SHOP TIPS

Autolite Ford

VOL. 9, NO. 4 DECEMBER, 1970

Towing and Troubleshooting Tips

SEE CENTER INSERT FOR TIMELY PROMOTIONS

TOWING AND

Technical parts and service information published by the Autolite-Ford Parts Division and distributed by Ford and Lincoln-Mercury Dealers to assist servicemen in Service Stations, Independent Garages and Fleets.

IN THIS ISSUE

Be sure and 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: Autolite-Ford Parts Division, Merchandising Services Dept., P.O. Box 3000, Livonia, Michigan 48151.

The descriptions and specifications contained in this publication were in effect at the time it was approved for printing. Our policy is one of continuous improvement and we reserve the right to change specifications or design without notice and without incurring obligation.

Autolite Ford

VOL. 71 MSD 17 LITHO IN U.S.A.

INTRODUCTION

Because there are a greater number of cars on the highways each year the number of service calls has also increased. But even more significant is the fact that a great proportion of owners DO NOT MAINTAIN THEIR CARS PROPERLY. They often fail to have engines tuned, batteries checked and tested, cooling systems inspected or such maintenance as fluid level checks.

As a result, service calls are big business!

Is your service outlet prepared to handle just about any kind of an emergency situation?

Ideally you should have a good wrecker, one that is equipped with a *Towing Dolly*, *Scotch Blocks*, *Tow Bar* and *Sling*, and where necessary, wood block adapters (made in advance) for pulling in vehicles with special towing problems. See page 5 for details about towing the new Capri.

Some of the more aggressive service outlets are even equipped with a two-way radio and car starter. These car starters are the safest and quickest way for getting a stalled engine started. Advances made in gas-engine/generators have almost obsoleted the method of using a booster battery and cables. Some of these car starters are also designed to charge a battery and provide alternating current power for lights and electrically operated tools and other equipment.

Make it a point to review your own service outlet towing equipment and make plans for bringing it up-to-date with the more modern methods of handling all types of road emergency calls.

HANDLING THE EMERGENCY CALL

Owners who have experienced a breakdown on the road, regardless of their problem, are visibly upset and tend to be irritable.

Therefore, when a call is received, your main problem at that moment is to attempt to handle the situation as carefully and as courteously as possible. Treating him (or her) with a calm but firm approach will often turn the owner into a loyal customer who will come in for all his service needs.

Getting off on the right foot is extremely important. Get all the necessary information on the nature of his (or her) emergency. Simple breakdowns such as a flat tire or "out-of-gas" naturally pose no difficulty. Find out if the owner heard any unusual noises prior to the breakdown. Question the owner to determine if the engine will "crank over" but will not start. Ask the owner if he noticed any unusual odors such as spilled gasoline (carburetor flooding, fuel line ruptured, etc.).

Often your questioning will reveal if the breakdown is serious and the car will have to be towed in for repairs . . . or if it is only a minor problem that can be corrected at the scene. Armed with this information you can decide the best possible method for getting the owner back on "wheels" again. Generally you can also determine the amount of time it will take. Nothing gets an owner "wound up" faster than a promise to get to his car at a certain time . . . then show up an hour later than agreed upon. It is much better to give yourself some leeway in your emergency scheduling. Showing up earlier makes you look more professional.

In this issue of *Shop Tips* you'll find some solid information that will help you to become even more of a professional service technician. You'll find such valuable service information as Troubleshooting Tips, Towing Tips and a number of pages devoted to the solving of some of the more unusual technical problems.

TROUBLESHOOTING TIPS

DO'S AND DON'TS OF TOWING/STARTING

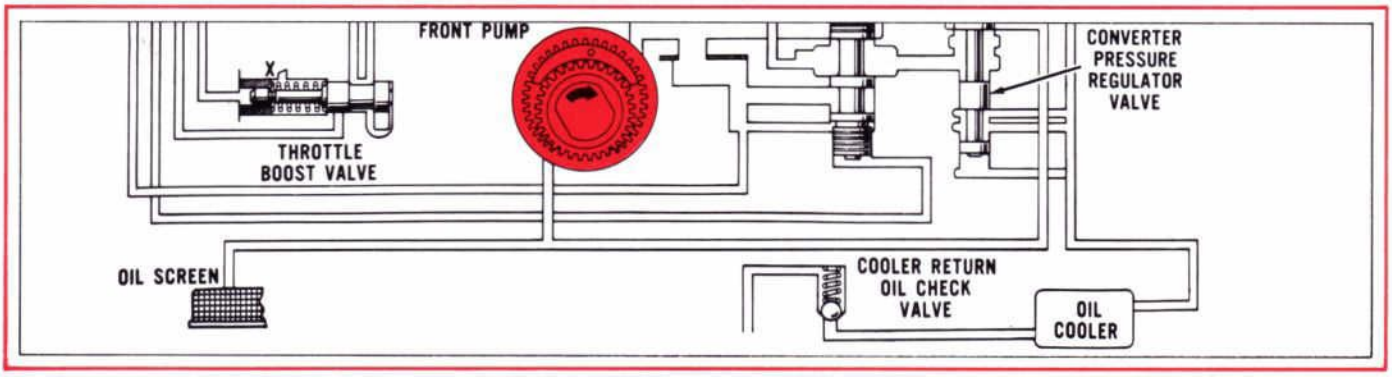


Figure 1—Typical Hydraulic Circuit Showing Only the One Front Pump; 1965 to 1971

Not too long ago, pushing an automatic or manual transmission equipped car to get it started was considered an accepted service practice.

This old-fashioned method still works for stick shifts. However, it should never be done except under extreme emergencies. Now is the time to quit this out-dated practice. Not only is it dangerous in certain situations and under adverse road conditions, but in some states it is illegal. The exception to this is when it is necessary to remove the disabled car out of the traffic lane and onto the road shoulder.

Push starting Ford-built automatic transmission equipped cars is not possible since the 1965 models came out. These transmissions have only one pump (see Figure 1) to supply the necessary hydraulic line pressure needed to operate the clutch and band pistons.

The front pump is driven by the engine through rotation of the input shaft. As a result, when the engine does not run, no hydraulic line pressure can develop. Therefore, the clutches cannot operate to couple the input and output shafts together. See Figure 2.

Since there is no rear pump as there is in 1964 and earlier models (see Figure 3), not only will the engine not turn over when the car is pushed but the transmission may become seriously damaged due to a lack of oil pressure and oil flow necessary for lubricating the internal operating parts such as the gears and bushings.

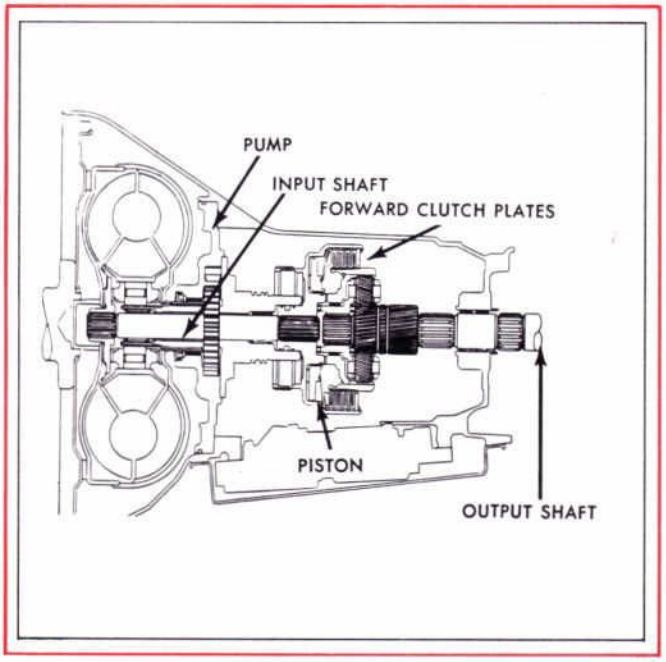


Figure 2—Pump Operation Necessary to Couple Input and Output Shafts Together

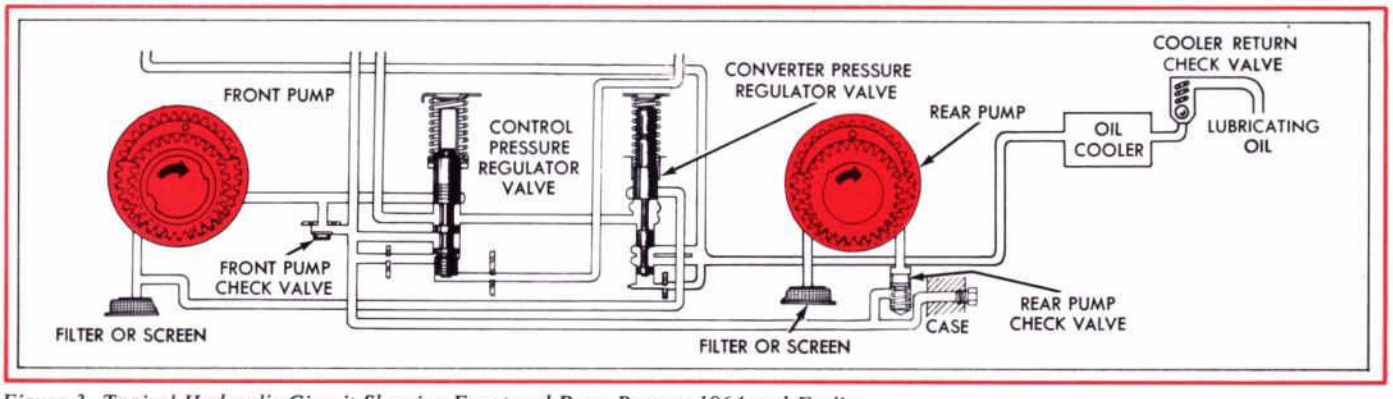


Figure 3—Typical Hydraulic Circuit Showing Front and Rear Pumps; 1964 and Earlier

TOWING AND

BEFORE TOWING A VEHICLE

There are some definite procedures that should be followed if you don't want to end up with a damaged vehicle on your hands. For the 1971 models these procedures are more important than ever.

