MOTORCRAFT

Pantera

► *SERVICE CAUTION: When testing or servicing alternator or regulator, take the following precautions to avoid damage to components.*

Battery – Do not reverse battery connections. Negative terminal must be connected to ground. When charging battery, cables must be disconnected from battery before connecting charger. *DO NOT use a charger as a booster for starting engine.* If a booster battery is used to start engine, negative cable of booster battery must be connected to car battery negative terminal.

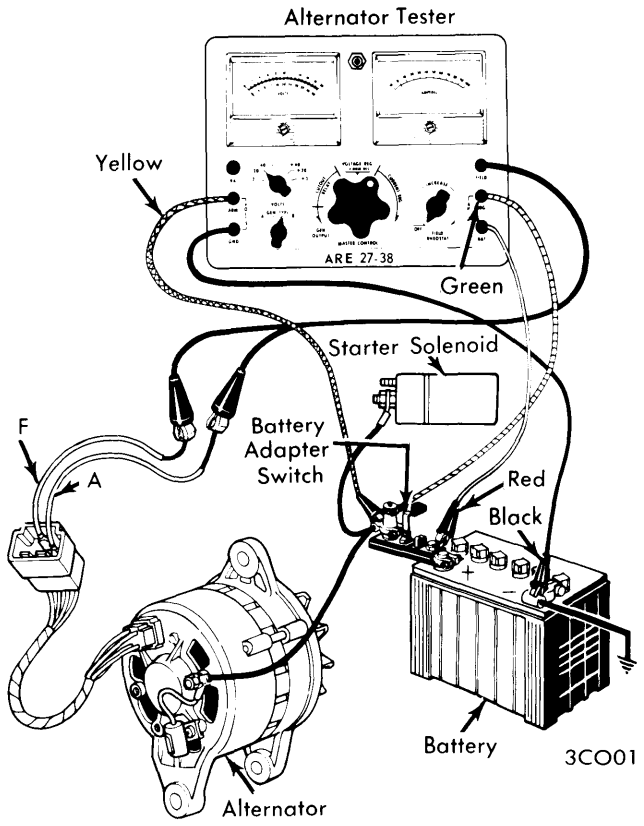
Alternator – DO NOT ground field circuit between alternator and regulator or operate alternator on an open circuit with field winding energized. DO NOT ground output terminal or attempt to polarize alternator as polarization is not required.

Regulator – Turn ignition switch off when working on regulator. Use care to prevent a short circuit between voltage regulator relay and regulator base when working on regulator. Use an insulated tool when making adjustments.

IDENTIFICATION & SPECIFICATIONS

Alternator is ink stamped with "FoMoCo" or "Motorcraft" trademarks. Rated output is stamped on frame (35A & 61A).

Application	Part No.	Amps (RPM)
Pantera	GL-95	61 (2900)



ALTERNATOR OUTPUT TEST CONNECTIONS

TESTING

NOTE – Following tests (except diodes) are made with a Rotunda ARE 27-38 volt-amp. alternator tester. If equivalent tester is used, follow manufacturer's instructions.

OUTPUT TEST (ON CAR)

1) Check drive belt tension. Connect test equipment as shown in illustration, making sure field rheostat knob is in off position. Close battery adapter switch, start engine then open adapter switch. Increase engine speed to approximately 2000 RPM. Turn off all lights and accessories. Turn field rheostat clockwise until voltmeter indicates 15 volts. Turn master control clockwise until voltmeter indicates 11-12 volts, hold master control in this position and turn field rheostat clockwise to maximum position, finally turn master control counterclockwise until voltmeter indicates 15 volts. Note ammeter reading, add 2 amperes to this reading to obtain alternator output.

