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Shop Tips

FROM Ford

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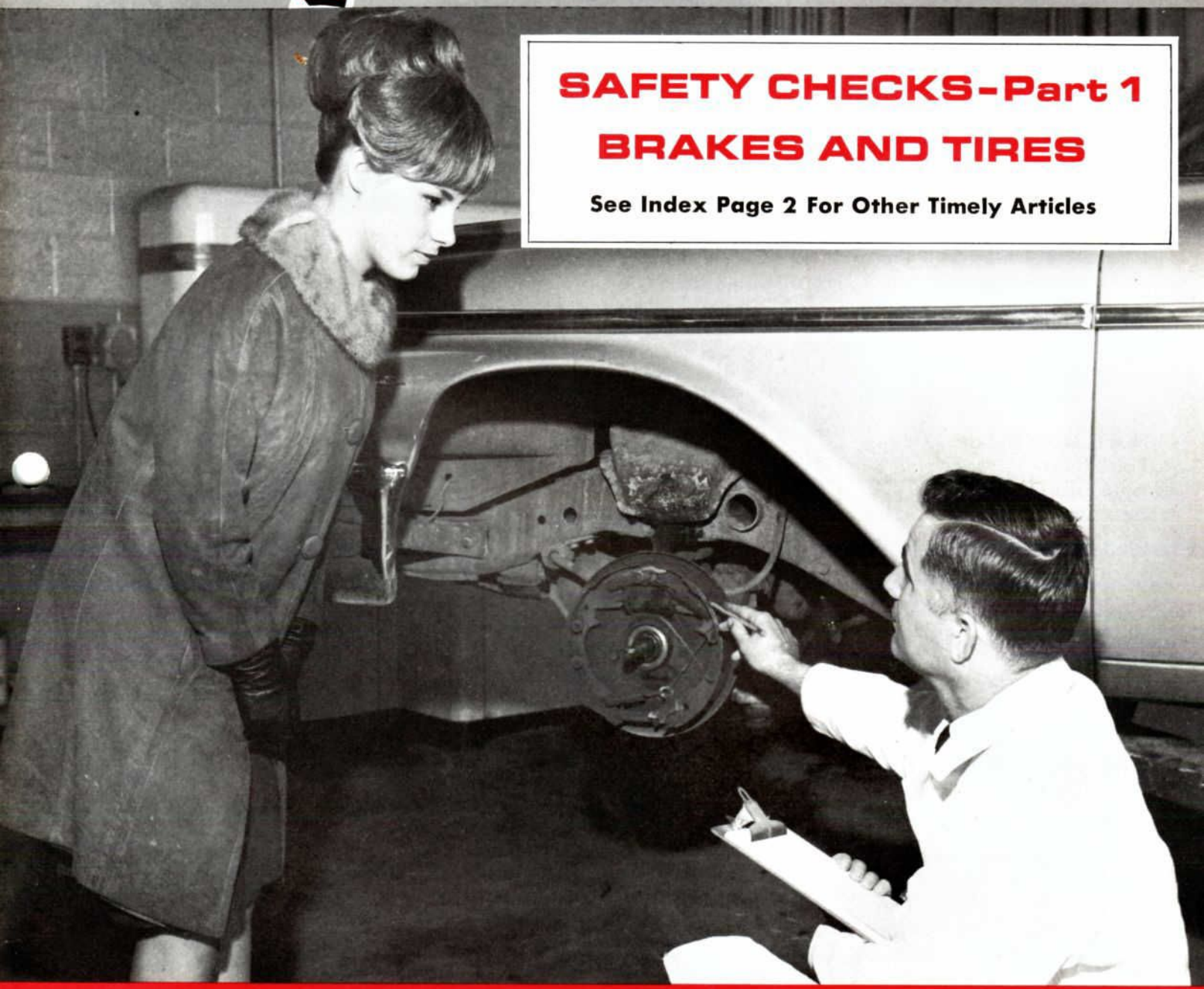
Technical parts and service information published by Ford Division to assist servicemen in Service Stations, Independent Garages and Fleets.

SAFETY CHECKS-Part 1
BRAKES AND TIRES

See Index Page 2 For Other Timely Articles



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 598, Dearborn, Michigan 48121.

FoMoCo GENUINE PARTS

AUTOLITE.

ROTUNDA

From Your Ford Dealer

SAFETY CHECKS—PART 1...

IN THIS ISSUE

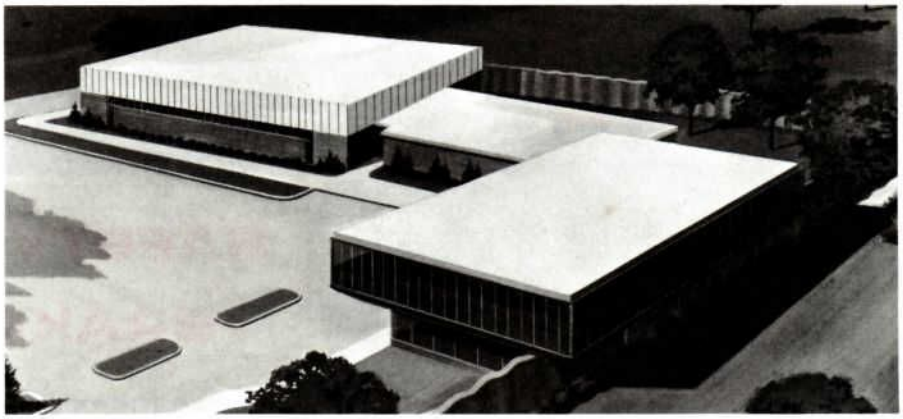


Figure 1—Ford Motor Company's Automotive Safety Center

Ford Motor Company's efforts to make driving safer take more than one form. They begin by designing extra safety into every vehicle they manufacture. Ford has been a leader in this field for many years. To continue this leadership and to make even greater strides in designing safety into Ford products, Ford is establishing another first, the Ford Automotive Safety Center (Figure 1). This center will be the focal point for all safety research and development activities where facts, opinions and tests will all come together for analysis, coordination and evaluation to help assure that every Ford product represents the most advanced design and construction practical. But, there is more to automotive safety.

Most authorities regard it as having three sides—state of mind, skill, and hardware. This is the first of two articles dealing with the hardware or "nuts and bolts" of safety. Every owner and operator of a vehicle has the responsibility of keeping it in good running order through periodic maintenance. However, they may need some items brought to their attention from time to time by trained service technicians.

