Shop Tips FROM FORD

OCTOBER, 1965

VOL. 3, NO. 7

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

The New Ford BRONCO

This issue includes features and servicing information on Bronco . . . plus info on other models. See index on page 2.

From Your Ford Dealer

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.

FoMoCo GENUINE PARTS

ROTUNDA

IN THIS ISSUE

REMINDER!

Many Service Training aids and publications are available directly from Ford. These include items such as 1966 and earlier model Shop Manuals, Wiring Diagrams, Specifications Booklets, Technical Handbooks, and others. See your Ford Dealer (Parts Manager or Service Manager) for a complete list and validated order form. Mail order form and check for the proper amout to:

Ford Service Publications
Post Office Box 7750
Detroit, Michigan 48207

INTRODUCTION TO THE

The Bronco is an all purpose "go anywhere–do anything" Utility Vehicle. It features all the versatility of three vehicles in one. It has passenger car styling, comfort, convenience, ride and handling; plus 4-wheel drive power and traction, off road capability, special use capability and heavy load capacity.

The Bronco can serve as a quick service unit on road calls, for tire repair, battery charging and gassing runs. Equipped with special power equipment it can also be used for a variety of other jobs such as snow plowing, winching and just about anything you can think of.

ROADSTER

The standard roadster without a roof or doors is the basic model of the Bronco series. Its windshield folds flat and can be secured to the hood with a spring-loaded pin. It features a cargo area of 55.2″ by 61″ in the rear.

SPORTS UTILITY

This model has a steel half roof, doors and roll-up glass windows. The roof encloses the passenger compartment plus the storage area behind the seat. In warm weather the steel top can be unbolted and removed.

WAGON

The Bronco wagon has a full-length roof with fixed side windows, plus doors with roll-up glass windows and a swing open rear window. Tailgates are the same for each model. In this form, the Bronco is completely lockable for safe storage of tools or luggage.

NEW BRONCO

EQUIPMENT	STANDARD	OPTIONAL
ALTERNATOR	38 amp.	45 amp. or 55 amp.
AXLE, FRONT: Capacity (lb.)	2500	
AXLE, REAR: Capacity (lb.), Ratio (to 1)	2780-4.11	2780-4.57, 3300*-4.11 or 4.57
Ratios for 2780 and 3300 limited-slip	—	4.11 or 4.57
BATTERY: (12 volts)	54 plates—45 amp. hr.	66 plates—55 or 70 amp. hr.
BRAKES, SERVICE: Size (in.) front	11 x 2	—
rear	10 x 2½	—
BRAKES, PARKING: Type	Cable actuation of rear brakes	—
CLUTCH: Dia. (in.)—Area (sq. in.)	9⅜—81.5	9⅜—81.5 HD
ENGINE:	170 cu. in. Six	—
SHOCK ABSORBERS: Front and Rear	Double-acting	—
SPRINGS, FRONT: Coil: Capacity @ pad (lb. ea.)	760	850
SPRINGS, REAR: Single-stage: Capacity @ pad (lb. ea.)	930	1280
STEERING: Gemmer	Worm & roller	—
TRANSFER CASE: Constant mesh, Dana 20	2 spd. through-drive	—
TRANSMISSION: Fully synchronized, Ford	3 spd. direct	—
WHEELS: No.—type—rim size (in.)	5—5 hole disc—5½K	5—5 hole disc—5K**
TIRES:	Tubeless 7.35-15 4 PR PT	Tube-type 6.50-16 6PR TT**

*Includes 11" x 1¾" rear brakes.

**Maximum tube-type available: for additional tires and wheels, see your Ford Dealer.

NOTE: With standard equipment, Bronco has a GVW warranty rating of 3900 lb. A 4700 lb. maximum GVW package may be purchased as a unit. This package includes a Ford 3300 lb. rear axle with 11 x 1¾ brakes, 1280 lb. rear springs and 8.15 x 15 8 PR tubeless tires.

POWER TRAIN

Bronco is powered by a 170-cubic-inch, 105-horsepower six-cylinder engine. Unique to the Bronco engine are a special carburetor and fuel pump, a special oil bath air cleaner; and a large, seven quart-capacity oil pan. The clutch housing is cast iron.

The Bronco transmission is a manual three-speed, fully synchronized design with column-mounted selector.

The two-speed transfer case has a single, floor-mounted shift lever. In sequence from front to rear, the lever provides "4-wheel drive, low," "neutral," "2-wheel drive, high," and "4-wheel drive, high." It is not necessary to stop or declutch when shifting into or out of "4-wheel drive, high." See Figure 1.

The transfer case, in addition to providing the 4-wheel drive compound low gear, provides "neutral" for the operation of an optional power-takeoff.

"Through-drive" design is featured in the transfer case to provide direct drive to the rear wheels without engaging the gears in the transfer case when the front axle is disengaged.

Constant velocity, double-cardan universal joints are used at the transfer case for both front and rear driveshafts to divide the angle equally between joint members and permit a higher mounting position for the transfer case for maximum ground clearance at the center of the vehicle with vibration-free operation.

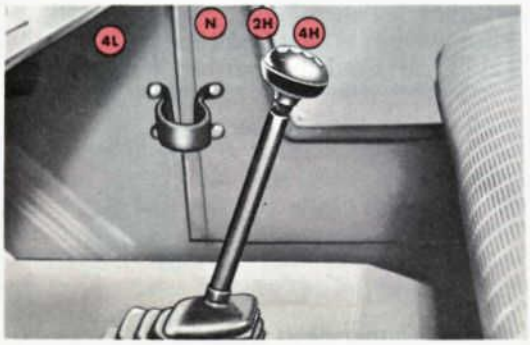


Figure 1—Bronco 4-Wheel Drive Transfer Case

Two rear axles are offered on the Bronco—a standard axle of 2,780 pounds' capacity, and an optional axle of 3,300 pounds' capacity. Both are available with optional limited-slip differential.

Front brake drums are 11-inch diameter by 2 inches in width with rear drums 10 inches in diameter by 2½ inches wide. These oversized brakes provide the Bronco driver with easier stopping and lighter pedal effort.

CHASSIS FEATURES

The Bronco front suspension is a unique design which combines extreme ruggedness with complete anti-dive characteristics.

This is achieved through a tubular beam axle located by forged steel radius rods and track bar. Because the radius rods transmit the braking and driving force and the track bar maintains axle alignment, coil springs are utilized for optimum riding comfort. Front shock absorbers are mounted to the radius arm for maximum control.

A new 37-degree-turn front axle is used on the Bronco to provide minimum turning circle diameter. Even with its 92-inch wheelbase for added riding comfort and stability, a Bronco can be turned in a 34-foot circle, curb to curb.

The rear springs of the Bronco are semi-elliptic leaf design, featuring Ford's exclusive taper-leaf configuration for minimum harshness. Optional heavy-duty, single-stage springs also are available for maximum loads. Rear shock absorbers—like the front shock absorbers featuring constant viscosity fluid—are mounted outboard.

The Bronco frame is of box section construction through its entire length, as are front and rear cross members. Eight special rubber cushions effectively insulate the Bronco body from chassis and road noise.

BRONCO 4-WHEEL DRIVE

OPERATION AND SERVICE TIPS

In order to diagnose the cause of a problem, it is best to visualize what is going on inside the mechanism while it is in operation. In the case of the Bronco 4-wheel drive system, this is not too difficult because it is not a very complicated mechanism.

TRANSFER CASE

The transfer case input shaft is splined to the transmission output shaft. Splined to the transfer case input shaft is the transfer case main drive gear. Anytime there is an input to the transfer case, the main drive gear turns. See Figure 2.

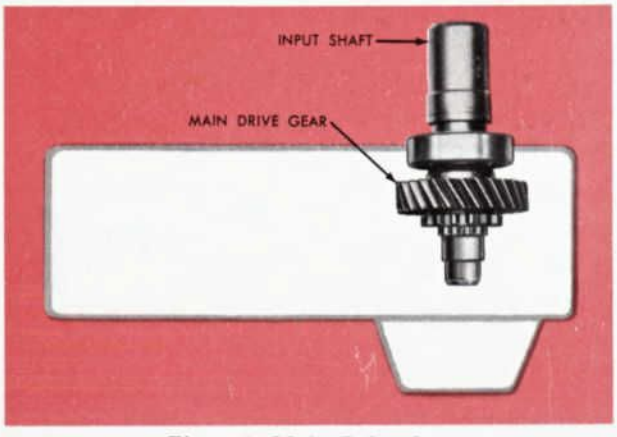


Figure 2–Main Drive Gear

IDLER SHAFT GEARS

In the center of the transfer case is the idler shaft two-gear cluster. Two-gears–the idler shaft drive gear and the idler shaft low speed gear–are machined from the same piece of stock. The idler shaft drive gear is always in mesh with the input shaft main drive gear. So the idler shaft gears also turn whenever there is an input from the transmission. See Figure 3.

