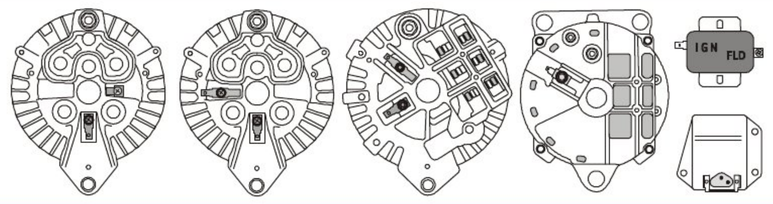
TECH BASICS 3

CHRYSLER CHARGING SYSTEMS 1961-1987

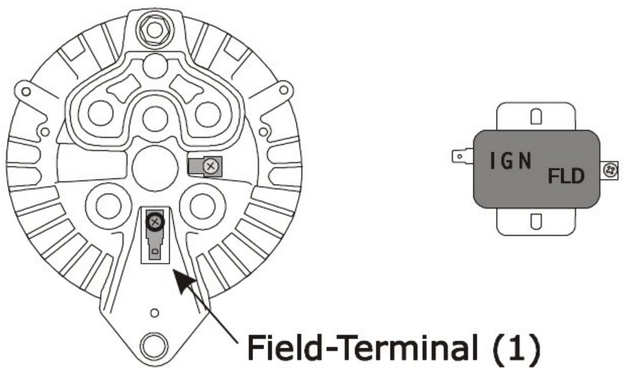


Chrysler made the switch from generators to alternators in 1961. The first system used a one field-terminal alternator with an external mechanical point-style voltage regulator and remained unchanged until 1970. In 1970, Chrysler changed to a two field-terminal alternator with an external solid-state electronic voltage regulator. This system was used until the mid 1980s when the voltage regulator was moved inside the engine control computer.

There are two "oddball" variations that were used. The first "oddball" is the 1969 Imperial, which has an alternator and voltage regulator that fits only that one year and model. The second "oddball" was introduced in 1974 on cars that use a large case 100 amp alternator. A special ***Field and Load relay*** was installed to reduce engine load while the starter was cranking.

This guide is divided into the following subsections:

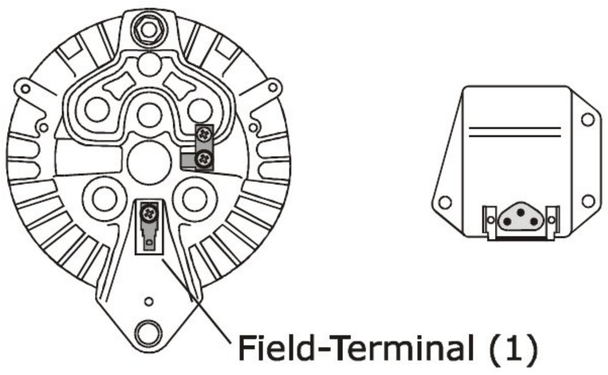
Alternator and Voltage Regulator	Section name / description



1961 - 1969 one field-terminal alternators

- One spade-connector field-terminal on alternator.
- Voltage regulator is mechanical (not solid state).

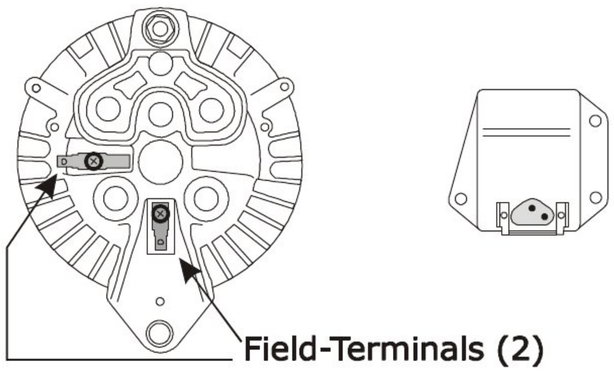
Use section ***1961 - 1969 ONE FIELD-TERMINAL ALTERNATORS***



1969 Imperial

- One spade-connector field-terminal on alternator.
- Voltage regulator is solid-state with ***three*** terminals.
- Used only in 1969 and only on Imperial models.

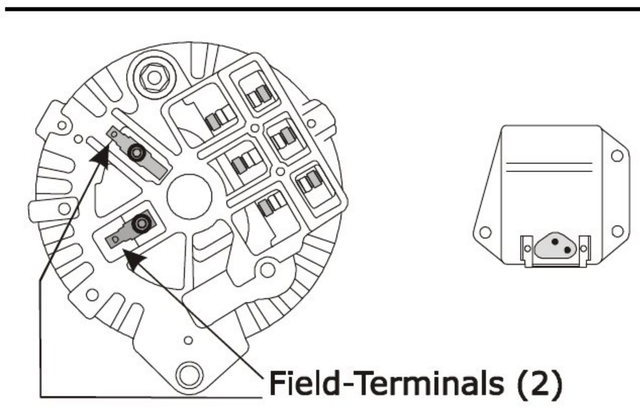
Use section ***1969 IMPERIAL ONLY***



1970 - 1971 two field-terminal alternators

- Two spade-connector field-terminals on alternator.
- Voltage regulator is solid-state with two terminals.

