

TROUBLE SHOOTING GUIDE

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| PROBLEM | PROBABLE CAUSE | REMEDY |
|---------------------------------|---|--|
| Starter Motor does not energize | <ol style="list-style-type: none"> 1. P.T.O. engaged 2. Brake pedal not depressed 3. Corroded or loose electrical connections 4. Discharged battery 5. Defective switches P.T.O. interlock, brake interlock ignition switch, etc. 6. Defective solenoid | <ol style="list-style-type: none"> 1. Disengage P.T.O. 2. Depress brake pedal and lock 3. Clean and tighten 4. Locate problem and recharge 5. Check and replace if necessary 6. Check and replace if necessary |
| Starter Motor turns too slow | <ol style="list-style-type: none"> 1. Weak or partially discharged battery 2. Corroded or loose electrical connections | <ol style="list-style-type: none"> 1. Check battery charge or replace if necessary 2. Clean and tighten |
| Battery discharges rapidly | <ol style="list-style-type: none"> 1. Low water level 2. Low or no output from alternator 3. Short in electrical system | <ol style="list-style-type: none"> 1. Check and refill 2. Check output and repair if necessary 3. Check out and repair |
| Battery will not charge | <ol style="list-style-type: none"> 1. Dirt and moisture on case 2. Corroded or loose battery terminals 3. Defective battery 4. No alternator output 5. Defective rectifier-regulator | <ol style="list-style-type: none"> 1. Clean case 2. Clean and tighten 3. Replace battery 4. Check out alternator and repair or replace 5. Check out rectifier-regulator, replace if necessary |
| Lights not operating | <ol style="list-style-type: none"> 1. Bulbs burned out 2. Loose or poorly connected wire 3. Circuit breaker defective | <ol style="list-style-type: none"> 1. Replace bulbs 2. Install properly and tighten 3. Check out circuit breaker, replace if necessary |

CHARGING CIRCUIT 1886s-05 & 06

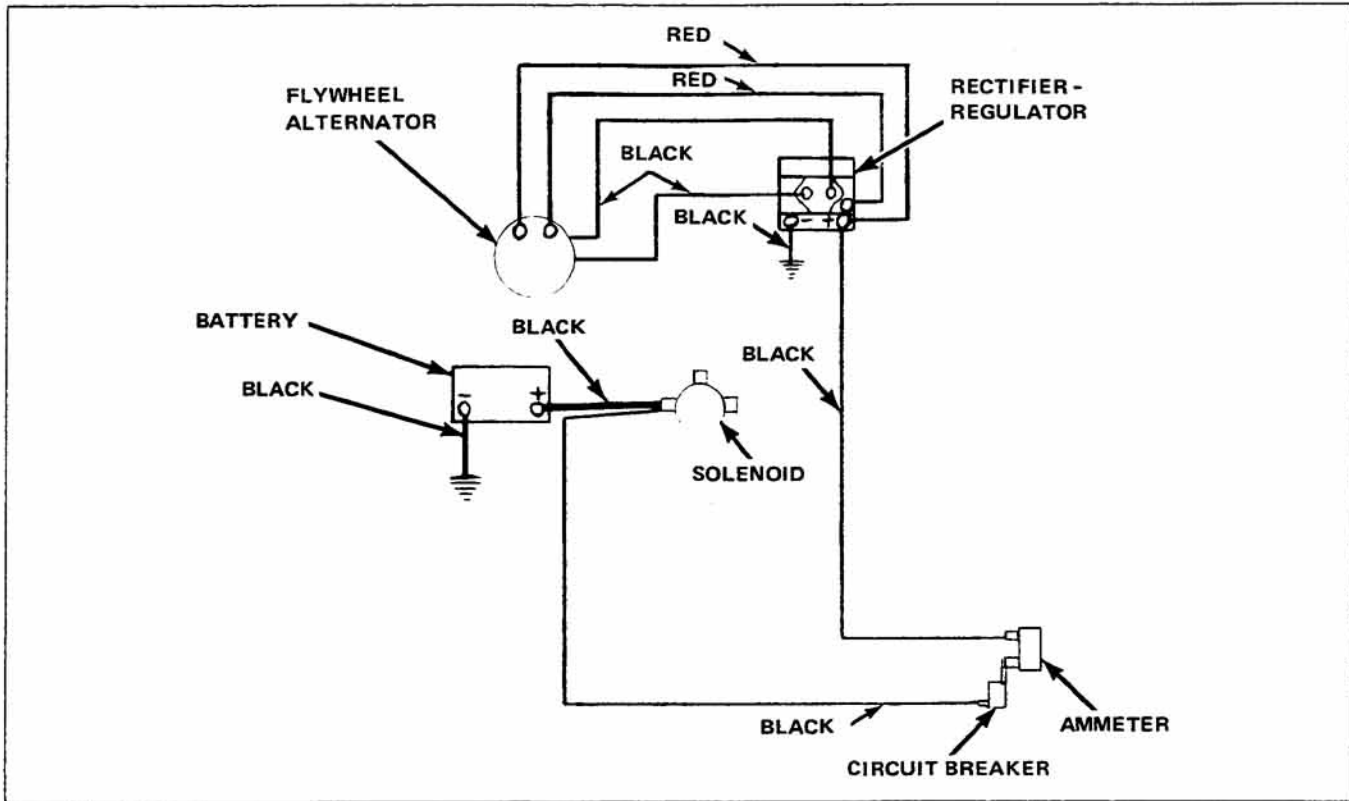
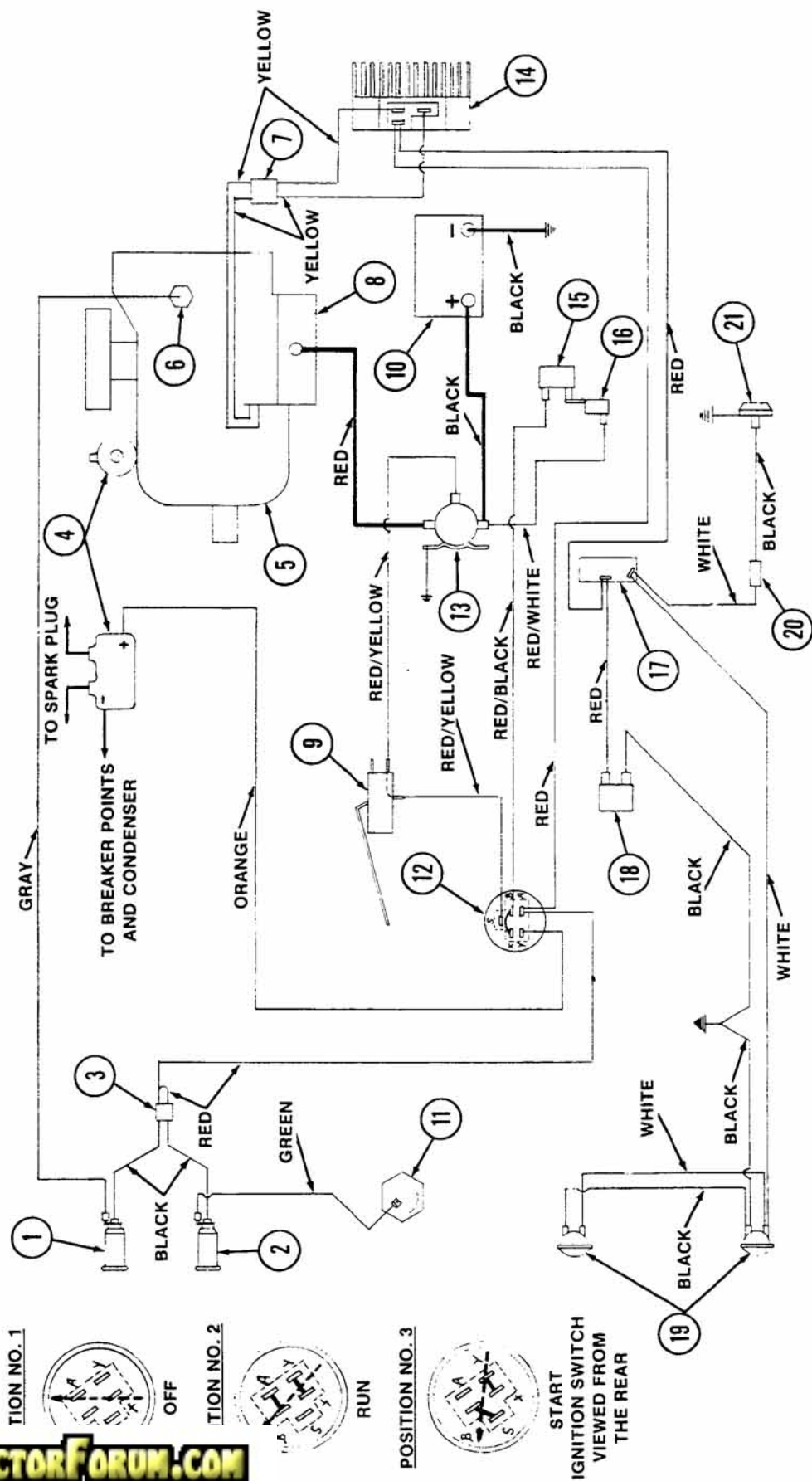


FIGURE 2-4

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ELECTRICAL SYSTEM (Continued)

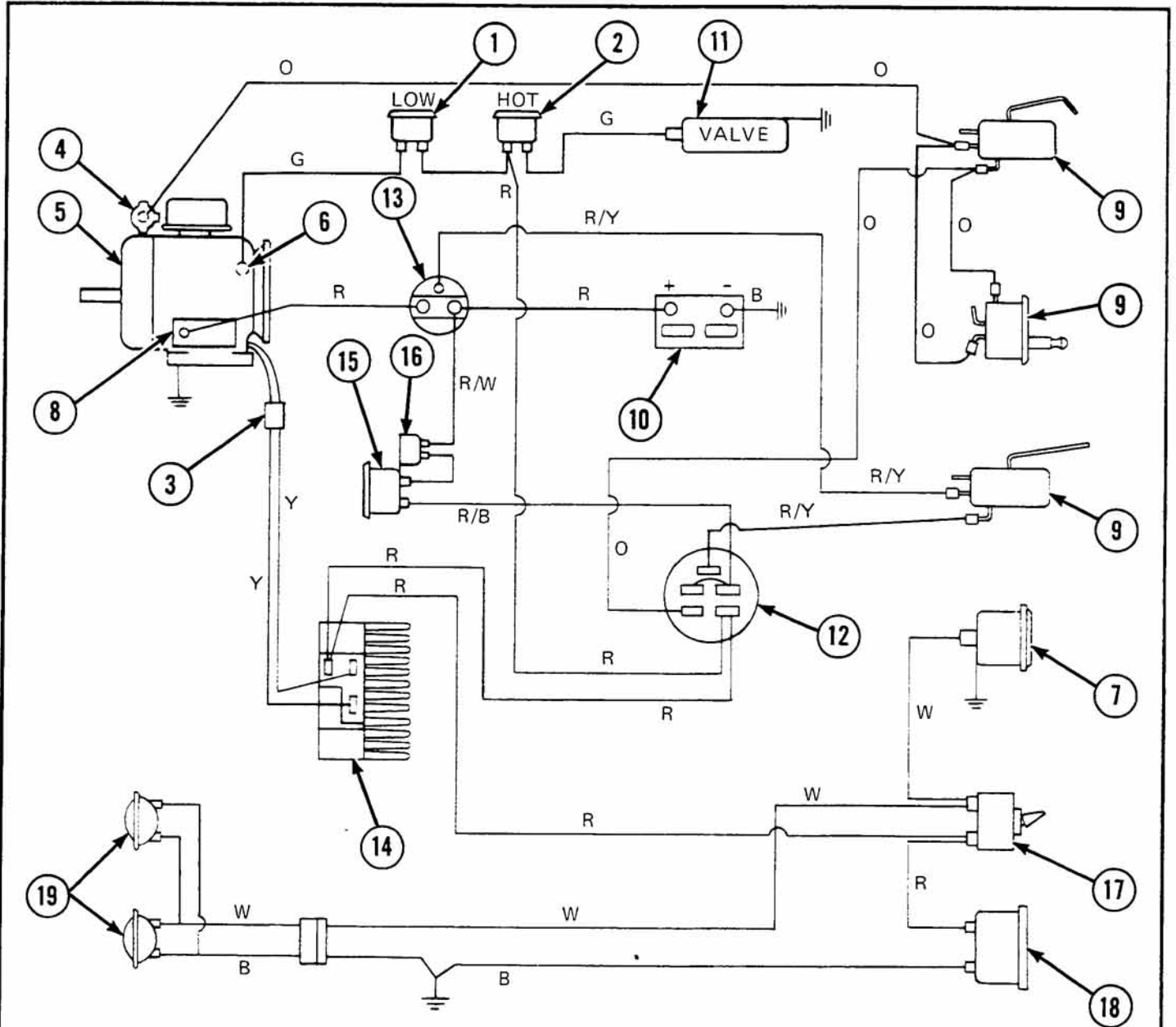
WIRING DIAGRAM 2086 & 2087 S/N 0100101 TO 0399999