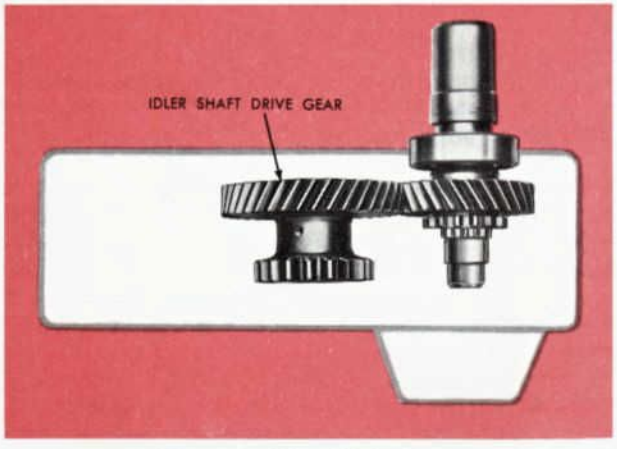


Figure 3–Idler Shaft Gears

HIGH-SPEED GEAR

The front output high speed gear is in constant mesh with the idler shaft drive gear. In neutral, it runs free on the front output shaft. The high speed gear has the same number of teeth as the main drive gear, so it will always turn with the main drive gear–at the same speed and in the same direction. See Figure 4.

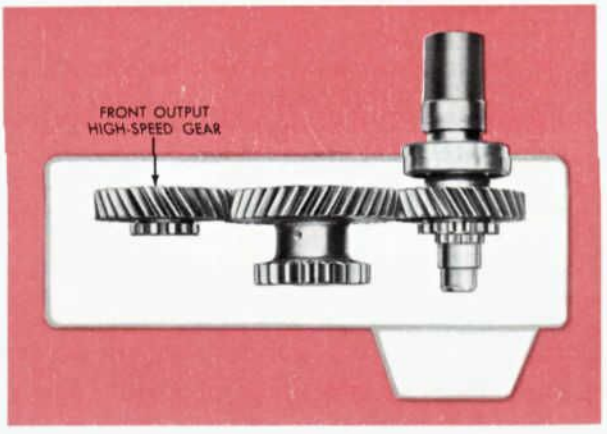


Figure 4–High-Speed Gear

REAR OUTPUT SHAFT, SLIDING GEAR AND CLUTCH

The rear output shaft is mounted in the transfer case on the same center line as the input shaft. Splined to the output shaft is a sliding gear and clutch. It can move forward to engage the clutch teeth on the main drive gear, thus locking the output shaft to the input shaft for direct drive. The sliding gear and clutch can also move rearward to mesh with the idler shaft low-speed gear, permitting the idler shaft to drive the rear output shaft for reduction. See Figure 5.

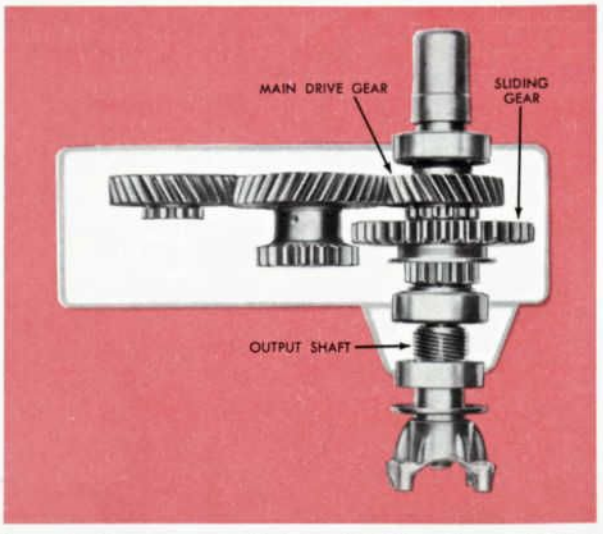


Figure 5–Rear Output Shaft and Sliding Gear and Clutch

FRONT OUTPUT SHAFT AND SLIDING GEAR

For front wheel drive, the front output shaft supports the front output high-speed gear. This shaft also has a sliding gear and clutch splined to it. The front output shaft sliding gear and clutch can move forward to lock the output shaft to the high-speed gear for direct drive; or it can move rearward to mesh with the idler shaft low-speed gear and drive the front output shaft in reduction. See Figure 6.

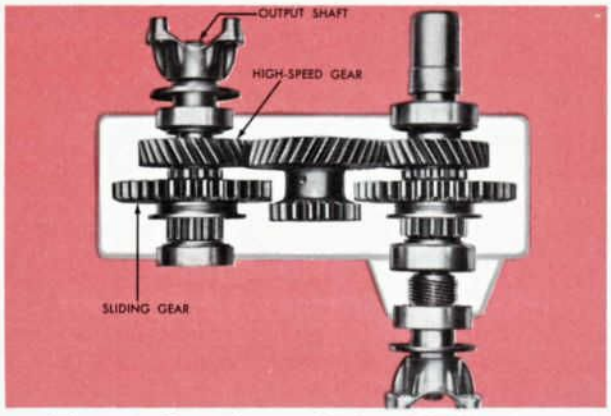


Figure 6–Front Output Shaft and Sliding Gear

SHIFTING GEARS

The sliding gears are moved by forks connected to two shift rails. The shift rails are connected to the floor shift lever through an adjustable clevis linkage. Spring-loaded "detent" balls and interlock pins fall into notches in the shift rails to give the driver the feel of completed shifts.

4L POWER FLOW

When shifting to 4L (4-wheel drive, low range) the shift rails move both sliding gears rearward to mesh with idler shaft low-speed gear. Since the sliding gears are splined to the output shafts, the idler low-speed gear can drive both output shafts. Power flow is from the input shaft and main drive gear to the idler gears. At the idler low-speed gear, the power splits and continues through the sliding gears and output shafts to the front and rear drive shafts. The transfer case gear reduction is 2.46 to 1.

2H POWER FLOW

In the 2H position (2-wheel drive, high range) the rear output shaft sliding gear is moved fully forward and engages with the main drive gear. This locks the main drive gear to the rear output shaft. The front output shaft sliding gear remains in the neutral position so the high-speed gear is still free-running and there is no action at the front axle. Power flow is straight through the input shaft and main drive gear, the rear output shaft sliding gear, and the rear output shaft to the rear wheel drive shaft. Power is transmitted through the transfer case to the rear axle only and without a change in gear ratio.

4H POWER FLOW

In the 4H (4-wheel drive, high range) position, both sliding gears are moved fully forward. The rear output sliding gear locks the main drive gear to the rear output shaft, just as in 2H. Also, the front output shaft sliding gear locks the front output shaft to the front output shaft high-speed gear. Power flow splits at the main drive gear and continues through the rear output shaft and also goes through the idler shaft drive gear to the high-speed gear and to the front output shaft.

OPTIONAL FREERUNNING HUBS

In the standard axle, the wheel hub is splined to a driving hub which is splined to the outer end of the axle shaft. It is not desirable to have the axle shafts turning with the wheels when in 2-wheel drive, because when the axle shaft turns the differential and the front drive shaft will have to turn too.

In the freerunning hub, a spring loaded jaw clutch is used to lock the wheel hub to the axle shaft. The inner jaw is splined to the wheel hub. The outer jaw is splined to the axle shaft. Unlocking the jaw clutch is as simple as turning the selector knob on the end of the hub 90 degrees either way. See Figure 7. Turning the knob causes cam action to force the outer jaw back out of engagement with the inner jaw. Then the front wheels can roll without dragging the axle drive shaft.

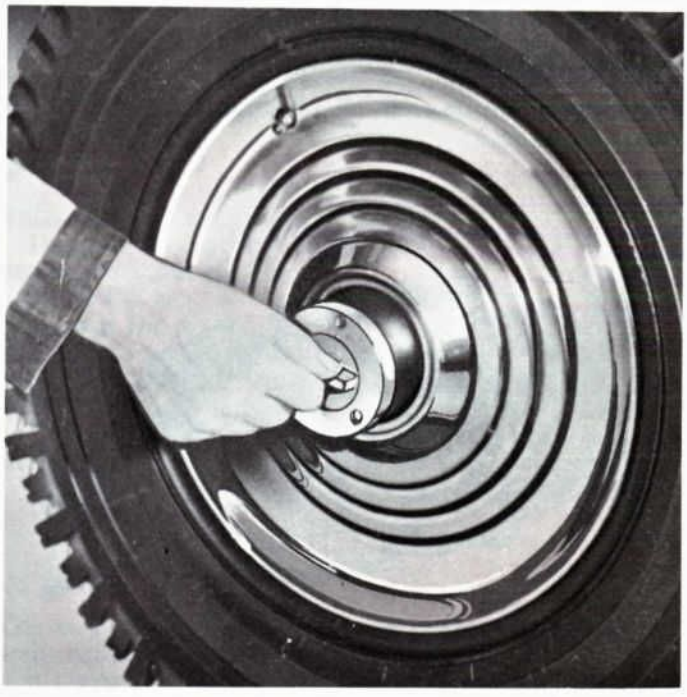


Figure 7–Hub Selector Knob

FRONT AXLE DRIVE

The front axle drive pinion is on the left side on the ring gear. Thus the front drive shaft and the drive pinion turn counterclockwise to drive the ring gear and the wheels forward. The rear axle drive pinion turns clockwise to drive the rear wheels forward. Remember that the rear axle is a right-hand drive. The front axle, because of the counterclockwise pinion rotation is referred to as a left-hand drive.

