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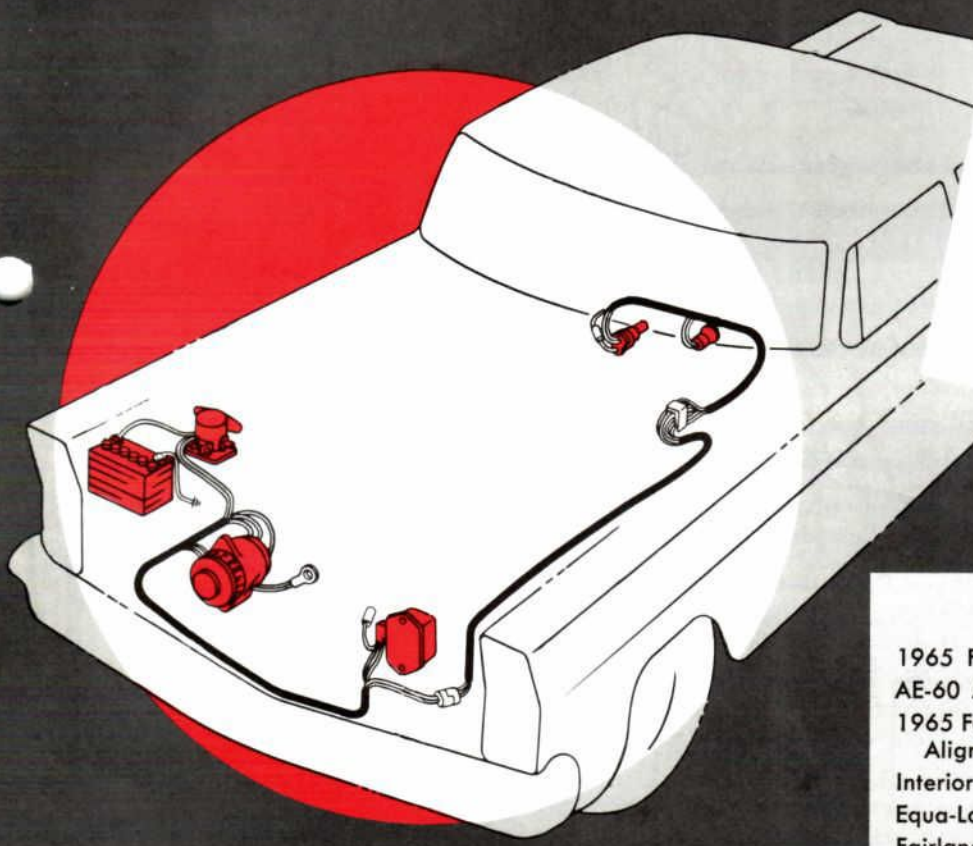
Technical parts and service information published by Ford Division to assist servicemen in Service Stations, Independent Garages and Fleets.

FEATURING!

ALTERNATOR CHARGING SYSTEM

DIAGNOSIS, ADJUSTMENT and OVERHAUL



SPECIAL!

This issue includes a four-page index covering all of the issues of Shop Tips since October, 1963. Be sure to remove this section and file it separately for quick reference.

ALSO . . .

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

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ALTERNATOR CHARGING SYSTEM...

The need for knowing how to service alternators is growing fast. In 1965, all Ford vehicles are equipped with alternators. It is important that service personnel understand how they work and be able to diagnose troubles and correct them.

The alternator is made up of the same functional parts as the D. C. generator. It has a field coil for excitation which is called the rotor. The rotor revolves within the alternator housing thus producing the magnetic field.

The alternator stator contains the heavy current carrying wires and is stationary as its name implies. The principal advantage of the alternator over the generator is the possibility of higher maximum operating speeds. Both the generator and the alternator produce electric current by the process of electromagnetic induction. In each case, current is induced within the conductors and transferred to the converting device. The induced current and voltage in both the alternator and the generator is alternating current. This alternating current must be converted into direct current before it can be used in the charging system of the automotive storage battery. The generator uses a mechanical switch (commutator and brushes) to convert the alternating current in the armature to direct current. The alternator system uses a diode rectifier to make the conversion. Both the generator and the alternator operate on the same fundamental principle; however, the alternator can produce more current in less space. See Figure 1 for the component parts of the alternator assembly.

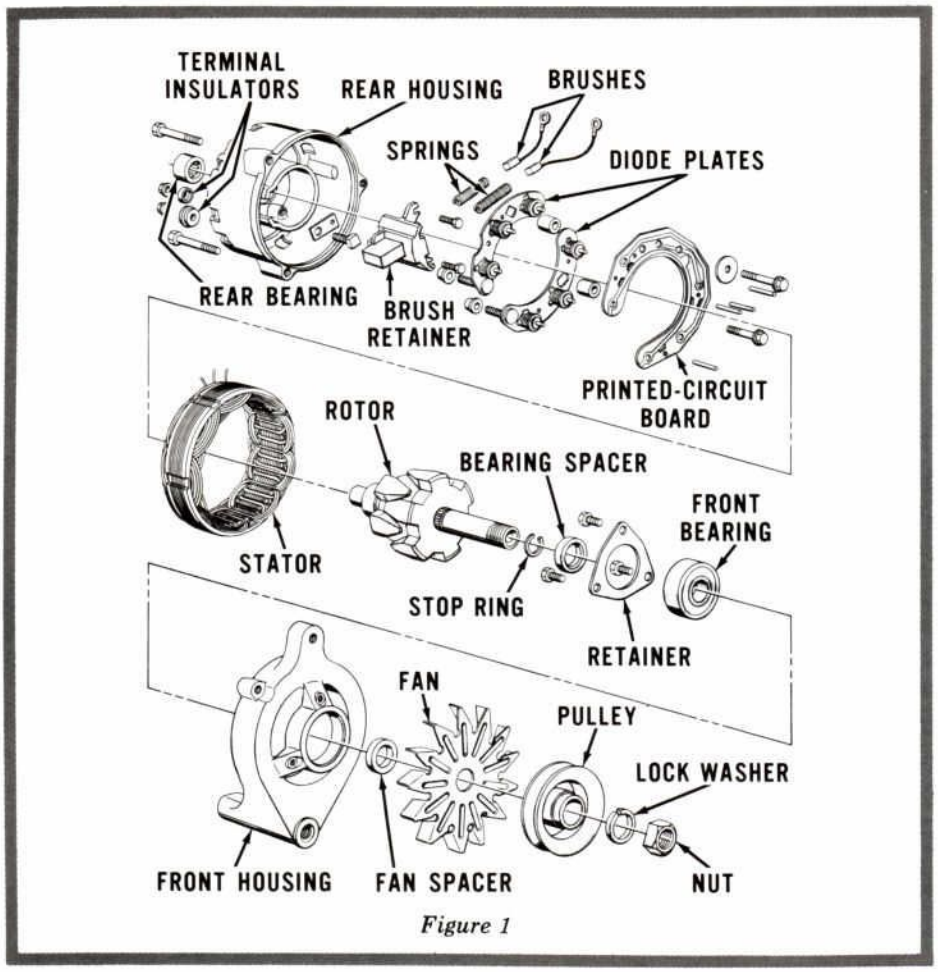

Figure 1

ALTERNATOR CHARGING SYSTEM

The alternator charging system is composed of an alternator, regulator, battery and a charge indicator or ammeter. These units are connected by means of cables, wires and parts of the vehicle itself.

Alternator output is controlled by the regulator so that adequate current is supplied without injury to the alternator or other electrical units served by the supply system.

To test and diagnose the charging system intelligently, it is necessary to know how the system operates, where to make tests, how to make tests and what the tests mean in relation to the performance of the system. An examination of the charging system circuit will reveal the circuit connecting points and locate the test areas. See Figure 2.

