GROUP 13

PART 13-1 GENERAL CHARGING SYSTEM SERVICE

1 DIAGNOSIS AND TESTING

TROUBLE DIAGNOSIS GUIDE

BATTERY LOW IN CHARGE

Indications of a battery low in charge are slow cranking, hard starting, and headlights dim at engine idle speed. Causes are:

1. The alternator belt worn, or loose and slipping over the pulley.
2. The battery in such poor condition that it will not hold or take a charge.
3. The alternator not producing its rated output.
4. Regulator unit out of adjustment, and excessive resistance in the alternator-to-battery circuit or in the battery-to-ground circuit.

First check the alternator belt adjustment and condition.

RECHARGE OR REPLACE BATTERY

Perform a battery Capacity Test (in this part). Replace the battery if the test indicates it is worn out or under capacity. If the battery capacity is normal, proceed as follows:

TEST ALTERNATOR OUTPUT

Test the alternator output(in this part) to determine if the alternator is at fault. If the output is normal or greater than the rating of the alternator, proceed with an alternator regulator test under the heading Test Alternator Regulator. If the output is low, proceed as follows:

ALTERNATOR OUTPUT LOW

Connect a heavy jumper wire from the battery ground post to the alternator ground terminal. Repeat the alternator output test. If the output now reaches or exceeds rated output, either the alternator or the battery is not properly grounded to the engine frame. Replace the battery-to-ground cable if it is corroded or partially broken. Clean the cable connections at the battery and engine, and tighten the connections. Tighten the alternator mounting bolts.

If the alternator output is still less than normal, the alternator output could be low due to an open or short circuit in the field, stator, brushes or brush holders, or the brushes can be worn too short or may be sticking in the brush holder and not making good contact in the slip rings. Remove the alternator for repair.

TEST CIRCUIT RESISTANCE

If the alternator output is normal, check the external circuit to deter-

CONTINUED ON NEXT PAGE

TROUBLE DIAGNOSIS GUIDE (Continued)

BATTERY LOW IN CHARGE (Continued)	mine the circuit resistance (in this part). **RESISTANCE EXCESSIVE** If the resistance (voltage drop) is greater than that specified for the vehicle, locate the trouble by performing a complete external circuit resistance test (in this part). Repair or replace the defective part. **RESISTANCE NORMAL** If the resistance (voltage drop) is equal to or less than that specified for the vehicle, test the alternator regulator.	**TEST ALTERNATOR REGULATOR** If the circuit resistance is normal, test the regulator to determine if it is properly adjusted. After checking both regulator units, adjust or replace the regulator as necessary. If the regulator is not at fault, the low charge is due to operational factors such as: 1. Excessive use of accessories. 2. Short trips. 3. Accidental discharge of battery. 4. Incorrect engine lubricant for ambient temperature encountered. 5. Regulator calibration set too close to low limit for vehicle operating conditions.
HIGH CHARGING RATE	Indications of a high charging rate are: 1. Lights and fuses burn out repeatedly. 2. Battery requires too frequent refilling. 3. The ignition contacts have a short life. To determine the possible cause of the high charging rate, check the following items.	1. Make certain that all connections, including the regulator ground, are tight. 2. Check the voltage limiter. If the voltage limit is high, check the contacts and replace the regulator if the contacts are burned. 3. If the contacts are in good condition, adjust the regulator to the specified limits (Part 13-3).

ALTERNATOR TESTS

Refer to Wiring Diagram Manual Form 7795P-65 for schematics and locations of wiring harnesses.

Use care when connecting any test equipment to the alternator system as the alternator output terminal is connected to the battery at all times.

ALTERNATOR OUTPUT TEST

When an alternator output test is conducted off the car, a test bench must be used. Follow the procedure given by the test bench equipment manufacturer. **When the alternator is removed from the car for this purpose, always disconnect a battery cable, as the alternator battery terminal is connected to the battery at all times.**

To test the output of the alternator on the car, proceed as follows:

1. Place the transmission in neutral or park and apply the parking brake. Make the connections as shown in Fig. 1. Be sure that the field resistance control is at the OFF position at the start of this test.
2. Close the battery adapter switch. Start the engine, then open the battery adapter switch.
3. Increase the engine speed to approximately 2750 rpm.
4. Adjust the field resistance control until the voltmeter reads exactly 15 volts. Observe the ammeter reading. Add 2 amperes to this reading when the car is equipped with standard ignition or 6 amperes with the transistor ignition system, to obtain total alternator output.

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:

5. Turn the field resistance control knob to the OFF position. Rotate the master control knob to the CURRENT REG. position. Maintain the engine speed at 2750 rpm.
6. Turn the field resistance control and the master control clockwise, maintaining a voltmeter reading of 15 volts maximum, until the field resistance control is at its maximum clockwise position.
7. Readjust the master control until the voltmeter reads exactly 15 volts. Observe the ammeter reading. Add 2 amperes to this reading when the car is equipped with standard ignition or 6 amperes with the transistor ignition system, to obtain total alternator output.
8. Stop the engine, return the field resistance control to the OFF position and disconnect the test equipment.

An output of 2 to 5 amperes below specifications usually indicates an open diode rectifier. An output of approximately 10 amperes below specifications usually indicates a shorted diode rectifier. An alternator with a shorted diode will usually whine, which will be most noticeable at idle speed.

DIODE TEST

To test the positive diodes, make the connections shown in Fig. 3. Contact the probe to each stator lead terminal. Make sure that the tip of the probe is sharp and that it penetrates the varnish at the stator terminals.

To test the negative diodes, make the connections shown in Fig. 4. Follow the same procedure as for the positive diodes.