BRONCO 4-WHEEL DRIVE

OPERATION AND SERVICE TIPS • CONTINUED

CONSTANT-VELOCITY U-JOINTS

Because the driving gear and driven yokes are rotating in different planes, the driven shaft is accelerated twice and decelerated twice in each revolution. Normally, with small operating angles, this non-consistent velocity effect is slight and is compensated for by flexibility in the drive line or by matching the axle drive pinion angle with the transmission output shaft angle. When the angles are matched, the axle pinion turns at the same angular velocity as the transmission output shaft, and only the drive shaft turns at a non-constant velocity. See Figure 8.

With large working angles, accelerating and decelerating the drive shaft can cause some serious noise and vibration, and can cause early joint failure especially at high speeds. On the Bronco, the working angles at the axle ends are small, but there are some angles of more than 10 degrees at the transfer case ends. A single caradan joint would not give vibration-free operation at these angles. For this reason, there is the double Cardan or constant-velocity universal joint in the Bronco. It is constructed so that the working angle is always split exactly in half between the two joints. This is accomplished by a ball-and-socket mechanism inside the joint.

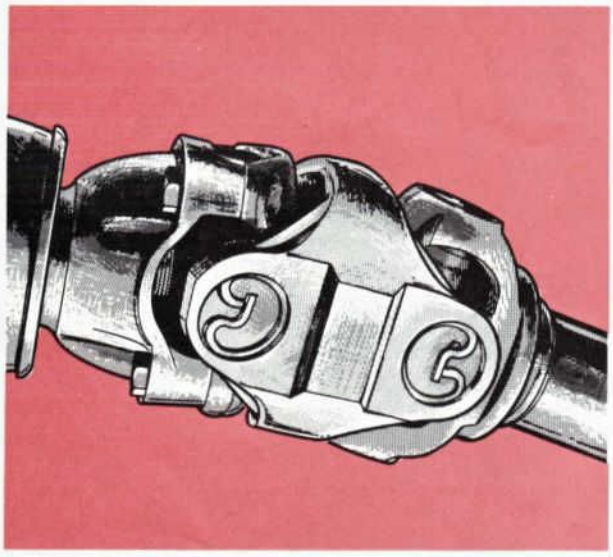


Figure 8–Constant Velocity U-Joints

CONSTANT VELOCITY

Dividing the angle equally between the two points has the same effect as cancelling or matching angles at the two ends of the drive shaft. The first joint's input yoke and spider turn at a constant velocity. The center yoke of the double Cardan joint is accelerated and decelerated. Since the double Cardan joint provides cancelling angles, the output spider and yoke turn at a constant velocity.

SERVICE TIPS

TRANSFER CASE SHIFT LINKAGE ADJUSTMENT

If it is necessary to adjust the transfer case shift linkage, remove the pin that attaches the shift rod clevis to the rail link. Turn the clevis on the rod to lengthen or shorten the connection as necessary. Proper adjustment will position the shift lever straight up and down in neutral.

CLUTCH PEDAL ADJUSTMENT

Proper clutch pedal adjustment is also necessary for proper shifting. Total pedal travel should be 6 5/8 to 6 7/8 inches. Adjust the clutch pedal stop at the upper end of the pedal to obtain the specified travel. Then tighten the stop nut to 12-16 foot pounds torque.

CLUTCH PEDAL FREE PLAY

Clutch pedal free play is 1 3/16 to 1 3/8 inches. Adjust the free play by backing off the lock nut and turning the sleeve on the release pushrod. This adjustment should be made with the retracting spring removed, then checked with the spring in place.

FRONT WHEEL TOE-IN

Front wheel toe-in is the only front suspension adjustment required. Toe-in is 1/32 to 5/32 inch. Adjust toe-in to this dimension by loosening the two tie-rod clamp bolt nuts and turning the tie-rod sleeve as required. Tighten the clamp nuts securely.

LUBRICATION

The lubricant specified for the transfer case is:

Above 10°F. Engine Oil SAE 50 Ford Spec. ESE-M2C39

Below 10°F. Engine Oil SAE 30 Ford Spec. ESE-M2C37

2 3/4 pints should bring the level to the bottom of the filler plug hole. The lubrication covers the front output shaft and idler gear only. The other gears are lubricated by splash. See the September, 1965 issue of Shop Tips for more maintenance and lubrication information.

FRONT AXLE "KINGPIN" BEARING PRELOAD

When servicing the spindle arms on these vehicles, it is important that the "kingpin" bearing preload be adjusted so that a torque of 5 to 10 foot-pounds is required to turn the entire front wheel with the tie-rod removed.

ADJUSTING THE AXLE GEARSET

Remember that the Bronco front axle is operated in left-hand drive. That means using the coast side of the ring gear for drive in the forward gears. If you have occasion to adjust the gearset in this axle, set the pattern on the drive side.

NEW SERVICE FEATURES For 1966 Passenger Cars

DISC BRAKES

The Ford disc brake system and the general servicing and repair of this system are basically similar to the 1965 Thunderbird disc brake system. (See Shop Tips, December, 1964).

No manual adjustment is required, inasmuch as the caliper assembly maintains the shoes in correct adjustment at all times (similar to the automatic adjusters in drum-type brakes.)

The power booster used with disc brakes is not to be overhauled. The booster unit should be replaced as an assembly when necessary. Adjustment of the booster push rod-to-master cylinder can be made as required.

ADJUSTMENT PROCEDURE

Under normal service, the adjustment screw does not require any further attention providing the push rod assembly remains in the original unit. However, when a new push rod is used or the push rod assembly is transferred to another unit, the distance from the end of the adjustment screw to the mounting surface of the booster body should be rechecked with a micometer depth gauge or with a height gauge to a dimension of 0.980″-0.995″. See Figure 1. To adjust the push rod, hold the serrated end of the rod with crossmilled pliers and turn the adjustment screw in to shorten or out to lengthen.

After assembly of the master cylinder to the power section, the piston cup in the hydraulic cylinder should just clear the compensating port hole when the unit is in the fully released position. This can be checked by placing a few drops of brake fluid over the compensating port and applying a light air pressure to the output port of the master cylinder. If air bubbles appear, the port is open. If the primary piston cup overlaps the compensating port, there will be no flow of air through the compensating port. If this condition exists, the adjustment screw should be turned into the push rod a slight amount or until the compensating port is open.

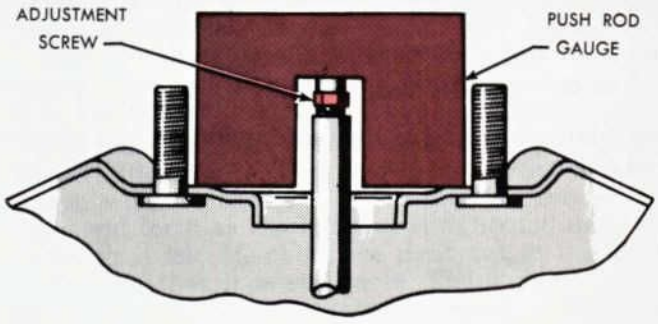


Figure 1–Push Rod Adjustment

FALCON & FAIRLANE PARKING BRAKE

The parking brake is foot-operated and has a manual release handle. Two parking brake equalizer-to-rear wheel cables (one for each rear wheel) are used on the Fairlane. A single cable passing through the equalizer connects the parking brakes at both rear wheels on Falcon passenger cars and Fairlane station wagons.

ADJUSTMENT PROCEDURE

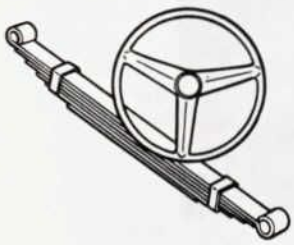
Fully release the parking brake pedal.

Depress the parking brake pedal one notch from its normal released position.

Raise the car.

Loosen the equalizer lock nut, and turn the adjustment nut forward against the equalizer until a moderate drag is felt when turning the rear wheels, then tighten the lock nut.

Release the parking brake, and make sure that the brake shoes return to the fully released position.