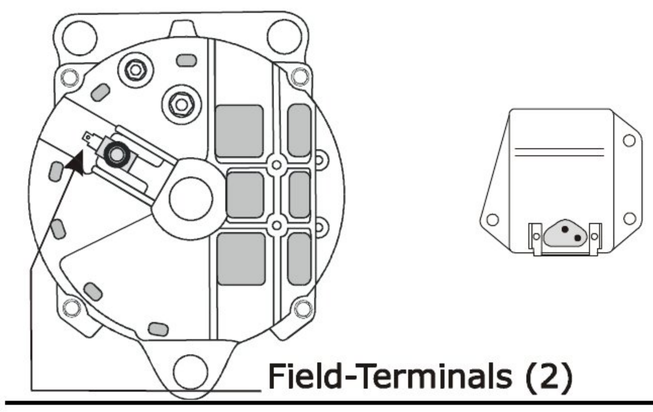
Use section ***1970 - 1987 TWO FIELD-TERMINAL ALTERNATORS***



1972 - 1987 two field-terminal alternators

- Two spade-connector field-terminals on alternator (screw-on connectors in later years).
  Voltage regulator is solid-state with two terminals.

Use section ***1970 - 1987 TWO FIELD-TERMINAL ALTERNATORS***



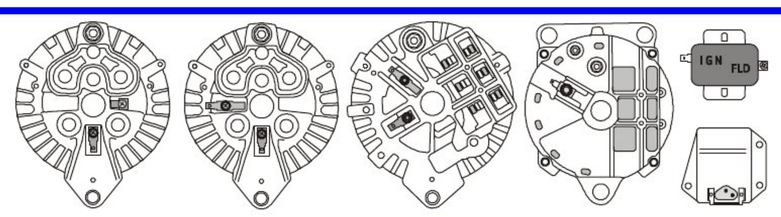
1974 -1987 two field-terminal large case alternators

- Two spade-connector field-terminals on alternator.
- Voltage regulator is solid-state with two terminals.
- Some vehicles use a ***Field and Load relay*** (see section ***FIELD & LOAD RELAY - 1974 to 1976***).

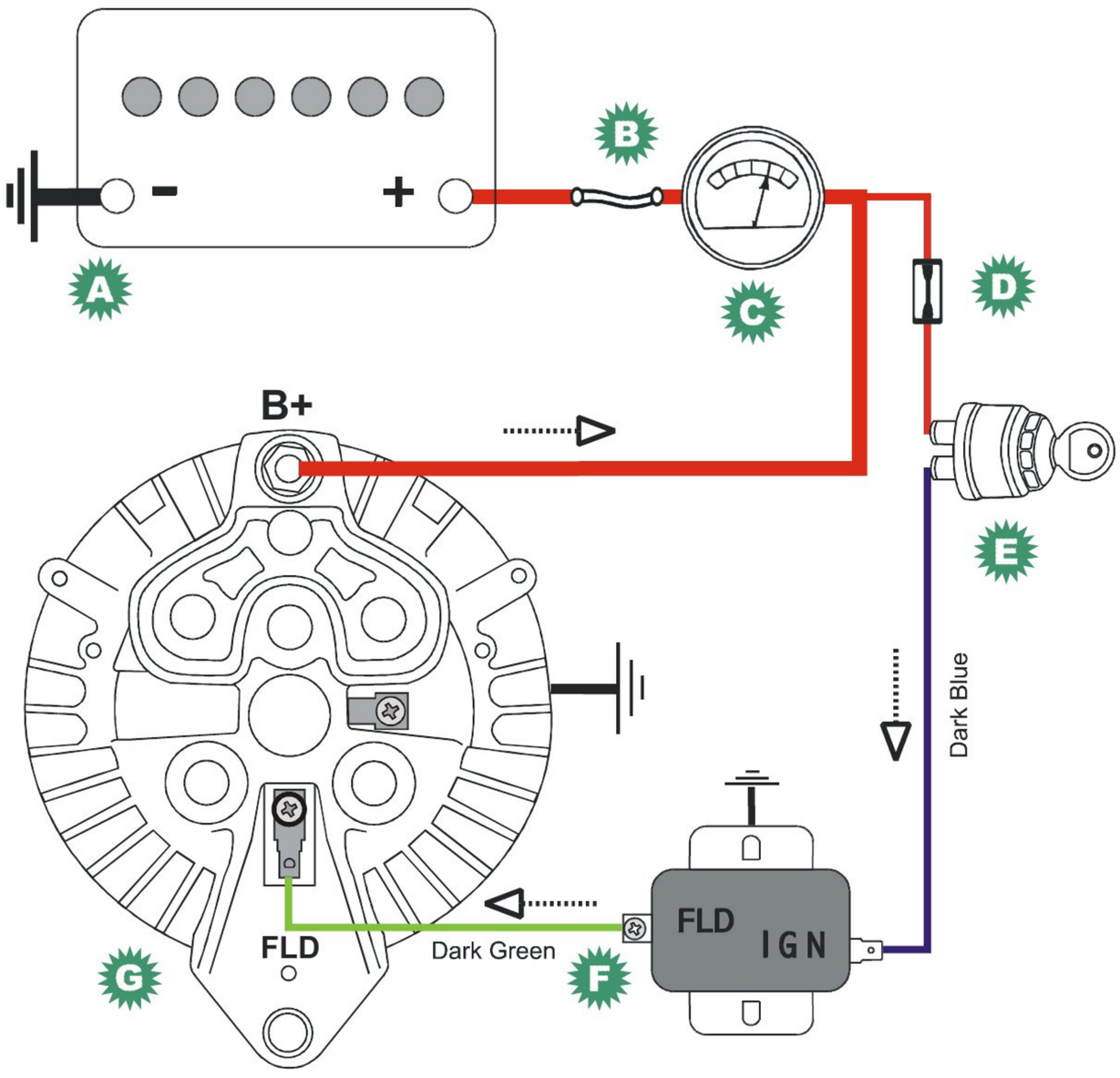
Use section ***1970 - 1987 TWO FIELD-TERMINAL ALTERNATORS***