Always make sure that:

1. The parking brake is released (off).
2. The transmission operates properly. Question the owner and/or look to see if the transmission has fluid.
3. The rear axle operates properly. Question the owner to find out if he noticed any abnormal noises in the drive train before the car stopped.

CAUTION: If the ignition key is not available to unlock the Anti-Theft Ignition, Steering and Transmission Lock System, it will be necessary to place a dolly under the rear wheels and tow the vehicle with the front wheels raised.

4. The attaching chain, towbar or cables should not be attached to a bumper or bumper bracket. Make certain the hookup is attached to a main structural member of the frame.

NOTE: Ford limits four-wheel towing or towing with the rear wheels on the pavement to NOT MORE THAN 15 miles with a maximum speed limit of 30 mph. If the car must be towed at speeds exceeding 30 mph or for longer distances . . . for example on freeways or tollways (where permitted by state or local laws), the rear wheels of the car should be lifted and the car towed on the front wheels. When this is necessary, make sure the steering wheel is secured in the straight ahead position, so as to maintain straight ahead tracking. A special purpose piece of equipment can be purchased to accomplish this. If the car is a late model type with a combination anti-theft ignition steering and transmission lock system, DO NOT USE this system to secure the front wheels.

This same procedure must be followed if the transmission (either manual or automatic) is damaged or inoperative. If this is not possible, it is advisable to tow the car with the driveshaft disconnected from the rear axle.

USING BOOSTER BATTERY AND JUMPER CABLES

Whenever you are called upon to start a car with a rundown battery, always follow these safe practice rules:

- Turn off all unnecessary electrical loads. Check all electrical switches and make sure the ignition key is in the OFF position.
- Place the gear selector lever in Neutral or Park position.
- Connect the positive jumper cable (+ or P) from the booster battery to the positive terminal of the car battery (+ or P).
- Connect the negative jumper cable (– or N) from the booster battery to the negative terminal of the car battery (– or N).

CAUTION: If you notice ice has formed in the fill vents or the electrolyte cannot be seen . . . DO NOT ATTACH JUMPER CABLES TO THE BATTERY. A frozen battery should be considered a potential bomb and it may explode causing serious damage and physical injury. It is far better to remove the battery from the battery carrier, take it to your shop or service station and recharge it slowly AFTER it has thawed out.

- Turn the ignition key to the Start position to crank the engine.
- After the engine is running normally, first remove the negative jumper cable from the terminal of the battery . . . then disconnect the positive cable.

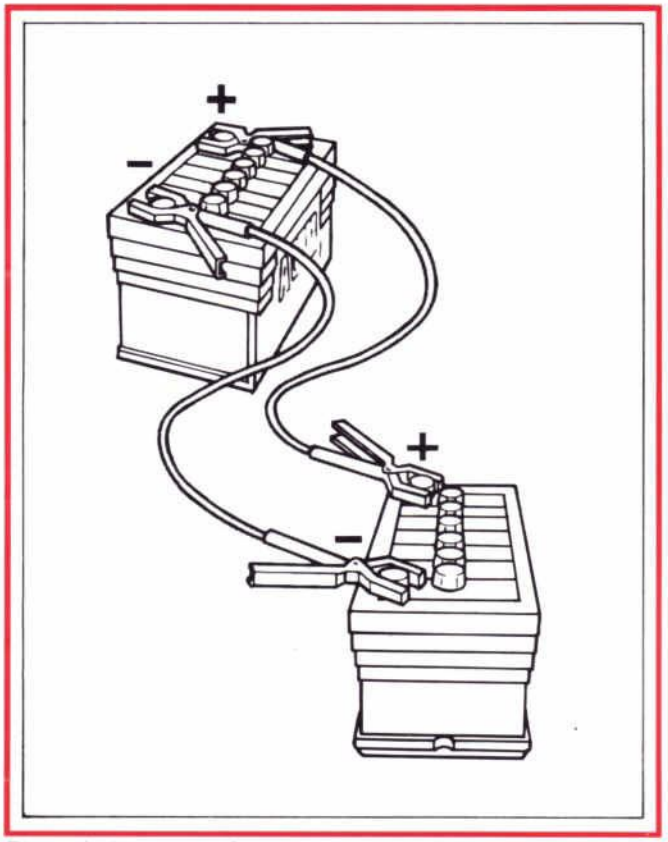


Figure 4—Correct Hook-Up of Booster Battery Cables to Vehicle Battery

NOTE: Ford service engineers have found that instances of small bulbs being "burned-out" can be prevented when using a booster battery by first reducing engine operation to idle speed. Then turn on the heater or air conditioner blower motor BEFORE disconnecting the booster battery cables.

TOWING THE CAPRI SAFELY AND PROPERLY

The Capri cannot be towed with existing tow truck equipment because damage will result to the bumper and/or adjacent panels. *Towing can only be performed with the rear wheels raised and with a special wood device required (locally made) to prevent vehicle damage.*

The following procedure must be strictly adhered to when towing a Capri:

1. Obtain two pieces of 2" x 4" wood and construct an adapter device using the dimensions shown in Figure 5. Nail the two pieces of wood together and install protective covering on the back side of the device to prevent paint damage.

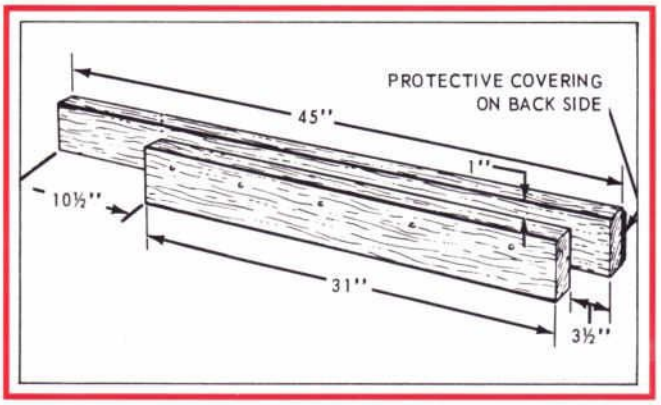


Figure 5—Towing Adapter Device

2. Install the tow truck sling hooks on the rear axle and position the wood device flush against the lower back panel and under the rear bumper as shown in Figure 6.

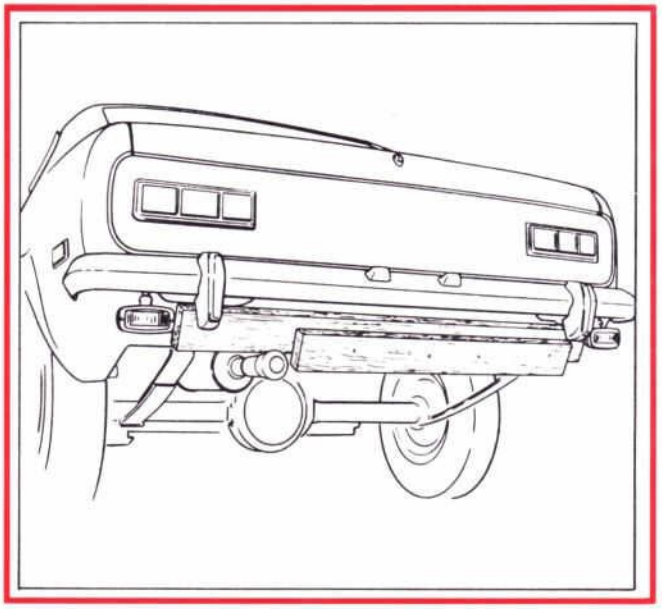


Figure 6—Wood Adapter Placed in Proper Position

3. Raise the sling until the rear tires are approximately 14" off the ground. This will assure that the sling does not contact the rear bumper. See Figure 7.

