NOVEMBER, 1965

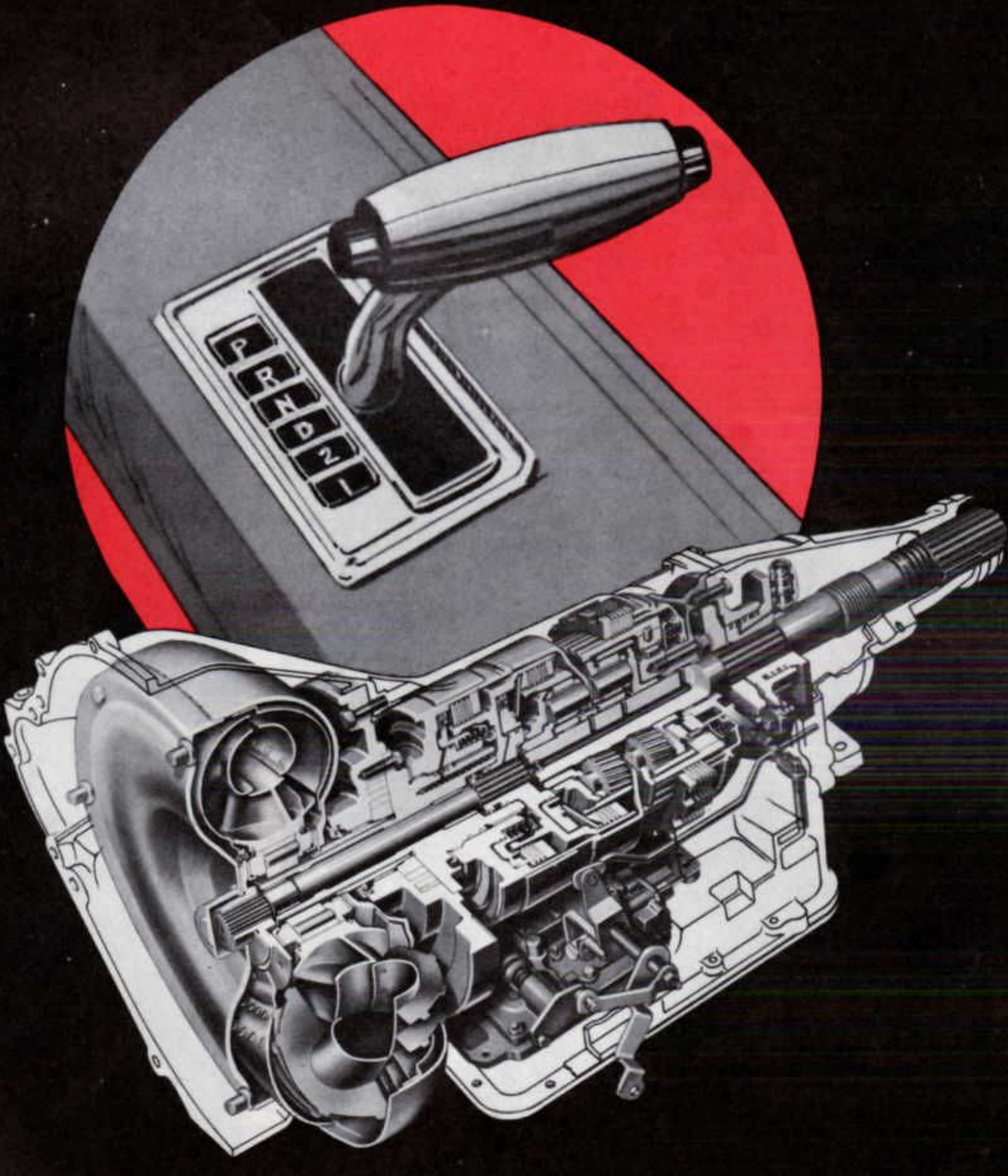
Shop Tips FROM FORD

VOL. 3, NO. 8

Technical parts and service information published by Ford Division to assist servicemen in Service Stations, Independent Garages and Fleets.

featuring...

THE 1966 FAIRLANE GTA SPORTS-SHIFT and C6 TRANSMISSION



Plus...

Valuable information on other 1966 features

See Index Page 2

Be sure to file this and future bulletins for ready reference. If you have any suggestions for additional information that you would like to see included in this publication please write to: Ford Division of Ford Motor Company, Parts and Service Promotion and Training Dept., P.O. Box 658, Dearborn, Michigan, 48121.

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IN THIS ISSUE

1966

REVISED PASSENGER CAR AND TRUCK SPECIFICATIONS

The specifications listed on this page are the latest revisions for 1966 model cars and trucks. By inserting these changes and additions in your copy of the September, 1965 issue of *SHOP TIPS*, you will have the latest available information.

Model	Page	Revised SPECIFICATIONS
Ford	4	**APPROXIMATE REFILL CAPACITIES** Fuel Tank Passenger Car .... 25 gal. Station Wagon .... 20 gal.
Ford	4	Automatic Transmissions Cruise-O-Matic .... 10 qts. All C-4 .... 10¾ qts. All C-6 .... 13 qts.
Ford	5	**ENGINES** 240-Six Brake Horsepower .... 155 @ 4200 Ignition Timing .... 12° 390-V8 (2V) Brake Horsepower .... 265 @ 4400 Maximum Torque (Foot Pounds) .... 401 @ 2600 427-V8 High Performance Bore & Stroke .... 4.23 x 3.98
Fairlane	6	**APPROXIMATE REFILL CAPACITIES** Automatic Transmissions Cruise-O-Matic .... 10 qts. C-4 (170 & 200 Engines) .. 7¾ qts. C-4 (All Others) .... 8¾ qts. C-6 (GT & GTA) .... 13 qts.
Fairlane	7	**ENGINES** 390-V8 Brake Horsepower .... 155 @ 4200 Maximum Torque (Foot Pounds) .... 427 @ 2800 Ignition Timing (Std. Trans.) .... 10° (Auto. Trans.) .... 10°
Falcon Mustang	8 10	**APPROXIMATE REFILL CAPACITIES** Automatic Transmissions Cruise-O-Matic .... 10 qts. C-4 (170 & 200 Engines) .. 7¾ qts. C-4 (All Others) .... 8¾ qts.
Mustang	11	**ENGINES** 289-V8 High Performance Spark Gap Width .... 0.028"—0.032" Ignition Timing (Std. Trans.) .. 12°
Thunderbird	12	**APPROXIMATE REFILL CAPACITIES** Automatic Transmission C-6 .... 13 qts.

Model	Page	Revised SPECIFICATIONS
Bronco	14	**APPROXIMATE REFILL CAPACITIES** Fuel Tank .... 14 gal. Cooling System .... 9½ qts. Transfer Case .... 2¾ pts.
Econoline & Falcon Club Wagon	16	**APPROXIMATE REFILL CAPACITIES** Cooling System .... 13 qts. Automatic Transmission (240-Six Engine) .... 10 qts.
Econoline & Falcon Club Wagon	17	**ENGINES** 240-Six Ignition Timing (Std. Trans.) .... 6°
Trucks—Series 100 through 350 and P Series	19	**APPROXIMATE REFILL CAPACITIES** Rear Axle All capacities should be measured in pints, not quarts
Trucks—Series 100 through 350 and P Series	18	**ENGINES** 170-Six Ignition Timing (Auto. Trans.) 8° 240-V8 Taxable Horsepower .... 38.4 Compression Pressure (PSI @ Cranking Speed) .. 150 @ 200 Oil Pressure Hot (PSI @ 2000 RPM) .... 35-60 300-V8 Compression Ratio .... 8.0:1 Oil Pressure Hot (PSI @ 2000 RPM) .... 35-60 352-V8 Idle Speed RPM (Std. Trans.) . 550-575 Idle Speed RPM (Auto. Trans.) 475-500
Trucks—Series 500 through 1000	21	**ENGINE COOLING SYSTEM REFILL CAPACITIES** P-3500, 4000, 5000 Diesel .... 19 qts. C-6000, 7000 Diesel .... 29 qts. N-6000, 7000 Diesel .... 28 qts.

The 1966 Fairlane GTA Sports-Shift And C6 Transmission

DESCRIPTION

In order to more effectively match transmissions and engines to the wide range of options available on 1966 models, an all new C6 Cruise-O-Matic transmission is used with 390 and 428 CID engines.

