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TABLE OF CONTENTS

Table of Contents

The Glossary contains information on virtually every electrical part used on Toro riding products.

The components are listed alphabetically by noun, followed by any adjectives. If you have trouble finding a component, use the Table of Contents at the front of the Glossary section.

These three sections should be all you need to diagnose problems on individual components.

GLOSSARY

odule, Low Voltage

se

e illumination of the battery light on the dash licates the battery voltage is too low. This is nsored through the low voltage module (Figur 3).

ow it works

The low voltage module is a voltag parator, checking ar/ rectifier volts D.C activates nt until the

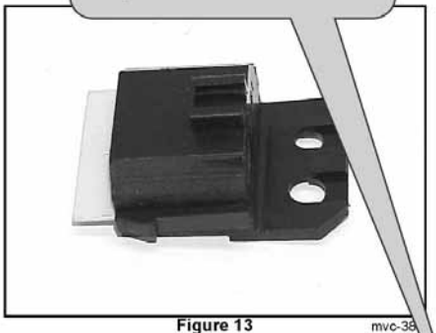


Figure 13 mvc-38

Testing

1. Before replacing the low voltage module, test the battery to make sure it is fully charged and is in good shape.
2. Next, check the charging system of the engine; follow the procedure in the Kohler Engine Service Manual.
3. If the battery checks out and is in good condition and the charging system checks out and is charging properly and the battery light on the dash is on, replace the low voltage module. Without specialized test equipment, it is not practical to test the low voltage module in the field.

Purpose

The relay monitors current in one circuit. If current is present, it flips an SPDT switch to the other position.

How It Works

A elay is an electrically actuated switch.

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. Switch: Terminals 30, 87, and 87a are actually part of a single pole, double throw (SPDT) switch. Terminal 30 is the common lead. The switch is spring loaded so that 30 and 87a are connected when the coil is not energized. When the coil is energized, the switch is "thrown" and 30 and 87 are connected (Figure 14).

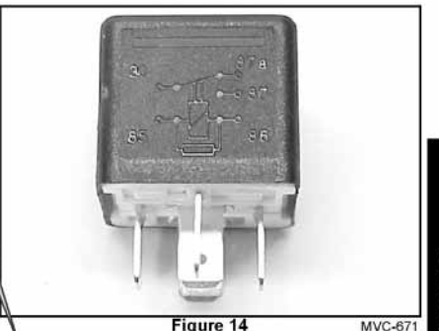


Figure 14 MVC-671

Testing

1. Disconnect the relay from the harness.
2. Verify the coil resistance between terminals 85 and 86 with a multimeter (ohms setting). Resistance should be from 70 to 90 ohms. There should be continuity between terminals 87a and 30 (Figure 15).

Demystification Glossary **3 - 9**

2002 - 2003

XL

Each product series has its own section including:
- Info List
- Wiring Diagrams
- Circuit Diagrams

Image helps you quickly identify product sections.

Information List

The "Info List" is the first page of each product section.

Each product section has its own "Table of Contents" to keep things simple.

XL Information List (2002 - 2003)

GLOSSARY

The description is the name given to the part in the book only.

Table of Contents

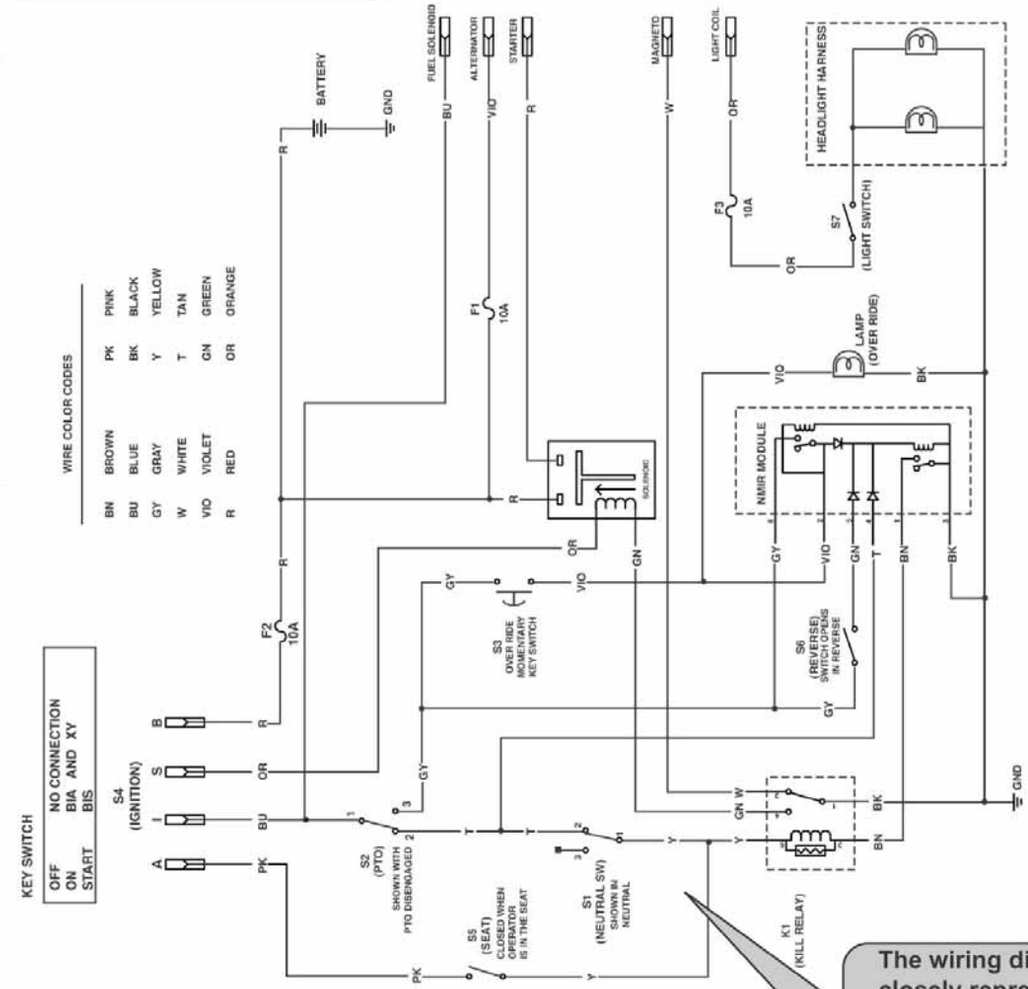
This is the most recent part number available at press time.

Wiring Diagram

XL **2002 - 2003**

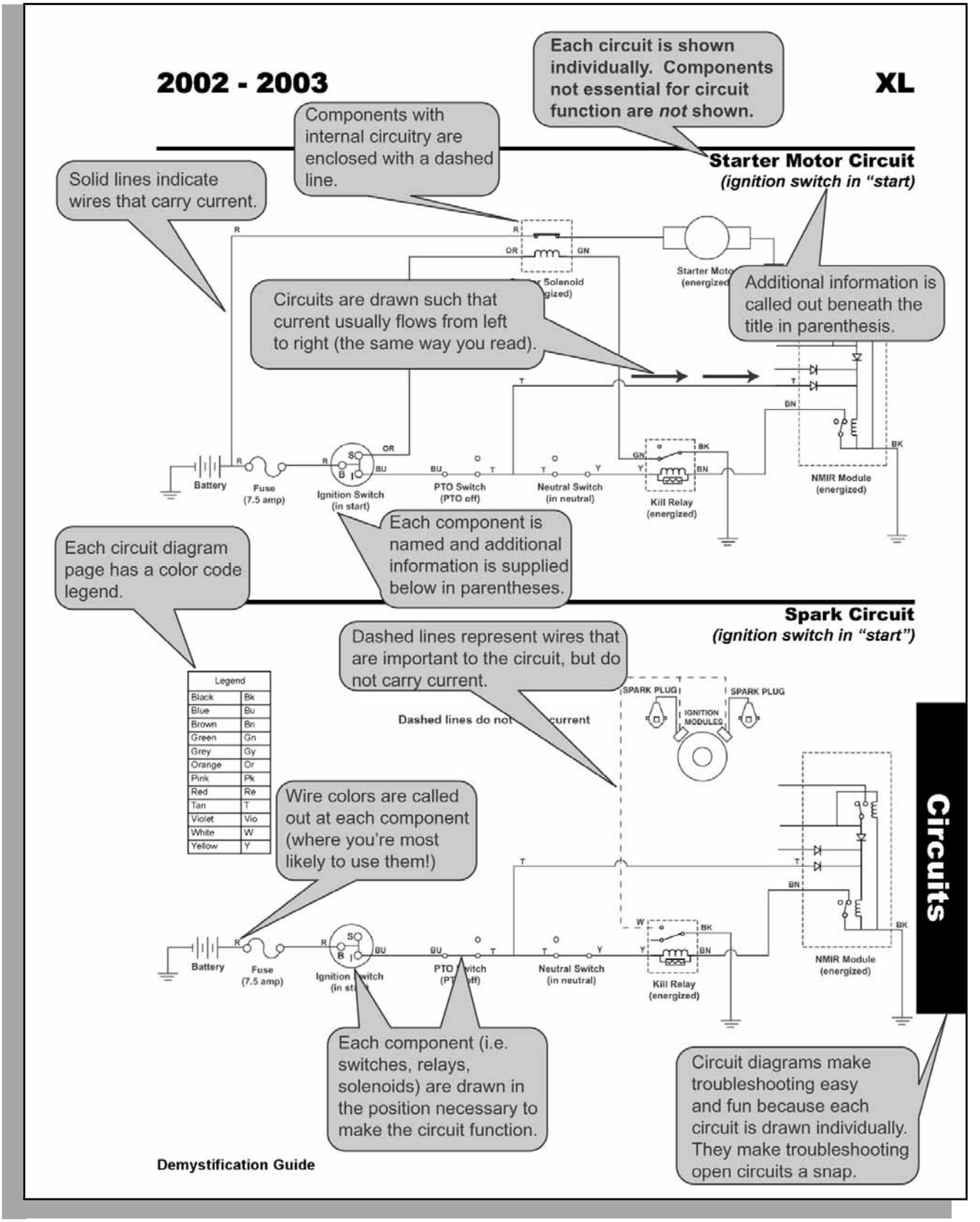
Wiring Diagram

Each product section includes the original wiring diagram.

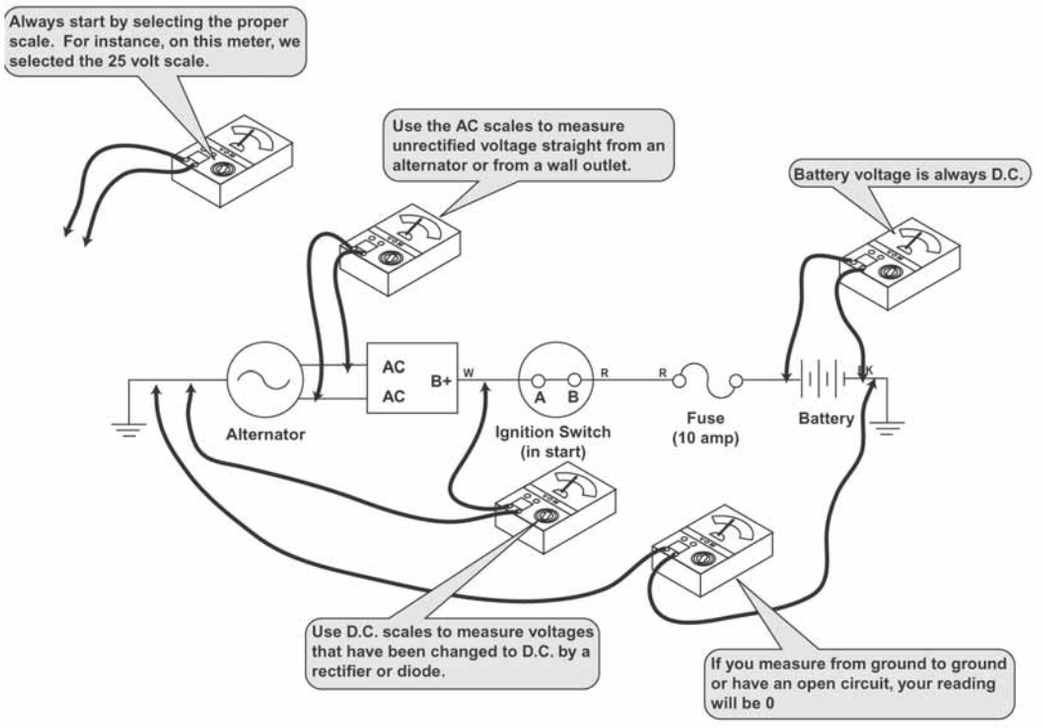


The wiring diagram closely represents the wiring harness and is very useful in diagnosing *short* circuits.

