XL TRACTOR ELECTRICAL DEMYSTIFICATION GUIDE

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TORO

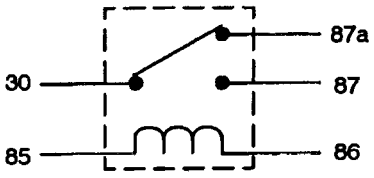
CONSUMER SERVICE DIVISION

10251

XL SERIES ELECTRICAL DEMYSTIFICATION GUIDE

Contents

Relay



Relay
(not energized) 10106

Coil	Terminals 30+87	Terminals 30+87a
not energized	open	closed
energized	closed	open

10164

Table 1

Part Numbers

48-4700

Purpose

The relay monitors current in one circuit. If current is present, it flips an SPDT (single pole, double throw) switch to the other position.

How It Works

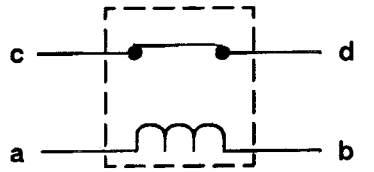
A relay is actually two simpler parts working together.

1. Coil: Terminals 85 and 86 are connected to a coil. Applying 12 volts to these terminals energizes the coil turning it into an electromagnet.
2. SPDT Switch: Terminals 30, 87 and 87a, are all actually part of a single pole, double throw switch. Terminal 30 is the common lead. The switch is spring loaded so that 30 and 87a are closed when the coil is not energized. When the coil is energized, the switch is "thrown" and 30 and 87 connected. For a simpler explanation, see below:

Testing

1. Disconnect the relay from the circuit.
2. Verify the "not energized" conditions above with a VOM.
3. Apply 12 volts to terminals 85 and 86 to energize the coil.
4. Verify the "energized" conditions above with a VOM.
5. Replace relay if any of the conditions in Table 1 were not met.

Solenoid



Solenoid
(energized) 10102

Part Numbers

47-1910

Purpose

The solenoid's purpose is simply to protect the ignition switch from the high current drawn by the starter motor.

How It Works

The solenoid has really only two parts. One is a coil of wire wrapped around an iron core. Whenever 12 volts is applied to the coil, it becomes a magnet. The other part is a steel bar type switch. Because it is made of steel it can easily handle the high current loads produced by the starter motor. So how does it protect the ignition switch? When 12 volts is applied to the coil, it becomes an electromagnet. This quickly pulls the steel bar toward the contacts and closes the switch. When power is removed from the coil, the spring loaded bar returns to its "normally open" position. Note: The solenoid closes and opens the switch very quickly. This protects the ignition switch because it minimizes the "arcing" that can damage switches.

Testing

1. Disconnect the solenoid from the wiring harness.
2. Check to insure that terminals "c" and "d" are open.
3. Apply a known good 12 volt power source to "a" and "b" terminals. You should be able to hear the solenoid switch "click" when you make the connection.
4. Verify that the switch has closed by making sure that terminals "c" and "d" are closed when power is applied to terminals "a" and "b".

Switch

Brake/PTO Switch

SPDT Switch
(at rest)

10081

Button	Condition
up	COM+NC2
down	COM+NO3

10180

Part Numbers

88-9931

Purpose

Used as part of the safety interlock circuit, it is typically used to monitor the position of the PTO or brake lever.

How It Works

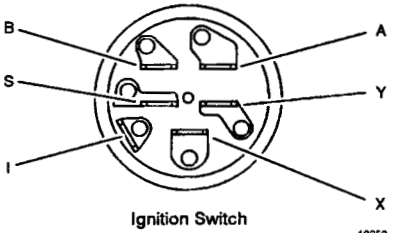
This SPDT microswitch has three terminals. The lever is spring loaded in the "up" position. When the lever on top of the switch is pushed, continuity switches from COM1 and NC2, to COM1 and NO3.

Testing

1. Disconnect the switch from the harness.
2. Verify the conditions in the table.

Switch

Ignition



Ignition Switch

10252

Position	Condition
off	none
run	B+I+A,X+Y
start	B+I+S

10253

Part Numbers

88-9830

Purpose

This component provides the proper switching for the starter, ignition, PTO, safety and accessory circuits.

How It Works

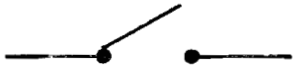
Detents inside the switch give it three positions: off, run and start. The start position is spring loaded so the cylinder automatically returns to run once the key is released.