The C6 is essentially a larger version of the C4 Cruise-O-Matic used in 1965. The gear trains are the same design, and so are the clutch and band combinations with one exception. The C6 has a low-reverse clutch pack in place of the C4 low-reverse band. Figure 1.

In the hydraulic control system, the principal valves perform identical functions, though there are some minor differences in design. Also there are some new valves in the C6 to help assure a good shift quality.

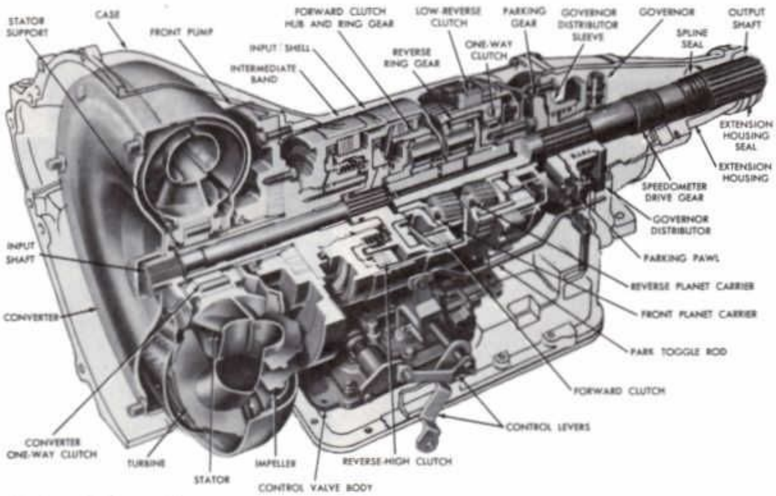

Figure 1—1966 C6 Transmission Schematic

"SPORTS-SHIFT" CRUISE-O-MATIC

The big news in automatic transmissions for 1966 is the "Sports-Shift" Cruise-O-Matic that is available on the high performance Fairlane GTA hardtop and convertible.

This unique concept in automatic transmissions permits the driver to manually shift through the three gears, or provide fully automatic operation as with the conventional Cruise-O-Matic. It enables the driver to shift independently of engine or car speed on both upshifts and downshifts, with the added benefit of torque convertor starts, and fully automatic operation if desired.

The shift pattern is as follows: P (park), R (reverse), N (neutral), D (drive), 2 (second gear), 1 (low gear). See Figure 2.

In the 1 position, the transmission is in low gear and will remain there until shifted to 2 or D positions. In the 2 position, the transmission is in second gear and will remain there until shifted to D or 1 positions. In D position, the transmission is fully automatic, starting in low gear and shifting into second, and then into high gear. With this shifting arrangement the driver can start in 1 (low), then shift to 2 (second) at any speed or peak RPM, and then into D (drive). Or he can elect to start in D (drive) and have fully automatic shifting.

The driver can also downshift from D to 2 or 1 for purposes of deceleration or acceleration with complete engine-transmission protection. Shifting from D to 2 will immediately downshift the transmission to second gear, providing an increased margin of safety as a braking or passing assist. Shifting from D to 1 will also downshift the transmission to second gear, and when road speed is decreased to a safe level, the transmission will downshift to low.

When shifting from Neutral to Reverse or Park it's necessary to depress the control button on the side of the selector lever just as with the conventional floor mounted Cruise-O-Matic. It is also necessary to depress the control button when downshifting from "D" to "2" or to "1" position.

STANDARD CRUISE-O-MATIC

The C6 also has a standard Cruise-O-Matic shift quadrant—Park, Reverse, Neutral, D2 (small dot) D1 (circle) and L (Manual Low) Figure 2.

In the normal driving range (D1), the car starts in low gear, and vacuum-controlled automatic shifting provides smooth gear changes to second and third as road speed increases. The transmission will downshift from high to low at about 10 mph, if the throttle is closed.

Figure 2—C6 Transmission Selectors: Automatic (L) Fairlane Sports-Shift (R)

The 1966 Fairlane GTA

The engine may be started in either Park or Neutral by means of linkage which completes a circuit between a starting switch mounted on the transmission and the cranking motor.

FORCED DOWNSHIFTS—Forced downshifts (kickdown shifts) from high to second gear are possible at speeds as high as 65 mph in D or D2. In D, it's possible to force a downshift to first gear up to 30 mph. Kickdown shifts require depressing the accelerator to the floor to actuate the downshift valve in the transmission.

In D2 range the car starts in second gear and then upshifts to high as road speed increases. This feature is especially useful for more safe accelerations on slippery surfaces. A coasting or closed-throttle downshift occurs at about 10 mph.

Manual low (L) range is primarily for engine braking. When starting in this position there is no upshift from low gear. If the transmission is in high gear in D, or D2 and the selector lever is moved to L, the transmission downshifts to second gear and stays there until about 10 mph, when it shifts to low.

DIAGNOSIS AND ADJUSTMENT

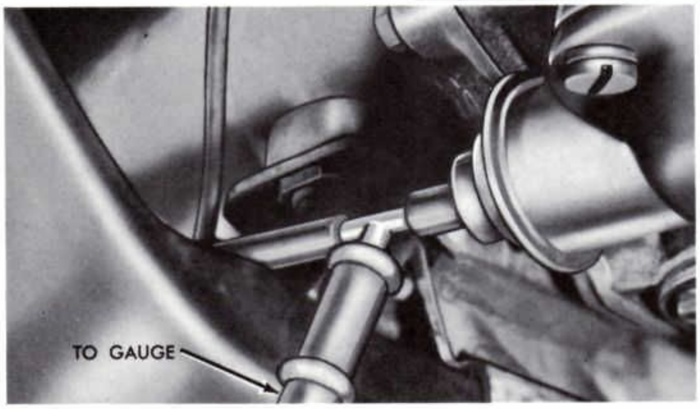

Figure 3—Vacuum Gauge Connection

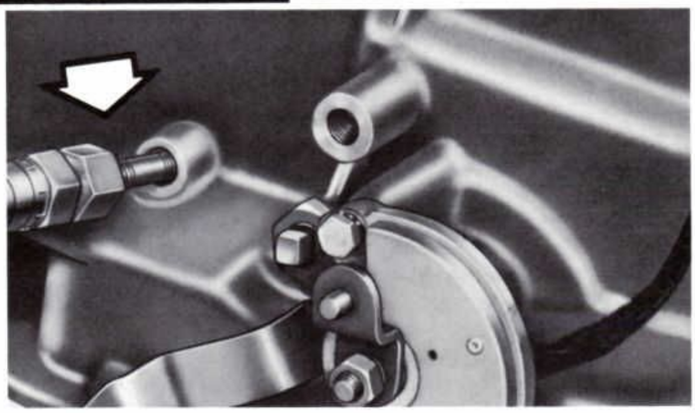

Figure 4—Control Pressure Gauge Connection

One of the most important things to remember about diagnosis and adjustment is to follow a definite procedure. The following guide lists the steps in the order they should be taken to cover the most likely causes of trouble first, and to help eliminate EVERY possibility that doesn't require opening the transmission. Very often, a simple adjustment made during the procedure will correct the problem.

TEST EQUIPMENT

An important part of diagnosis is reliable testing equipment: to check out a Cruise-O-Matic transmission, a tachometer, vacuum gauge and pressure gauge are necessary.

The standard test connections are:

- Tachometer: Connect one lead to the distributor terminal on the coil, and the other to a ground
- Vacuum Gauge: Connect a tee into the diaphragm vacuum line; Figure 3.
- Pressure Gauge: Connect to the control pressure tap at the left front of the case; Figure 4.

FLUID LEVEL AND CONDITION

The very first test to make of ANY automatic transmission complaint is the level and condition of the fluid.

Too little fluid starves the hydraulic system and causes delay in clutch application and slips. There's also danger of the pump taking in air and causing foaming resulting in mushy application of clutches and bands and excessive wear.

Too much fluid can be just as bad as too little. The gear train churns it up with the same results as the pump sucking air.

Certain fluid conditions are important to watch for, such as varnish on the dipstick, or black fluid with the odor of a burned electrical coil, and friction material in the fluid. Varnish on the dipstick indicates the control valves are varnished too—likewise the clutches and gears. Burned, black fluid means overheating and a clutch or band burned out.

