SHOP TIPS FROM Autolite Ford

VOL. 6, NO. 2 OCTOBER 1967

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.

FEATURING

New Idle Adjustment Procedure For 1968 Engines

NEW IDLE ADJUSTMENT

INDEX

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 of Ford Motor Company, Ford Products Merchandising Dept., P.O. Box 3000, Livonia, Michigan 48151.

The description and specifications contained in this book were in effect at the time the publication was approved for printing. The Ford Motor Company, whose policy is one of continuous improvement, reserves the right to discontinue models at any time, or to change specifications or design without notice and without incurring obligation.

Autolite Ford

VOL. 68 FPM 21 LITHO IN U.S.A.

Several controls and devices are used on 1968 Ford Motor Company vehicles to keep exhaust emission within government regulations–crankcase emission control (previously called PCV), two types of exhaust emission control: Thermactor and IMCO (Improved Combustion), dual diaphragm distributor with retarded spark advance and carburetors with idle adjustment limiters. Idle adjustment limiters restrict the maximum idle richness of the air/fuel mixture and prevent individuals from making overly rich adjustments.

There are two types of idle limiters: internal and external. The internal needle limiter is located in the idle channel (Fig. 1) and is not externally visible. This limiter is set and sealed at the factory. Under no circumstances, during normal service or during overhaul, should the seal be removed and adjustments made to this needle. This type of limiter is used on the Holley 4-V and Carter 1-V carburetors.

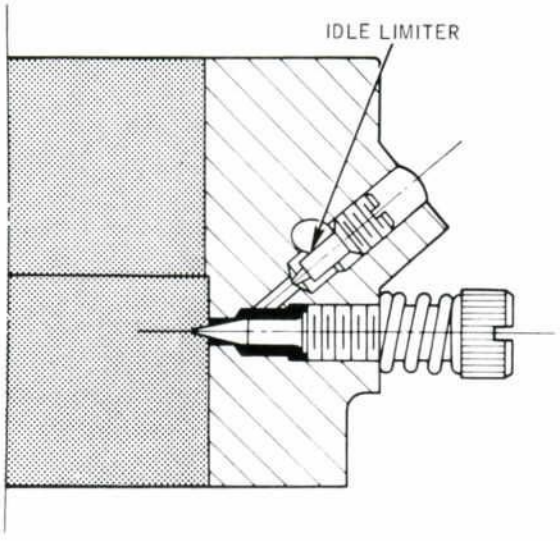


Fig. 1–Internal Idle Limiter

The other type of Idle Limiter is an external plastic idle limiter cap installed on the knurled head of the idle fuel mixture adjusting screw (Fig. 2). This type limiter is used on Carter 4V and all Autolite carburetors. Any adjustment to the idle fuel mixture on carburetors having this type of limiter must be made within the range of the plastic limiter cap.

Under no circumstances may the limiter cap, the stop boss, or the power valve cover, which the limiter caps stop against *be mutilated or deformed in any way to render the limiter inoperative.* A satisfactory idle is obtainable within the range of the limiter cap.

PROCEDURE FOR '68 ENGINES

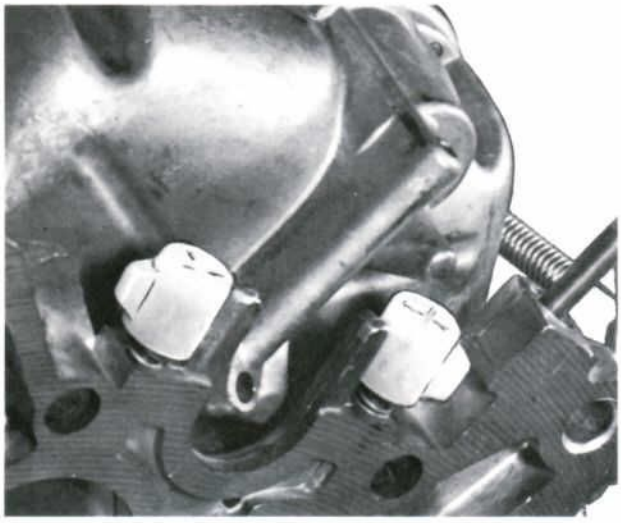


Fig. 2—External Idle Limiter

The addition of idle limiters doesn't relieve the service technician from the responsibility of adjusting engine idle speed and mixture. All the limiters do is prevent overly rich mixtures, which increase the amount of hydrocarbons emitted to the atmosphere. The service technician still must adjust engine idle. If performed in accordance with the procedures that follow, it should be no problem to keep customer's cars operating at peak performance . . . and within Federally-established limits for hydrocarbon exhaust-emissions.

IDLE FUEL MIXTURE ADJUSTMENT —ENGINE OFF

1. Preliminary Adjustment

External Limiters On all Autolite carburetors and Carter 4V carburetors, set the idle fuel mixture screw(s) and limiter cap(s) to the full counterclockwise position of the limiter cap(s).

Internal Limiters On Carter 1-V and Holley 4-V carburetors, establish an initial idle mixture screw setting by turning the screw inward until it's lightly seated. Then, screw it outward 1 to 1½ turns.

CAUTION: Never tighten an idle mixture adjusting screw against its seat. If the tapered tip of the screw is damaged, it must be replaced before a satisfactory mixture adjustment can be made.

2. Back off the idle speed adjustment screw until the throttle plate(s) seat in the throttle bore(s). Be sure the dashpot (if so equipped) is not interfering with the throttle lever. If the dashpot interferes, loosen the dashpot adjusting screw to allow the throttle plate to seat in the throttle bore. Also check to see that the hot idle compensator is seated on Carter 4-V, Autolite 4-V and on the crankcase ventilation valve tube on some 2-V carburetors.

3. Turn the idle speed adjusting screw (except Thunderbird and Lincoln) inward until it just makes contact with the screw stop on the throttle shaft and lever assembly. Then, turn the idle speed adjusting screw inward 1 to 1½ turns to establish a preliminary idle speed adjustment.

4. Turn the idle speed adjusting screw (Thunderbird and Lincoln only) *inward* until it lightly seats. Then, turn the screw *outward* 3½ turns.

5. Set the parking brake while making idle mixture and idle speed adjustments. On vehicles with a vacuum release parking brake, remove the vacuum line from the power unit of the vacuum release parking brake assembly. Plug the vacuum line, then set the parking brake. The vacuum power unit must be deactivated to keep the parking brake engaged while the engine is running with the transmission in "Drive".

IDLE ADJUSTMENT—ENGINE RUNNING

1. Attach an accurate tachometer to the engine.

2. Engine and underhood temperatures must be stabilized before idle adjustments are made. Run the engine at least 20 minutes at 1500 rpm. Position the fast idle screw on the intermediate step of the cam to hold this engine speed.