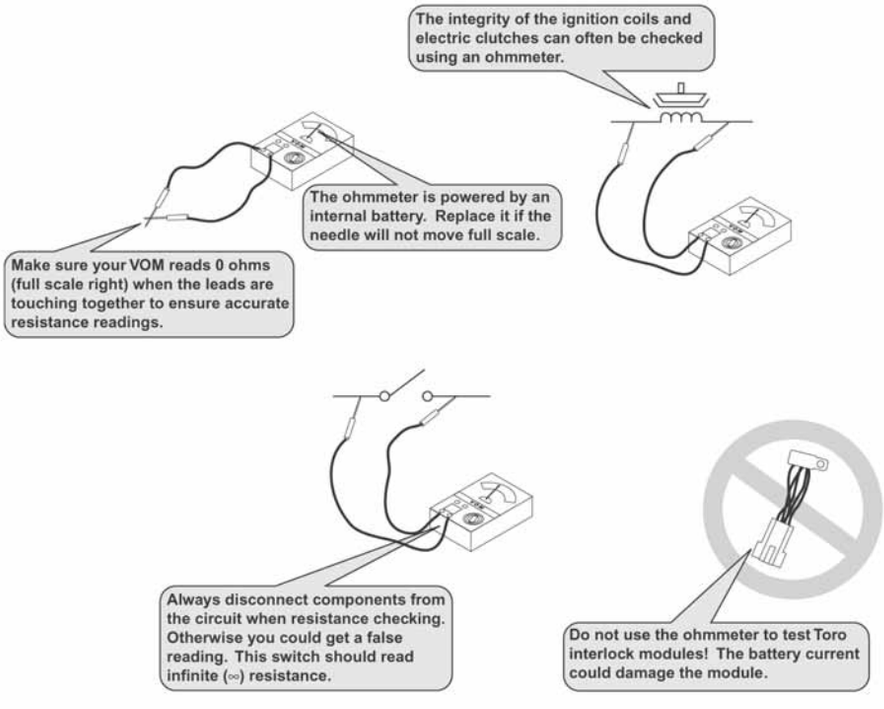
3 - 2 Demystification Guide


2002 - 2003
XL
Each circuit is shown individually. Components not essential for circuit function are *not* shown.
Components with internal circuitry are enclosed with a dashed line.
Solid lines indicate wires that carry current.
Starter Motor Circuit
(ignition switch in "start")
Additional information is called out beneath the title in parenthesis.
Circuits are drawn such that current usually flows from left to right (the same way you read).
Battery
Fuse (7.5 amp)
Ignition Switch (in start)
PTO Switch (PTO off)
Neutral Switch (in neutral)
Kill Relay (energized)
NMR Module (energized)
Each component is named and additional information is supplied below in parentheses.
Each circuit diagram page has a color code legend.
Spark Circuit
(ignition switch in "start")
Dashed lines represent wires that are important to the circuit, but do not carry current.
SPARK PLUG
SPARK PLUG
IGNITION MODULES
Legend
Black Bk
Blue Bu
Brown Bn
Green Gn
Grey Gy
Orange Or
Pink Pk
Red Re
Tan T
Violet Vio
White W
Yellow Y
Wire colors are called out at each component (where you're most likely to use them!)
Each component (i.e. switches, relays, solenoids) are drawn in the position necessary to make the circuit function.
Circuit diagrams make troubleshooting easy and fun because each circuit is drawn individually. They make troubleshooting open circuits a snap.
Demystification Guide

1 Checking Voltage

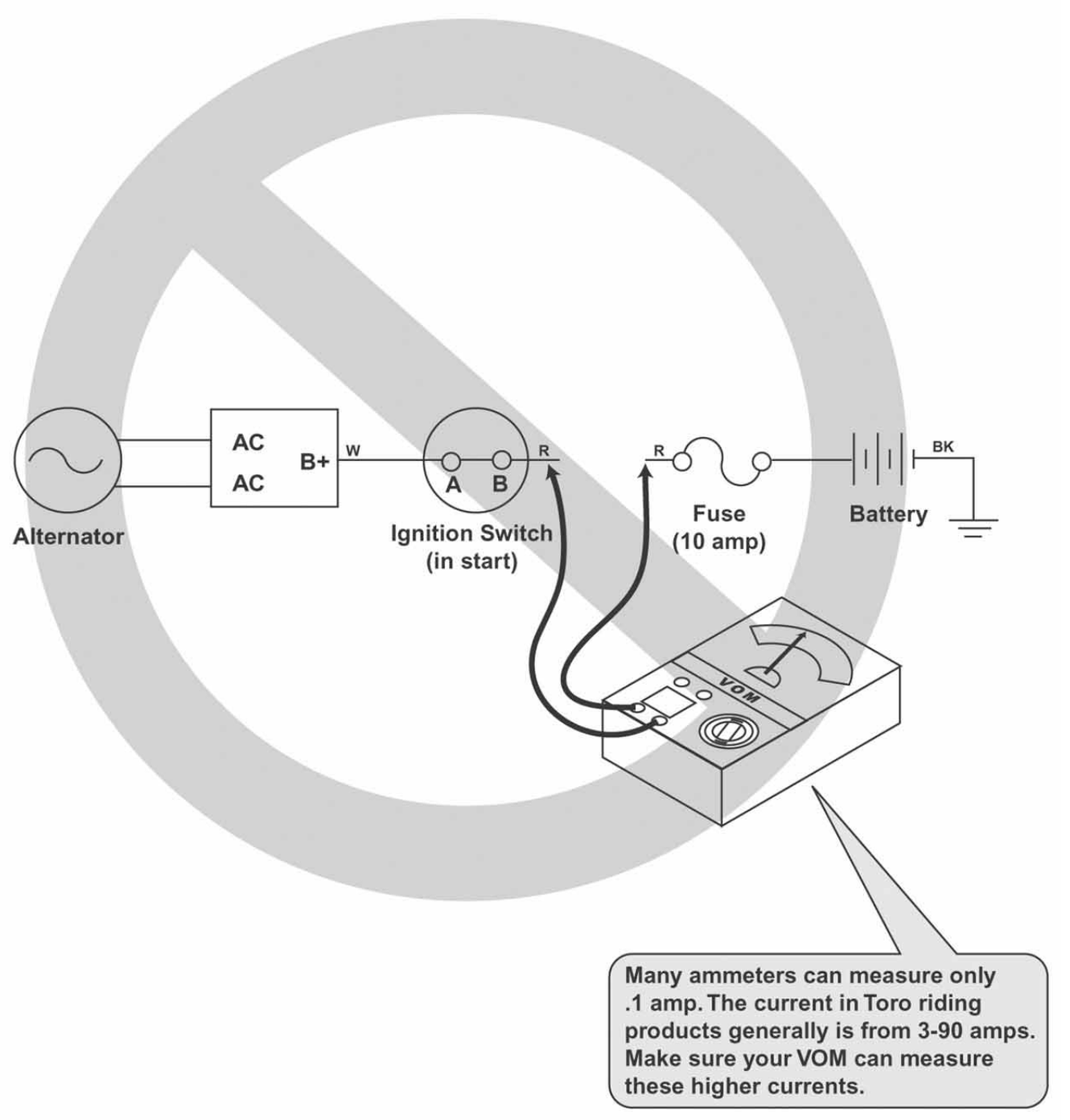


2 Checking Resistance

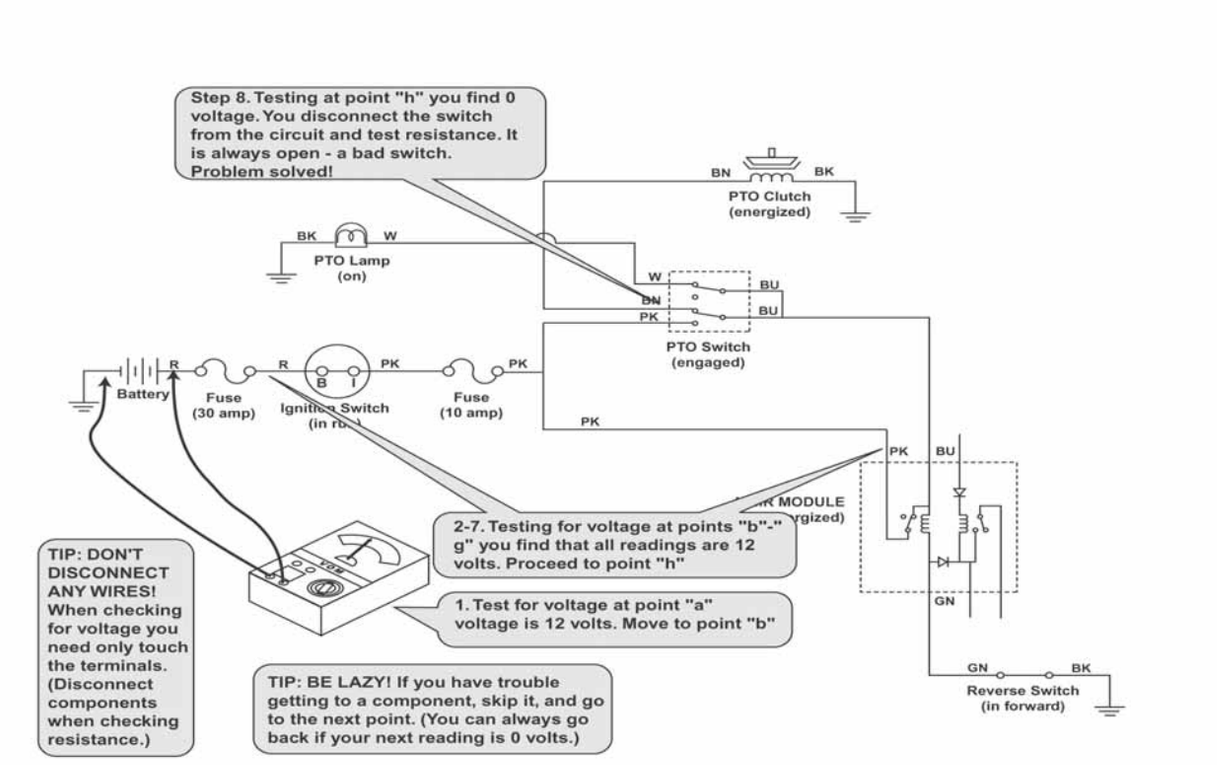


3

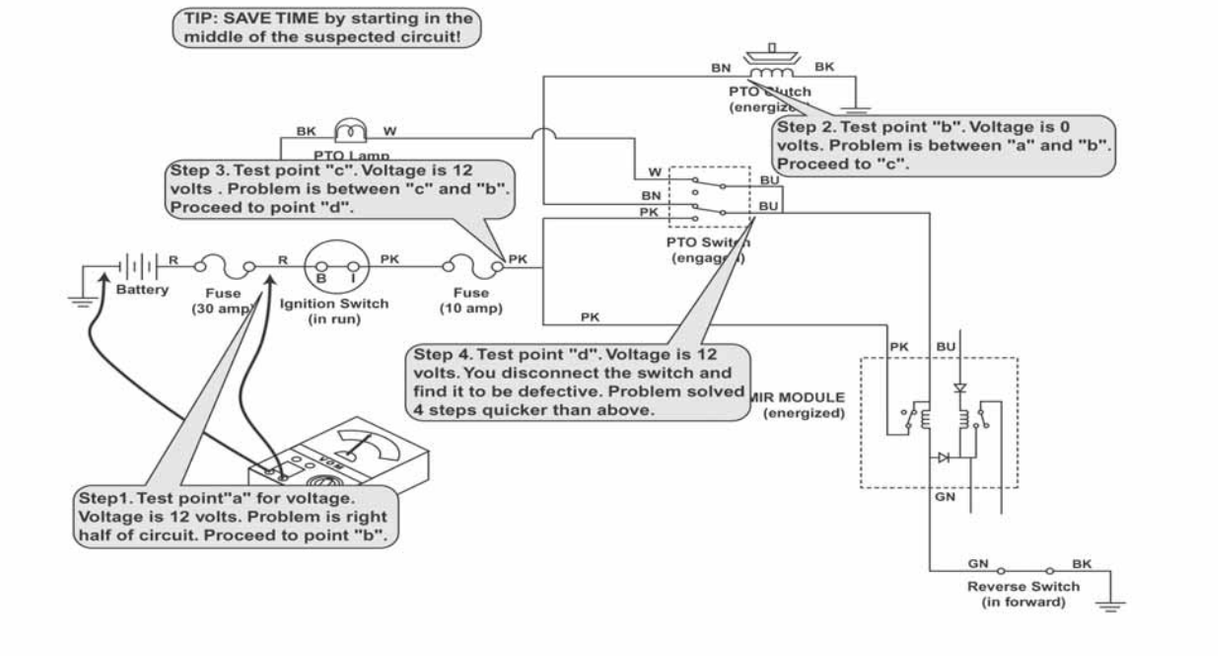
What about checking current?



Sample Problem: 266-H electric clutch will not engage

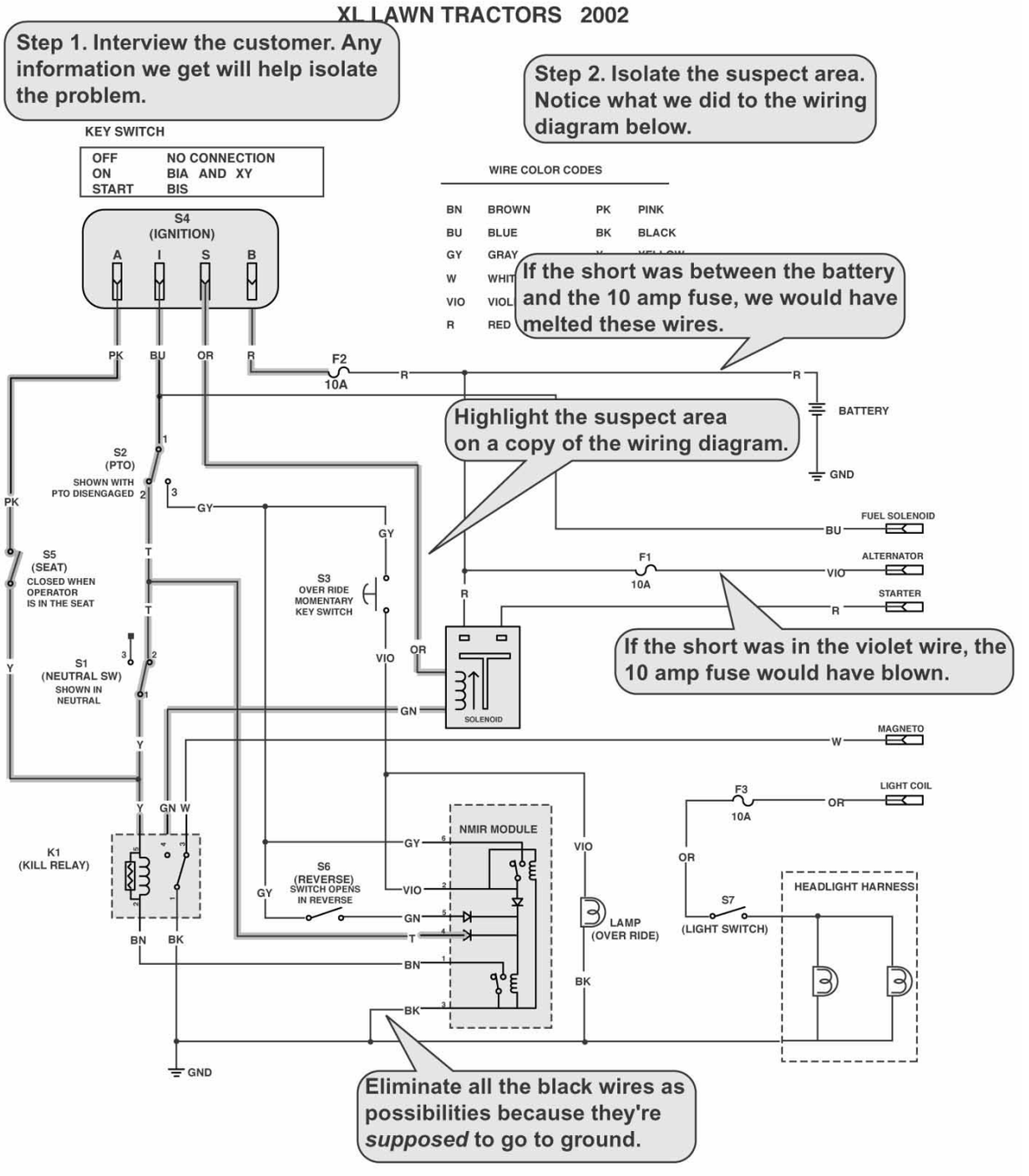


Same Sample Problem: 266-H electric clutch will not engage (this time)