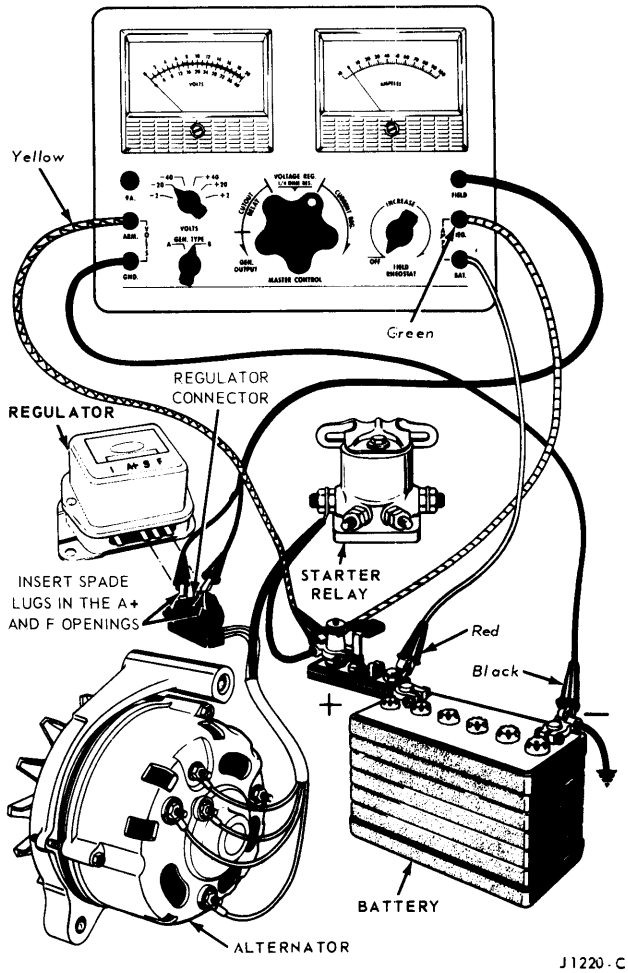

FIG. 1—Alternator Output Test

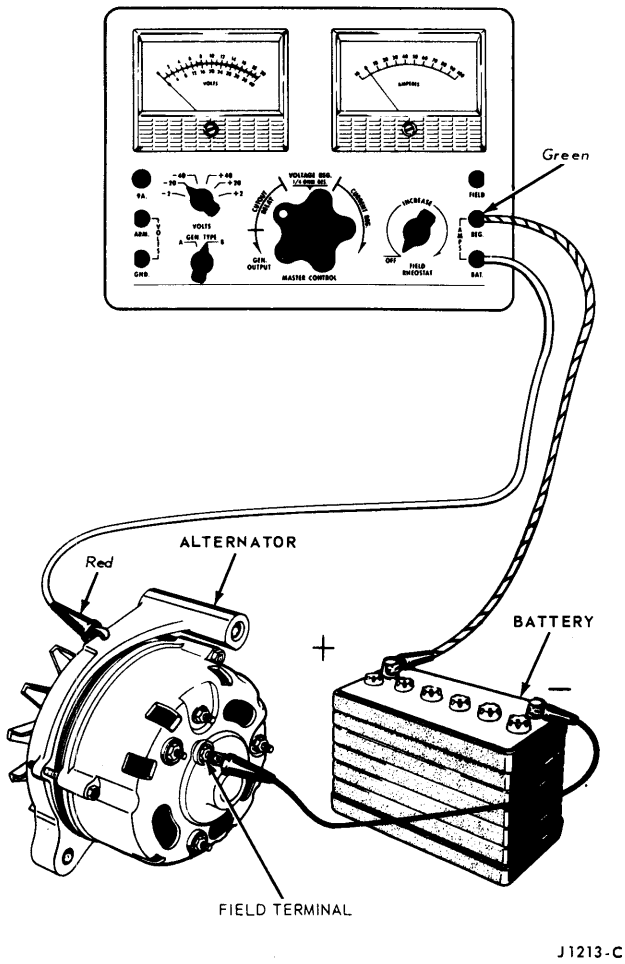

FIG. 2—Field Open or Short Circuit Test

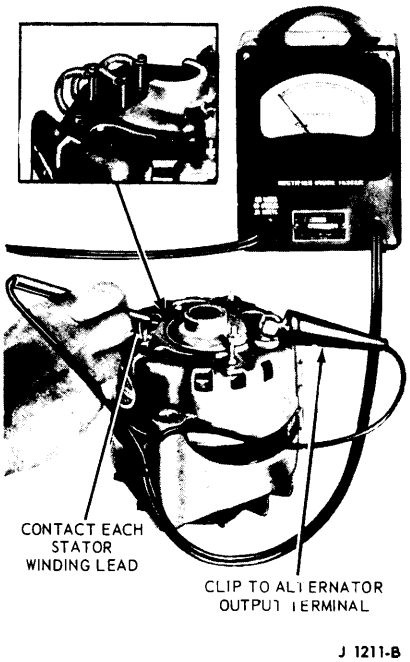

FIG. 3—Positive Diode Test

Good diodes will be indicated as on the meter in Figs. 3 and 4 (2 amperes or more and readings alike within 2 scale divisions).

FIELD OPEN OR SHORT CIRCUIT TEST

Make the connections as shown in Fig. 2. The current draw, as indicated by the ammeter, should be to specifications. If there is little or no current flow, the field or brushes have a high resistance or are open. A current flow considerably higher than that specified above, indicates shorted or grounded turns or brush leads touching. If the test shows that the field is shorted or open and the field brush assembly or slip rings are not at fault, the entire rotor must be replaced.

REGULATOR AND CIRCUIT TESTS

The tests presented are outlined for on-the-car operation. Be sure that the regulator is at normal operating