1968 CURB IDLE RPM

ENGINE	IMCO	THERMACTOR	
	Auto. Trans.	Auto. Trans.	Std. Trans.
CAR			
170 Six (1-V)	550		700
200 Six (1-V)	550		700
240 Six (1-V)	500		600
289 V-8 (2-V)	550		625
289 V-8 (4-V) H.P.		650	750
302 V-8 (2-V)	550		625
302 V-8 (4-V)	550		625
390 V-8 (2-V)	550		625
390 V-8 (2-V) Prem. Fuel	550		
390 V-8 (4-V)	550		625
390 V-8 (4-V) GT		550	700
427 V-8 (4-V)		600	
428 V-8 (4-V)	550		625
429 V-8 (4-V)	550		
462 V-8 (4-V)	550		
BRONCO, ECONOLINE AND F-100 - F-350 TRUCK			
170 Six (1-V)			700
240 Six (1-V)	500		600
289 V-8 (2-V)			625
300 Six (1-V)	500		600
360 V-8 (2-V)	550		625
390 V-8 (2-V)	550		625
MEDIUM AND HEAVY DUTY TRUCKS			
All Automatic Transmission	500 rpm		
All Standard Transmission	525 rpm		

Chart—Curb Idle Speeds—1968 Engines

3. At the end of the engine warm-up period, connect a timing light and check initial ignition timing. Engine speed must be below 600 rpm to avoid erroneous readings due to partial advance of the distributor. Also disconnect and plug the distributor to the carburetor vacuum hose. (If the engine is equipped with a dual diaphragm distributor, disconnect both hoses (Fig. 3) and plug them). Also check the centrifugal advance mechanism.

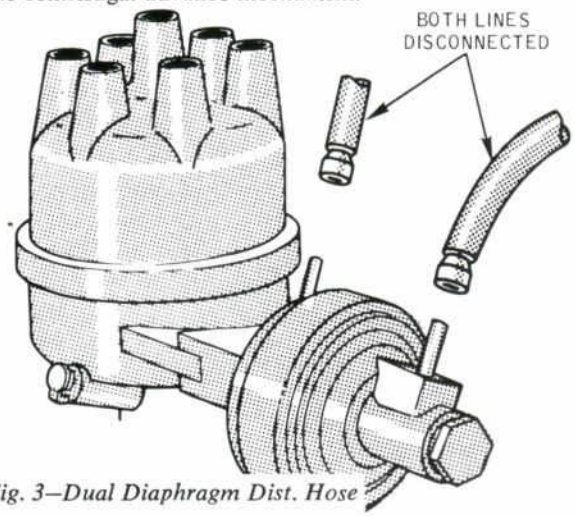


Fig. 3—Dual Diaphragm Dist. Hose

Accelerate the engine to 2000 rpm and see if the timing advances. If the timing advances, the centrifugal advance is functioning. Check vacuum advance by dropping engine speed to 1500 rpm and noting the degree of spark advance. Install the carburetor vacuum line (Fig. 4) and recheck the timing marks. With the hose connected, there should be *increased* vacuum advance.

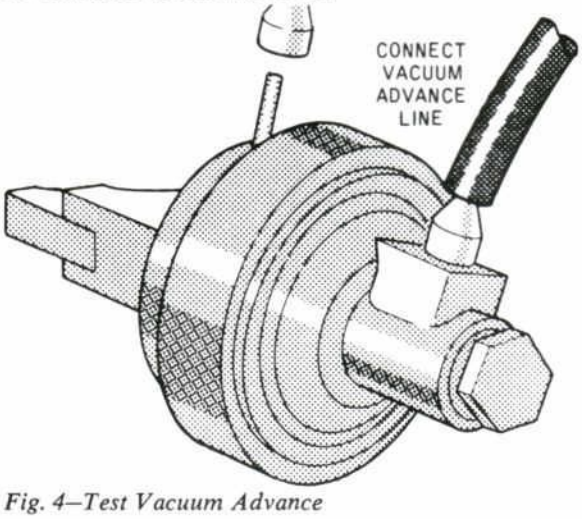


Fig. 4—Test Vacuum Advance

Check the vacuum retard on dual-diaphragm distributors by connecting the intake manifold vacuum line to the inner (retard) diaphragm side of the vacuum advance (Fig. 5). Operate the engine at normal idle speed and check the timing before and after this operation. If the retard diaphragm is functioning properly, the spark timing should retard (less advance) after the vacuum hose is connected.

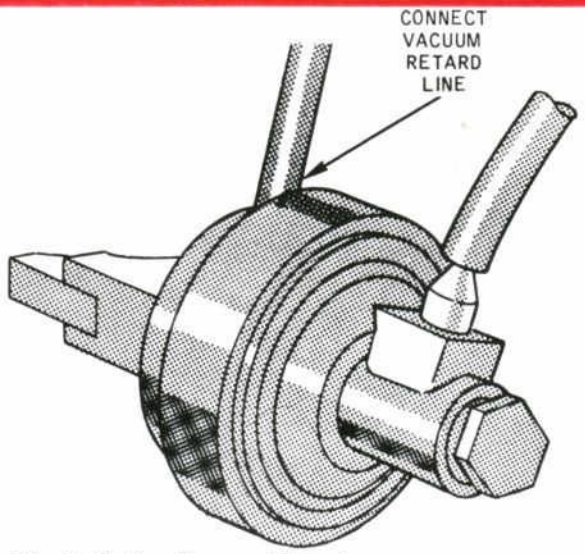


Fig. 5—Testing Vacuum Retard

4. Re-connect the distributor vacuum hose(s).

5. Check to make sure the carburetor choke plate is fully open. On carburetors with a hot idle compensator or where the idle compensator is in the crankcase ventilation hose, be sure the compensator is seated to allow proper idle adjustment.

6. Put a load on the alternator by turning on the headlights. If the car has air conditioning, turn it to maximum cooling (except 200 & 302-2V CID engines with automatic transmission).

Adjust these engines with air conditioner off. On cars with manual-shift transmission, the idle must be adjusted with the transmission in Neutral. On cars with automatic transmission, the shift lever must be in Drive. Set the parking brake while making adjustments. On vehicles with a vacuum release parking brake, remove the vacuum line from the power unit of the vacuum release parking brake assembly. Plug the vacuum line, then set the parking barke. The vacuum power unit must be deactivated to keep the parking brake engaged while the engine is running with the transmission in "Drive."

IDLE SPEED AND MIXTURE ADJUSTMENT

1. Adjust the engine curb idle speed to the specifications shown in the chart on page 3. On Thunderbird and Lincoln, readjust the idle air bypass screw as required to correct the idle speed. The tachometer reading should be taken with the air cleaner installed. If you can not adjust the idle speed with the air cleaner in place, remove it to make adjustments, *but always take the final idle speed tachometer reading with the air cleaner installed.*

2. Turn the idle mixture adjusting screw(s) inward in small increments to obtain the smoothest idle possible within the range of the idle limiter(s). On 2- and 4-barrel carburetors, turn both idle mixture adjusting screws inward by equal amounts to maintain balanced fuel distribution. *Check for smoothness with the air cleaner installed.*

3. If idle mixture adjustments result in an increase in idle rpm, reset the curb idle as in step 1 and then repeat the mixture adjustment as in step 2. After the final adjustment, stop the engine and adjust the fuel bowl vent valve to specifications on all carburetors except Autolite Model 4100 4-V and Carter Model YF 1-V.