Before checking the fluid be sure it is warmed up. Move the selector lever through all the ranges to fill the clutches and servo. Then, with the engine still operating and the selector lever in the Park position, check the fluid level. It should be to the FULL mark on the dipstick, but NEVER HIGHER. If there's too much fluid, take some out. If it's low, add some. And when adding fluid use Rotunda Automatic Transmission Fluid — Ford Part Number C1AZ-19582-A, C, or D. Figure 5.

ENGINE IDLE

Too high an engine idle can cause rough initial shifts because of too much control pressure applying the clutches. Be sure the engine idle is set to specifications. See September, 1965 Issue of "SHOP TIPS" for complete engine specifications.

Figure 5

ENGINE	SPECIFIED RPM	STALL SPEED TEST CHART	
		Above Specified RPM	Below Specified RPM
390 2V	1750-1950	1. Transmission slippage	1. Poor engine performance (needs tune-up etc.)
390 4V	1800-2000	2. Clutches or Bands not holding	2. Converter one way clutch slippage or improperly installed
428 4V	1550-1750		

Chart 1—Stall Speed Test Chart

STALL TEST

The stall test is used to check for clutch slippage in the transmission, torque converter operation and engine performance. It consists of checking the maximum engine RPM at stall in D2, D1, Manual Low, and Reverse. Never make a stall test without first checking that the engine coolant level and transmission fluid level are correct. Then warm up the engine and transmission to operating temperature.

PROCEDURE

1. Connect a tachometer so you can read it from the driver's seat. Mark the maximum specified RPM on the dial with a grease pencil.
2. Firmly apply the parking and service brakes.
3. Shift the selector lever to the range being tested.
4. Push the accelerator pedal steadily to the floor and hold it there just long enough for the tachometer reading to stabilize. Five seconds should be enough.
5. Record the engine RPM.
6. Return the selector lever to Neutral and operate the engine at 1000 RPM for at least a minute for cooling.
7. Repeat the above procedure in each driving range.
8. Refer to Chart 1 for possible cause of malfunction.

RPM TO SPECIFICATION

If a good stall test is obtained in any or all ranges, the holding members in that range are correct. See Chart 2. The only exception to this rule is in one-way clutch holds you won't get any slip. The band must be checked during the road test.

Another important point is that a good stall test in any range indicates the engine performance is good and the converter stator clutch is doing its job.

RPM ABOVE SPECIFICATION

If at any time the rpm exceeds the maximum specified, a clutch is slipping in the transmission. Let off the gas so you don't cause any more damage.

Since the rear wheels are stationary, the transmission can't upshift during a stall test. So by knowing what's applied, you can usually figure out what is slipping.

Sometimes you have to road test to find out more about the slipping. For instance the low-and-reverse clutch can slip in reverse, but you won't know if it slips in L range because the one-way clutch holds. If the intermediate band slips in a D2 stall test, the one-way clutch will take over. Again you'll have to road test.

RPM BELOW SPECIFICATION

Low stall speed indicates either engine performance is below normal or the converter stator one-way clutch isn't holding. Again you can quickly find out which it is with a road test.

If the clutch doesn't lock the stator, you'll have poor acceleration up to about 30 mph. Above 30 mph, acceleration will be normal. With below normal engine performance, acceleration will probably be poor at all speeds.

RANGE	HOLDING MEMBERS APPLIED	
D2	Forward Clutch	—Band
D1	Forward Clutch	—One-Way Clutch
L	Forward Clutch	—Low-and-Reverse Clutch
R	Reverse-and-High Clutch	—Low-and-Reverse Clutch

Chart 2—High RPM Slippage Chart

Here are some of the possibilities:

- Slip in all ranges—Control pressure lost
- Slip in D2, D1 and L—Forward Clutch
- Slip in D1 only—One-way Clutch
- Slip in reverse only—Reverse-and-High Clutch or Low-and-Reverse Clutch

ROAD TEST

A properly conducted road test is just about your most valuable diagnosis tool. By checking the speeds at which various shifts occur and the "feel" of the shifts, the exact cause of complaint can be diagnosed.

Before you go on the road, install an extra return spring on the downshift rod so you'll be sure and "feel" the detent.

The 1966 Fairlane GTA

MINIMUM THROTTLE SHIFTS

To check minimum throttle upshifts, give the car just enough gas to barely accelerate. You should have at least 17 inches of vacuum for all minimum throttle shifts (see Chart 3).Seventeen inches of vacuum is not enough to raise control pressure or to cause modulated throttle pressure to act on the shift valves to delay the shift.

With the selector in D1 position the forward clutch and governor supply system is charged with control pressure. The clutch applies and you are in first gear. If the shift is good you can be sure the primary governor valve is not stuck in the out position. If it were, governor pressure would build up immediately causing an immediate upshift to second.

Throttle Opening	Range	Shift	Engine Axle 390-2V, 4V 3.00:1 428-4V 3.00:1	Engine Axle 390-2V, 4V 3.25:1 428-4V 3.25:1	Engine Axle 390-4V 2.80:1 428-4V 2.80:1
			Spec.	Spec.	Spec.
Closed (Above 17" Vacuum)	D^1	1-2	7-14	6-12	8-14
	D^1	2-3	11-22	11-20	13-23
	D^2	3-2	7- 9	6- 8	8-10
	D^1	3-1	7- 9	6- 9	8-10
	L	2-1	7- 9	6- 8	8-10

Chart 3—Minimum Throttle Shift Points

MINIMUM THROTTLE 1-2

When you reach about 10 mph, governor pressure cuts in causing a 1-2 shift. A smooth 1-2 shift at 10 mph tells you the governor, 1-2 shift valve train, accumulator and scheduling valve are all free and that the servo is applying the band. If the band doesn't apply, you stay in first gear and upshift to third at a higher speed.

MINIMUM THROTTLE 2-3

Without increasing the throttle setting, check for 2-3 shift around 15 mph. (In all cases, the exact ranges specified for each engine-axle-tire combination are listed in the charts.) Now, governor pressure has risen to overcome the 2-3 shift valve spring, which moves the 2-3 shift valve and changes the reverse-and-high clutch system. As the clutch applies, release pressure on the servo releases the 1-2 shift band. The governor is still doing its job, the clutch circuit is hydraulically tight and the 2-3 shift valve is free.

CLOSED THROTTLE 3-2

Put the selector lever in D2 range and coast down in high gear. Governor pressure should cut out at about 10 mph, the 2-3 shift valve is forced back by its spring and relieves pressure on the reverse-and-high clutch system. Oil pressure is exhausted through a 3-2 coasting valve. A smooth shift tells you the 3-2 coasting valve is free and the governor is still working properly.

CLOSED THROTTLE 3-1

In D1 range, also check the coastdown shift. When governor pressure cuts out, both the 2-3 shift valve and 1-2 shift valve move up from spring force. Only the forward clutch is still pressurized and the car is free-wheeling.

CLOSED THROTTLE 2-1

When you shift out of high gear in D1 or D2 to manual low (L) range, the transmission downshifts to second. If you start at high enough speed (55 mph) and don't get slip on this shift, the coast boost valve is free.

When governor pressure cuts out as you coast down to 10 mph, you get a 2-1 downshift. This time, though, first gear is not freewheeling, since the low-and-reverse clutch is on. To be sure it's holding, accelerate to 25 mph in first gear (L) and test for engine braking.

Throttle Opening	Range	Shift	Engine Axle 390-2V, 4V 3.00:1 428-4V 3.00:1	Engine Axle 390-2V, 4V 3.25:1 428-4V 3.25:1	Engine Axle 390-4V 2.80:1 428-4V 2.80:1
			Spec.	Spec.	Spec.
To Detent (Torque Demand)	D^1	1-2	28-43	26-39	32-47
	D^1 D^2	2-3	52-74	48-67	59-80
	D^1 D^2	3-2	21-40	20-36	24-43

Chart 4—"To Detent" Shift Points

"TO DETENT" SHIFTS

The "to detent" upshifts (Chart 4) are full throttle shifts. Throttle pressure is maximum and modulator pressure is available to delay upshifts.

"TO DETENT" 1-2 AND 2-3

In D1 range, push the accelerator to the detent position and hold it there. Check the upshift points. If they're to specifications, the throttle valve, throttle booster valve, and throttle modulation valve are operating freely. Also, the governor is still doing its job.

TO DETENT 3-2

At about 25 mph in high gear, push the accelerator to the detent. The transmission should quickly downshift, to second gear. Going into low gear momentarily on this shift could mean a stuck 3-2 coasting control valve is delaying the band application.