STEERING and SUSPENSION

FORD REAR SUSPENSION

The 1966 Ford rear suspension incorporates a number of detailed improvements. These improvements include better ride balance, better station wagon handling, reduced transmission of road and axle noise, more secure shock absorber attachment, longer lived track bar bushings and a simplified pinion nose bumper.

FRONT SUSPENSION– FALCON AND FAIRLANE

The suspension upper arm inner shaft is bolted to the body side member and is not adjustable. The suspension lower arm attachment to the underbody incorporates an eccentric bolt or cam. A strut is attached to the outer end of the lower arm and to the underbody front cross member. See Figure 2, page 8. Camber adjustment is accomplished by rotating the cam at the inner end of the arm. Rotating the cam moves the lower arm laterally to tilt the wheel in either an inward or outward direction as desired.

Caster adjustment is accomplished by changing the distance between the outer end of the lower arm and the strut front mount. This adjustment is made at the forward end of the strut and moves the outer end of the lower arm in a fore-or-aft direction to obtain the desired caster angle.

NEW SERVICE FEATURES For 1966 Passenger Cars

...CONTINUED

STEERING LINKAGE—FALCON AND FAIRLANE

The linkage used with standard steering incorporates changes principally in the Pitman arm and idler arm areas on six-cylinder models and in idler arm area on V-8 models. The linkage now is basically the same as the 1965 and 1966 Ford standard steering linkage.

The power steering linkage, as in the past, is similar to the standard steering linkage but modified to accomodate attaching of the power cylinder and the control valve.

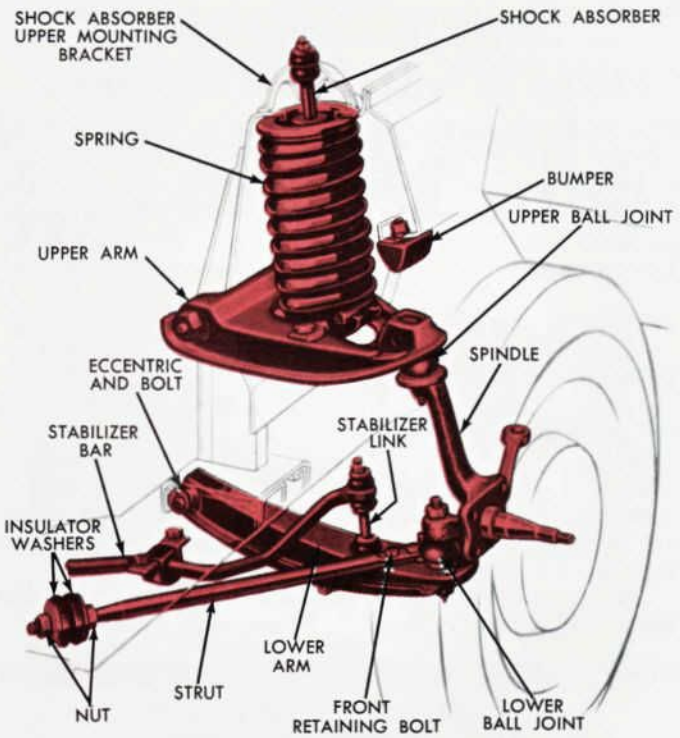


Figure 2—Falcon, Fairlane Front Suspension

POWER STEERING—ALL CAR LINES

The power steering pump is not to be overhauled. The pump is to be replaced as an assembly when inoperative or if it leaks at any point other than the reservoir seal. Service replacement seals are available to correct reservoir leakage. Replacement reservoirs and reservoir attaching parts are also available through your Ford Dealers' Parts Department.

VALVE CENTERING SHIM REPLACEMENT

Replacement of the valve centering shim can be accomplished without removing the piston and recirculating balls from the worm shaft, provided the proper tools are used.

Hold the steering gear over a drain pan in an inverted position and cycle the input shaft six times to drain the remaining fluid from the gear.

Mount the gear in a soft jawed vice.

Turn the input shaft to either stop, then turn it back approximately 1¾ turns to center the gear.

Remove the two sector shaft cover attaching screws and the identification tag.

Tap the lower end of the sector shaft with a soft-faced hammer to loosen it, then lift the cover and shaft from the housing as an assembly. Discard the O-ring.

Remove the four valve housing attaching bolts. Lift the valve housing from the steering gear housing while holding the piston to prevent it from rotating off the worm shaft.

Remove the valve housing and the lube passage O-rings and discard them. Place the valve housing, worm and piston assembly in a bench-mounted holding fixture with the piston on top.

Rotate the piston upward 3½ turns.

Loosen the worm bearing lock nut and hold the lock nut up out of the way and loosen the attaching nut.

Lift the piston-worm assembly from the valve housing. During removal, hold the worm to prevent it from spinning off the shaft.

Change the power steering valve centering shim.

Install the piston-worm assembly into the valve housing being sure to hold the worm to prevent it from spinning off the shaft.

Install the valve housing attaching nut and torque. See Figure 3.

Install the power steering worm bearing lock nut.

Rotate the piston upward backing off ½ turn.

Remove the valve housing, worm, and piston assembly from the holding fixture.

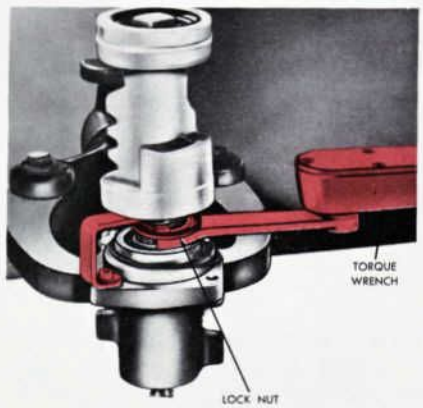


Figure 3—Valve Centering Shim Replacement

Position a new lube passage O-ring in the counterbore of the gear housing. Apply petroleum jelly to the teflon seal on the piston, and place a new O-ring on the valve housing.

Slide the piston and valve into the gear housing being careful not to damage the teflon seal. Then align the lube passage in the valve housing with the one in the gear housing and install but do not tighten the attaching bolts.

Rotate the ball nut so that the teeth are in the same place as the sector teeth. Tighten the four valve housing attaching bolts.

Position the sector shaft cover O-ring in the steering gear housing.

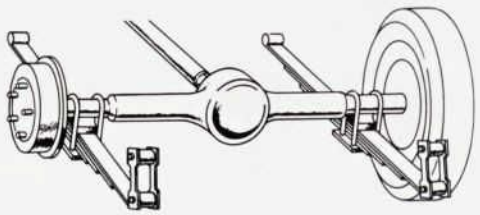
Turn the input shaft as required to center the piston.

Apply petroleum jelly to the sector shaft journal; then, position the sector shaft and cover assembly in the gear housing. Install the steering gear identification tag and air conditioner line mounting bracket, if so equipped, and the two sector shaft cover attaching bolts. Position an inch-pound torque wrench on the gear input shaft and adjust the meshload to approximately 4-in-lbs. torque.

Then torque the sector shaft cover attaching bolts.

After the cover attaching bolts have been tightened, adjust the meshload with an inch-pound torque wrench.

REAR AXLES



The main new feature for 1966 is the new 9⅜ ring gear and mating pinion gear. A solid spacer is used with the new pinion gear bearings. A new torque specification for the pinion bearing preload with no seal and used bearings (solid spacer) is 12½ to 32½-in-lbs. On other pinions with collapsible spacers the torque with used bearings and new seals is 8 to 14-in-lbs.

The 9⅜-inch ring gear rear axle contains one filler plug on the housing cover. It is a ⅞-inch plug and requires a torque of 25 to 35 ft-lbs.

The axle shafts used with the new axle have 31 tooth splines and are not interchangeable with past model axle shafts.

NEW PROCEDURES

A new procedure has been established for setting the preload on the pinion bearings after changing the pinion seal or the yoke and with the pinion assembly in the vehicle.

Before removing the yoke, pull the axle shafts from the housing. Take a reading of the pinion torque. Record this for future reference. Mark the nut, pinion shaft and yoke so that it can be aligned in assembly. Replace the seal with a new one if the yoke is changed.

In assembly with a new seal, align the parts as they were before disassembly, according to the indicated marks. Take a torque reading and compare with the reading taken before disassembly.

The reading should be the same, if not, add enough torque to get the original reading. Added torque is obtained by tightening the pinion nut. If the torque on the pinion nut is more than 180-220-foot-pounds, a new collapsible spacer must be used. If the original torque can be obtained, continue tightening the pinion nut until an additional 8 to 14 inch-pounds is obtained. Do not over torque the nut. If more than 14 inch-pounds is obtained, replace the spacer. Proper torque must not be obtained by loosening the pinion nut.