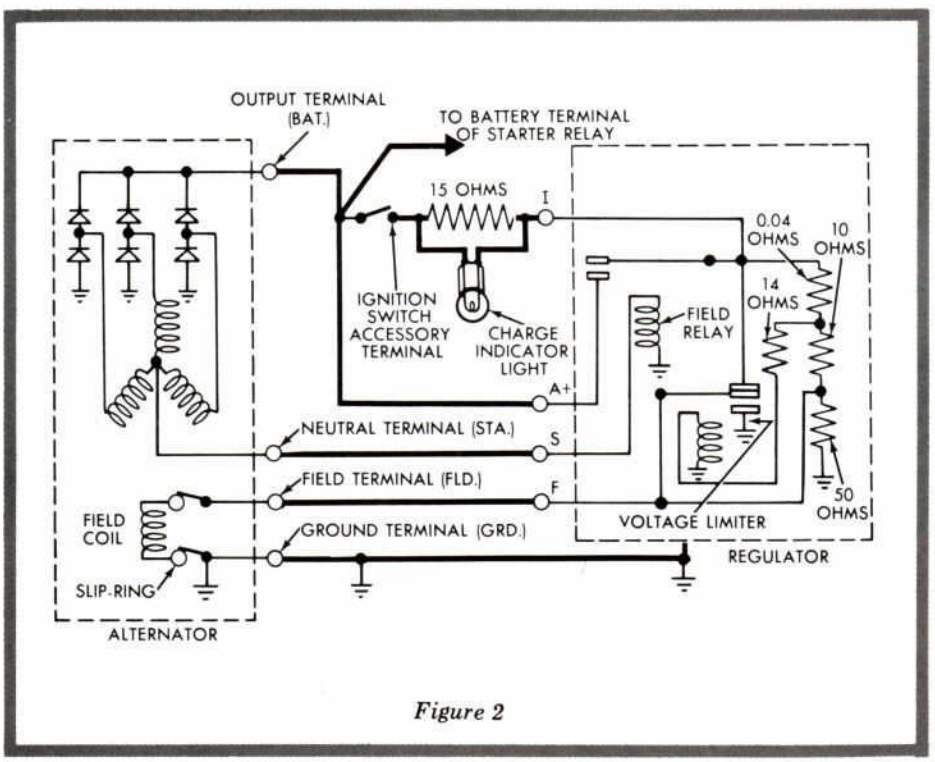

Figure 2

DIAGNOSIS, ADJUSTMENT and OVERHAUL

ALTERNATOR CIRCUITS

Figure 3 shows the schematics of the alternator charging system.

When a *charge indicator light* is used in the charging system, the regulator terminals are connected as shown in Figure 3-A, and a wire is connected between the regulator ground and the alternator ground. The field relay is activated as the regulator output reaches a specified output.

When an *ammeter* is used in the charging system, the regulator "I" terminal is not connected, nor is the alternator neutral terminal connected. The regulator "A" terminal is connected to the starter relay battery terminal and the regulator "S" terminal is connected to the ignition switch as in Figure 3-B. Closing the ignition switch activates the regulator field relay.

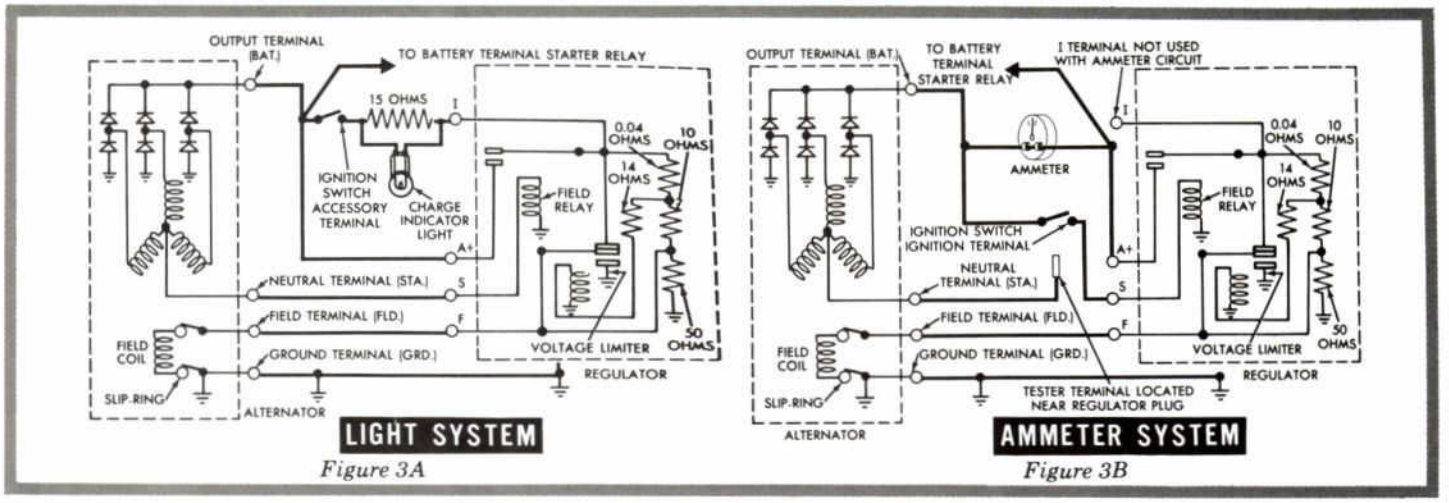

Figure 3A *Figure 3B*

TESTING AND DIAGNOSIS

Mechanical energy supplied by the engine is converted into electrical energy by the alternator. This energy is used to charge the battery and supply power to the electrical system when the engine is running. The alternator should supply all power for the load and also recharge the battery. If the charging system does not operate properly and the battery and drive belt have been eliminated as possible causes of the trouble, check the alternator output.

ALTERNATOR OUTPUT TEST

The Alternator Output Test measures the current output at the specified speed and voltage. The test result is a measure of the ability of the alternator to produce its rated output. See page 8 for specifications. Connect the test instruments to the charging system as shown in Figure 4. Remove the ground cable and the positive cable, then install the battery post adapter switch. Open the switch and connect the ground cable. Connect the field leads to the regulator plug with a jump wire (male spade lugs with wire leads may be used to make these connections). Turn the field resistance off. Connect a tachometer to indicate the engine rpm. Place the transmission in neutral or park and apply the parking brake.

Test Procedure

1. Close the battery post adapter switch and start the engine. Open the battery post adapter switch. All electrical accessories must be turned off, including door-operated interior lights.

2. Increase the engine speed to approximately 2500 rpm and observe the voltmeter and ammeter.

3. Turn the field resistance control knob clockwise until 15 volts are indicated on the voltmeter.

4. Observe the ammeter reading. To obtain the total alternator output, add two amperes for vehicles equipped with the transistor ignition system.

5. If the battery was fully charged, it might not be possible to obtain maximum current output. If specified current is not obtained, make the following test before condemning the alternator:

A. Turn the field resistance control knob off. Rotate the master control knob to the Current Reg. position. Maintain the engine speed at 2500 rpm.

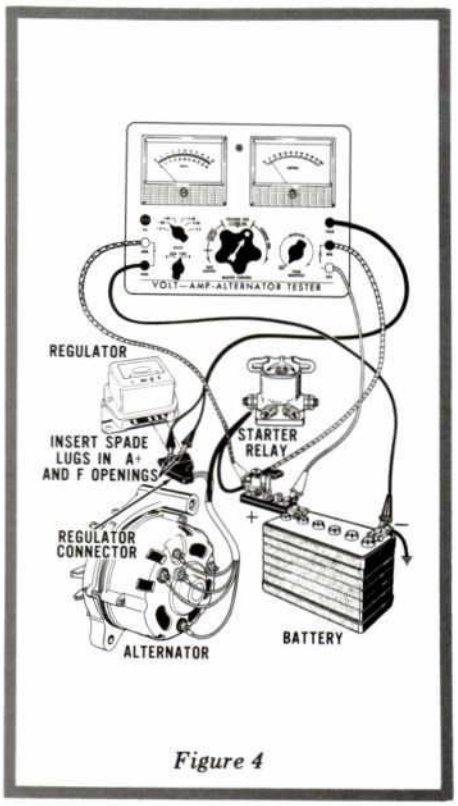

Figure 4

ALTERNATOR CHARGING SYSTEM...

OUTPUT TEST—continued

B. Turn the field resistance control knob and the master control clockwise, maintaining a voltmeter reading of 15 volts maximum, until the field resistance control is at its maximum clockwise position.