- | | | |
|-------------------------|---------------------------|-------------------------|
| 1. OIL PRESSURE LIGHT | 8. STARTER | 15. AMMETER |
| 2. HEAT INDICATOR LIGHT | 9. INTERLOCK SWITCH | 16. CIRCUIT BREAKER |
| 3. CONNECTOR | 10. BATTERY | 17. LIGHT SWITCH |
| 4. IGNITION COIL | 11. HEAT INDICATOR SWITCH | 18. OPTIONAL HOUR METER |
| 5. ENGINE | 12. IGNITION SWITCH | 19. HEAD LIGHTS |
| 6. OIL PRESSURE SWITCH | 13. SOLENOID | 20. CONNECTOR |
| 7. CONNECTOR | 14. RECTIFIER — REGULATOR | 21. TAIL LIGHT |

FIGURE 2-5

WIRING DIAGRAM 2087 S/N 0400101 AND UP & 2389



- 1. OIL PRESSURE LIGHT
- 2. HEAT INDICATOR LIGHT
- 3. CONNECTOR
- 4. IGNITION COIL
- 5. ENGINE
- 6. OIL PRESSURE SWITCH
- 7. TAIL LIGHT
- 8. STARTER
- 9. INTERLOCK SWITCH
- 10. BATTERY
- 11. HEAT INDICATOR SWITCH
- 12. IGNITION SWITCH
- 13. SOLENOID
- 14. RECTIFIER - REGULATOR
- 15. AMMETER
- 16. CIRCUIT BREAKER
- 17. LIGHT SWITCH
- 18. HOUR METER
- 19. HEAD LIGHTS

COLOR CODE

- GY - GRAY
- G - GREEN
- W - WHITE
- R - RED
- B - BLACK
- O - ORANGE
- Y - YELLOW
- R/W - RED/WHITE
- R/B - RED/BLACK
- R/Y - RED/YELLOW

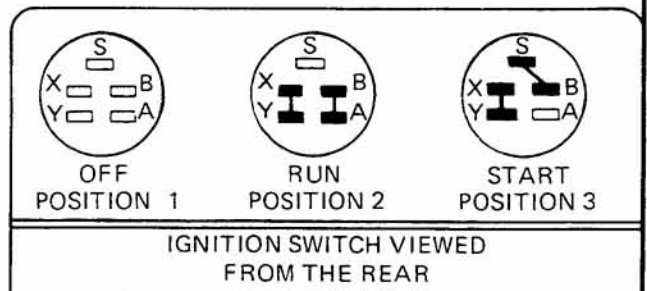
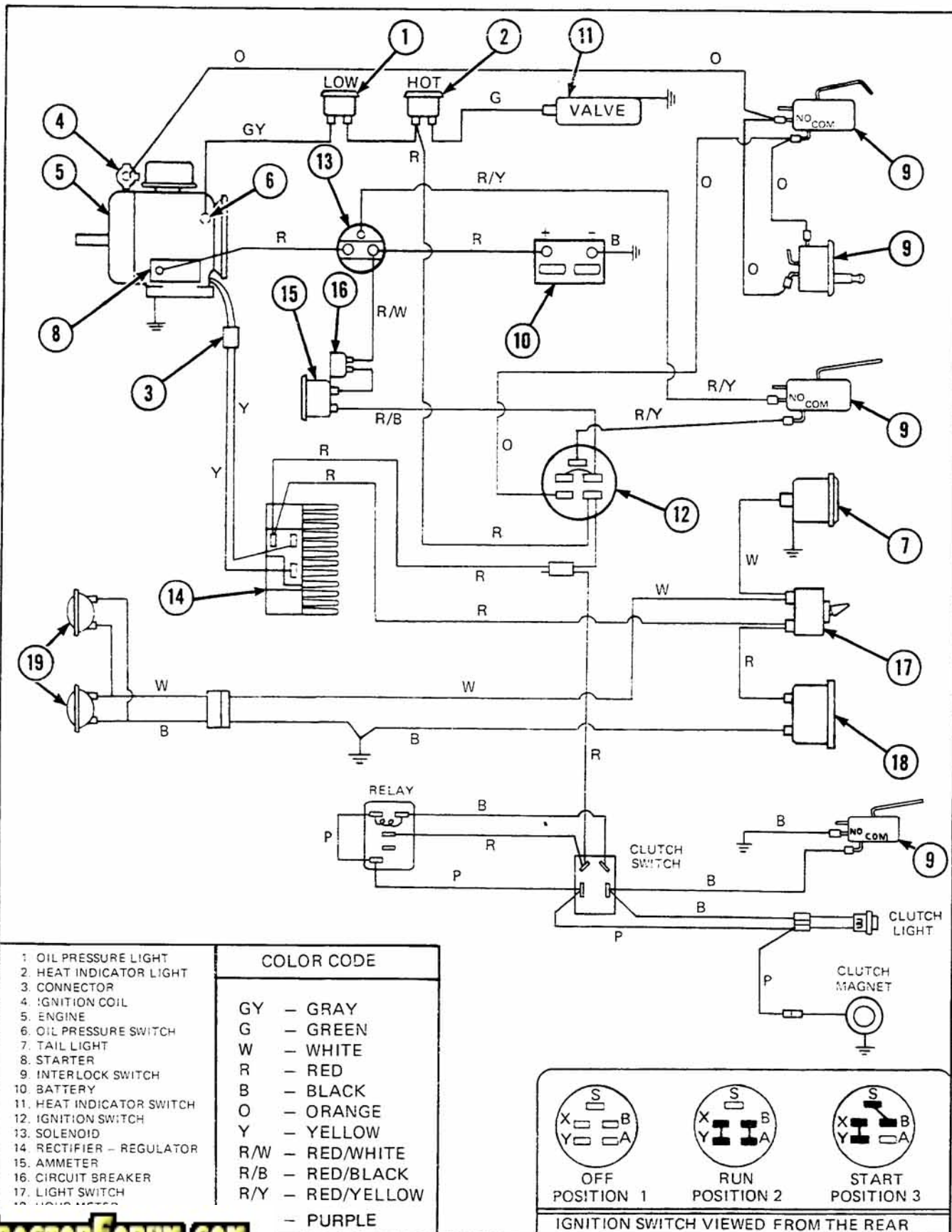


FIGURE 2-5A

ELECTRICAL SYSTEM (Continued)