BACKLASH AND DIFFERENTIAL BEARING PRELOAD ADJUSTMENTS

If a check finds the tooth contact pattern incorrect, the following procedure should be followed. The ring gear is moved away from or toward the pinion as described in the following procedure:

1. Remove the adjusting nut locks, loosen the differential bearing cap bolts, then torque the bolts to 25 ft-lbs before making any adjustments.
2. The left adjusting nut is on the ring gear side of the carrier. The right nut is on the pinion side. Loosen the right nut until it is away from the cup. Tighten the left nut until the ring gear is just forced into the pinion with no backlash. Keep rotating the pinion back and forth as the left nut is tightened until no backlash is felt. Re-check the right nut at this time to be sure that it is still loose. Tightening the left nut moves the ring gear into the pinion to decrease backlash and tightening the right nut moves the ring gear away from the pinion to increase backlash. See Figure 4.

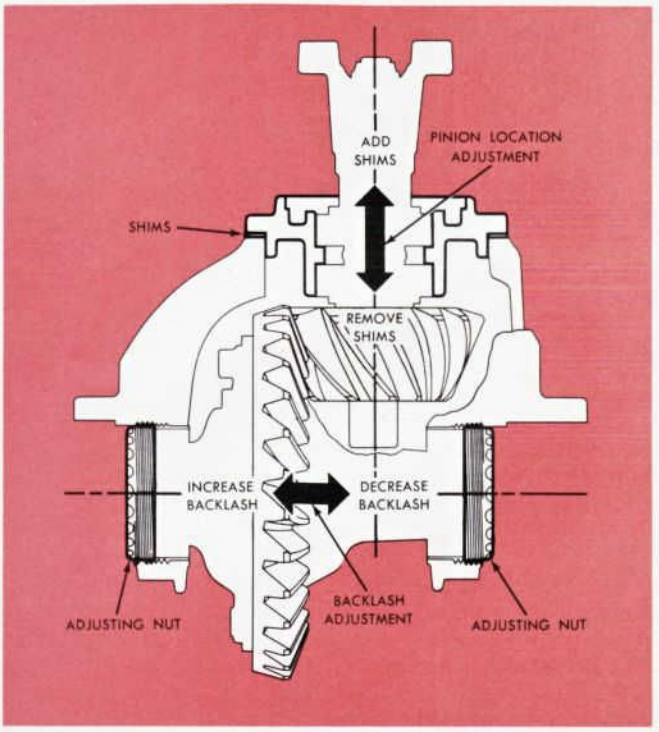
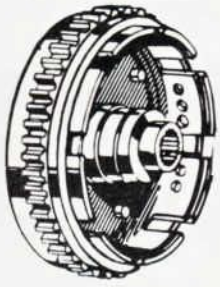


Figure 4—Pinion and Ring Gear Tooth Contact Adjustment

3. Tighten the right nut until it first contacts the bearing cup. Rotate the ring gear several revolutions in each direction while the bearings are loaded to seat the bearings in their cups to be sure no bind is evident. Then install the dial indicator.
4. Again loosen the right nut to release the preload. If there is any backlash between gears, tighten the left nut enough to remove the backlash. Carefully tighten the right nut until it just contacts the cup.

Backlash and Differential Bearing Preload Adjustments . . . continued

5. Torque the differential cap bolts, and tighten the right nut until the dial indicator shows a case spread of 0.012", when new bearings are installed. If original bearings are re-used, the case spread should be 0.005 to 0.008".
6. Measure the backlash on several teeth around the ring gear. If the measurements vary more than 0.003 inch, there is excessive runout in the gears or in their mountings, which must be corrected to obtain a satisfactory unit. If the backlash is out of specification, loosen one adjusting nut and tighten the opposite nut an equal amount, to move the ring gear away from or into the pinion. When moving the adjusting nuts, the final movement should always be made in a tightening direction. This makes it certain that the nut is contacting the bearing cup, and that the cup cannot shift after being put in service. If the backlash must be re-adjusted after the bearing preload has been set, reset the bearing preload to correct specifications.
7. Again check the tooth contact pattern. If the pattern is still incorrect, a change in pinion location is indicated.



AUTOMATIC TRANSMISSIONS

The 1966 C6 Transmission (See Figure 5) is designed to provide fully automatic three-speed dual range transmission capable of transmitting higher torque.

In operation, it provides six-selector-level positions: Park (P), Reverse (R), Neutral (N), Drive (D2), Drive (D1), and Low (L). In Drive (D1) the vehicle starts off in low gear; as vehicle speed increases, automatic upshifts to intermediate and high gear will occur at appropriate intervals. In Drive (D2) range, the vehicle starts in intermediate gear, with an automatic upshift to high gear following.

Forced downshifts to second gear are possible between 30 and 65 miles per hour in either drive range; in Drive (D1) forced down-shifts to low gear are possible at speeds under 30 mph. When starting the selector lever in Low (L) the transmission will remain in low gear; no shifts will occur.

The C6 transmission employs the Simpson gear train. In addition to the generally larger size of the C6, there are two major differences in its design as compared to the 1965 C4 transmission. The most important of these differences is the use of a multiple-plate clutch in place of the reverse band. The second major difference is the use of a single aluminum die casting to house both the transmission elements and the converter assembly.

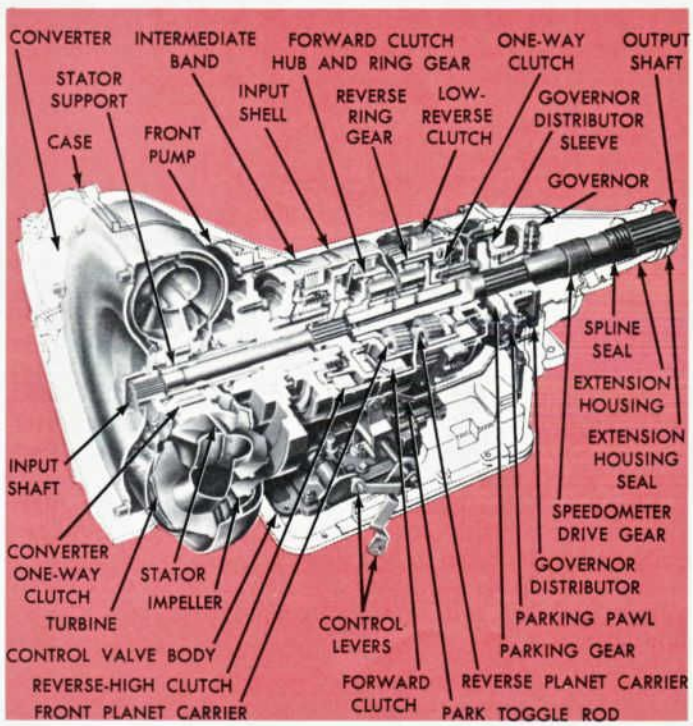


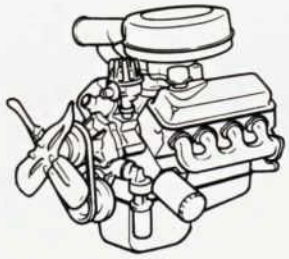
Figure 5—C6 Automatic Transmission

1966 THROTTLE LINKAGE

The Mustang, Ford and Thunderbird throttle linkage systems are the same as the throttle linkage system for 1965.

The throttle linkage systems on the Falcon and Fairlane are new. These systems have a "stabilized" pedal-to-carburetor linkage system to prevent pedal movement with engine movement or pedal "walk" as it is generally referred to.

The throttle linkage systems are identical for the 6-cylinder engine and the 8-cylinder 289 CID engines.



ENGINE-FUEL

CHANGES IN THE 289 CID V8 ENGINE

A new thinner camshaft sprocket is now used. This is to accommodate a thinner lighter timing chain. The camshaft thrust spacer has been eliminated and a thicker thrust plate has been incorporated.

The intake manifold and coolant outlet housing have been changed. The recess for the thermostat is now in the outlet housing necessitating gasket replacement on the manifold side of the thermostat. See Figure 6. A steel insert has been added to the bore of the outlet housing to reduce corrosion.

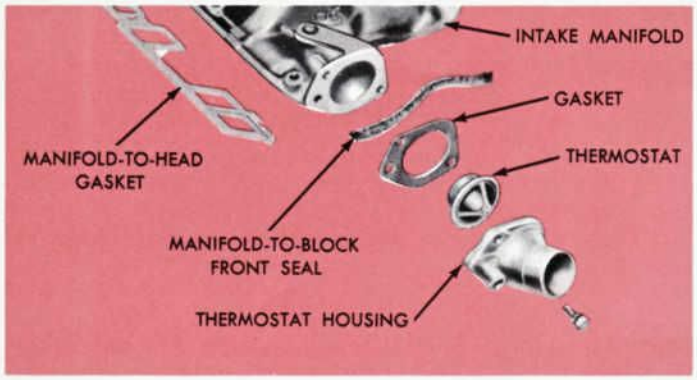


Figure 6–Coolant Housing

In order to provide better and more reliable intake manifold-to-cylinder head sealing, a new torque sequence has been developed. See Figure 7.