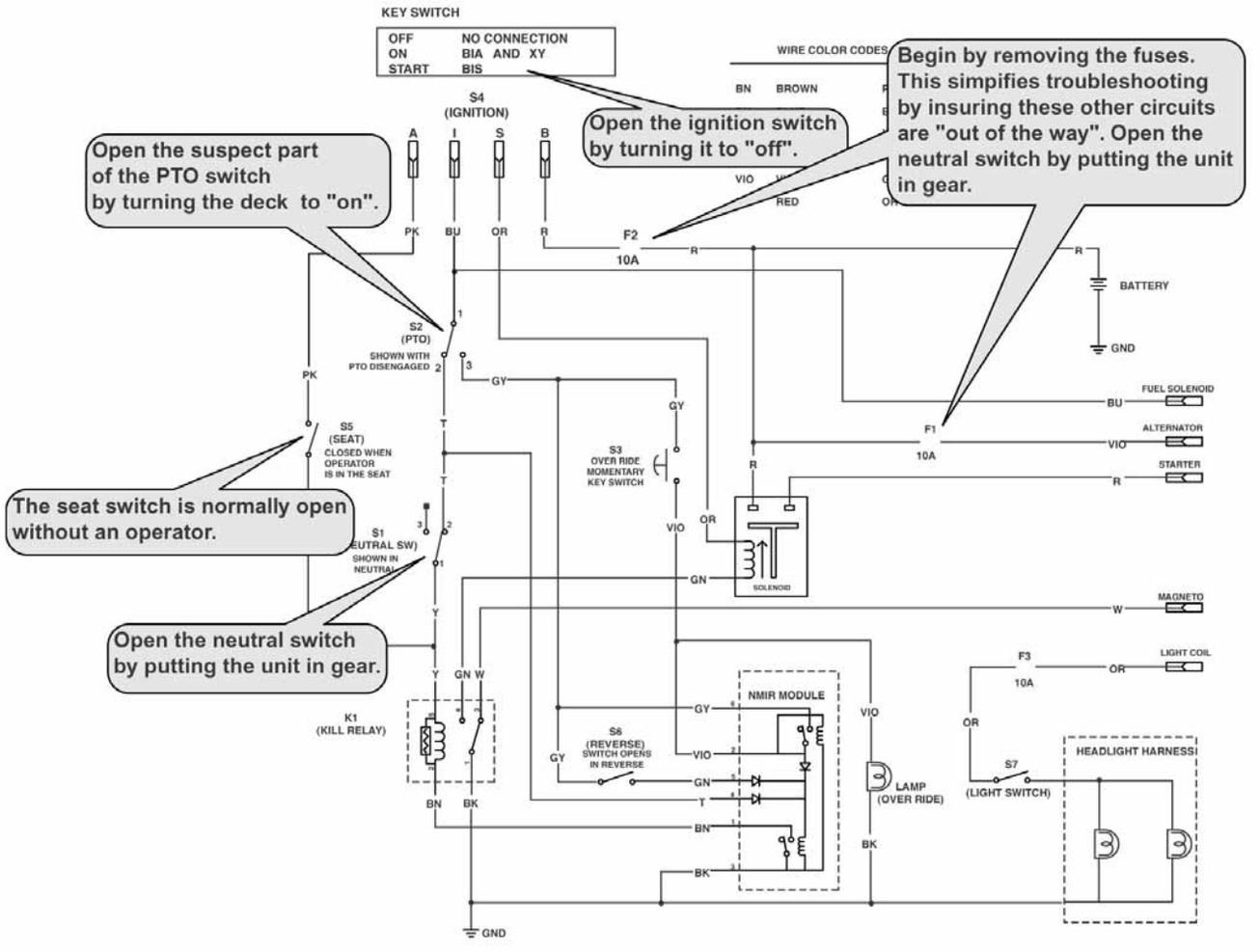
Sample Problem: **This XL lawn tractor won't turn over. The customer parked it in the garage and turned it off. When he tried to start it a week later, he heard one click. After that, nothing would happen when he turned the key.**

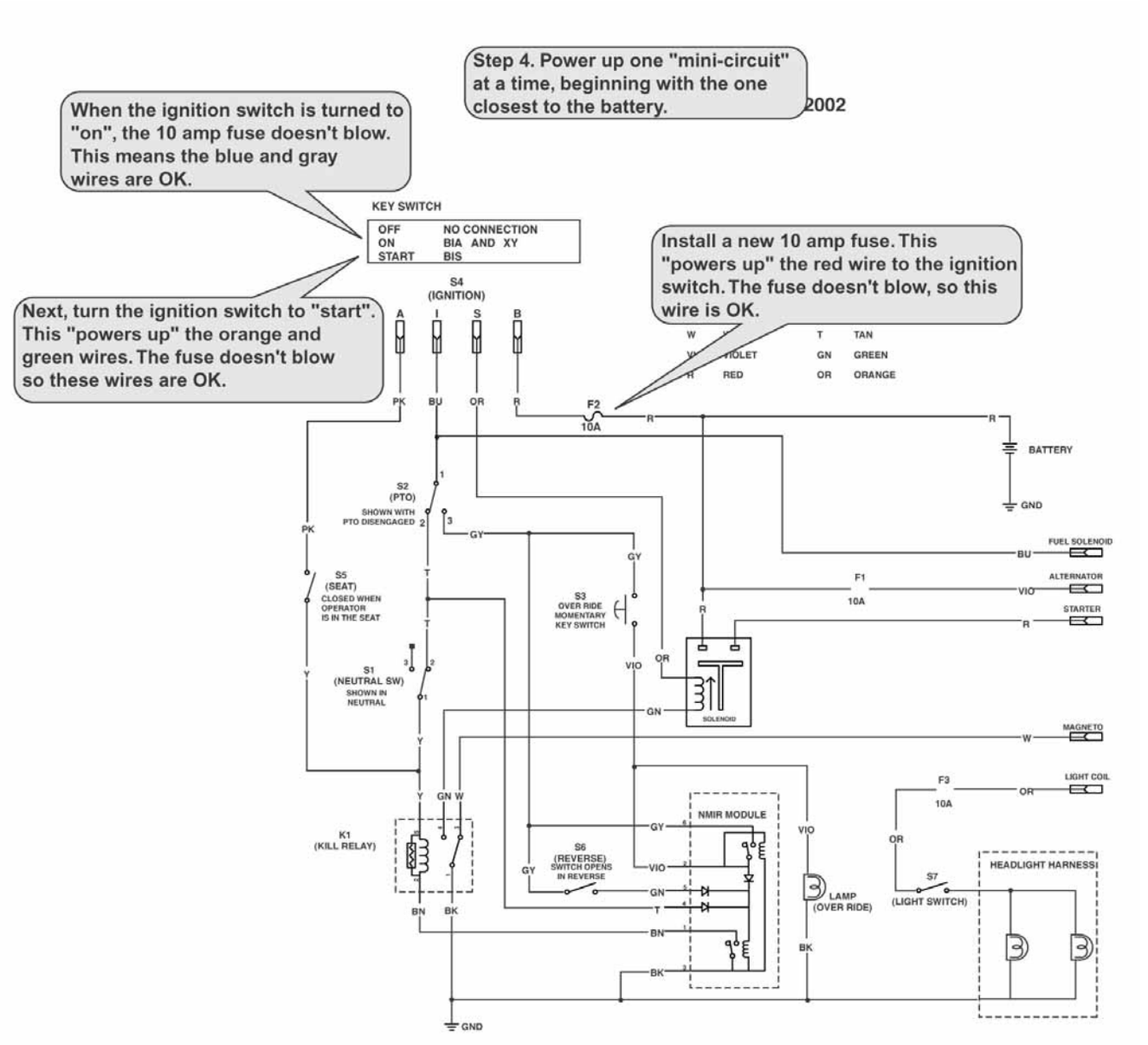
We know it is a short circuit because we found the 10 amp fuse blown.

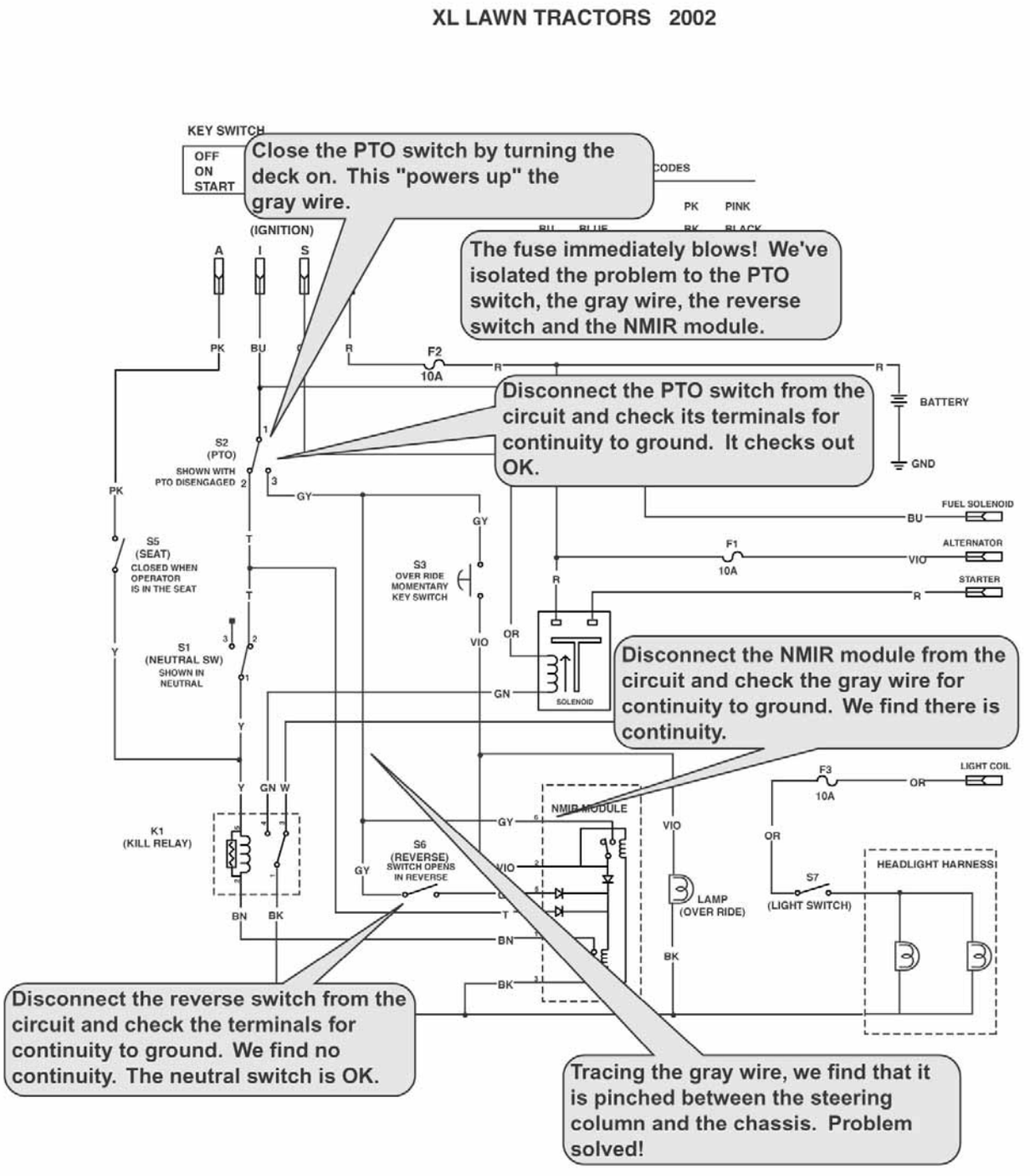


Step 3. Break the suspect area down tnto "mini-circuits". Do this by removing the unblown fuses and by opening all switches.