BRAKES

There is no hard and fast rule as to when brakes should be checked, because driving habits vary greatly from driver to driver. However, a good rule-of-thumb is that any car with 20,000 miles on a set of linings should have the brakes inspected. If the brakes have been used harshly, an inspection will probably reveal only a few thousand miles left on the linings. Light or normal usage generally gives upwards of 30,000 miles per set of linings. Otherwise brakes should be checked whenever any trouble symptom occurs. See Charts, pages 4 and 5.

DIAGNOSIS AND TESTING

Preliminary Tests

1. Check the fluid level in the master cylinder. If it is necessary to add fluid (fluid level should be within ⅜ inch from top of reservoir) be sure to use a heavy-duty high-temperature brake fluid such as Rotunda Brake Fluid (Ford Part Number B7AZ-19452-A). For power disc brakes, Rotunda Power Disc Brake Fluid (Part Number C6AZ-19542-A) is required.

2. With the engine running or enough vacuum in the system for power brakes, push the brake pedal down as far as it will go while the car is standing still. If the pedal travels more than halfway to the floor, check the brake adjustment and adjusters. (Do not use excessive force)

To check adjuster operation, inspect the shoes and adjuster components for binding or improper installation.

Make several reverse brake stops to insure uniform adjustment at all wheels.

3. On cars with power brakes, with the transmission in neutral, turn off the engine and apply the parking brake. Depress the service brake pedal several times to exhaust all vacuum in the system. Then, depress the pedal and hold it in the applied position. Start the engine. If the vacuum system is operating, the pedal will tend to fall away under foot pressure and less pressure will be required to hold the pedal in the applied position. If no action is felt, the vacuum booster system is not functioning. Follow the procedure in the Booster Diagnosis Guide. See Figure 2. With the engine shut off, exhaust all vacuum in the system.

Depress the brake pedal and hold it in the applied position. If the pedal gradually falls away under this pressure, the hydraulic system is leaking. Check all tubing, hoses and connections.

If the brake pedal feels spongy, bleed the hydraulic system to remove air from the lines and cylinder. Also check for leaks or insufficient fluid.

4. Should one of the brakes be locked and the car must be moved, open the brake cylinder bleed screw long enough to let out a few drops of fluid. THIS BLEEDING OPERATION WILL RELEASE THE BRAKES, BUT WILL NOT CORRECT THE CAUSE OF THE TROUBLE.

Road Tests

The car should be road tested only if the brakes will safely stop the car. Apply brakes at a speed of 25-30 mph to check for existence of the trouble symptoms listed in the Tables, except for those resolved in the preliminary tests, and brake chatter. (To check for chatter, apply the brakes lightly at approximately 50 mph.) For each of the symptoms encountered, check and eliminate the causes which are also listed in the Charts on pages 4 and 5.

BOOSTER INOPERATIVE—HARD PEDAL	If the preliminary tests show that the booster is inoperative or if a hard pedal condition still exists after eliminating the causes of Excessive Pedal Effort or Hard Pedal, the trouble may be caused by vacuum leakage. Disconnect the vacuum line at the booster, remove the vacuum manifold and check valve assembly, and look for a sticking or faulty check valve. Check all vacuum connections for leakage or obstruction. Check all hoses for a leaking or collapsed condition. Repair or replace parts as necessary. If the foregoing procedure does not eliminate the trouble, remove the booster from the car. Separate the front shell from the rear shell, and check the valve and rod assembly reaction disc, diaphragm plate, and diaphragm assembly for damage that would cause leaks. When assembling, be sure that the diaphragm assembly is properly positioned. Improper location could cause leakage between the vacuum and atmospheric sides of the diaphragm.
BRAKES DRAG OR GRAB	If the brakes still drag or grab after eliminating the causes listed in Charts 1 and 2, the condition is probably caused by a sticking valve plunger assembly. Remove and disassemble the booster. Clean, inspect, and replace parts as necessary.
SELF APPLICATION OF BRAKES WHEN ENGINE STARTS	Remove and disassemble the booster. Check for a leak in the rear shell. Check the diaphragm for being out of locating radii in the housing. Check for a sticking or unseated valve poppet. Clean, inspect, and replace parts as necessary. Be sure that the diaphragm is properly located when assembling.

Figure 2—Brake Booster Diagnosis Guide

TABLE 1—DISC BRAKES—Trouble Symptoms and Possible Causes

Possible Causes of Trouble Symptoms	Trouble Symptoms							
	Excessive Pedal Travel	Brake Roughness or Chatter (Pedal Pumping)	Excessive Pedal Effort	Pull—Uneven or Grabbing Brakes	Rattle	Heavy Brake Drag	Caliper Brake Fluid Leak	No Braking Effect When Pedal is Depressed
Shoe and Lining Knock-back after violent cornering or rough road travel	X							
Piston and Shoe and Lining Assembly Not Properly Seated or Positioned	X							X
Air Leak or Insufficient Fluid in System or Caliper	X							X
Loose Wheel Bearing Adjustment	X							
Damaged or Worn Caliper Piston Seal	X						X	X
Excessive Lateral Run-out of Rotor		X						
Rotor Excessively Out of Parallel		X						
Frozen or Seized Pistons			X	X		X		
Brake Fluid, Oil or Grease on Linings			X	X				
Shoe and Lining Worn Below Specifications			X					
Proportioning Valve Malfunction			X					
Caliper Out of Alignment with Rotor				X				
Loose Caliper Attachment				X				
Excessive Clearance Between Shoe and Caliper or Between Shoe and Splash Shield					X			
Shoe Hold-Down Clips Missing or Improperly Positioned					X			
Operator Riding Brake Pedal						X		
Scores in the Cylinder Bore							X	
Corrosion Build-up in the Cylinder Bore or on the Piston Surface							X	
Bleeder Screw Still Open								X
Improper Booster Push Rod Adjustment	X							
Shoe Out of Flat More Than 0.005"	X							
Rear Brake Auto. Adjusters Inoperative	X							
Improperly Ground Rear Brake Shoe and Lining Assemblies	X							
Booster Inoperative			X					
Leaking Booster Vacuum Check Valve			X					
Unequalized Front Tire Pressure				X				
Incorrect Front End Alignment				X				
Lining Protruding Beyond End of Shoe				X				
Incomplete Brake Pedal Return Due to Linkage Interference						X		
Faulty Booster Check Valve Holding Pressure in Hydraulic System						X		
Residual Pressure in Front Brake Hydraulic System						X		
Metal Chip in Seal Groove							X	
Air in Hydraulic System or Improper Bleeding								X