The Carter YF 1-V doesn't have a vent valve adjustment and the Autolite 4300 4-V is simply adjusted by aligning a notch on the accelerating pump rod with a mark on the carburetor casting. All other carburetors incorporate a vent valve as shown in Figure 6. The clearance should be 0.070 inch on all carburetors except:

Autolite Model 2100 2-V used with–
289 CID engine in Fairlane, Falcon & Mustang
302 CID engine in Fairlane, Comet & Cougar
where the clearance should be 0.080 inch.

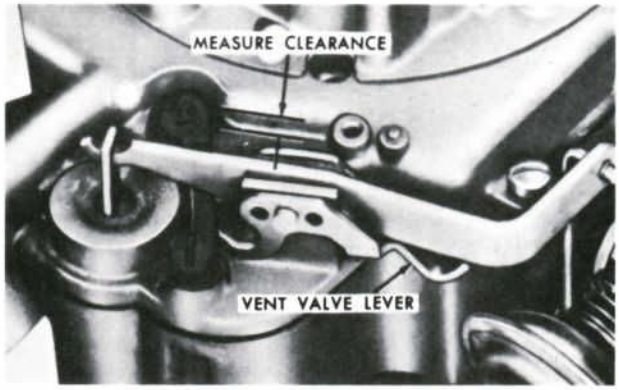


Fig. 6–Fuel Bowl Vent Valve

ADDITIONAL IDLE SPEED AND FUEL MIXTURE PROCEDURES

Normally, a satisfactory idle speed should be obtained at this point with an engine that's in good operating condition. If a satisfactory idle adjustment is not obtained, perform the following additional checks:

A. Check for vacuum leaks.
B. Check ignition system wiring continuity.
C. Check the spark plugs.
D. Check distributor breaker point dwell angle.
E. Check distributor point condition.
F. Check initial ignition timing.

If idle condition is not improved after the above checks, inspect the following:

A. Fuel level and fuel bowl vent.
B. Crankcase ventilation system.
C. Valve lash (mechanical tappets) and valve clearance.
D. Engine compression.

If even after the above checks and inspection has been made, the idle is still not satisfactory; the cause may be an isolated case of a lean fuel mixture. If this condition exists, check the air fuel ratio with an exhaust gas analyzer.

USING AN EXHAUST GAS ANALYZER

1. With the engine off, disconnect and plug all vacuum hoses at the distributor. If the engine is equipped with Thermactor emission control, disconnect the air supply hose at the pump or check valve. *Do not adjust idle speed to compensate for the drop in rpm when the Thermactor air supply is cut off.*

2. Connect an Exhaust Gas Analyzer to the tailpipe, following the equipment manufacturer's instructions. *All exhaust gas analyzers used for this purpose should be properly calibrated and bear "Certified Calibration" on their faces.*

3. With the engine thoroughly warmed up and idling, take an analyzer reading *with the air cleaner installed.* The proper air-fuel ratios are 14.2:1 for all IMCO engines except those with Carter single-barrel carburetors, and 13.8:1 for all Thermactor engines and Sixes with Carter carburetors.

4. If the specified ratio is not obtained, adjust the idle mixture screw(s) in small increments within the range of the limiter caps in an effort to achieve the specified mixture ratio with the air cleaner installed. Correct any change in idle speed after any mixture adjustment and allow at least ten seconds for the analyzer to stabilize before taking your readings. On Thermactor engines, adjust idle speed to the rpm originally noted after the air supply was disconnected.

NOTE: Thermal conductivity type exhaust gas analyzers will give you a rich reading when the mixture is extremely lean. To check for this, choke the carburetor a bit or pump the throttle several times to enrich the mixture. The analyzer meter will accurately reflect a momentary rich condition and will deflect properly toward a lean indication as the rich condition subsides. But as the excessively lean condition returns, the meter will gradually swing back to an erroneous rich reading.

5. If the specified fuel-air ratio cannot be obtained or if the engine idle remains unacceptable with the proper fuel-air ratio, perform any diagnostic and repair procedures necessary to give you positive assurance that all engine electrical system, fuel system and mechanical specifications are correct. After completing any needed repairs, recheck the idle mixture ratio setting with the exhaust gas analyzer as described in steps 1 through 4.

6. If the specified fuel-air ratio still cannot be obtained within the adjustment limits provided, the plastic limiter cap(s) on the idle mixture adjusting screw(s) should probably be replaced. This must be performed by authorized Ford or Lincoln-Mercury Dealers as they must mark the carburetor to show this service has been performed. Carburetors with internal idle adjustment limiters must be replaced–their limiting devices should never be tampered with.

NEW TRUCK SPECIFICATION LIST

SPEEDS PARTS ORDERS

Ford has come up with another better idea . . . this one to help you keep "downtime" to an absolute minimum. Downtime can be, of course, mighty embarrassing if you can't get the right part, but more importantly, it costs the owner money every minute a vehicle is out of business. So Ford developed a whole new system to quickly and accurately identify the components used on trucks. The system features a Truck Specification List (T.S.L.), which identifies the 36 major components used in the manufacture of each truck. The glove box of every truck built after August 14, 1967 contains a copy of the T.S.L.

GUARANTEED ACCURACY

Accuracy that you can depend upon is vital to the success of the T.S.L. To accomplish this objective, Ford established the following procedure:

- After the "Truck Order" has been processed and is ready for production, the T.S.L. is prepared. Part numbers are entered in the appropriate spaces on the form. The T.S.L. then accompanies the truck along the production line.
- At four main inspection stations on the truck assembly line, the part numbers are verified and certified by an Inspector. The Inspector corrects the T.S.L. to agree with production changes made because of:
  - Component substitutions
  - Improved engineering designs
  - Use of alternate source components

FORD IS THE ONLY HEAVY TRUCK MANUFACTURER KNOWN TO TAKE SUCH EFFORTS TO GUARANTEE THE ACCURACY OF THE T.S.L.

The list also can be used by the owner to accurately record any modifications he makes to the truck after delivery. So always check the T.S.L., both front and back (which is blank so such additional information may be added) before ordering parts.

SPECIAL ORDER COMPONENTS

An "X" or "√" mark in the DSO box for each component indicates it has been "Special Ordered" for the truck. Special Order parts are categorized into two classifications as follows:

- Items that are available in the Ford Truck *line* but are not offered on the *model* that was ordered.
- Items that are not offered on any Ford Truck models. These parts are called "unique" DSO's.

Cross reference guides in your Ford Dealers' parts book will enable him to determine the type of DSO part, and the correct part number. Even unique DSO parts may be ordered through your Ford Dealer, by giving him the part numbers found on the T.S.L. plus the manufacturer's part number that may be stamped or stenciled on the part or assembly.


FORD MOTOR COMPANY TRUCK SPECIFICATION LIST

BRAKE SYSTEM | SUSPENSION | POWER TRAIN | WHEELS - HUBS - DRUMS

FRONT AXLE & STEERING

MISCELLANEOUS

ELECTRICAL

INSPECTOR

- RETAIN ONE COPY OF THIS LIST IN TRUCK AT ALL TIMES

IT CONTAINS THE INFORMATION NECESSARY TO CORRECTLY IDENTIFY THE COMPONENTS SHOWN

ADDITIONAL COPIES AVAILABLE ON REQUEST FROM:

AUTOLITE/FORD PARTS DIVISION
SPECIAL ORDER SECTION
P.O. BOX 3020
LIVONIA, MICHIGAN 48151

ENCLOSE $1.00 FOR EACH COPY. IDENTIFY THE VEHICLE BY SERIAL NUMBER SHOWN ABOVE

AAD-7125 LSVL

1 - COMPANY MASTER FILE

TSL in every glove box

BENEFITS OF THE T.S.L.