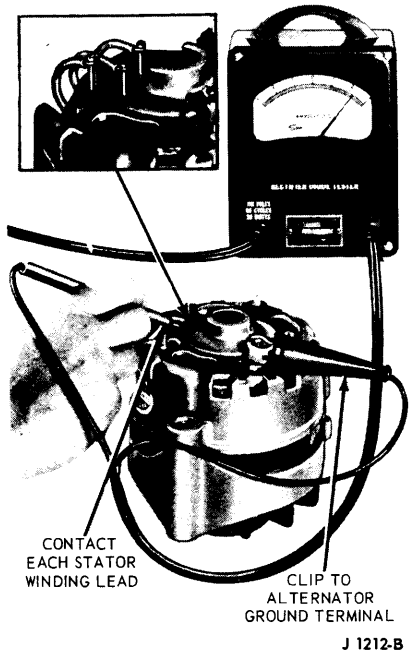

FIG. 4—Negative Diode Test

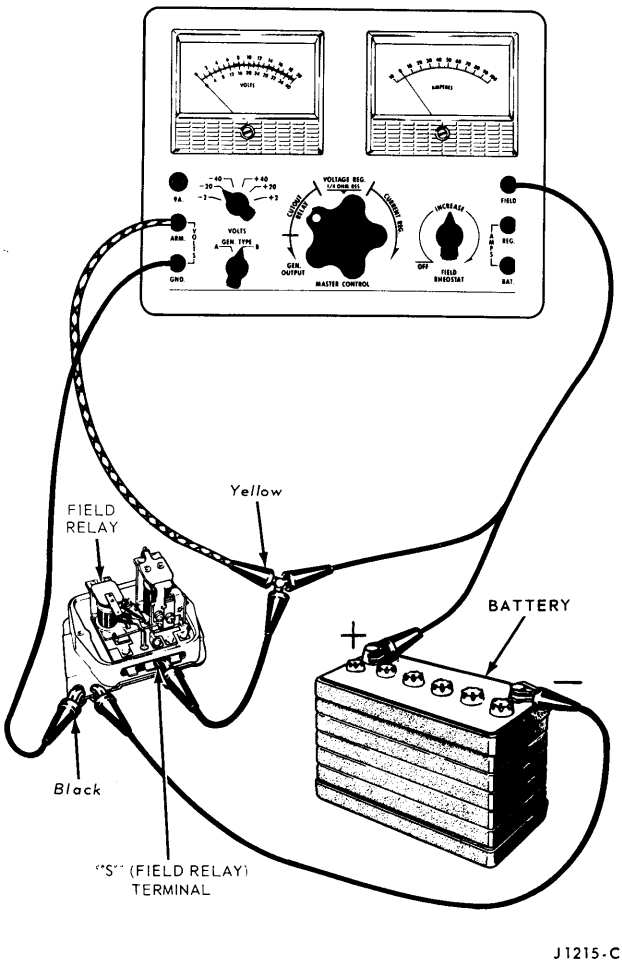

FIG. 5–Field Relay Test

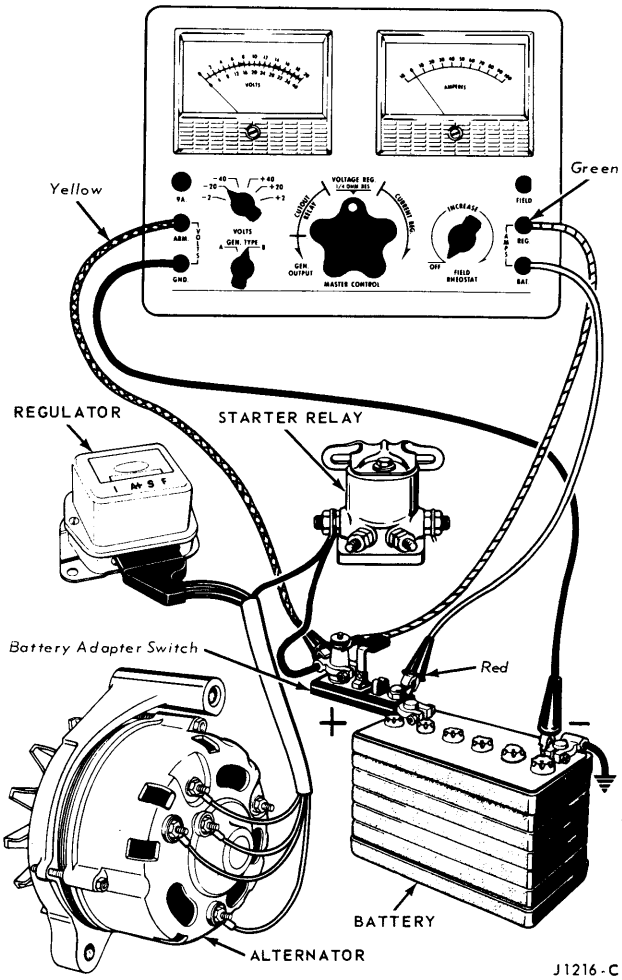

FIG. 6–Voltage Limiter Test

temperature (equivalent to the temperature after 20 minutes of operation on the car with the hood down).

FIELD RELAY TEST

Disconnect the regulator connector plug, and remove the regulator cover. Make the connections as shown in Fig. 5. Slowly rotate the field resistance control clockwise from the OFF position until the field relay contacts close. Observe the voltmeter reading at the moment that the relay closes. This is the relay closing voltage. If the relay closes immediately, even with the field resistance close to the OFF position, use a 6-volt battery for this test. If the closing voltage is not to specifications, adjust the relay (Part 13-3).

VOLTAGE LIMITER TEST

For test purposes, the lower stage (armature vibrating on the lower contact) regulation is used. Voltage limiter calibration tests must be made with the regulator cover in place and the regulator at normal operating temperature (equivalent to the temperature after 20 minutes of operation on the car with the hood down).

Make the test connections as shown in Fig. 6. Turn all accessories off, including door operated dome lights. Close the battery adapter switch, start the engine, then open the adapter switch. Attach the voltage regulator thermometer Tool T56L-10505-A, to the regulator cover. Operate the engine at approximately 1850 rpm for 5 minutes. Turn the master control to the cutout relay position. If the ammeter indicates more than 10 amperes, stop the engine, remove the battery cables and charge the battery.

When the battery is charged, and the voltage regulator has been temperature stabilized, rotate the master control to the VOLTAGE REG. position. The ammeter should indicate approximately 2 amperes.

TABLE 1–Voltage Limiter Setting Versus Ambient Air Temperature

Ambient Air Temperature °F	Voltage Limiter Setting (Volts)
50	14.3-15.1
75	14.1-14.9
100	13.9-14.7
125	13.8-14.6
150	13.6-14.4
175	13.5-14.3

Cycle the regulator as follows: stop the engine, close the adapter switch, start the engine, and open the adapter switch. Allow the battery to normalize for a short time, then read the voltmeter. Read the thermometer, and compare the voltmeter reading with the voltage given in Table 1 for the ambient temperature indicated on the thermometer. If the