TABLE 2—DRUM BRAKES—Trouble Symptoms and Possible Causes

Possible Causes of Trouble Symptoms	Trouble Symptoms												
	One Brake Drags	All Brakes Drag	Hard Pedal	Spongy Pedal	Car Pulls to One Side	One Wheel Locks	Brakes Chatter	Excessive Pedal Travel	Pedal Gradually Goes to Floor	Brakes Uneven	Shoe Click Release	Noisy or Grabbing Brakes	Brakes Do Not Apply
Mechanical Resistance at Pedal or Shoes Damaged Linkage		X	X										
Brake Line Restricted	X	X	X		X								
Leaks or Insufficient Fluid				X				X	X				X
Improper Tire Pressure					X					X			
Improperly Adjusted or Worn Wheel Bearing	X				X								
Distorted or Improperly Adjusted Brake Shoe	X	X	X		X	X		X				X	
Faulty Retracting Spring	X				X								
Drum Out of Round	X				X		X						
Linings Glazed or Worn			X		X	X	X	X				X	X
Oil or Grease In Lining			X		X	X	X			X		X	X
Loose Carrier Plate	X					X	X						
Loose Lining					X		X						
Scored Drum										X		X	
Dirt on Drum-Lining Surface												X	
Faulty Wheel Cylinder	X				X	X						X	
Dirty Brake Fluid	X	X								X			X
Faulty Master Cylinder		X						X	X				X
Air in Hydraulic System	X			X				X					X
Self Adjusters Not Operating					X			X			X		
Insufficient Shoe-to-Carrier Plate Lubrication	X										X		
Tire Tread Worn						X							
Poor Lining to Drum Contact							X						
Loose Front Suspension							X						
"Threads" Left by Drum Turning Tool Pull Shoes Sideways											X		
Cracked Drum								X					
Sticking Booster Control Valve		X										X	

COMMON ADJUSTMENTS and REPAIRS

Parking Brake Linkage Adjustment

Check the parking brake cables when the brakes are fully released. If the cables are loose, adjust them as follows:

1. Fully release the parking brake pedal.
2. Depress the parking brake pedal one notch from its normal released position.
3. Raise the car.
4. Turn the adjusting nut forward against the equalizer until a moderate drag is felt when turning the rear wheels (Figure 3).
5. Release the parking brake, and make sure that the brake shoes return to the fully released position.

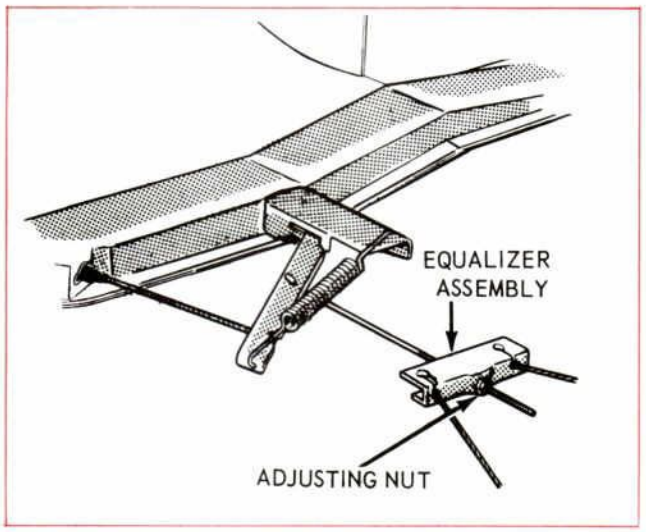


Figure 3—Parking Brake Linkage Adjustment

Power Brake Master Cylinder Push Rod Adjustment

The push rod is provided with an adjustment screw to maintain the correct relationship between the booster control valve plunger and the master cylinder piston. Failure to maintain this relationship will prevent the master cylinder piston from completely releasing hydraulic pressure and can cause the brakes to drag.

To check the adjustment of the screw, fabricate a gauge to the dimensions shown in Figure 4. On the Midland-Ross-type booster, remove the master cylinder and air filter assembly and push the bellows back into the booster body. Re-install the air filter directly against the booster body, and then place

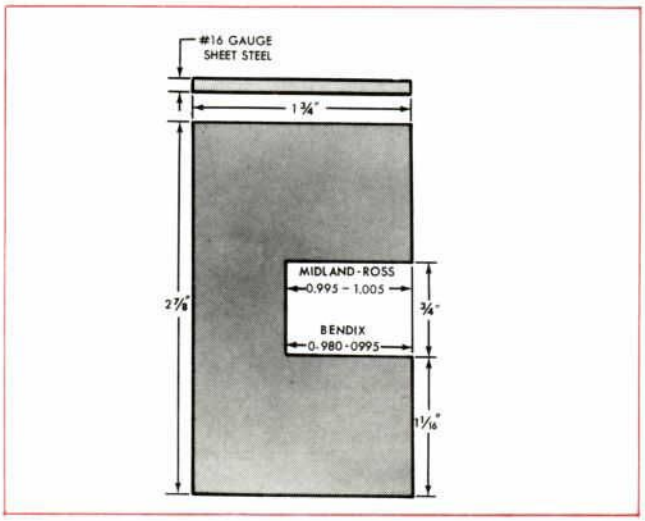


Figure 4—Push Rod Gauge Dimensions

the gauge against the master cylinder mounting surface of the air filter assembly as shown in Figure 5. The push rod screw should be adjusted so that the end of the screw just touches the inner edge of the slot in the gauge. Do not set up side forces on the push rod as it may break the valve plunger.

To check the Bendix-type booster, remove the master cylinder and fit the gauge against the master cylinder mounting surface as shown in Figure 6.

THIS IS AN APPROXIMATE ADJUSTMENT ONLY. To verify the adjustment, look through the rear port of the master cylinder when installing the master cylinder to the booster. The master cylinder piston should not move more than 0.015 inch as it contacts the push rod. No movement (exact contact) is ideal.