WIRING DIAGRAM 2389s S/N 0100101 and later



LIGHT CIRCUIT 2086, 2087, 2389 & 2389s

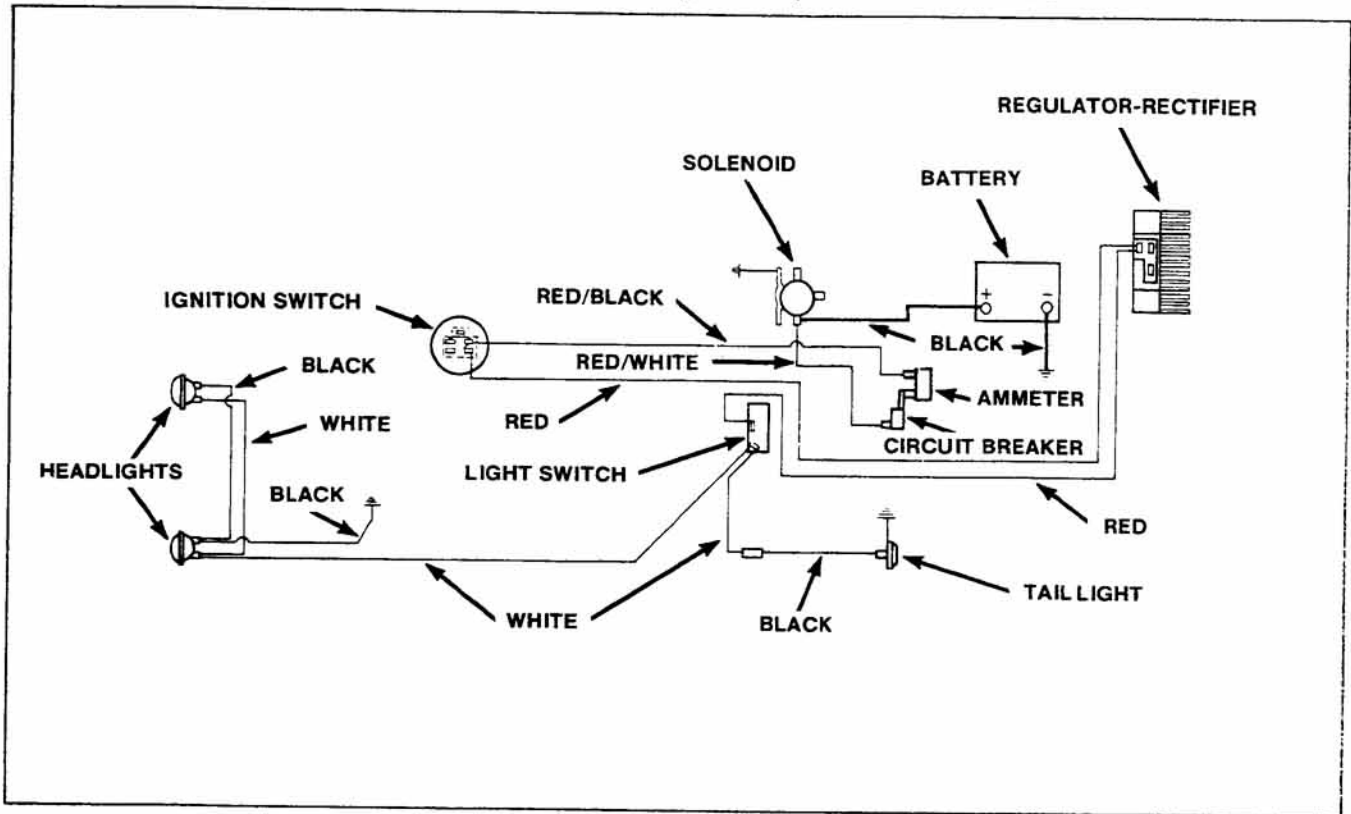


FIGURE 2-6

START-RUN CIRCUIT 2086 & 2087 S/N 0100101 THRU 0399999

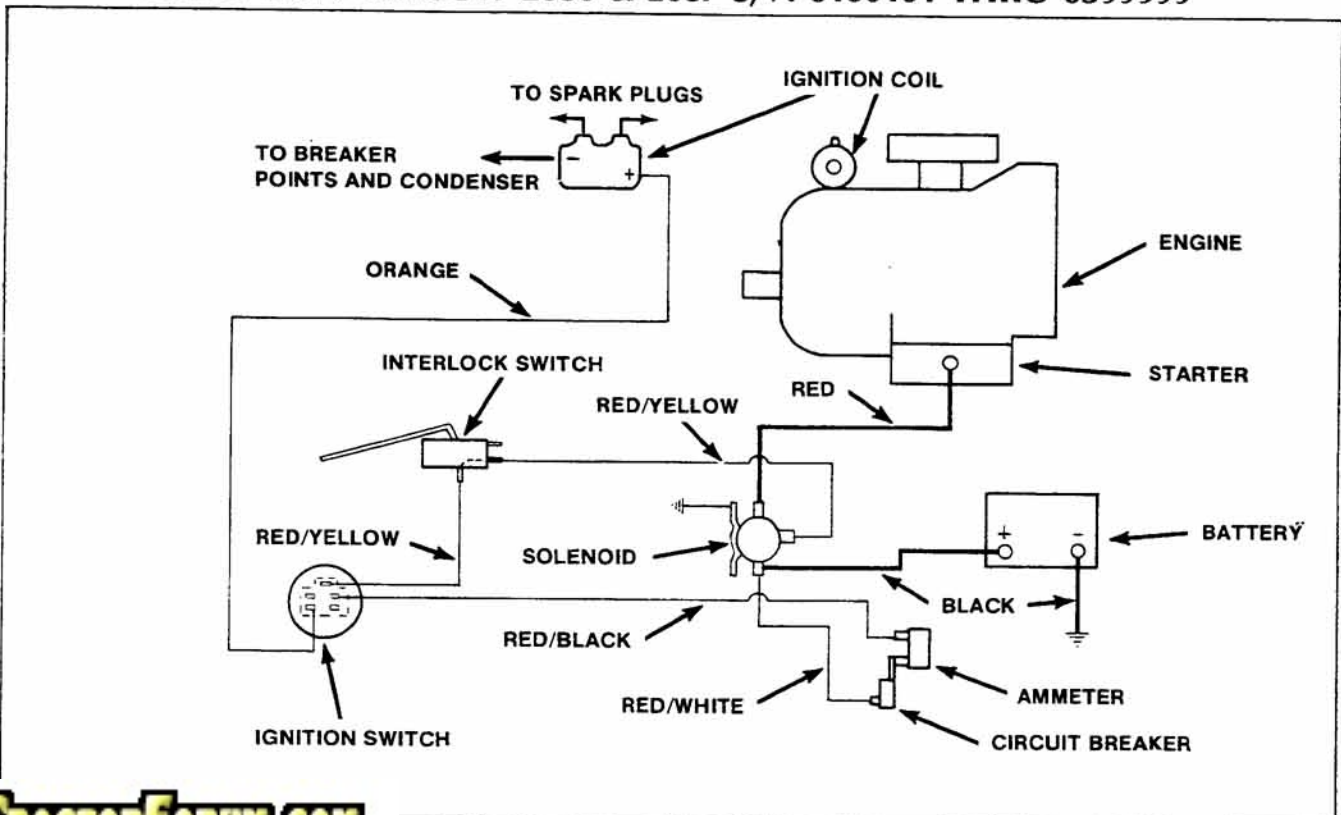
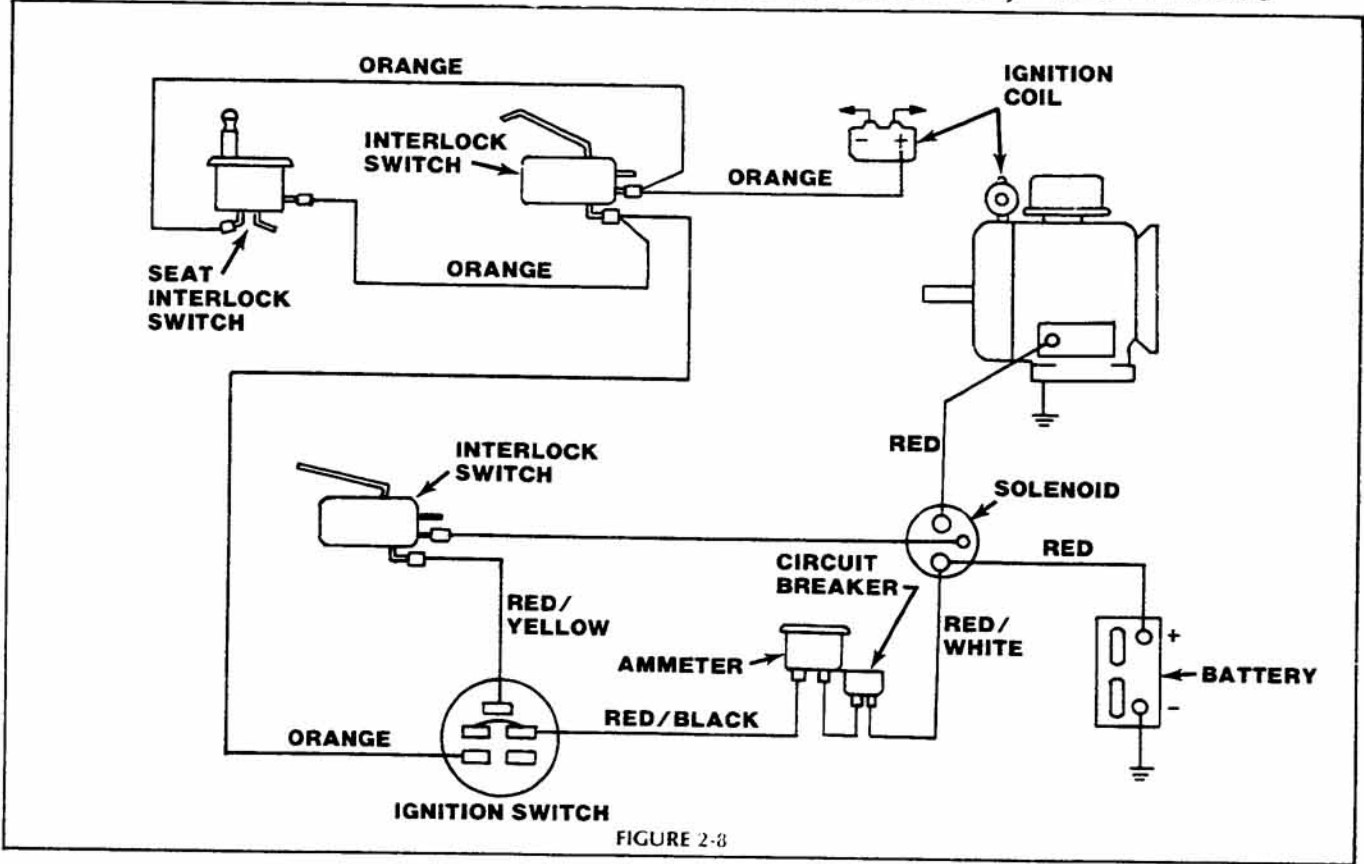


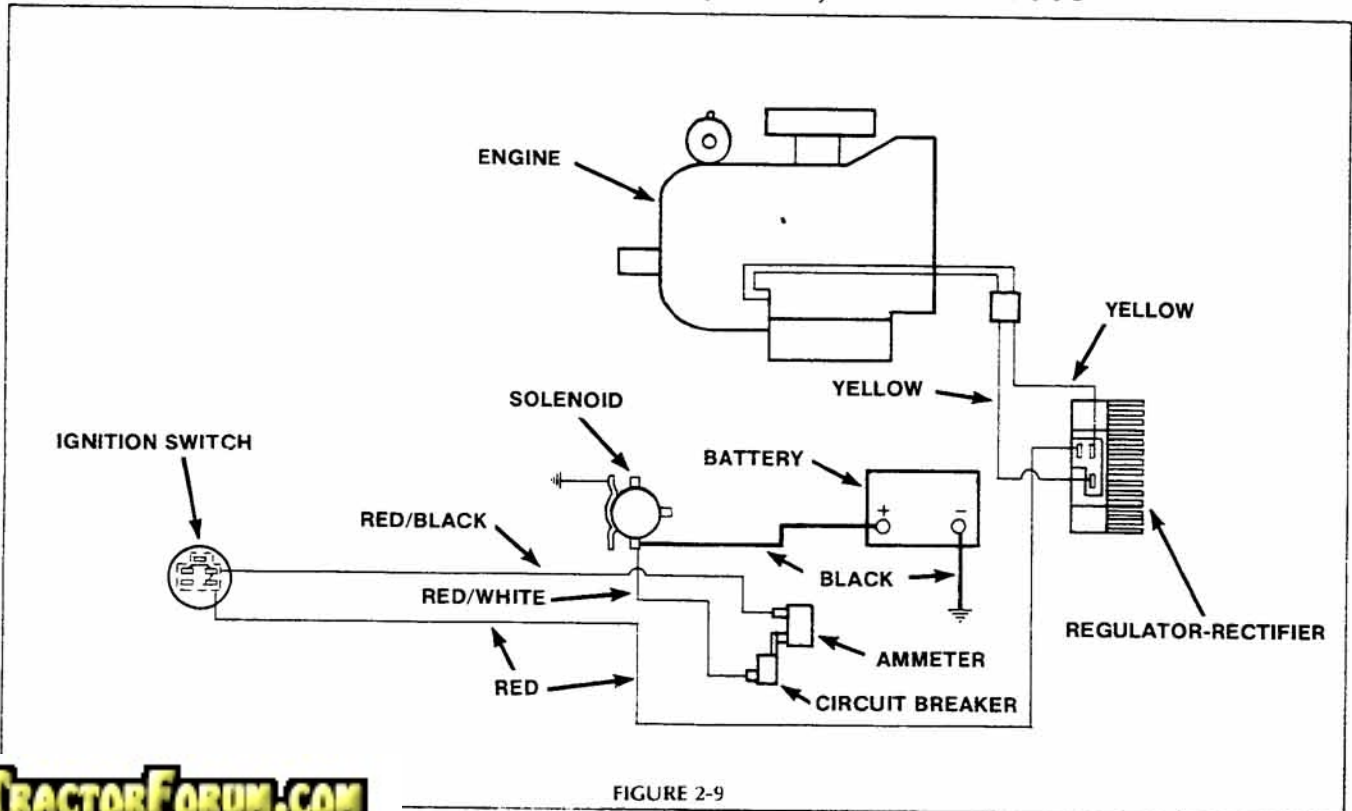
FIGURE 2-7

ELECTRICAL SYSTEM (Continued)

