

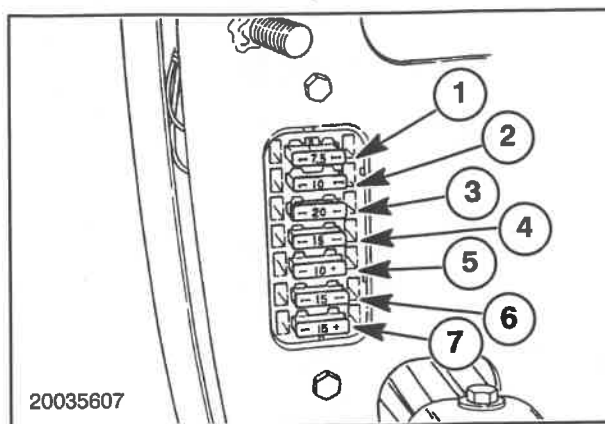
## FUSE BLOCK

### Description

The fuse block is located on the right-hand side of the engine compartment fire wall. Always replace blown fuses with the size specified for that circuit.

From top to bottom as viewed from the front of the tractor, the fuse block contains the following fuses:

Fuse #	Fuse Size	Circuit Protected
1	7.5 amp	PTO Safety Start Circuit, Instrument Panel Indicator Lights and Gauges
2	10 amp	Alternator, Safety Start Circuit
3	20 amp	Turn Signals, Front Road Lights, Taillights, Instrument Panel Illumination
4	15 amp	Cruise Control (HST) Auxiliary Work Light
5	10 amp	Fuel Shutoff Solenoid
6	15 amp	Auxiliary Work Lights, Auxiliary Power Socket
7	15 amp	Hazard Lights, Work Lights

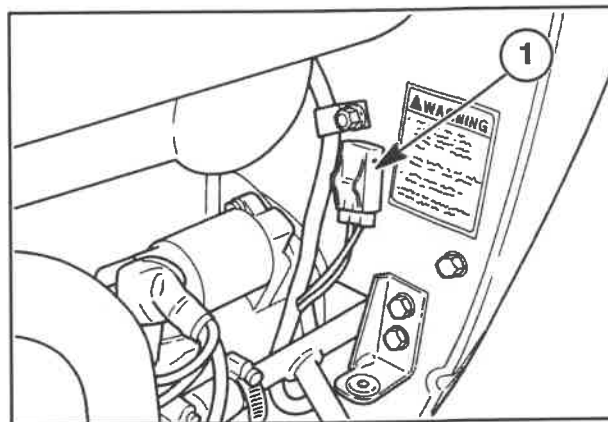


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## MAIN FUSE

### Description

The main fuse is a 40 amp fuse, 1, wire tied to the main harness in the area of the engine starter. This fuse protects the tractor's entire electrical system.



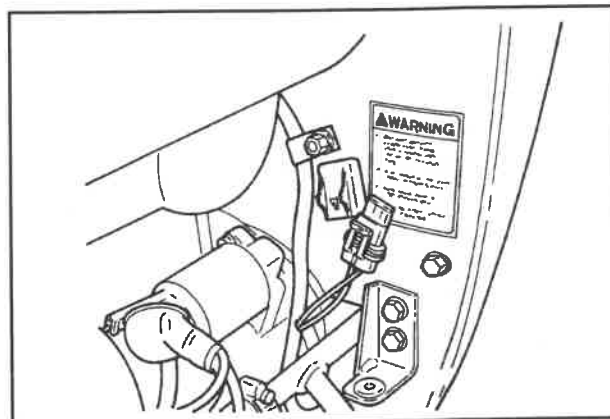
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### Replacing the Main Fuse

To replace the main fuse:

1. Unplug the connector to expose the fuse.
2. Remove the old fuse from the fuse holder and replace.

**IMPORTANT:** Always replace this fuse with a similar 40 amp fuse; DO NOT increase amperage rating.



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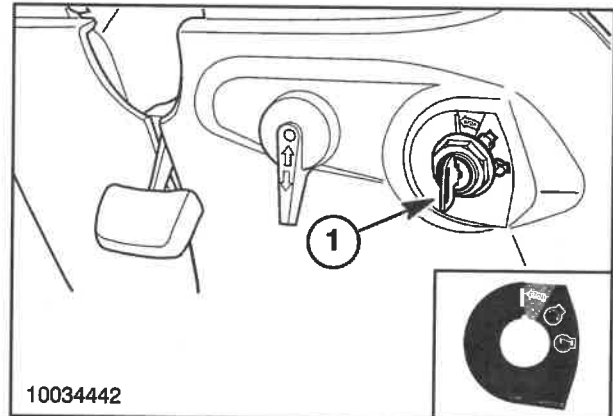
## ELECTRICAL SYSTEM COMPONENTS — DESCRIPTION AND TESTING

### KEY SWITCH

#### Description

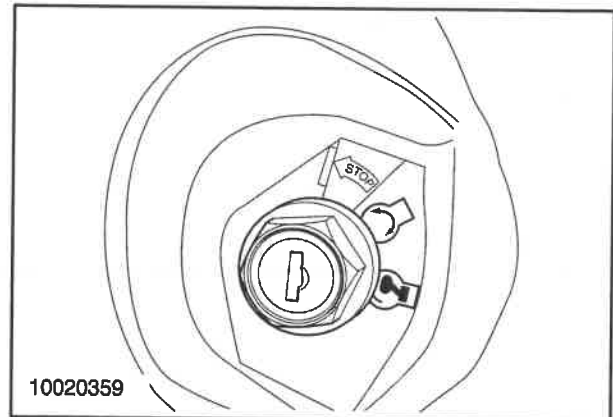
The key switch, 1, is located on the right side of the operator's console. The four positions of the key switch are:

- OFF
- ACCESSORY/RUN
- ENGINE PREHEAT
- START



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**NOTE:** All positions are in a clockwise rotation. From "OFF," the "START" and "ENGINE PREHEAT" positions are spring loaded to return to "ACCESSORY/RUN."