C. Readjust the master control until the voltmeter reads exactly 15 volts. Observe the ammeter reading. Add two amperes for vehicles with the conventional ignition system and six amperes for the transistorized ignition system to obtain total alternator output.

6. Stop the engine.

Conclusions

If the output is two to five amperes below the specified rating, (See Specifications on page 8), it usually indicates an open diode rectifier. A slipping drive belt or excessive circuit resistance can also cause this indication. Recheck the belt and the circuit resistance.

An output of approximately 10 amperes less than the specified rating is usually an indication of a shorted diode. An alternator with a shorted diode often causes a noticeable whine at idle speeds.

A shorted positive diode often causes alternate flashing of the oil pressure warning light and the charge indicator light with the ignition switch off. Feedback from the charge indicator light circuit to the accessory terminal of the ignition switch causes this peculiar effect by activating the fuel and temperature gauge system. (When the contacts in the constant-voltage regulator on the instrument cluster close, the oil pressure light becomes dim and the charge indicator light becomes bright. When the constant-voltage contacts open, the oil pressure light becomes bright and the charge indicator light becomes dim). A shorted positive diode also causes battery discharge through the field circuit due to the closed field relay contacts.

Any test indicating alternator malfunction should be followed by circuit resistance tests to determine whether the circuit is faulty or if the alternator should be removed from the vehicle for bench testing and repair. If the alternator output test is conducted on a test bench, follow the procedure outlined by the test bench manufacturer.

CIRCUIT TESTING AND DIAGNOSIS

Excessive resistance in the charging circuit can cause an undercharged battery condition due to the higher-than-normal voltage drop. Two tests will determine the condition of the circuit: A) A ground circuit resistance test and B) an insulated circuit resistance test. Both tests involve a constant current flow of 20 amperes, indicated on the test ammeter, and a voltage loss or drop measurement of each circuit. Loose or corroded connections are a common cause of this problem.

VOLTAGE DROP TEST—

Alternator To Battery Ground Terminal

Test Connections

Install the battery post adapter switch and make the other test connections as shown in Figure 5. Set the voltage meter in the lowest volt position.

Place the transmission in neutral or park and apply the parking brake.

Test Procedure

1. Close the battery post adapter and start the engine. Open the battery post adapter switch. All electrical accessories must be turned off, including the door-operated interior lights.

2. Increase the engine speed until the ammeter indicates 20 amperes. If the battery is fully charged, use a battery discharge tester (Battery Starter Tester) to obtain the 20 ampere reading.

3. Observe the voltmeter. The voltage indicated on the voltmeter should be less than 0.1 volt. A faulty ground circuit is indicated when the voltmeter reading is more than 0.3 volt on vehicles with a charge indicator light, and 0.7 volt on ammeter systems.

Conclusions

If the voltage reading is higher than specified, (See specifications on page 8), there is excessive resistance in the circuit. Inspect the battery ground cable for corrosion or loose connections. Repair or replace any defective parts.

Alternator To Battery Positive Terminal

Test Connections

Except for the voltmeter, the test connections are the same as for the "Alternator To Battery Ground Terminal Test". Connect the voltmeter as shown in Figure 6.

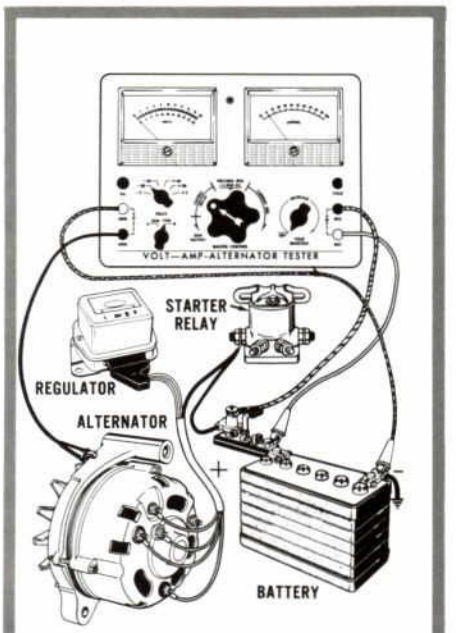

Figure 5

Place the transmission in neutral or park and apply the parking brake.

Test Procedure

1. Close the battery post adapter switch and start the engine. Open the battery post adapter switch. All electrical accessories must be turned off, including the door-operated interior lights.

2. Increase the engine speed until the ammeter indicates 20 amperes. If the battery is fully charged, it may be necessary to connect the battery discharge tester (Battery Starter Tester) to the battery terminal and adjust the load on the battery.

3. Observe the voltmeter. A faulty charging circuit is indicated when the reading is more than 0.3 volt on vehicles with a charge indicator light and 0.7 volt on ammeter systems.

Conclusions

If the voltage reading is higher than specified, there is excessive resistance in the circuit. Inspect the battery positive cable and the wiring harness from the starter relay positive terminal to the alternator for broken wires or loose or corroded connections. Repair or replace any defective parts.

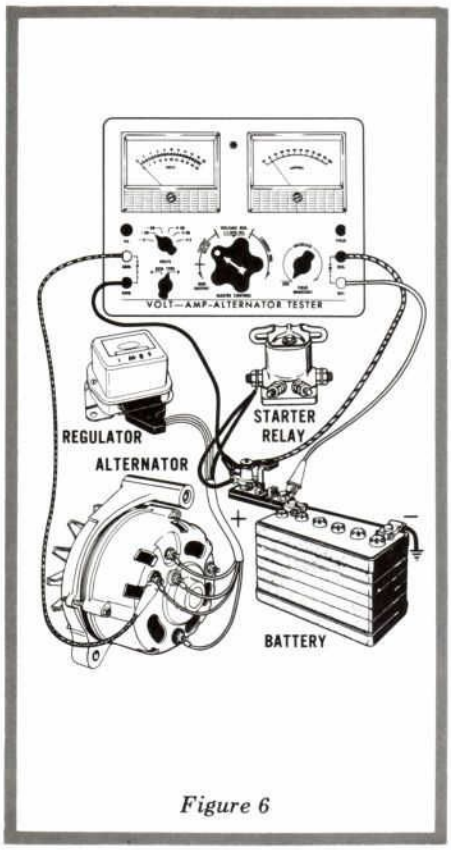

Figure 6

REMOVAL AND INSTALLATION

A circuit breaker (cutout relay) is not used; therefore the output terminal of the alternator is "hot" at all times. Grounding the output terminal or the lead wire will result in a wire harness burn-out or damage to the alternator. *The battery ground cable must always be disconnected before removing the alternator.*

Removal

1. Disconnect the battery ground cable.

2. Loosen the alternator mounting bolt and remove the adjusting arm to alternator belt. Disconnect the alternator wiring harness retaining clip, if required.

3. Disengage the alternator belt. Remove the alternator mounting bolt and spacer. Lift the alternator to the fender apron area and disconnect the wires from the alternator.

Installation

1. To install the Ford alternator, connect the wires to the alternator as follows:

BAT. Terminal—Black & Yellow wire (except Econoline & Fairlane—Black)

GRD. Terminal—Black & Red wire

STA. Terminal—White & Black wire

FLD. Terminal—White wire

2. Position the alternator on the engine, and install the spacer and alternator mounting bolt fingertight.

3. Install the adjusting arm to the alternator bolt.

4. Adjust the bolt tension. Apply pressure on the alternator front housing only, when tightening the belt. Tighten the adjusting arm bolts and the mounting bolt.

5. Position the wiring harness retaining clip, if required, and connect the battery ground cable.

Servicing Precautions

1. Never connect the battery ground cable until all wiring harness connections to the alternator have been made and are properly tightened.

2. When adjusting the drive belt tension, always place the pry bar against the rear of the front housing. Never pry against the stator (steel center) section of the alternator.

3. Never attempt to polarize the alternator. The alternator is polarized every time the ignition switch is turned to the On position. Attempting to polarize the alternator will damage the voltage regulator and the wiring harness.

