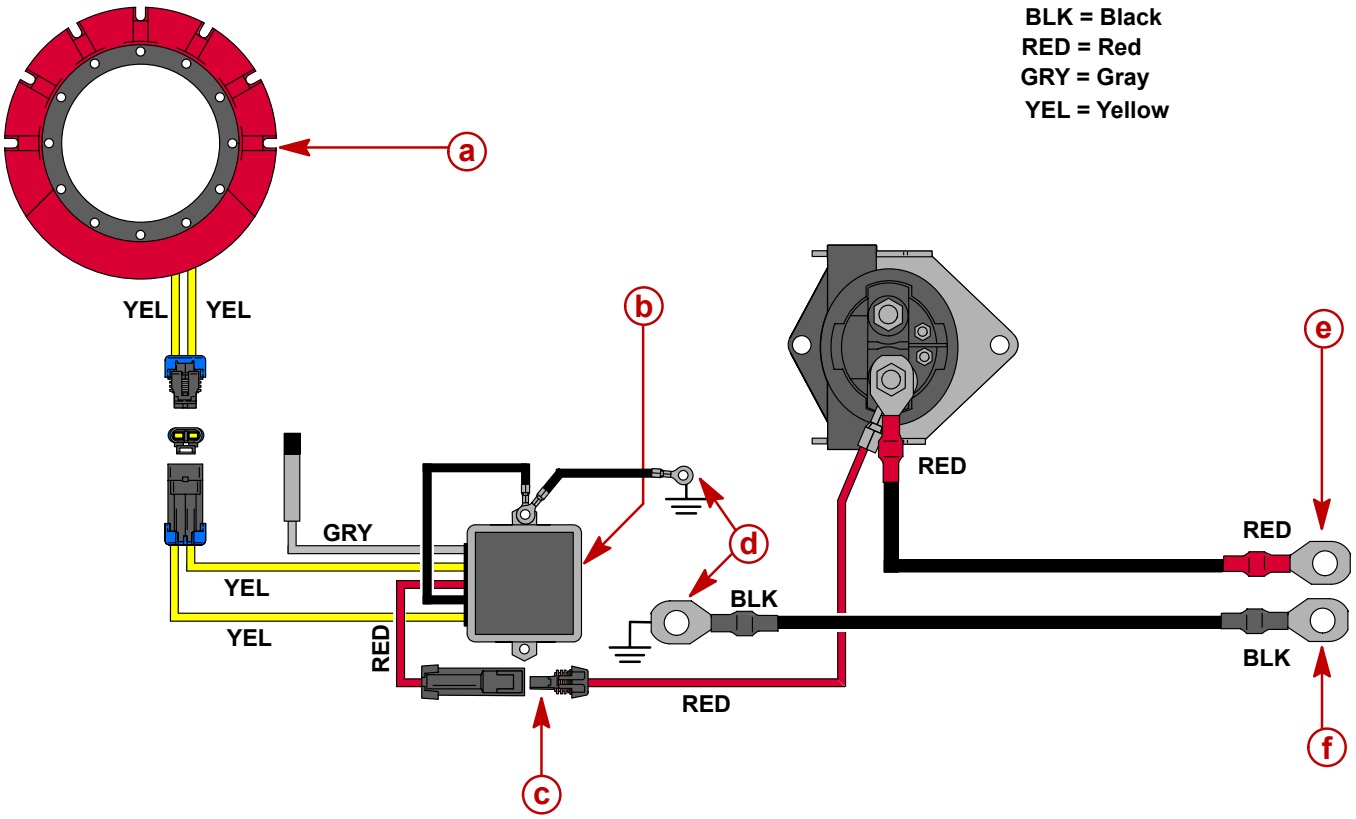
Battery Charging System

Description (20 Ampere)

The battery charging system components are the flywheel, stator, regulator/rectifier, and battery. Alternating current (generated in battery charge coils) flows to the regulator/rectifier, which changes the alternating current to a regulated direct current for charging the battery.

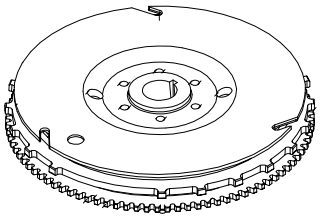
Wiring Diagram (20 Ampere)



a - Stator
b - Voltage Regulator/Rectifier
c - Connector
d - To Engine Ground
e - To Battery Positive **(Red)** Terminal
f - To Battery Negative (**Black**) Terminal

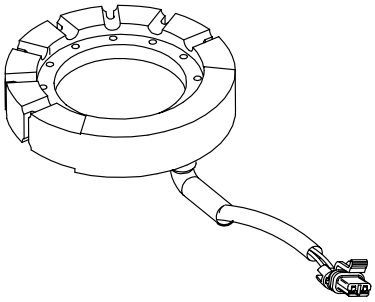
Charging System Description

Flywheel Assembly



The flywheel assembly contains six permanently charged magnet segments which are bonded and retained to the inner wall of the flywheel. Each magnet contains a north and a south pole providing a 12 pole system.