TECH BASICS 3

CHRYSLER CHARGING SYSTEMS 1961-1987



1961 - 1969 ONE FIELD-TERMINAL ALTERNATORS



A Battery
B Fusible Link
C Ammeter
D Fuse
E Ignition Switch
F Voltage Regulator
G Alternator

How it works:

With the engine running, current flows from the battery ⇨ through the fusible link ⇨ through the ammeter ⇨ through the fuse ⇨ through the ignition switch ⇨ to the voltage regulator ***IGN*** terminal. The voltage regulator controls alternator charging by varying the current it sends to the alternator ***FLD*** terminal.

When the alternator is charging, current flows from the alternator ***B+*** terminal ⇨ through the ammeter ⇨ through the fusible link ⇨ to the battery positive terminal.

Figure 1 - 1961 to 1969 charging system

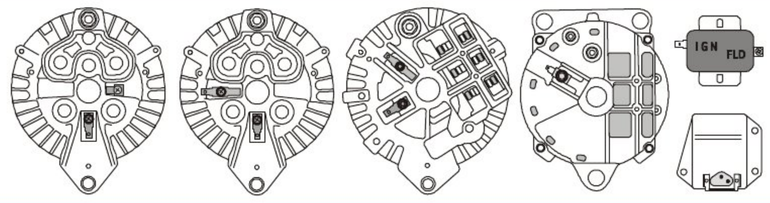
How to test and repair

Start by doing these tests in the order below:

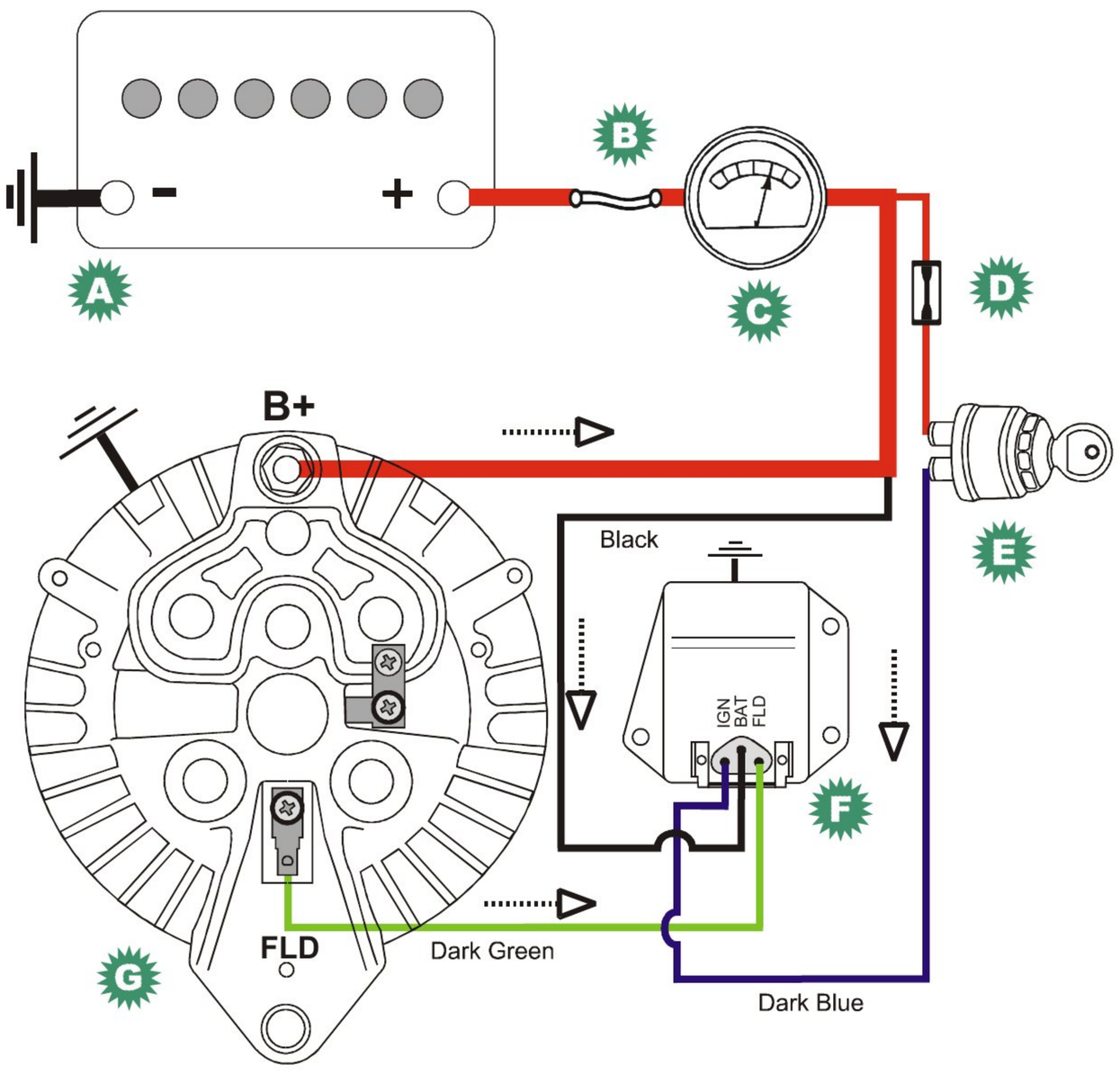
- Remove the ***IGN*** connector from the voltage regulator. With the key on and the engine off, test for battery voltage at the wire that goes to the voltage regulator ***IGN*** terminal. If no voltage or low voltage is found, check the wiring, fuse, or fusible link and repair as needed. Reconnect the wire to the voltage regulator ***IGN*** terminal.
- The voltage regulator must be properly grounded. Inspect the screws and body area where it mounts and sand off any corrosion. Remove the ***FLD*** wire from the voltage regulator. With the key on and the engine off, test for battery voltage at the voltage regulator ***FLD*** terminal. If no voltage is found, the voltage regulator is bad and must be replaced. If the regulator is bad, read the section at the end of this guide titled ***ROTOR WARNING***.
- Remove the belt from the alternator. Remove both the ***FLD*** and the ***IGN*** wires from the voltage regulator. Connect the two wires removed from the voltage regulator together. With the key on and the engine off, place the flat blade of a screwdriver against the rear bearing of the alternator. If the alternator field circuit is good, you will feel a magnetic pull on the screwdriver. Slowly turn the pulley while performing this test. If the magnetic pull goes on and off while turning the pulley, or if there is no magnetic pull, the alternator is bad and must be replaced.
- Test for battery voltage at the alternator ***B+*** terminal. If low or no voltage, check the positive battery cable, the fusible link (some early cars do not have fusible links), and the ammeter. Many of the 1960's cars use a direct-style ammeter. This style ammeter passes all the charging current through the meter. It's common for these meters to go "open" and not allow any current flow.
- Reconnect all wires and perform the ***Charging System Test*** described at the end of this guide.

TECH BASICS 3

CHRYSLER CHARGING SYSTEMS 1961-1987



1969 IMPERIAL ONLY



A Battery
B Fusible Link
C Ammeter
D Fuse
E Ignition Switch
F Voltage Regulator
G Alternator

Figure 2 - 1969 Imperial only

How it works:

With the engine running, current flows from the battery ⇨ through the fusible link ⇨ through the ammeter ⇨ through the fuse ⇨ through the ignition switch ⇨ to the voltage regulator ***IGN*** terminal. The voltage regulator controls alternator charging by grounding the current sent to it from the alternator ***FLD*** terminal.

When the alternator is charging, current flows from the alternator ***B+*** terminal ⇨ through the ammeter ⇨ through the fusible link ⇨ to the battery positive terminal.