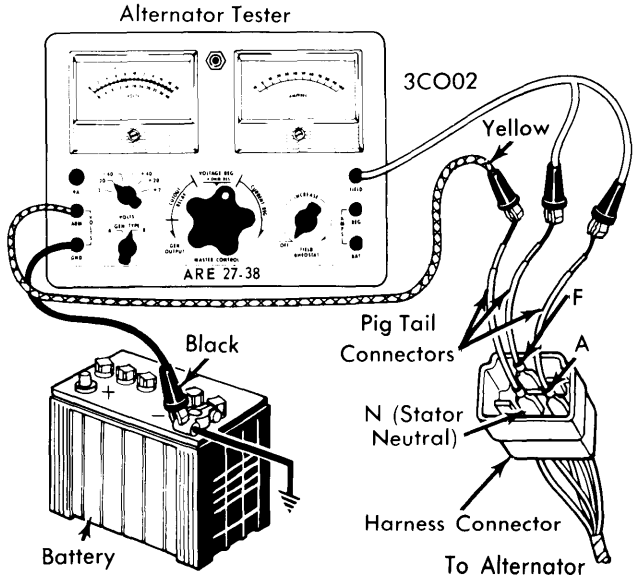
2) If rated output cannot be obtained, increase engine speed to 2900 RPM and repeat test procedure as in Step 1) (above). If rated output obtained, return field rheostat knob to off, release master control knob and stop engine. If output not within specifications, alternator must be disassembled for necessary bench tests. An output of 2-5 amperes below specifications, indicates an open diode. Output of 10 amperes below specifications, indicates a shorted diode. If diode shorted, alternator will usually whine.

STATOR TEST (ON CAR)

To test for stator neutral voltage, disconnect regulator connector plug from regulator. Connect test equipment as shown in illustration. Start engine and run at 1000 RPM, turn off all lights and accessories. Rotate field rheostat clockwise until 6 volts indicated on voltmeter. If 6 volts or more cannot be obtained, remove alternator and perform diode and stator tests to determine defect.

STATOR TEST (ON BENCH)

1) To test for open stator, set ohmmeter multiply-by knob at 1. Connect probes between each pair of stator leads. If ohmmeter does not shown equal readings between each pair of stator leads, stator is open and must be replaced.



STATOR NEUTRAL VOLTAGE TEST CONNECTIONS

MOTORCRAFT (Cont.)

2) To test for grounded stator, set ohmmeter multiply-by knob at 1000. Connect probes between one of the stator leads and stator core. Ohmmeter should not show continuity (no reading). If reading shown, stator winding is grounded and must be replaced.

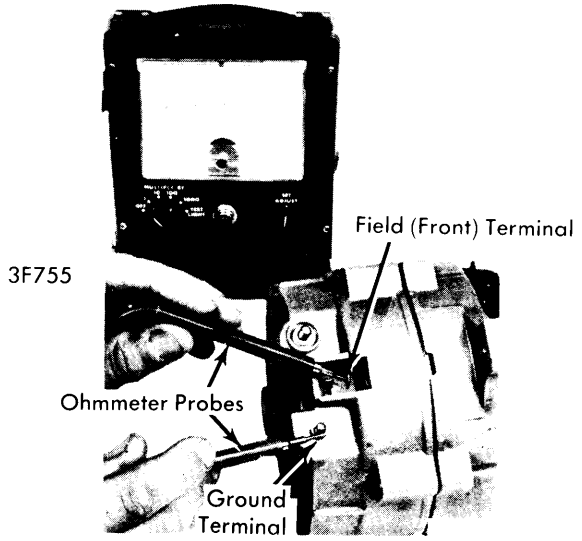
FIELD TEST

1) Connect an Ohmmeter as shown. Set Ohmmeter multiply knob at 1. Contact alternator field terminal with one probe and ground terminal with other probe, then spin pulley. Ohmmeter reading should be between 4 and 250 Ohms, and should fluctuate while pulley is turning.

2) An infinite reading (no meter movement) indicates an open brush lead, worn or stuck brushes, or bad rotor assembly. An Ohmmeter reading of less than 4 Ohms indicates a grounded brush assembly, a grounded field terminal, or a bad rotor.