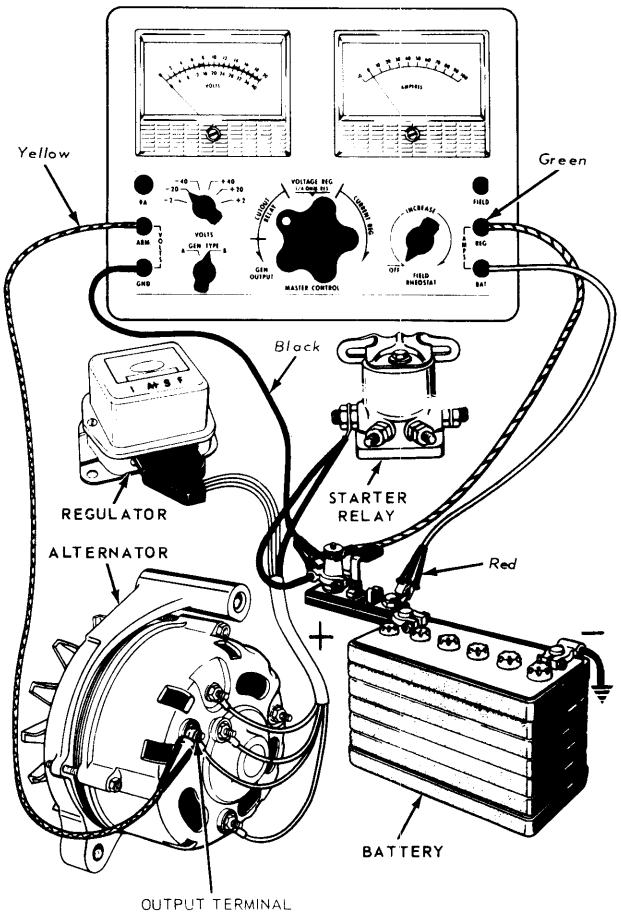

FIG. 7—Voltage Drop Test—Alternator to Battery Positive Terminal

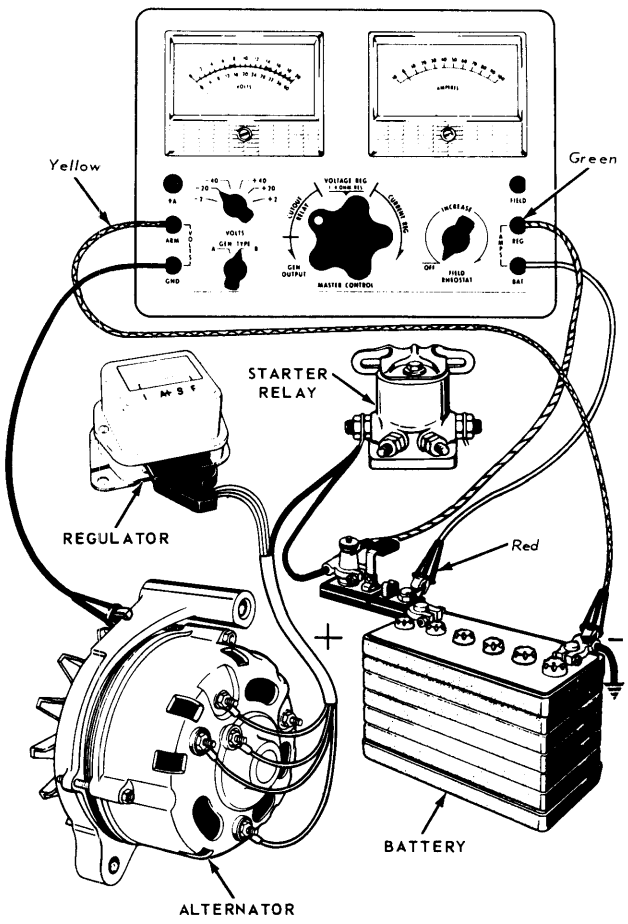

FIG. 8—Voltage Drop Test—Alternator to Battery Ground Terminal

regulated voltage is not within specifications, make a voltage limiter adjustment. After each adjustment, be sure to cycle the regulator before each reading. **The readings must be made with the cover in place.**

CIRCUIT RESISTANCE TESTS

For the purpose of this test, the resistance values of the circuits have been converted to voltage drop readings for a current flow of 20 amperes.

Alternator to Battery Positive Terminal. To check the alternator to battery positive terminal voltage drop, make the connections as shown in Fig. 7. Turn off all electrical accessories and lights. Close the battery adapter switch, start the engine, then open the battery adapter switch. Slowly increase the engine speed until the ammeter reads 20 amperes. Note the voltmeter reading at this point. The voltage reading should be no greater than 0.3 volt.

These voltage drops have been computed for a standard car. The current used by auxiliary, continuously operating, heavy-duty equipment will not show on the ammeter and will have to be taken into account when making this test.

If the battery is fully charged, it may not be possible to reach the 20 amperes required for the test. Connect a battery discharge tester to the battery terminals and adjust the load on the battery until the required 20 amperes is indicated.

Alternator to Battery Ground Terminal. To check the alternator to battery ground terminal voltage drop, make the connections as shown in Fig. 8. Close the battery adapter switch, start the engine and open the adapter switch. Slowly increase the engine speed until the ammeter reads 20 amperes. The voltage indicated on the voltmeter should be less than 0.1 volt. If necessary, use a battery discharge tester, as in the preceding test to obtain the required 20-ampere reading.

BATTERY TESTS AND CONCLUSIONS

Tests are made on a battery to determine the state of charge and also the condition. The ultimate result of these tests is to show that the battery is good, needs recharging, or must be replaced.

If a battery has failed, is low in charge, or requires water frequently, good service demands that the reason for this condition be found. It may be necessary to follow trouble shooting procedures to locate the cause of the trouble (Section 1 in this part).

Hydrogen and oxygen gases are produced in the course of normal battery operation. This gas mixture can explode if flames or sparks

are brought near the vent openings of the battery. The sulphuric acid in the battery electrolyte can cause a serious burn if spilled on the skin or spattered in the eyes. It should be flushed away immediately with large quantities of clear water.

Before attempting to test a battery, it is important that it be given a thorough visual examination to determine if it has been damaged. The presence of moisture on the outside of the case and/or low electrolyte level in one or more of the cells are indications of possible battery damage.

The Ford and Mercury batteries incorporate a single one-piece cover which completely seals the top of the battery and the individual cell connectors. This cover must not be pierced with test probes to perform individual cell tests.

A battery can be tested by determining its ability to deliver current. This may be determined by conducting a Battery Capacity Test. Fig. 9 shows the battery capacity test in outline form.

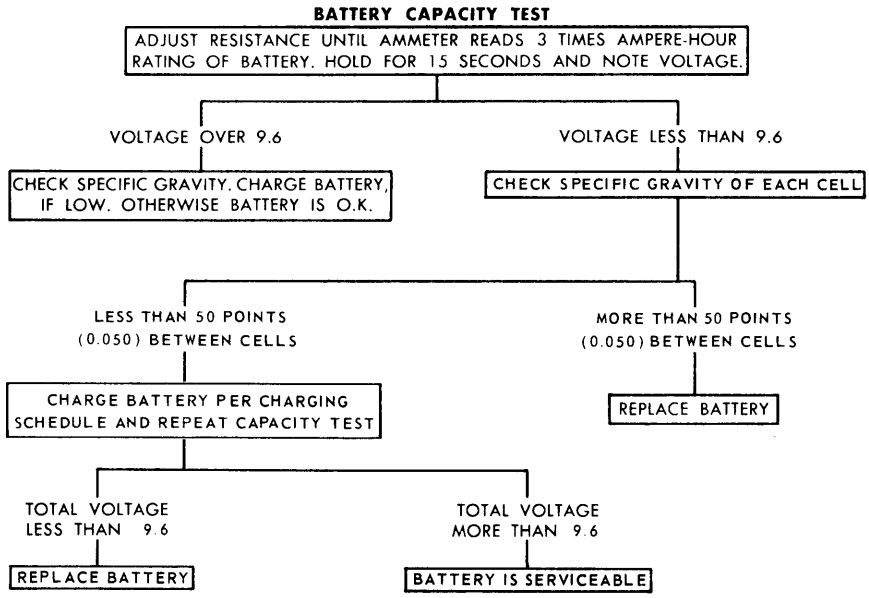

FIG. 9—Battery Capacity Test Outline J1039-D

BATTERY CAPACITY TEST

A high rate discharge tester (Battery-Starter Tester) in conjunction with a voltmeter is used for this test.