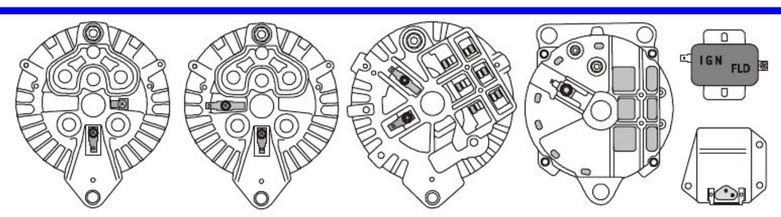
How to test and repair

Start by doing these tests in the order below:

- Test for battery voltage at the alternator ***B+*** terminal. If low or no voltage, check the positive battery cable and the fusible link (some early cars do not have fusible links).
- Disconnect the plug from the voltage regulator. With the key on and the engine off, test for battery voltage at the voltage regulator plug ***IGN*** and ***BAT*** terminals. If no voltage or low voltage is found, check the wiring, fuse, or fusible link and repair as needed.
- With the plug still disconnected from the voltage regulator, remove the belt from the alternator. Using a jumper wire, connect the ***FLD*** wire of the voltage regulator plug (usually dark green) to ground. With the key on and the engine off, place the flat blade of a screwdriver against the rear bearing of the alternator. If the alternator field circuit is good, you will feel a magnetic pull on the screwdriver. Slowly turn the pulley while performing this test. If the magnetic pull goes on and off while turning the pulley, or if there is no magnetic pull, the alternator is bad and must be replaced. Reconnect the plug to the voltage regulator.
- The voltage regulator must be properly grounded. Inspect the screws and body area where it mounts and sand off any corrosion.
- Perform the ***Charging System Test*** described at the end of this guide.

TECH BASICS 3

CHRYSLER CHARGING SYSTEMS 1961-1987



1970 - 1987 TWO FIELD-TERMINAL ALTERNATORS

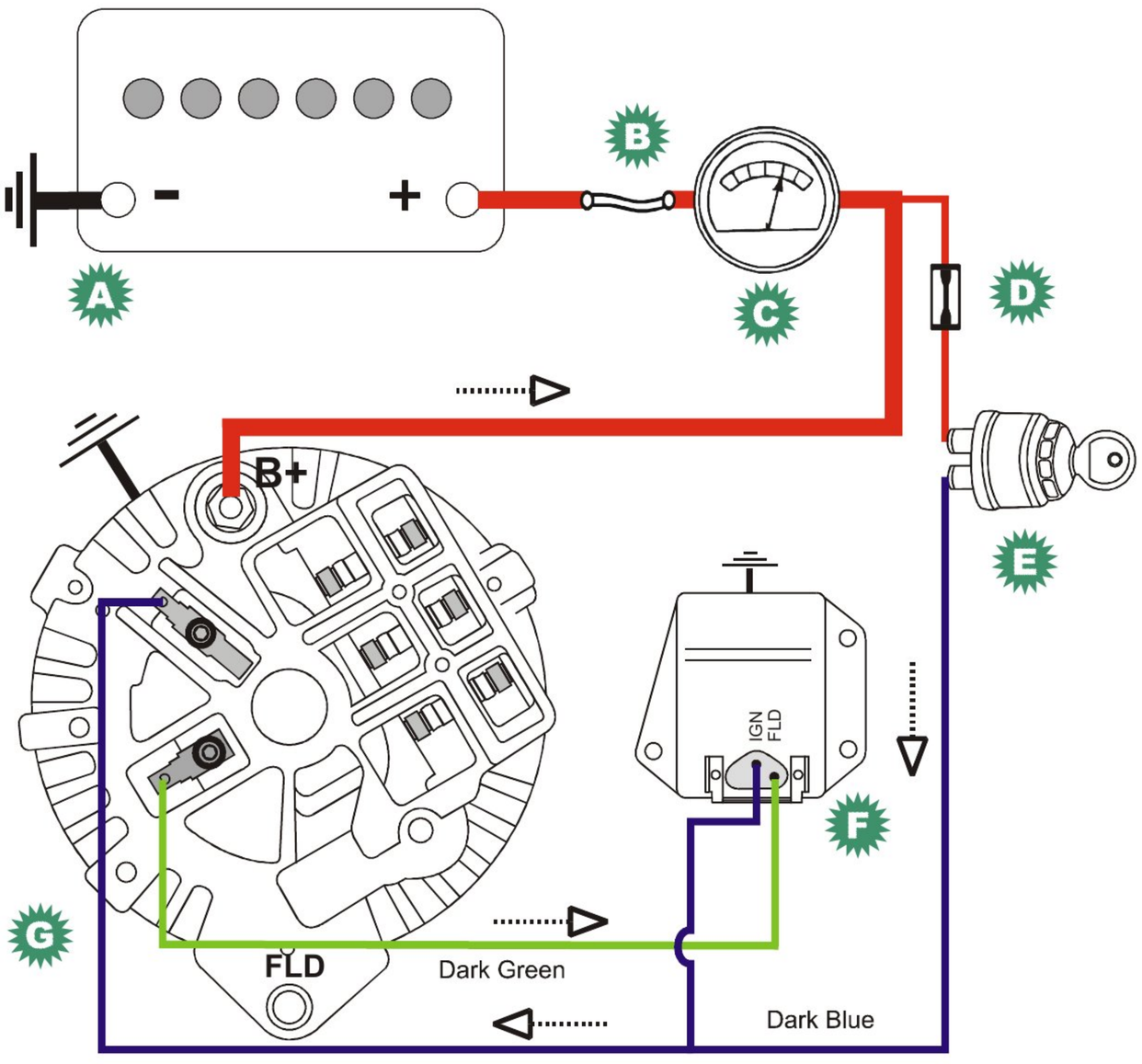
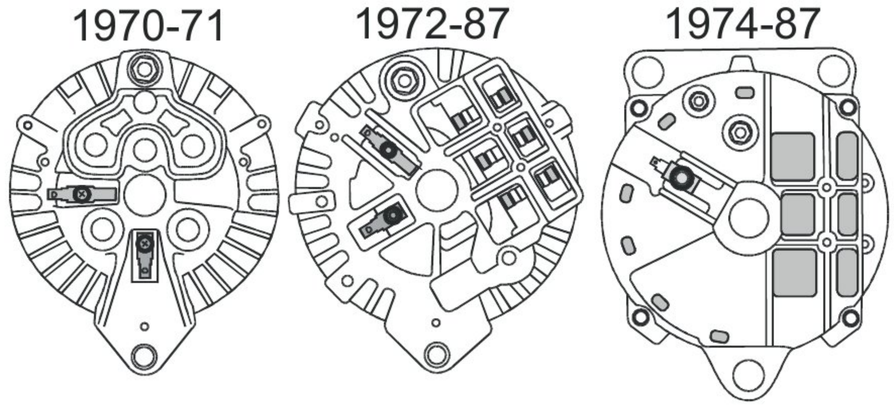