Throttle Opening	Range	Shift	Engine Axle 390-2V, 4V 3.00:1 428-4V 3.00:1	Engine Axle 390-2V, 4V 3.25:1 428-4V 3.25:1	Engine Axle 390-4V 2.80:1 428-4V 2.80:1
			Spec.	Spec.	Spec.
Through Detent (W.D.T.)	D^1	1-2	38-46	35-42	43-50
	D^1 D^2	2-3	72-84	66-76	81-90
	D^1 D^2	3-2	64-75	59-68	73-81
	D^1	2-1 or 3-1	26-34	24-31	30-37

Chart 5—"Through Detent" Shift Points

"THROUGH DETENT" SHIFTS

Through the detent, we have the downshift system charged, exerting the maximum shift-delay force on the shift valves. The shifts will come in at the highest shift points (Chart 5).

Check the through detent-upshift by pushing the accelerator to the floor in D1 range and holding it there. Check the kickdown shift points by pushing the accelerator through detent at the appropriate road speed. These shift points are a check on the downshift valve and governor pressure output above 10 mph.

BAND ADJUSTMENT

If you have any difficulty with intermediate gear on the road test, a band adjustment is in order when you get back.

Some possible indications of a slipping band are:

- First gear start in D2 (2 in the GTA)
- Upshift directly from first to high
- Bump on 1-2 upshift or dragged-out shift

Besides adjusting the band, look for any evidence of leakage around the servo cover seal.

ADJUSTING PROCEDURE

1. Loosen the locknut on the adjusting screw several turns (Figure 6).
2. Torque the screw to 10 ft-lbs. or until the adjuster wrench overruns.
3. Back the screw off exactly one turn.
4. Hold the adjustment and torque the locknut to 35-45 ft-lbs.

Of course, if second gear appeared to be the only problem, you should repeat those parts of the road test.

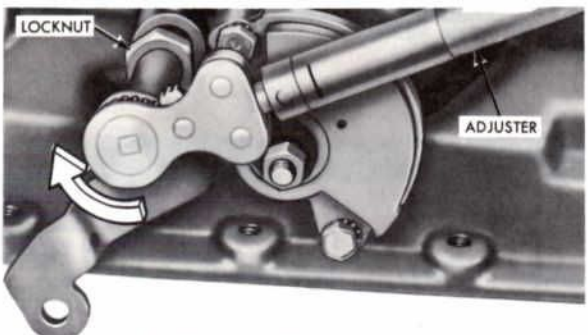

Figure 6—Band Adjustment

CONTROL PRESSURE TESTING

Pressure tests should be performed any time there is slip in the gear train or the shift feel isn't right. Harsh, delayed upshifts often are the result of too much throttle pressure. The harshness comes from the throttle boost to control pressure and the delay from excess modulated throttle pressure. Of course, slip and no-drive conditions can be caused by too little control pressure—either from excess leakage in the system or sticking valves.

If you come back from the road test with a slipping hydraulic clutch, the control pressure test in the various ranges will probably tell you whether the slip is caused by a hydraulic leak or mechanical failure.

In the pressure tests, begin by checking control pressure in all ranges with no throttle pressure input, then check the control pressure rise when pulling the vacuum down to build throttle pressure.

PRESSURE CHECK AT IDLE

1. With the vacuum gauge and pressure gauge connected, place the tester where you can read the gauges from the driver's seat.
2. Check that the manifold vacuum is high—at least 18 inches, if the vacuum is very low, crack the throttle a little and it should rise. If it doesn't, locate and correct the lead before you go on.

Engine Vacuum at Idle	Control Pressure (psi)
17"	51-66
16"	51-72
15"	51-78
14"	51-84
13"	51-90
12"	51-97
11"	51-103

Chart 6—Idle Operation Pressure Specifications

At higher altitude than sea level, you may not be able to get the vacuum as high as 18 inches. In that case, these are your control pressure specifications for idle operation. See Chart 6.

3. Depress and release the accelerator quickly to be sure that vacuum changes with throttle setting. If the vacuum changes seem to lag, you may have a restricted vacuum line to the diaphragm. Repair it before you go on.
4. Record the control pressure in all ranges as shown on Chart 7.

Engine R.P.M.	Manifold Vacuum Ins. Hg.	Throttle	Range	P.S.I. Control Pressure Spec.	P.S.I. Throttle Pressure Spec.
Idle	Above 17	Closed	P	51-66	0-13
			N	51-66	0-13
			D^1	51-66	0-13
			D^2	51-66	0-13
			L	51-66	0-13
			R	72-108	0-13
As Req'd.	15	As Req'd.	D^1	70-78	20-22
As Req'd.	10	As Req'd.	D^1	98-109	40-44
As Req'd.	1 or Lower	Open	D^1	157-172	77-84
			D^2	157-172	77-84
			L	157-172	77-84
			R	230-252	77-84

Chart 7—Control Pressure Specifications

LOW PRESSURE AT IDLE

Low pressure in all the ranges at idle points to some problem in the pressure supply-low pump output; excessive leakage in the pump, case or valve body; or a sticking regulator valve.

If the pressure is low in only certain ranges, there is probably a hydraulic leak in one of the systems that's charged in those ranges. For example, a leak in the forward clutch and governor system could cause low pressure in all forward ranges, but pressure would be good in Reverse, Park and Neutral. Of course, the leak would have to be bad enough that the pump volume could not keep up with the leakage.

The 1966 Fairlane GTA Sports-Shift And C6 Transmission

CONTINUED

HIGH PRESSURE AT IDLE

High pressure at idle probably is caused by a throttle pressure input to the pressure booster valve. If the diaphragm leaks, throttle pressure is going to be high and will boost control pressure.

To check where the vacuum leak is, remove the vacuum gauge tee and connect the gauge directly to the vacuum hose to see if vacuum is higher with the diaphragm out of the picture. If necessary, check vacuum at the other end of the hose to see if the hose leaks. Of course, if either the hose or diaphragm unit leaks, it must be replaced.

PRESSURE RISE CHECK

1. Set the parking brake and apply the service brakes firmly.
2. In the forward ranges, increase the throttle setting to pull the vacuum down to 15 inches and record the control pressure. Repeat the procedure and record the pressures at 10 inches of vacuum and at less than one inch. Make the final test in reverse also.
3. Between tests, operate the engine at 1000 rpm in Neutral for a minute for cooling.

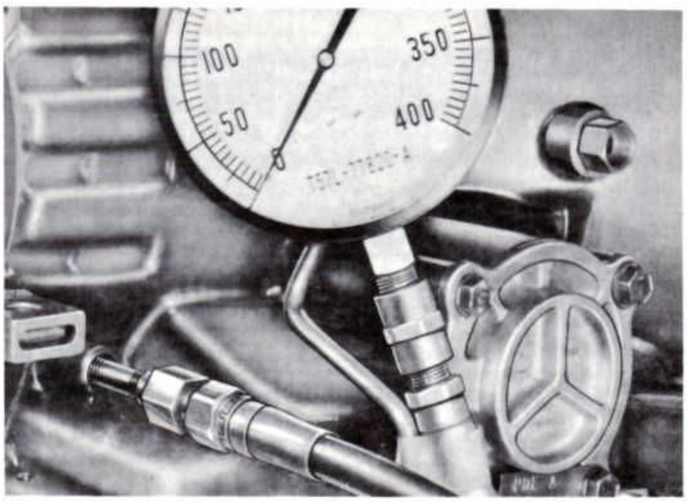

Figure 7–Throttle Pressure Gauge Connection

PRESSURE DOESN'T INCREASE

If you don't get a pressure increase as vacuum drops, check the mechanical connection between the diaphragm and throttle valve. If the control rod isn't assembled, there's no spring force on the throttle valve so throttle pressure can't build up.

PRESSURE INCREASES NOT TO SPECIFICATIONS

If the pressure does increase, but is not within specifications, you may have a stuck throttle valve, pressure booster valve or regulator valve. You can isolate the cause by actually reading throttle pressure on the C6 transmission.