XL LAWN TRACTORS 2002




Step 4. Power up one "mini-circuit" at a time, beginning with the one closest to the battery.
2002
When the ignition switch is turned to "on", the 10 amp fuse doesn't blow. This means the blue and gray wires are OK.
Next, turn the ignition switch to "start". This "powers up" the orange and green wires. The fuse doesn't blow so these wires are OK.
Install a new 10 amp fuse. This "powers up" the red wire to the ignition switch. The fuse doesn't blow, so this wire is OK.
KEY SWITCH
OFF NO CONNECTION
ON BIA AND XY
START BIS
S4 (IGNITION)
A I S B
PK BU OR R
W WHITE
V VIOLET
R RED
T TAN
GN GREEN
OR ORANGE
F2 10A
BATTERY
GND
S2 (PTO)
SHOWN WITH PTO DISENGAGED
S5 (SEAT)
CLOSED WHEN OPERATOR IS IN THE SEAT
S1 (NEUTRAL SW)
SHOWN IN NEUTRAL
S3 OVER RIDE MOMENTARY KEY SWITCH
SOLENOID
FUEL SOLENOID
ALTERNATOR
STARTER
F1 10A
MAGNETO
LIGHT COIL
F3 10A
K1 (KILL RELAY)
S6 (REVERSE) SWITCH OPENS IN REVERSE
NMIR MODULE
LAMP (OVER RIDE)
S7 (LIGHT SWITCH)
HEADLIGHT HARNESS


XL LAWN TRACTORS 2002
KEY SWITCH
OFF
ON
START
(IGNITION)
A
I
S
CODES
PK PINK
BK BLACK
Close the PTO switch by turning the deck on. This "powers up" the gray wire.
The fuse immediately blows! We've isolated the problem to the PTO switch, the gray wire, the reverse switch and the NMIR module.
Disconnect the PTO switch from the circuit and check its terminals for continuity to ground. It checks out OK.
Disconnect the NMIR module from the circuit and check the gray wire for continuity to ground. We find there is continuity.
Disconnect the reverse switch from the circuit and check the terminals for continuity to ground. We find no continuity. The neutral switch is OK.
Tracing the gray wire, we find that it is pinched between the steering column and the chassis. Problem solved!
F2
10A
F1
10A
F3
10A
BATTERY
GND
FUEL SOLENOID
ALTERNATOR
STARTER
LIGHT COIL
S2
(PTO)
SHOWN WITH
PTO DISENGAGED
S5
(SEAT)
CLOSED WHEN
OPERATOR
IS IN THE SEAT
S3
OVER RIDE
MOMENTARY
KEY SWITCH
S1
(NEUTRAL SW)
SHOWN IN
NEUTRAL
SOLENOID
NMIR MODULE
K1
(KILL RELAY)
S6
(REVERSE)
SWITCH OPENS
IN REVERSE
LAMP
(OVER RIDE)
S7
(LIGHT SWITCH)
HEADLIGHT HARNESS

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Clutch, Electric (PTO)

Purpose

This clutch electrically controls the engagement and disengagement of the Power Take Off (PTO) pulley.

How It Works

The PTO clutch is composed of three major components; the field, the clutch plate, and the friction plate. The clutch plate always turns with the engine. The field is a coil of wire on an iron core, which becomes an electromagnet when power is applied. The friction plate can slide up and down on the crankshaft axis. It is normally spring loaded so that it is not in contact with the clutch plate and is pressed against the brake material opposite the clutch. When power is applied, the friction plate is drawn toward the clutch plate and the two rotate as one.

Testing

If the electric PTO clutch is not engaging or is suspected as a cause of electrical problems, use the troubleshooting steps. These procedures will help you determine if the clutch has failed or is the cause of the electrical problem.

Coil Resistance Measurement

1. Disengage the PTO, set the parking brake, turn the ignition key to ***OFF*** and remove the key.
2. Disconnect clutch wire connector.
3. Set the multimeter or volt/ohm meter to check resistance (ohms).
4. Connect the meter lead wires to the wires in the clutch connector (Figure 1).

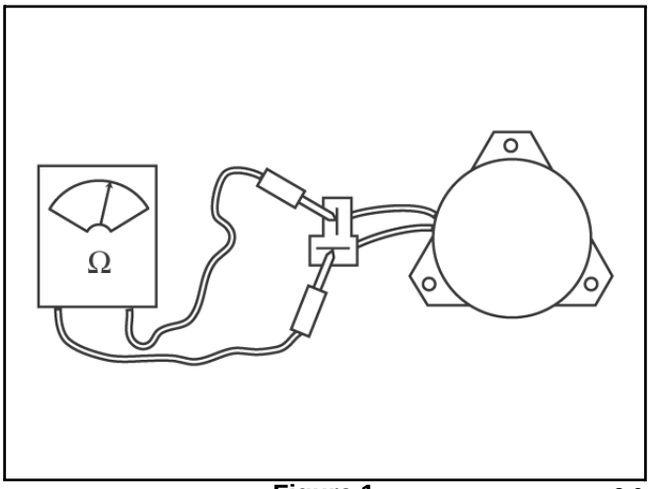


Figure 1 3-6

5. The meter should read between 2.40 ohms and 3.40 ohms. If the reading is above or below these readings, the field has failed and needs to be replaced. If the reading is between these two limits, measure the clutch current draw.

Measuring Clutch Current Draw

1. Disengage the PTO, set the parking brake, and turn the ignition to ***OFF***.
2. Disconnect the clutch wire connector.
3. Set the multimeter to check amps (10 amp scale).
4. Connect the positive meter lead to the tractor terminal (1) of the clutch wire, Figure 2.
5. Connect the negative meter lead to the corresponding wire terminal (3), Figure 2.
6. Connect a short jumper lead from terminal (2) to (4), Figure 2.
7. Turn the ignition switch to the “RUN” position and the PTO switch to the “ON” position.

8. If the meter reading is 3.5 amps or above, the system is functioning properly. If the meter reading is below 3.5 amps, check the electrical system for problems (i.e., the battery, ignition switch, PTO switch, or wiring harness may be malfunctioning).

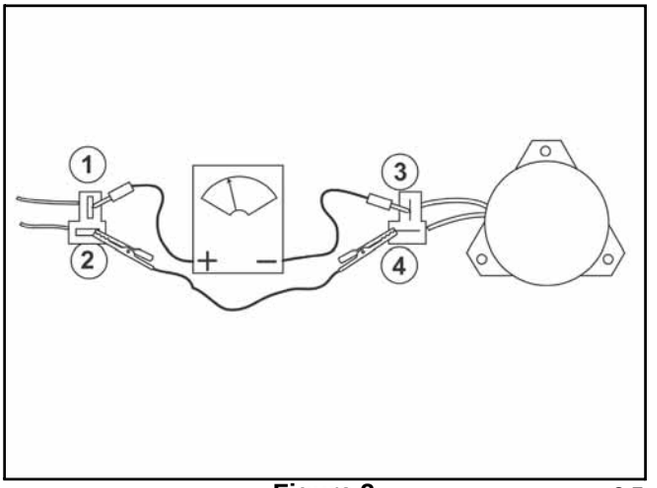


Figure 2 3-7

Clutch Burnishing Procedure

The clutch should be burnished as part of the pre-delivery service, or whenever a new clutch is installed. Burnishing polishes the clutch plate, allowing for smooth clutch engagement.

With a PTO driven attachment installed (i.e., mower, snowthrower, or tiller), run the engine at half throttle. Engage and disengage the clutch 5 times (10 seconds on/10 off).

Increase engine RPM to ¾ to full throttle. Engage and disengage clutch 5 times (10 seconds on/10 seconds off). Check and adjust the PTO clutch air gap (not required on 2000 and later models).

Gauge, Fuel

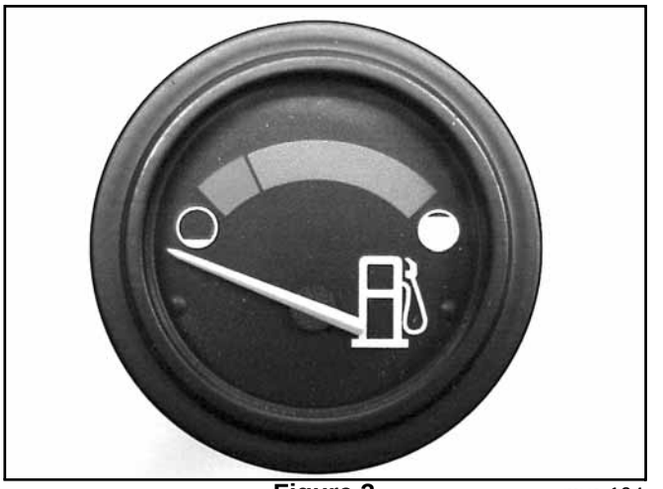


Figure 3 mvc-104

Purpose

This gauge indicates fuel level (Figure 3).

How it Works

The meter movement moves in proportion to the amount of resistance provided by the fuel level sender in the tank. The movement is dampened to compensate for movement of the fuel in the tank.

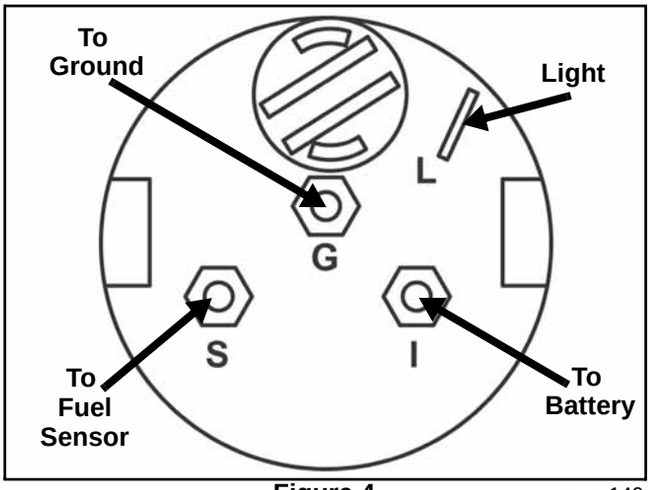


Figure 4 mvc-149

Testing

1. With the gauge still connected to the harness, turn the key to the “RUN” position.

2. Using a VOM, set scale capable of reading 12 volts D.C., connect the negative lead to ground (Figure 4) to verify the conditions in the table below.

Terminal	Reading
G	0 volts
I	12 volts*
S	2.5 volts tank full
S	7.5 volts tank empty

* All voltage readings should be within 20%.

Gauge, Voltmeter

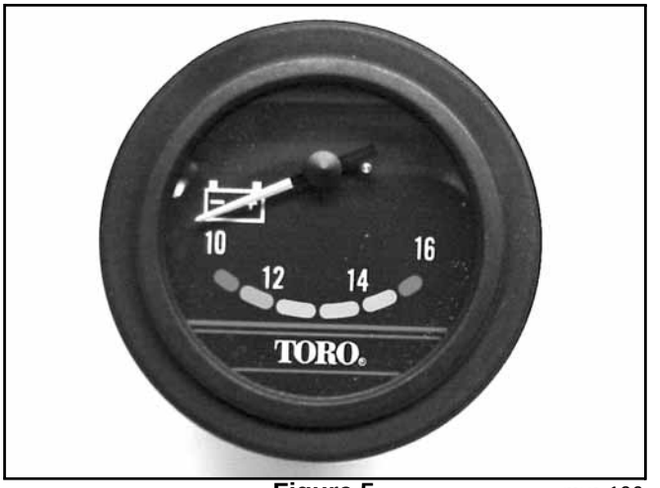


Figure 5 mvc-106

Purpose

This gauge indicates the voltage across the battery (Figure 5).

How it Works

The meter movement moves proportional to the voltage level across the two terminals of the battery. This is accomplished by placing a resistor in parallel with the meter movement.

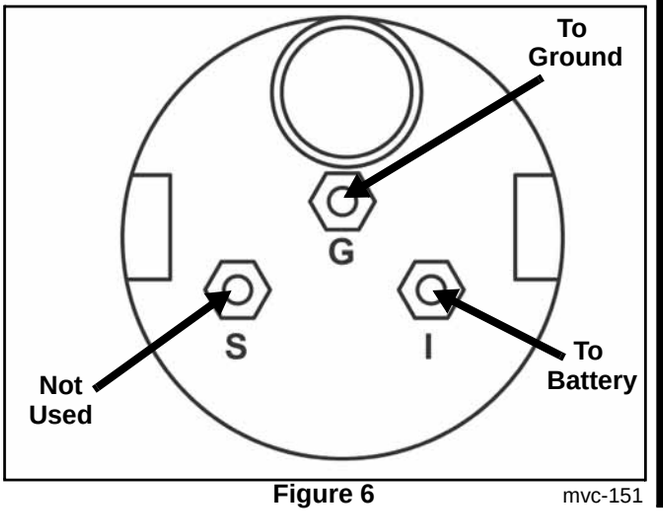


Figure 6 mvc-151

Testing

1. With the meter still connected to the harness, turn the key to the “RUN” position.

2. Verify the conditions in the table below. If they are not met, replace the voltmeter as it is not serviceable (Figure 6).

Terminal	Condition
I	12 volts DC +/- 20%
G	0 volts DC

Hourmeter

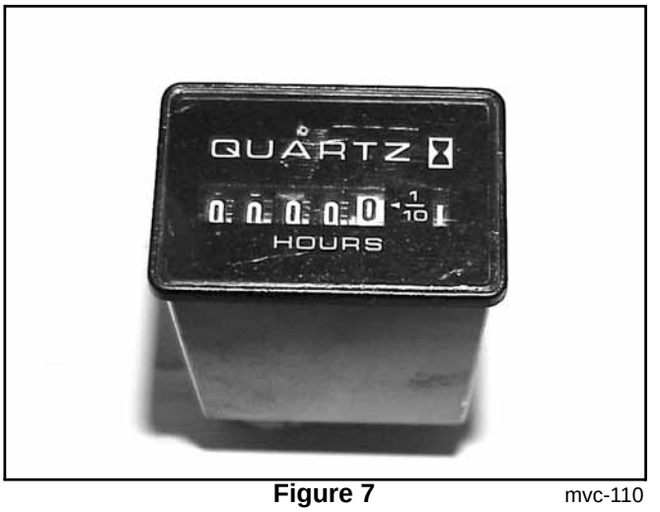


Figure 7 mvc-110

Purpose

The hourmeter keeps track of the actual engine hours (Figure 7). This is accomplished by connecting the hourmeter to the engine oil pressure switch.

How it Works

Since a normal clock might be affected by variations in voltage and current, the hourmeter is made up of a combination of an electric “winder” and a mechanical clock movement. When power is applied, a coil is energized to wind the movement. The movement unwinds in about two seconds. As it finishes its rotation, it re-energizes the coil so that the cycle can start over.

Testing

Verify that 12 volts is present across the two terminals when the engine is running. If so, and the meter is not running, replace the meter. If 12 volts is not present, check the connections and the engine oil pressure switch. The meter is a permanently sealed unit and is not repairable.

Magnet Assembly - Cruise Control

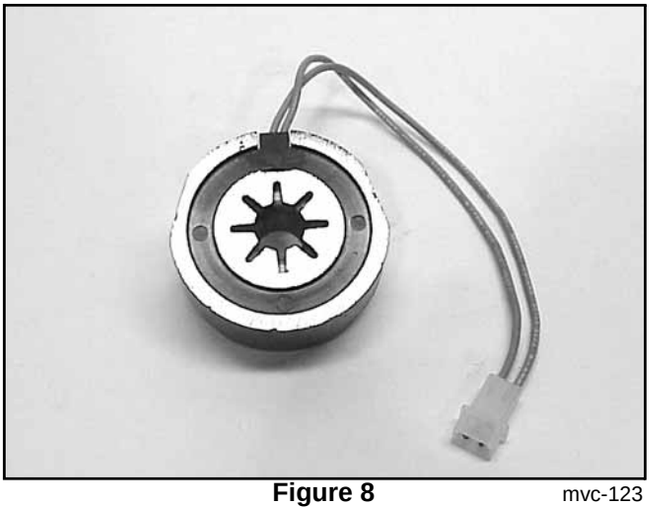


Figure 8 mvc-123

Purpose

When engaging cruise control, the magnet assembly engages a cruise control plate that locks the control linkage to the speed that is set (Figure 8).