ALTERNATOR OVERHAUL

Disassembly

1. Mark both end housings and the stator so that they can be assembled in the same position.

2. Remove the three housing through bolts.

3. Separate the front end housing and rotor from the stator and rear end housing.

4. Remove all the nuts and washers from the rear end housing and remove the rear end housing from the stator and diode plate assembly. The slip ring brush springs may be bound out of their openings.

5. Remove the alternator drive pulley nut, then slide the pulley fan, fan spacer, rotor and bearing spacer from the front end housing. See Figure 7.

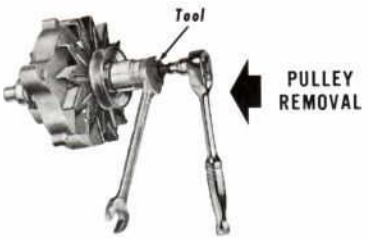

Figure 7

Diode Tests

An adequate test of the diodes can be made with the alternator completely assembled. Contacts can be made with the probe inserted through the venting slot on the end plate and contacting the stator terminals. The stator terminals on the printed-circuit board can be used for both diodes.

Several diode testers are available which permit diode testing without the inconvenience and time-consuming procedure of disconnecting the stator lead wires. The following procedure is based on the use of a tester of this type (See Figure 8). Specific instructions provided by the tester manufacturer should be followed.

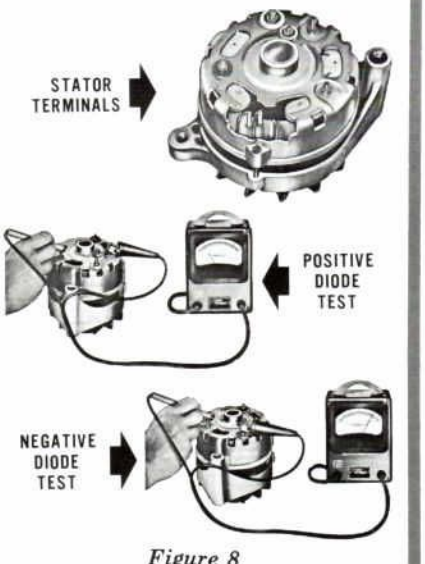

Figure 8

1. To make a test of the positive diodes, first attach the clip lead to the alternator output terminal (BAT). With the sharp end of the probe, make contact with each of the stator terminals on the printed-circuit board. Each terminal contacts a pair of diodes; one

ALTERNATOR CHARGING SYSTEM...

OVERHAUL—continued

positive diode and one negative diode. Be sure that the probe makes good contact with each terminal.

2. Compare all three readings taken at the printed-circuit board stator terminals. If the meter reads two amperes or more, the diodes are good. They should also read within two scale points of each other.

3. A low reading will usually indicate a fully soldered connection at one of the diode terminals.

4. If the readings are not satisfactory, the printed-circuit board or diode assembly plate must be replaced. Check each new diode on the plate before installing the plate in the stator assembly. The good diode should read two amperes or more.

5. To check the negative diode assembly, attach the tester clip lead to the ground terminal (GRD) on the housing. With the probe follow the same procedures as outlined for the positive diodes.

Diode Replacement

1. If either diode plate assembly is being replaced, carefully unsolder the stator leads from the printed-circuit board terminals, slip the stator neutral lead split-terminal lug out from under the head terminal screw, and separate the stator from the diode plate assembly. Use only a 100 watt soldering iron. Leave the soldering iron in contact with the terminals only long enough to remove the wires. Excess heat can damage the printed-circuit board and diodes.

Figure 9

2. Hold the diode plate that is to be replaced, in a vise. Use a thin hacksaw blade to cut the three diode leads as close to the diodes as possible being careful not to break the printed-circuit board. See Figure 9.

3. Press the insulated terminal bolt out of the insulator and remove the insulators.

4. Separate the diode plate from the printed-circuit board. Discard the roll pins as they are only required for automated assembly.

5. Carefully unsolder and remove the cut diode leads from the printed-circuit board, using a 100 watt soldering iron. Remove any remaining solder and washers from the diode lead holes.

6. If the printed-circuit board is being replaced, cut the printed-circuit board into six separate pieces and unsolder each piece from the diode it is attached to.

7. If a new diode plate or printed-circuit board is being installed, position the diode plate so that the diode leads go through the three holes in the printed-circuit board. Install the terminal bolt and insulator. Maintain the ½ inch insulator spacing between the printed-circuit board and the diode plate. Install a small tinned washer and a solder ring on each diode lead and solder the diode leads to the printed-circuit board. Use a 100 watt iron. Avoid excess heat on the printed-circuit board so as not to loosen the printed-circuit wiring from the board.

8. Wrap the three stator winding leads around the printed-circuit board terminals and solder them. Use a 100 watt soldering iron and resin core solder. Slip the stator neutral lead split terminal lug under the head of the stator terminal screw.

STATOR TESTS

Stator Coil Test

The purpose of this test is to locate shorted coils and faulty neutral junction splices. Replace a stator having discolored or burned coils. Insulation enamel will flake off badly burned coils.

1. With the stator assembly disconnected from the diode and plate assembly, connect the tester as shown in Figure 10. The voltmeter test clips must be attached to the coil wire directly. A separate carbon pile rheostat in series with an ammeter, and a

Figure 10

12 volt battery comprises the basic circuit.

2. Adjust the carbon pile to produce 20 amperes of current flow and read the voltmeter. Refer to the specifications on page 8.

3. If the voltage is too high, check the splice and repair. Test the stator when the repairs are complete. If voltage is still too high, replace the stator. If the voltage is too low, a section of the coil is shorted and the stator must be replaced.

Ground Test

The stator must be disconnected from the diode and plate assemblies when this test is made or else the 120 volt power supply will burn out the diodes. Faulty or damaged insulation between the coil wires and the stator core can cause grounded stator coils.

Always use care to avoid electrical shock from bodily contact with the test probes during use. Remove the tester plug from the outlet when not in use.

1. Insert the plug into a 115 volt A.C. outlet. Use a 7 to 15 watt bulb.

2. Touch one test probe to a bare metal surface of the stator core and the other probe to a bare stator lead wire. The test lamp should not light.

3. If even the slightest glow appears in the test lamp, the stator asembly should be replaced.

INDEX TO SHOP TIPS ARTICLES
1963···1964

This handy four page index contains both an alphabetical listing and a listing by Car and Truck Line of all the articles contained in Shop Tips issues from the initial issue of October, 1963 to December, 1964.

This index may be removed from this issue for ready reference. Keep it in a convenient place for quick reference to all the back issues of Shop Tips.

If you haven't been saving all of the issues of Shop Tips, start now. Save this and all future issues to keep up to date on the very latest technical information from Ford.

ALPHABETICAL INDEX TO SHOP TIPS ARTICLES 1963-64

INDEX TO SHOP TIPS ARTICLES 1963-64 BY CAR AND TRUCK LINE

ROTOR TESTS

Nicks and scratches may be removed from the rotor slip-rings by turning down the slip-rings. Do not go beyond the minimum diameter limit of 1.22 inches. If the slip-rings are badly damaged, the entire rotor must be replaced as it is serviced as an assembly.

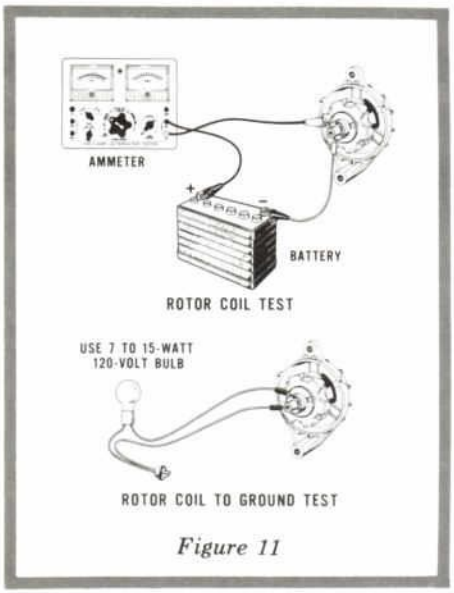

Figure 11

Rotor Coil Test

Insulation will flake off a badly burned rotor coil. Replace a rotor having a discolored or burned coil.