Note: The letters stamped on the terminals may be incorrect.

Testing

1. Disconnect the switch from the wiring harness.
2. Verify the following conditions in the table.
3. Check each of the terminals to case ground. None should show continuity.

Switch
Seat



Seat Switch
(no operator) 10094

Condition	Status
operator on	closed
operator off	open

10173

Part Numbers
38-1420

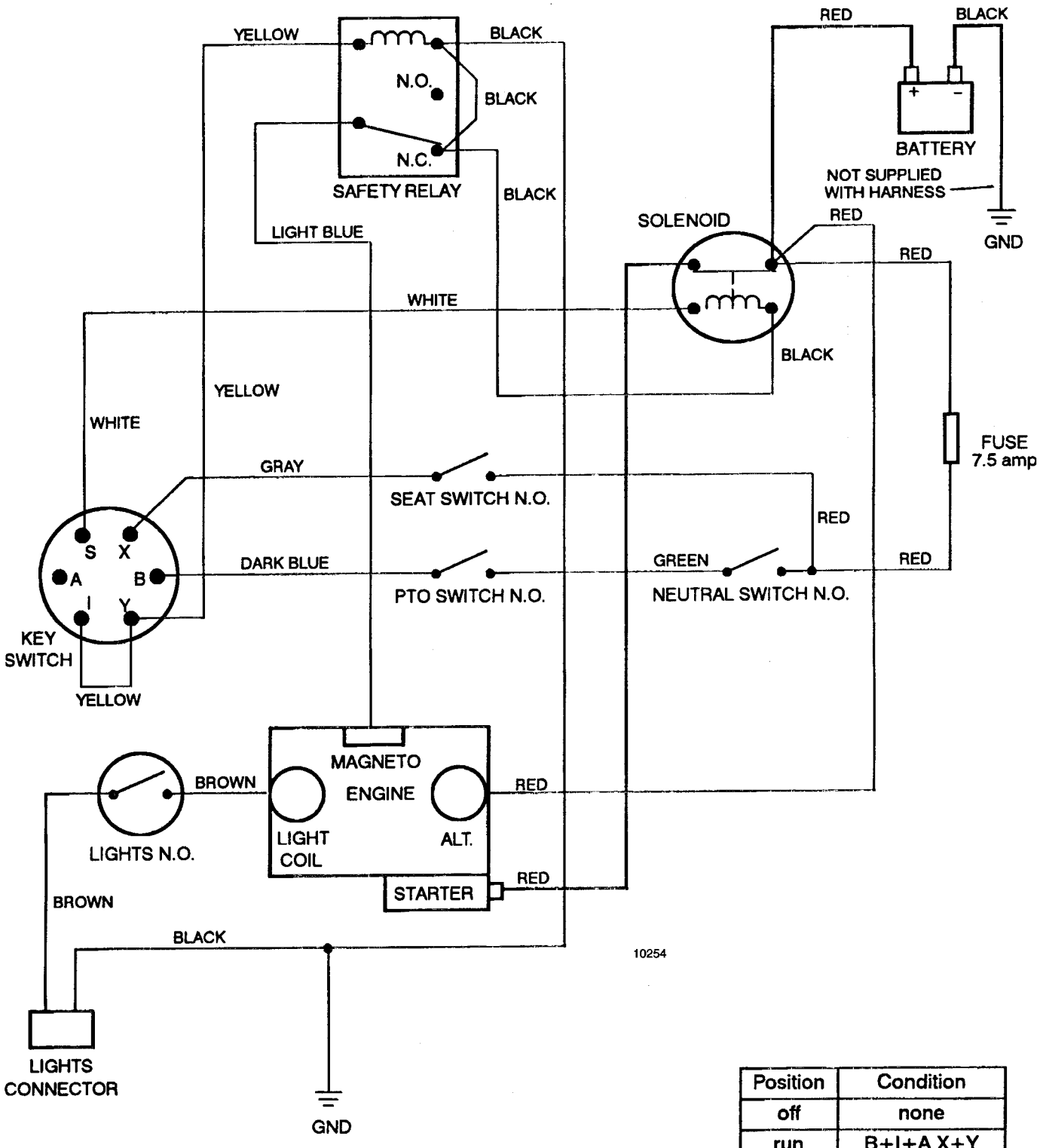
Purpose
This switch monitors whether or not an operator is in the seat.