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#### Key Switch Terminal Identification

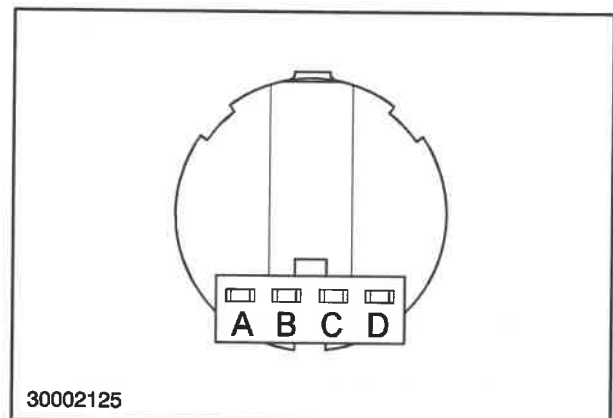
A	Start
B	12 V Input
C	ACC Terminal
D	12 V Input

#### Testing

Use an ohmmeter to test each position of the key switch for electrical continuity.

#### Stop Position (Not Shown)

1. With the key switch in the stop position, continuity should not exist between any of the terminals. If continuity exists between any of the terminals while the switch is in the "stop" position, the key switch is defective and needs replaced.



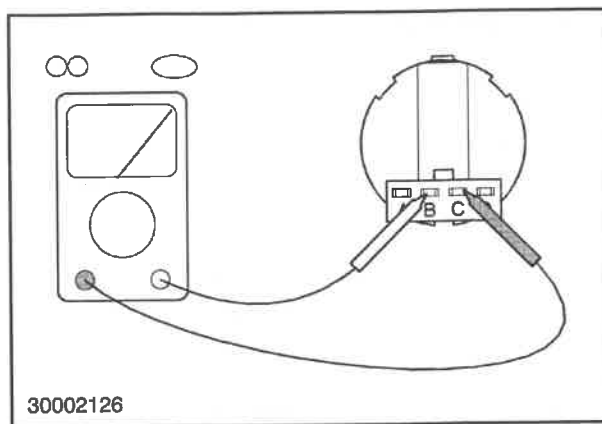
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### Heat/ Accessory/ Run Position

When the key switch in the "Heat/ ACC/ Run" position, continuity should exist between the "B" and "C" terminals.

1. Make sure the switch is in the "Heat/ACC/Run" position.
2. Using an ohmmeter, touch one of the test probes to terminal "B". Touch the other test probe to terminal "C".
3. Observe the ohmmeter. The ohmmeter should show little or no resistance indicating that continuity exists between terminal "B" and terminal "C". If continuity does not exist between terminal "B" and terminal "C", the key switch is defective and needs replaced.

**NOTE:** Continuity should not exist between terminals A and D in the "Heat/ACC/Run" position.

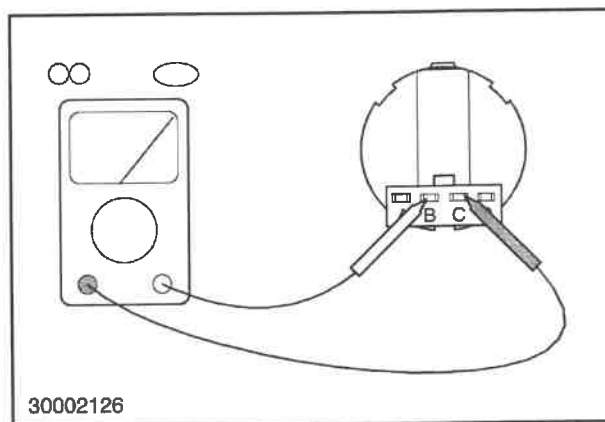


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### Start Position

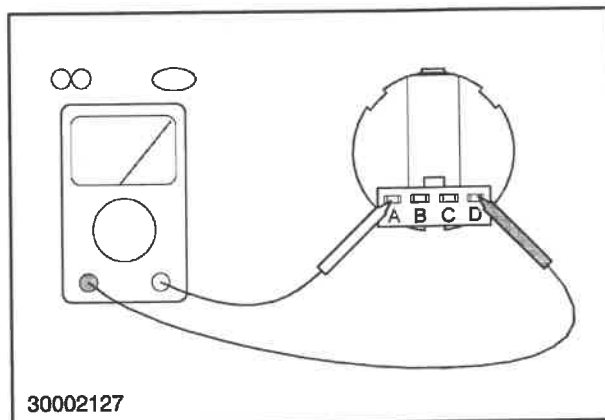
Make sure the key switch is in the "Start" position.

1. Using an ohmmeter, touch one of the test probes to terminal "B". Touch the other test probe to terminal "C".
2. Observe the ohmmeter. The ohmmeter should show little or no resistance indicating that continuity exists between terminal "B" and terminal "C". If continuity does not exist between terminal "B" and terminal "C", the key switch is defective and needs replaced.



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3. Following the procedure outlined in the previous 2 steps, test terminals "A" and "D". With the Key in the "Start" position, continuity should exist between the "A" and "D" terminals.