Do not attempt to measure coil resistance through the brushes of an assembled alternator. The brushes add resistance to the circuit causing erroneous readings.

1. Use either an ohmmeter or an ammeter to check rotor coil resistance. A fully charged 12-volt battery must be used. Ammeter readings could vary from the values given in the chart on page 8 if the battery voltage is not precisely 12 volts.

2. Inspect the soldered connection at the slip-ring terminals. Repair, if necessary, and check the coil.

3. Replace the rotor assembly if the coil fails the prescribed test.

Rotor Ground Test

Grounded rotor coils are caused by defective coil or lead wire insulation which allows wire contact to some metal part of the rotor. Damaged regulator voltage limiter contacts usually result from the increased field current flow.

A relatively high voltage is used in this test to detect slight leakage before actual failure occurs. Use care to avoid electrical shock from bodily contact with the test probes during use. Remove the plug from the outlet when the tester is not in use.

1. Insert plug into a 115-Volt A.C. outlet. Use a 7 to 15-watt bulb. See Figure 11.

2. Touch one test probe to a bare metal surface of the rotor shaft and the other to the slip-rings. The test lamp should not light.

3. Replace the rotor assembly if even the slightest glow is seen in the test lamp.

BRUSH RETAINER

1. Remove the two brush retainer mounting screws and remove the retainer brushes, brush springs, insulator and FLD terminal. See Figure 12.

2. If replacement of the rear bearing is necesary, replace the bearing before installing the brush retainer assembly.

3. Check the brushes for chipped edges, frayed or stiff pig-tail lead wires and proper retention in the brush holder arm. Check brush holder arms for freedom of movement and for spring tension. Examine spring for damage or distortion.

4. Place the brush springs, brushes, brush terminal and terminal insulator in the brush holder and hold the brushes in position by inserting a piece of stiff wire in the brush holder.

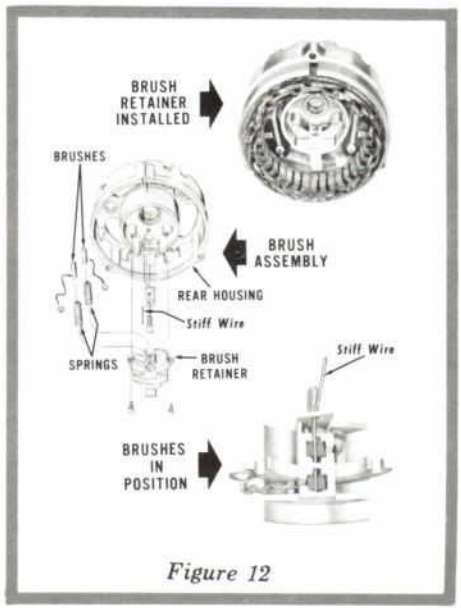

Figure 12

5. Position the brush holder assembly in the rear end housing. The stiff wire should go through the hole provided in the housing. Install the mounting screws. The inside brush lead terminal should be placed under the left mounting screw. Position the brush leads in the brush holder opening.

BEARING REPLACEMENT

The bearings can be damaged when removed; therefore, remove only the bearings you intend to replace. Bearings should be inspected for damaged seals, rough spots when turned, or excessive play.

Front Bearing Replacement

1. Remove the three screws that hold the front bearing retainer.

2. Support the front housing bearing inner boss with a 2-inch I.D. pipe and press inward on the bearing with 1-inch bar stock. See Figure 13.

3. Inspect the front housing for cracks, particularly near the threaded mounting ear, at the ribs which support the mounting boss, and at the struts which support the bearing pocket.

4. Press the front bearing on the outer race with a 1½-inch I.D. pipe and install the bearing retainer and screws.

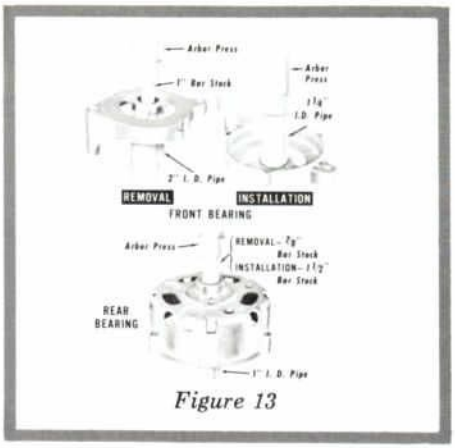

Figure 13

Rear Bearing Replacement

1. Press the rear bearing from the housing using ⅞-inch bar stock supporting the housing inner boss with 1-inch I.D. pipe.

2. Inspect the rear bearings for contamination of the grease by abrasive substances. Do not add grease to the bearings; replace the bearing when grease is lost or contaminated. Examine the rear bearing surface of the rotor shaft for roughness.

3. Support the housing on the inner boss with 1-inch I.D. pipe and press the bearing into the housing with 1½-inch bar stock until the bearing is flush with the outer end surface.

OVERHAUL—continued

ASSEMBLY

1. If the stop-ring on the rotor drive shaft was damaged, install a new stop-ring. Push the new ring on the shaft and into the groove. Do not open the ring with snap ring pliers as permanent damage will result.

2. Position the front end bearing spacer on the drive shaft with the recessed side against the stop-ring.

3. Position the drive end housing, fan spacer, fan, pulley and lock washer on the rotor drive shaft and install the retaining nut to 60-80 ft-lbs torque.

4. Install the STA and BAT terminal insulators. Position that stator and diode plate assembly in the rear end housing. Position the STA (black), BAT (red), and FLD (white) insulators, on the terminal bolts, and install five retaining nuts.

5. Wipe the rear end bearing surface of the rotor shaft with a clean lint-free rag.

6. Position the rear end housing and stator assembly over the rotor and align the scribe marks made during disassembly. Seat the machined portion of the stator core into the step in both end housings. Install the housing through bolts. Remove the brush retracting rod, and put a daub of waterproof cement over the hole to seal it.

SERVICING PRECAUTIONS

Several servicing procedures can cause diode damage or complete failure if carried out improperly.

1. Observe polarity when installing a battery in the vehicle. Reversed battery cable connections or installation of a battery which has been charged backwards will burn out diodes. Use a voltmeter to determine battery terminal post polarity before connecting the cables. The ground cable must be connected to the negative battery terminal post.

2. Observe polarity when a booster battery is used to start the engine. Connect negative to negative and positive to positive.

3. Disconnect the ground cable at the battery before connecting a charger to the battery.

4. Never operate the alternator on open circuit with the rotor (field) coil energized. Very high voltage will be developed which can burn the rotor coil or possibly damage the diodes.

5. Do not use a 115-volt test lamp to check diodes. The diodes are not rated to withstand such high voltage.

ALTERNATOR SPECIFICATIONS

Type	Ford Part Number	Rating		Field Current Amps. @ 12 V.	Cut-in Speed (Engine r.p.m.)	Rated Output Speed (Engine r.p.m.)	Slip-Ring Turning (Inches)		Brush Length (Inches)		Pulley Nut Torque (ft.-lbs.)	Belt Tension (lbs.)	
		Amperes @ 15 V.	Watts @ 15 V.				Min. Dia.	Max. Runout	New	Wear Limit		6 Cyl.	8 Cyl. *
Autolite	C5TZ-10346-A (C5AF-10300-A, B, C, D, E)	45	675	2.8-3.3	400	2200 Cold 2900 Hot	1.22	.0005	½	5/16	60-80	60-90	80-110
Autolite	C5TZ-10346-B (C5AF-10300-F, G; C5TF-10300-E, F)	55	825	2.8-3.3	400	2200 Cold 2900 Hot	1.22	.0005	½	5/16	60-80	60-90	80-110
Leece-Neville	C5AZ-10346-B C5AZ-10346-C (C5AF-10300-H; 90302, 6242-AA)	53	795	2.8-3.3	400	1700 Cold 2100 Hot	Light Cut	.002	5/8	3/8	30-50	60-90	80-110
Leece-Neville	C5TZ-10346-D (C5TF-10300-L; 90304, 7024-AA)	60	840	2.8-3.3	400	1600 Cold 2000 Hot	Light Cut	.002	½	9/32	30-50	60-90	80-110

*Used Belt. New Belt 110-140. A used belt is one that has been in operation more than 10 minutes. Ford Alternator Pulley nut Torque 60-80 foot pounds.