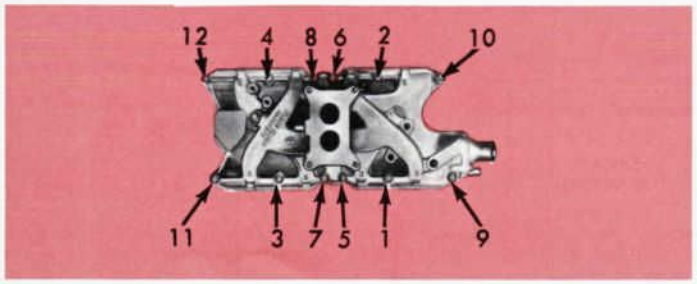


Figure 7–Intake Manifold Torque Sequence

352, 390, AND 428 CID V8 ENGINES

A 428 CID engine has been added to the 352-390 engine family. No new unique service procedures are necessary for this engine, however.

The ventilation system has changed in the area of intake manifold and ventilation routing. Two manifold vent holes are now present in the manifold. A tee pipe carries the vetilation air from the rocker shaft cover hose to the intake manifold.

The intake manifold water-heated spacer for the carburetor has been eliminated and an exhaust control valve has been added to supply heat flow through the intake manifold for intake mixture vaporization on 390 and 428 engines.

CRANKCASE EMISSION CONTROL

The 352, 390 and 428 family engines will have a new split-type crankcase emission system in 1966. See Figure 8. The new system is essentially the same as the "jiggle pin" used in 1965; however, it distributes the unburned gases into two separate locations in the intake manifold rather than one. This contributes to improved driveability and idle stability.

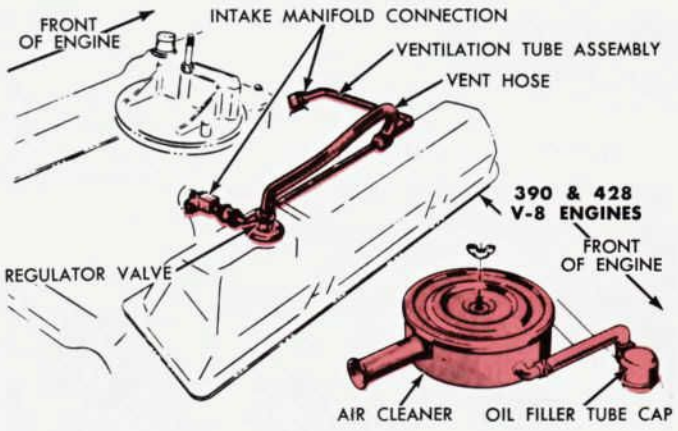


Figure 8–Crankcase Emission Control System

FUEL PUMP AND FILTERS

The fuel pump used in 1966 on the 170, 200, 240 and 300 6-cylinder car and truck engines and the 427 V8 car engine has no filter. The filter is relocated in the fuel line at the carburetor. The pump is a take apart type.

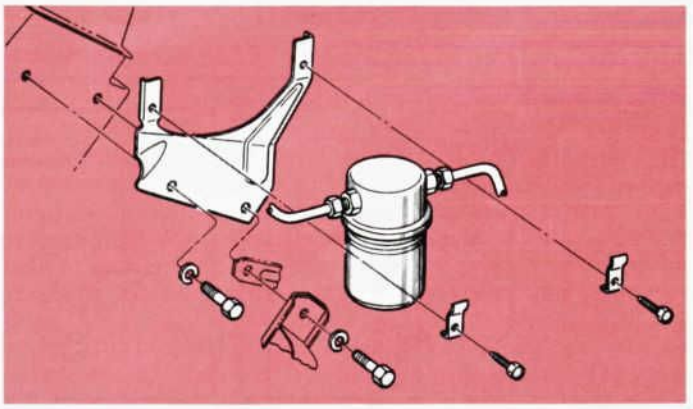


Figure 9–In-Line Replaceable Fuel Filter–427 Engine

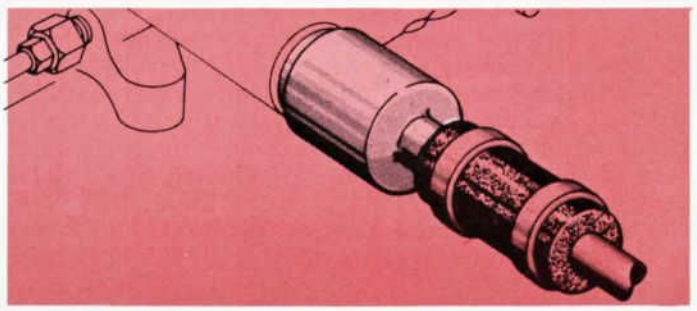


Figure 10–In-Line Replaceable Fuel Filter Assembly–170, 200, 240, 352, 390 and 428 Engines

Engine and Fuel . . . continued

More wide-spread use of sealed fuel pumps on the 289, 352 and 428 CID car engines and the 352 truck engine will be found in the 1966 lineup. All of these pumps except for the Thunderbird use an in-line filter located at the carburetor on most models of Ford cars. See Figures 9 and 10.

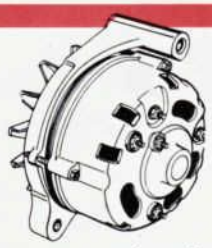
FORD 2V AND 4V CARBURETORS

A nitrophyl (plastic) float is now used in Ford 2V and 4V carburetors. The torsion spring has been eliminated. The float shaft retainer spring clip shape has been changed.

Other than the elimination of some disassembly and assembly steps, service procedures remain the same in this area.

A slightly different choke plate pulldown nut is now used. Adjustment procedures remain the same.

The shape of the fast idle cam has changed, necessitating a change in the idle speed. However, the method of adjustment is the same as in previous models.



ELECTRICAL

IGNITION SYSTEM

A new transistorized ignition system is being used on the 1966 Thunderbird. See Figure 11. The system has an improved quality transistor which doesn't require the protective components used in the 1965 system. Other cars and trucks use the same system as in 1965 models.

Ballast resistors are the same value as in 1965, but the tolerance has been decreased from 10% to 5%. Cold start relay and the toroid have been removed from the system. The 2-mfd capacitor has also been removed.

Other changes include: changing of the 8-ohm resistor wire to 7.5 ohms with closer tolerances (7.1 to 7.9); the 5.6-ohm resistor increased to 10-ohms. Also, the amplifier is replaceable only as an assembly, and the transistor used in the amplifier has been changed.

CHARGING SYSTEM

Very few changes have been made here. The radio condenser is now a built-in unit in all Autolite alternators. To replace or test the condenser, it is necessary to remove the alternator rectifier to gain access. A transistorized regulator must be used with the 60-amp Autolite alternator and is optional with the 42- and 45-amp alternators. This regulator has just one adjustment. The field relay is a separate piece and is not adjustable.

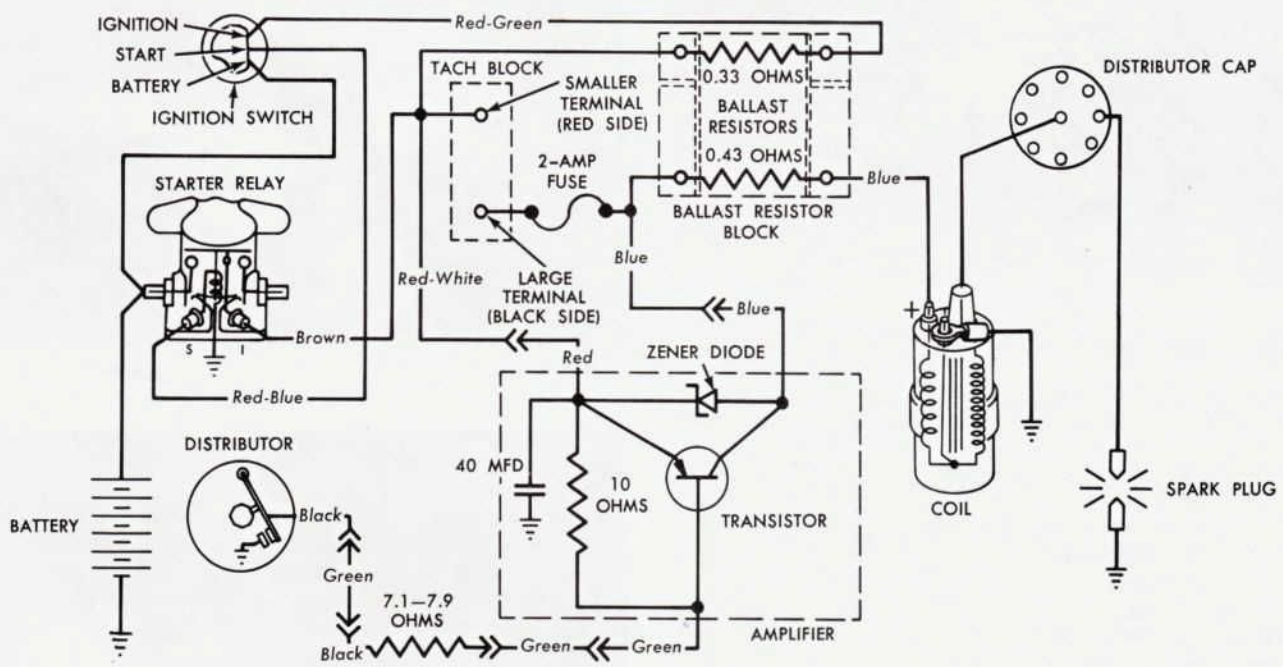


Figure 11—Transistorized Ignition System

ALTERNATOR AND TRANSISTORIZED REGULATOR CIRCUITS

When the engine is started, battery current is supplied to the field through the field relay, field current supply diode, and the power transistor.