How it Works

When the desired forward speed is obtained, push the cruise control switch on the dash. Through a cruise control relay, 12 volts is sent to the magnet assembly and this locks the magnet to the cruise control plate and locks the traction control. This allows you to remove your foot from the traction control.

Testing

1. Unplug the wires and remove the magnet assembly from the tractor.

2. Place the magnet assembly on a metal surface and apply 12 volts D.C. positive and negative to the wire leads.

3. The magnet assembly should hold to the metal surface. When voltage is removed, the magnet assembly can be removed from the metal surface.

Microswitches

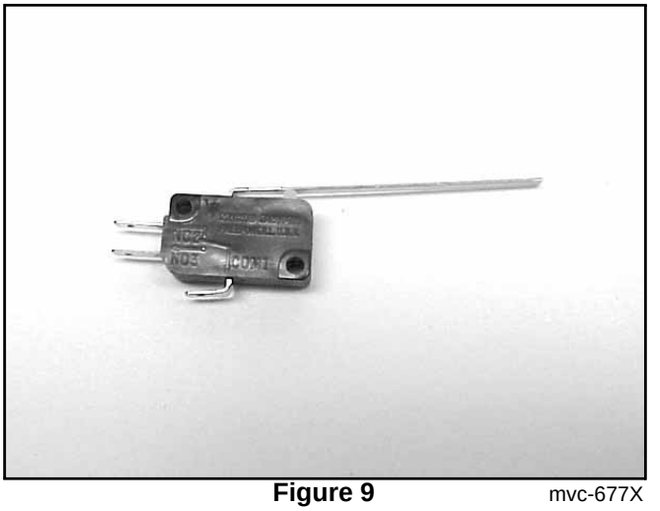


Figure 9 mvc-677X

Purpose

Microswitches are used to monitor whether or not a lever or pedal is in the correct position (Figure 9).

How It Works

This SPDT (Single Pole Double Throw) microswitch has three terminals. The lever is spring loaded in the “up” position. When the button is pushed down, continuity switches from COM and NC to COM and NO.

Testing

1. Disconnect the switch from the harness.

2. Using an ohmmeter (ohm), connect one meter lead to the “COM” terminal, and other lead to the “NC” terminal.

3. With the switch in the spring loaded “up” position, there should be continuity; the switch is operating properly. Push the button “down”. There should be **no** continuity; the switch is operating properly.

4. Connect one meter lead to the “COM” terminal and the other lead to the “NO” terminal.

5. With the button in the “OUT” spring loaded position, if there is **no** continuity, the switch is operating properly.

6. Then move the switch button to the “down” position. If there is continuity, the switch is operating properly.

KeyChoice™ Reverse Operating System

This interlock feature is provided to prevent unintentional engine-powered attachment operation in reverse. If the tractor is shifted into reverse while the mower blade or other Power Take Off (PTO) driven attachment is engaged, the electric clutch will disengage or the engine will stop, depending on the model. **DO NOT MOW WHILE BACKING UP UNLESS ABSOLUTELY NECESSARY.** If you need to mow while in reverse or use other PTO drive attachments (such as a snowthrower), this interlock feature may be temporarily deactivated.

Before deactivating this feature, be sure there are no children present on or near property where you are using the tractor and that are likely to appear while you are mowing or operating an attachment. Be extra observant after you have chosen to deactivate the interlock feature because the sound of the tractor's engine might prevent you from being aware that a child or bystander has entered the area where you are operating the tractor.

Once you are sure you can safely mow in reverse or operate an attachment, deactivate the reverse operating system by turning the KeyChoice™ switch, located around the seat area, after engaging the PTO system. A red light will illuminate on the dash as a reminder that the reverse operating system interlock has been deactivated. Once the interlock is deactivated, it stays in this mode **WITH YOUR MOWER BLADE OR ATTACHMENT OPERATING WHENEVER YOU BACK-UP**, and the dash light stays on until either the PTO clutch is disengaged or the engine is turned off.

Systems:

There are two different "shutdown" systems used in the KeyChoice™ Reverse Operating System. One system is used with the electric (PTO) clutch - when the tractor is shifted to reverse while the mower blade or other PTO driven attachment is engaged the electric clutch will disengage. The other system is used with the manual (PTO) clutch - when the tractor is shifted to reverse while the mower blade or other PTO driven attachment is engaged, the engine will stop.

Testing the KeyChoice™ Reverse Operating System - <u>Electric PTO System</u> - Unactivated

1. With the parking brake released, seat occupied, turn the ignition key to "RUN" without starting the engine.
2. Pull the PTO electric clutch switch "ON".
3. You should hear an audible click, indicating the PTO is activated and the PTO light will come on.
4. Move the forward/reverse pedal to reverse. On the gear drive tractors, shift the gear selector to reverse.
5. You should hear an audible click indicating the PTO is deactivated and the PTO light, on the dash, should turn off.

Testing the KeyChoice™ Reverse Operating System - <u>Electric PTO System</u> - Activated

1. With the parking brake released, seat occupied, turn the ignition switch to "RUN" without starting the engine.
2. Pull the PTO electric clutch switch to "ON".
3. Turn the "KeyChoice" key and release.
4. The "KeyChoice" warning light on the dash should come on.
5. Move the foot pedal to reverse. On the gear drive model tractors, move the gear selector to reverse.
6. The PTO and "KeyChoice" warning lights on the dash should remain on.
7. Push the PTO switch to "OFF".
8. The PTO light and the "KeyChoice" warning lights should turn off.

Testing the KeyChoice™ Reverse Operating System - <u>Manual PTO System</u> - Unactivated

1. Move the Power Take Off (PTO) lever to the "disengage" position and move the gear shift lever to neutral on the gear shift model tractors. Depress the clutch/brake pedal.
2. Now start the engine.

3. While the engine is running, move the PTO lever to the “engage” position, on gear shift models, move the gear shift lever in reverse, and on Hydro models, move the forward/reverse pedal to reverse.

4. The engine should stop.

Testing the KeyChoice™ Reverse Operating System - Manual PTO System - Activated

1. Move the PTO lever to the “disengage” position and move the gear shift lever to neutral on gear shift models. Depress the clutch/brake pedal on the Hydro’s.

2. Now start the engine.

3. Move the PTO lever to the “engage” position and turn the KeyChoice™ key, located around the seat area.

4. A red light on the dash turns on, indicating the interlock (Reverse Operating System) is disabled.

5. You should be able to operate the machine in reverse and the engine/mower will continue to run.

6. Move the PTO lever to the “disengage” position and the red light should turn off on the dash.

How It Works

Low Voltage - The low voltage portion of the module is a voltage comparator, checking the charge voltage from the engine regulator/rectifier system. If the charge is less than 11 volts D.C., the low voltage module senses this and activates the indicator lamp on the dash which will light until the voltage is over 11 volts D.C.

KeyChoice™ Reverse Operating Module - The KeyChoice ™ Reverse Operating System Module is made up of several components, such as diodes and relays. When it is connected in the circuit, voltage is applied to certain terminals of the KeyChoice™ Reverse Operating System module from the PTO switch, reverse switch, and the override switch, which energizes certain relays in the module. If voltage is not applied to proper terminals on the KeyChoice™ Reverse Operating System Module, the electric PTO clutch will stop.

Testing - Low Voltage Testing

Before replacing the Low Voltage/KeyChoice™ Reverse Operating Module, Check the following:

1. Test the battery to make sure it is fully charged and is in good shape.

2. Next, check the charging system of the engine; follow the procedure in the appropriate engine service manual.

3. If the battery checks out and is in good condition and the charging system checks out and is charging properly and the battery light on the dash is on, replace the module. Without specialized test equipment, it is not practical to test the module in the field.

KeyChoice™ Reverse Operating System Module

Purpose

The KeyChoice™ Reverse Operating System Module must be removed from the wiring harness. Using a multimeter, check the following (Figure 10).

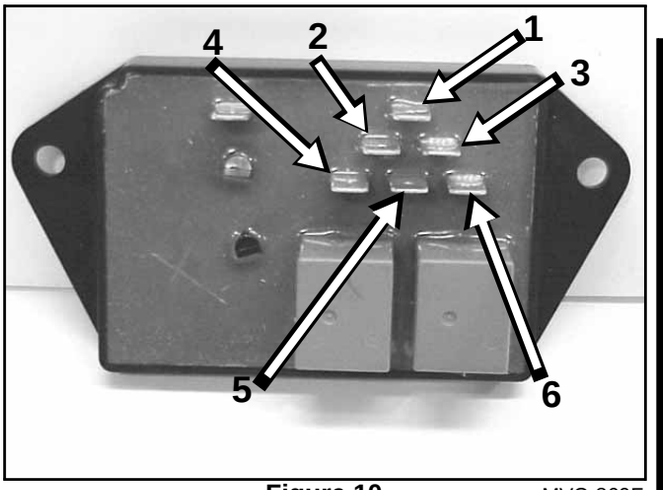


Figure 10 MVC-869F

Testing - No Power To Circuit (With Module Out of Circuit)

Meter Scale	Meter Probe Negative	Meter Probe Positive	Meter Reading
Ohms	Pin 3	Pin 5	Open (More than 100K ohms)
Diode*	Pin 3	Pin 6	.5 to 1 Volt
Diode*	Pin 3	Pin 1	.5 to 1 Volt
Diode*	Pin 3	Pin 4	.5 to 1 Volt
Ohms	Pin 1	Pin 4	350 to 400 ohms
Ohms	Pin 2	Pin 4	Open (more the 100K ohms)

***Note:** If the multimeter does not have a diode test feature, this test can not be performed. This is not a problem if powered tests are done. Powered tests must be performed to test relays (see table below).

Testing - Powered Circuit (With Module Out of Circuit)

	Volt Meter		Battery		
Meter Scale	**Neg Probe**	**Pos Probe**	**Neg Lead**	**Pos Lead**	**Meter Reading**
Ohms	Pin 3	Pin 5	Pin 3	Pin 6	< 10 Ohms
Volts (Caution)	Pin 1	Pin 2	Pin 1	Pin 4	12 Volts***
Volts (Caution)	Pin 3	Pin 2	Pin 3	Pin 4	12 Volts***

*** Same as battery voltage

Note: A 12 volt battery is needed for this test. **USE CAUTION WHEN MEASURING RESISTANCE WITH A POWERED CIRCUIT. CONTACTING A VOLTAGE SOURCE WITH A METER IN OHMS POSITION CAN SERIOUSLY DAMAGE THE METER.**

Module, KeyChoice™ Reverse Operating System (Electric PTO Clutch)

Purpose

The KeyChoice™ Reverse Operating System Module (Figure 11) works with the KeyChoice™ switch, PTO switch, and the reverse switch. It responds to the reverse switch. If the override switch (KeyChoice™ switch) is not activated and the PTO is engaged, it will stop the electric PTO clutch.

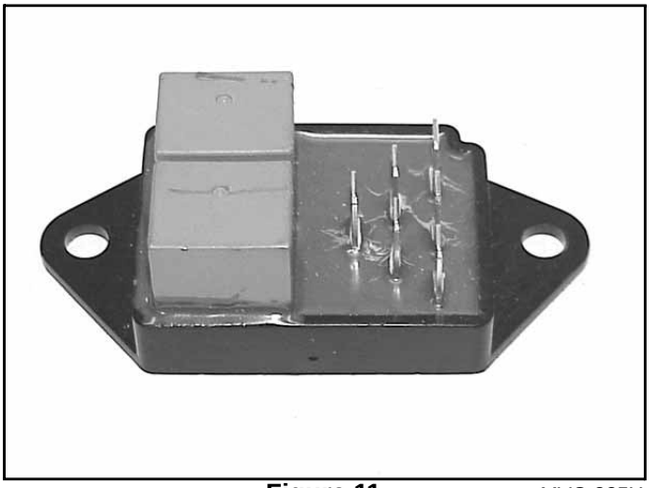


Figure 11 MVC-385X

How It Works

The KeyChoice™ Reverse Operating System Module is made up of several components, such as diodes and relays. When it is connected in the circuit, voltage is applied to certain terminals of the KeyChoice™ Reverse Operating System module from the PTO switch, reverse switch, and the override switch, which energizes certain relays in the module. If voltage is not applied to proper terminals on the KeyChoice™ Reverse Operating System Module, the electric PTO clutch will stop.

Testing

The KeyChoice™ Reverse Operating System Module must be removed from the wiring harness. Using a multimeter check the following (Figure 12):

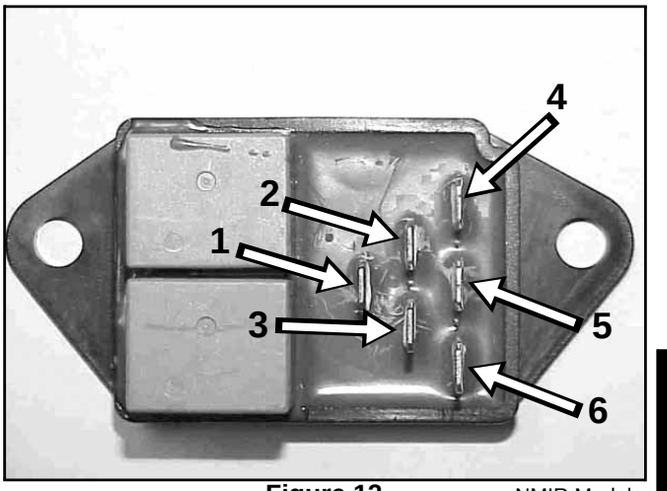


Figure 12 NMIR Module

Testing - No Power To Circuit (With Module Out of Circuit)

Meter Scale	Meter Probe Negative	Meter Probe Positive	Meter Reading
Ohms	Pin 3	Pin 5	Open (More than 100K ohms)
Diode*	Pin 3	Pin 6	.5 to 1 Volt
Diode*	Pin 3	Pin 1	.5 to 1 Volt
Diode*	Pin 3	Pin 4	.5 to 1 Volt
Ohms	Pin 1	Pin 4	350 to 400 ohms
Ohms	Pin 2	Pin 4	Open (more the 100K ohms)

***Note:** If the multimeter does not have a diode test feature, this test can not be performed. This is not a problem if powered tests are done. Powered tests must be performed to test relays (see table below).