REGULATOR

Type	Ford Part Number	Current Rating	Lower Stage Voltage Regulation @ 75° F.	VOLTAGE LIMITER		FIELD RELAY		
				Contact Gap (Inches)	Core Air Gap (Inches)	Contact Gap (Inches)	Core Air Gap (Inches)	Closing Volts
Autolite	C3SZ-10316-B (C5AF-10316-A; C4TF-10316-B, D; C4UF-10316-A, B; C5TF-10316-A)	Used With Ford Alternators	14.1-14.9	0.017-0.022	0.049-0.056	—	0.012-0.022	2.5-4
Leece-Neville Indicator Light Circuit	C5AZ-10316-B (C5AF-10316-B; 3727-RA)	Used With 53 Amp. Leece-Neville Alternator	14.1-14.9	0.018-0.020 With Lower Contacts Closed	0.042-0.052 With Lower Contacts Closed	0.018-0.020	0.009-0.011 With Contacts Touching	1.6-2.6
Leece-Neville Ammeter Circuit	C5TZ-10316-B (C5TF-10316-B; 3737-RA)	Used With 53-60 Amp. Leece-Neville Alternator	14.1-14.9	0.018-0.020 With Lower Contacts Closed	0.042-0.052 With Lower Contacts Closed	0.024-0.026	0.011-0.013 With Contacts Touching	6.2-7.2

1965 FORD HEADLIGHT ALIGNMENT

All headlight adjustments should be made with a half-full tank of gasoline plus or minus one gallon, with a person seated in the driver's seat, and a person seated in the right front passenger seat, the car unloaded and the trunk empty except for the spare tire and jacking equipment, and recommended pressure in all tires. Before each adjustment, bounce the car by pushing on the center of both the front and rear bumpers, to level the car.

To align the No. 1 headlights by means of a wall screen, select a level portion of the shop floor. Lay out the floor and wall as shown in Figure 14.

Establish the headlight horizontal centerline by subtracting 20 inches from the actual measured height of the headlight lens center from the floor and adding this dimension (dimension B upper diagram Figure 15) to the 20-inch reference line obtained by sighting over the uprights. Draw a horizontal line 2 inches below, and parallel to the headlight horizontal centerline. Then draw the headlight vertical centerlines on the screen as measured on the car (dimension A, upper diagram Figure 15).

NO. 1 HEADLIGHT ADJUSTMENT (LOWER LIGHTS)

Adjust each No. 1 headlight beam as shown in Figure 15. Cover the No. 2 lights when making this adjustment.

Some states may not approve of the 2-inch dimension for the No. 1 headlights. Check the applicable state law, as a 3-inch dimension may be required.

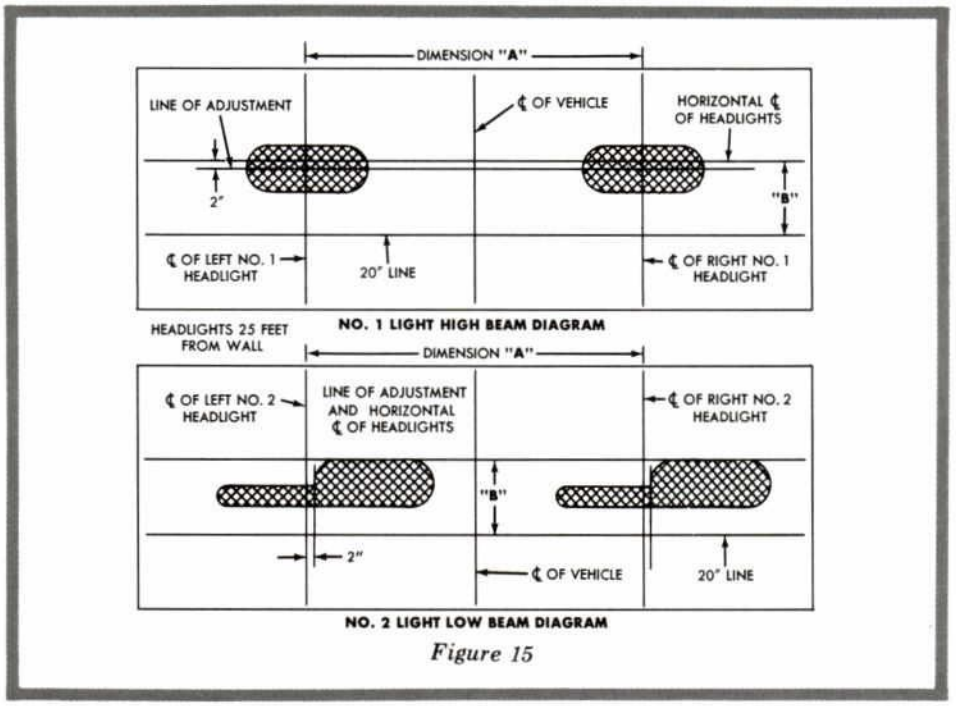

Figure 15

NO. 2 HEADLIGHT ADJUSTMENT (UPPER LIGHTS)

To align the Ford No. 2 headlights (upper lights), a wall chart similar to lower diagram Figure 15 is used. Dimension B for the No. 2 lights will be different than B for the No. 1 lights, but dimension A which is measured on the car will be the same as for the No. 1 lights. Note that the line of adjustment of the No. 2 lights is the horizontal centerline of the No. 2 lights. Turn the headlights to low beam and adjust each No. 2 light as shown in Figure 15.

Each headlight can be adjusted by means of two screws located under the headlight trim ring (Figure 16).

Always bring each beam into final position by turning the adjusting screws clockwise so that the headlights will be held against the tension springs when the operation is completed.

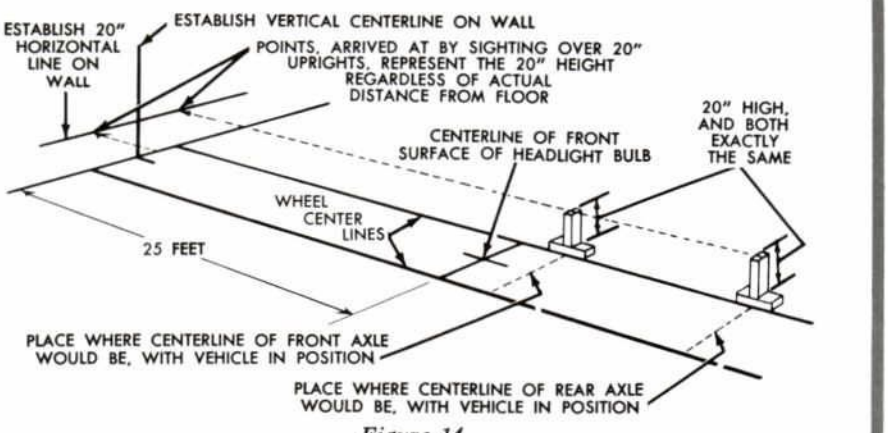

Figure 14

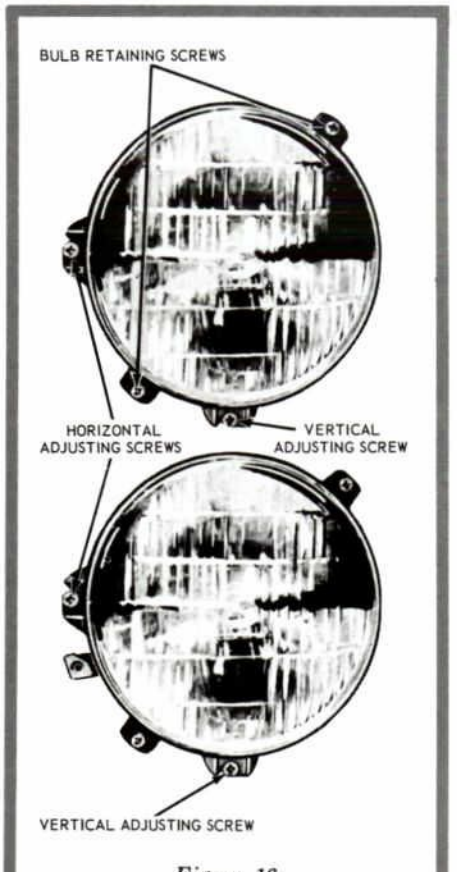

Figure 16

AE-60 ACRYLIC ENAMELS FOR PAINT REPAIRS

In spite of the fact that Ford automobiles have on them the toughest, most durable finish ever designed, it is often necessary to repair the original factory finish due to collision or parking lot wear and tear and for a number of other reasons other than normal wear.