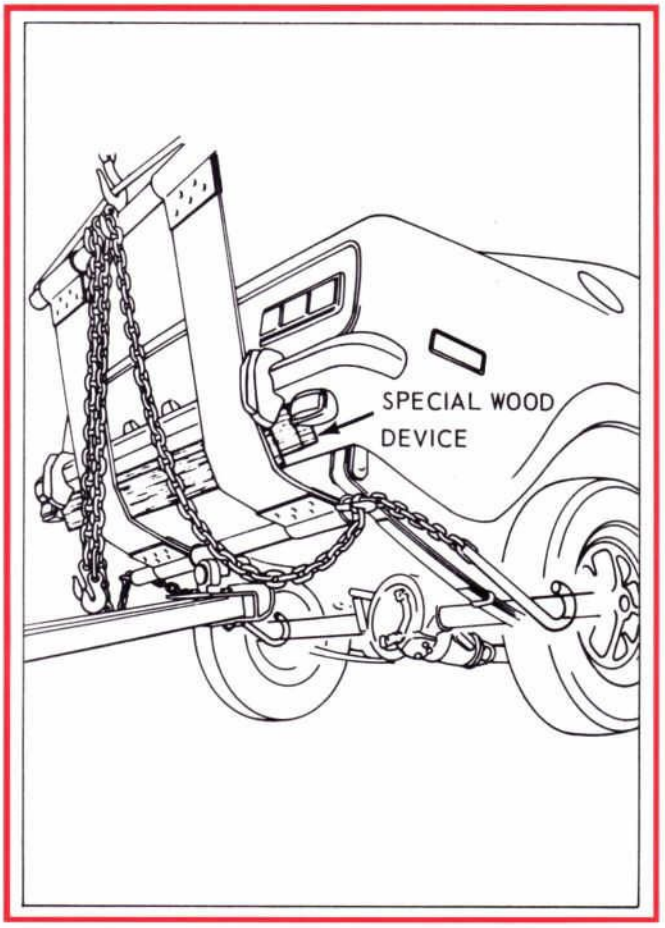


Figure 7—The Capri Supported Properly for Safe Towing

NOTE: Before towing the Capri, the ignition key should be removed from the switch so that the front wheels are locked in the straight forward position. Make sure the parking brake is released and the transmission gears are in neutral position. Removing the ignition key from the switch on Capri models, locks ONLY the steering column.

CAUTION: If the front end of the vehicle is damaged extensively, or the front wheels are locked, tires are flat, or for any other unsafe towing condition, it will be necessary to place a dolly under the front wheels and tow the vehicle with the rear wheels raised.

TOWING AND

STARTING TIPS

STARTER WILL NOT CRANK ENGINE

Most Probable Cause	Diagnosis Procedure	Action to Repair
1 **Corroded battery cables or connections.**	Place a heavy jumper wire in parallel with the battery to starter relay cable and then in parallel with the battery to engine (ground) cable. If the starter now cranks the engine, the battery cable is at fault.	Clean battery connections or replace battery cables and try to start.
	IF OK ↓	
2 **Battery low in charge.**	Perform a battery capacity test by loading the battery to three times its ampere hour rating for 15 seconds. If total battery voltage is less than 9.6 volts, check specific gravity of each cell. If less than 50 points between cells, battery is low in charge.	Charge battery and check charging system.
	IF OK ↓	
3 **Failed battery.**	If specific gravity test shows more than 50 points between cells, battery has failed.	Replace battery and check charging system.
	IF OK ↓	
4 **Failed starter relay.**	Connect a jumper from the battery positive terminal to the S terminal of the starter relay. If the starter will not crank the engine, the starter relay is not operating.	Replace starter relay.
	IF OK ↓	
5 **Failed starter drive.**	Operate ignition switch and listen for starter noise. If starter rotates or makes a distinct clunk but will not crank the engine, the drive is malfunctioning.	Replace starter drive.
	IF OK ↓	
6 **Failed starter.**	Temporarily connect heavy jumper from battery positive terminal to starter terminal of starter relay. If starter will not crank the engine, the starter needs repair.	Repair or replace starter.
	IF OK ↓	
7 **Maladjusted neutral start switch (if used).**	Apply brakes and attempt to start the engine while moving the transmission selector lever through all ranges. If the engine cranks when selector is anywhere but at N or P, the neutral start switch is out of adjustment.	Adjust neutral start switch.
	IF OK ↓	
8 **Inoperative neutral start switch (if used).**	Place selector lever in N or P and set brakes. Remove the neutral start switch connector block and connect a jumper between the two red-blue stripe wires. If the engine will now crank, the neutral start switch is not operating.	Replace neutral start switch.
	IF OK ↓	
9 **Failed ignition switch.**	Remove the connector block from the ignition switch and connect a jumper wire between the yellow and red-blue stripe wire terminals. If the engine cranks, the ignition switch needs replacing.	Replace ignition switch.
	IF OK ↓	
10 **Failed wiring from ignition switch through neutral start switch (if used), to starter relay.**	Make a starter control circuit test by substituting a jumper wire for the wires from the ignition switch to the starter relay. If the starter cranks, the wires are shorted or broken.	Replace failed wire.
	IF OK ↓	
11 **Hydrostatic lock.**	Remove spark plugs. Remove coil high tension lead wire at distributor and ground it to the engine. Try to crank engine with starter. If engine cranks, it indicates that water is leaking into cylinders.	Remove the cylinder head(s) and inspect the gasket(s) and head(s) for leaks and cracks. Examine the cylinder block for cracks. Repair or replace damaged engine components.
	IF OK ↓	
12 **Engine has seized-pistons or bearings.**	With spark plugs removed and coil to distributor high tension lead grounded to engine, attempt to crank engine with starter. If engine does not crank or cranks very slowly, a seized engine is indicated.	Remove engine oil pan. Check for water in lubrication system. If water is found, remove cylinder head(s) and check for combustion chamber leaks. Check for seized pistons, rings and bearings. Clean, repair or replace damaged engine components.

TROUBLESHOOTING TIPS

Continued

ENGINE CRANKS NORMALLY, BUT WILL NOT FIRE

Most Probable Cause	Diagnosis Procedure	Action to Repair
1 **No fuel.**	Turn on ignition key and check fuel gauge for adequate fuel supply. **IF OK** ↓	Add fuel.
2 **Ignition system not operating properly.**	Perform a spark intensity test by disconnecting a spark plug wire and observing spark across a gap (see Note 1). **IF OK** ↓	Perform ignition primary and secondary tests.
3 **Ignition primary circuit.**	Perform ignition primary circuit test with a voltmeter or oscilloscope to determine if voltage drop across the battery, coil and starting ignition circuit is excessive. **IF OK** ↓	Repair or replace defective parts or connections.
4 **Ignition secondary circuit.**	Perform ignition secondary circuit tests. Check the secondary (high tension) wires for excessive resistance and open circuits. Check the spark plugs and distributor for damage or improper adjustment. **IF OK** ↓	Repair or replace parts or connections as needed.
5 **Ignition timing incorrect.**	Check the ignition initial timing with the distributor vacuum line disconnected, or check initial timing on an oscilloscope. **IF OK** ↓	Adjust.
6 **Choke not operating correctly.**	Check the automatic choke thermostatic spring housing and choke plate pulldown clearance for improper adjustment. Check the choke linkage and plate for binding. **IF OK** ↓	Adjust, repair or replace as required.
7 **Carburetor accelerating pump inoperative or no fuel to carburetor.**	Perform accelerating pump discharge test. Remove the air cleaner and observe fuel flow from accelerating pump discharge nozzles while pumping accelerator. **IF OK** ↓	Check fuel supply to carburetor before repairing accelerator pump.
8 **Insufficient fuel supply to carburetor.**	Perform fuel pump pressure and volume tests with a pressure gauge connected to the carburetor fuel inlet port. **IF OK** ↓	Clean or replace parts as required.
9 **Carburetor fuel level or float set incorrectly.**	Check carburetor for incorrect wet fuel level or float setting. **IF OK** ↓	Adjust fuel level or float setting to specifications.
10 **Low or erratic compression.**	Perform an engine compression test to isolate sticking valves and low or erratic compressions (see Note 2).	Adjust or repair as required.

NOTE 1. Perform the spark intensity test as follows:

A. Disconnect a spark plug wire. Check the spark intensity of one wire.

B. Install a terminal adapter in the terminal of the wire to be checked. Hold the adapter approximately $\frac{3}{16}$ inch from the exhaust manifold and crank the engine with a remote starter switch. The spark should jump the gap regularly.

C. If the spark intensity is satisfactory, the ignition is satisfactory with the possible exception of ignition timing, spark plugs and distributor advance.

NOTE 2. On engines equipped with a Thermactor exhaust emission control system, disconnect the Thermactor emission control system before performing engine diagnosis procedures. Disconnect the anti-backfire valve vacuum sensing line and air supply line (air gulp type) at the intake manifold connections. Plug the manifold connections to preclude leakage. Normal engine diagnosis can then be performed. Upon completion of the engine diagnosis procedures, unplug the manifold connections and connect the vacuum sensing line and air supply line (air gulp type) at the intake manifold connections and check for leaks.