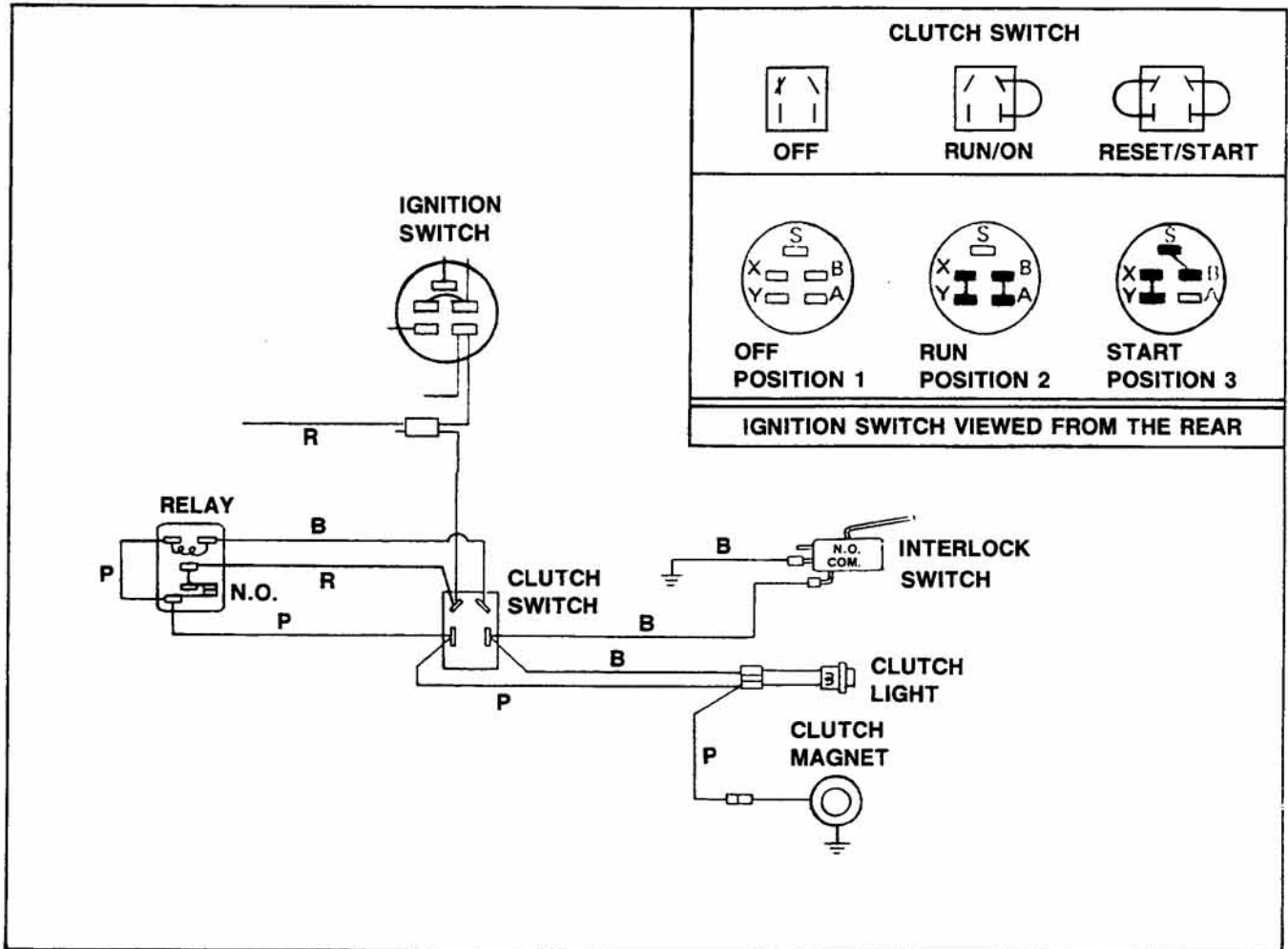
START-RUN CIRCUIT 2087 S/N 0400101 AND UP, 2389 & 2389s



CHARGING CIRCUIT 2086, 2087, 2389 & 2389s

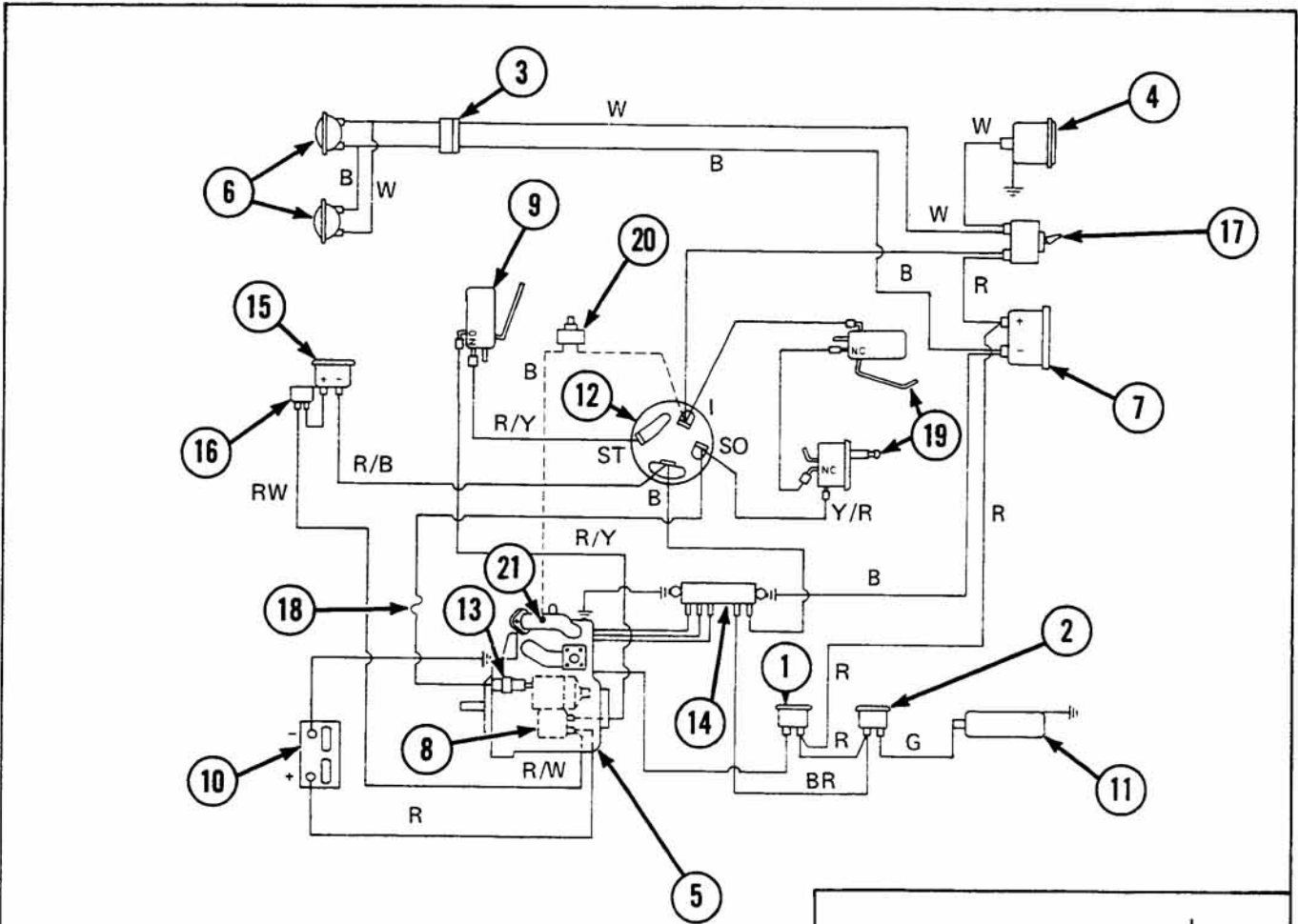


CRUISE CONTROL CLUTCH CIRCUIT



ELECTRICAL SYSTEM (Continued)

WIRING DIAGRAM 2288 & 2289 S/N 0100101 - 0199999



1. OIL PRESSURE LIGHT
2. HEAT INDICATOR LIGHT
3. CONNECTOR
4. TAIL LIGHT
5. ENGINE
6. HEAD LIGHTS
7. HOUR METER
8. STARTER
9. INTERLOCK SWITCH (PTO BRAKE)
10. BATTERY
11. HEAT INDICATOR SWITCH
12. IGNITION SWITCH
13. SOLENOID (2288 ONLY)
14. RECTIFIER - REGULATOR
15. AMMETER
16. CIRCUIT BREAKER
17. LIGHT SWITCH
18. FUSE 6A (2288 ONLY)
19. INTERLOCK SWITCH NOT FUNCTIONAL ON 2288
20. COLD START SWITCH (PART OF COLD START KIT)
21. THERMOSTART PLUG (PART

COLOR CODE

- GY - GRAY
- G - GREEN
- W - WHITE
- R - RED
- BR - BROWN
- O - ORANGE
- Y/R - YELLOW/RED
- R/W - RED/WHITE
- R/B - RED/BLACK
- R/Y - RED/YELLOW

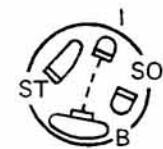
STOP
POSITION
(MODEL 2289
ONLY)