Alternator Field Currect

Alternator Amps.	Field Current	Volts
61	2.9	12



FIELD TEST

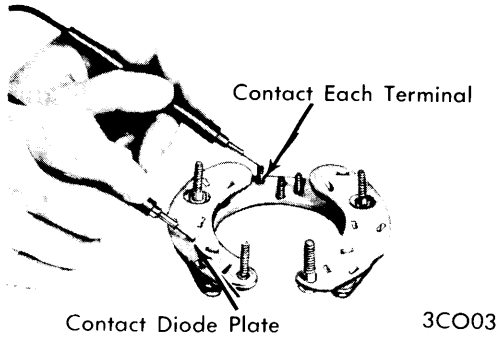
DIODE TEST

Disassemble alternator and disconnect diode assembly from stator. Connect test equipment as shown in illustration. *NOTE — Make sure ohmmeter multiply-by knob set at 10.* Place one test probe on diode place and contact each of the three stator lead terminals with other probe. Note ohmmeter reading, then reverse probes and repeat test. Check both positive and negative diodes in this manner. All 6 tests (8 tests on 61 amp alternators) should show a low reading of 60 ohms in one direction and infinite reading (no needle movement) in opposite direction.

NOTE — Ford Motor Co. also recommends a voltmeter test procedure. The following article covers the volt-ammeter test bank method of testing. See following pages for the voltmeter method of testing.

VOLTMETER TEST PROCEDURES

***NOTE** — When performing charging system test with a **voltmeter**, turn off all lights and electrical components. Be sure **battery specific** gravity is at least 1.200.*



DIODE TEST CONNECTIONS (TYPICAL)

1) Connect negative lead of voltmeter to negative battery clamp, and positive lead to postive battery cable clamp. Record battery voltage.

2) Hook up tachometer and start engine. Operate at 1500 RPM with no electrical load. The voltmeter reading should increase one volt and not exceed two volts above earlier reading. Reading should be taken when voltmeter needle stops moving.

3) With engine running, turn on heater or A/C blower motor to high speed and headlights to high beam. Increase RPM to 2000, voltmeter should indicate a minimum of .5 volt increase over original reading. If system conforms to these readings it is operating normally.

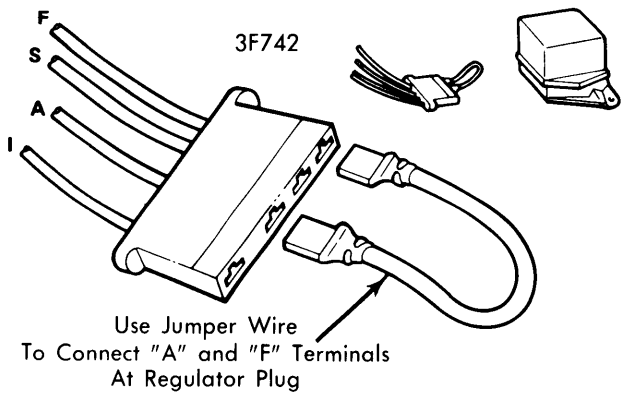
TEST RESULTS

1) If voltmeter reading indicates over voltage (more than two volts above battery voltage), stop engine and check ground connections between regulator and alternator and/or regulator and engine. Clean and tighten connections securely and repeat tests.

2) If over voltage still exists, disconnect regulator wiring plug and repeat test. If over voltage condition disappears, replace voltage regulator and repeat test.

3) If over voltage still exists with regulator disconnected, a short is indicated in wiring harness between alternator and regulator.