Truck owners, dealers and independent service men all benefit from T.S.L. A few of the most important benefits are:

- *Accurate Parts Identification Reduces Downtime.* The T.S.L. lists the major component parts used in the manufacture of each truck, permitting the accurate identification of the correct replacement parts. These parts can then be quickly located in dealer inventories or, if the parts are not in the dealer's parts stock, they can be readily ordered through the Parts Depot. Because the T.S.L. assures the procurement of the correct replacement parts, the time required to service a disabled truck is reduced.
- *Source for Parts Inventory Planning.* By comparing dealer parts usage records with the items listed on various T.S.L.'s, it is possible to determine the faster moving parts for a particular truck or group of trucks. Dealer parts inventories can then be established to provide ready availability of these fast moving parts.
- *Fleet Office Record.* The T.S.L. provides fleet owners with a complete record of the models and major components used in their trucks, even though the vehicles might be widely dispersed throughout the country.

REMEMBER!

The *first* thing to do when working on a truck built after August 14, 1967 is to look in the glove box for the T.S.L. It contains all the information needed to get fast,accurate delivery of parts. If the T.S.L. is missing or lost, a replacement copy may be ordered by sending $1.00 to cover the cost of handling and postage to:

Autolite-Ford Parts Division
Special Order Section
P.O. Box 3020
Livonia, Michigan 48151

REROUTING LINCOLN VACUUM HOSES IN THE DOOR LATCH SYSTEM

Effective 5-1-67, 1967 Lincolns equipped with a vacuum door lock system incorporate a revised routing of the vacuum hoses and installation of a new vacuum hose connector (Ford Part No. C7VY-5322035-D) in cowl side panel area.

Figs. 1 and 2 reflect the old and new hose routings and hose connectors which will assist service personnel in diagnosing the vacuum door latch system. The remaining hose routings and components of the system remain unchanged.