OFF
POSITION



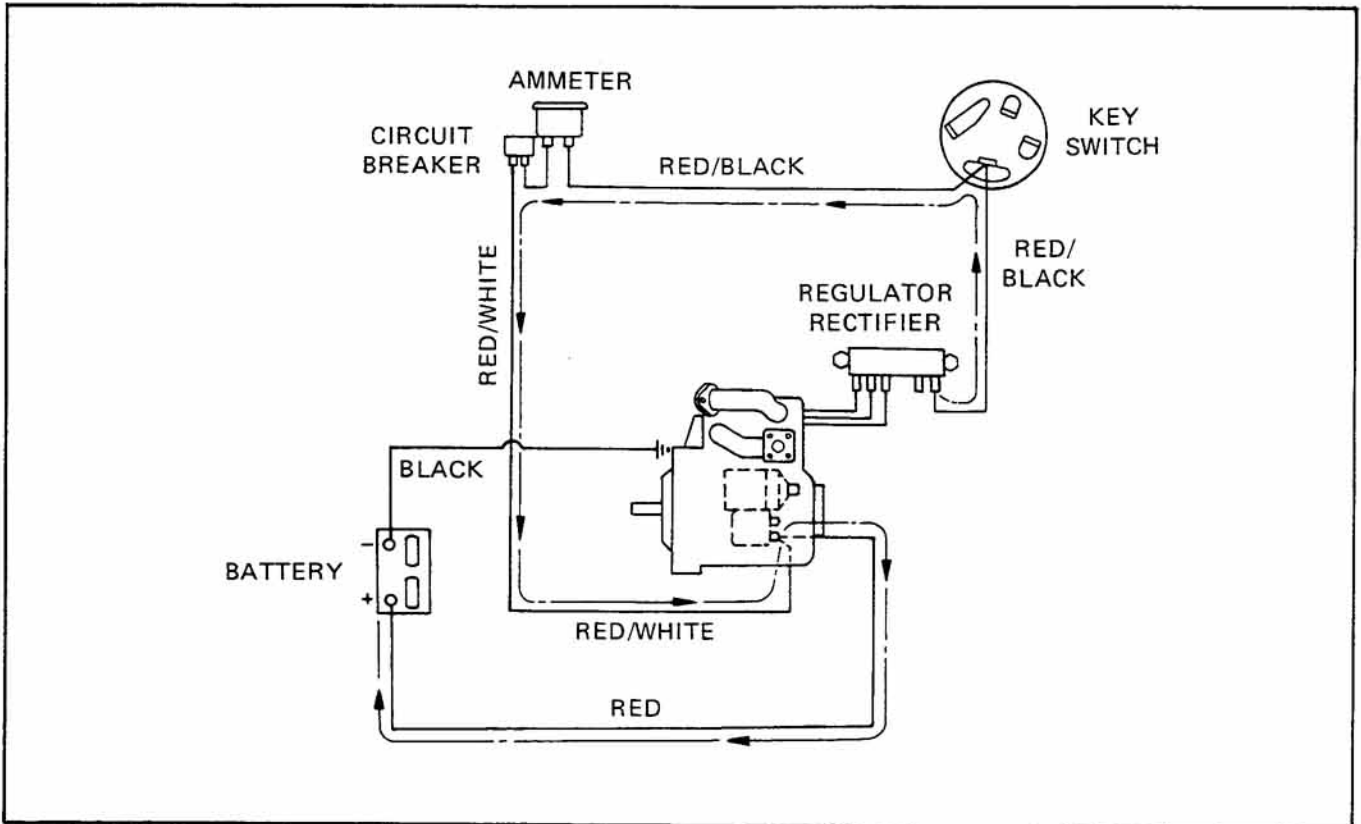
RUN
POSITION



START
POSITION

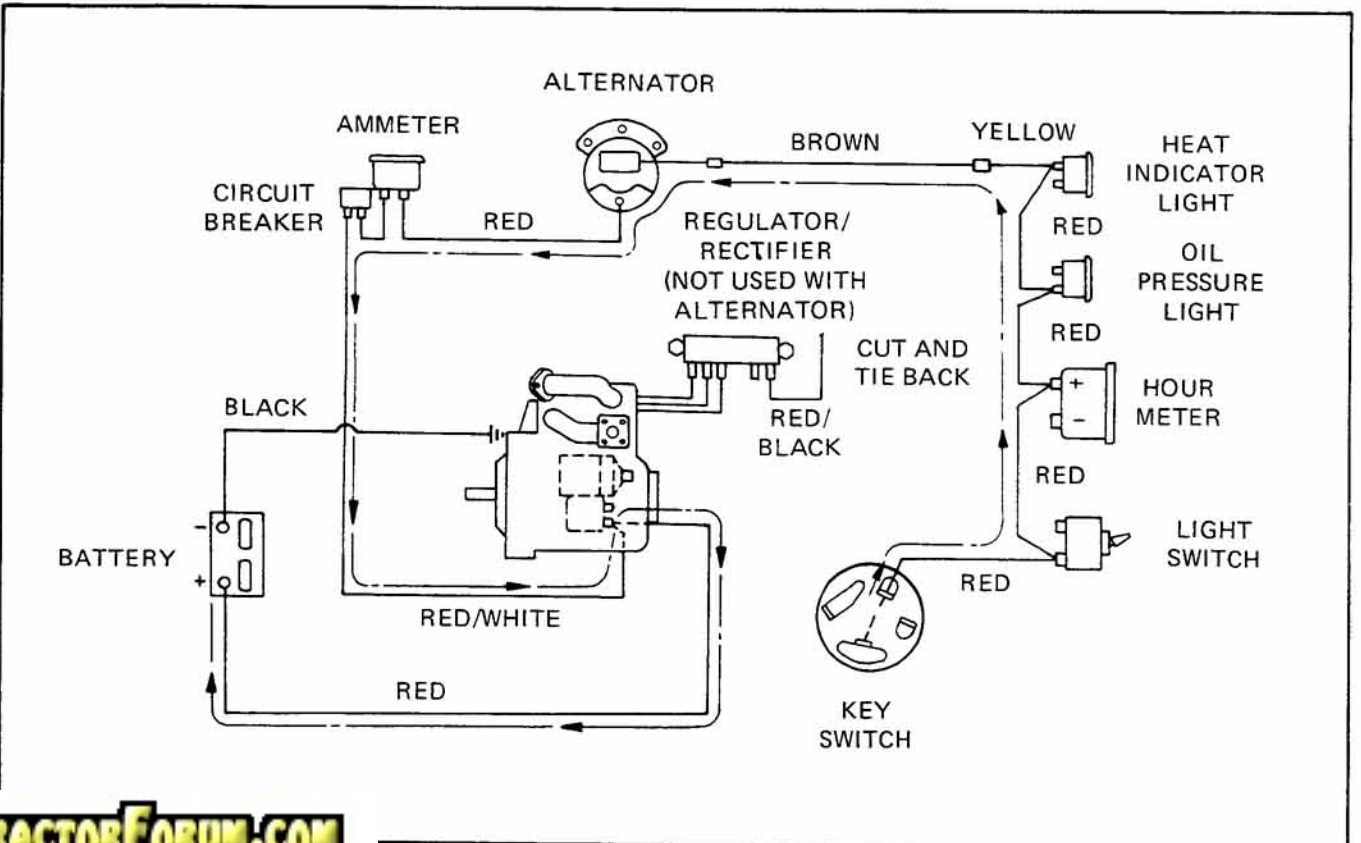


CHARGING CIRCUIT 2288 & 2289 S/N 0100101 THRU 0199999



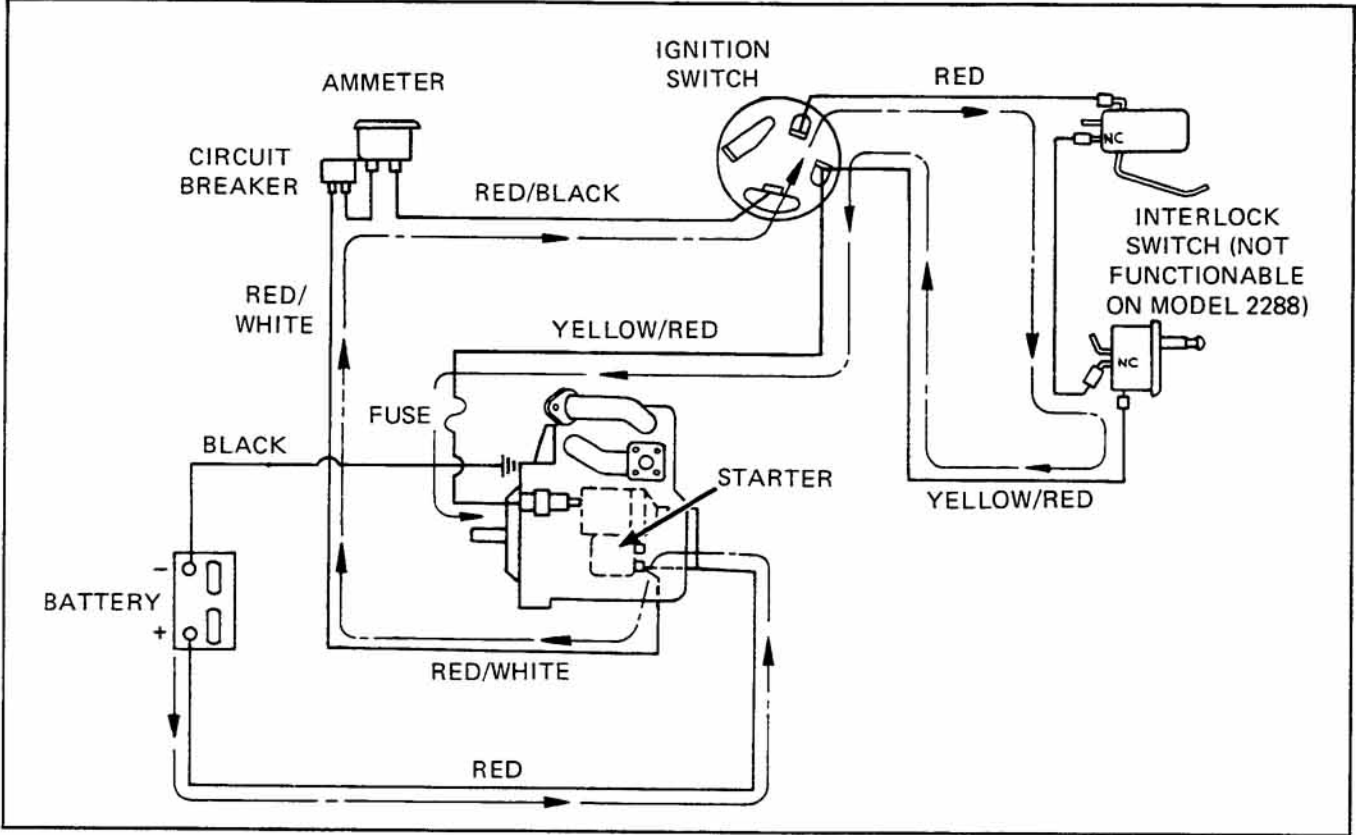
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CHARGING CIRCUIT 2288 & 2289 S/N 0100101 thru 0199999 (with Alternator Kit Model 18317)