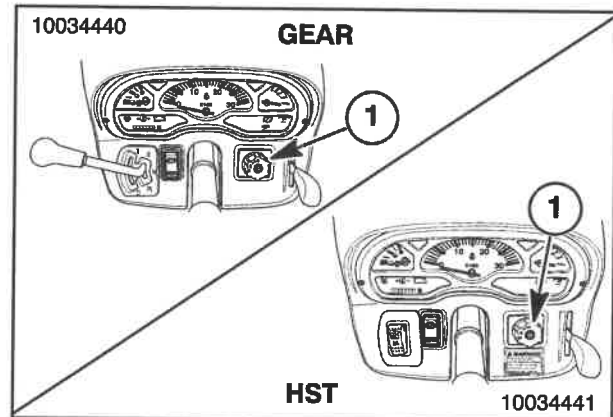
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## LIGHT SWITCH

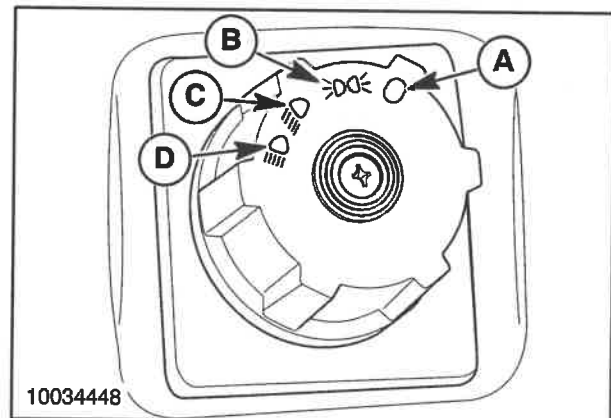
### Description

The light switch, 1, is located on the right side of the dash panel. This is a rotary type switch that has four positions: (rotating clockwise from "OFF" position)

- A. Off
- B. Instrument panel and Taillights
- C. Work lights, Instrument panel and Taillights
- D. Road lights, Work lights, Instrument panel and Taillights (A blue high beam indicator light will illuminate in the instrument panel when the road and work lights are illuminated)



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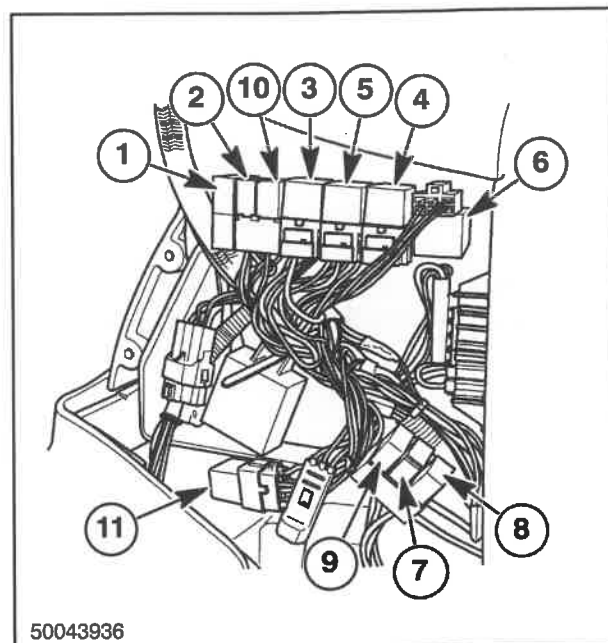
## RELAYS

### Description and Location

Relays monitor the current in a circuit. If current is present, the relay activates a single pole, double throw (SPDT) switch, causing it to flip over to its other position. The relays are located in the relay-diode panel found underneath the right rear side panel.

1. Fuel shutoff relay
2. Glow plug lamp relay
3. Glow plug power relay
4. Neutral start relay
5. PTO safety start relay
6. Glow plug lamp timer relay
7. PTO safety interlock relay
8. Hazard flasher cutoff relay
9. Front work light relay
10. Auxiliary work light relay
11. Cruise control relay

Relays 3, 4 and 5 are interchangeable.



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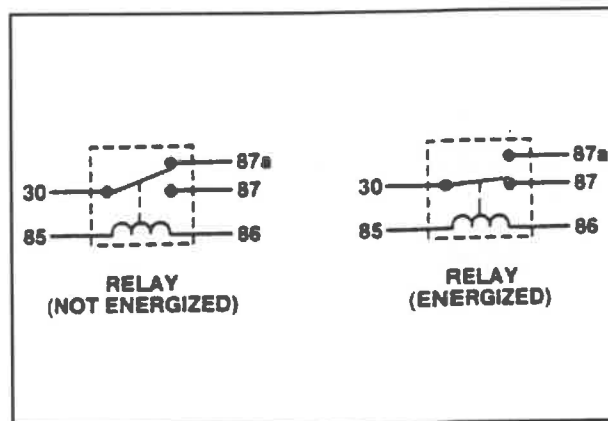
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A relay consists of two parts which work together: a coil and an SPDT switch.

Terminals 85 and 86 are connected to a coil. Applying 12 volts to these terminals energizes the coil, turning it into an electromagnet.

Terminals 30, 87 and 87A are actually part of a single pole, double throw switch, with terminal 30 being the common lead.

The SPDT switch is spring loaded so terminals 30 and 87A are closed when the coil is not energized. When the coil is energized, the switch is thrown, and terminals 30 and 87 are connected.