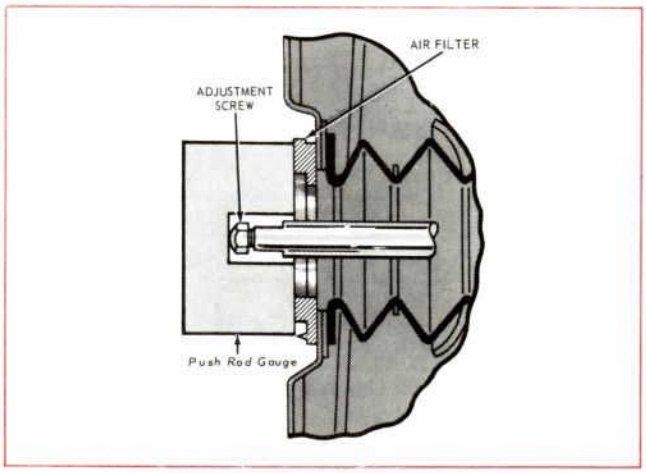


Figure 5—Push Rod Adjustment—Midland Ross

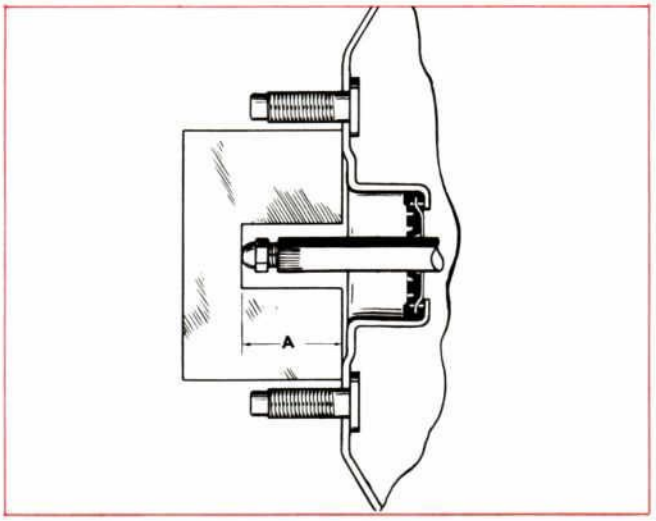


Figure 6—Push Rod Adjustment—Bendix

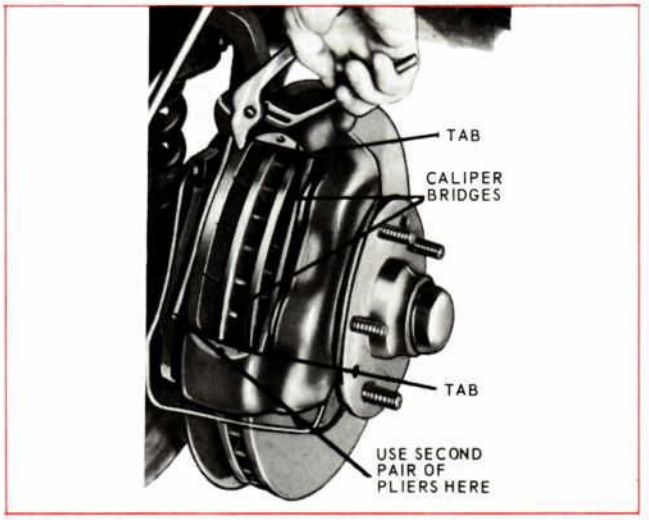


Figure 7—Removing Disc Brake Shoe And Lining Assembly

Hydraulic System Bleeding

When any part of the hydraulic system has been disconnected, air may get into the lines and cause a spongy pedal action. Therefore, the system must always be bled after repair work is complete and the system has been properly connected together again. The air must be expelled from the brake cylinders, disc brake calipers and lines by manual bleeding or pressure bleeding.

Always bleed the longest line first. Keep the master cylinder reservoir filled with NEW heavy-duty brake fluid during the bleeding operation. If the reservoir is not kept full, the diaphragm gasket may be sucked down to the bottom of the master cylinder. NEVER USE BRAKE FLUID WHICH HAS BEEN DRAINED FROM THE HYDRAULIC SYSTEM. Be sure the front brake pistons (disc brakes) are returned to their normal position and that the shoe and lining assemblies are properly seated. BRAKE FLUID SHOULD NOT BE ALLOWED TO CONTAMINATE THE ROTORS OR SHOE AND LINING ASSEMBLIES. It is mandatory that the brake pedal be pumped after disc brake repair or bleeding to establish proper brake running clearances and brake pedal reserve.

CLEANING AND INSPECTION

Disc Brakes

1. Remove the wheel and tire, caliper splash shield, and the shoe and lining assembly. Be careful to avoid damage or interference with the caliper splash shield, bleeder screw fitting or transfer tube. Figure 7.
2. Make three thickness measurements with a micrometer across the middle section of the shoe and lining. Take one reading at each side and one in the center. If the assembly has worn to a thickness of 0.195 inch (shoe and lining together) or 0.030 inch (lining material only) at any one of the three measuring locations, replace all (4) shoe and lining assemblies on both front wheels.
3. With the shoe and lining assemblies installed, insert a feeler gauge between the lining and rotor. If the clearance is not within 0.002-0.010 inch, check for shoe and lining assemblies not being properly seated on the caliper bridges, for a piston pushed back in the cylinder bore, for a seized piston, or for malfunction of a piston seal. Ordinarily, the clearance should be 0.002-0.010 inch. However, if the car was stopped just prior to checking the clearance, the brakes may drag slightly.
4. To check rotor runout, first eliminate the wheel bearing end play by tightening the adjusting nut. After tightening the adjusting nut check to see that the rotor can still be rotated.
5. Clamp a dial indicator to the caliper housing so that the stylus contacts the rotor at a point approximately 1 inch from the outer edge. Rotate the rotor and take an indicator reading. If the reading exceeds 0.002 inch total indicator runout, either replace or refinish the rotor. The rotor refinish specifications are: total lateral runout of 0.002 inch, roughness level of 80/15 microfinish, total overall material removed should not exceed 0.100 inch, and minimum allowable rotor thickness is 1.150 inch.

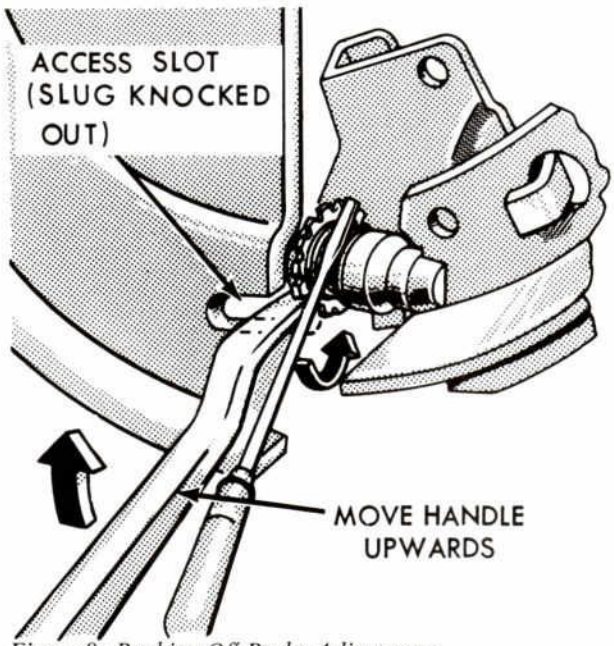


Figure 8—Backing Off Brake Adjustment

When the runout check is completed, be sure to adjust the bearings in order to prevent bearing failure.