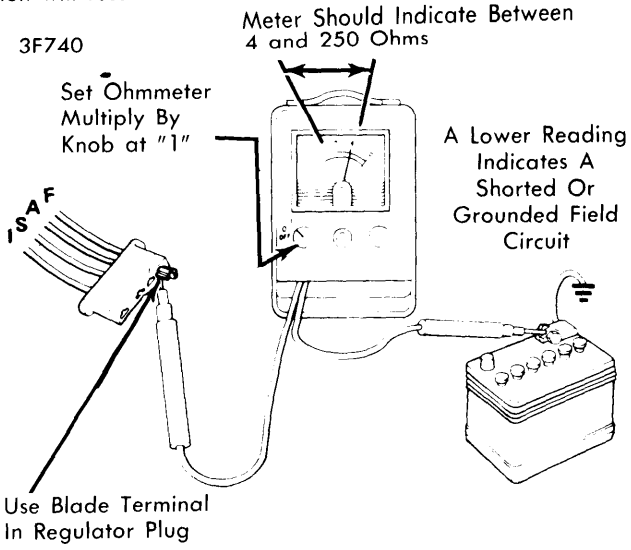
4) If voltmeter reading does not increase at least one volt, check for presence of battery voltage at alternator "BAT" terminal, and at regulator plug "A" terminal. If no voltage is present, an open wire is indicated.



REGULATOR PLUG JUMPER WIRE CONNECTION

MOTORCRAFT (Cont.)

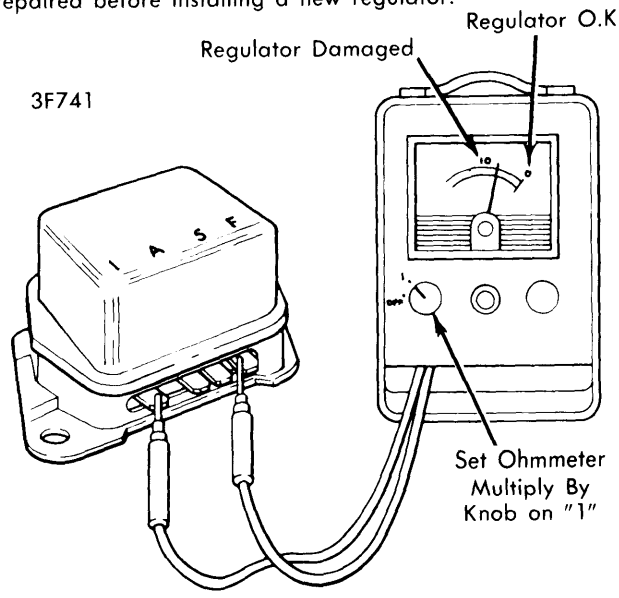
5) Before performing other tests, the field circuit (regulator plug to alternator) must be checked for a grounding condition. If the field circuit is grounded and the jumper wire is used as a check at regulator wiring plug from "A" to "F" terminals, excessive current will cause heat damage to regulator wiring plug terminals and may burn the jumper wire (see illustration). Also if the field circuit was grounded, the connector wire inside the regulator will be burned open and an under voltage condition will result.



TESTING FIELD CIRCUIT WITH OHMMETER

6) The field circuit should be checked with the regulator wiring plug disconnected and an ohmmeter connected from the "F" terminal of regulator wiring plug to battery ground. The ohmmeter should indicate between 4 and 250 ohms (see illustration).

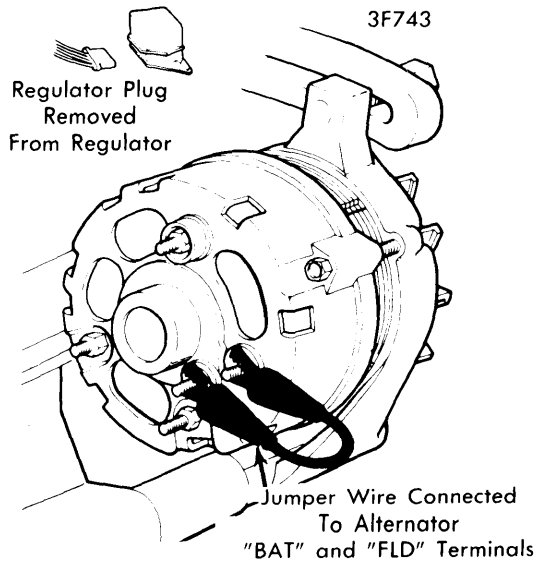
7) A check for regulator burned open wire is made by connecting an Ohmmeter from the "I" to "F" terminals on regulator (see illustration). If reading indicates approximately 10 Ohms, the connector wire inside the regulator is burned open. Field circuit ground condition must be found and repaired before installing a new regulator.