Engine Speed	Throttle	Manifold Vac. (Ins. Hg.)	Range	Throttle Pressure (psi)	Control Pressure (psi)
Idle	Closed	Above 17″	P, N, D1, D2, L & R	0-13 0-13	51-66 72-108
As Req'd	As Req'd	15″	D1, D2, L	20-22	70-78
As Req'd	As Req'd	10″	D1, D2, L	40-44	98-109
As Req'd	Open	0.5″	D1, D2, L R	77-84 77-84	157-172 230-252

Chart 8–Throttle Pressure Gauge Specifications

THROTTLE PRESSURE GAUGE

Connect another pressure gauge to the throttle pressure tap. (Figure 7). Check the throttle pressure against the specifications shown in Chart 8.

If throttle pressure is okay and control pressure isn't, your trouble is in the valve body. If throttle pressure is low, the throttle valve is at fault.

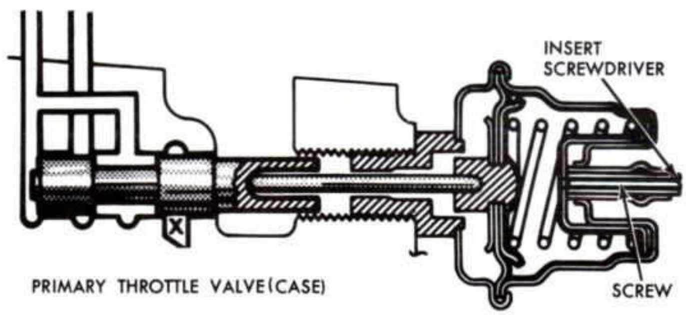

Figure 8–Diaphragm Adjusting Screw

ADJUSTING THE DIAPHRAGM

On rare occasions, the diaphragm assembly may need adjusting. It's preset at the factory, but once in awhile all the pressure readings are slightly high or low and adjusting the spring tension will fix it.

The adjusting screw is accessible by removing the vacuum line (Figure 8). One full turn of the screw changes the control pressure two to three psi. Turn the screw in to increase pressure; out to decrease it.

IMPORTANT: Never adjust the pressure below specifications to alter the shift feel, as this is liable to cause slip and burned clutches.

1966 Ford Drive Shafts

All Fords utilize a drive system employing an exposed drive shaft with universal joints at either end. All drive shafts are of seamless steel tubing of uniform wall thickness. Forged yokes are welded on each end of the shaft to accommodate the universal joints, and then the entire assembly is precision balanced to provide more vibration-free operation.

SINGLE STEEL TUBE DRIVE SHAFT

SINGLE TUBE DRIVE SHAFT WITH SOUND-PROOFING LINER

RUBBER-ISOLATED TUBE-IN-TUBE DRIVE SHAFT

RUBBER-DAMPED STEEL TUBE DRIVE SHAFT

Single Steel Tube Drive Shaft—Used on some Falcon models, the single steel tube drive shaft provides well-balanced connection between the transmission and the rear axle without excess weight. Because this basic drive shaft is used only with the 170 CID 6-cyinder engine and three-speed manual transmission, where lower power requirements are anticipated, no insulation of "damping" is required.

Drive Shaft With Soundproofing Liner—Used on all Mustangs and all Falcons except those with the 170 CID engines and three-speed transmissions, this drive shaft provides a sound barrier in the drive line to block any vibration and extraneous noise. The construction is similar to that used for the single steel tube, with the addition of the soundproofing liner and the use of heavier steel in the tube.

Rubber-Isolated, Tube-In-Tube Drive Shaft—Used in all Fords with 3.25:1 and 3.50:1 axles, and in all Fairlanes and Thunderbirds, the rubber-isolated drive shaft is a specially constructed, two-piece, rubber-cushioned design that effectively reduces transmission of road noise or hum and provides a smooth, quiet power flow to the rear wheels. One drive shaft section is fitted within the other and supported with resilient rings of high-quality rubber to form a secure connection, with the necessary flexibility to absorb noise and vibration.

Rubber-Damped Drive Shaft—Used exclusively in Fords with 2.80:1 axles, except in the 427 CID V-8 engine. The rubber-damped drive shaft has internally-mounted rubber "doughnuts" that absorb vibration and help prevent transmission of noise into the passenger compartment.

DRIVE SHAFT SPECIFICATIONS

Model	Drive Shaft Type
Ford All models with 2.80 to 1 or 3.00 to 1 axle except "352" or "427" V-8	Rubber-Damped One-Piece
All models with 3.00 to 1 or 3.50 to 1 axle, and all "352" and "427" V-8s	Rubber-Isolated Tube-In-Tube
Falcon All models with "170" Six and 3-Speed Manual Transmission	Single Steel Tube
All other models	Single Steel Tube Soundproofing Liner
Fairlane All models	Rubber-Isolated Tube-In-Tube
Mustang All models	Single Steel Tube Soundproofing Liner
Thunderbird All models	Rubber-Isolated Tube-In-Tube

FORD'S NEW THERMACTOR EXHAUST

DESCRIPTION & OPERATION

The Thermactor Exhaust Emission Control system is mandatory on ALL 1966 Ford cars and F-100 trucks sold in the state of California. Used in conjunction with the closed-type crankcase emission system, it controls the amount of unburned hydrocarbon and carbon monoxide gases which are emitted from internal combustion engines, which under certain conditions may contaminate the air.

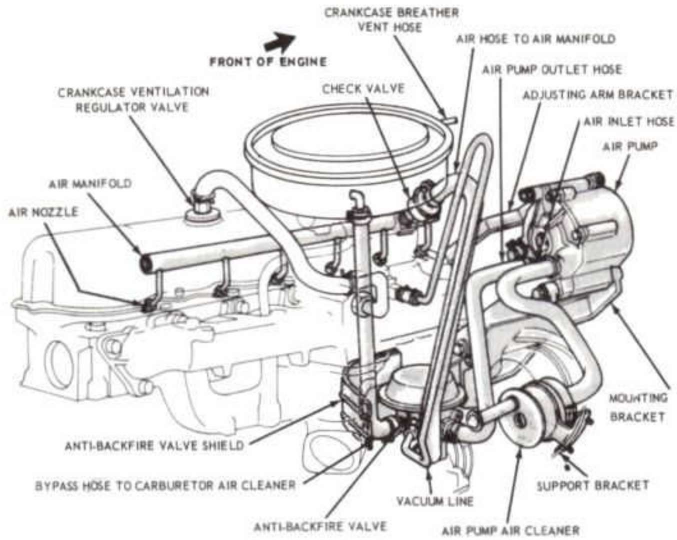

Figure 1—Thermactor System Installation—6-Cylinder Engine

The Thermactor system reduces contamination by injecting fresh air under pressure into the manifold at the exhaust valve of each cylinder. The oxygen in the air, plus the heat of the exhaust gases cause combustion during the exhaust stroke of the piston. The undesirable gases are burned in the exhaust manifold and then flow out the exhaust system.

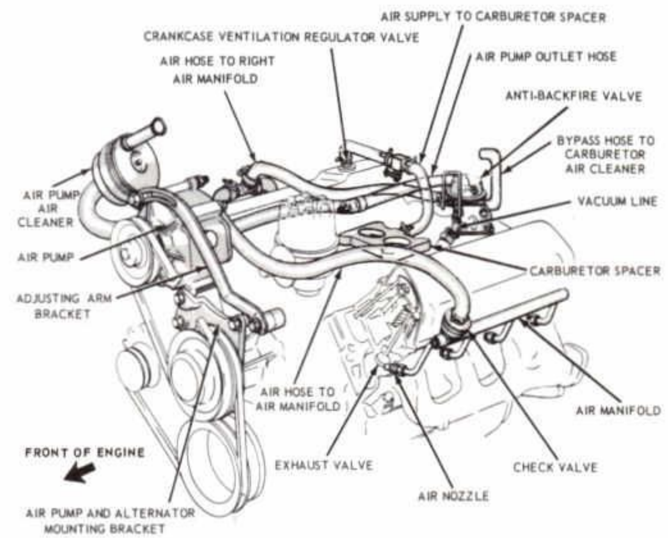

Figure 2—Thermactor System Installation—8-Cylinder Engine

Components—The Thermactor system (Figures 1 & 2) consists of the following components: air supply pump; air manifold for each cylinder head; backfire—suppressor valve; air filter for the air pump; check valve on each air manifold; air nozzle for the exhaust port of each cylinder; air supply hoses and vacuum sensing line.

Air Supply Pump—A vane-type air pump, belt driven by the engine supplies all the air under pressure for the system. The vanes rotate past three chambers in the housing—intake, compression and exhaust. Each vane completes a pumping cycle in every revolution of the pump.