6. Check the rotor for scoring. Minor scores can be removed with fine emery cloth. If the rotor is excessively scored, replace it.

7. Visually check the caliper. If it is cracked or if excess leakage is evident, it should be replaced. Slight leakage or seized pistons indicate removal and disassembly.

8. If upon disassembly the caliper is found to be distorted or damaged, or if the cylinder bores are scored or excessively worn, replace the assembly.

THE TWO HALVES OF THE CALIPER ASSEMBLY SHOULD NEVER BE SEPARATED. DAMAGE OR FAILURE OF ONE REQUIRES REPLACEMENT OF BOTH AS A UNIT.

Drum Brakes

1. Remove the wheel and drum. Be careful not to burr, chip or damage the notches in the adjusting screw when backing off; otherwise the self-adjusting mechanism will not function properly. Figure 8. Wash all parts except the brake shoes in a cleaning fluid and dry with compressed air.

2. Brush all dust from the carrier plates and interior of the brake drums.

3. Inspect the brake shoes for excessive lining wear or shoe damage. If the lining is worn within 1/32 inch of the rivet heads or if the shoes are damaged, they must be replaced. Replace any lining that has been oil saturated. Replace lining in axle sets. Prior to replacement of lining, the drum diameter should be checked to determine if oversize linings must be used.

4. Check the condition of brake shoes, retracting springs, hold-down springs, and drum for signs of overheating. If the shoes have a slight blue coloring, indicating overheating, replacement of the retracting and hold-down springs is strongly recommended. OVERHEATED SPRINGS LOSE THEIR PULL AND COULD CAUSE THE NEW LINING TO WEAR PREMATURELY, IF THEY ARE NOT REPLACED.

5. If the car has 30,000 miles or more of operation on the brake linings or signs of overheating are present when relining brakes, the wheel cylinders should be disassembled and inspected for wear and entrance of dirt into the cylinder. The cylinder cups should be replaced, thus avoiding future problems.

6. Inspect all other brake parts and replace any that are worn or damaged.

7. Inspect the brake drums and if necessary refinish.

TIRES

Performance, ride and handling qualities of any car are greatly influenced by tire condition and pressure. Abnormal tire wear due to underinflation, overinflation, cornering wear, etc., are usually readily noticeable to the eye.

Tire Wear

Spotty Wear occurs along the edge of the tire in small circular areas. It's caused by a number of conditions including tread design, inflation pressure and misalignment.

Overinflation wear occurs at the center of the tread area. This causes early failure in the center of the ribs and sidewall failure.

Underinflation wear occurs at both edges of the tread. Car weight usually distorts the normal contour of the tire so that it bellies out or bulges. This also leads to excessive heat, broken cords, wheel-rim bruises and premature failure.

Toe-in and Toe-out wear produces a feather-like edge on the edges of the treads due to a scrubbing action on the road. Toe-in produces a feather edge on the inner edge of the tread and toe-out an edge on the outer tread edge.

Camber and Cornering wear produces excessive wear on the outer or inner half of the tire.

Since tires wear at different rates on all four wheels due to a great many factors, maximum tire life can be increased if the tires are rotated every few thousand miles.

Figure 1—Abnormal tire wear caused by underinflation

Figure 2—Abnormal tire wear caused by overinflation

Figure 3—Fast driving on curves and around corners caused this tire to be worn smooth on the shoulders of the tread

Figure 4—A single spot or series of cuppings around the tire circumference caused by a combination of underinflation and mechanical irregularities

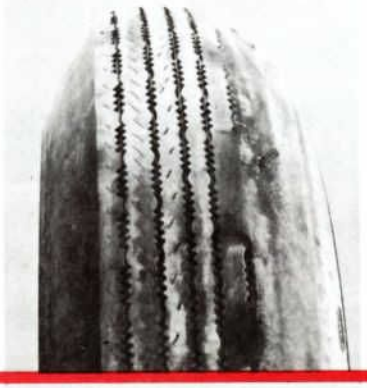


Figure 5—Too much wheel camber caused this uneven tire wear condition

Figure 6—Misalignment of the wheels caused the feathered edge on the tread of this tire

Photographs Courtesy of Rubber Manufacturers Association

TIRE INFLATION

Maintaining correct tire pressure is the most important element of good tire care. Tire pressures should always be checked when the tire is reasonably cool; that is, if the car has been parked for three hours and not driven more than three miles. If it is not possible to check the tires cold, then, assume a 2-4 psi increase over the cold specifications. Never bleed air out of a hot tire to adjust pressure. Since tire pressure may increase up to 8 psi after prolonged high speed driving, bleeding tire pressure from a hot tire will result in lower than specified pressures when the tire cools off.

Tire pressure lower than recommended will reduce tire life and vehicle handling qualities. Pressures above those recommended on the following chart affect the life and comfort factor of the vehicle adversely. "Hard" tires tend to magnify, rather than absorb road shocks and are more vulnerable to damage from striking depressions or blunt objects in the road.

FALCON AND FAIRLANE TIRE SPECIFICATIONS

TIRE INFLATION (COLD)
UP TO FULL RATED LOAD

	Front	Rear
Car	26	26
Wagon and Ranchero	24	30

FULL RATED LOADS

	Full Rated (Max.) Load (lbs.)	Passenger and Luggage Equivalent of Full Rated (Max.) Load
All Models except Station Wagons and Rancheros	1075	Driver + 5 Pass. + 175 Lbs. Luggage
Station Wagons	1200	Driver + 5 Pass. + 300 Lbs. Luggage
Ranchero Standard Suspension	850	Driver + 700 Lbs. Cargo
Ranchero Heavy Duty Suspension	1250	Driver + 1100 Lbs. Cargo
Trailer Towing up to 200 lb. actual tongue load	Driver + Passengers + Luggage + Actual Tongue Load must not exceed full rated (Max.) load	
For heavier tongue loads see your Ford Dealer.		

For sustained legal speeds over 60 mph (one hour or more), add 4 lbs. (up to 32 max.) to the recommended inflation pressures. While we strongly discourage excessive speed, if the car is to be driven over 90 mph, special high speed tires are required.