Ford has available a new advancement for repairing the original factory finish. The product is a new and revolutionary acrylic enamel which is marketed under the name AE-60. This product is not only designed to produce a fine color match but also to match the depth, gloss and texture of the original finish. It is the first of its kind to be offered for refinishing. AE-60 is a relatively simple, trouble-free product to apply if procedures outlined in this article are followed.

1. Wash entire surface to be repaired and refinished with FoMoCo Silicone Wax and Grease Remover (DL-60-3721A). This will remove any road film, tar or foreign matter from the surface before sanding and keep this type of contamination from being sanded into the area that is about to be refinished.

2. Feather-edge and spot-prime the necessary areas with FoMoCo Lacquer Primer Surfacer M6J-12D (Gray) or M6J-13D (Red). Sand primed spots with #280 or #320 grit sandpaper, wet or dry.

3. Sand entire surface to be painted, both factory color and surfaced spots, with no coarser paper than #360, perferably #400.

4. Apply a full wet coat of new improved Non-Sanding Sealer DL-60-13A just as it comes from the can. This product is packaged at spray consistency. Allow the Sealer to dry 30 minutes before applying the color. This product can be nib-sanded lightly to remove any dust or dirt specks.

5. Reduce the AE-60 color enamel 50% to 75% with AE-60-647A Reducer. Apply the first coat in a full wet procedure. Allow this coat to tack up for 15 minutes. Apply a second wet coat in the same manner as the first. In some instances, especially in the case of metallics, it may be desirable to apply a third coat. There is no harm in doing so but we find that two coats in the majority of cases is sufficient. The AE-60 color coat will be dry and ready to deliver in 1 hour under normal conditions.

If the above outlined procedure is followed, the result will be an outstanding job every time. The repaired area or refinished section or over-all paint job will be as close as possible to matching Ford's fine lustrous original factory finish.

Here are a few recommended precautions to take and a quick recap of procedures.

1. Wash first and then sand surface so as to obtain as clean a spraying surface as possible.

2. Do not use any coarser paper than #360 for color sanding.

3. Be sure to seal with new, improved Non-Sanding Sealer (DL-60-13A) before applying color and allow ½ hour for flash-off.

4. If it is necessary to apply a fog coat, as it is sometimes in the application of high metallics, DO NOT exceed four parts reducer to one part paint. Also, the use of a small amount of lacquer type retarder is recommended in this fog coat.

1965 FORD TRUCK FRONT WHEEL ALIGNMENT SPECIFICATIONS

The following specifications are to be used when checking or resetting the front wheel alignment of 1965 Model Ford Trucks. The Checking Specifications give the allowable minimum limits that should be used to determine if the wheel alignment is satisfactory.

When the wheel alignment is not within the checking specifications the alignment should be re-set to the optimum specifications.

All the checking and re-setting specifications are given for F-100 and F-250 model trucks with the frame at nominal ride height. To obtain nominal ride height place a 3½ inch wood spacer block between each frame side rail and its respective front axle I-beam (Figure 17).

If the frame side rail does not contact the upper end of the spacer block, add enough weight to the front end (bumper) to make the side rail rest on the block (Figure 17).

The checking and re-setting specifications are given for all trucks with the frame level.

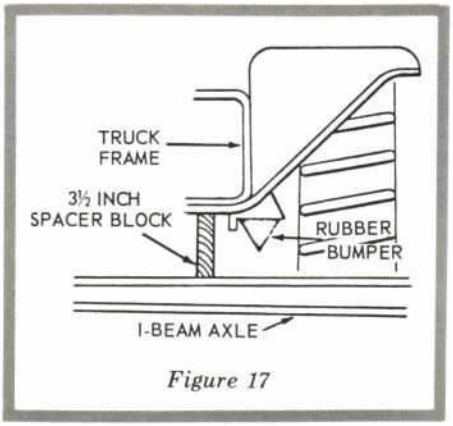

Figure 17

Truck Model	Front Axle Capacity	Alignment Factors	Checking Specifications			Optimum Resetting Specifications Desired Alignment
			Minimum	Maximum	Maximum Variation Between Wheels	
F-100	2600	Caster	+4⅜°	+5⅜°	¾°	+5°
		Camber	+¼°	+1°	⅜°	+⅜°
		Toe-In	1/16"	3/16"		1/8"
F-250	3000	King Pin Angle				4°
F-100, F-250 (4 Wheel Drive)	3000 3500	Caster	+3½°	+4½°	½°	+4°
		Camber	+1°	+2°	¼°	+1½°
		Toe-In	1/16"	¼"		3/16"
		King Pin Angle				7½°
F-350	All	Caster	+3½°	+4½°	½°	+4°
		Camber	+⅛°	+⅝°	¼°	+¼°
		Toe-In	1/16"	3/16"		1/8"
		King Pin Angle				4°
P-100	2600	Caster	+3°	+4°	½°	+3½°
		Camber	+⅛°	+⅜°	¼°	+⅜°
		Toe-In	1/16"	3/16"		1/8"
		King Pin Angle				4°
P-350 P-3500	All	Caster	+3¾°	+5¼°	½°	+4½°
		Camber	+⅜°	+⅞°	¼°	+⅜°
		Toe-In	1/16"	3/16"		1/8"
		King Pin Angle				4°
P-400 P-500 P-4000 P-5000	All	Caster	+2¾°	+4¼°	½°	+3½°
		Camber	0°	+1°	¼°	+½°
		Toe-In	1/16"	3/16"		1/8"
		King Pin Angle				4°
F-B-500-600	5000	Caster-Manual	+3°	+4°	½°	+3½°
		Caster-Power	+6½°	+7½°	½°	+7°
F-B-600	5500	Camber	+½°	+1½°	¼°	+1°
		Toe-In	1/16"	3/16"		1/8"
		King Pin Angle				4°
F-700, N-500-600-700, N-6000-7000	5000	Caster-Manual	+3°	+4°	½°	+3½°
		Caster-Power	+6°	+7°	½°	+6½°
F-B-700-750 N-600-700-750-6000-7000	5500	Camber	+½°	+1½°	¼°	+1°
		Toe-In	1/16"	3/16"		1/8"
		King Pin Angle				4°
C-550-600-6000 C-600-700-750-6000-7000, F-800, F-N-850-950, F-N-950-D, T-700-750	6000 7000	Caster	+2½°	+3½°	½°	+3°
		Camber	+½°	+1½°	¼°	+1°
C-800 Thru 1100, CT-750 Thru 950, N-750	9000	Toe-In	1/16"	3/16"		1/8"
C-800 Thru 1100, CT-750 Thru 950	12000	King Pin Angle				5½°
F-B-600-700-750, N-600-700-750-6000-7000	6000	Caster-Manual	+3½°	+4½°	½°	+4°
		Caster-Power	+6½°	+7½°	½°	+7°
F-B-700-750, N-700-750-7000	7000	Camber	+½°	+1½°	¼°	+1°
		Toe-In	1/16"	3/16"		1/8"
		King Pin Angle				5½°
F-800, T-700	6000	Caster	+2¾°	+3¾°	½°	+3¼°
F-850 Thru 1100, N-850 Thru 1100, T-750-800-950, NT-850-950, NT-850-D, NT-950-D, T-850-D, T-950-D, F-N-950-D, H-1000, H-1000-D, F-N-1000-D, F-N-1100-D	9000	Camber	+½°	+1½°	¼°	+1°
F-800 Thru 1100, N-850 Thru 1100, F-N-950-D Thru 1100-D, T-750 Thru 950, NT-850-950, T-NT-850-D-950-D, H-1000, H-1000-D, HT-950-D, HT-950	12000	Toe-In	1/16"	3/16"		1/8"
		King Pin Angle				5½°
F-C-800-850, F-C-950-1100, F-950-D, F-1100-D, T-750 Thru 950, N-850-950-1100, N-950-D, N-1100-D, NT-850-950, HT-950, T-NT-HT-950-D, CT-750-850-950, H-1000-D, H-1100-D	11000	Caster	−1½°	−½°	½°	−1°
		Camber	+½°	+1½°	¼°	+1°
		Toe-In	1/16"	3/16"		1/8"
		King Pin Angle				0°
F-H-N-1000, F-H-N-1000-D, F-N-1100, F-N-1100-D, T-800-950, NT-850-950, T-NT-HT-850-D—950-D	15000	Caster	+2¾°	+3¾°	½°	+3¼°
		Camber	+½°	+1½°	¼°	+1°
		Toe-In	1/16"	3/16"		1/8"
		King Pin Angle				8°
C-950 Thru 1100 CT-800 Thru 950	15000	Caster	+2½°	+3½°	½°	+3°
		Camber	+½°	+1½°	¼°	+1°
		Toe-In	1/16"	3/16"		1/8"
		King Pin Angle				8°
T-850-950 T-850-D, T-950-D	18000	Caster	+2¾°	+3¾°	½°	+3¼°
		Camber	+½°	+1½°	¼°	+1°
		Toe-In	1/16"	3/16"		1/8"
		King Pin Angle				5°