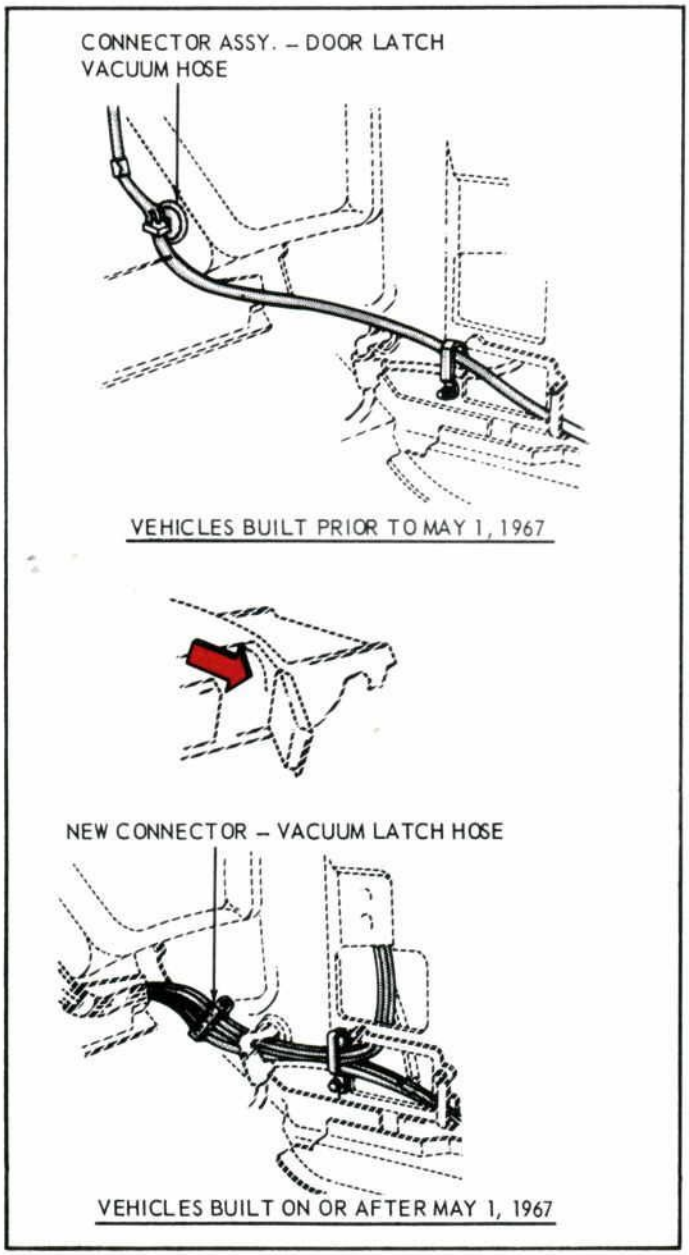


Fig. 1–R. H. Cowl Side Vacuum Hose Routing– Vacuum Door Latch System

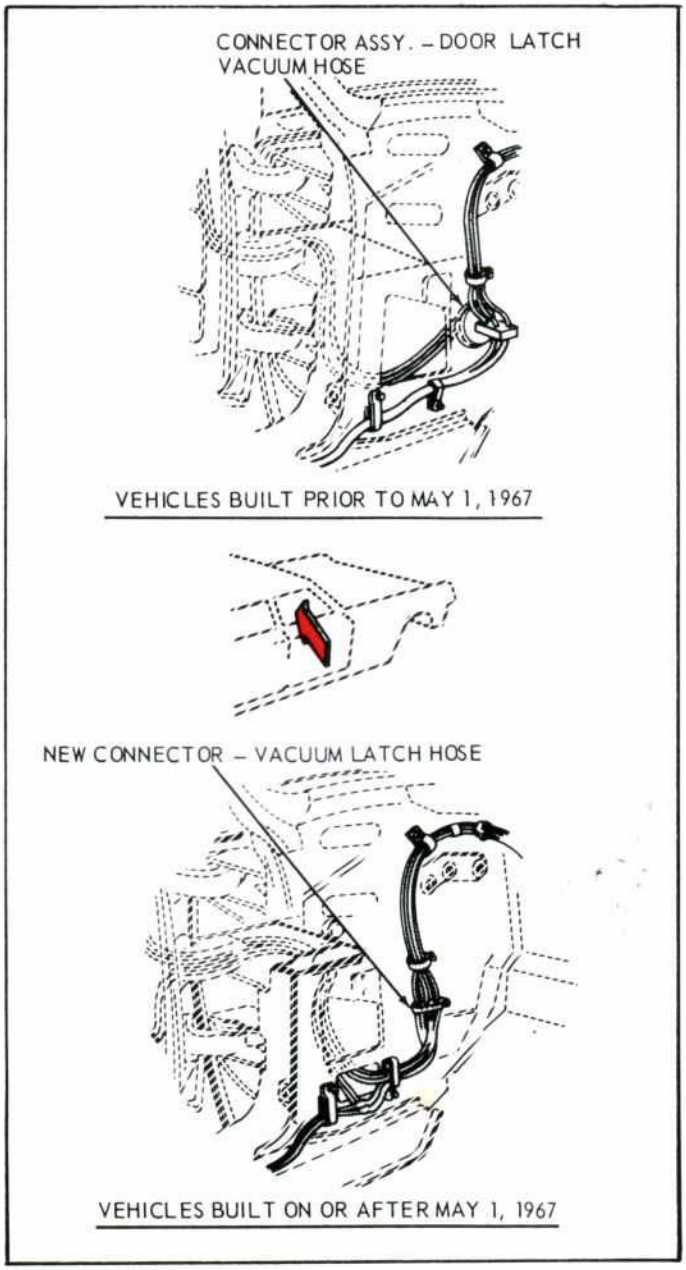


Fig. 2–L. H. Cowl Side Vacuum Hose Routing– Vacuum Door Latch System

Congratulations! HERE IS THE GRAND

25 DISTRICT WINNERS IN AUTOLITE'S "PIC

The response was terrific! Besides those participating directly in the contest, 20,150,000 households were exposed to the Autolite name. This figure is established on the basis of the A. C. Nielsen official 1967 TV rating of the Emmy Show.

In addition, millions of car conscious individuals have already been reached as a result of Autolite's aggressive 1967 Advertising Campaign. National Television, Radio, Consumer and Trade Publications plus Direct Mail Programs will continue to focus the customer's attention on the Autolite name . . . each helping you in your sales of Autolite Products.

Grand National Winner

Herod F. Ellis (left) of Ahoskie, No. Carolina (Richmond District), accepts keys to his 1967 Thunderbird Four-Door Landau from T. C. Page, Product and Marketing Manager of the Autolite-Ford Parts Division.

NATIONAL PRIZE WINNER...PLUS THE TOP

K THE EMMY AWARD WINNERS" CONTEST

DISTRICT WINNERS

For their skill, the top experts (listed below) in each of Autolite's 25 Sales Districts have been awarded a 1967 Philco Color TV Set.

Atlanta	William E. Turner, Jr. Atlanta, Georgia
Boston	Carmelo J. Calcina Amesbury, Massachusetts
Charlotte	Shirley P. Wallace Reidsville, North Carolina
Chicago	Wayne Schlipman Quincy, Illinois
Cincinnati	Ray A. Bailey Princeton, W. Virginia
Cleveland	Florian Dumitrescu Berea, Ohio
Dallas	Kenneth Ray Harris Lubbock, Texas
Denver	William Ray Looney Pueblo, Colorado
Des Moines	David R. King Durant, Iowa
Detroit	James Lesperance Dearborn, Michigan
Houston	L. F. Schubert Houston, Texas
Jacksonville	Glenn Craig Bradenton, Florida
Kansas City	C. Collins Stockton, Missouri
Los Angeles	Robert Archuleta Carpinteria, California
Oklahoma City	H. E. Wallace Happy, Texas
Memphis	Garrison Campbell Union City, Tennessee
Minneapolis-St. Paul	William D. Sammons Marshall, Minnesota
New Orleans	W. T. Underwood Meridian, Mississippi
New York	Walter J. Zeltner Bayside, New York
Philadelphia	William N. Wallace Chester, Pennsylvania
Pittsburgh	Melvin Rohm McConnellsburgh, Pennsylvania
Richmond	Barbara M. Summerlin Tarboro, North Carolina
Salt Lake City	William B. Hansen St. George, Utah
San Francisco	Jack Petersen San Francisco, California
Seattle	R. E. Laumeister Pendleton, Oregon

OUTSTANDING DRAMATIC SERIES

Mission: Impossible

OUTSTANDING COMEDY SERIES

The Monkees

OUTSTANDING VARIETY SERIES

The Andy Williams Show

OUTSTANDING CONTINUED PERFORMANCE BY AN ACTOR IN A LEADING ROLE IN A DRAMATIC SERIES

Bill Cosby as Alexander Scott (I Spy)

OUTSTANDING CONTINUED PERFORMANCE BY AN ACTRESS IN A LEADING ROLE IN A COMEDY SERIES

Elizabeth Montgomery as Samantha Stephens (Bewitched)

REVISED LUBRICATION SERVICE PROCEDURES

LUBRICATION INTERVALS FOR DRIVESHAFT AND 4-WHEEL DRIVE FREE RUNNING HUBS

(1967 Bronco, Econoline and Light Truck)

This article supplements current information regarding lubrication of front driving axle free running hubs on 1967 4-wheel drive vehicles and driveshafts for 2- and 4-wheel drive light trucks.

Free Running Hubs—Bronco and F-100-250 4-Wheel Drive

Each 12,000 miles the free running hubs should be inspected, the lubricant removed, and the hubs repacked with a lithium based (blue-black) lubricant. Rotunda Multi-Purpose Long Life Lubricant (Ford Part No. C1AZ-19590-B, C, or D), or equivalent, should be used.

NOTE: If the vehicle is operated continuously in deep water, the hubs should be repacked DAILY or after each such operation. Water tends to wash away the lubricant which can result in premature failure of the king pins or front hub bearings, if the more frequent lubrication maintenance is not performed.

Driveshaft Universal Joints and Slip Yokes

Most light truck drivelines are equipped with extended-life universal joints. They do not require lubrication and have no lubrication fittings or plugs. The extended-life universal joint *should not be disassembled for repacking.* The seal is designed to maximize both the retention of lubricant and exclusion of foreign matter. The seal can easily be damaged if disturbed and the service life shortened. All slip yokes and universal joints (with and without lubrication fittings) require the same type of lithium-based lubricant as the free running hubs.

The following chart lists truck models and the recommended lubrication interval for slip yokes and universal joints.

Recommended Lubrication Interval

Model	Slip Yoke Spline	U-Joint Journals
F-100 (4x2)	Lubricate every 6000 miles	Service lubrication not req'd
F-250 (4x2)		
F-350		
F-100 (4x4)	Lubricate every 6000 miles	Lubricate every 6000 miles
F-250 (4x4)	(or more frequently for	(or more frequently for
	severe service)	severe service)
Bronco	Lubricate every 6000 miles	Lubricate every 6000 miles
	(or 1000 miles or daily for	(or 1000 miles or daily for
	severe service)	severe service)*
Econoline	Lubricate every 6000 miles	Lubricate every 6000 miles
P-100	(Not applicable)	Service lubrication not required
P-350/3500	Lubricate every 1000 miles	Service lubrication not required
P-400/4000		
P-500/5000	Lubricate every 1000 miles	Lubricate every 1000 miles

*The centering ball only has a lubrication fitting on the double joint on vehicles produced since April 3, 1967. Areas without fittings have a long life design.

NEW, IMPROVED HYPOID GEAR LUBE

If, when checking the lubricant in an axle, you discover a lube that has some of the color and flow characteristics of motor oil—DO NOT REPLACE WITH BLACK LUBRICANT! Visually, it may not appear to be the correct lube; but that's because Ford no longer uses the familiar "black-colored" hypoid gear lube in most 1967 and 1968 cars and trucks.