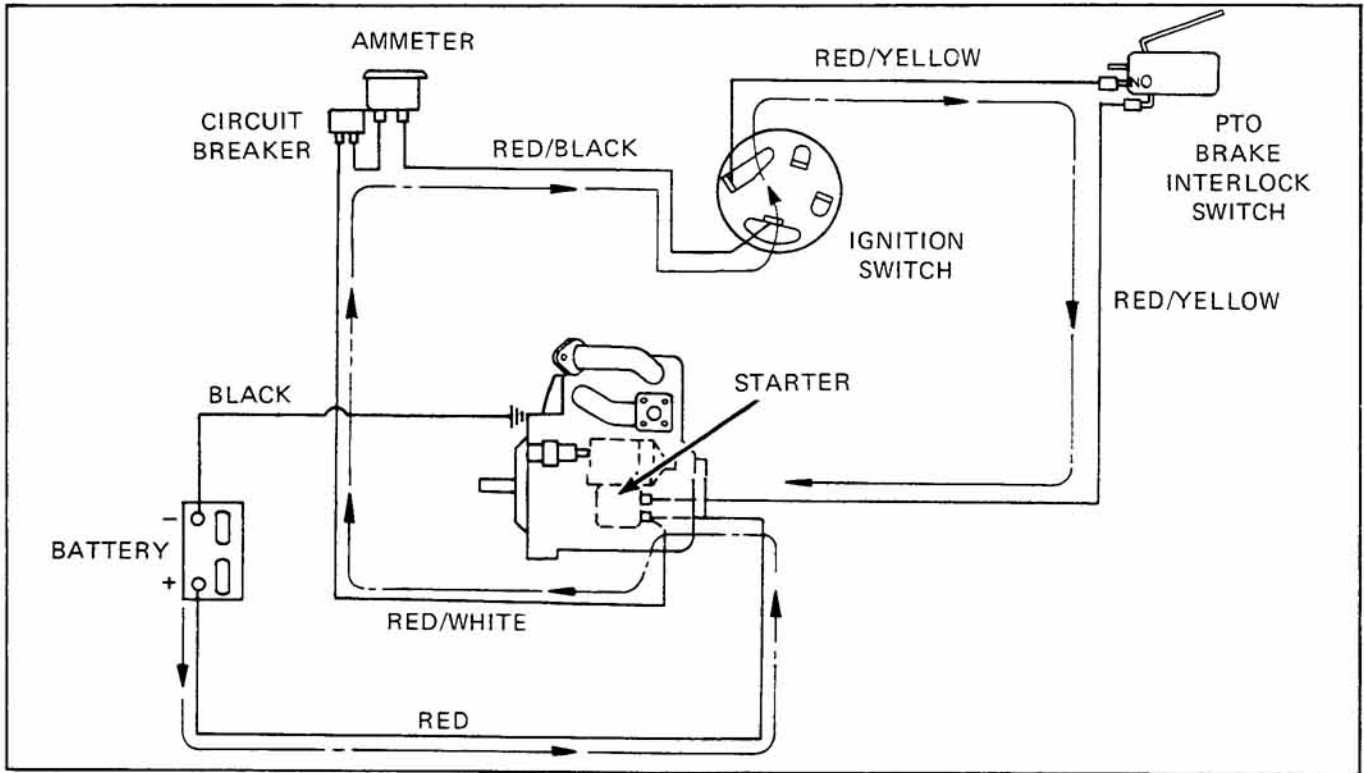


ELECTRICAL SYSTEM (Continued)

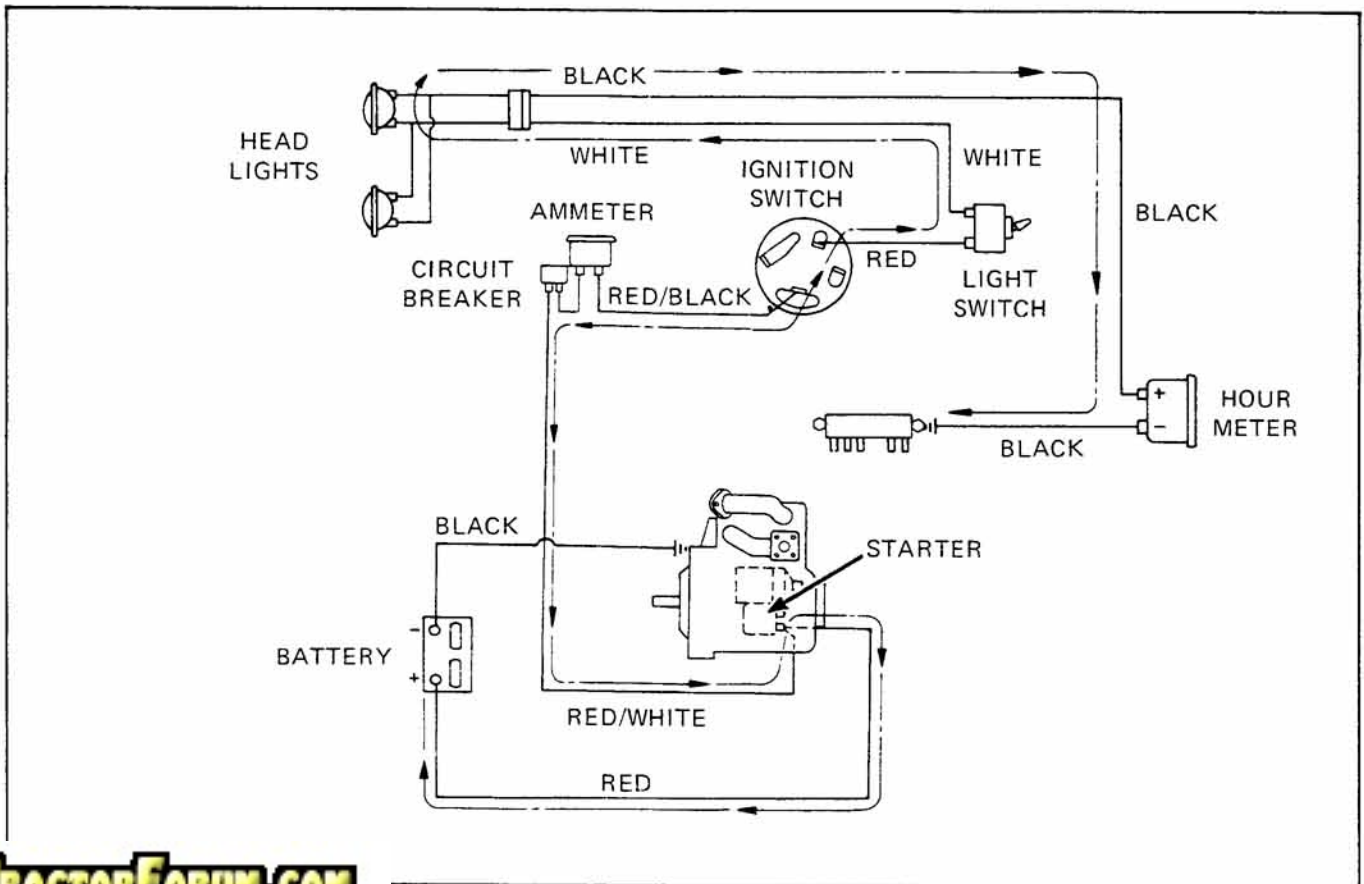
SEAT CIRCUIT 2288 & 2289 S/N 0100101 AND UP



START CIRCUIT MODELS 2288 & 2289 S/N 0100101 AND UP



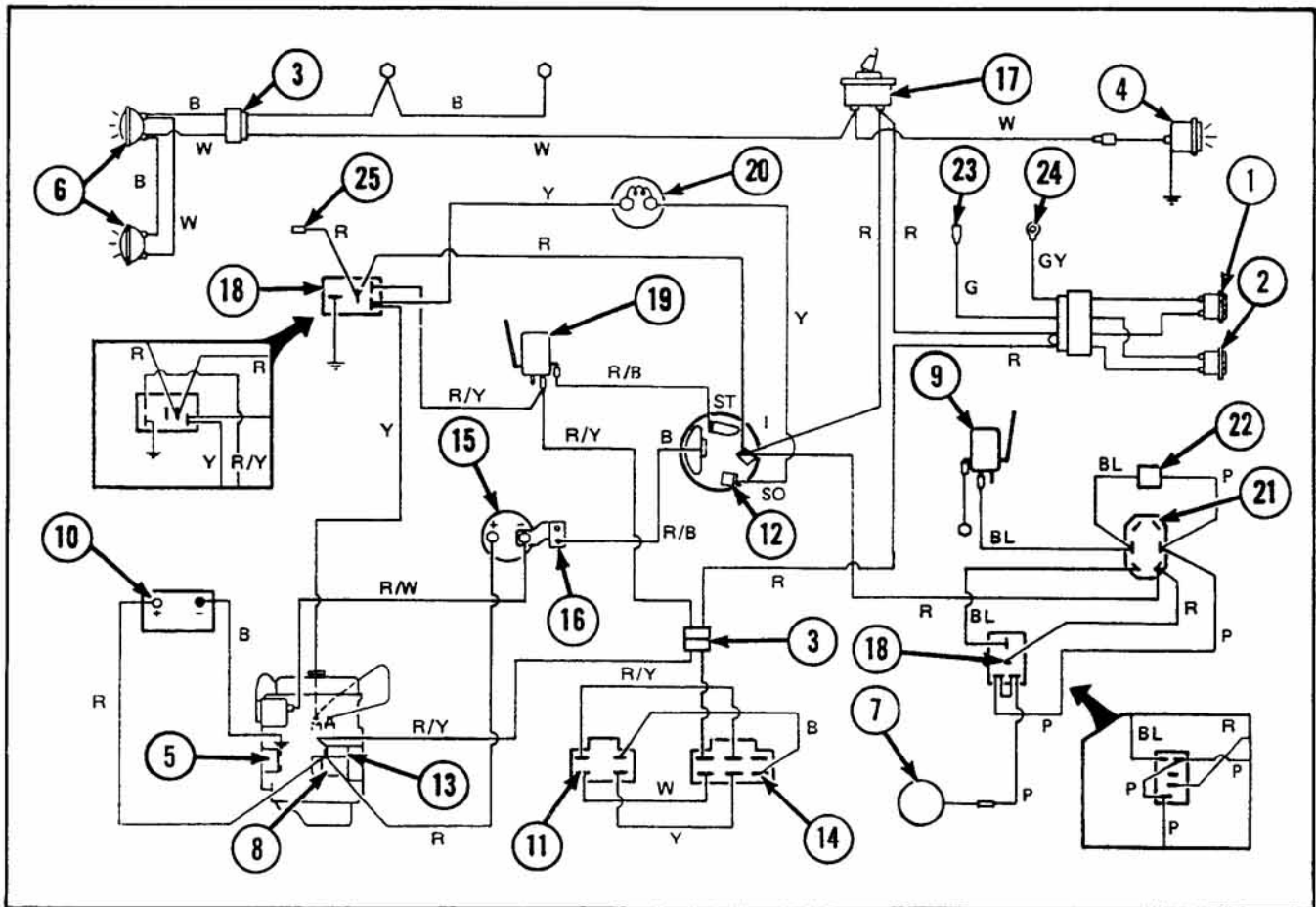
LIGHT CIRCUIT MODELS 2288 & 2289 S/N 0100101 AND UP