INTERIOR BULBS REMOVAL AND INSTALLATION—1965 FORD EQUIPPED WITH SELECTAIRE AIR CONDITIONING

Removal

1. Disconnect the battery ground cable.
2. Cover the seat.
3. Cover steering column.
4. Remove the retaining screws and remove the lower instrument panel cluster cover if equipped with movable steering column.
5. Remove the retaining screws and remove the instrument panel cluster pad and retainer. See Figure 18.
6. Remove the retaining screws and remove the cluster assembly from the instrument panel. Position the cluster on the steering column.
7. Remove the bulb(s).

Installation

1. Install the bulb(s).
2. Install the cluster assembly on the instrument panel and install the retaining screws.
3. Install the instrument cluster pad and retainer, and install the retaining screws.
4. Position the lower instrument panel cluster cover and install the retaining screws if equipped with movable steering column.
5. Remove the cover from the steering column and seat.
6. Connect the battery ground cable.

EQUA-LOCK SERVICE IDENTIFICATION TAG

(1965 Ford, Mercury, Thunderbird, Falcon, Comet, Fairlane, Mustang and Econoline)

The decimal point, in the ratio designation on the second line of the tag, is replaced by the letter "L" to indicate a locking differential. For example, a 3.00 axle with a locker would read 3L00. See Figure 19.

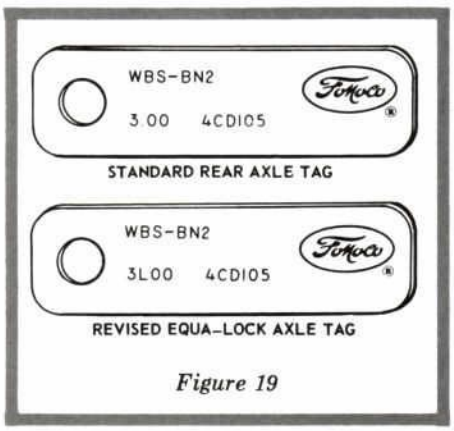

Figure 19

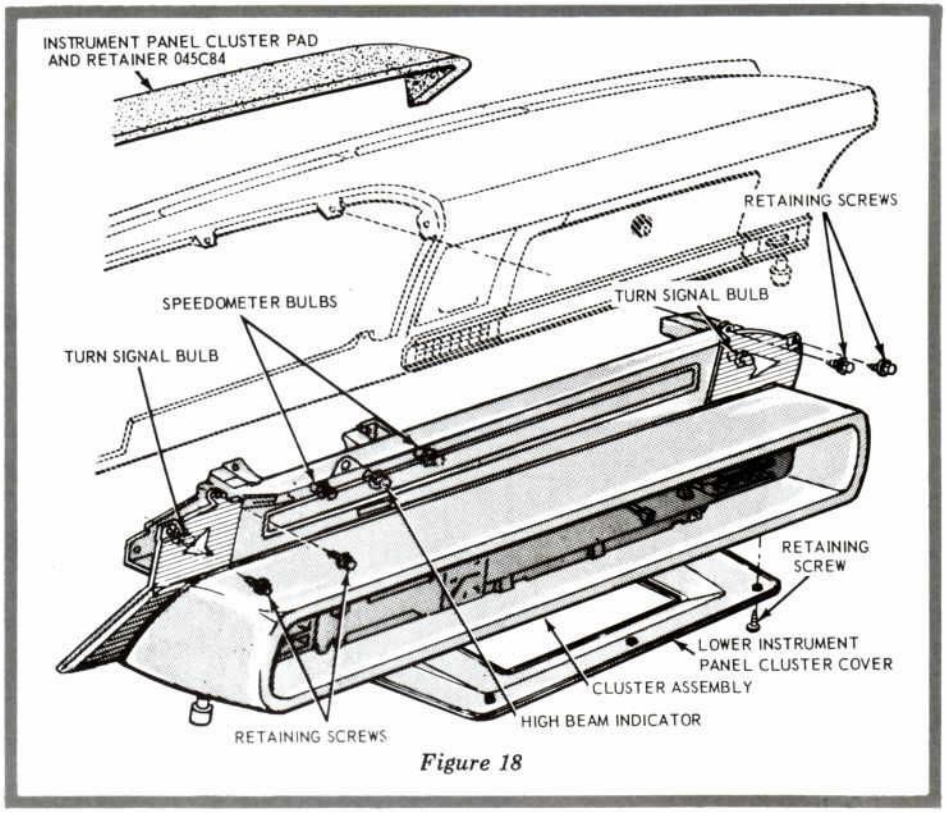

Figure 18

FAIRLANE HEADLIGHT REMOVAL AND INSTALLATION

The sealed beam headlight assemblies have been changed on 1965 Fairlanes. The retaining ring is now held in place by a retaining hook and an unhook spring instead of the three retaining screws used formerly.

Removal and installation procedures for the sealed beam bulbs have been revised for 1965 as indicated below:

1. Remove the retaining screws and remove the headlight trim ring.
2. Release the unhook spring from the retaining ring and remove the retaining ring as shown in Figure 20 Headlight Assembly.
3. The headlight bulb may now be pulled forward far enough to disconnect the wiring assembly plug.
4. Plug in the new bulb and place it in position, making sure that the locating tabs are placed in the positioning slots.
5. Install the headlight bulb retaining ring and attach the unhook spring.
6. Align the bulb with the wall screen.
7. Place the trim ring in position and install the retaining screws.

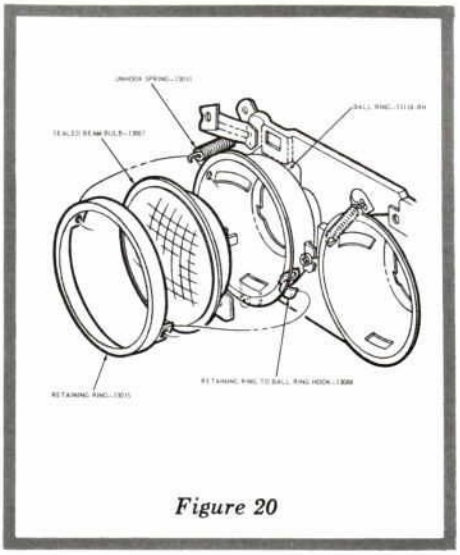

Figure 20

FLOOR SAFETY STAND PLACEMENT—1965 FORD

When using floor safety stands under the rear of the car, they should be placed as follows: one under each rear frame side member near the bumper support arms. *Do not place the safety stands under the number 5 (rear) crossmember as this may cause distortion of the number 5 crossmember.*