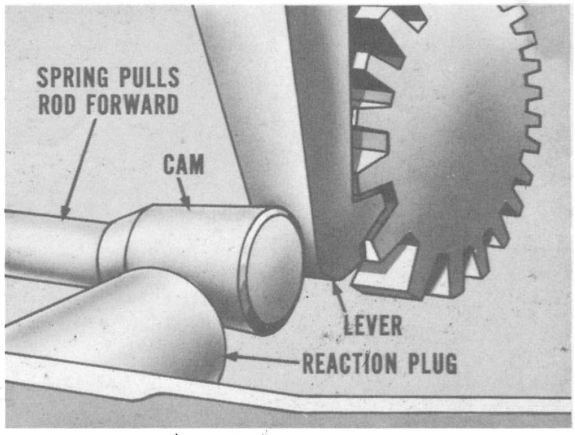


Fig. 39—Overtravel spring operates lock

ATTACHING SWIVEL RETAINER

On some of the early production 1966 Torque-Flites, the retainer clip on the bottom of the attaching swivel has a small tab for assembly purposes. These tabs could rub on the valve body causing what seemed to be a stiff operating selector mechanism. The retainer clip was revised to eliminate the tab. If you disassemble a transmission, for any reason, and find a tabbed clip, use one of the new clips, without the tab, during assembly.

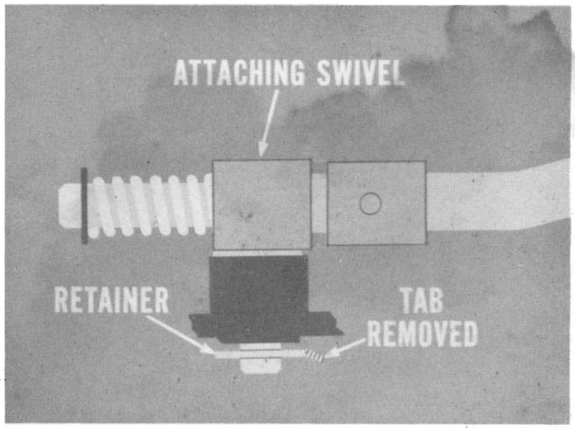


Fig. 40—Bend removed from retainer

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