Air is drawn through a filter and into the intake chamber. A vane moves the air into the smaller compression chamber. The now pressurized air is moved into the exhaust chamber. Hoses and air manifolds for each cylinder route the pressurized air into nozzles that terminate just under the exhaust valve heads.

A spring loaded relief valve (Figure 3) is located in the exhaust chamber and relieves exhaust air flow if the pressure exceeds a preset value.

Exhaust Check Valve—Located in the air inlet side of each air supply manifold, is an exhaust check valve (Figures 1 & 2). It prevents a backflow of exhaust gases into the air supply pump in the event exhaust pressure is greater than air pump delivery pressure.

Backfire—Suppressor Valves—Two types of backfire suppressor valves are used; an air gulp-type for large displacement engines, and an air by-pass-type for small and medium displacement engines.

Air Gulp-Type Valve—The air gulp-type valve has one air inlet and one air outlet (Figure 4).

It is mounted on the engine and operates only during periods of sudden decrease in intake manifold pressure, such as occurs immediately following the closing of the throttle, after a period of acceleration. A rich fuel mixture results due to the momentary continuation of fuel flow from the carburetor.

The overly rich mixture isn't completely burned by the air being injected into the exhaust ports. Upon the next firing of the cylinder, the flame traveling out the exhaust port may ignite the overly rich mixture and cause an explosion or backfire in the exhaust system. To prevent this condition and insure complete burning of the gases, the backfire-suppressor valve allows additional air to enter the induction system whenever the intake manifold pressure decreases.

Air By-pass-Type Valve—The air by-pass-type valve has two air outlets and one air inlet as shown in Figure 4 and operates essentially the same as the air gulp-type valve, except for the following three main differences:

1. All the air to the air manifold passes through the backfire-suppressor valve.
2. No Thermactor air is directed to the intake manifold.
3. During deceleration, Thermactor air delivery to the exhaust system is cut off and the air is diverted to the carburetor air cleaner for silencing purposes only.

EMISSION CONTROL SYSTEM

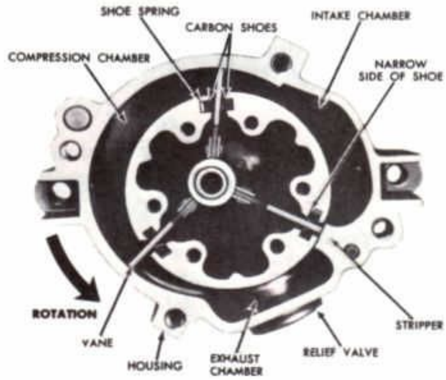

Figure 3—Air Pump Interior

Service and Diagnosis—The design of the Thermactor system is such that certain carburetor and distributor recalibrations are necessary for best performance. (See specifications below.) In addition, before perfoming any diagnosis involving the Thermactor system, it must be determined that other engine components are functioning properly. To do this, the backfire-suppressor valve vacuum sensing hose and air supply hose MUST be disconnected at the intake manifold.

For best results and most efficient operation, the emission control system hoses, tubes, oil separator screen, fittings, and carburetor spacer should be cleaned; and the emission control valve replaced every 12,000 miles. Also the air pump filter element must be replaced every 12,000 miles.

If engine components not part of the Thermactor system are functioning properly, use the following diagnosis guide to isolate Thermactor malfunctions.

Excessive Backfiring in Exhaust System—Damaged, plugged, disconnected or leaking backfire-suppressor valve or vacuum sensing hose.

Defective or malfunctioning backfire-suppressor valve resulting in insufficient air delivery to the intake manifold or air delivery not timed to engine requirement.

Excessive Hesitation on Acceleration after Sudden Throttle Plate Closure (Above 20 MPH)—Intake vacuum leak at backfire-suppressor valve, vacuum hose or air outlet hose (to intake manifold).

Defective or malfunctioning backfire-suppressor valve.

Air Supply Hose(s) Baked or Burned—Defective exhaust; check valve.

Engine Surges at all Speeds—Backfire-suppressor valve defective or stuck open; improper carburetor adjustment-idle speed, idle speed mixture, automatic choke, etc.

Noisy Air Pump Drive Belt—Drive belt improperly adjusted. Seized or failing air pump. Misaligned or defective pulleys.

Rough Engine Idle—Improper carburetor adjustment-idle speed, idle fuel mixture, automatic choke, etc. Improper initial ignition timing. Intake vacuum leak at the backfire-suppressor valve vacuum hose or air inlet hose. Backfire-suppressor valve defective or stuck open.

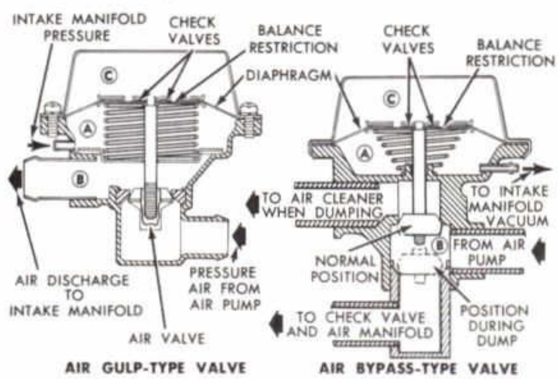

Figure 4—Backfire Suppressor Valves Schematic

SPECIFICATIONS—THERMACTOR EQUIPPED ENGINES ONLY

ENGINE IDLE RPM*

Manual-Shift Transmission and Lights On

170, 200, 240, and 300 6 cyl. engines 625-650

289, 352, and 428 V-8 engines............ 610-635

Automatic Transmission and Lights On

170, 200, 240, and 300 6 cyl. engines

and Mustang 289 4V engine 550-575

289, 352, 390, 428, V-8s 525-550

**On vehicles equipped with air conditioning, the engine idle speed should be set with the air conditoner in operation for a minimum of twenty minutes.*

DRIVE BELT TENSION

New ....110-140 lbs.

Used (any belt operated over 10 minutes)....80-110 lbs.

INITIAL IGNITION TIMING—BTDC**

170, 200, 240, and 300 6 cyl. and 289 V-8

352, 390, and 428 V-8 ....6 degrees

***If the individual requirements of the vehicle and/or the use of substandard fuel dictate, the initial timing may have to be retarded from the normal setting to eliminate detonation. If retarding is necessary, it should be performed progressively and not exceed 2 degrees BTDC.*

TORQUE LIMITS

Exhaust Check Valve-to-Air Manifold ....16-19 ft-lbs.

Air Manifold Nut-to-Cylinder Head .... 5-7 ft-lbs.

Air Pump Drive Pulley-to-Pump Hub Bolt ....10-15 ft.lbs.

Air Pump Mounting Bolts ....23-28 ft-lbs.

Dual-Action Tailgate Adjustment

(1966 Station Wagons)

All Ford Station Wagons for 1966 are equipped with the new Dual-Action tailgate which operates both as a door and as a tailgate.

A unique design of hinges and latches makes this operation possible. At the lower left is a hinge that pivots in either a horizontal or a vertical direction. The upper left hinge pivots for door operation or releases for tailgate operation. The lower right hinge releases or pivots as required. At the upper right, a standard design cam-type latch is used.

When performing simple adjustments on the 1966 Ford Station Wagon Dual-Action Tailgate, best results can be obtained if these adustments are carried out in the following order:

1. LOWER LEFT HINGE

The pillar half of this hinge is adjustable up and down, by means of enlarged holes in the hinge and pillar. This provides for crease line alignment at the left side of the tailgate.

The door half of this hinge is adjustable in and out and from side to side by slotted enlarged holes in the tailgate. This provides for panel surface alignment and margin (gap) adjustment at the lower left side of the tailgate. See Figure 1.