TOWING AND TROUBLESHOOTING TIPS *Continued*

ENGINE FIRES, BUT FAILS TO KEEP RUNNING

Most Probable Cause	Diagnosis Procedure	Action to Repair
1 **Ignition system not operating properly.**	Perform a spark intensity test by disconnecting a spark plug wire and observing spark across a gap (see Note 1). **IF OK** ↓	Perform ignition primary and secondary tests.
2 **Ignition primary circuit.**	Perform ignition primary circuit test with a voltmeter or oscilloscope to determine if voltage drop across the battery, coil and starting ignition circuit is excessive. **IF OK** ↓	Repair or replace parts or connections as needed.
3 **Ignition secondary circuit.**	Perform ignition secondary circuit tests. Check the secondary (high tension) wires for excessive resistance and open circuits. Check the spark plugs and distributor for defects or improper adjustment. **IF OK** ↓	Repair or replace parts or connections as needed.
4 **Choke not operating correctly.**	Check the automatic choke thermostatic spring housing and choke plate pull-down clearance for improper adjustment. Check the choke linkage and plate for binding. **IF OK** ↓	Adjust, repair or replace mechanism as required.
5 **Carburetor accelerating pump inoperative or no fuel to carburetor.**	Perform accelerating pump discharge test. Remove the air cleaner and observe fuel flow from accelerating pump discharge nozzles while pumping accelerator. **IF OK** ↓	Check fuel supply to carburetor before repairing accelerator pump.
6 **Insufficient fuel supply to carburetor.**	Perform fuel pump pressure and volume tests with a pressure gauge connected to the carburetor fuel inlet port. **IF OK** ↓	Clean or replace parts as required.
7 **Idle fuel mixture, fast idle or curb idle speed are out of adjustment.**	Check the carburetor idle fuel mixture and idle speed screws for proper initial adjustment. **IF OK** ↓	Adjust initial idle fuel mixture and idle speed to specification.
8 **Carburetor fuel level or float set incorrectly.**	Check carburetor for incorrect wet fuel level or float setting. **IF OK** ↓	Adjust fuel level or float settings to specifications.
9 **Carburetor contains dirt or foreign material or has wrong jet(s).**	Remove the carburetor, disassemble as necessary and clean it. Inspect all parts for wear or damage.	Replace improper, worn or damaged parts. Adjust carburetor to specifications.

NOTE 1. Perform the spark intensity test as follows:

A. Disconnect a spark plug wire. Check the spark intensity of one wire at a time.

B. Install a terminal adapter in the terminal of the wire to be checked. Hold the adapter approximately $\frac{3}{16}$ inch from the exhaust manifold and crank the engine with a remote starter switch. The spark should jump the gap regularly.

C. If the spark intensity of all the wires is satisfactory, the ignition is satisfactory with the possible exception of ignition timing, spark plugs and distributor advance. If the spark is weak at some wires, check the ignition secondary circuit. If the spark is weak or non-existent at all plugs, check the ignition primary circuit.

Do a little testing... It will increase your profits!

Sell Autolite's "LITTLE WONDER"...

It takes less than five minutes to check and replace a PCV valve on today's vehicles if it's not doing its job. It's a high profit replacement, especially when the vehicle is already in your shop for other work such as tune-up, oil and filter change, or minor repairs. PCV valves should be changed at least every 12,000 miles and inspected as often as possible. With Autolite's high quality and all-vehicle application coverage, PCV valve replacements are easy.

Make the Simple Test ...

It's easy to check a PCV valve . . . just remove the oil filler cap and hold the Autolite EV-44 PCV Valve Tester over the oil fill hole or tube with the engine idling. Remember, when a PCV valve is operating properly, the tester will read "good" and crankcase contaminants will be trapped and cycled to the intake manifold to be burned off in the combustion chambers. But a dirty or plugged PCV valve, indicated by a "repair" reading on the tester, can cause serious problems in the engine; such as:

- *Oil contamination*
- *Blown oil seals and oil leaks*
- *Foul smelling smoke and fumes*
- *Rough engine idle and greater fuel consumption*
- *Costly damage . . . premature engine failure*

And, replacing with an Autolite PCV valve is a positive approach to the air pollution problem . . . the contamination of the air by a malfunctioning engine. This "LITTLE WONDER" works to keep pollution at a minimum . . . and also helps the engine maintain maximum performance.

Explain to your customers the need for PCV valve replacement . . . to protect their vehicle investment and reduce air pollution. They'll appreciate it. And you'll profit from your good deed.

VISIT OUR PARTS COUNTER AND STOCK UP NOW!

looking for new profit potentials?

GO! With Autolite Sno-Power this winter!

Snowmobile owners will buy nearly six million replacement snowmobile spark plugs this winter alone. That's profit potential worth looking at!

Outstanding Features and Proven Performance!
Autolite Snowmobile Spark Plugs assure satisfied customers because they are made in the same way and with the same materials as Autolite's Racing Spark Plugs . . . *the winners at the Indianapolis 500 for four years in a row!* What's more, Autolite Snowmobile Spark Plugs are specially designed to keep the trouble out—keep the fun in snowmobiling for your customers.

1. **Hi-Density Insulator Prevents Misfires**
Autolite's hard ceramic insulator stops power-robbing flashover caused by the severe oil and moisture problems to which all snowmobile spark plugs are exposed.

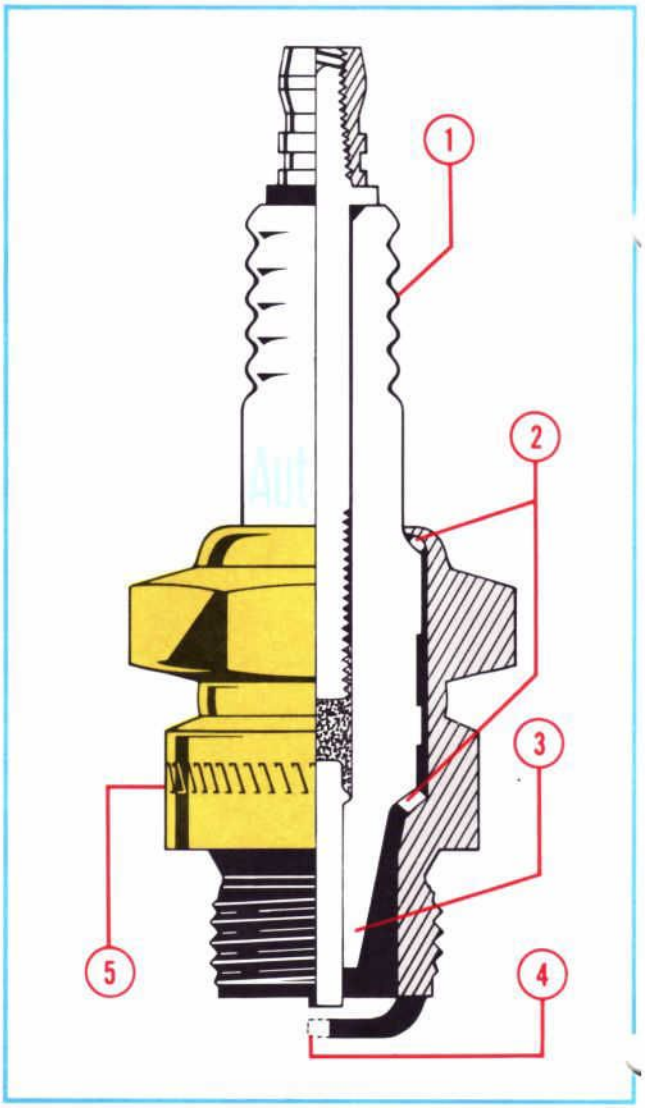
2. **Zero-Leakage Seal**
Autolite's zero-leakage hermetic seal helps prevent spark plug overheating and pre-ignition ping.

3. **Insulator Tip Resists Fouling**
Autolite's slender insulator tip stays cleaner longer . . . burns away fouling deposits that drain engine power.

4. **Special Electrode Design Provides Faster Starts**
Autolite's short side electrode plus thinner center electrode requires less voltage to fire than standard plugs giving faster starts even in the coldest weather.

5. **. . . And a Golden Shell!**
Autolite is the only snowmobile spark plug with a special shell surface treatment of gold epoxy to resist rust and corrosion.

Only Autolite Snowmobile Spark Plugs offer all these extra features, yet they *cost no more* than regular spark plugs.



GO! With Colorful Display Package Appeal!

Autolite Snowmobile Spark Plugs have the best-looking package in the industry (packed ten to a carton). Perfect for peg-board or counter display, they attract customers and make it easy to find the right number.

GO! With Exciting Sno-Power Promotion to Attract New Customers!

Take over the snowmobile spark plug sales action in your area with this sensational product/promotion combination . . . available exclusively from Autolite! Free display kit with your order for Autolite Snowmobile Spark Plugs includes . . .

A. **Sno-Power Window Poster**—Big 19″ x 28″ poster on transparent plastic identifies retailer headquarters for Autolite Snowmobile Spark Plugs . . . and invites customers to come in for FREE Sno-Power Decal.

B. **FREE Sno-Power Decal Offer**—Snowmobilers everywhere will want the big 4″ sharp-looking Sno-Power decals...great drawing power for Autolite Snowmobile Spark Plug retailers. And you can offer them FREE because you get five decals in each carton of ten Autolite Snowmobile Spark Plugs at no extra cost.