1. Turn the control knob on the Battery-Starter Tester to the OFF position.
2. Turn the voltmeter selector switch to the 16 or 20-volt position.
3. Connect both positive test leads to the positive battery post and both negative test leads to the negative battery post. **The voltmeter clips must contact the battery posts and not the high rate discharge tester clips. Unless this is done the actual battery terminal voltage will not be indicated.**
4. Turn the load control knob in a clockwise direction until the ammeter reads three times the ampere hour rating of the battery (a 45 ampere-hour battery should be tested at 135 amperes load).
5. With the ammeter reading the required load for 15 seconds, note the voltmeter reading. **Avoid leaving the high discharge load on the battery for periods longer than 15 seconds.**
6. If the voltmeter reading is 9.6 volts or more, the battery has good output capacity and will readily accept a charge, if required. Check the specific gravity. If the specific gravity reading is 1.240 or below, charge the battery until it is fully charged.

The battery is fully charged when the cells are all gassing freely and the specific gravity ceases to rise for three successive readings taken at hourly intervals. Additional battery testing will not be necessary after the battery has been properly charged.

7. If the voltage reading obtained during the capacity test is below 9.6 volts, check the specific gravity of each cell.
8. If the difference between any two cells is more than 50 points (0.050), the battery is not satisfactory for service and should be replaced.
9. If the difference between cells is less than 50 points (0.050), the battery should be charged according to the following charging schedule. In some cases the electrolyte level will be too low to obtain a specific gravity reading. In such cases water should be added until the electrolyte level just covers the ring in the filler well, then charge the battery at 35 amperes for 15 minutes. Check the specific gravity of each cell and if the difference between cells is less than 50 points (0.050), charge the battery according to the schedule.
10. After the battery has been charged, repeat the capacity test. If the capacity test battery voltage is still less than 9.6 volts, replace the battery. If the voltage is 9.6 volts or more, the battery is satisfactory for service.
11. If the battery is found to be discharged only, check for a loose fan belt, loose electrical connections, charging system performance, and

TABLE 2—Allowable Battery High Rate Charge Time Schedule

Specific Gravity Reading	Charge Rate Amperes	Battery Capacity—Ampere Hours			
		45	55	70	80
1.125-1.150*	35	65 min.	80 min.	100 min.	115 min.
1.150-1.175	35	50 min.	65 min.	80 min.	95 min.
1.175-1.200	35	40 min.	50 min.	60 min.	70 min.
1.200-1.225	35	30 min.	35 min.	45 min.	50 min.
Above 1.225	5	**	**	**	**

*If the specific gravity is below 1.125, use the indicated high rate of charge for the 1.125 specific gravity, then charge at 5 amperes until the specific gravity reaches 1.250 at 80°F.

Charge at 5 ampere rate ***only* until the specific gravity reaches 1.250 at 80°F.

make a battery drain test (in this section).

BATTERY DRAIN TEST

This test will determine if there is any external load that would cause unwanted battery discharge.

Disconnect the battery ground cable and connect the positive lead of a voltmeter to the cable. Connect the negative lead of the voltmeter to the battery negative post.

With all circuits off, the meter should read zero. Any battery external load will cause the voltmeter to read full battery voltage.

If the car is equipped with an electric clock, momentarily connect the battery ground cable to the battery negative post to make certain that the clock is wound. When the clock runs down at the end of approximately 2 minutes the voltmeter will show full battery voltage.

2 COMMON ADJUSTMENTS AND REPAIRS

BELT ADJUSTMENT

1. Loosen the alternator mounting bolt and the adjusting arm bolts.

2. **Apply pressure on the alternator front housing only** and tighten the adjusting arm to alternator bolt.

3. Check the belt tension using tool T63L-8620-A. Adjust the belt for specified tension.

4. Tighten all mounting bolts.

3 CLEANING AND INSPECTION

1. The rotor, stator, and bearings must not be cleaned with solvent. Wipe these parts off with a clean cloth.

2. Rotate the front bearing on the drive end of the rotor shaft. Check for any scraping noise, looseness or roughness that will indicate that the bearing is excessively worn. Look for excessive lubricant leakage. If any of these conditions exist, replace the bearing.

3. Inspect the rotor shaft at the rear bearing surface for roughness or severe chatter marks. Replace the rotor assembly if the shaft is not smooth.

4. Place the rear end bearing on the slip-ring end of the shaft and rotate the bearing on the shaft. Make the same check for noise, looseness or roughness as was made for the front bearing. Inspect the rollers and cage for damage. Replace the bearing if these conditions exist, or if the lubricant is lost or contaminated.

5. Check the pulley and fan for excessive looseness on the rotor shaft. Replace any pulley or fan that is loose or bent out of shape. Check the rotor shaft for stripped or damaged threads. Inspect the hex hole in the end of the shaft for damage.

6. Check both the front and rear housings for cracks. Check the front housing for stripped threads in the mounting ear. Replace defective housings.

7. Check all wire leads on both the stator and rotor assemblies for loose soldered connections, and for burned insulation. Resolder poor connections. Replace parts that show burned insulation.

8. Check the slip rings for nicks and surface roughness. Nicks and scratches may be removed 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 will have to be replaced, as they are serviced as a complete assembly.

9. Replace any parts that are burned or cracked. Replace brushes and brush springs that are not to specification.

PART 13-2 ALTERNATOR

1 DESCRIPTION AND OPERATION

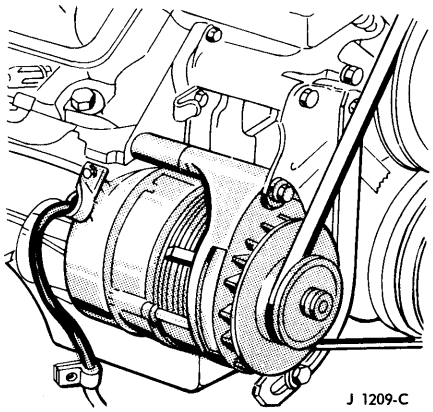

FIG. 1—Alternator Mounting

The charging system is a negative (—) ground system, and consists of an alternator, a regulator, a storage battery and associated wiring. Refer to Wiring Diagram Manual Form 7795P-65 for schematics and locations of wiring harnesses.