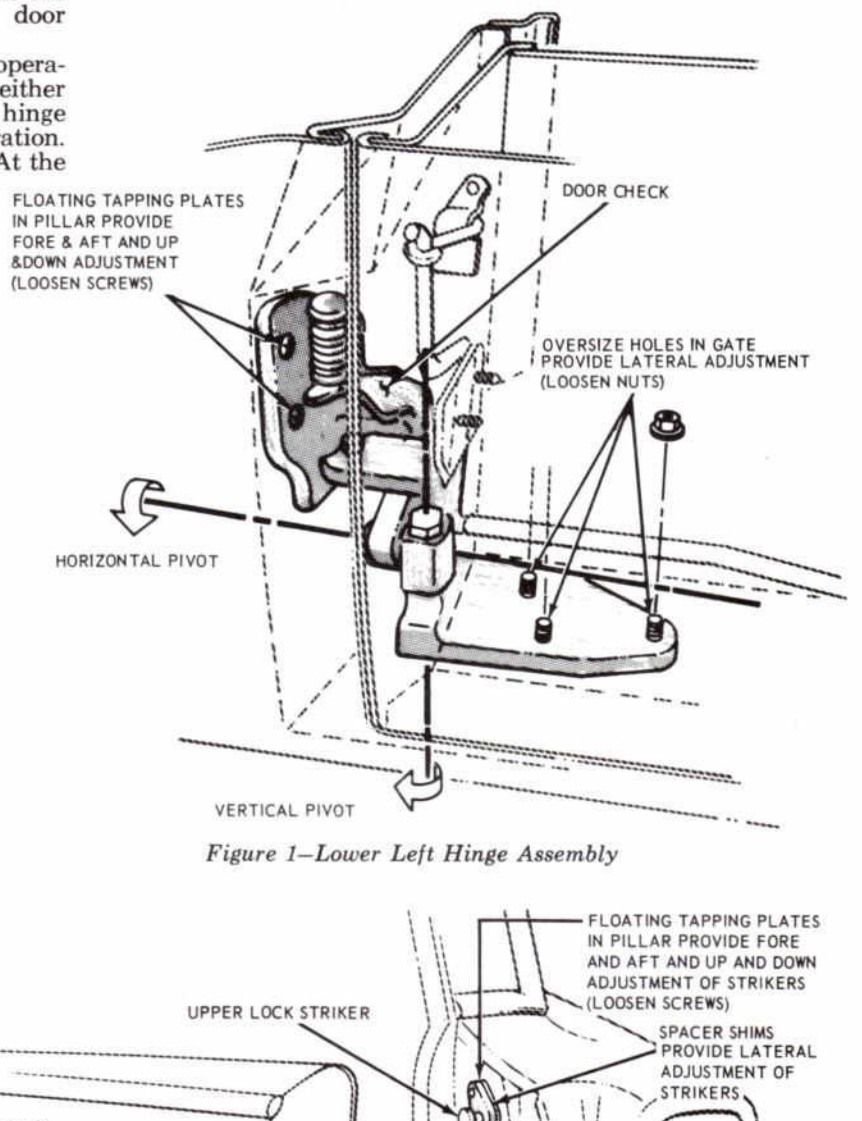

Figure 1—Lower Left Hinge Assembly

2. UPPER LEFT HINGE AND LATCH

The pillar portion of this upper hinge and latch is adjustable in and out, up and down through a movable tapping plate in the pillar. This provides for panel surface alignment at the upper left portion of the tailgate and for proper functional alignment to the two halves of the combination hinge-latch. There are also shims between this half of the hinge latch and the pillar. These are to provide for margin (gap) adjustment at the upper left portion of the tailgate and, with the lower hinge, provide for control of sag when the tailgate is opened as a door.

3. UPPER AND LOWER STRIKER PLATES—RIGHT SIDE

These striker plates adjust like those in conventional doors. They provide for panel surface alignment at the right side of the tailgate. Because the upper and lower latches are linked mechanically, it is important to get proper in and out adjustment of these striker plates relative to each other, in order to have the latches operate smoothly. Best procedure is to set the lower striker plate to give correct panel surface alignment and then set the upper striker plate to give smooth latch operation. See Figure 2.

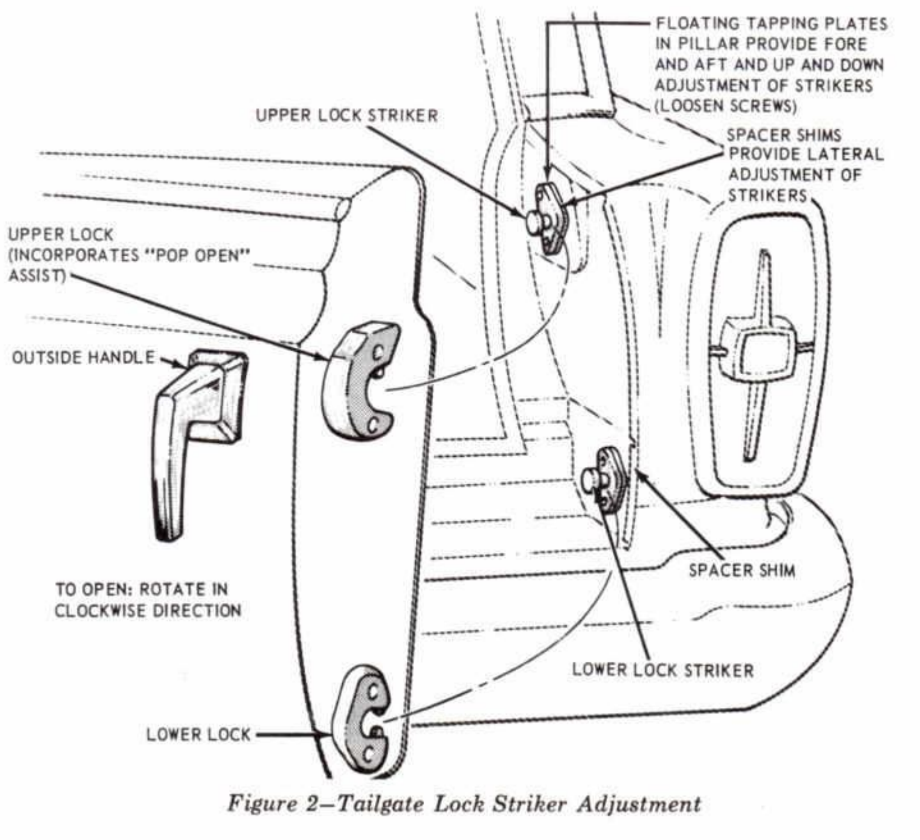

Figure 2—Tailgate Lock Striker Adjustment

1966 FORD LIGHT TRUCK REFERENCE AND SELECTION CHART

Series	Wheelbases (in.)	Nominal Body Lengths Range (Ft.)	Body Styles	Maximum GVW	Maximum Gross Body Equipment and Payload Allowance*
RANCHERO 	113.0	6	Pickup	4400	1250*
ECONOLINE PICKUP 	90	7	Pickup	4930	2075*
ECONOLINE VAN AND SUPERVAN 	90	9-10	Panel Van, Standard Van, Display Van, Window Van,	4930	2050*
F-350 	132	7½—9	Chassis-Cab, Styleside Pickup, Flareside Pickup, Stake, Platform, Chassis-Cowl, Chassis-Windshield	8000 (Single Rear Tires) 10,000 (Dual Rear Tires)	4195 6150
F-100 	115 129	6½—8	Chassis-Cab, Styleside Pickup, Flareside Pickup, Stake, Platform,‡ Chassis-Windshield‡	5000	1925
F-100 4x4 	115 129	6½—8	Chassis-Cab Styleside Pickup, Flareside Pickup,	5600	2050
F-250 	129	7-8	Chassis-Cab, Styleside Pickup, Flareside Pickup, Stake, Platform, Chassis-Windshield	7500	4000
F-250 4x4 	120	7-8	Chassis-Cab, Styleside Pickup, Flareside Pickup, Stake, Platform	7700	3700
AND BRONCO 	92	4	Roadster Sports Utility, Wagon	4700	1775†

*Payload allowance (body included in chassis curb weight). †Roadster. ‡115" Wheelbase only.

TECHNICAL SERVICE

LOCKING DIFFERENTIAL LUBRICANT

(All Models)

All vehicles equipped with locking differentials, regardless of engine size, must use Locking Differential Additive (Ford Part Number C1AA-19B546-A) to provide quieter and smoother operation. One ounce of additive should be used with each pint of C1AZ-19580-E or F Hypoid Gear Lube. SAE grade 90 lubricants are recommended for all temperatures above −25 degree F. For temperatures below −25 degrees F, the same type of lubricant, but of an SAE 80 grade should be used.

POWER STEERING PUMP OIL LEAKS

(1965-1966 Ford, Thunderbird, Falcon, Mustang and Fairlane with Ford-Thompson Power Steering Pump)

When a power steering pump appears to be wet with oil for no apparent reason, it may be the result of oil by-passing the filler cap seal.