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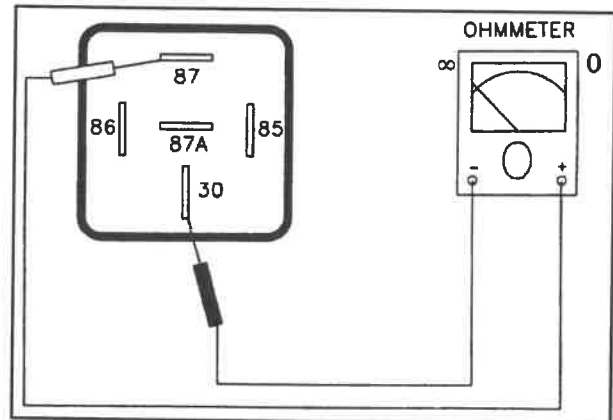
## SECTION 55 - ELECTRICAL SYSTEM - CHAPTER 1

### Testing

To test a relay, disconnect it from the circuit.

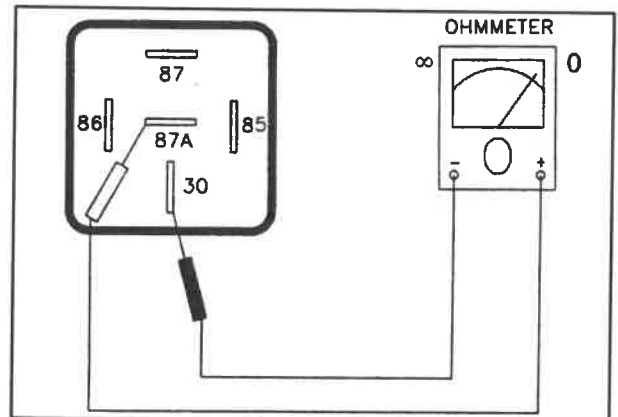
Use an ohmmeter to verify nonenergized conditions.

1. Connect the ohmmeter leads to terminals 87 and 30.
  - There will be no continuity between terminals 87 and 30 if the relay is working properly.



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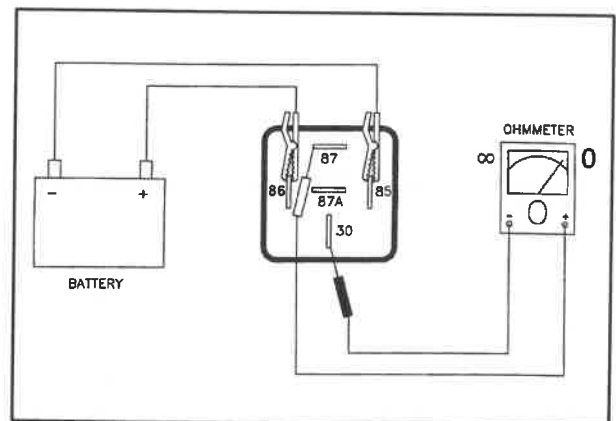
2. Connect the ohmmeter leads to terminals 87A and 30.
  - There will be continuity between terminals 87A and 30 if the relay is working properly.



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Next use the ohmmeter to verify energized conditions.

1. Energize the coil by applying 12 volts of current across terminals 85 and 86.
2. Connect the ohmmeter leads to terminals 87 and 30.
  - There will be continuity between terminals 87 and 30 if the relay is working properly.

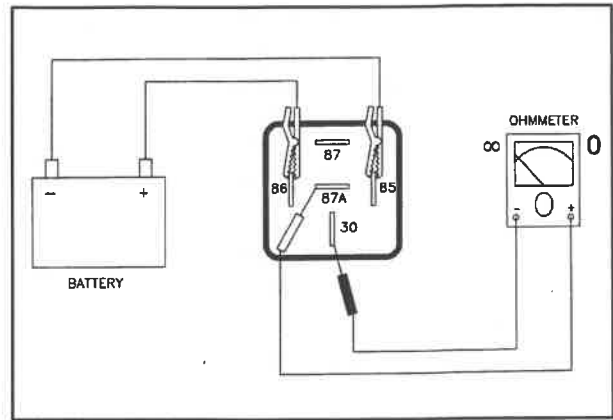


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3. Connect the ohmmeter leads to terminals 87A and 30.

- There will be no continuity between terminals 87A and 30 if the relay is functioning properly.

If continuity readings do not match those stated in the above test procedures, replace the relay.

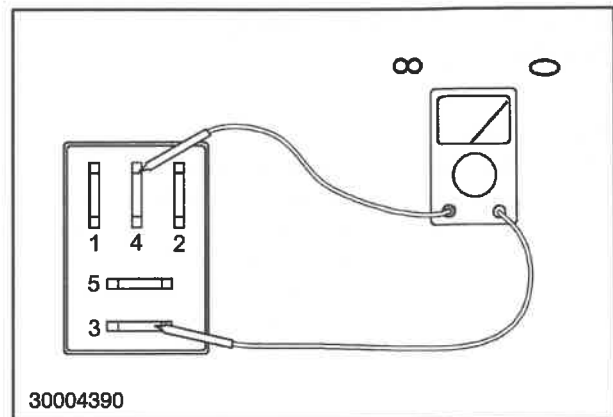


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### Testing-Micro Relays

#### Fuel Shutoff, Glow Plug Lamp, PTO Safety Interlock, Hazard Flasher Cutoff

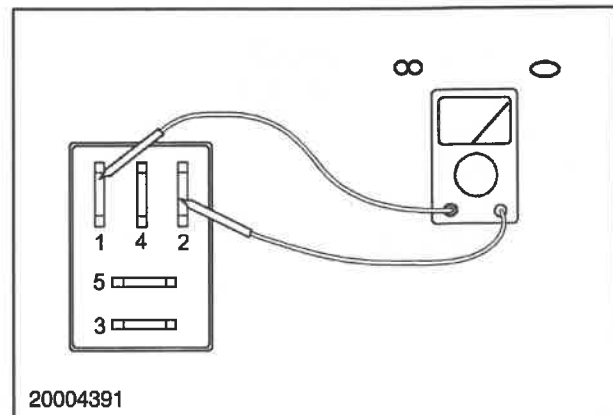
1. Remove the relay suspected of being faulty from the tractor to test.
2. Using an ohmmeter, touch one test probe to terminal 3 and the other test probe to terminal 4.
3. Observe the ohmmeter. There should be little or no resistance, indicating continuity. If there is no continuity, the relay is defective and needs replaced.