An alternator is belt driven from the engine. The alternator mounting is shown in Fig. 1.

The mechanical construction of the alternator differs from a generator in that the field rotates, and the generating windings are stationary. Energy is supplied from the system to the rotating field through two brushes to two slip rings. The slip rings are mounted on the rotor shaft (Fig. 2).

The alternator produces power in the form of alternating current. The alternating current is rectified to direct current by six diodes (Fig. 2) for use in charging the battery and supplying power to the electrical system.

2 REMOVAL AND INSTALLATION

1. Disconnect the battery ground cable.
2. Loosen the alternator mounting bolt and remove the adjustment arm to alternator bolt.
3. Disengage the alternator belt. Remove the alternator mounting bolt and spacer, disconnect the alternator wiring harness, and remove the alternator.
4. Attach the alternator wiring harness. Position the alternator on the engine, and install the spacer and alternator mounting bolt finger-tight (Fig. 1).
5. Install the adjustment arm to alternator bolt.
6. Adjust the belt tension using tool T63L-8620-A. **Apply pressure on the alternator front housing only, when tightening the belt.** Tighten the adjusting arm bolts and the mounting bolt.
7. Connect the battery ground cable.

3 MAJOR REPAIR OPERATIONS

DISASSEMBLY

Fig. 2 shows a disassembled view of the Ford alternator.

1. Mark both end housings and the stator with a scribe mark for assembly.
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.
5. Remove the brush holder mounting screws and remove the holder, brushes, brush springs, insulator and terminal.
6. If replacement is necessary, press the bearing from the rear end housing, supporting the housing on the inner boss.
7. 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 of the 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.
8. Hold the diode plate that is to be replaced, in a vise. Use a thin hacksaw blade and cut the three diode leads as close to the diodes as possible. Be careful not to break the printed-circuit board.
9. Press the insulated terminal bolt out of the insulators, and remove the insulators.
10. Separate the diode plate from the printed-circuit board. Discard the roll pins.
11. Carefully unsolder and remove the cut diode leads from the printed-

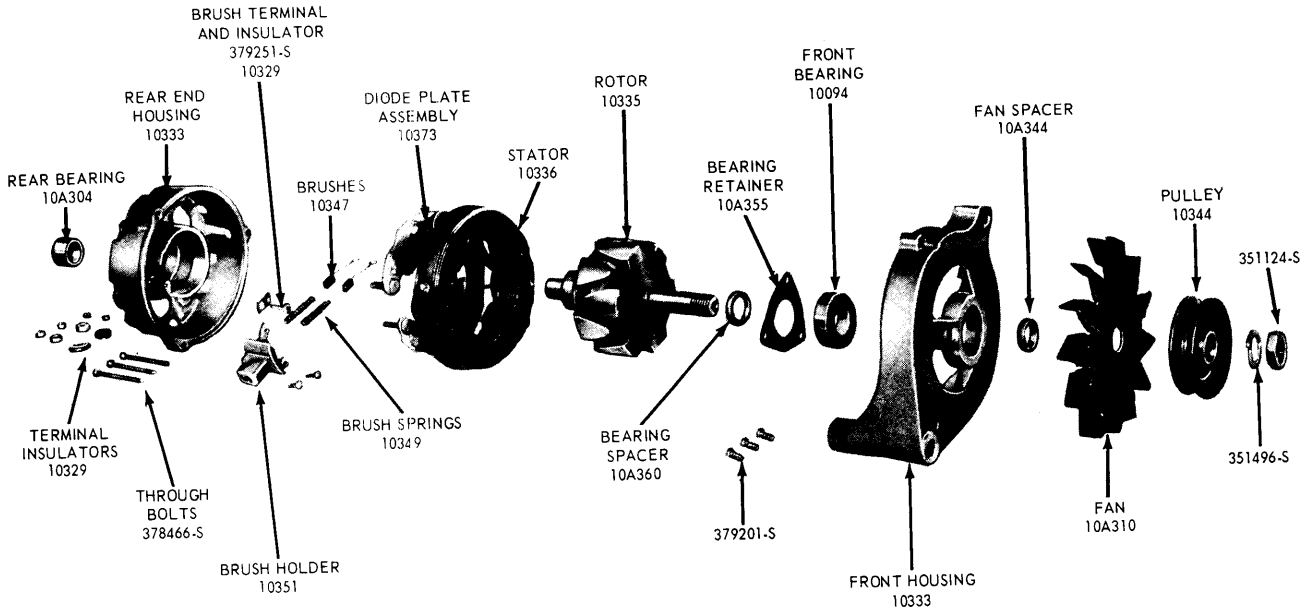

FIG. 2–Disassembled Alternator

circuit board, using a 100-watt soldering iron. Remove any remaining solder and washers from the diode lead holes.

12. 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. Remove and discard the roll pins from the diode plates.

13. Remove the drive pulley nut, pulley, fan, fan spacer, rotor and bearing spacer (Fig. 3).

14. Remove the three screws that hold the front end bearing retainer, and remove the retainer. Support the housing close to the bearing boss, and press out the old bearing from the housing, only if the bearing is loose or has lost its lubricant.

15. Perform a diode test and a field open or short circuit test (Part 13-1).

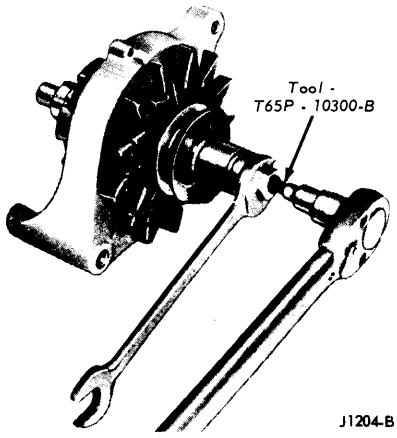

FIG. 3–Pulley Removal

PARTS REPAIR OR REPLACEMENT

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. All other assemblies are to be replaced rather than repaired.

ASSEMBLY

1. Press the front end bearing in the bearing boss and install the bearing retainer.

2. 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.**

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

4. Position the drive end housing, fan spacer, fan, pulley and lock washer on the drive shaft and install the retaining nut (Fig. 3), to specified torque.

5. If the rear end housing bearing was removed, support the housing on the inner boss and press in a new bearing flush with the outer end surface.

6. 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 as shown in Fig. 4.