Instead, Ford specifies a new, improved hypoid gear lubricant that varies in color from yellowish-green when new, to beige or gray as mileage increases. Flow characteristics resemble those of motor oil.

It's available under the following service part numbers:

Conventional Axle—

Ford Part Number C6AZ-19580-B (1-Gal. Can)

Ford Part Number C6AZ-19580-D (120-Lb. Keg)

Limited Slip Axle—

Ford Part Number C6AZ-19580-C (1-Gal. Can)

The new lube provides excellent lubricating characteristics over a wide range of operating conditions; from cars with small sixes, to cars with high performance V-8's. This eliminates the necessity of stocking several grades of axle hypoid lube. To achieve the superior lubricating qualities of the new lube, the following *preferred* service recommendations should be adhered to.

SERVICE RECOMMENDATIONS

Axles with "black" Lube

If fluid is required to bring level to full mark, service as follows:

Conventional Axle: ADD Rotunda Hypoid Gear Lube (yellowish-green) Ford Part No. C6AZ-19580-B or D, or equivalent. Black-colored lube such as the previously used Rotunda Hypoid Gear Lube (black), Ford Part No. C1AZ-19580-E and C2AZ-19580-D, or equivalent, may be used as an alternate.

Limited Slip Axle: ADD one-ounce of Rotunda Locking Differential Additive (Ford Part No. C1AA-19B546-A), or equivalent, to each pint of (black) hypoid gear lube.

NOTE: DO NOT drain black lube from axles just to comply with the new specifications. If an axle is drained for overhaul, however, then clean all parts and refill with the new, improved hypoid gear lube.

Axles with "Yellowish-green" Lube

If fluid is required to bring level to full mark, ADD Rotunda Hypoid Gear Lube (yellowish-green), or equivalent, as follows: Conventional Axle: Ford Part No. C6AZ-19580-B (1-Gal. Can); Limited Slip Axle: Ford Part No. C6AZ-19580-C (1-Gal. Can)

NOTE: Do not use Rotunda Locking Differential Additive with either of the above lubricants for truck applications. Add 4-oz. of Rotunda Additive, C1AA-19546-A, or equivalent, Ford Spec ESW-M2C58-A, when refilling "integral" type (rear cover) conventional axle for cars only.

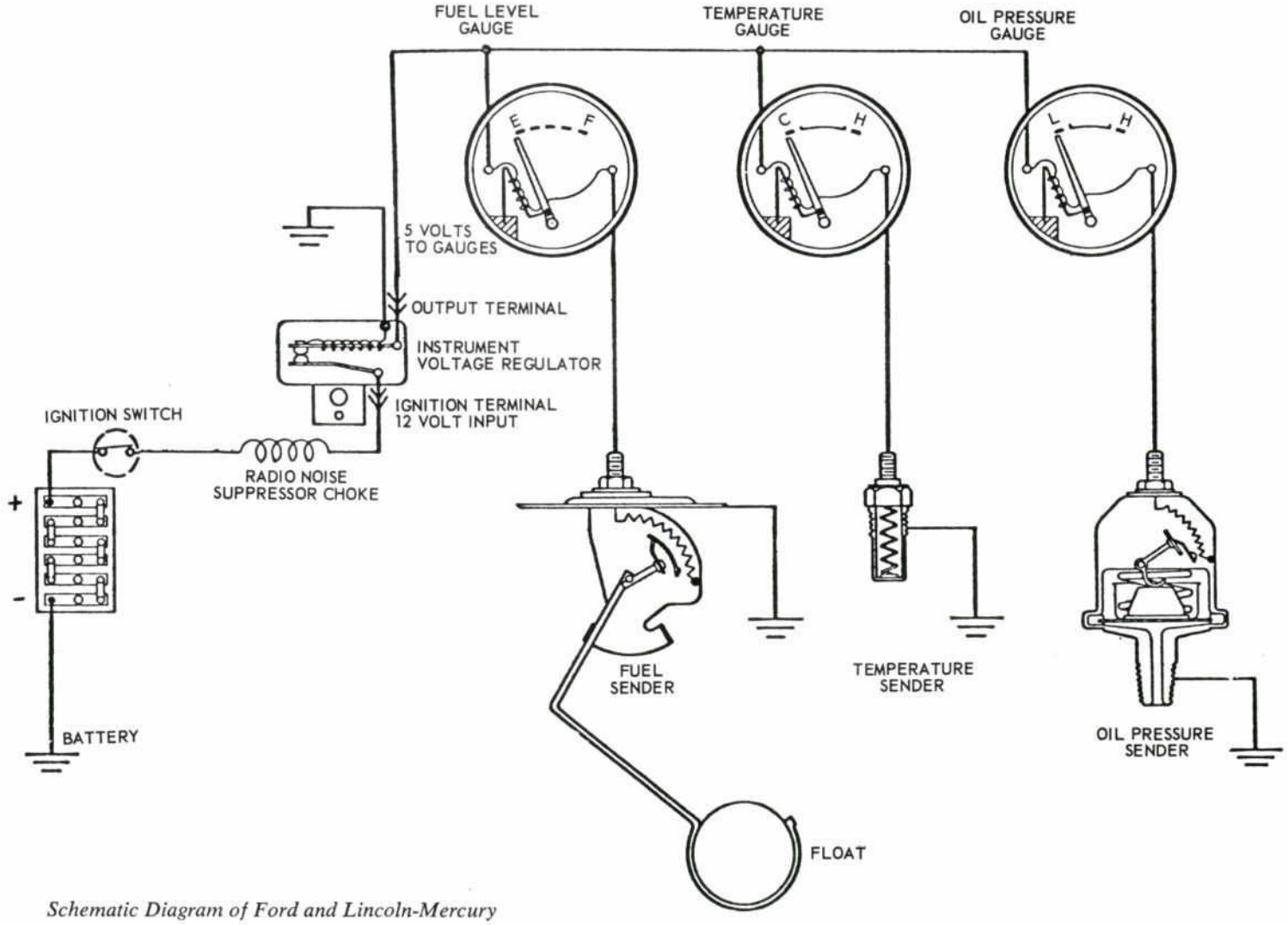
SERVICE PROCEDURE FOR INSTRUMENT CLUSTER GAUGES

CAUTION

The Ford Motor Company instrument cluster gauge system is a five volt system. Applying twelve volts to any part of the system except the Instrument Voltage Regulator input (terminal marked IGN) or grounding any part of the system except as outlined under Test Procedures may result in burning out one or more of the components. When removing or replacing the Instrument Cluster, the Gauges, or tne Senders the Battery Ground Cable must be disconnected.

FUEL GAUGE SYSTEM

The level of fuel in the tank governs the p sition of the Fuel Sender Float, which in turn controls the position of a contact on a variable resistor. When the fuel is low, the sender resistance is high and retricts the flow of electric current to the gauge. A high fuel level causes a low resistance and higher gauge current. The gauge pointer is controlled by a bimetal strip, which is heated by the current from the sender. When the current is low, there is little heating effect and the pointer moves a short distance. A



Schematic Diagram of Ford and Lincoln-Mercury Instrument System

higher current produces a proportionately higher heating effect and pointer movement. The Instrument Voltage Regulator provides a pulsing output with a peak at battery voltage but with an average value of five volts.