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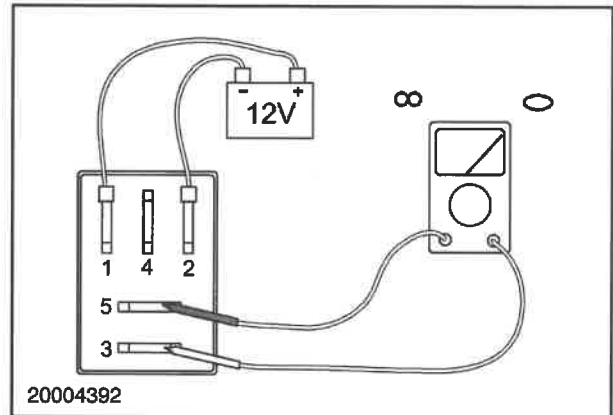
4. If the previous test showed continuity, touch one ohmmeter probe to terminal 1 and the remaining probe to terminal 2.
5. Observe the ohmmeter. The ohmmeter should read approximately 79.5 ohms. If the reading is not as specified, the relay is defective and needs replaced.



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6. If the results from the previous test were good, use a jumper lead to connect the positive (+) terminal of a 12-volt power source to terminal 1 of the relay. Use a jumper lead to connect the negative (-) terminal of a 12-volt power source to terminal 2 of the relay. The relay should now energize.
7. Using an ohmmeter touch a test probe to terminal 3 of the relay. Touch the other ohmmeter test probe to terminal 5.
8. Observe the ohmmeter. There should be little or no resistance, indicating continuity. If there is no continuity, the relay is defective and needs replaced.

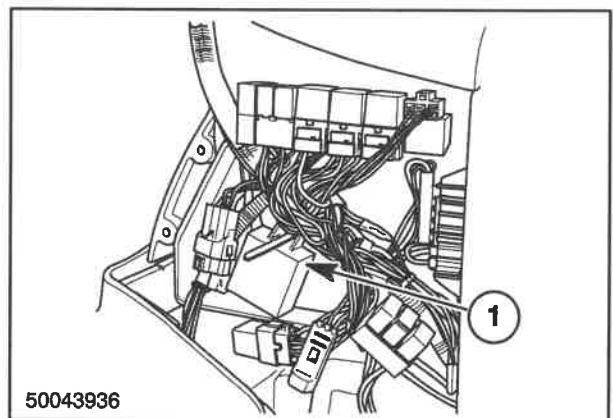


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## HAZARD FLASHER/TURN SIGNAL CONTROL MODULE

### Description

The hazard flasher/turn signal control module, 1, is located behind the tractor firewall, on the right side of the tractor. The control module controls current flowing to the hazard flasher/turn signal lights on the rear fenders. Refer to the chart below for the functions of the control module.



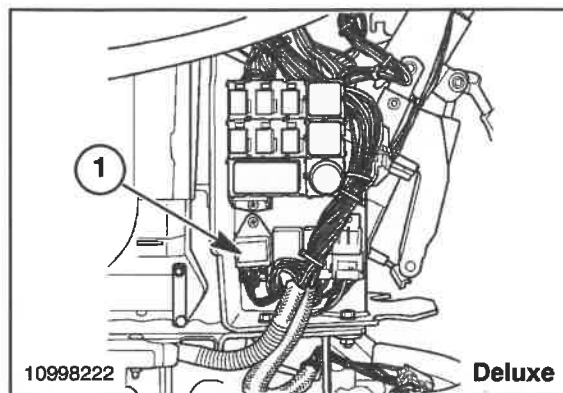
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HAZARD/TURN SIGNAL SWITCH POSITION	RESULT
Hazard switch "On"	Both flashers blink in unison.
Left turn signal "On"	Left flasher and taillight blink and right flasher and taillight remain solid.
Right turn signal "On"	Right flasher and taillight blink and left flasher and taillight remain solid.

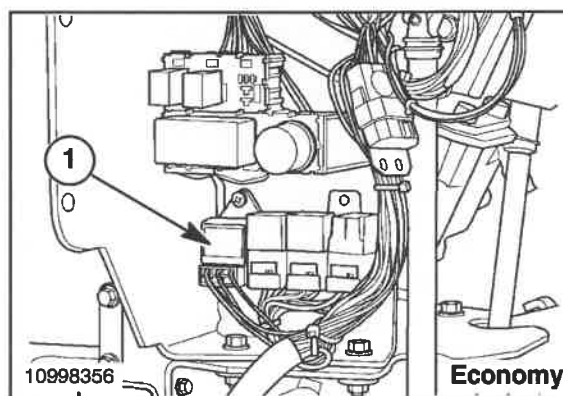


**GLOW PLUG TIMER****Description and Location**

The glow plug timer, 1, is an electronic timer that is located under the left side of the dash cover, behind the tractor's firewall. The timer controls how long the glow plugs and the indicator light on the instrument panel remain supplied with current when the key switch is turned from the "OFF" position to the "ACC/RUN" position. The glow plug timer delays the glow plugs and indicator light on deluxe model tractors for 4-5 seconds and for 10-11 seconds on the economy model tractors. The glow plug timer controls the glow plug and indicator light circuit by supplying or cutting the ground path to the glow plug power relay's coil circuit.