FORD TIRE SPECIFICATIONS

TIRE INFLATION (COLD)

MODERATE LOAD (5 Persons or Less)*

	Front	Rear
Car	26	26
Wagon	20	28

*Moderate load on bucket seat models is 4 persons or less.

UP TO FULL RATED LOAD

Car	28	31
Wagon	22	31

FULL RATED LOADS

	Full Rated (Max.) Load (lbs.)	Passenger and Luggage Equivalent of Full Rated (Max.) Load
Sedans & Hardtops (with bench seats)	1100	Driver + 5 Pass. + 200 Lbs. Luggage
Convertibles (with bench seats)	950	Driver + 4 Pass. + 200 Lbs. Luggage
Bucket Seat Models	800	Driver + 3 Pass. + 200 Lbs. Luggage
Station Wagons	1200	Driver + 5 Pass. + 300 Lbs. Luggage or Driver + 7 Pass.
Trailer Towing up to 200 lb. actual tongue load.	Driver + Pass. + Luggage + Actual Tongue load must not exceed full rated (Max.) load.	
For heavier tongue loads see your Ford Dealer.		

For sustained legal speeds over 60 mph (one hour or more), add 4 lbs. (up to 32 max.) to the recommended inflation pressures. While we strongly discourage excessive speed, if the car is to be driven over 90 mph, special high speed tires are required.

MUSTANG TIRE SPECIFICATIONS

TIRE INFLATION (COLD)
UP TO FULL RATED LOAD

	Front	Rear
All models (except as noted below)	24	24
Hi-Performance models and other vehicles with high speed tires	28	28

THUNDERBIRD TIRE SPECIFICATIONS

TIRE INFLATION (COLD)

MODERATE LOAD (4 Persons or Less)

	Front	Rear
Hardtop	24	25
Convertible	24	25

UP TO FULL RATED LOAD

	Front	Rear
Hardtop	24	25
Convertible	24	27

FULL RATED LOADS

	Full Rated (Max.) Load (lbs.)	Passenger and Luggage Equivalent of Full Rated (Max.) Load
All Models	775	Driver + 3 Pass. + 175 Lbs. Luggage
Trailer Towing up to 200 lbs. actual tongue load.	Driver + Passengers + Luggage + Actual Tongue Load must not exceed full rated (Max.) load	

For sustained legal speeds over 60 mph (one hour or more), add 4 lbs. to the recommended inflation pressures. While we strongly discourage excessive speed, if the car is to be driven over 90 mph, special high speed tires are required.

2-PLY VS 4-PLY

Considerable comment on the relative merits of 2-ply vs 4-ply tires has resulted in some confusion as to the safety of original equipment 2-ply tires. The following table is based upon testimony given by the Chairman of the Engineering Advisory Committee, Automobile Manufacturers Association, in 1965 before the Committee on Commerce, the United States Senate. The figures speak for themselves on the superiority of 2-ply tires with 4-ply rating used as original equipment. In addition to the figures shown, the testimony also brought out that 2-ply tires run 4.4 percent cooler and have better traction and skid resistance.

TIRE PERFORMANCE COMPARISON

	Four Ply 4-Ply-Rating	Two Ply 4-Ply-Rating	Per Cent Improvement*
POWER LOSS PER TIRE	1.67 hp @ 30 mph	1.60 hp @ 30 mph	4.2%
	3.36 hp @ 60 mph	3.20 hp @ 60 mph	4.8%
FUEL CONSUMPTION	17.6 mpg	17.9 mpg	1.7%
TEMP. INCREASE IN 30 MIN.	to 136° F	to 130° F	4.4%
PRESS. INCREASE IN 30 MIN.	5½ psi	4 psi	30.0%
TREAD WEAR	100%	up to 120%	up to 20%
HIGH SPEED	100%	up to 120%	up to 20%
STRENGTH (Hazard Resistance)	100%	100%	0
STABILITY	—	Superior	—
RIDE COMFORT	—	Equal	—

*Per cent improvement related to four-ply, 4-ply rating tire.

NEW FoMoCo HI-Lo PISTON RINGS

Ford's exclusive FoMoCo Hi-Lo piston ring sets are designed specifically for replacement in Ford engines of any condition—high or low mileage, even rebored.

This handy application and installation guide is designed to help independent service personnel specify the correct Ford Part Number for every replacement ring job they have.

The chart contains important engine application information for the entire Ford family of passenger cars with the correct part number listed in the far right hand column of the chart.

PISTON RINGS INSTALLATION PROCEDURES

1. Remove the ridge at the top of the cylinder before removing the piston. Piston damage can occur if the ridge isn't removed. Use a good ridge reamer.

2. Always deglaze the cylinder. A proper cross-hatch pattern is necessary to prevent early break-in scuffing and to seat the rings correctly.

3. After deglazing clean the cylinders thoroughly with warm soap and water and *keep all parts clean.* Any dirt or deglazing abrasive will reduce the life of the engine.

4. Before installation, check the gap of the rings at the bottom of the piston ring travel. Oversize or undersize rings will cause failures.

5. Clean ring grooves with proper tool before installing rings on piston. Check ring side clearance in piston groove, as excessive side clearance will cause ring breakage.

6. Follow instructions for installing rings on pistons. Use a good ring installation tool. Improperly installed or overstressed rings will not do a good job.

7. Before installing pistons and rings into engine block, dip rings and the piston in clean engine oil. Use a good ring compressor to install pistons.

NO. CYL.	DISPLACEMENT CU. IN.	BORE DIAMETER	FORD PASSENGER	FORD TRUCK
6	144	3½″		60-64
6	170	3½″		61-66
6	200	3.68″		
6	215	3 9/16″	52-53	52-53
6	223	3⅜″	54-64	54-64
6	240	4″	65-66	65-66
6	262	3 23/32″		61-64
8	221	3½″		
8	239	3½″	54	54-55
8	256	3⅜″		54-55
8	260	3.8 ″	62-63	
8	272	3⅜″	55-57	56-58
8	289	4″	63-66	
8	292	3¾″	55-62	58-62
8	312	3.8″		
8	332	4″	58-59	
8	352	4″	58-66	
8	361	4.05″		
8	383	4.3 ″		
8	390	4.05″	61-65	
8	390	4.05″	66	
8	406	4.13″	62-63	
8	410	4.05″		
8	427	4.23″	63-65	
8	427	4.23″	65-66	
8	428	4.13″	66	
8	430	4.3″		
8	462	4.38″	66	

*NOTE: Each set includes necessary rings for two pistons.
When doing a complete engine overhaul, 3 Hi-Lo sets are needed for 6-cylinder engines, and 4 Hi-Lo sets are needed for 8-cylinder engines.