How It Works
The switch is open without an operator and closed with an operator. The ribbon operates a friction mechanism which, in turn, activates the switch. A removable cover provides access to the switch contacts.

Testing
Note: Because of the friction mechanism, it is possible to get false readings with the switch removed from the seat. Perform testing with the switch in place.

1. Disconnect the switch from the circuit, but do not remove from the seat.
2. Verify the conditions in the table.

Wiring Diagram

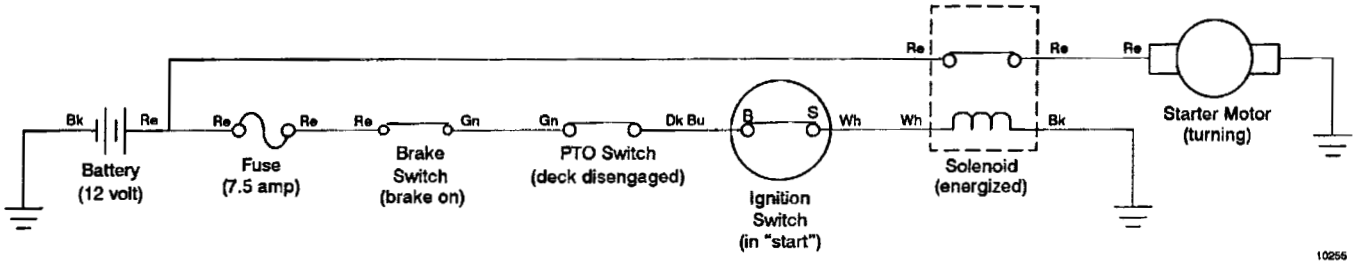


Position	Condition
off	none
run	B+I+A X+Y
start	B+I+S

10253

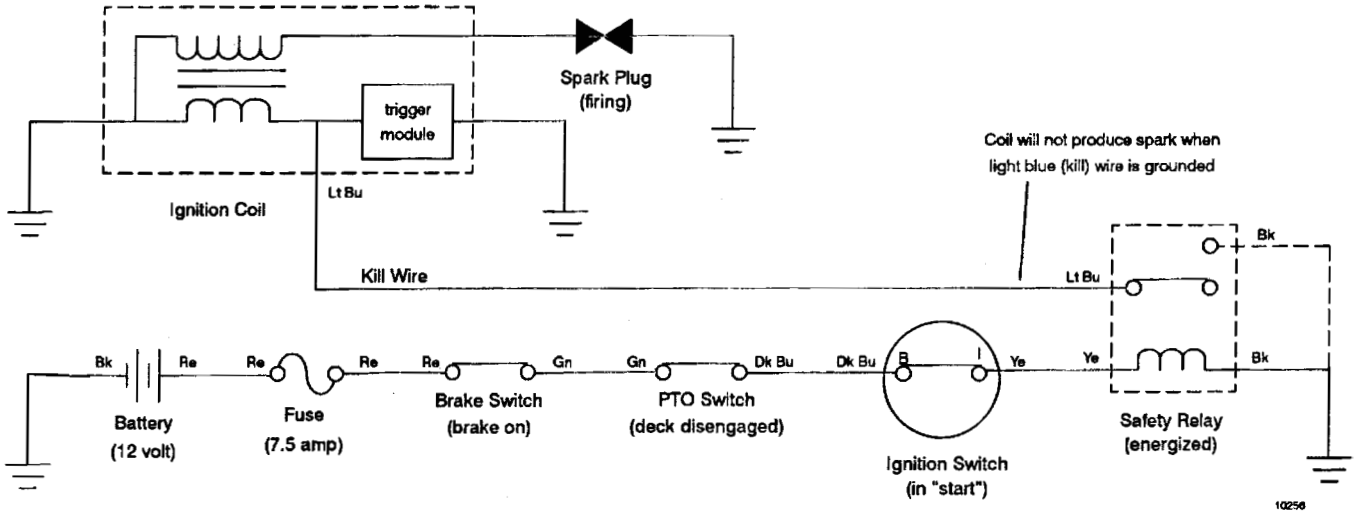
Starter Motor Circuit

(ignition switch in "start")