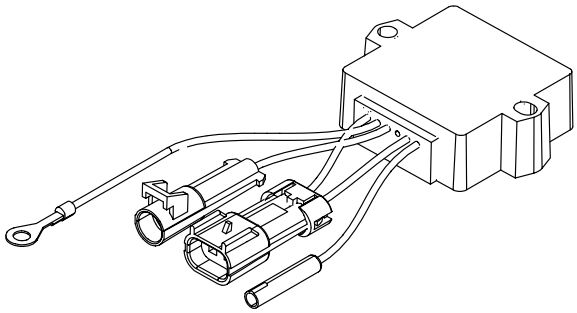
Stator Assembly



58489

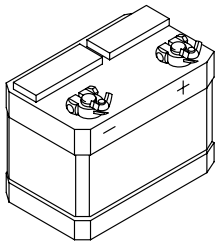
The stator assembly located under the flywheel contains the battery charge coils. As the flywheel permanent magnets pass the respective stator coil windings, an AC pulse current is produced at each coil winding when magnet polarity changes. (South to North), (North to South) etc.

Voltage Regulator/Rectifier Assembly



The voltage regulator converts the alternating current from the stator to direct current that can be stored in the battery.

Battery



A 12 volt battery with a minimum rating of 465 marine cranking amps (MCA) or 350 cold cranking amps (CCA). For operation below 32° F (0° C) a rating of 1000 Marine Cranking Amps (MCA) or 775 Cold Cranking Amps (CCA) is recommended.

Battery Charging System Troubleshooting

⚠ CAUTION

The charging system may be damaged by: 1) reversed battery cables, 2) an open circuit, such as a broken wire or loose connection.

A fault in the battery charging system usually will cause the battery to become undercharged. Check battery electrolyte level, and charge battery.

If battery will NOT accept a satisfactory charge, replace battery.

If battery accepts a satisfactory charge, determine the cause of the charging system problem as follows.

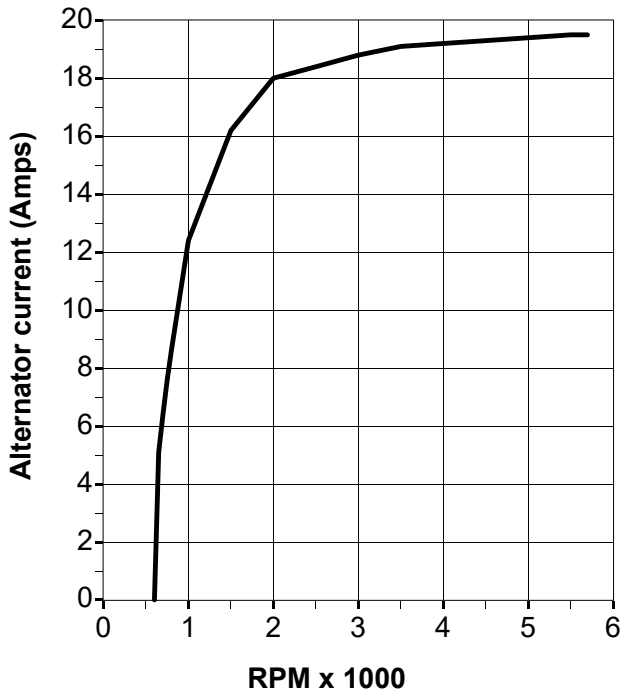
1. Check for correct battery polarity [RED cable to POSITIVE (+) battery terminal]. If polarity was incorrect, check for damaged regulator/rectifier. See “REGULATOR/RECTIFIER DIODE TEST”.
2. Check for loose or corroded battery connections.
3. Visually inspect wiring between stator and battery for cuts, chafing, and a disconnected, loose or corroded connection.
4. Excessive electrical load (from too many accessories) will cause battery to run down.

If visual inspection determines that battery connections and wiring are OK, perform the following stator and regulator/rectifier tests.

Alternator System Test

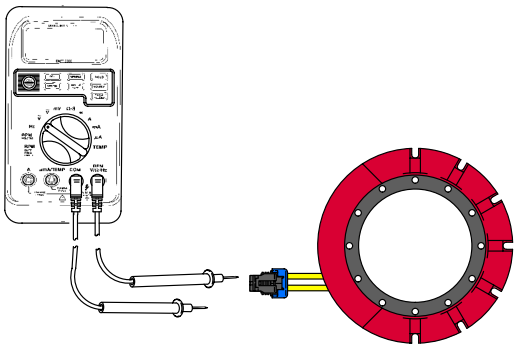
20 AMPERE STATOR

1. Check battery voltage at battery with engine running.
2. If battery voltage is above 15.0 volts, replace voltage regulator/rectifier. Check condition of battery as overcharging may have damaged battery.
3. If battery voltage is below 12.5 volts, charge battery. If battery can NOT be satisfactorily charged, replace battery.
4. If battery accepts a satisfactory charge, check battery voltage while cranking engine. If cranking voltage is not acceptable, replace battery.
5. If cranking voltage is acceptable, disconnect the RED (voltage regulator) connector.
6. Connect RED (+) ammeter lead to RED voltage regulator wire, and the BLACK (–) ammeter lead to the RED wiring harness wire.
7. Secure stator wires away from flywheel.
8. With engine running at the indicated RPM's, the ammeter should indicate the following appropriate amperes:



9. A reading of 19.5 amperes at 5000 RPM indicates the charging system is functioning properly.
10. If ammeter reads less than required amperes @ 5000 RPM, test the stator (refer to "**Stator Resistance Test**"). If stator tests OK, replace rectifier/regulator.