Figure 3 - 1970 to 1987 charging system

Two field-terminal alternator styles used

1970-71 1972-87 1974-87



A Battery
B Fusible Link
C Ammeter
D Fuse
E Ignition Switch
F Voltage Regulator
G Alternator

How it works:

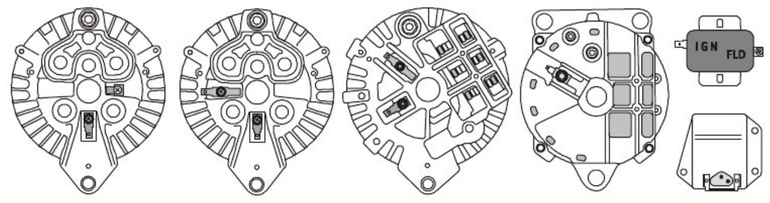
With the engine running, current flows from the battery ⇨ through the fusible link ⇨ through the ammeter ⇨ through the fuse ⇨ through the ignition switch ⇨ to the voltage regulator ***IGN*** terminal. The voltage regulator controls alternator charging by grounding the current sent to it from the alternator ***FLD*** terminal.

When the alternator is charging, current flows from the alternator ***B+*** terminal ⇨ through the ammeter ⇨ through the fusible link ⇨ to the battery positive terminal.