As the alternator begins to supply current, the battery voltage will increase. When the battery voltage reaches approximately 14.5 volts, the zener diode suddenly reduces its resistance and lowers the voltage on the control transistor.

The control transistor then acting as a switch applies battery voltage on the power transistor. The power transistor also acting as a switch then opens cutting off battery current to the field. The battery voltage drops slightly, the zener diode increases its resistance, opening the control transistor, which in turn closes the power transistor and battery current again flows to the alternator rotor field.

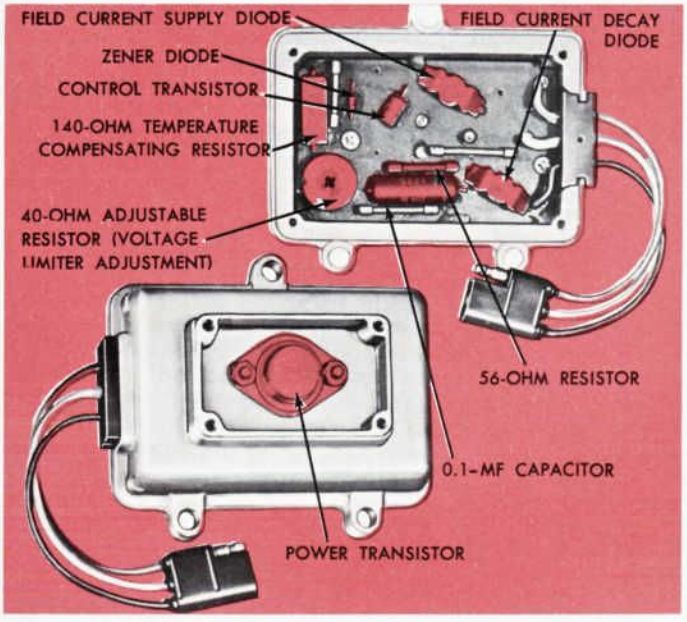


Figure 12–Transistorized Voltage Regulator

TRANSISTORIZED VOLTAGE REGULATOR

The transistorized voltage regulator (Figure 12) controls the alternator voltage output in a similar manner to a mechanical voltage regulator, by regulating the alternator field current. The regulation is accomplished electronically with the use of transistors and diodes rather than by a vibrating armature relay. The voltage sensing element is a zener diode which has the characteristics of suddenly changing its resistance when a specified voltage is reached.

The field current supply diode is used to protect the power transistor.

The field current decay diode performs the same function as the resistors in a mechanical regulator, providing a path to ground for the energy from the field when the field current is interrupted.

The 140-ohm resistor is made of a special material that changes its resistance with temperature in such a manner that during cold weather the battery charging voltage is increased. This resistor performs the same function as the bimetal hinge on the voltage limiter armature of a mechanical regulator.

The regulator voltage limitation is adjusted by varying the 40-ohm adjustable resistor. Varying the adjustable resistor performs the same function as adjusting the voltage limiter armature spring tension on a mechanical regulator.

The 0.1-microfarad capacitor in series with the 56-ohm resistor causes the control transistor and the power transistor to switch on and off faster, providing better control of the field current.

The remaining resistors in the unit provide proper operating voltages for the zener diode and the two transistors.

The field relay, Figure 13, is still used in the transistorized system, but it is mounted separately from the voltage regulator. This field relay is not adjustable since the cover is crimped in place.

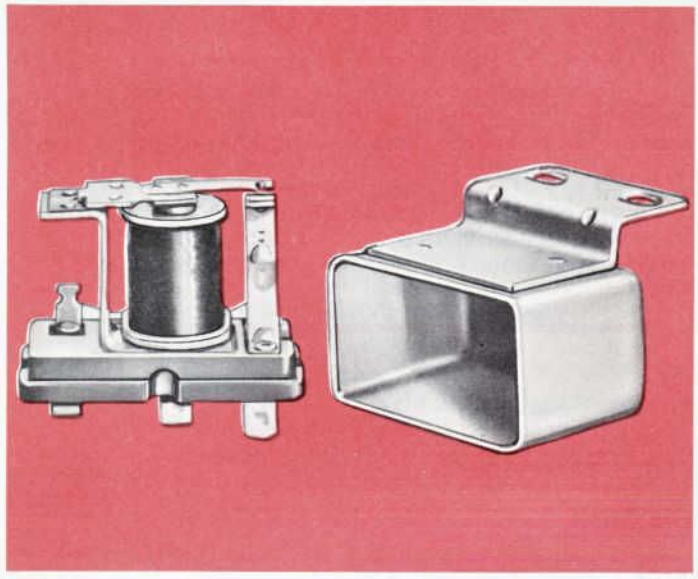


Figure 13–Field Relay

TRANSISTORIZED REGULATOR ADJUSTMENT

The only adjustment on the alternator transistorized regulator is the voltage limiter adjustment. The regulator voltage limitation is adjusted by varying the 40-ohm resistor. This performs the same function as adjusting the voltage limiter armature spring tension on a mechanical regulator.

Adjustment of the transistorized regulator must be made with the regulator at normal operating temperature. Remove the regulator mounting screws and remove the bottom cover. The voltage limitation can be adjusted up-or-down by turning the screw. There is an approximate 280° adjustment from stop-to-stop.

FIELD RELAY TEST– TRANSISTORIZED REGULATOR

Disconnect the relay connector plug. Slowly rotate the Field Rheostat Control clockwise from the maximum counter-clockwise position until the test light comes on. Observe the voltmeter reading at the moment that the light comes on. This is the relay closing voltage. If the relay closes immediately, even with the field rheostat close to the maximum counter-clockwise position, push the red button between the two meters, and repeat the test. If the closing voltage is not to specification, replace the relay.

HOOD LATCH INSPECTION and ADJUSTMENT PROCEDURES

(Ford, Fairlane, Falcon, Mustang, Thunderbird)

Should the occasion arise where it is necessary to service the hood latch mechanism there are certain critical relationships that should be maintained within the mechanism to help insure proper adjustment of the hood latch system. The following inspection and adjustment procedure should serve as a guide.

1. Raise the hood.
2. Actuate the hood latch mechanism to assure that all moving parts operate freely about their respective pivots.
3. Inspect the dowel opening in the latch mechanism to assure that the dimension between the inside wall of the dowel guide and the lock trigger in the closed position is 7/8" maximum. See Figure 1.
4. Adjust the hood dowel length to 2.98 inches as shown in Figure 2. Inspect the dowel to be sure it is perpendicular in both directions to the hood inner panel surface.
5. Be sure that the latch assembly is positioned on the centerline of the vehicle and mounted symmetrically in the latch mounting plate. Reposition as necessary.
6. Open and close the hood. Check the hood for complete engagement of the dowel into the latch mechanism. If the dowel does not engage correctly, lower or raise the dowel height and then re-check the surface alignment of the hood at the fender. It may be necessary to make a fore-aft adjustment of the latch assembly also, to prevent interference between the dowel and the inner wall of the dowel guide. Be sure to adjust the hood bumper height as required.

NOTE: Do not attempt to set lateral hood to fender margins by using the hood dowel. Hood to fender lateral margins should be corrected by adjustment of the hinge attachment to the hood.

7. Inspect the fore-aft distance between the auxiliary catch striker plate and the dowel shank to assure that the design specified dimensions of 1/4" is maintained. This is essential to obtain proper operation of the auxiliary catch. See Figure 3.
8. Close and open the hood several times to verify satisfactory engagement and operation of the hood latch system.