Stator Resistance Test - 20 Amp. Stator



METER TEST LEADS		METER SCALE (ANALOG)	READING (Ω)
RED	BLACK	RX1	0.20 - 0.30
YEL	YEL		

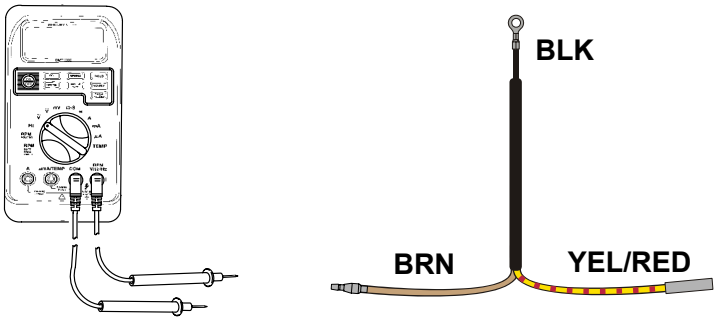
NOTE: *If using DMT 2000 turn the selector switch to Ω. Allow the meter to auto-range.*

Suppression Diode Tests

The suppression diode is located between the brown start solenoid lead, the yellow/red key switch lead (within the engine harness) and connects to engine ground. The purpose of the suppression diode is to eliminate the inductive spike created as the start solenoid is de-energized (key switch turned from START to RUN).

Symptoms of a failed suppression diode:

1. Open circuit - Longer crank times during engine start-up (3 seconds warm engine).
2. Short circuit - Blown fuse #3 (Main Power Relay/Accessory).



DIODE TEST

BLK	RED	YEL/RED	BRN	BLK
YEL/RED		X	0V or SHORT	0.4 - 0.8V
BRN		0V or SHORT	X	0.4 - 0.8V
BLK		OUCH, OL, ∞	OUCH, OL, ∞	X

RESISTANCE TEST

BLK	RED	YEL/RED	BRN	BLK
YEL/RED		X	< 0.5Ω	1 - 3MΩ

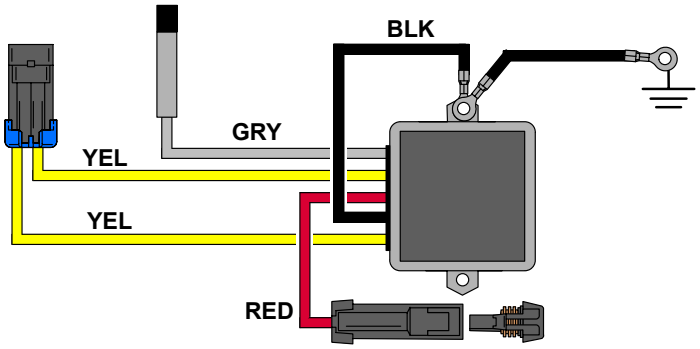
BRN	< 0.5Ω	X	1 - 3MΩ
BLK	OUCH, OL, ∞	OUCH, OL, ∞	X

Regulator/Rectifier (P/N 854514-1) Diode Test

ANALOG METER

NOTE: *Voltage regulator/rectifier specifications are given for informational purposes only. Use the appropriate troubleshooting techniques previously mentioned to find the faulty component in the charging system.*

BLK = Black
GRY = Gray
RED = Red
YEL = Yellow



DIODE TEST:

1. Set Ohm meter to R X 10 scale.
2. Connect Red (+) meter lead to RED regulator lead.
3. Connect Black (–) meter lead to either YELLOW regulator lead.

TEST RESULTS:
100 - 400 OHMS

DIODE TEST:

1. Set Ohm meter to R X 1k scale.
2. Connect Black (–) meter lead to RED regulator lead.
3. Connect Red (+) meter lead to YELLOW regulator lead. Test. Then change Red (+) meter lead to the other YELLOW regulator lead for 2ND test reading.

TEST RESULTS (1ST READING):
20,000 to ∞OHMS

TEST RESULTS (2ND READING):
∞OHMS (No needle movement)

SCR TEST:

1. Set Ohm meter to R X 1k scale.
2. Connect Red (+) meter lead to regulator case.
3. Connect Black (–) meter lead to one YELLOW regulator lead. Test. Connect Black (–) meter lead to the other YELLOW lead.

TEST RESULTS (BOTH TESTS):
8,000 - 15,000 OHMS (8k - 15K)