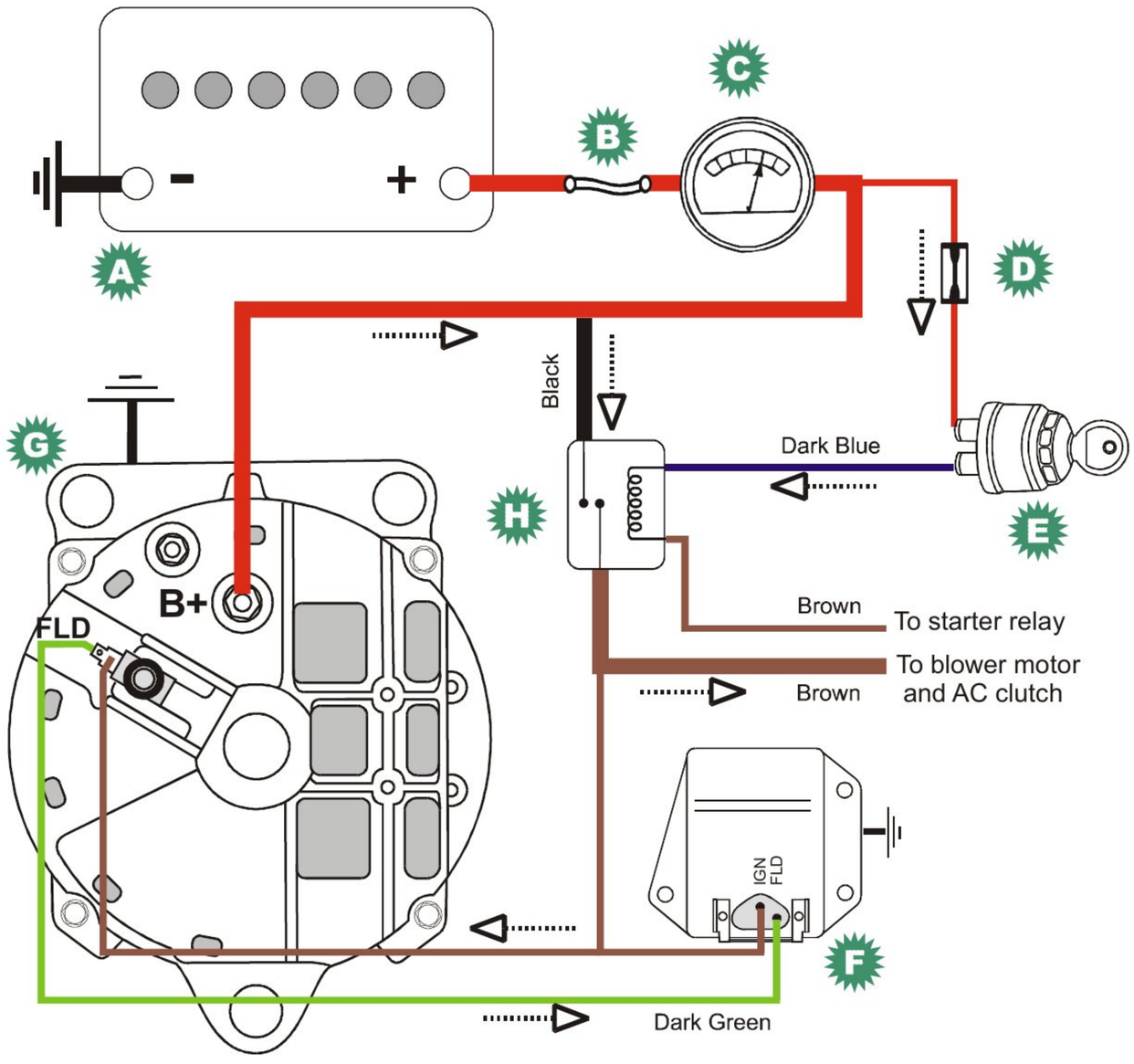
How to test and repair

Start by doing these tests in the order below:

- Test for battery voltage at the alternator ***B+*** terminal. If low or no voltage, check the positive battery cable and the fusible link (some early cars do not have fusible links).
- Disconnect the plug from the voltage regulator. With the key on and the engine off, test for battery voltage at the voltage regulator plug ***IGN*** terminal. If no voltage or low voltage is found, check the wiring, fuse, or fusible link and repair as needed.
- With the plug still disconnected from the voltage regulator, remove the belt from the alternator. Using a jumper wire, connect the ***FLD*** wire of the voltage regulator plug (usually dark green) to ground. With the key on and the engine off, place the flat blade of a screwdriver against the rear bearing of the alternator. If the alternator field circuit is good, you will feel a magnetic pull on the screwdriver. Slowly turn the pulley while performing this test. If the magnetic pull goes on and off while turning the pulley, or if there is no magnetic pull, the alternator is bad and must be replaced. Reconnect the plug to the voltage regulator.
- The voltage regulator must be properly grounded. Inspect the screws and body area where it mounts and sand off any corrosion.
- Perform the ***Charging System Test*** described at the end of this guide.



FIELD & LOAD RELAY - 1974 to 1976



A Battery
B Fusible Link
C Ammeter
D Fuse
E Ignition Switch
F Voltage Regulator
G Alternator
H Field & Load Relay

The ***Field and Load relay*** was introduced in 1974 and used only on police vehicles with heavy duty charging systems. In 1975 and 1976 it was used on all vehicles that had the large case 100 amp alternator installed. In 1977 the use of the ***Field and Load relay*** was discontinued, although Chrysler still used the large case alternator until 1987.

Figure 4 - 1974 to 1976 charging system
100 amp large case alternator with Field and Load relay

How it works:

The purpose of the ***Field and Load relay*** is to reduce the mechanical and electrical load while the starter is cranking the engine.

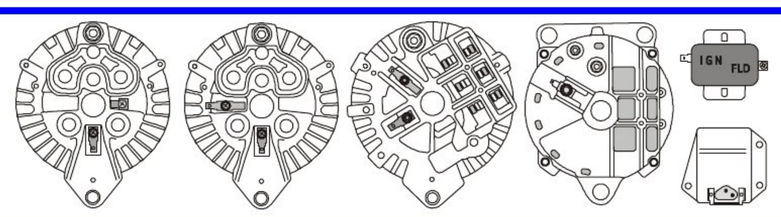
When the ignition switch is turned to the ***start*** position, current flows from the ignition switch to the ***Field and Load relay*** coil. It also flows from the starter relay ***S*** terminal to the ***Field and Load relay*** coil. Since the same voltage is present on both sides of the ***Field and Load relay*** coil, no current can flow and the points open. This breaks the current flow to the voltage regulator, alternator field, blower motor and AC clutch.