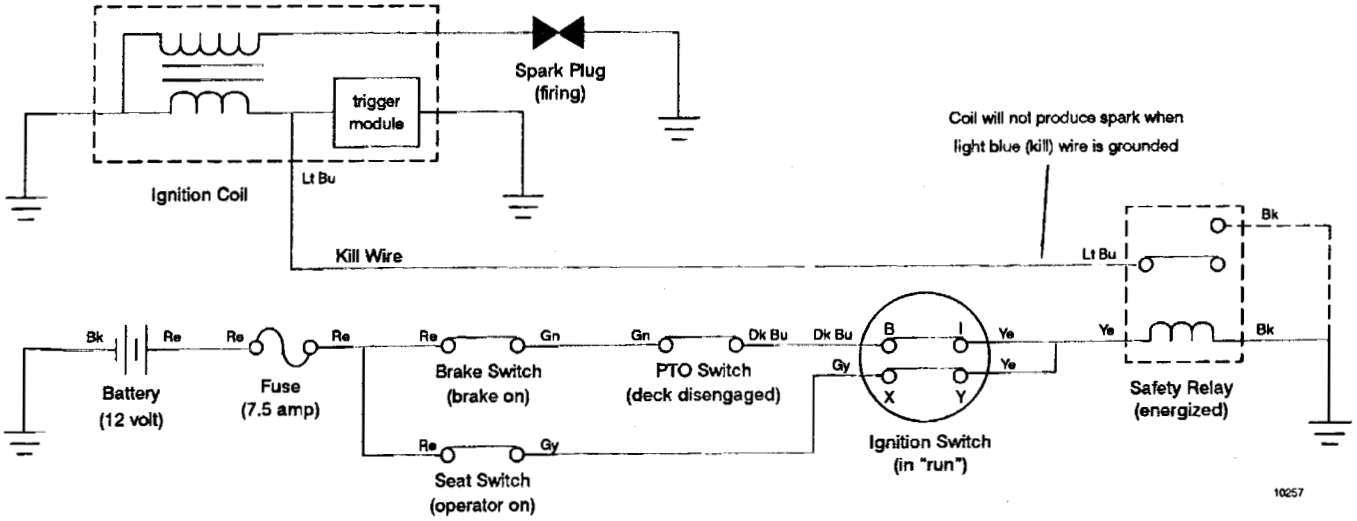
Spark Circuit

(ignition switch in "start")

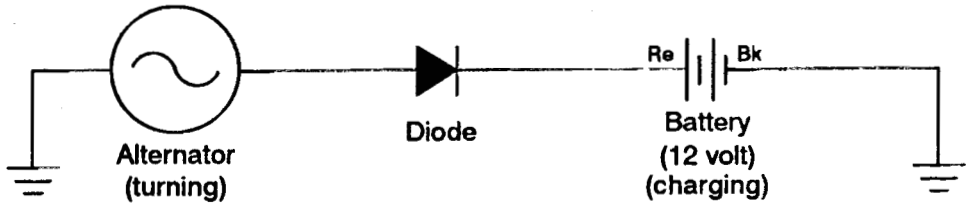


Spark Circuit

(ignition switch in "run")

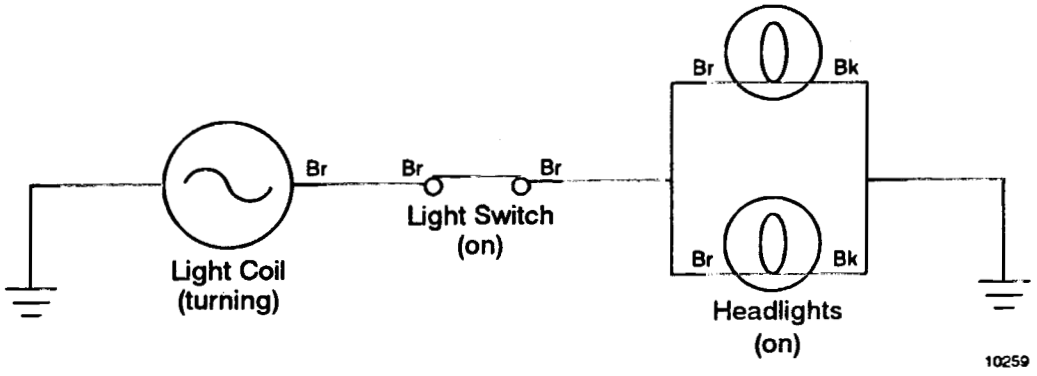


Charging Circuit



Lights Circuit* — 12 hp model only

(ignition switch in "run")



**Use A.C. scale on VOM to test.*