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GROUP II. ELECTRICAL SYSTEM

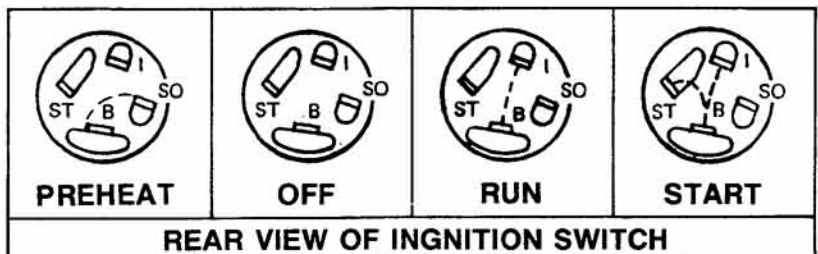
WIRING DIAGRAM MODEL 2388s



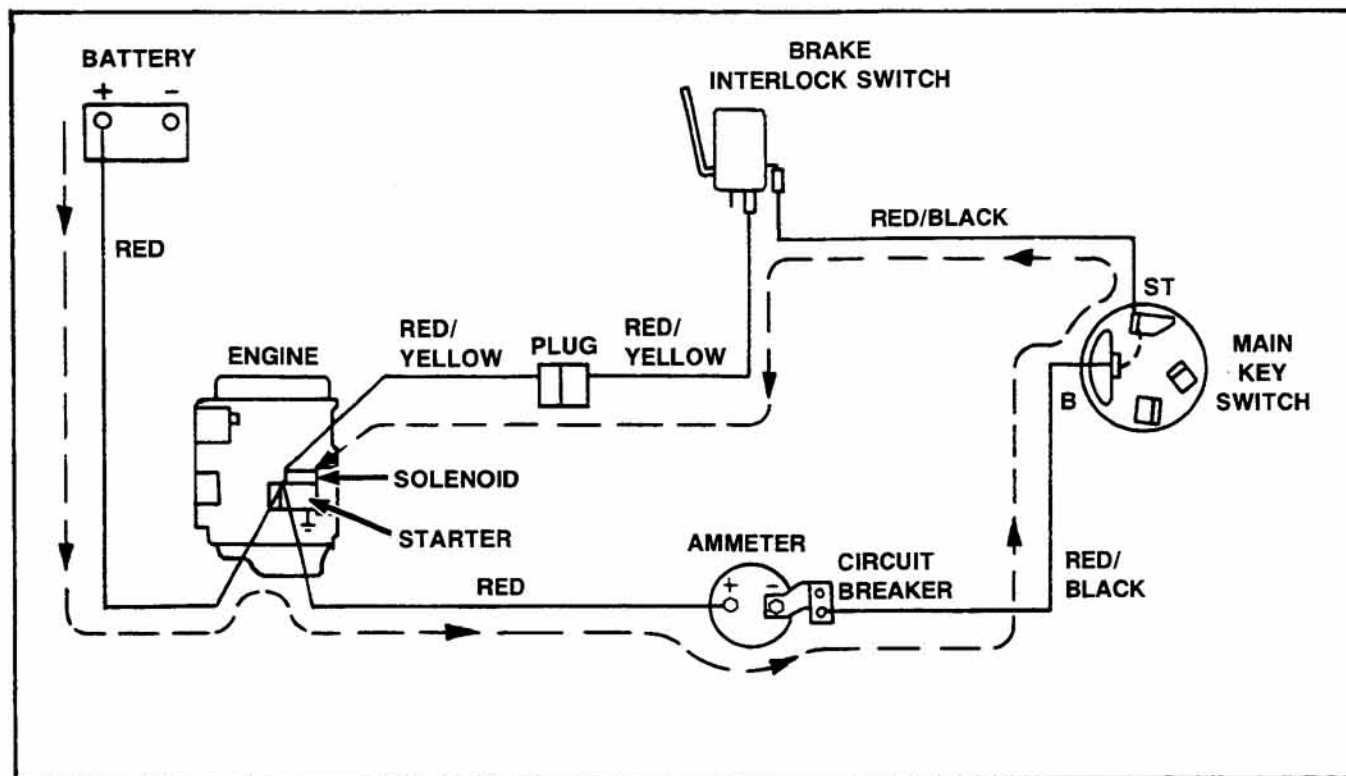
1. OIL PRESSURE LIGHT
2. HEAT INDICATOR LIGHT
3. CONNECTOR
4. TAIL LIGHT
5. ENGINE
6. HEADLIGHTS
7. SPEED CLUTCH
8. STARTER
9. INTERLOCK SWITCH
10. BATTERY
11. ALTERNATOR PLUG
12. MAIN SWITCH
13. SOLENOID
14. REGULATOR PLUG
15. AMMETER
16. CIRCUIT BREAKER
17. LIGHT SWITCH
18. RELAY
19. INTERLOCK SWITCH (BRAKE)
20. GLOW PLUG
21. SPEED SWITCH
22. SWITCH LIGHT
23. HYDROSTATIC TEMP.
24. OIL PRESSURE

COLOR CODE

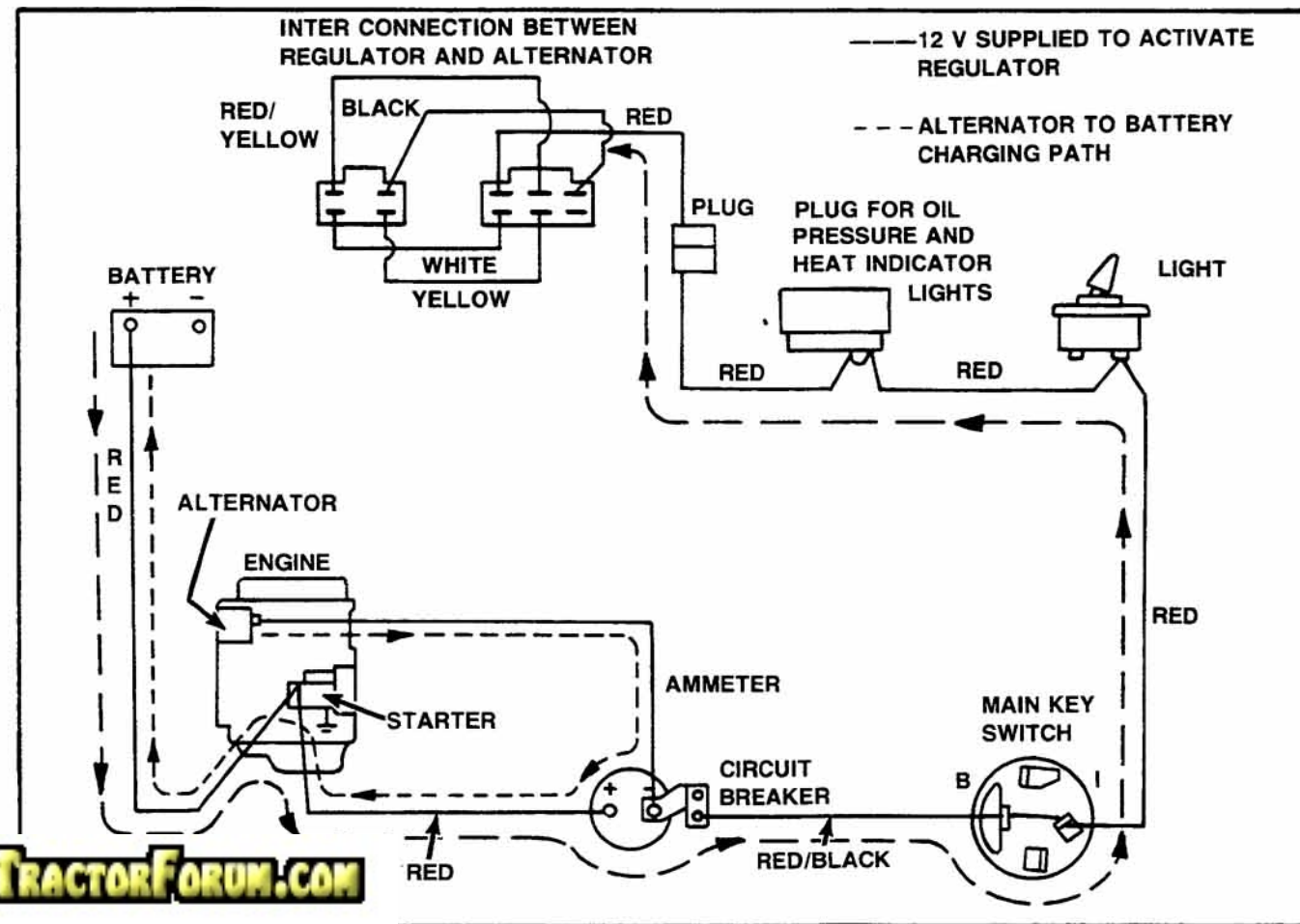
| | |
|-----|------------|
| R/B | RED/BLUE |
| GY | GRAY |
| G | GREEN |
| W | WHITE |
| R | RED |
| R/W | RED/WHITE |
| R/B | RED/BLACK |
| R/Y | RED/YELLOW |
| P | PURPLE |