Application Guide And Installation Tips

FALCON	FAIRLANE	THUNDER-BIRD	MERCURY	COMET	MUSTANG	METEOR	EDSEL	BRONCO	LINCOLN	HI-LO UNIVERSAL RING SET*
60-64				60-63						C0DZ-6148-A (3)
60-66	60-65			61-65	65	62-63		66		C0DZ-6148-A (3)
64-66	63-66				65-66	63				C3OZ-6148-A (3)
										B2AZ-6148-A (3)
			61-62				58-60			B4AZ-6148-F (3)
										C3AZ-6148-B (3)
										C1TZ-6148-A (2)
	62-63					62-63				C0DZ-6148-A (3)
										B4AZ-6148-A (3)
			54-56							B4AZ-6148-F (3)
63-64	62-64			63-64	65	62-63				B6AZ-6148-A (2)
										B4AZ-6148-F (3)
63-66	63-66			63-66	65-66			66		C3AZ-6148-B (3)
		55-57	55 & 61-62				59-60			B5AZ-6148-A (3)
		56-57	56-60							B6AZ-6148-A (2)
							58-59			B8AZ-6148-A (3)
		58-60	61-62				60			B8AZ-6148-A (3)
							58-59			C1AZ-6148-A (3)
			58-60							C0SZ-6148-A (2)
		61-65	61-65							C1AZ-6148-A (3)
	66	66	66	66						C6AZ-6148-A (2)
			62-63							C2AZ-6148-A (1)
			66	66						C6AZ-6148-E (2)
			63-65							C3AZ-6148-A (1)
										C5AZ-6148-A (1)
		66	66							C6AZ-6148-A (2)
		59-60	58-60						58-65	C0SZ-6148-A (2)
									66	C6VY-6148-A (2)

(1) Standard size only, no oversizes available.
(2) Standard, .020 o/s, .030 o/s and .040 o/s available.
(3) Standard, .020 o/s, .030 o/s, .040 o/s and .060 o/s available.

TECHNICAL

WIRING SHORT CIRCUIT TRACING AIDS
(All Cars And Trucks)

Tracing of shorted wires is difficult, unless the individual circuits can be isolated. To aid in circuit isolation, two test lights can be fabricated from the nylon instrument panel light sockets used for either charge indicator light or oil pressure indicator light. Using one socket with at least six inches of wire from the socket, solder one wire to each end of a blown fuse (recommend ¾" long fuse). With the other socket, solder needlepoint probes to the ends of the wires.

These two test lights can be used to advantage when trying to locate and isolate a short circuit by substituting the test light for the blown fuse. When the test light is inserted, the bulb will glow and will remain aglow until the short circuit is removed. Determining which circuit is at fault can be accomplished by disconnecting the affected circuits until the test light goes out. At this point, the defective circuit is isolated, and any short caused by contact with sharp metal surfaces, pinched wires or screws, can then be detected by visual inspection.

When trouble-shooting at the fuse panel, remove the blown fuse and insert the test light. Then follow the isolating procedure as indicated above until the defective circuit is located. For vehicles not having a fuse panel, but using "in-line" fuses for each individual circuit, use the test light having two needlepoint probes for piercing the wiring insulation on each side of the blown fuse, and follow the same testing procedure indicated above.

Satisfactory repair can be accomplished in accordance with standard electrical practices.

BUBBLES IN VINYL TOP MATERIAL
(All Car Lines Equipped with Vinyl Roof Cover)

Vehicles equipped with vinyl roof covers may develop small localized bubbles under the cover in areas of direct contact with the metal roof panel. The bubbles, which may present an undesirable appearance, are caused by inadequate adhesion of the material to the roof panel. (See Figure 1).

In most instances, the bubbles can be successfully removed by a very limited application of heat across the exterior surface of the vinyl material. When heat is applied, the loose vinyl material in the bubble area has a tendency to shrink and can be pressed down to conform to the roof surface by finger or hand pressure. A suitable source of heat is obtained by the use of a heat lamp or heat gun, available through local electric tool dealers. Care should be taken not to subject the top material to extreme heat since permanent damage may occur causing deterioration of the grain and giving the material a shiny appearance. To assure proper control of heat, no greater concentration should be used than can be endured by the back side of the operator's hand.

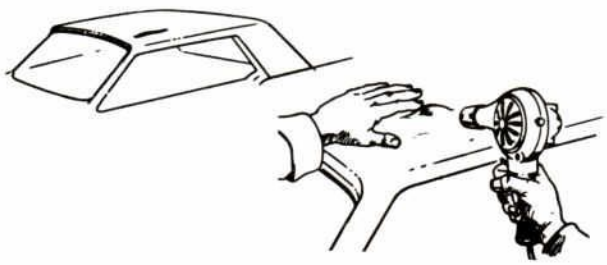


Figure 1—Applying Heat To Remove Bubbles In Vinyl Top Material

SPARK PLUG SPECIFICATIONS
(1966 Ford)

Spark plug usage for the 1966 Ford application has been revised.

Changes were made in the 240, 240 Police and Taxi and 428 Police applications.

For future reference, mark these revisions into your own personal reference guides.

Engine	Type	Ford Part Number	Gap (inches)	Torque (Ft. Lbs.)
240	BF41	B8A-12405-A	0.032-0.036	15-20
240 Police and Taxi	BTF6	B7A-12405-A	0.032-0.036	15-20
289, 352, 390 and 410	BF42	B8A-12405-A	0.032-0.036	15-20
427	BF32	C0AZ-12405-A	0.028-0.032	15-20
428	BF42	B8A-12405-A	0.032-0.036	15-20
428 Police	BF32	C0AZ-12405-A	0.028-0.032	15-20

1. When a new spark plug is installed in a new replacement cylinder head, torque the spark plug to 20-30 ft-lbs.
2. All spark plugs used are 18MM.

SERVICE BRIEFS

THERMACTOR EXHAUST EMISSION SYSTEM
(All Vehicles Thermactor Equipped)

To assist service personnel when checking, trouble shooting, or repairing Thermactor equipped vehicles, identification of certain parts and their application are explained here.

Thermactor Air Supply Pump Applications

All six cylinder engine pumps have three straight hose connections on the rear plate. (See Figure 1.)

All eight cylinder pumps have three short right angle hose connections on the rear plate, except Lincoln Continental.