Figure 1

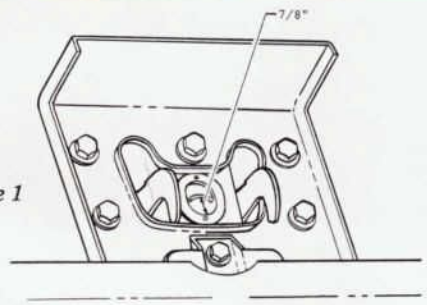


Figure 2

Figure 3

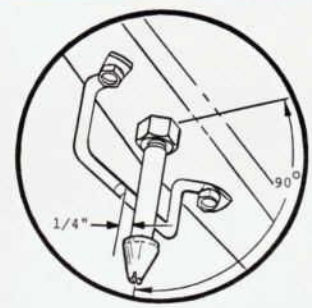
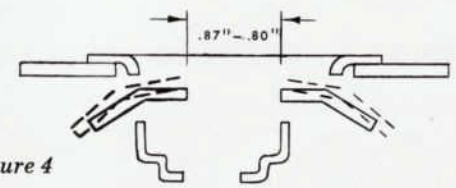


Figure 4



SPECIAL NOTES ON THE 1964-65 THUNDERBIRD

The following adjustment specifications are important to proper adjustment of the 1964-65 Thunderbird hood latch mechanism which varies slightly from the other models.

1. Adjust dowel length as required so that when the lock is latched, the hood contacts the outboard bumpers and the lock release lever effort is between 8 and 22 lbs. This dowel length should be approximately 2.55 inches from the sheet metal to the latch side of the dowel spacing washer under these conditions.
2. All hood component attachments should be tightened to the following torque values.

Hood Hinge Bolts	12-18 foot-lbs.
Hood Lock Bolts	12-18-foot-lbs.
Auxiliary Lock Bolts	12-18 foot-lbs.
Lock Dowel Lock Nut	15-22-foot-lbs.
Bumper Lock Nut	8-13 foot-lbs.

3. Be sure that there is sufficient engagement of the auxiliary catch with the radiator support.
4. Adjust the hood bumper height as required.

Figure 4 covers adjustment procedures for the 1964-65 Thunderbird.

TECHNICAL SERVICE BRIEFS

HOISTING PRECAUTION (ALL FORD LINES)

Damage to steering linkage components on all subject vehicles as well as damage to front suspension struts on some vehicles may occur if care is not exercised when positioning the hoist adapters of twin post-type hoists prior to lifting the vehicles.

On Fairlane, Falcon, and Mustang vehicles the hoist front adapters are placed under the front suspension lower arms. If care is not exercised, the adapters may strike and damage the tie-rod end assemblies possibly causing the wheel toe-in to be out of specification.

On Thunderbird and Ford vehicles hoist adapters may be placed under the front suspension lower arms or the number one cross member. If the adapters are placed under the front suspension lower arms, care must be exercised to prevent the arms from damaging the steering linkage. If the adapters are placed under the number one cross member, a piece of wood 2 x 4, approximately 16" long, should be placed in the hoist channel between the adapters to prevent the adapters from contacting and damaging the front suspension struts.

PROPER INSTALLATION OF FOG LAMP BULBS

(1965-½ Mustang With GT Equipment)

When replacing fog lamp bulbs, in a Mustang with the GT equipment package, the following procedure should be followed:

1. Remove the fog lamp door and attaching screws.
2. Loosen the bulb wire attaching screws and disconnect the wires.
3. Bend both corners of the retaining ring bulb locating notch downward and away from the bulb approximately .070".
4. Apply two self-adherent neoprene gasket pads (about 1½" long) on the retaining ring at the fog lamp door attaching screw holes to cushion the bulb.
5. Install the new bulb.
6. Cut two rubber spacers ⅛" long from windshield washer hose.
7. Reinstall the fog lamp door using these spacers between the door and the retaining ring.

Caution should be used when tightening the lamp door screws so as not to exceed 12 in.-lbs. torque.

VALVE ROCKER ARM IDENTIFICATION

Although similar in appearance the 240 and 300 CID six-cylinder engine valve rocker arms are not interchangeable with those used on the 221, 260, and 289 CID V-8 engines. To minimize the possibility of installing the incorrect rocker arms on any of these engines, they are 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 300 six rocker arms. The cast letter "A" identifies the 221, 260, and 289 CID V8 rocker arms.

SPARK PLUG USAGE

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

Spark Plug	Ford Part Number	Usage
BF42	B8A-12405-A	240-289 engines (normal passenger use)
BTF42	C5TZ-12405-A	240-289 engines—Passenger cars pulling trailers or other heavy duty use. Light trucks, Econoline.
BF32	C0AZ-12405-A	289 High Performance Engines
BTF6	B7A-12405-A	240 engine—Police & Taxi use.

EMERGENCY WARNING FLASHERS

A new accessory available through Ford Dealers Parts Department is an Emergency Warning Flasher which can be installed in 1965 Fords, Falcons, Fairlanes and Mustangs using a new accessory kit.

This kit, Ford Part Number C5MY-15B584-A allows all four turn signal lights to flash simultaneously at the flick of an instrument panel switch. This is to warn traffic of an emergency or call attention to the driver's need for assistance.

Installation of this accessory is easily accomplished by following the instructions and installation sketch that accompanies each kit.

Should you have occasion to install one of these for a customer, you should instruct him that when the warning flasher system is in operation, the turn signal switch on the steering column should be in the "off" position. This will eliminate any effect that this equipment might have on other accessories in the vehicle.

Getting Ready for Cold Weather?

LOOK TO YOUR FORD DEALER

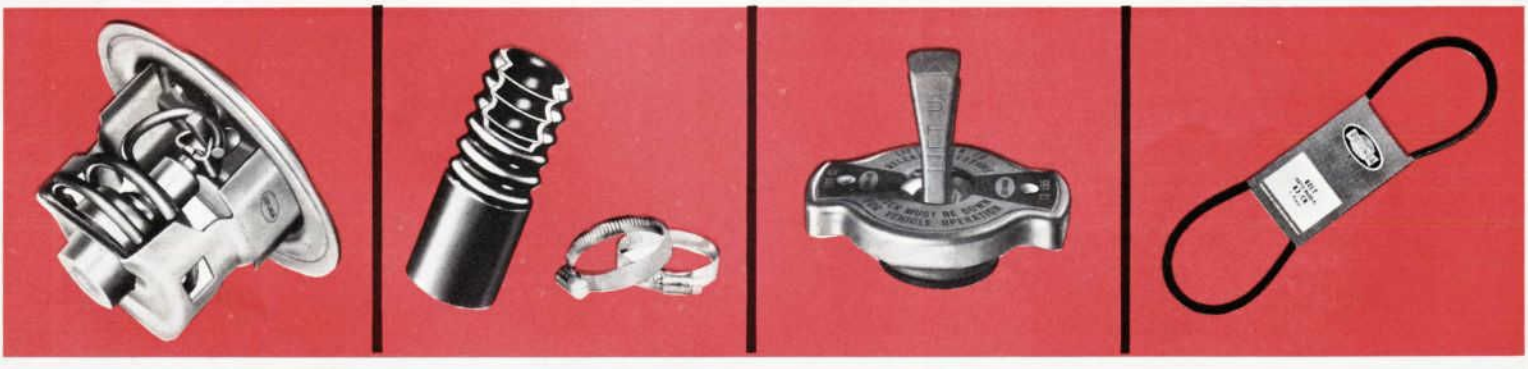
For Big Discounts On Cooling System Parts

Now is the time for you to get big savings on wholesale purchases of cooling system parts at your local Ford Dealer's Parts Counter.

During September and October, participating Ford Dealers are featuring a special discount offer on the purchase of Rotunda Thermostats and other related cooling system parts; such as radiator hoses and clamps, radiator caps and fan belts.

This offer can mean even bigger savings to you when you purchase in quantities, and bigger profits when you sell to your service customers.

Be sure to stock up now so that you will be able to provide your Ford owners with genuine Ford parts for top performance.



ROTUNDA THERMOSTATS

- Power Element that provides long lasting, accurate control of engine temperature.
- Unique Fail-Safe Device that causes valve to lock open should the thermostat ever fail. Prevents engine damage from overheating.

ROTUNDA RADIATOR HOSES AND HOSE CLAMPS

- Rotunda Hoses are built to withstand greatest pressures and are reinforced with an internal tempered steel coil.
- Adjustable Hose Clamps with unique worm design to provide almost unlimited application.

ROTUNDA RADIATOR CAPS

- Vacuum Relief Valve which opens automatically as the car engine cools off to prevent formation of vacuum in the system.
- Safety Valve that keeps the pressure within the desired safety limits as designed by the manufacturer.

ROTUNDA FAN BELTS

- Special neoprene, rubber, and nylon cord Construction makes them more durable than most other makes.
- Greater Flexibility at all temperatures to prevent cracking and deterioration.