C. **Special Sno-Power Racing Jacket Offer**—Authentic Autolite Winter Racing Jackets with colorful embroidered cloth Sno-Power Patches for your customers! Complete description and order coupon included on customer folders in display kit.

D. **Application, Cross Reference, and Heat Range Chart**—This handy, durable 8½″ x 11″ chart shows Autolite Spark Plug applications for over 150 snowmobile engines. Use it in a catalog rack or displayed on the counter for convenient customer reference.

E. **Customer Folders that Sell Sno-Power**—25 folders in each display kit are perfect envelope stuffers or counter handouts. They give snowmobilers all the facts about Autolite Snowmobile Spark Plugs AND the special offer on Autolite Winter Racing Jackets and Sno-Power Patches.

E.

A.

B.

D.

C.

GO! With Minimum Inventory!
It takes just seven Autolite Snowmobile Spark Plug Part Numbers to cover the requirements of 90% of all popular snowmobile engines . . . AE2X, AE3X, AG2X, AG3X, B2W, B3W, and B6X.

Order A Complete Inventory of Autolite Snowmobile Spark Plugs Today!

They're Golden!

No problem...!

It's "No problem!" to keep promises and protect customer satisfaction with Authorized Remanufactured Ford Parts . . . you know every unit is ready to install fast and is right for the job.

You're sure because every replacement part meets Ford engineering standards . . . is tested for original part performance and is backed up with a warranty honored coast to coast.

All this protects you against comeback jobs and assures satisfied customers.

To get "No problem" remanufactured Ford parts, just give us a call.

NATIONAL WARRANTY

Every Remanufactured Ford Part is warranted nationally by the Remanufacturer to be free of defects in materials and workmanship for 90 days or 4000 miles from date of installation, whichever occurs first. Complete OHV engine assemblies are warranted for 12 months or 12,000 miles on passenger vehicles, and 6 months or 12,000 miles on trucks, whichever occurs first. This Warranty includes parts replacement plus related labor.

Ford and Lincoln-Mercury dealers will honor this warranty anywhere in the country.

Remanufactured

Ford

Engines · Parts

TOWING AND TROUBLESHOOTING TIPS *Continued*

ENGINE CRANKS SLOWLY, BUT WILL NOT START

Most Probable Cause	Diagnosis Procedure	Action to Repair
1 Corroded battery cables.	Place a heavy jumper wire in parallel with the battery to starter relay cable and then in parallel with the battery to engine (ground) cable. If the starter now cranks the engine, the battery cable is at fault.	Clean battery connections or replace battery cables and try to start.
	IF OK ↓	
2 Battery low in charge.	Perform a battery capacity test by loading the battery to three times its ampere hour rating for 15 seconds. If total battery voltage is less than 9.6 volts, check specific gravity of each cell. If less than 50 points between cells, battery is low in charge.	Charge battery and check charging system.
	IF OK ↓	
3 Failed battery.	If specific gravity test shows more than 50 points between cells, battery has failed.	Replace battery and check charging system.
	IF OK ↓	
4 Failed starter relay.	Connect a heavy jumper wire from the battery terminal of the starter relay to the starter terminal of the relay.	Replace relay.
	IF OK ↓	
5 Failed starter.	Make a Starter Load Test, Starter No Load Test, Armature Open Circuit Test and Armature Ground Circuit Test to determine which part of the starter is not working.	Repair or replace starter.
	IF OK ↓	
6 Incorrect viscosity engine oil in crankcase.	Examine dipstick for congealed engine oil. Check car owner regarding viscosity and grade of oil in crankcase.	Drain crankcase and install proper viscosity engine oil. Change oil filter, if required.
	IF OK ↓	
7 Pistons or bearings partially seized.	Check for partially seized pistons or bearings. Remove oil pan. Check for water in lubrication system. If water is found, remove cylinder head and check for combustion chamber leaks. Check for seized pistons, rings and bearings.	Clean, repair or replace damaged engine components.

COLD WEATHER STARTING TIPS

The diagnostic charts (pages 6-11) give definite step-by-step procedures for solving "hard start" problems for seven different conditions. However, experience shows that most often one of the following problems usually causes the starting difficulty. They are relatively simple and generally occur during extremely cold weather in vehicles that operate satisfactorily in warmer weather. For instance, temperatures below zero drastically reduce available battery power and greatly increase the difficulty of igniting the air/fuel mixture. In other words, these conditions are specifically caused by COLD weather. Many other items may be at fault, and are covered in detail in each chart. You can often save some time, however, by being aware of these problem areas.

Engine Cranks (slow) — Doesn't Start

1. *Weak Battery or Corroded Cables* — If engine turns over slowly, a discharged battery or excessive resistance due to bad cables is most likely. Outside chance of starter malfunction.
2. *Oil Viscosity* — The lower the temperature, the more sticky and molasses-like the crankcase oil becomes which takes more power to turn the crankshaft. 10W-30 or 10W-40 multi-viscosity oils are okay down to −10°F, *if battery is in good shape*. 5W-30 may be required at lower temperatures.

Engine Cranks (fast) — Doesn't Start

1. *Ignition* — Remove plug wire and hold ¼-inch from ground while cranking engine. No spark indicates problem up the line, probably points or condenser. If weather is also damp, check inside distributor cap for moisture and carbon tracking. If spark occurs trouble can be isolated as spark plugs or fuel.
2. *Fuel* — To assure against fuel-line "freeze-up" check for flow by pumping the accelerator rod and observing main venturi nozzles. Carbon deposits tend to cause sticky automatic choke operation. Choke (butterfly) plate should be completely closed after depressing accelerator.
3. *Starting Procedure* — Excessive pumping of accelerator floods engine. See page 10 for "Cold Weather Starting Procedures."

Engine Will Not Crank

1. *Discharged Battery or Loose Cables* — If starter relay doesn't click when ignition is turned to "Start," a dead battery or bad cables are indicated. If relay clicks, the battery still may not be strong enough to turn engine, or cables may be too loose to pass sufficient current. However, most likely the starter, or starter circuit is defective.

TOWING AND

ENGINE CRANKS NORMALLY, BUT STARTS HARD — COLD WEATHER

Most Probable Cause	Diagnosis Procedure	Action to Repair
1 **Improper starting procedure.**	Check car owner regarding starting procedure used, for example: setting choke, accelerator position, and accelerator pumping.	* Advise car owner of proper starting procedure.
	IF OK ▼	
2 **Fast (cold engine) idle speed and/or fuel mixture improperly adjusted.**	With the engine at normal operating temperature, check the carburetor idle fuel mixture, curb idle and fast idle speeds.	Adjust as required.
	IF OK ▼	
3 **Choke not operating correctly.**	Check choke mechanism for improper adjustment or binding in linkage or plate.	Adjust, repair or replace choke mechanism as required.
	IF OK ▼	
4 **Choke thermostatic spring housing improperly adjusted.**	Check choke thermostatic spring housing for proper adjustment.	Adjust thermostatic spring housing.
	IF OK ▼	
5 **Ignition primary circuit.**	Perform ignition primary circuit test with a voltmeter or oscilloscope to determine if voltage drop across the battery, coil and starting ignition circuit is excessive.	Repair or replace parts or connections as needed.
	IF OK ▼	
6 **Ignition secondary circuit.**	Perform ignition secondary circuit tests on an oscilloscope. Check the secondary (high tension) wires for excessive resistance and open circuits. Check the spark plugs and distributor for defects or improper adjustment.	Repair or replace parts or connections as needed.
	IF OK ▼	
7 **Initial ignition timing incorrect.**	Check the ignition initial timing with the distributor vacuum line disconnected.	Adjust ignition timing.
	IF OK ▼	
8 **Insufficient fuel supply to carburetor.**	Disconnect fuel line at carburetor and pump fuel into a clean glass container. Inspect fuel for water contamination.	If water accumulation is excessive, remove and flush fuel tank, thaw ice restrictions, flush and blow out fuel lines. Clean or replace fuel filter, if required.
	IF OK ▼	
9 **Carburetor fuel level or float set incorrectly.**	Check carburetor for incorrect wet fuel level or float setting.	Adjust fuel level or float setting to specifications.
	IF OK ▼	
10 **Uneven engine compression or intake vacuum leak.**	Perform engine dynamic compression test on an oscilloscope to isolate defective cylinder(s). Check intake manifold and carburetor spacer for vacuum leaks (see Notes 1 and 2). If no vacuum leak is indicated, problem indicated by dynamic compression test is due to low engine compression (see Note 3).	Repair or replace worn or damaged parts.

NOTE 1. On engines equipped with a Thermactor exhaust emission control system, disconnect the thermactor emission control system before performing engine diagnosis procedures. Disconnect the anti-backfire valve vacuum sensing line and air supply line (air gulp type) at the intake manifold connections. Plug the manifold connections to preclude leakage. Normal engine diagnosis can then be performed. Upon completion of the engine diagnosis procedures, unplug the manifold connections and connect the vacuum sensing line and air supply line (air gulp type) at the intake manifold connections and check for leaks.