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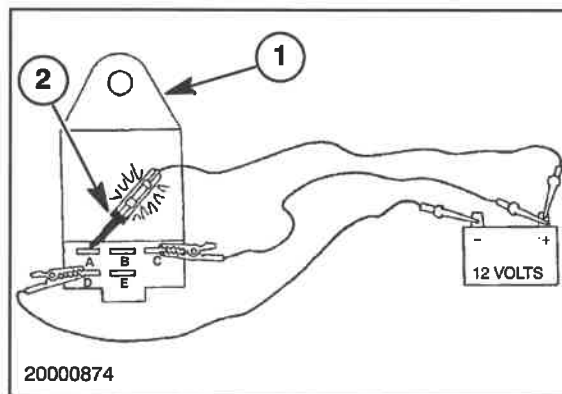
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**Glow Plug Indicator Light Timer Testing**

1. Disconnect the negative (-) battery cable from the battery.
2. Remove the bolt retaining the light timer to the tractor and disconnect the timer from the main wiring harness.

**NOTE:** The terminals are not number or letter coded on the light timer.

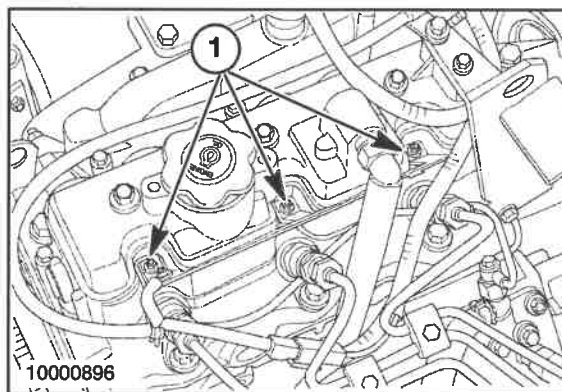
3. Connect a jumper wire from terminal "C" on the timer, 1, to the positive (+) terminal of a 12-volt power supply.
4. Connect a test light, 2, from terminal "A" of the timer, 1, to the positive (+) terminal of a 12-volt power supply.
5. Connect a jumper wire from terminal "D" of the timer, 1, to the negative (-) terminal of the 12-volt power supply. Observe the test light, 2.
6. The test light should illuminate for approximately 4 – 5 seconds for the deluxe models and 10-11 seconds for economy models, then turn off. If the test light fails to illuminate or does not turn off after the specified time, the timer is defective and needs replaced.
7. Connect the negative (-) battery cable to the battery.



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**Op. 55 201****ENGINE GLOW PLUGS****Description**

The engine glow plugs, 1, are located on the right side of the engine cylinder head, below the fuel injectors. The glow plugs are used to preheat the air in the pre-combustion chamber. This aids in the starting of the engine when cold.



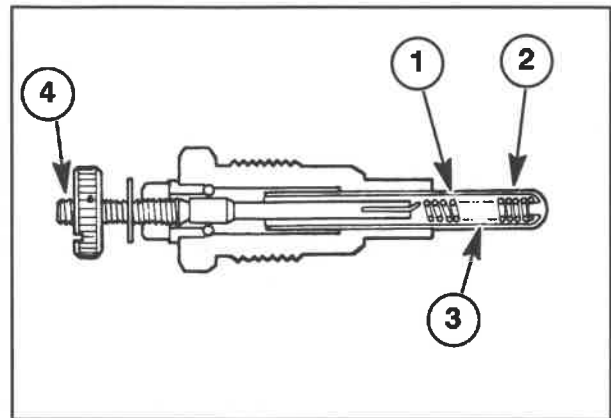
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## GLOW PLUGS

### Description

Glow plugs are heating elements used to warm the air in the combustion chambers before and during engine startup. The glow plugs are located on the right side of the engine cylinder head.

The heating element wire is contained in a stainless steel sheath, 1, with the fine heat wire in coil form, 2, immersed in sintered magnesium oxide powder, 3. One end of this heat wire is welded to the sheath front tip. The other end is attached to the center electrode, 4.



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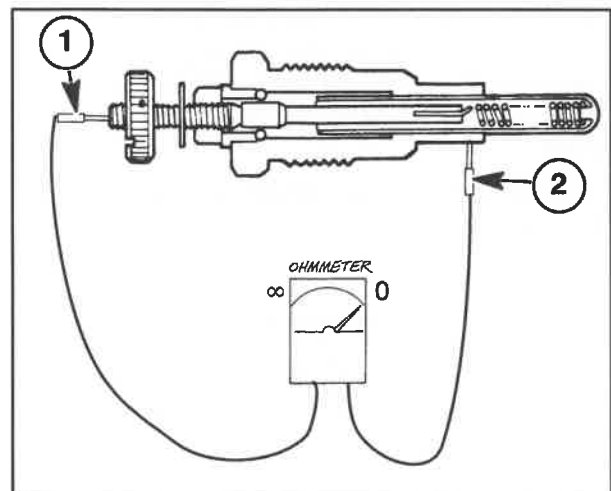
### Testing

Use an ohmmeter to test the glow plugs.

Place one lead on the center electrode, 1, and the other lead on the glow plug body, 2.

- A resistance reading of 0.8 ohms maximum is normal for the Y701 glow plug.