STARTING CIRCUIT 2388s

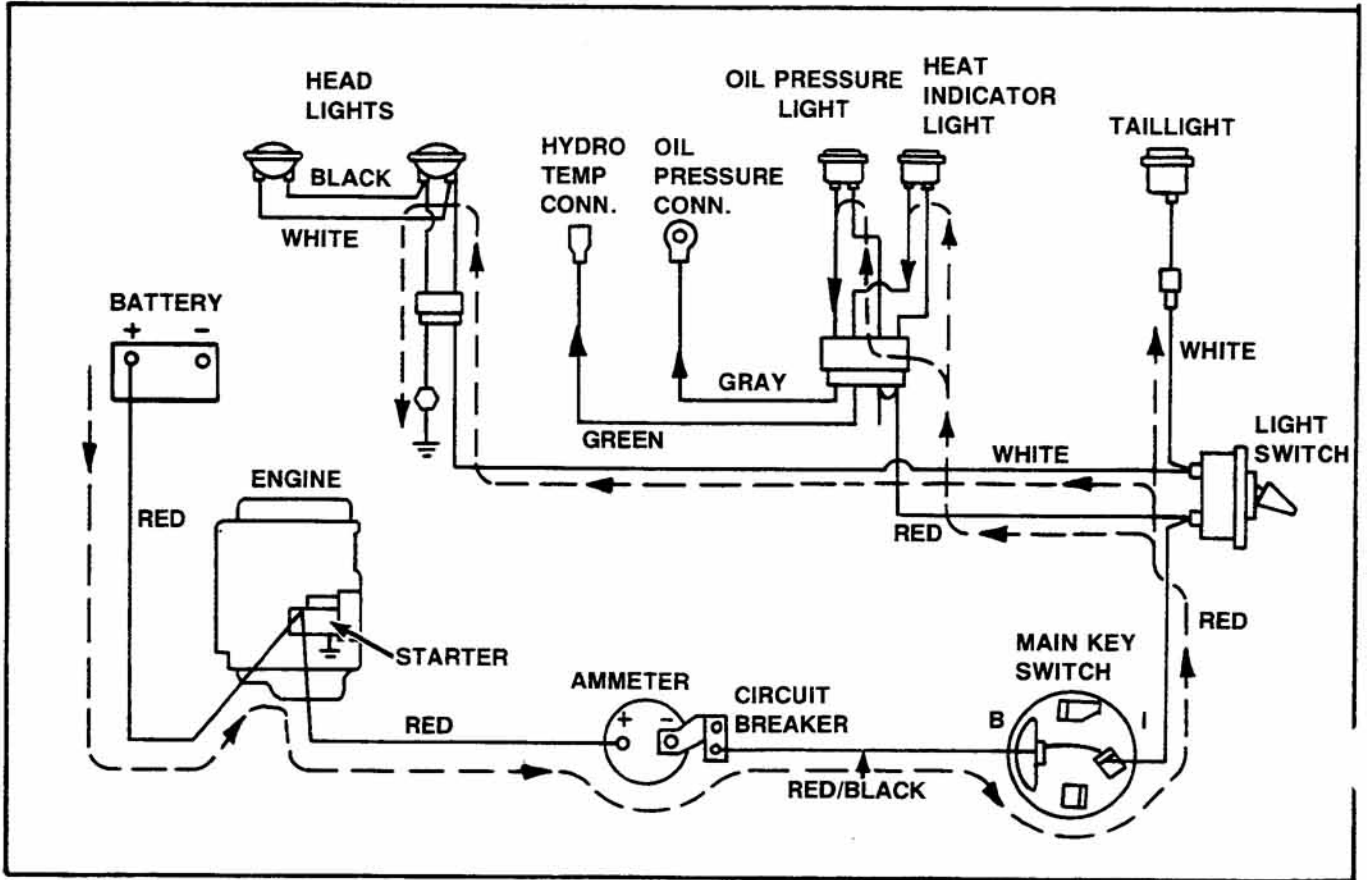


RUN CIRCUIT 2388s

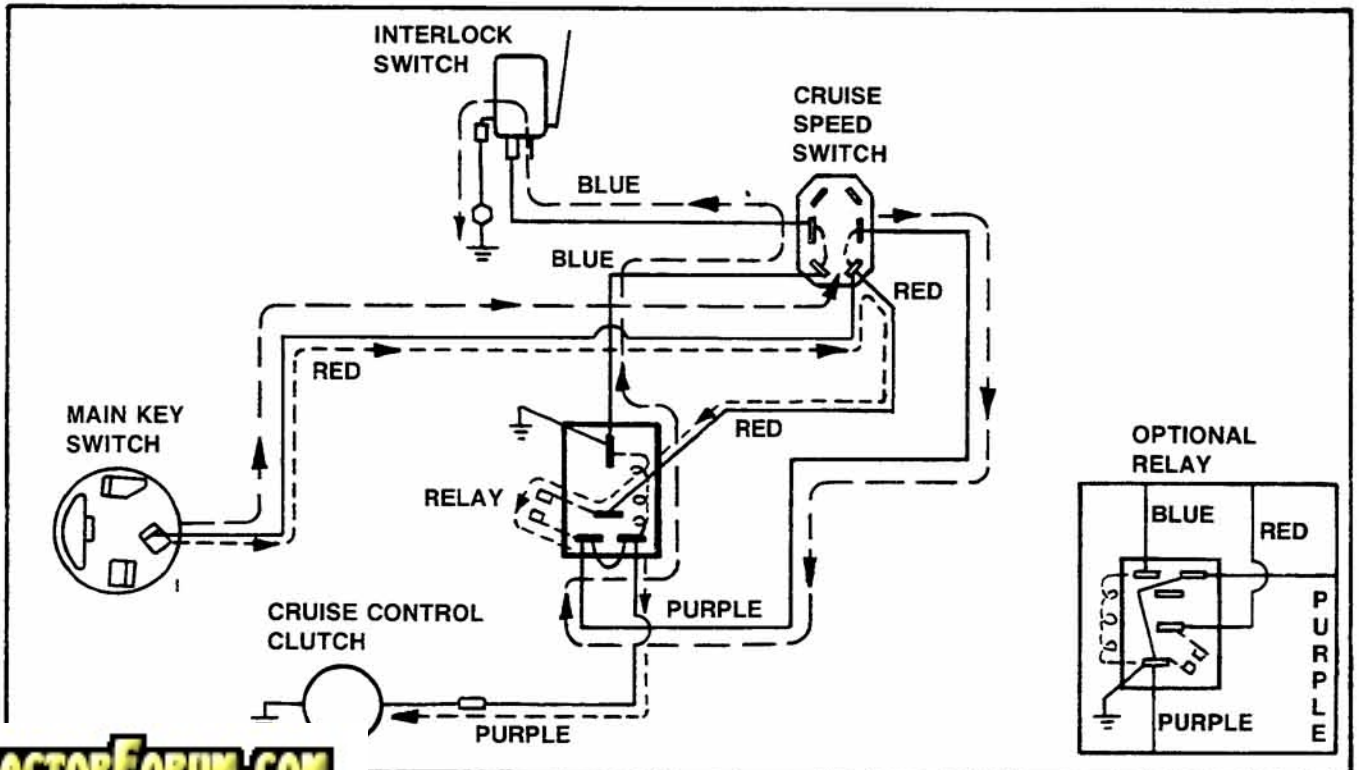


ELECTRICAL SYSTEM (Continued)

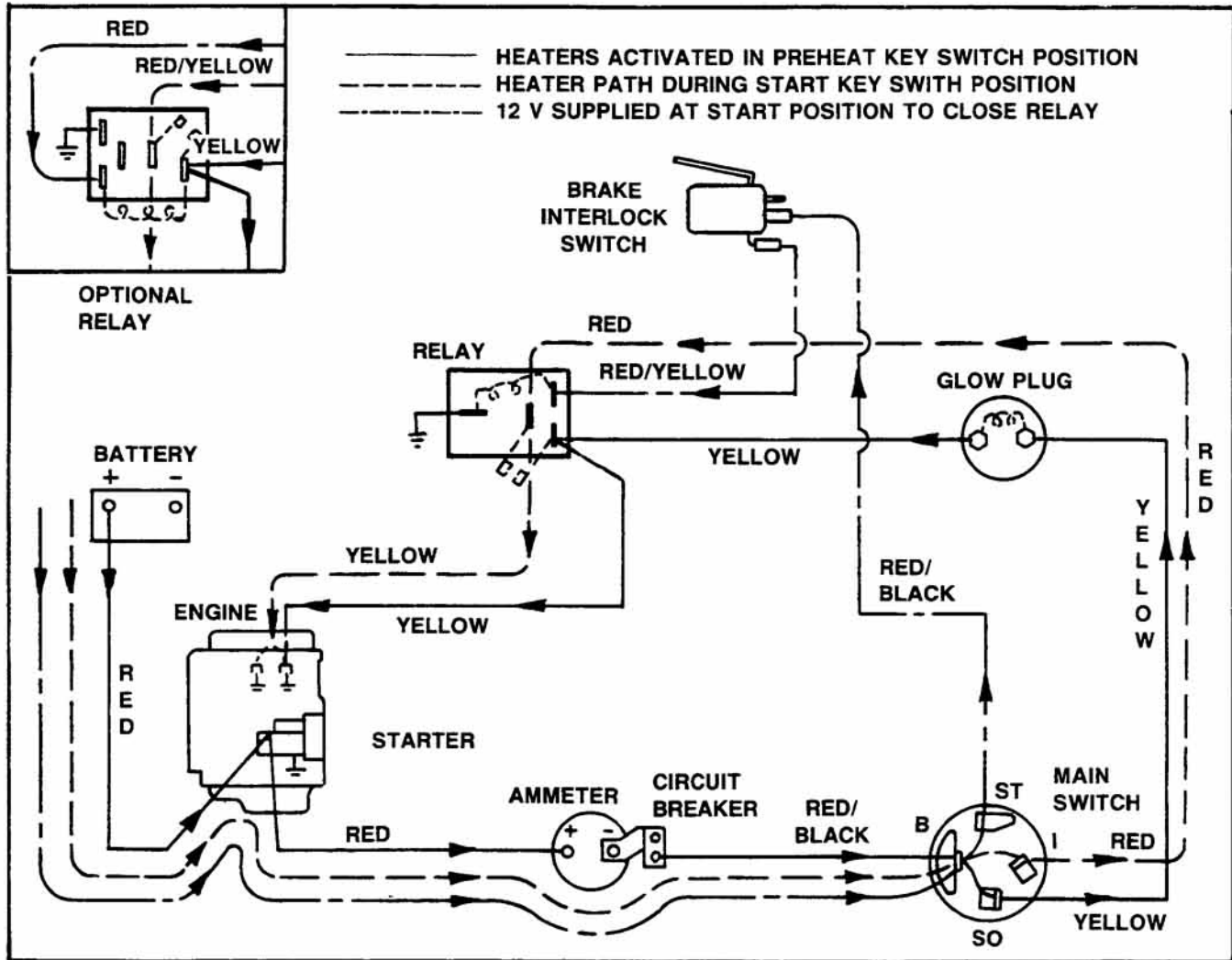
LIGHT CIRCUIT 2388s



CRUISE CONTROL CIRCUIT 2388s



PREHEAT CIRCUIT



TESTING ELECTRICAL SYSTEM

TESTING BATTERY

CHECKING SPECIFIC GRAVITY

To determine whether the battery is capable of meeting the requirements of the starting motor, it is necessary to subject the battery to a load test. The battery must be at least 75% charged for this test. To determine the percentage of charge a hydrometer reading should be taken.

The following table illustrates ranges of specific gravity for each cell in various states of charge at 80°F.

SPECIFIC GRAVITY

| | PERCENTAGE CHARGED |
|----------------------|--------------------|
| 1.250 TO 1.280 | 100% |
| 1.230 TO 1.250 | 75% |
| 1.200 TO 1.220 | 50% |
| 1.170 TO 1.190 | 25% |
| 1.140 TO 1.160 | 10% |
| 1.110 TO 1.130 | DISCHARGED |

CHECKING BATTERY VOLTAGE

Battery voltage can be checked with a volt-ohmmeter and should be between 11.5 and 12.5 volts.

BATTERY CRANKING TEST

For this test the battery should be approximately 80°F. (26°C).

1. Check battery electrolyte level, add water if necessary. Battery must be fully charged.

2. Check battery voltage. It should be between 11.5 and 12.5 volts.
3. Crank the engine using the starter motor for 15 seconds. Battery voltage should not drop below 9.0 volts at the end of this 15 second test.
4. If voltage is less than 9.0 volts, repeat steps 1 through 4. If same results are obtained, replace battery.

SOLENOID TEST

The solenoid is a sealed unit and must be replaced if found inoperative.

To test the solenoid connect 12 volts between the solenoid case and the small solenoid terminal. **CAUTION:** If battery is the 12 volt power source a spark may ignite battery gases.

When contact is made the plunger should be activated. If test does not activate the plunger, replacement is necessary.

SWITCH TEST

Before electrical tests of the switches are made, make sure mechanical adjustments of the actuating mechanisms are correct.

SEAT SWITCH

The seat switch is wired normally open (NO).

To test connect ohmmeter as shown in Figure 2-10 and depress plunger. Meter should indicate zero resistance. At normally closed position the meter should indicate an infinite resistance.

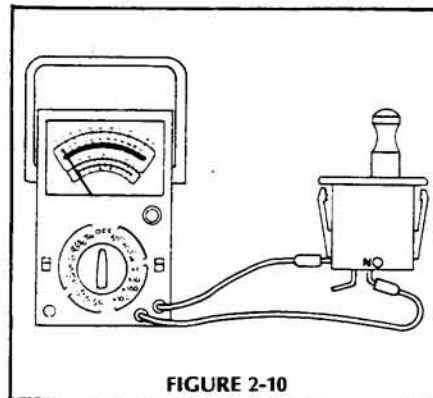


FIGURE 2-10

2086, 2087, 2288, 2289, 2389, 2389s, and 2388s

TESTING BATTERY CHARGING SYSTEM

Battery does not charge.

Check to make sure all wiring harness plugs have good electrical connections. Check wires for damage caused by vibration, heat, etc. Refer to charging circuit wiring diagram.

With the battery connected, check DC voltage from the B terminal of the Rectifier-Regulator to ground. The reading should be 13.8 volts or higher. Place a load on the battery, such as the headlights, to reduce the battery voltage below the 13.8 volts. If the battery charges, it was fully charged at time of first test. If battery does not charge, the stator or Rectifier-Regulator is defective.

Testing to determine which is defective.

Remove wiring harness plug which comes from stator in engine from the Rectifier-Regulator. Run engine at full R.P.M. and check AC voltage at plug. If reading is below 28 AC volts, the stator may be defective. If the reading is more than 28 AC volts, the Rectifier-Regulator may be defective.

Battery charges at high rate.

Check the DC voltage from the B terminal of the Rectifier-Regulator to ground. If the reading is over 14.7 DC volts, the Regulator system of the Regulator-Rectifier may be defective.