NOTE 2. Check for vacuum leaks at the intake manifold and carburetor gaskets. Also check for leaks at all connections and lines used with vacuum-power units, if the car is so equipped. To isolate a vacuum leak, proceed as follows:

Start engine and allow it to idle.

Squirt kerosene or light engine oil around areas of possible vacuum leaks. A noticeable change in engine idle when solution is squirted on a given point indicates a vacuum leak at that point. CAUTION: Use care while squirting to prevent a fire.

NOTE 3. After it is determined that there are no other contributing factors to the starting problems, recommend to the owner that the compression problem must be corrected before normal starting can be expected. Low or uneven compression can be attributed to leaking cylinder head gasket(s), valve train component malfunction, pistons and/or rings.

*COLD WEATHER STARTING PROCEDURES

Cold weather starting problems often can be traced directly to drivers not knowing how to properly start their cars. Many pump the accelerator pedal furiously if the engine doesn't start right away. A couple of pumps in extremely cold weather helps, but too much extra gas in the combustion chamber usually floods the engine and makes starting more difficult. Owners should be advised to use one of the following procedures.

Automatic Choke (Engine Cold)

1. Turn ignition switch on. Depress accelerator to floor and release. This engages the automatic choke. If properly adjusted, it is calibrated to create the proper "rich" carburetor air/fuel mixture to start the engine in cold weather. NOTE: If the outside temperature is very cold (below zero) or the vehicle has been idle for several days, it may be helpful to depress the accelerator pedal 2 or 3 times before attempting to start the engine.
2. Turn ignition switch to "Start" position and release when the engine starts. *If engine falters in starting, be sure the starter stops spinning before re-engaging it, otherwise the starter may be damaged.*
3. After starting engine and allowing it to run for a few seconds, depress accelerator pedal slightly and release it to reduce engine speed. The engine will continue to run at a faster than normal idle speed until the engine is warm and the automatic choke disengages and becomes fully open.

Automatic Choke (Engine Warm)

1. If the engine has been stopped for only a short time and is still relatively warm, don't push the accelerator pedal all the way to the floor. You may flood the warm engine with too much gas and prevent it from starting. Instead, depress accelerator pedal about ¼ way down and hold in this position. *Do not pump the pedal.*
2. Turn the ignition key to the "Start" position until engine catches and starts. Then release key to "On" position.

Manual Choke

Starting an engine with a manual choke takes a little experience to know how far to pull out the choke, depending on how warm the engine is. If very cold, the choke must be pulled all the way out. If relatively warm, such as outside temperature above 70°F, it may not be necessary to use the choke at all.

1. To start a cold engine, depress accelerator pedal all the way to the floor.
2. Pull the choke out and release the accelerator pedal.
3. Turn ignition switch to "Start" position, and release when engine starts.
4. As engine warms up, push choke in to a position that keeps the engine running smoothly. When the engine reaches normal operating temperatures, the choke should be all the way in.

Starting Flooded Engine

If accelerator has been pushed to the floor when starting warm engine, or pumped when starting cold engine, it is possible to flood the engine (usually evident with smell of gasoline). To start a flooded engine:

1. Push accelerator pedal to floor and hold it there. This opens throttle plates in carburetor and lets in more air.
2. While holding accelerator pedal on floor, turn ignition key to "Start" position and hold it there until engine starts. This may take a few seconds until the extra air dilutes the gas and forms a suitable air/fuel mixture for starting.
3. As soon as the engine starts, let up on the accelerator pedal to hold a normal fast idle speed.

NOTE: If the engine doesn't start within 30 seconds, turn off ignition key and wait for a few seconds before cranking the engine again. *Do not release accelerator pedal.* This will prevent starter from overheating and give battery time to build up power.

TROUBLESHOOTING TIPS

Continued

ENGINE STALLS WHEN IDLING — ENGINE COLD (OK WHEN HOT)

Most Probable Cause	Diagnosis Procedure	Action to Repair
1 Fast (cold engine) idle speed set too low.	With the engine at normal operating temperature, use a tachometer to check the carburetor, idle fuel mixture and fast idle speed for conformance to specified engine rpm. **IF OK** ↓	Adjust fast (cold engine) idle speed.
2 Carburetor icing.	Remove air cleaner and check for ice formation on booster venturi and/or throttle plates. **IF OK** ↓	Thaw carburetor. Adjust, repair or replace air intake duct valve (if so equipped). Recommend fuels containing de-icing additives.
3 Choke not operating correctly.	Check choke mechanism for improper adjustment or binding in linkage or plate. **IF OK** ↓	Adjust, repair or replace, as required.
4 Choke thermostatic spring housing improperly adjusted.	Check choke thermostatic spring housing for proper adjustment. **IF OK** ↓	Adjust thermostatic spring housing.
5 Choke-plate (pull-down) setting incorrect.	Check carburetor choke plate (pull-down) clearance. **IF OK** ↓	Adjust choke plate (pull-down) clearance to specifications.
6 Water contaminated fuel system.	If temperature is below freezing, check for water in fuel lines, fuel filter, fuel pump or carburetor which may have frozen, thereby restricting the flow of fuel. Disconnect fuel line at carburetor and pump fuel into a clean glass container. Inspect fuel for water contamination.	Thaw ice restrictions. If water accumulation is excessive, remove and flush fuel tank. Flush and blow out fuel lines. Clean or replace fuel filter, if required.

ENGINE STALLS WHEN IDLING — ENGINE HOT (OK WHEN COLD)

Most Probable Cause	Diagnosis Procedure	Action to Repair
1 Engine (hot) idle speed set too low.	With engine at normal operating temperature, use tachometer to check engine idle speed. **IF OK** ↓	Adjust engine (hot) idle speed.
2 Engine idle fuel mixture improperly adjusted.	With engine at normal operating temperature, check idle mixture screw(s) for proper adjustment. **IF OK** ↓	Adjust engine idle fuel mixture. Adjust engine idle speed as required.
3 Choke not operating correctly.	Check for stuck or binding carburetor choke plate or linkage and proper choke operation. Check choke heat tube and air inlet tube for restriction. **IF OK** ↓	Adjust, repair or replace, as required.
4 Distributor breaker point dwell incorrect or excessive point resistance.	Perform ignition system tests on oscilloscope to check breaker point dwell and point resistance. **IF OK** ↓	Clean and adjust or replace breaker points.
5 Carburetor fuel level or float set incorrectly.	Check carburetor for incorrect wet fuel level or float setting. **IF OK** ↓	Adjust fuel level or float setting to specification.
6 Carburetor external vent plugged.	Visually check vent for accumulation of dirt or foreign material.	Clean vent and/or adjust vent valve (if so equipped).

IDENTIFICATION OF METRIC SIZE BOLTS, NUTS AND SCREWS

ALL CAPRI MODELS

The following details will help you to identify metric size bolts, nuts and screws so that you can replace them (if damaged) with corresponding type.

1. Metric bolts and screws of the hexagon head type will have the letters "M" or "1SOM" stamped on the head. All hexagonal bolts and screws having this feature will be of metric dimensions.
2. Metric size hexagonal nuts have the letter "M" stamped on the flats of the nuts.

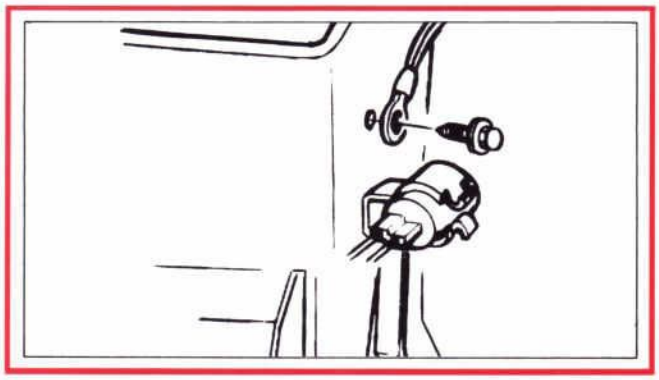
NOTE: Metric machine screws and machine screw nuts do not have these identification features.

CYLINDER HEAD GASKET LEAKS CORTINA—1967-68-69

Cortina's that experience cylinder head gasket leakage can be corrected on 1969 and all earlier models by installing the 1969 type of cylinder head gasket. This new gasket can be easily identified by the *metal reinforcing ring* that is stamped into position around the *main oil feed hole*. The part number is 2737E-6051-B.

1970 ECONOLINE WITH IRREGULAR OPERATING INSTRUMENT GAUGES

If you are asked to correct this operating problem on the 1970 Econoline and are stumped for the solution, here is one of the electrical check points you should make in your troubleshooting procedure: Look at the ground wire connections attached to the brake support bracket, as shown in the illustration below. Make sure the small ground eyelet screw is tight and the wire held firmly. If you find the threads stripped, then install a larger zinc-plated screw so as to provide a positive electrical contact.



1971 PINTO MANUAL INFORMATION

To assist you in servicing the Pinto, here is an updated Scheduled Maintenance Service Interval for valve lash adjustment. This change reflects the latest engineering recommendation and will appear in the 2nd edition of the Pinto Owner's Manual. Use the valve tappet chart to set correct clearances.