Testing - Powered Circuit (With Module Out of Circuit)

	Volt Meter		Battery		
Meter Scale	**Neg Probe**	**Pos Probe**	**Neg Lead**	**Pos Lead**	**Meter Reading**
Ohms	Pin 2	Pin 5	Pin 3	Pin 6	< 10 Ohms
Volts (Caution)	Pin 1	Pin 2	Pin 1	Pin 4	12 Volts***
Volts (Caution)	Pin 3	Pin 2	Pin 3	Pin 4	12 Volts***

*** Same as battery voltage

Note: A 12 volt battery is needed for this test. **USE CAUTION WHEN MEASURING RESISTANCE WITH A POWERED CIRCUIT. CONTACTING A VOLTAGE SOURCE WITH A METER IN OHMS POSITION CAN SERIOUSLY DAMAGE THE METER.**

Module, KeyChoice™ Reverse Operating System (Manual PTO Clutch)

Purpose

The Key Choice™ Reverse Operating System module works with the KeyChoice™ switch, PTO switch, and the reverse switch. It responds to the reverse switch; if the override switch (KeyChoice™ switch) is not activated and the PTO is engaged, it will stop the engine (Figure 13).

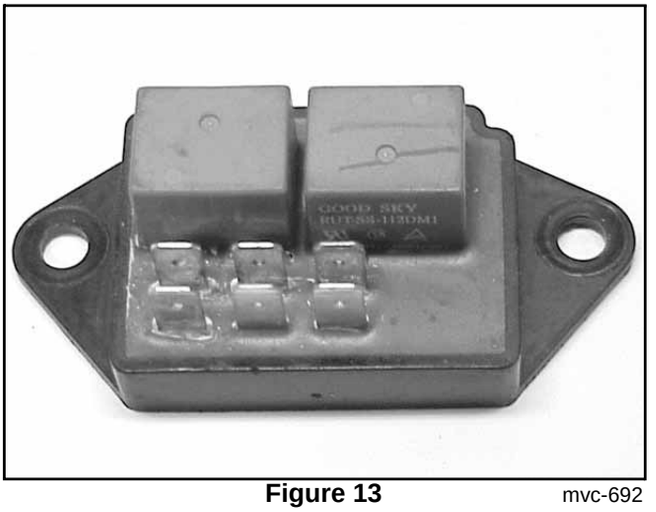


Figure 13 mvc-692

How it Works

The Key Choice™ Reverse Operating System is made up of several components, such as diodes and relays. When it is connected in the circuit, voltage is applied to certain terminals of the Key Choice™ Reverse Operating System module from the PTO switch, reverse switch, and the override switch, which energizes certain relays in the module. If voltage is not applied to the proper terminals on the Key Choice™ Reverse Operating System module, the engine will stop.

Testing

The Key Choice™ Reverse Operating System module must be removed from the circuit. Using a multimeter check the following:

Meter Scale	Meter Probe Negative	Meter Probe Positive	Meter Reading
Ohms	Pin 3	Pin 1	Open (more than 100k ohm)
Ohms	Pin 3	Pin 2	350 to 450 ohms
Diode	Pin 3	Pin 4	0.7V to 1.0V *
Diode	Pin 3	Pin 5	0.7V to 1.0V *
Ohms	Pin 3	Pin 6	Open (more than 100k ohms)

* **NOTE:** If multimeter does not have a diode scale, this test can not be done. This is not a problem if powered tests are done. Powered test must be done to check out relays (Figure 14).

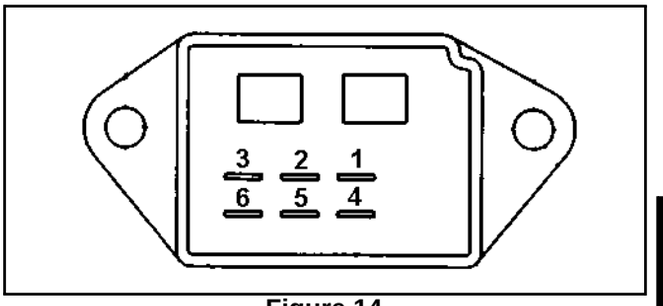


Figure 14

Powered circuit test (with module out of circuit). A 12 volt battery is needed for this test. NOTE: USE CAUTION WHEN MEASURING RESISTANCE WITH A POWERED CIRCUIT. CONTACTING A VOLTAGE SOURCE WITH METER IN OHMS POSITION CAN SERIOUSLY DAMAGE THE METER.

Ground	B+ (12V)	Meter Probe Neg.	Meter Probe Pos.	Meter Scale	Meter Reading
Pin 3	Pin 4	Pin 3	Pin 1	Ohms	<2 ohms
Pin 3	Pin 5	Pin 3	Pin 1	Ohms	<2 ohms
Pin 3	Pin 2	Pin 3	Pin 1	Ohms	<2 ohms
Pin 3	Pin 2	Pin 3	Pin 6	Volts	12 V **

** **NOTE:** Actual reading should be same as B+ applied to Pin 2.

Module, Low Voltage

Purpose

The illumination of the battery light on the dash indicates the battery voltage is too low. This is controlled by the low voltage module (Figure 15).

How it works

The low voltage module is a voltage comparator, checking the charge voltage from the engine regulator/ rectifier system. If the charge voltage is less than 11.3 volts D.C., the low voltage module senses this and activates the indicator lamp on the dash which will light until the voltage is over 12 volts D.C.

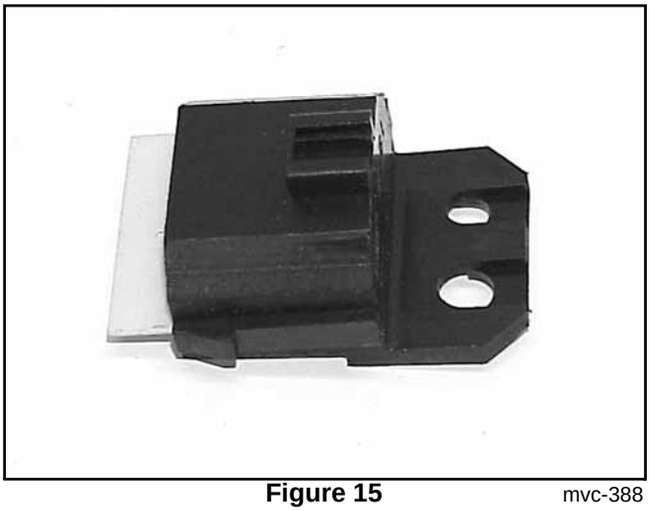


Figure 15 mvc-388

Testing

1. Before replacing the low voltage module, test the battery to make sure it is fully charged and is in good shape.

2. Next, check the charging system of the engine; follow the procedure in the appropriate engine service manual.

3. If the battery checks out and is in good condition and the charging system checks out and is charging properly and the battery light on the dash is on, replace the low voltage module. Without specialized test equipment, it is not practical to test the low voltage module in the field.

Relay

Purpose

The relay is used in a variety of ways to turn circuits on and off.

How It Works

A relay is an electrically actuated switch.

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. Switch: Terminals 30, 87, and 87a are actually part of a single pole, double throw (SPDT) switch. Terminal 30 is the common lead. The switch is spring loaded so that 30 and 87a are connected when the coil is not energized. When the coil is energized, the switch is “thrown” and 30 and 87 are connected (Figure 16).

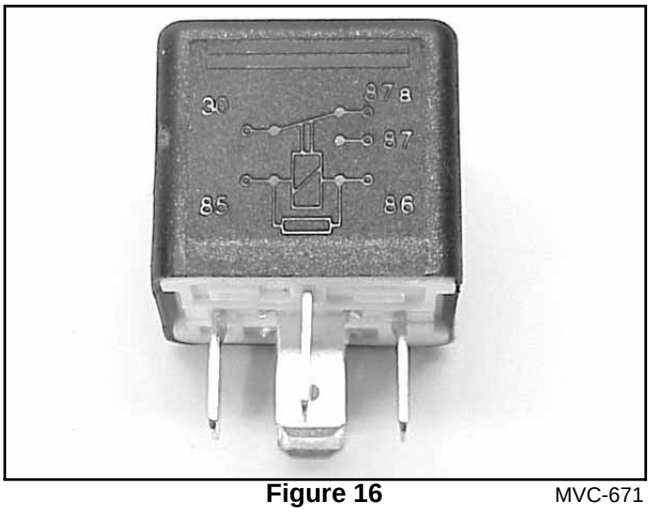


Figure 16 MVC-671

Testing

1. Disconnect the relay from the harness.

2. Verify the coil resistance between terminals 85 and 86 with a multimeter (ohms setting). Resistance should be from 70 to 90 ohms. There should be continuity between terminals 87a and 30 (Figure 17).

3. Connect multimeter (ohms setting) leads to relay terminals 30 and 87. Ground terminal 86 and apply +12 VDC to terminal 85. The relay should make and break continuity between terminals 30 and 87 as 12 VDC is applied and removed from terminal 85 (Figure 17).

4. Connect multimeter (ohms setting) leads to relay terminals 30 and 87a. Apply +12 VDC to terminal 85. With terminal 86 still grounded, the relay should break and make continuity between terminals 30 and 87a as 12 VDC is applied and removed from terminal (Figure 17).

5. Disconnect voltage and multimeter leads from relay terminals.

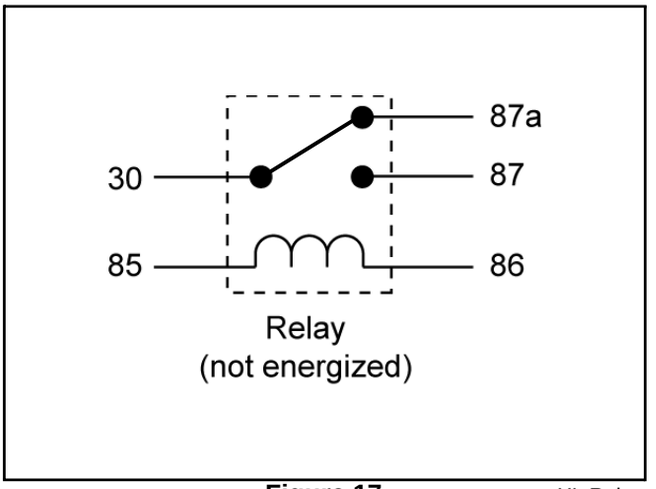


Figure 17 XL Relay

Sender, Fuel

(P/N 94-1716)

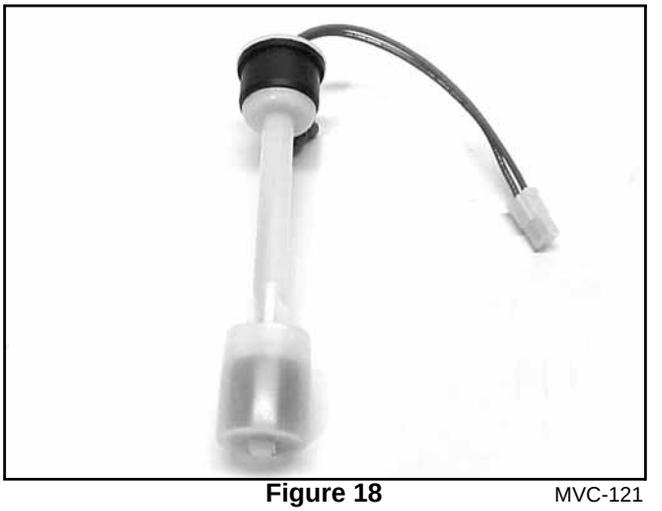


Figure 18 MVC-121

Purpose

This electrical component monitors the level of fuel in the tank (Figure 18).

How it Works

Located at the bottom of the fuel sender is a float. When fuel runs low in the fuel tank, the float should drop. When it reaches a certain point, the sensor's contacts close and the low fuel light, located on the dash, lights up.

Testing

1. Disconnect the fuel sender from the wiring harness and remove from the fuel tank.

2. With a VOM set for continuity, connect to the two wire leads, hold the fuel sender upright, float in down position, and the wiring facing the top. You should have continuity.

3. Turn the fuel sender upside down, with the float up and the wires down. You should have NO continuity.

Sender, Fuel

(P/N 95-3971)

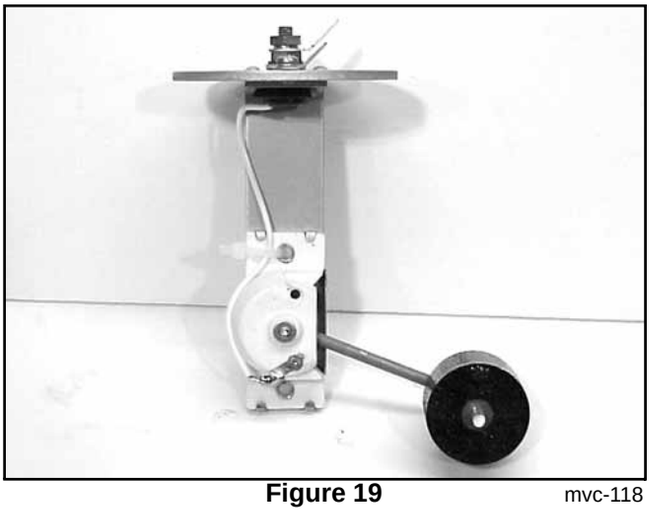


Figure 19 mvc-118

Purpose

This electrical component monitors the level of fuel in the tank (Figure 19).

How it Works

A float is attached to a pivoting lever. This lever rotates a potentiometer (a device much like the volume control on your stereo) to vary resistance. The resistance will be 25 to 200 ohms, plus or minus 20%.