TESTING REGULATOR FOR BURNED OPEN WIRE

8) If field circuit is satisfactory, disconnect regulator wiring plug at regulator and connect a jumper wire between "A" and "F" terminals on regulator wiring plug. Repeat voltmeter test procedures. If a problem of under voltage still exists, remove jumper wire at regulator plug and leave plug disconnected from regulator; then, connect a jumper wire to the "FLD" and "BAT" terminals on the alternator (see illustration). Repeat voltmeter test procedure. If results are now satisfactory, repair the wiring harness from alternator to regulator.

9) If voltmeter tests still indicate under voltage, repair or replace the alternator.



JUMPER WIRE CONNECTION

OVERHAUL

DISASSEMBLY

G.P.D. Rear Terminal – 1) Mark both end housings and stator with a scribe mark for assembly. Remove thru bolts. Separate front housing and rotor from stator and rear housing. Remove all nuts and insulators from rear housing and remove rear housing from stator.

2) Remove brush holder mounting screws, and remove holder, brushes, springs, insulator, and terminal. If replacement is necessary, press bearing from rear housing, supporting housing on inner bore. If rectifier assembly requires replacement, unsolder stator leads from printed circuit board and separate stator from rectifier. Use a 100 watt soldering iron.

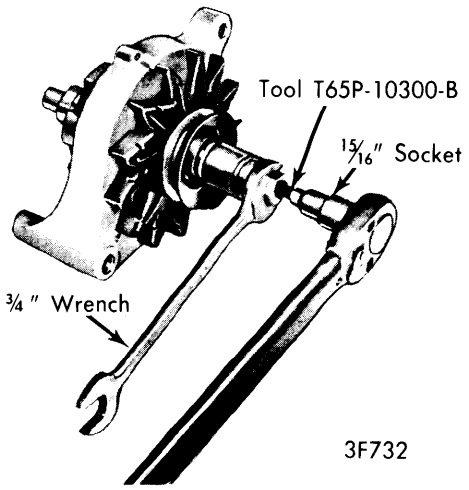
3) Original production alternators will have one of three types of rectifier circuit boards; one has circuit board spaced away from diode plates with diodes exposed, a second type is a single circuit board with built in diodes, and the third type has built in diodes with an additional booster diode plate containing two diodes (used on 61 Amp. alternators only).

4) If alternator rectifier has an exposed diode circuit board, remove screws from rectifier by rotating bolt heads ¼ turn clockwise to unlock and remove them. Push stator terminal screw straight out on a rectifier with diodes built into circuit board, avoid turning screw while removing to make certain that the straight knurl will engage insulators when installing. Do not remove grounded screw.

5) On 61 Amp. alternator rectifier, press stator terminal screw from circuit board with a vise, back up terminal board with a ½" drive ½" socket. Leave nut on end of terminal to keep from damaging threads. When terminal has moved about ¼" remove nut, and lift screw from board.

MOTORCRAFT (Cont.)

6) Remove pulley as shown in illustration. Then pull lockwasher, pulley, fan, fan spacer, front housing, and rotor from shaft.



REMOVING ALTERNATOR PULLEY

7) Remove front bearing retainer. If bearing is damaged or has lost its lubricant, support housing close to bearing boss and press out old bearing. With alternator now fully disassembled perform a diode test.