If test results are not as outlined as above, replace the faulty glow plug.



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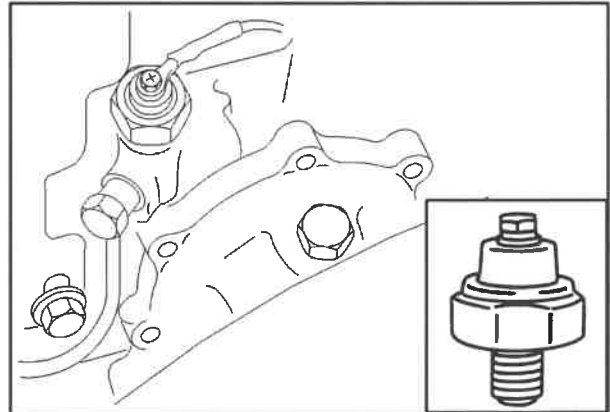
## ENGINE SENSORS

### ENGINE OIL PRESSURE SENDER

#### Description

The oil pressure sender is located on the top front side of the engine. The switch opens under normal oil pressure (above 6 PSI) and closes when oil pressure is low (3 - 6 PSI) to complete the ground circuit of the oil pressure warning light.

When the ground circuit is completed, the oil pressure warning light illuminates on the instrument panel when the key switch is turned to the "ON" position and goes out when the engine is started. If the light does not go out after the engine has started, first check the engine oil level. If oil level is correct, check for a malfunctioning sender or engine oil pump.

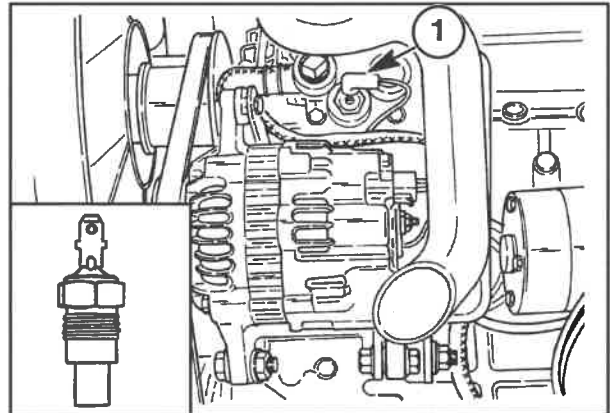


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### ENGINE COOLANT TEMPERATURE SENDER

#### Description

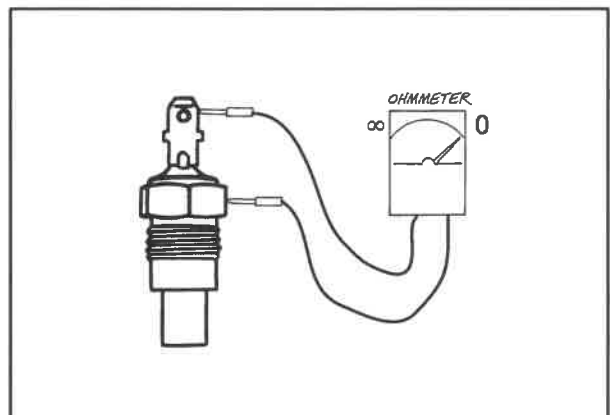
The coolant temperature sender is located at the left front side of the engine inside the thermostat housing. This sender regulates a variable resistance to ground, which translates into the movement of the temperature gauge.



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#### Testing

Coolant Temperature	Sender Resistance
122°F (50°C)	154 Ohms
176°F (80°C)	52 Ohms
212°F (100°C)	27 Ohms
248°F (120°C)	16 Ohms

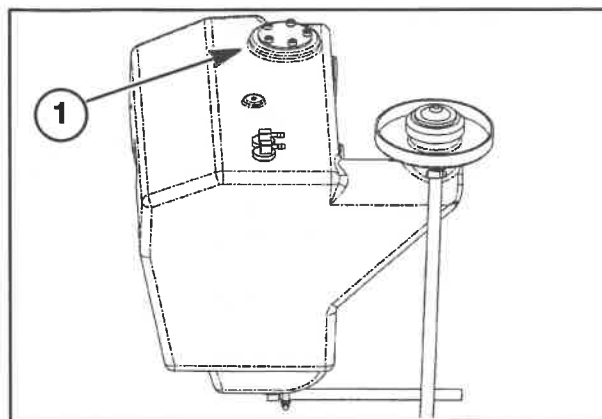


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## FUEL LEVEL SENDER

### Description

The fuel level sender, 1, is mounted on the top of the inside of the fuel tank. The sender float moves up and down with the fuel level in the tank, while changing the resistance to the ground circuit of the fuel gauge.



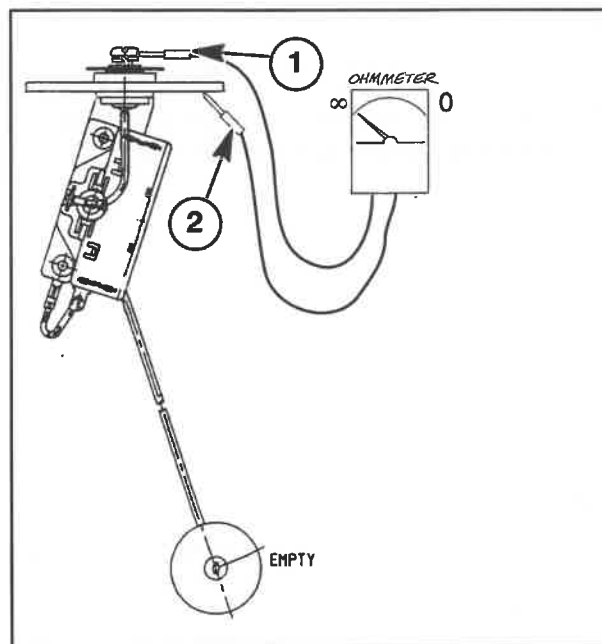
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### Testing