Air Pump Pressure Setting Plug and Silencer Usage

All Air Supply Pumps have a pressure-setting plug pre-set at the assembly plant. By way of quick and accurate identification, all six-cylinder installations should have a GREEN color coded pressure-setting plug. All eight-cylinder installations should have a BLUE color coded pressure-setting plug.

If the installation includes an air pump relief valve silencer, it will be necessary to remove the silencer to observe the color coded pressure setting plug.

When installing the silencer, refer to Table 1 for the proper position of the silencer. Also see Figure 1 for an understanding of the angle positions referred to. Note that position "A" is straight forward, "B" is in a 45° downward position and "C" is straight down or 90° clockwise from the forward position.

These positions are important to satisfactorily control the air noise level.

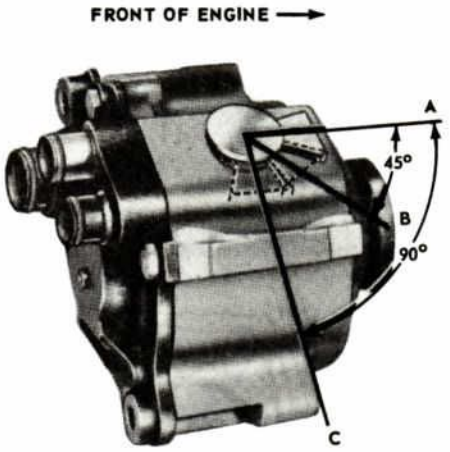


Figure 1—Thermactor Air Supply Pump—Six Cylinder

TABLE 1

ENGINE DISPLACEMENT Cubic Inches	CAR LINE	SILENCER POSITION
170	Falcon Econoline Bronco	B B A
200	Fairlane Falcon Mustang Comet	A B B A
240	Ford Econoline F-100	A C A
289	All Cars	A
300	F-100	A
352, 390, 428	All Cars	Not Required

EXCESSIVE OIL CONSUMPTION, EXHAUST SMOKING AND SPARK PLUG FOULING

The purpose of this article is to alert you that if instances of high oil consumption, exhaust smoking and spark plug fouling occur, you should add one additional check to your normal diagnosis to confirm if an oil consumption problem exists. The additional area that should be checked is the rocker arm support bolts to determine if the support bolt holes are drilled into the cylinder head and intersecting the intake ports. Inasmuch as these bolts are subjected to full engine oil pressure by their passage through the rocker arm shaft, this would permit oil seepage around the threaded portion of the bolt to enter the intake ports. The following procedure can be used to determine if the above condition exists.

1. Remove carburetor air cleaner and lock the primary throttle and choke plates open.
2. Remove both rocker arm covers.
3. Remove both rocker arm shaft assemblies.
4. Apply air pressure to the bolt holes. If air flows from the carburetor throat this indicates that the hole is drilled through and the bolts must be replaced with new service studs.

The studs that have been released are:

Ford Part Number

372351-S. . . . . Stud 3/18-16-24 x 3.84 (use in countersunk holes)

372350-S. . . . . Stud 3/8-16-24 x 3.52 (use in chamfered holes)

Use the existing washers with 3/8"–24 connecting rod nut.

The service stud thread differs from the bolt thread in that it is designed to obtain maximum thread sealing engagement, thereby minimizing the possibility of oil leakage along the helical path of the threads.

REVISED IGNITION TIMING SPECIFICATIONS

ALL 1966 VEHICLES

Many of the 1966 ignition timing specifications have been revised. The enclosed tables contain the up-to-date specifications and supersede any previously published material.

1. If the individual requirements of the car and/or the use of sub-standard fuels dictate, the initial timing may have to be retarded from the recommended setting to eliminate detonation (spark knock). If retiming is necessary, it should be done progressively and not to exceed 2° BTDC. It should be noted that Thermactor equipped vehicles with an initial timing of TDC cannot be retarded.
2. For altitude operation, and/or to obtain optimum engine performance and fuel economy, the initial ignition timing may be advanced 5° over the "normal" setting. No further improvement in engine performance or fuel economy will be achieved by advancing beyond this point. Advance the timing progressively until engine detonation (spark knock) is evident under actual road test acceleration. Retard the timing until the detonation (spark knock) is eliminated.

PASSENGER CARS

ENGINE	IGNITION TIMING BTDC— Std. Trans.	Auto. Trans.
170 and 200 six Non-Thermactor	6° 2	12° 2
170 and 200 Six Thermactor	TDC	TDC
240 Six Non-Thermactor	6° 2	10° 2
240 Six Thermactor	TDC	4°
289 V-8 (except HP) Non-Thermactor	6°	6°
289 V-8 (except HP) Thermactor	TDC	TDC
289 HP V-8 Non-Thermactor	12°	12°
352 V-8 Non-Thermactor	—	10° 2
352 V-8 Thermactor	—	10°
390 V-8 (except GT) Non-Thermactor	10° 2	10° 2
390 V-8 (except GT) Thermactor	6°	6°
390 GT V-8 (All)	10°	10°
428 (except Police) V-8 Non-Thermactor	10°	10°
428 (except Police) V-8 Thermactor	6°	6°
428 Police V-8 (All)	12°	12°
427 HP V-8 Non-Thermactor	8° 2	—

UTILITY VEHICLES

ENGINE	IGNITION TIMING BTDC — Std. Trans.	Auto. Trans.
170 Bronco Non-Thermactor	6° 2	—
170 Bronco Thermactor	TDC	—
170 Econoline Non-Thermactor	4° 2	8° 2
170 Econoline Thermactor	TDC	TDC
240 Econoline Non-Thermactor	4°	10°
240 Econoline Thermactor	TDC	TDC

TRUCKS

ENGINE	IGNITION TIMING BTDC — Std. Trans.	Auto. Trans.
170 Six Non-Thermactor	4° 2	8° 2
240 LD Six Non-Thermactor	6°	10° 2
240 LD Six Thermactor	TDC	TDC
240 MD Six Non-Thermactor	6° 2	—
300 LD Six Non-Thermactor	6° 2	10° 2
300 LD Six Thermactor	TDC	TDC
300 HD Six Non-Thermactor	6° 2	—
330 MD V-8	12° 2	12° 2
330 HD V-8	10° 2	10° 2
352 V-8 Non-Thermactor	6° 2	6° 2
352 V-8 Thermactor	TDC	TDC
361 HD V 8	10° 2	10° 2
391 HD V-8	8° 2	8° 2
401, 477 and 534 SD V-8	8°	8°

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