REASSEMBLY

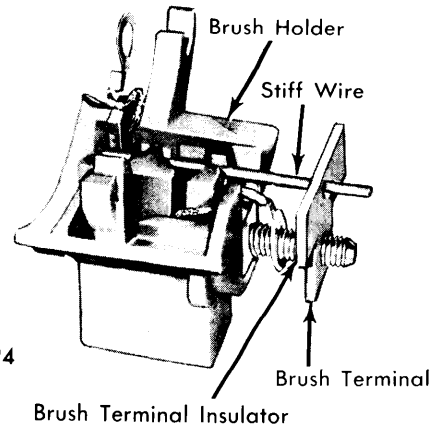
1) Rotor, stator bearings must not be cleaned with solvent, simply wipe with a clean cloth. Press front bearing in front housing, put pressure on outer race only, and install retainer. If stop ring on rotor drive was damaged, install a new one. Push new ring on shaft and into groove, do not open snap ring with pliers as it will stretch.

2) Position rotor stop on drive shaft with recessed side against stop ring. Position front housing, fan, spacer, pulley, and lock washer on drive shaft and install retaining nut. If rear housing bearing was removed, support housing on inner boss and press new bearing flush with outer end surface.

3) Place brush springs, brushes, brush terminal and terminal insulator in brush holder. Hold brushes in place by inserting a stiff piece of wire in brush holder (see illustration). Position brush holder assembly in rear housing, and install mounting screws. Wrap the three stator winding leads around circuit board terminals and solder them in place, be sure to use rosin core solder.

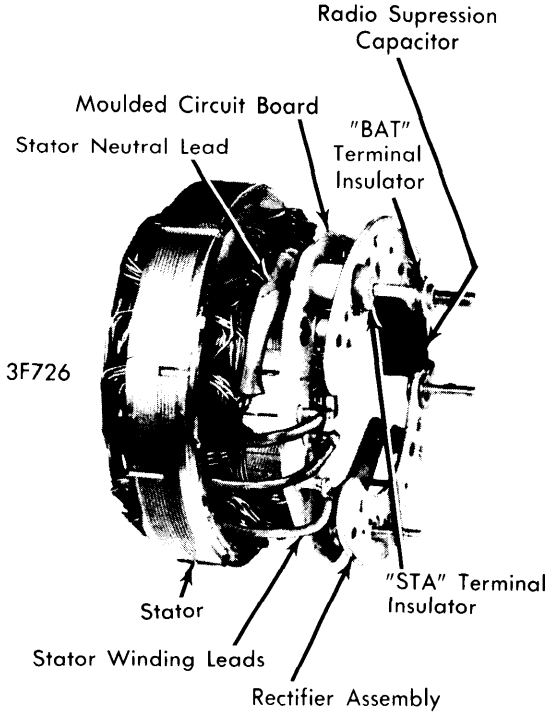
4) Position stator neutral lead eyelet on stator terminal screw and install screw in rectifier assembly. For a rectifier with diodes exposed, insert the special screws thru wire lug, dished washers and circuit board. Turn ¼ turn counterclockwise to lock. For single circuit boards with built in diodes, insert screws straight thru wire lug, insulating washer, and rectifier into square hole in rectifier into the insulator. Dished washers are used on exposed diode circuit boards only.

5) For a rectifier with a booster diode plate (61 Amp.), position stator wire terminal on stator terminal screw and position screw into rectifier. Position square insulator over screw and into square hole in recitifier. Rotate terminal screw until it locks into position, then press screw in finger tight. Install stator wire. Now press terminal screw into rectifier and insulator, using a vise and a 3/8" drive 3/8" socket.



INSTALLING BRUSHES IN BRUSH HOLDER

6) Position radio noise suppression capacitor on rectifier terminals. On circuit boards with exposed diodes, install the "STA" and "BAT" (see illustration) terminal insulators. On single circuit boards, position the square stator terminal insulator in the square hole in rectifier assembly. Position "BAT" terminal insulator.



STATOR LEAD CONNECTIONS

7) Position stator and rectifier assembly in rear housing, make certain all terminal insulators are seated properly in the recesses. Position the "STA" (black), "BAT" (red), and "FLD" (orange) insulators on terminal bolts and install retaining nuts.

8) Position rear housing and stator assembly over rotor and align scribe marks made prior to disassembly. Seat machined portion of stator core into step in both end housings. Install thru bolts. Remove brush retracting wire, and put a daub of water proof cement over hole to seal it.