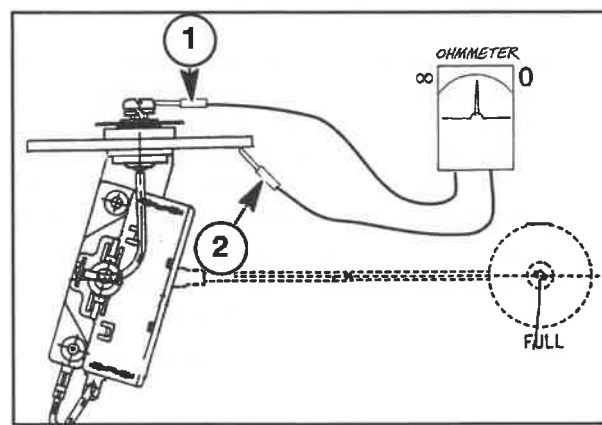
Use an ohmmeter to test the fuel level sender.

1. Remove the sender from the fuel tank.
2. Attach one of the meter leads to the center post, 1, of the sender. Attach the other meter lead to the ground spade terminal, 2, of the sender body.
  - With the sender in the EMPTY (DOWN) position, the meter reading will be 244-250 ohms.
  - With the sender in the FULL (UP) position, the meter reading will be 29-26 ohms.

If test results do not match the above, replace the fuel level sender.



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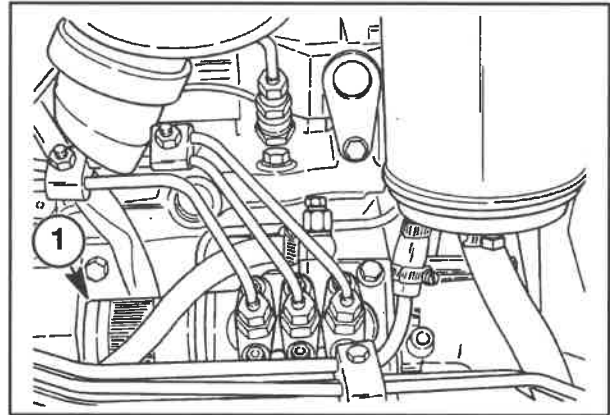


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## FUEL SHUTOFF SOLENOID

### Description

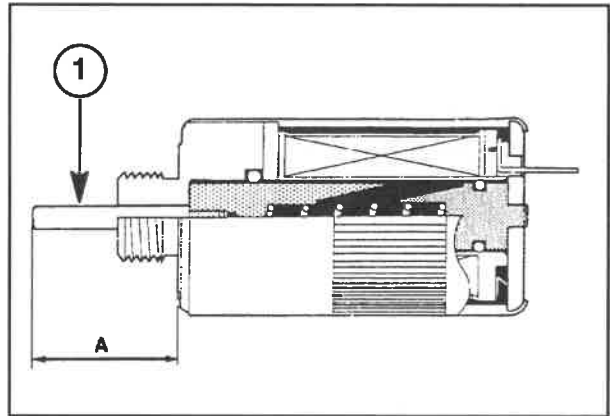
The injection pump is equipped with a fuel shutoff solenoid, 1, threaded into the rear of the injection pump casting. The solenoid plunger is spring loaded; when the solenoid is not energized the plunger pushes the injection pump control rack forward into the closed (shut-off) position. When the solenoid is energized, as when the key switch is turned to the "ON" and "START" positions, the solenoid plunger is retracted and the governor linkage moves the pump control rack rearward into operating position.



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### Removal

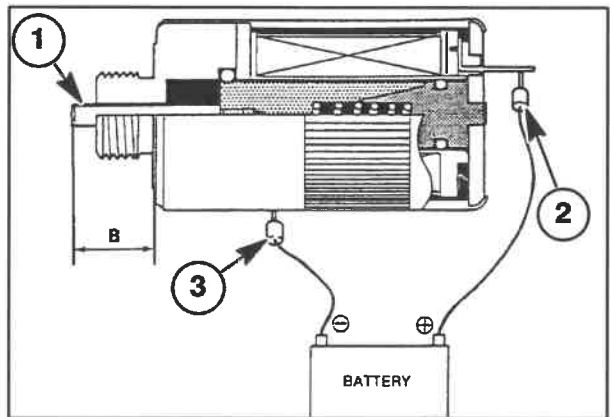
1. Disconnect the engine stop solenoid wiring.
2. Using pliers, remove the solenoid from the rear of the injection pump mount casting.



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### Testing

1. With the solenoid de-energized, measure the protrusion distance "A" of the plunger, 1, as shown at right.
  - In the shut-off position, the plunger protrusion distance, A, should measure 25.5 mm - 26.4 mm (1.004" - 1.04").
2. Connect a jumper wire from the solenoid terminal to the battery positive (+) terminal. Connect a second jumper from the battery negative (-) terminal to the solenoid body, 3. The solenoid plunger will retract. Measure the protrusion distance "B" of the plunger, 1, as shown at right.
  - In the retracted position, the plunger protrusion distance, B, should measure 11.5 mm - 14.5 mm (0.453" - 0.571").



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If the measurements are not within the limits specified above, replace the solenoid.