VALVE LASH ADJUSTMENT INTERVAL

To maintain proper engine operation and realize top performance, both the Pinto 1600 cc and 2000 cc powerplants should have the valve tappet clearances (lash) checked and adjusted at EVERY 6,000 MILES or 6 MONTHS . . . whichever occurs first.

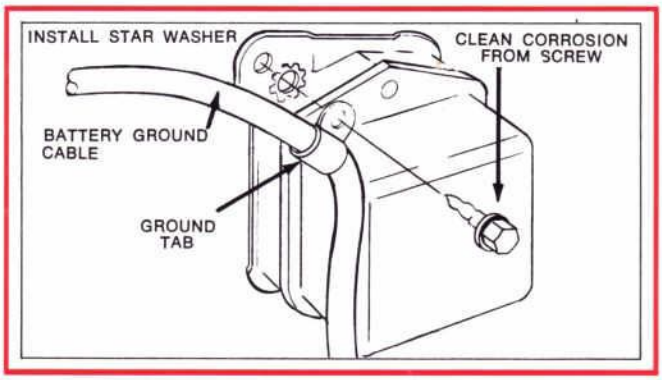
1971 PINTO VALVE TAPPET CLEARANCES CHART

VALVES	1600 cc ENGINE	2000 cc ENGINE
Intake	.010" Cold. Between Valve Tip and Rocker Foot	.008" Cold. Between Cam and Follower
Exhaust	.017" Cold. Between Valve Tip and Rocker Foot	.010" Cold. Between Cam and Follower

HIGH READING INSTRUMENT GAUGES

Excessively high readings of the temperature and/or oil gauges on 1970 Mustang, Cougar, Torino and Montego, especially with the headlamps or air conditioning turned on, may be caused by a loose or corroded body ground at the *alternator regulator base*.

To correct this condition on the above cars listed, remove and clean the grounding tab contact surfaces and the sheet metal screw. Then install a star washer *between* the negative cable grounding tab and the alternator regulator base as shown in the illustration below.



SERVICE BRIEFS

1971 DISTRIBUTOR BREAKER COVER SERVICE INFORMATION

1971 FULL-SIZE FORD AND MERCURY CARS WITH 302 AND 351 CID ENGINES

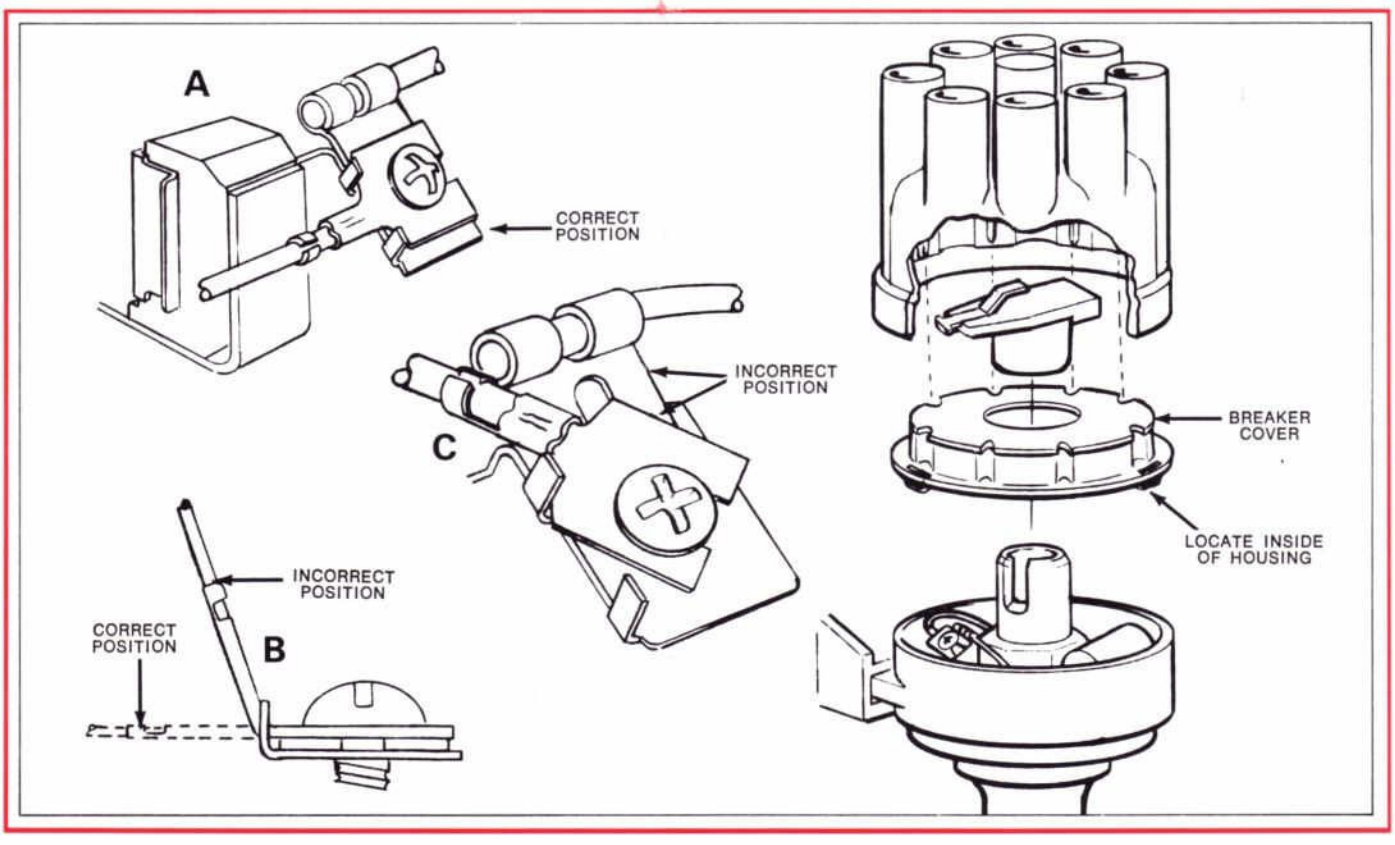
These two engines are equipped with a metal distributor breaker cover. It has a plastic plate on top to prevent high tension current arcing from the rotor blade to the cover.

Three locating tabs on the underside of the cover flange fit the inside diameter of the distributor body. Eight locating notches around the outer diameter of the cover are designed to fit the eight ribs on the inside diameter of distributor cap.

CAUTION: It is extremely important that the coil primary wire and the condenser wire connectors attached to the distributor point terminal are correctly positioned. Note figures A, B and C. There is ample clearance between these terminals and the breaker cover when the terminals are correctly installed. If the terminals are bent upwards or not fully seated it is likely that the terminals will contact the cover and could permanently or intermittently ground out the ignition electrical system.

When servicing the distributor, installing the breaker cover or diagnosing an engine "miss" or "won't start" condition, here's the procedure to follow:

1. Remove the distributor cap and rotor.
2. Inspect the primary wire and condenser leads for correct installation to the breaker point assembly. See Figure A.
3. If the terminal on the primary wire is bent upward (incorrect) bend to the correct position as shown in Figure B.
4. If primary wire and condenser leads are incorrectly positioned as shown in Figure C, then loosen the screw and reposition the leads as shown in Figure A. Retighten the screw.
5. Install the distributor breaker cover and make sure it is fully seated on the distributor base casting. Reinstall the rotor.
6. Reinstall the distributor cap. As you're doing this, slowly rotate the distributor cap back and forth to engage the ribs of the cap into the slots in the breaker cover plastic.
7. Fasten the bail clips to hold down the distributor cap.



1970 GASOLINE ENGINE PERFORMANCE SPECIFICATIONS . . . ALL FORD-BUILT TRUCKS (REVISED)

ENGINE PERFORMANCE SPECIFICATIONS

Engine	Dwell Angle At Idle Speed	Distributor Point Gap	Spark Plug Gap	Spark Plug No.†
170 1-V	35-40	0.027	0.032-0.036	BF-82
240 1-V Econoline Bus, F-100 240 1-V Econoline Van, F-250, 350, P350, 400				BTF-42
240 1-V, 500, F, B and LN500	37-42	0.025	0.028-0.032	BTF-31
300 1-V, F-100	35-40	0.027	0.032-0.036	BTF-42
300 1-V F-250, 350, P350, 400, 500, F, B, LN500, 600, C500-600	37-42	0.025	0.028-0.032	BTF-31
302 2-V Econoline Bus—E-100, 200, F-100	24-29	0.021	0.028-0.032	BTF-31
302 2-V Econoline E-300	26-31	0.017	0.028-0.032	BTF-31
330-2-V-MD	26-31	0.017	0.028-0.032	BTF-31
330-2-V-HD	26-31	0.017		
360-2-V F-100	24-29	0.017	0.032-0.036	BF-32
360 2-V F-250-350	26-31	0.017	0.032-0.036	BF-32
361 2-V	26-31	0.017‡	0.028-0.032	BTF-31
390 2-V F-100	24-29	0.021	0.032-0.036	BF-32
390 2-V F-250-350	26-31	0.017‡	0.032-0.036	BF-32
391 4-V	26-31	0.017‡	0.028-0.032	BTF-31
401 477 534	26-31	0.017‡	0.028-0.032	BRF-31
Initial Ignition Timing				
All Truck Engines except 330MD, 401, 477, 534			6°BTC	
330MD			12°BTC	
401, 477, 534			8°BTC	

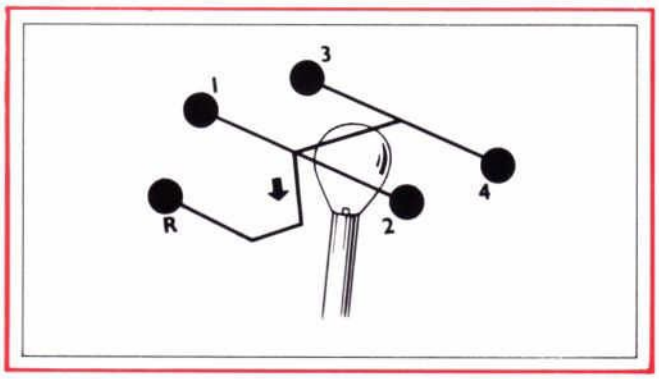
†Installation torque 15-20 ft.-lbs. ‡If equipped with transistorized ignition, set point gap at 0.020 and dwell angle at 22-24°.