TEMPERATURE GAUGE SYSTEM

The operation of the temperature system is the same as the fuel level system, except that the variable resistance is produced by a Thermistor located in the Temperature Sender. The resistance of the Thermistor is high when the temperature is low, and low when the temperature is high.

OIL PRESSURE GAUGE SYSTEM

The operation of the Oil Pressure System is the same as the fuel level system except that a diaphragm controls the position of the contact on the variable resistor.

INSTRUMENT GAUGES DIAGNOSTIC PROCEDURE

The chart on page 12 lists typical problems and their correction. This information should be used in conjunction with the Test Procedures to correct instrument gauge problems.

TEST PROCEDURES

A. Wiring Harness

Refer to the schematics in appropriate Shop Manuals (available from Ford or Lincoln-Mercury Dealers) for wire identification and color coding to facilitate proper testing procedure. A voltmeter or test light is recommended for finding a broken or open condition in the wiring harness system. Place the range selector of the voltmeter on the 20 volts D.C. scale. Attach the negative (minus) lead to a good ground and the positive lead to the sender wire. If the pointer moves in a pulsating manner or the test light flickers, there is continuity from the power source. If the meter pointer does not deflect or pulse, the open circuit exists between the test point and the power source. Repeating this procedure at the various connectors should define or isolate the faulty section of wire harness.

B. Sender and Gauge

Disconnect the sender lead wire of the sender and gauge being tested and connect to one lead of a Borroughs BT-11-7 Gauge tester, or equivalent, and the other lead to ground. With the ignition key on, adjust the dials on the tester for high, mid-scale and low and observe the gauge in each position. If the tester is not available, connect the Sender Lead to ground through a 10 OMH Resistor. This is equivalent to the HIGH or FULL scale setting of the tester.

If the gauge does not indicate or operate during the test, the gauge or the wiring to it has an open circuit. If the gauge never worked or does not work after replacement, there may be an open circuit in the vehicle wiring system.

(See test procedure A)

C. Instrument Voltage Regulator

The Instrument Voltage Regulator may be tested in the vehicle as follows. Connect one lead of a test light or the positive lead of a voltmeter to the temperature sending unit terminal, oil pressure sending unit terminal, or fuel sender gauge terminal without disconnecting the vehicle lead. Connect the other lead to a suitable ground. With the ignition key on, a flashing light or pulsing voltmeter indicates that the Instrument Voltage Regulator is good.

CAUTION: DO NOT GROUND OR SPARK EITHER TERMINAL OF THE INSTRUMENT VOLTAGE REGULATOR. This will burn out the dash Wiring Harness, the Instrument Voltage Regulator or both.

INSTRUMENT CLUSTER GAUGES

INSTRUMENT GAUGES DIAGNOSTIC PROCEDURE

All Gauges Pegged	
POSSIBLE CAUSE	**CORRECTION OR PROCEDURE**
Loss of regulator case ground to vehicle.	1. Use ohmmeter to check for proper ground (zero resistance). 2. Use ohmmeter to check for cracked ground circuit in printed circuit.
Faulty instrument voltage regulator.	Use voltmeter or test light to check for pulsing instrument voltage regulator output (see test procedure C).

All Gauges Do Not Indicate With Ignition Switch ON	
POSSIBLE CAUSE	**CORRECTION OR PROCEDURE**
Open circuit in radio noise suppression choke.	Replace choke.
Faulty instrument voltage regulator.	Use voltmeter or test light to check for pulsing instrument voltage regulator output. (See test prcedure C).
Open circuit in battery feed to instrument voltage regulator.	Use voltmeter or test light to locate open circuit in feed. (See test procedure A).
Open circuit in printed circuit.	Use voltmeter or test light to locate open circuit in printed circuit.

Individual Fuel, Oil or Temperature Gauge Does Not Indicate or Operate	
POSSIBLE CAUSE	**CORRECTION OR PROCEDURE**
Associated sender not grounded.	Test sender ground with ohmmeter (zero resistance).
Open circuit in wiring harness or printed circuit.	Use voltmeter or test light to locate open circuit. (See test procedure A).
Open circuit winding in gauge or sender.	Test gauge and sending unit individually. (See test procedure B).

Individual Fuel, Oil or Temperature Gauge Pegged	
POSSIBLE CAUSE	**CORRECTION OR PROCEDURE**
Harness or sender shorted to ground.	1. Bypass harness with jumper wire. 2. If still pegged, replace sender. 3. If operative, repair harness.

Erratic Operation of All Gauges	
POSSIBLE CAUSE	**CORRECTION OR PROCEDURE**
Dirty contacts in instrument voltage regulator.	Replace instrument voltage regulator.

All Gauges Read Low	
POSSIBLE CAUSE	**CORRECTION OR PROCEDURE**
Radio noise choke connected to output terminal.	Connect radio noise choke to input (IGN) terminal.
Instrument voltage regulator out of calibration.	Check calibration as described in Sender and Gauge. (See test procedure B).

SPEEDOMETER SYSTEM DIAGNOSIS

A systematic diagnosis procedure can save you valuable time and avoid *unnecessary* disassembly or replacement of speedometer components. Most problems usually fall into one of the following categories:

1. AUDIO–Noises such as clicking sounds.
2. AUDIO AND VISUAL–Distracting noise and function such as a clicking, and oscillating pointer.
3. VISUAL–Distracting function such as oscillating pointer.
4. FUNCTIONAL–Usually not readily noticeable, such as a high or low reading.

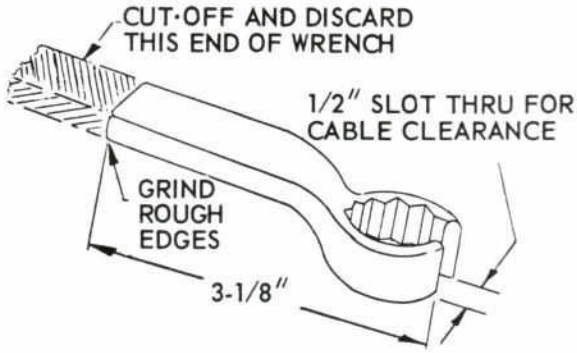


Fig. 1–Speedometer Wrench

THE MOST PROBABLE CAUSES FOR AUDIO AND/OR VISUAL PROBLEMS ARE:

A. Defective cable core (kinked, bent tip, etc.).

B. Defective outer casing (severe bends due to improper routing, etc.).

C. Defective driven gear at cable input (transmission) due to nicks on teeth, etc.

D. Defective speedometer assembly.

E. Loose cable attaching nut.

THE MOST PROBABLE CAUSES FOR FUNCTIONAL PROBLEMS ARE:

A. Incorrect driven gear at cable input (transmission).

B. Defective speedometer head assembly.

When resolving noise problems, the following procedure should be followed prior to the replacement of any parts.

A. Road test the car to verify the nature of the problem.

B. Check the cable attaching nut and ferrule for tightness to the speedometer head. If loose, an altered wrench such as shown in Fig. 1, makes a handy tool to quickly and easily tighten the nut.