When the engine has started and the ignition switch is in the ***run*** position, current flows from the ignition switch ⇨ through the ***Field and Load relay*** coil ⇨ to the starter relay ***S*** terminal. Its completes the circuit to ground through the starter solenoid coils. This causes the ***Field and Load relay*** points to close and powers up the voltage regulator, alternator field, blower motor and AC clutch.

Other than the use of the ***Field and Load relay***, this system is the same as all other two field-terminal systems. Use section ***1970 - 1987 TWO FIELD-TERMINAL ALTERNATORS*** to check the wiring and components.

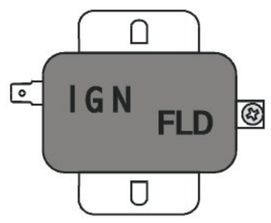
TECH BASICS 3

CHRYSLER CHARGING SYSTEMS 1961-1987



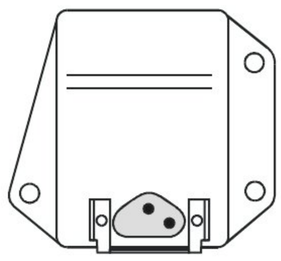
ROTOR WARNING

Alternators produced in the 1960s were designed to be used with mechanical, point-style voltage regulators. These are the one field-terminal alternators described in the section ***1961 - 1969 One Field-Terminal Alternators***. The rotor field-coil amp draw is low - only 2.3 to 2.7 amps. This is all the current that the voltage regulator points can handle without arcing and destroying themselves.



Early Style Voltage Regulator
used from 1961 - 1969
mechanical points
Maximum rotor amps: 2.7

Alternators produced in the 1970s were designed to be used with electronic voltage regulators. These are the two field-terminal alternators described in the section ***1970 - 1987 Two Field-Terminal Alternators***. The rotor field-coil amp draw is much higher than the 1960s rotors - some are as high as 7 amps. The transistors in the electronic voltage regulators are able to handle much higher current flow than points could.



Later Style Voltage Regulator
used from 1970 - 1987
solid-state electronic
Maximum rotor amps: 7.0

If you install an alternator with a high-amp rotor on a vehicle with a mechanical point-style voltage regulator, the voltage regulator will fail in a very short time. Some alternator remanufacturers sell only the 1970 - 1980 two field-terminal alternators with high-amp rotors. They include hardware and instructions on how to convert the two field-terminal alternator to a one field-terminal alternator. We do not recommend doing this, as it is sure to cause voltage regulator problems. If you have a 1960s car that keeps going through voltage regulators, rotor amp draw is the place to start looking. The best way to determine rotor amp draw is to remove the alternator and have it bench tested.

CHARGING SYSTEM TEST

At this point you have verified all the wiring and connections for the system you are checking.

The battery must be fully charged and load tested. The engine must be off. Be sure the alternator belt is properly tensioned. Connect the negative lead of a voltmeter to the negative battery post and the positive voltmeter lead to the positive battery post. Write down this reading - it will be referred to as ***base voltage***. Do both of the following tests:

LOAD TEST: Start the engine. Turn the headlights on and the heater/ac motor to high. Increase engine speed to 2000 RPM. Check the voltage across the battery terminals. See chart for results.

LOAD TEST VOLTAGE READINGS:	***RESULT:***
Voltage increases at least 0.5 volts over ***base voltage***	***Pass***
Voltage does not increase at least 0.5 volts over ***base voltage***	***Fail***

NO-LOAD TEST: Turn off the accessories, decrease engine speed to 1500 RPM and check the voltage across the battery terminals again. See chart for results.

NO-LOAD TEST VOLTAGE READINGS:	***RESULT:***
Voltage is less than 2.0 volts over ***base voltage***	***Pass***
Voltage is more than 2.0 volts over ***base voltage***	***Fail***

- ✓ ***If both LOAD TEST and NO-LOAD TEST Pass*** the charging system is working correctly.
- ✓ ***If LOAD TEST Fails*** remove the alternator and have it bench tested. Replace if bad and retest. If ***LOAD TEST*** still fails, replace the voltage regulator.
- ✓ ***If NO-LOAD TEST Fails*** replace the voltage regulator and retest.

About the author:

This Tech Basics guide was written by Wesley S. Grueninger. Wes has been in the rebuilding industry since 1975, the year he started Auto Lab. Auto Lab specializes in remanufacturing import alternators and starters in addition to stocking a full line of domestic units. Many hours of research have gone into the Tech Basics series and we want to hear from you if you have any suggestions or comments. Contact us at autolab@execpc.com.