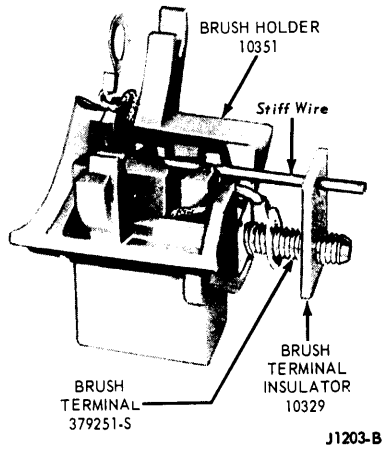

FIG. 4–Brush Holder Assembly

7. Position the brush holder assembly in the rear end housing and install the mounting screws. Position the brush leads in the brush holder as shown in Fig. 5.

8. 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.

9. Wrap the three stator winding leads around the printed-circuit board terminals and solder them. Use a 100-watt soldering iron and rosin-core solder. Slip the stator neutral lead split-terminal lug under the head of the stator terminal screw (Fig. 6).

10. Install the STA and BAT terminal insulators (Fig. 6). Position the 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 (Fig. 7).

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

12. 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.

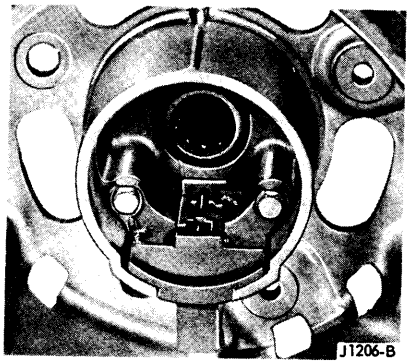

FIG. 5—Brush Lead Positions

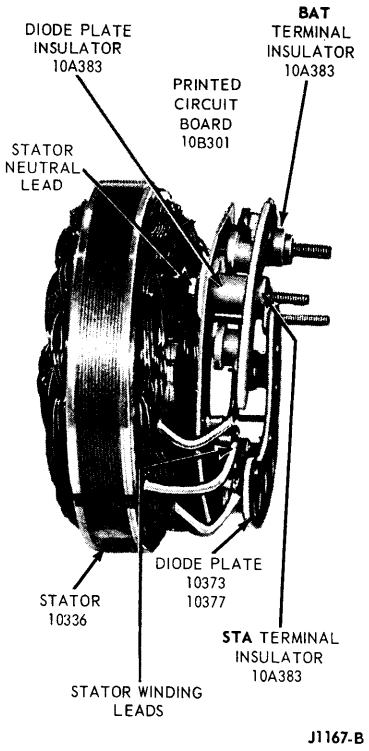

FIG. 6—Stator Lead Connections

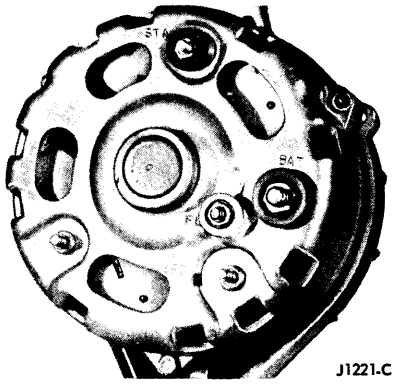

FIG. 7—Alternator Terminal Locations

PART 13-3 REGULATOR

1 DESCRIPTION AND OPERATION

The alternator regulator is composed of two control units, a field relay and a voltage limiter, mounted as an assembly (Fig. 1). Because the reverse current through the rectifier is small, a reverse current cutout relay is not needed. The alternator is self current limiting, thus a current limiter is not needed. Refer to Wiring Diagram Manual Form 7795P-65 for schematics and locations of wiring harnesses.

FIELD RELAY

The field relay serves to connect the battery and alternator output to the field circuit when the engine is running. When the ignition switch is closed, the field relay is energized. Closing of the relay contacts, connects the battery and alternator output to the field through the voltage limiter contacts.

VOLTAGE LIMITER

The temperature compensated voltage limiter is a double contact unit. Limiting is accomplished by controlling the amount of current supplied to the rotating field.

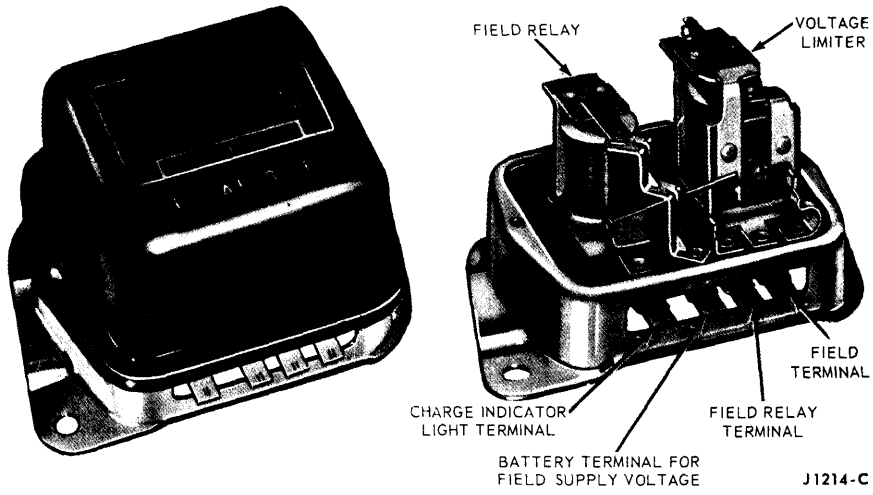

FIG. 1—Alternator Regulator

When the upper contacts are closed, full system voltage is applied to the field and maximum field current will flow. When the limiter armature floats between the contacts, field current is reduced by flowing through the field resistor. When the limiter lower contacts are closed, zero current flows to the field. At low engine speed and with a load applied, the armature vibrates on the upper contacts. At high engine speed and light or no load, the armature vibrates on the lower contacts.

A 50-ohm resistor is connected from the field terminal to ground to absorb electrical surges in the alternator circuits as the voltage limiter armature vibrates on the contacts.

2 IN-CAR ADJUSTMENTS AND REPAIRS

REGULATOR ADJUSTMENTS

Erratic operation of the regulator, indicated by erratic movement of the voltmeter pointer during a voltage limiter test, may be caused by dirty or pitted regulator contacts. Use a very fine abrasive paper such as silicon carbide, 400 grade, to clean the field relay and the voltage limiter contacts. Wear off the sharp edges of the abrasive by rubbing it against another piece of abrasive paper. Fold the abrasive paper over and pull the paper through the contacts to clean them. Keep all oil or grease from contacting the points. Do not use compressed air to clean the regulator. When adjusting the gap spacing use only hospital-clean feeler gauges.