C. Inspect the entire cable routing for severe bends, kinks, proper clip retention, or other damage.

D. Remove the cable from the transmission and inspect the driven gear for nicks or abnormal wear patterns.

E. Carefully remove the cable core. While holding one end in each hand (below the square ends), and with the core hanging in approximately a 9-12 inch diameter loop, rotate the core and check for torque uniformity. The cable core should rotate smoothly. Inspect for bent core tips.

NOTE: Before re-installing or replacing the core, generously lubricate the length with Rotunda Speedometer Cable Lubricant (Ford Part No. B5AZ-19581-A), or equivalent. Also apply a small dab of FoMoCo Speedometer Shaft Compound (Ford Part No. C5AZ-19581-A), or equivalent, in the speedometer head drive square before re-attaching the cable assembly.

ENGINE ROUGHNESS DURING NO-LOAD OPERATION

(Engines with Vacuum Advance Distributors)

Operating an engine at faster than curb idle speed, under no load (transmission in neutral) may cause a "skip" or "engine roughness." If the engine is properly timed, this condition is entirely *normal* and should not be automatically diagnosed as some type of engine problem. The "skip" results from abnormal operating conditions.

Normally, when the engine is operating under a load (transmission in gear) the distributor vacuum advance provides far less spark advance, than under a no-load condition. That's because an engine under a load produces far less vacuum than a free running engine under a no-load condition.

Thus, between the off idle to 1200 rpm range the engine, due to excessive spark advance, actually runs rough as though a cylinder is mis-firing. This condition is inherent in any internal combustion engine equipped wth a centrifugal vacuum spark advance distributor. It's the product of the particular advance curve and initial ignition timing for the engine.

You can verify this by momentarily disconnecting the distributor vacuum line at the distributor. Plug the line while it's disconnected. If the roughness smooths out

without loss of rpm, nothing is wrong with the engine and no corrective action is required. If obvious roughness is still present, then an engine problem may exist and further diagnosis is required.

INTAKE MANIFOLD GASKET INSTALLATION

The heat distribution pattern within an engine block tends to cause a very small, but significant degree of warpage. On occasion it may cause sealing problems at the intake manifold to cylinder head gasket. To prevent such leaks, the following procedure is recommended:

1. Install a *new* gasket. Tighten the intake manifold attaching bolts to the specified torque.
2. Start the engine and run until normal operating temperatures are reached. (About 10 minutes.)
3. Shut off engine.
4. Retighten all bolts to the specified torque. This SECOND RE-TORQUE operation provides uniform sealing characteristics over the entire surface of the gasket.

FABRICATE TOOL . . . TO REMOVE HARD TO REACH BULBS

To facilitate removal of small, hard-to-reach bulbs . . . such as the 1967 Thunderbird seat belt and brake warning lamp sockets in the safety convenience package . . . it's suggested a tool such as shown in Figure 2 be fabricated.

The tool consists of a screw driver of appropriate size and two pieces of rubber hose . . . one of fairly firm durometer to fit tightly on the end of the screw driver, and one of softer durometer with an inside diameter of appropriate size to stretch over and firmly hold the bulb.

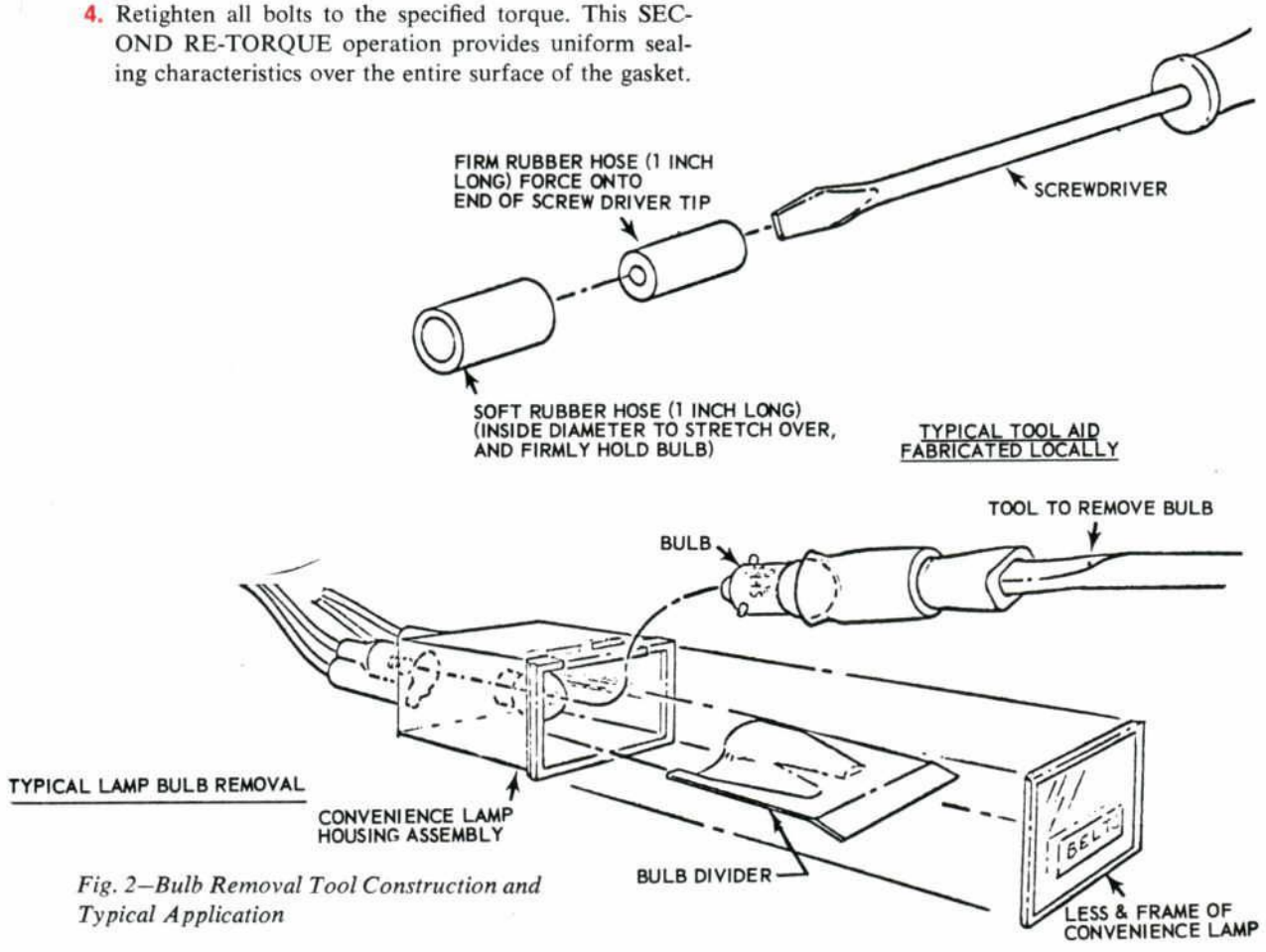


Fig. 2–Bulb Removal Tool Construction and Typical Application

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