Testing

1. Before removing the unit, verify that the float has not sunk. Replace the float if it is sunk.
2. Disconnect the sender unit from the wiring harness and remove from the gas tank.
3. Verify that it matches the resistance in the following table.

Float Position	Resistance
Full	25 ohms +/- 20%
Empty	200 ohms +/- 20%

Solenoid

Purpose

The solenoid's purpose is simply to connect the battery to the starter motor when the ignition switch is turned to "START". The solenoid is used to protect the ignition switch from the high current drawn by the starter motor.

How it Works

The solenoid has two primary 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 bar type switch (Figure 20). Because it has a large contact area with the contact terminals it can easily handle the high current loads required by the starter motor.

When 12 volts is applied to the coil, it becomes an electromagnet. This quickly pulls the bar toward contacts and closes the switch. When power is removed from the coil, the spring loaded bar returns to its "normally open" position. The solenoid closes and opens the switch very quickly. This minimizes the "arcing" that can damage other types of switches.

The ignition switch is protected because only a small amount of current is needed to activate the coil.

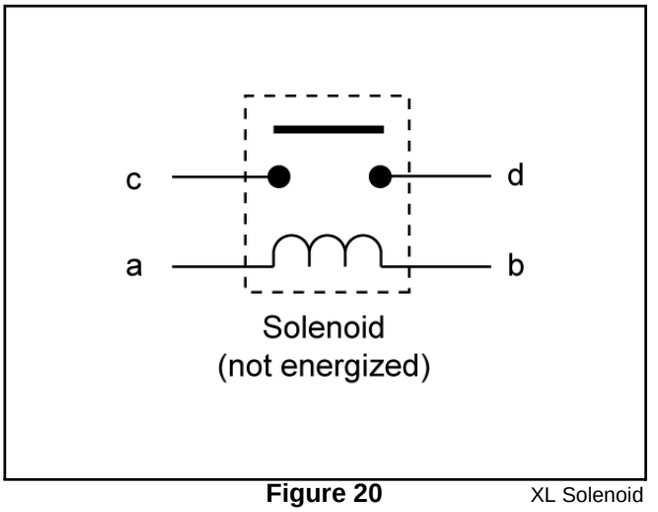


Figure 20 XL Solenoid

Testing

1. Disconnect the solenoid from the wiring harness.

2. With a multimeter (ohms setting), check to ensure that terminals “c” and “d” are open (no continuity) (Figure 20).

3. Apply +12 VDC to terminal “a” and ground terminal “b”. Terminals “c” and “d” should now be closed (continuity) (Figure 20).

4. You should be able to hear the solenoid switch “click” when you make the connection.

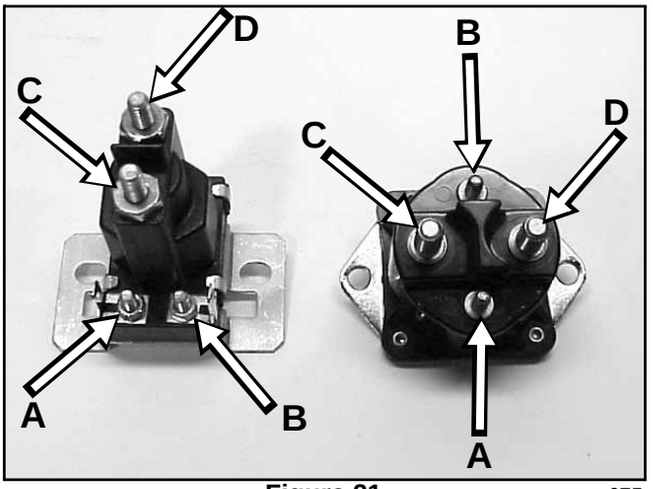


Figure 21 mvc-675

(A) & (B) Coil Terminals	(C) & (D) Contact Terminals

Switch, Brake

Purpose

This double pole plunger type switch has four terminals. When the brake pedal is depressed, it completes the safety circuit for start. On tractors with cruise control, the cruise control circuit is connected to the brake switch. When the brake pedal is depressed, the switch opens and the cruise control magnet disengages.

How it Works

This double pole plunger switch has four terminals. When the brake pedal is depressed, it pushes on the plunger, closing and opening the contacts in the switch.

Testing

1. Disconnect the switch from the wiring harness.

2. Using a multimeter, follow the procedures listed below (Figure 22):

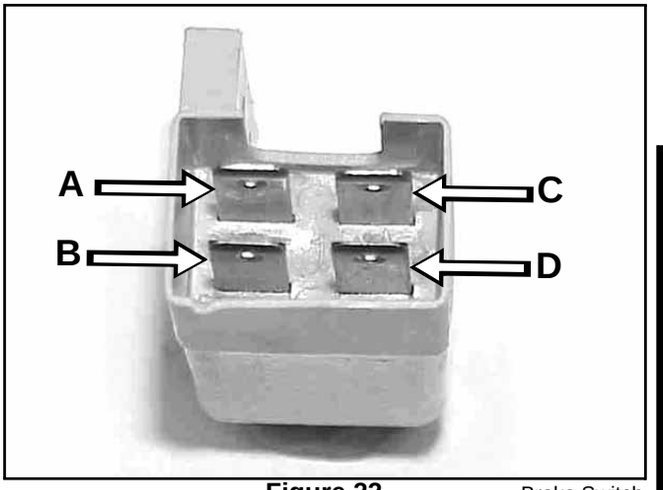


Figure 22 Brake Switch

Note: Terminals on actual switch not labeled.

Plunger Not Depressed	Plunger Depressed
A/B Terminals - Closed Circuit - Continuity	A/B Terminals - Open Circuit - No Continuity
C/D Terminals - Open Circuit - No Continuity	C/D Terminals - Closed Circuit - Continuity

Switch, Cruise Control

P/N 93-0527 and P/N 94-7602

P/N 93-0527

Figure 23 mvc-112

P/N 94-7602

Figure 24 mvc-114

Purpose

This rocker switch is used to provide switching for the cruise control (Figure 23 and Figure 24).

How it Works

The switch has contacts inside which connect two terminals in one position while disconnecting them in the other. There are 3 positions to the switch; OFF, START, and RUN. The start position is spring loaded so that the switch automatically returns to the “RUN” position.

Testing

1. Disconnect the switch from the wiring harness.
2. Using a VOM or test lamp, test the continuity of the terminals using the following diagrams (Figure 25 and Figure 26).

P/N 93-0527

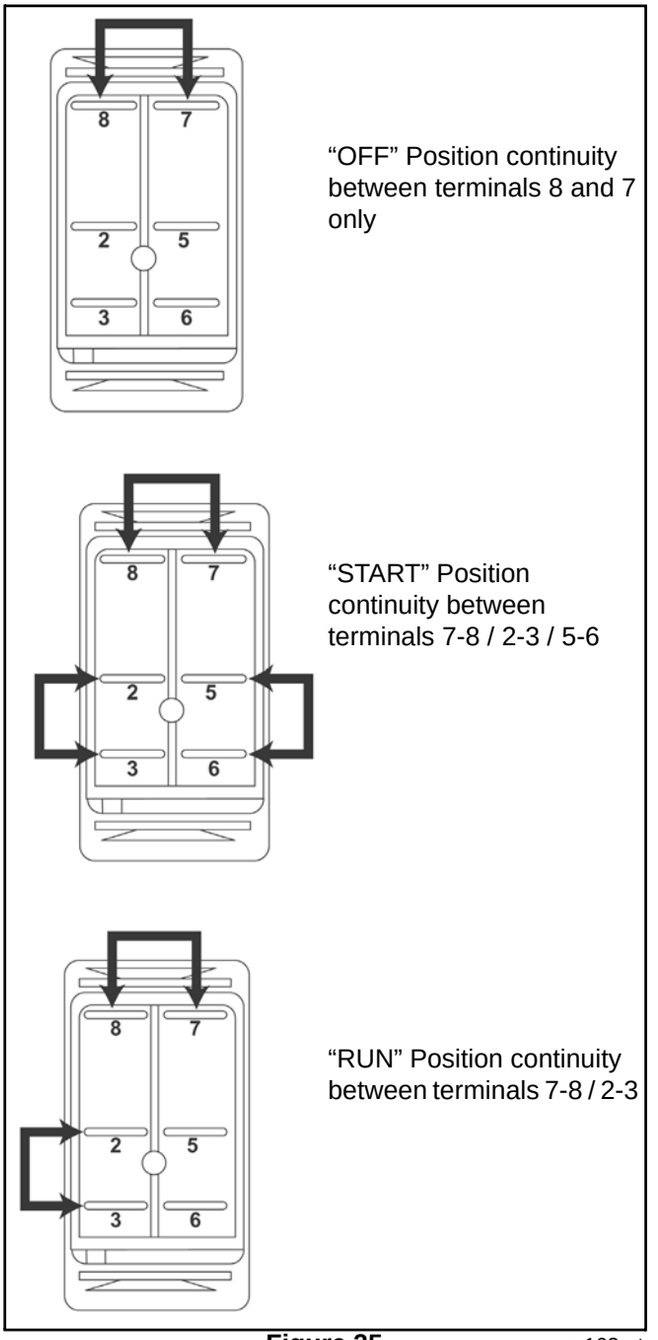


Figure 25 mvc-163art

P/N 94-7602

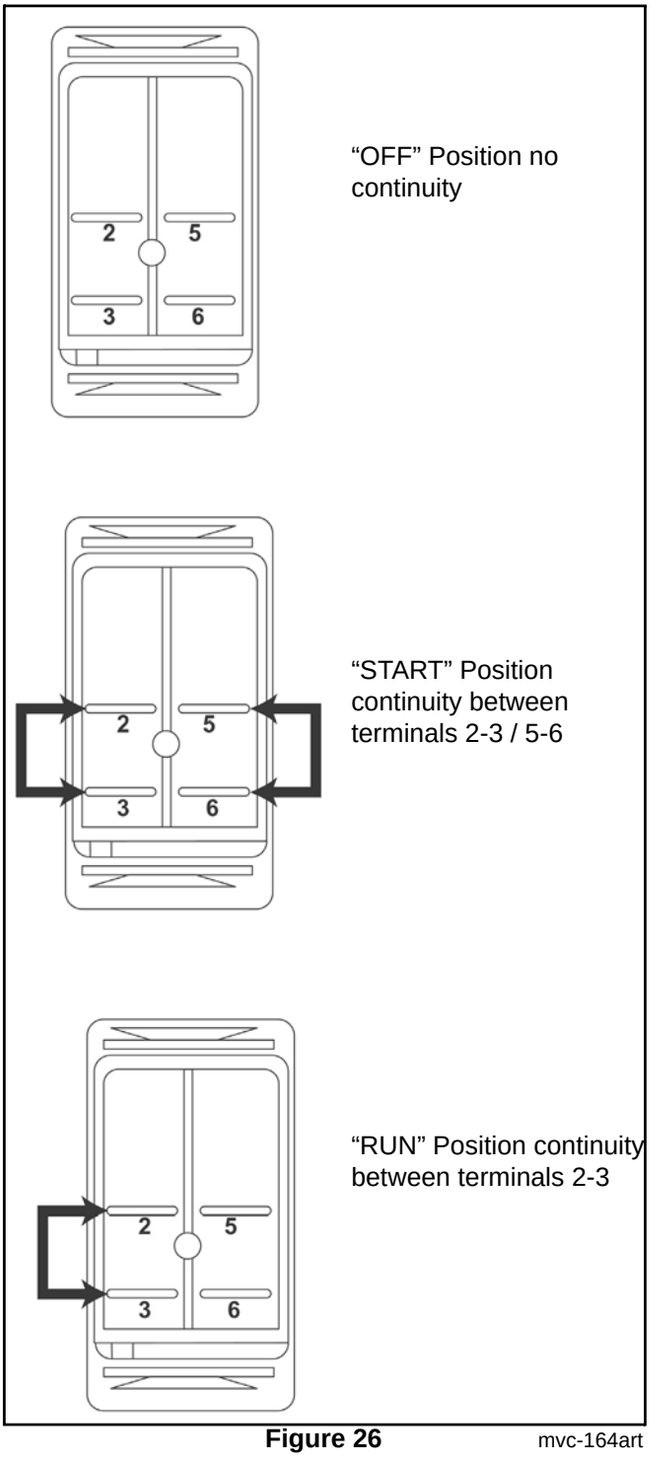


Figure 26 mvc-164art

Switch, Key

(P/N 88-9830 or 104-2541)

Purpose

This component provides the proper switching for the starter, ignition, accessories, and safety circuits (Figure 27).

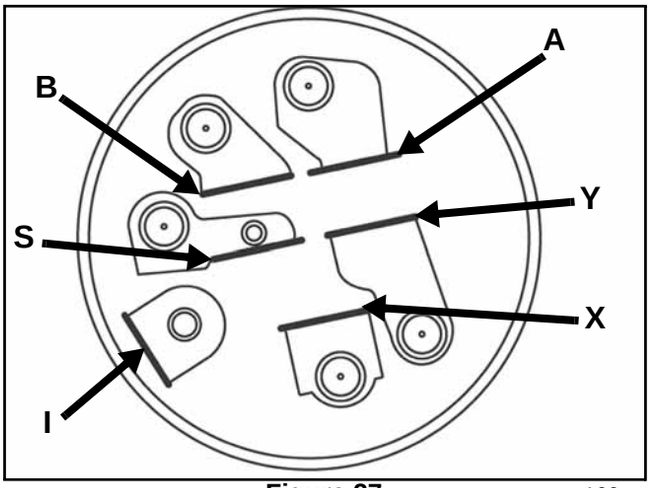


Figure 27 mvc-166art

How it Works

Detents inside the switch give it 3 positions: OFF, RUN, and START. The START position is spring loaded so the cylinder automatically returns to RUN once the key is released.

Testing

1. Disconnect the switch from the wiring harness.

2. Verify that continuity exists between the terminals listed for the switch position. Verify that there is NO continuity between terminals not listed for the switch position (Figure 28).