REGULATOR GAP ADJUSTMENTS

Voltage Limiter. The difference between the upper stage and lower stage regulation (0.3 volt), is determined by the voltage limiter point and core gaps. Make the gap adjustments with the regulator removed from the car.

Adjust the point gap first. Loosen the left side lock screw ¼ turn. Use a screwdriver blade in the adjustment slot above the lock screw. Adjust the upper contact until there is 0.017 to 0.022-inch gap between the lower contacts. Tighten the lock screw and recheck the contact gap.

Adjust the core gap with the upper contacts closed. Loosen the center lock screw ¼ turn. Use a screwdriver blade in the adjustment slot under the lock screw. Adjust the core gap for 0.049 to 0.056-inch clearance between the armature and the core at the edge of the core closest to the contact points. Tighten the lock screw and recheck the core gap.

Field Relay. Place a 0.012 to 0.022-inch feeler gauge on top of the coil core closest to the contact points. Hold the armature down on the gauge. Do not push down on the contact spring arm. Bend the

contact post arm (Fig. 2) until the bottom contact just touches the upper contact.

REGULATOR VOLTAGE ADJUSTMENTS

Final adjustment of the regulator must be made with the regulator at normal operating temperature.

The field relay closing voltage is adjusted by bending the armature frame (Fig. 2). To increase the closing voltage, bend the frame down. To decrease the closing voltage, bend the frame up.

The voltage limiter is adjusted by bending the voltage limiter spring arm (Fig. 2). To increase the voltage setting, bend the adjusting arm downward. To decrease the voltage setting, bend the adjusting arm upward.

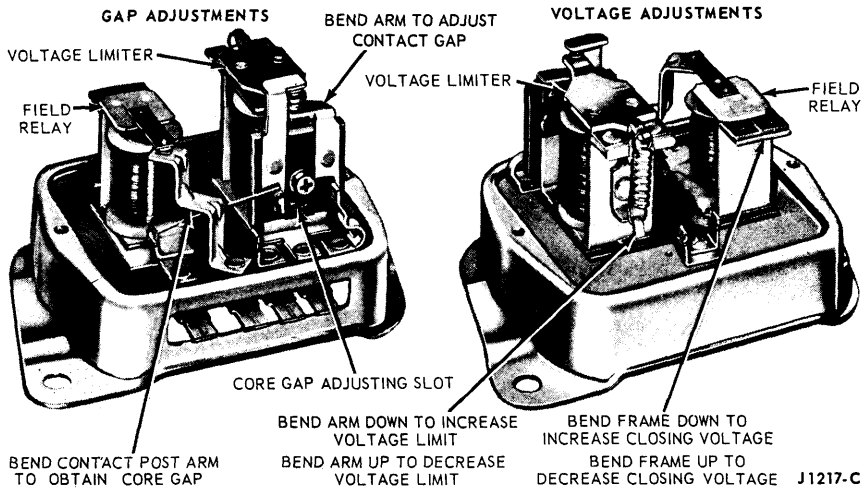

FIG. 2—Regulator Adjustments

Before setting the voltage and before making a final voltage test, the alternator speed must be reduced to zero and the ignition switch opened momentarily, to cycle the regulator.

3 REMOVAL AND INSTALLATION

1. Remove the battery ground cable.
2. Remove the regulator mounting screws.
3. Remove the cable disconnect from the regulator.
4. Attach the cable disconnect to the new regulator.
5. Mount the regulator to the radiator left air deflector. The main wiring harness hold-down clamp mounts under the upper mounting screw. The radio suppression condenser mounts under the lower mounting screw, with an external tooth lock washer between the condenser bracket and the regulator frame.
6. Connect the battery ground cable, and test the system for proper voltage regulation.

PART 13-4 SPECIFICATIONS

ALTERNATOR

Supplier	Amperes (@ 15V)	Watts (@ 15V)	Field Current (Amperes @ 12V 75°F.)	Cut-In Speed Engine R.P.M.	Rated Output Speed Engine R.P.M.	Minimum Slip Ring Turn Down Diameter	Maximum Slip Ring Run Out	Brushes		Pulley Nut Torque (Ft. Lbs.)	Belt Tension (Pounds)†
								New Length (Inches)	Wear Length (Inches)		
Autolite	42	630	2.8-3.3	350	1800 Cold 2750 Hot	1.220	.0005	½	5/16	60-80	80-110
Autolite	45	675	2.8-3.3	300	1800 Cold 2350 Hot	1.220	.0005	½	5/16	60-80	80-110
Autolite	55	825	2.8-3.3	350	1800 Cold 2350 Hot	1.220	.0005	½	5/16	60-80	80-110

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

REGULATOR

Supplier	Current Rating	Voltage Regulation @ + 75°F	Voltage Limiter		Field Relay	
			Contact Gap (Inches)	Armature Air Gap (Inches)	Armature Air Gap (Inches)	Closing Voltage @ + 75°F
Autolite	Used with 42, 45 & 55 Ampere Alternator	14.1 to 14.7	0.017 to 0.022	0.049 to 0.056	0.012 to 0.022	2.5

VOLTAGE REGULATION SETTING

Ambient Temperature °F.	Standard Alternator Regulator
50	14.3-15.1
75	14.1-14.9
100	13.9-14.7
125	13.8-14.6
150	13.6-14.4
175	13.5-14.3

BATTERY

Filler Cap Color	Number of Plates	Ampere Hours
Gray	66	55
Black	78	80

BATTERY FREEZING TEMPERATURES

Specific Gravity	Freezing Temperature
1.280	−90°F.
1.250	−62°F.
1.200	−16°F.
1.150	+ 5°F.
1.100	+19°F.

TOOLS

Ford Tool No.	Former No.	Description
T56L-10505-A	M-183-RT6-5	Voltage Regulator Setting Thermometer
T63L-8620-A	8620 BT-33-73-F	Belt Tension Gauge

ALLOWABLE BATTERY HIGH RATE CHARGE TIME SCHEDULE

Specific Gravity Reading	Charge Rate Amperes	BATTERY CAPACITY—AMPERE HOURS			
		45	55	70	80
1.125-1.150*	35	65 min.	80 min.	100 min.	115 min.
1.150-1.175	35	50 min.	65 min.	80 min.	95 min.
1.175-1.200	35	40 min.	50 min.	60 min.	70 min.
1.200-1.225	35	30 min.	35 min.	45 min.	50 min.
Above 1.225	5	**	**	**	**

*If the specific gravity is below 1.125, use the indicated high rate of charge for the 1.125 specific gravity, then charge at 5 amperes until the specific gravity reaches 1.250 at 80°F.
**Charge at 5 ampere rate only until the specific gravity reaches 1.250 at 80°F.