PINTO INSTRUCTIONS FOR SHIFTING INTO REVERSE

The Pinto 4-speed manual transmission requires a slightly different procedure for shifting into reverse than on other Ford Division car lines.

When you or your servicemen are required to drive a Pinto equipped with this 4-speed transmission, here is the correct procedure.

1. With the gearshift in Neutral position, (between 1st and 2nd gear position) press DOWN on lever knob.
2. While maintaining this DOWNWARD pressure, move the shift lever to the left and then forward towards the instrument panel.



1971 PINTO SPARK PLUG GAP

Listed in the chart below are the correct spark plug and gap specifications. This information supersedes all previously printed specifications which indicated a different spark plug gap for both Pinto engines.

DISPLACEMENT	1600 cc	2000 cc
SPARK PLUG (Autolite)	AGR 22	BRF 32
SPARK PLUG GAP	.030"	.025"

BATTERY CHARGING PROBLEM

(ALL MODELS)

Some servicemen are not aware that very low batteries may not accept a fast charge. Here is the reason:

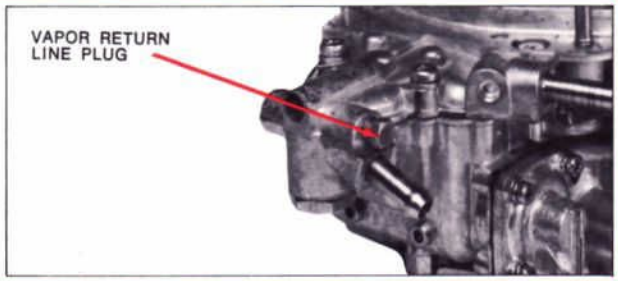
When a battery has been slowly discharged over a long period of time and the specific gravity is very low (completely discharged), it will sometimes appear to be defective because it will not take a fast charge.

Part of this problem is due to the very low acid content of the electrolyte causing the conductivity to be so poor that high charging currents will not flow. The answer to this service problem is to first slow charge the battery for a short period of time. This may require up to four hours slow charge to restore the conductivity and thus permit the battery to be successfully fast charged.

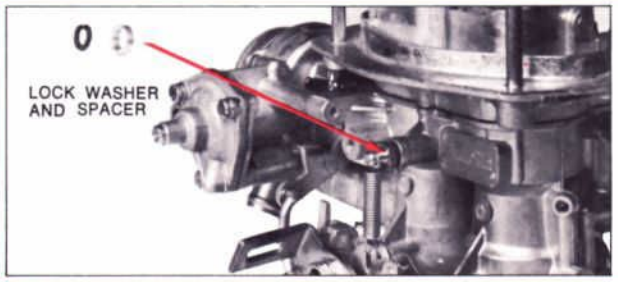
SERVICE BRIEFS

IMPORTANT INFORMATION ON *NEW* SERVICE CARBURETOR

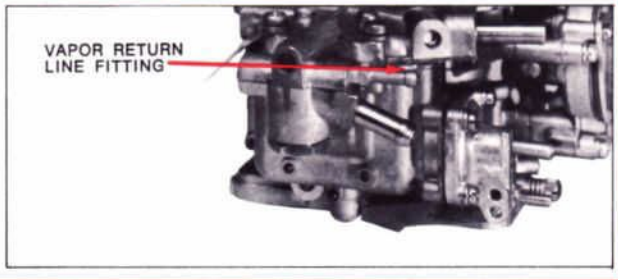
ALL 2000 cc PINTO APPLICATIONS



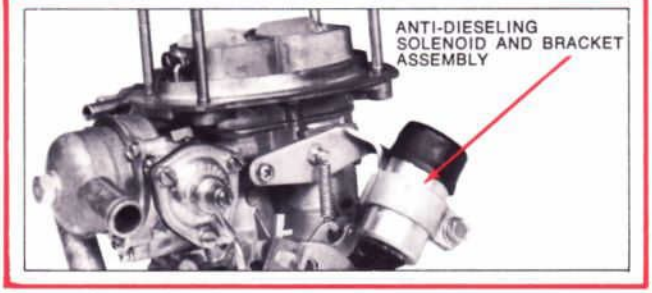
Non-Air-Conditioned Applications



Non-Air-Conditioned Applications



Air-Conditioned Applications



Air-Conditioned Applications

MODEL 5200-C REVISED SPECIFICATIONS CHART

1971 PINTO WITH 2000 cc ENGINE

SPECIFICATIONS	AUTO. TRANS.	STD. TRANS.
This carburetor (Autolite Sales No.) services all tag numbers shown	CA-802-B	CA-802-B
	Carburetor Tag No.	Carburetor Tag No.
Air-Conditioned	D12F-AA* D12F-CA* D12F-DA	D12F-EA**
Air-Conditioned	D12F-FA D1PF-KA	D12F-GA**
DRY FLOAT SETTING (at toe of float; Air Horn inverted)	½"	½"
BUMPER SPRING to Drop Tang	.010"—.025"	.010"—.025"
MAIN METERING JET—Primary	Stamped 135	Stamped 135
Secondary	Stamped 145	Stamped 145
IDLE JET—Primary	Stamped 50	Stamped 50
Secondary	Stamped 50	Stamped 50
HIGH SPEED BLEED—Primary	Stamped 180	Stamped 180
Secondary	Stamped 170	Stamped 170
PUMP DISCHARGE NOZZLE	Stamped 50	Stamped 50
FAST IDLE CAM Clearance	.010"—.030"	.010"—.030"
VACUUM PULL DOWN (Downstream)	15/64" Drill	15/64" Drill
DECHOKE (Downstream)	17/64" Drill	17/64" Drill
CURB IDLE (rpm)	650 in Drive	700-750 in Neutral
Air-Conditioned Cars—Solenoid Lead Disconnected. Trans./Neutral	450-500	
Solenoid Energized—Air Conditioning On—in Drive	650	
FAST IDLE (rpm) 2nd Step of Cam	1800	1800
Note: Float Drop (at toe of float) Air Horn inverted. If carburetor not equipped with Bumper Spring	1⅞"	1⅞"
*Main Metering Jet—Primary	Stamped 137	
**Idle Jet—Primary		Stamped 55

COMPLIMENTS OF

WILLIAMS FORD, INC.
50 RAYMOND ROAD 236-2525
WEST HARTFORD, CONN. 06091

YOUR SOURCE FOR GENUINE FORD AND AUTOLITE ORIGINAL EQUIPMENT PARTS

Ford and Lincoln-Mercury Dealerships are always at your service...

with better idea parts for all better idea cars!

Better ideas are a way of business at Ford Motor Company. Most of Ford's year-to-year improvements involve coming up with better components or better ways of making components work together. This is a full-time job. But it's worth the effort... we keep old friends and make new ones. Being just a little bit better works to your advantage, too... especially when you use genuine Ford *better idea* parts when servicing Ford vehicles. These are the parts that Ford owners have confidence in and prefer when replacements are necessary. For example:

▪ *Ignition System Parts . . . they are made expressly for Ford vehicles to keep fine Ford engines in perfect tune* ▪ *Brake Parts . . . linings dissipate heat faster to resist brake fade and provide longer wear. All Ford brake parts are of the same original equipment quality* ▪ *Engine Parts . . . all Ford replacement engine parts—rings, bearings, rocker arm assemblies and others are all part of a "matched set" to provide like-new dependability* ▪ *Exhaust System Parts . . . heavy gauge construction adds strength. Only 7 mufflers cover 75% of 1960-66 Ford-built cars* ▪ *Wheel Assemblies . . . what better way to keep things rolling smoothly than with Ford original equipment quality parts—wheels, wheel bearings, hubs, etc?*

Whatever your needs—from minor replacements on up to major transmission and axle parts—we can serve you promptly. And the odds are you'll do a better job when you use better idea parts to start with!

Call us today...we're headquarters for all genuine Ford and Autolite replacement parts!