This condition can be caused by low engine idle RPM in vehicles equipped with a manual transmission, or a loose pump belt in vehicles equipped with either the manual or automatic transmissions. During low pump speed, the oil displaced by the pump piston is not recirculated through the system, causing the reservoir to overflow. Low pump speed is usually accompanied by "catch-up" and loss of power assist.

To correct for this problem, the following steps should be taken:

1. Check power steering pump belt tension. Adjust to specifications, if necessary.
2. Check engine idle RPM. Adjust to specifications if necessary.
3. Check fluid level in reservoir (on straight neck reservoirs, fluid level should be at the bottom of the filler neck. On angled neck reservoirs, fluid should be to correct level indicated on dip stick).
4. Thorughly clean oil and dirt off the pump.

For Specifications, see September, 1965 issue of SHOP TIPS.

PINCHED SECONDARY WIRING

(1965 Ford with 352 or 390 CID Engines)

The secondary ignition harness (driver side) may become pinched between the coil and air cleaner on vehicles with 352 or 390 CID engines. This condition can be caused by improper routing which results in chafing of the insulation causing eventual grounding of the wire and loss of ignition at the spark plugs.

To reduce the possibility of such ignition failures, remove the air cleaner and position the wires as shown in Figure 1.

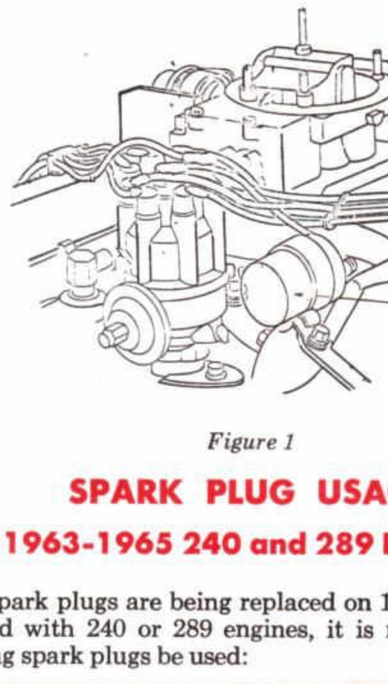

Figure 1

SPARK PLUG USAGE

(1963-1965 240 and 289 Engines)

When spark plugs are being replaced on 1963-1965 vehicles equipped with 240 or 289 engines, it is recommended the following spark plugs be used:

SPARK PLUG	FORD PART NUMBER	APPLICATION
BF 42	B8A-12405-A	240-289 engines Normal passenger use.
BTF 42	C5TZ-12405-A	240-289 engines Passenger cars pulling trailers or other heavy duty use. Light trucks. Econoline.
BF 32	COAZ-12405-A	289 High Performance engines
BTF 6	B7A-12405-A	240 engine Police and Taxi use.

The BF 42 spark plug is factory installed equipment on 1966 models with the 289 CID engine for improved idle speed characteristics.

CAMSHAFT REMOVAL

(All 401,477 and 534 Truck Engines)

Removal of the valve rocker arm shaft assemblies and the cylinder heads when removing the camshaft, is no longer recommended. Instead, back off the valve lash adjusting screws turning the crankcase as necessary to follow the firing order; then slide the rocker arms to one side and remove the push rod in sequence. To complete removal of the camshaft follow these steps:

1. Remove the distributor and governor, and the push rod cover.
2. Remove the valve tappets keeping them in order so that they can be replaced in their original position.
3. Remove the crankshaft front oil slinger. Align the timing marks on the camshaft and crankshaft timing gears.
4. Remove the camshaft thrust plate retaining bolts. Remove the camshaft gear, spacer, thrust plate and camshaft as an assembly.

VALVE ROCKER ARM IDENTIFICATION

(1962-66 240, 300, 221, 260 and 289 CID Engines)

Although similar in appearance, the 240 and 300 CID 6-cylinder engine valve rocker arms are not interchangeable with those used on the 221, 260 and 289 CID V8 engines. To minimize the possibility of installing the incorrect rocker arm on any of these engines, they may be identified by a cast letter on the upper surface of the push-rod end of the rocker arm. The cast letter "E" is used to identify the 240 and the 300 CID 6-cylinder engine rocker arms. The cast letter "A" identifies the 221, 260 and 289 CID V8 rocker arms.

UNIVERSAL JOINT MAINTENANCE

(All Truck Lines)

Inadequate or improper lubrication is among the most common causes of U-joint failure. To insure proper lubrication, of all four bearing assemblies on truck universal joints, it is essential that lubricant is added until it appears at all journal cross bearing seals. This assures removal of dirt particles and other contaminants that find their way into the bearing. Bearing cavities are not filled with new lubricant unless flow is noticed around all four bearing seals.

If lubricant does not appear at one or more bearing seals, move the driveshaft in all four directions and pull on the bearing cap opposite while lubricant gun pressure is applied to the lube fitting.

Specified lubricant is Rotunda Multipurpose Lubricant, (R-156-A) Ford Part Number C1AZ-19590-B.

FUEL PUMP DIAGNOSIS

(All Ford Vehicles)

Sometimes, noise diagnosed as fuel pump noise may really be noise originating from the engine or other area of the vehicle. It is therefore appropriate that more emphasis be placed on the other abnormal noises possible, present in an engine, that could be thought to be coming from the fuel pump.

When performing tests relative to this problem, the engine must be hot with temperatures normalized.

First of all, any peculiar noise that can be associated with the fuel pump will have a frequency rate of ½ the crankshaft speed. This immediately eliminates bearing knocks, piston slap, piston pin knocks, and possible piston ring noises.

Following is a list of the possible causes of abnormal valve train noises and sounds that could possibly be mistaken for a noise emanating from or caused by the fuel pump.

1. Excessive valve stem to rocker arm clearance. In hydraulic lifter-type valve trains, a few thousandths clearance in excess of the amount the lifter can compensate for, will produce a slight click which could be mistaken for fuel pump noise.
2. Valve seating noise due to excessive valve guide clearance produces a slight hollow clicking sound similar to a fuel pump.
3. Sluggish hydraulic lifters, which do not recover the clearance produced during the leakdown cycle will produce a noise much like excessive clearance noise.
4. Valve spring clicking due to improper orientation of the damper coil (if so equipped) can be mistaken for fuel pump noise especially if it occurs in the number 5 cylinder.
5. Camshaft movement fore and aft due to excessive camshaft end play will produce a hollow-like thumping sound which can be mistaken as coming from the fuel pump.
6. A loose fuel pump eccentric bolt will obviously produce abnormal noises.

Use of stethoscopes or sounding rods are an aid in pinpointing the origin of a particular sound; however, extreme care must be taken with the use of these devices as sounds are easily carried throughout the engine.

It is especially important when using a sounding rod in the vicinity of the fuel pump, that inherent normal sounds emanating in the pump are not mistaken for the particular sound causing the complaint.

The final test for verifying a noise which is thought to be produced by the fuel pump is to remove the assembly from the engine and operate the engine on the residual fuel in the carburetor or by using an auxiliary gravity fuel supply. If the complaint sound disappears and reappears when the pump is reinstalled, the fuel pump should be replaced.

Check Out The Big "ONE FREE" Offer

On Distributor Point Sets During November-December

During November-December, participating Ford Dealers are offering a big "One Free" offer on FoMoCo distributor point sets. You can buy any nine at the everyday low wholesale discount price, and get the tenth one free. This can mean big savings for you plus big profit when you sell the one set you receive free as part of the "One Free" offer.

FoMoCo distributor points are made to the most rigid production standards, and feature the highest quality design which makes them right for Ford replacement jobs. You know they're right because FoMoCo points feature these four important advantages:

- Unique Vent Hole to minimize pits and deposits and provide extra cooling for longer life
- Electro Polished Tungsten points provide positive electrical contact over maximum surface to assure longer life
- Beryllium-Copper Strip plus steel spring flex indefinitely without excess fatigue or hardening
- Steel Base Plate and pivot post help maintain original factory alignment

AND DON'T FORGET THESE RELATED IGNITION PARTS

Check your Ford Dealer for competitive wholesale prices on other ignition parts such as FoMoCo Rotors and Condensers. It will pay you to visit your Ford Dealer for all your parts needs.