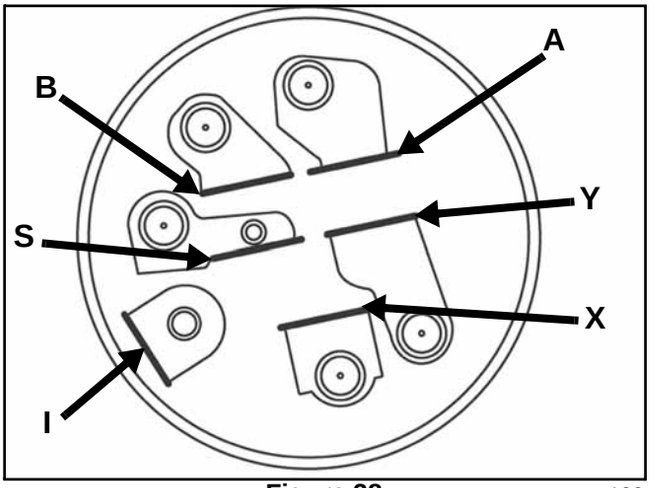


Figure 28 mvc-166

Position	Condition
Off	No continuity
Start	B + I +S
Run	B + I + A and X + Y

Switch, Key

(P/N 99-7429)

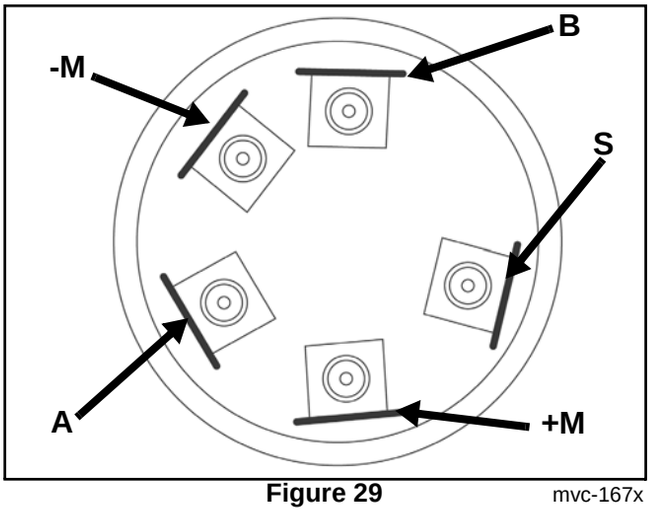


Figure 29 mvc-167x

Purpose

This switch provides the proper switching for the starter, ignition, accessories, and safety circuits (Figure 29).

How it Works

Detents inside the switch give it 3 positions: OFF, RUN, and START. The START position is spring loaded so the cylinder returns to RUN once the key is released.

Testing

1. Disconnect the switch from the wiring harness.

2. Verify that continuity exists between the terminals listed for the switch position. Verify that there is NO continuity between terminals not listed for the switch (Figure 30).

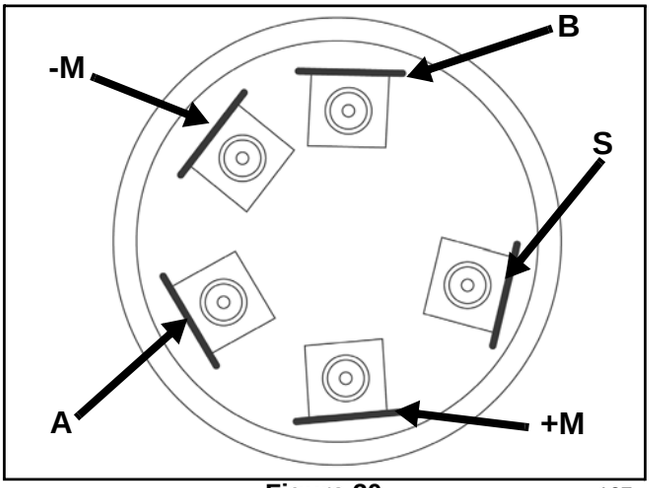


Figure 30 mvc-167x

Position	Condition
Off	+M + - M
Start	B + A + S
Run	B + A

Switch, Key

(P/N 92-6785)

Purpose

This component provides the proper switching for the starter, ignition, accessories, and safety circuits (Figure 31).

How It Works

Detents inside the switch give it four positions: OFF, LIGHTS (ACCESSORIES), RUN, and START. The START position is spring loaded so the cylinder automatically returns to RUN once the key is released.

Terminals of the ignition switch as viewed from the terminal end (Figure 31).

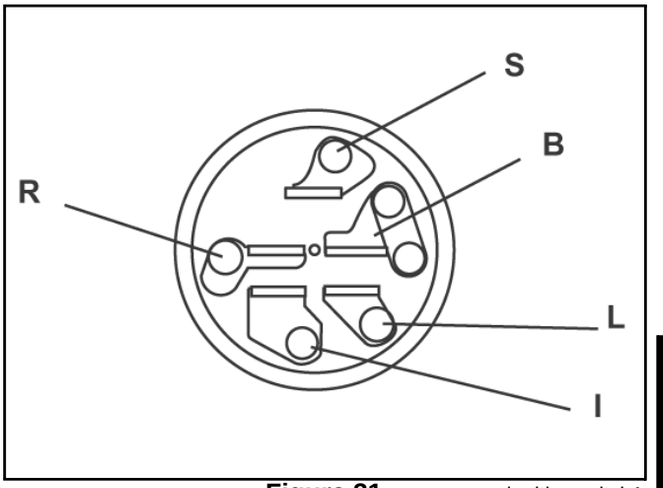


Figure 31 ignitionswitch1

B = Battery voltage “in” S = Starting Circuit I = Safety & Ignition Circuit	R = Regulator Circuit L = Light Circuit

Testing

1. Disconnect the switch from the wiring harness.

2. Verify that continuity exists between the terminals listed for the switch position. Verify that there is **NO** continuity between terminals not listed for the switch position (Figure 32).

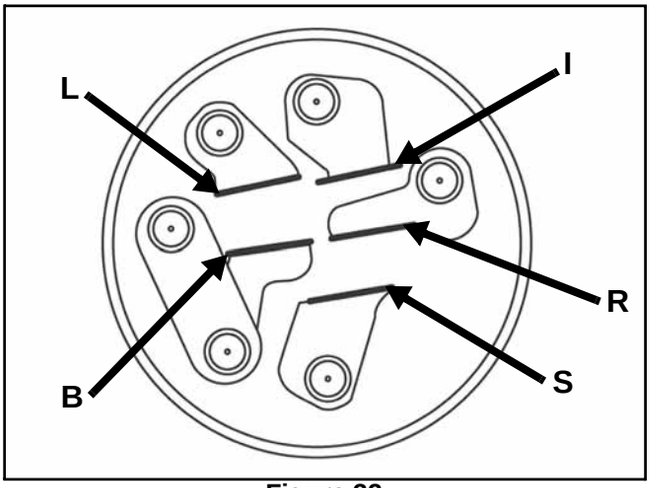


Figure 32

Position	Condition
Off	No Continuity
Start	B + I + S
Run	B + I + R
Run - Lights	B + I + R + L

Switch, KeyChoice™ Reverse Operating System

Purpose

This switch is used in the Key Choice™ Reverse Operating System circuit. When turned to the On position, it allows the operator to mow in reverse.

How It Works

The switch is basically an on/off switch spring-loaded to return to the Off position. When turned to the On position with the PTO engaged, it activates circuits in the Key Choice™ Reverse Operating System reverse module and allows the operator to mow in reverse (Figure 33).

Figure 33 mvc-691

Testing

1. Disconnect the switch from the circuit.

2. With a multimeter, check the continuity across the two terminals.

3. Turn the key to the on position and hold, since the switch is spring loaded. There should be continuity across the two terminals.

Switch, Light

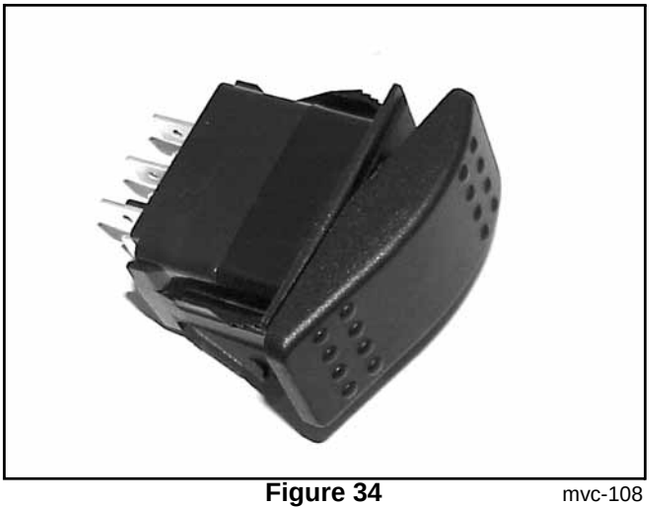


Figure 34 mvc-108

Purpose

This rocker switch is typically used to provide switching for the lights (Figure 34).

How it Works

The switch has contacts inside which connect two terminals in one position while disconnecting the other two. The rating on the switch is 20 amp capacity at 12 volts.

Testing

1. Disconnect the switch from the wiring harness.
2. Using a VOM or test lamp, test the continuity of the terminals, using the diagrams below (Figure 35).

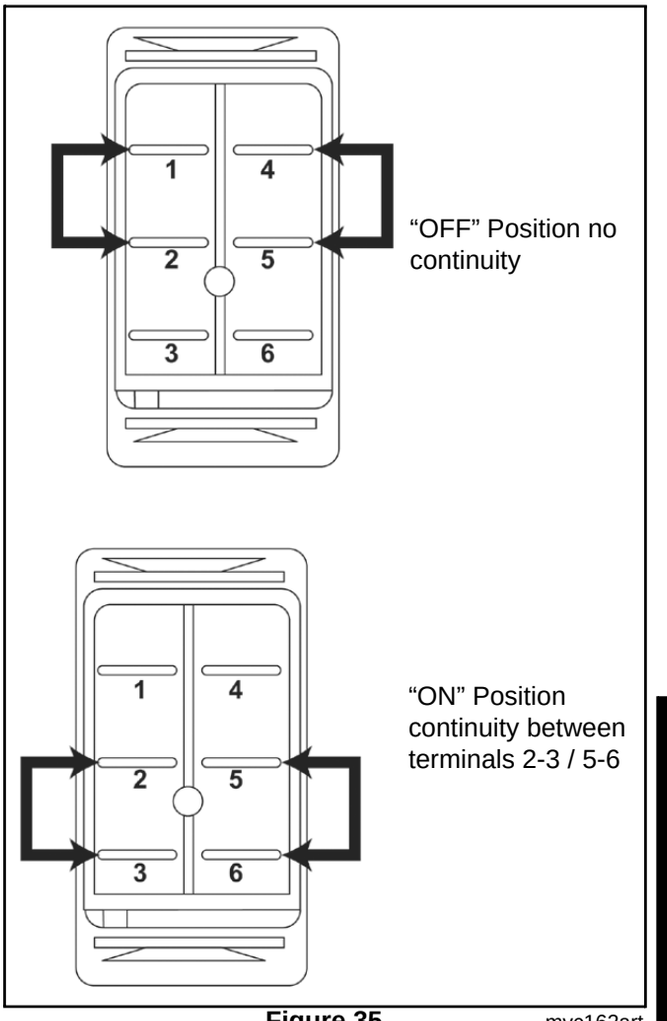


Figure 35 mvc162art

Switch, Neutral

Purpose

Used to ensure the transmission is in neutral when starting the unit. It is activated when the clutch/brake pedal is depressed.

How It Works

This single pole plunger type switch has two terminals. When the clutch/brake pedal is depressed, it pushes on the plunger, closing the contact, and connecting the two terminals (Figure 36).

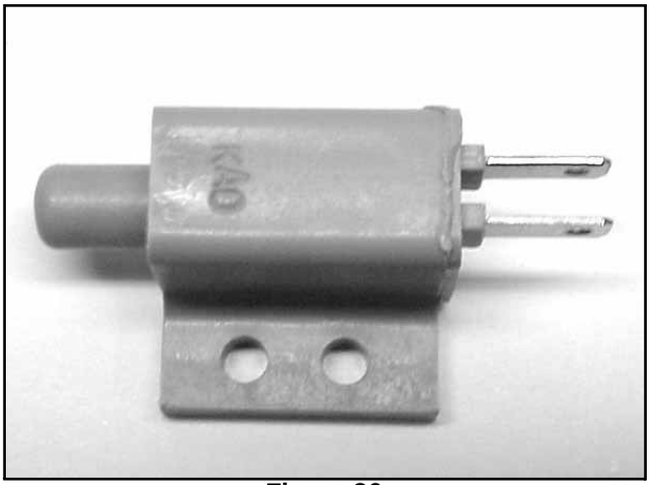


Figure 36 mvc-680

Testing

1. Disconnect the switch from the wiring harness.
2. Check first to ensure that there is NO continuity between either terminal. Foot OFF the pedal.
3. With the clutch/brake pedal depressed there should be continuity between the terminals.

Switch, Neutral - Plunger Type

Purpose

Used to ensure the transmission is in neutral when starting the unit. It is activated when the brake pedal is depressed.

How it Works

This double pole plunger type switch has four terminals (Figure 37). When the brake pedal is depressed, it pulls an arm that pushes on the plunger of the switch, closing the contacts, and connecting the four terminals.

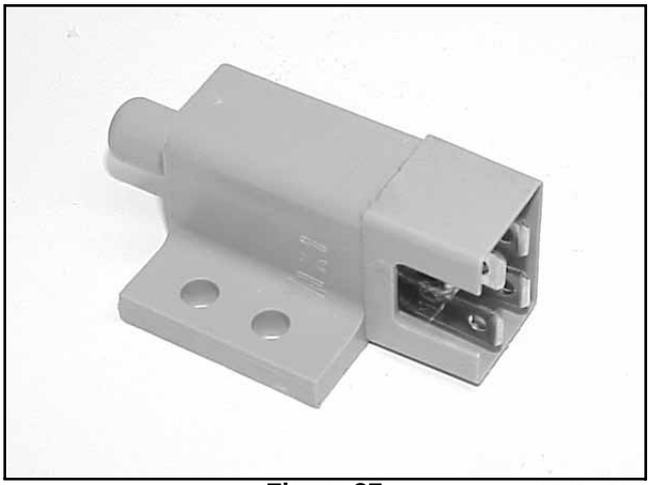


Figure 37 MVC-400X

Testing

1. Disconnect the switch from the wiring harness.

2. Using a multimeter, follow the procedure listed below (Figure 38):

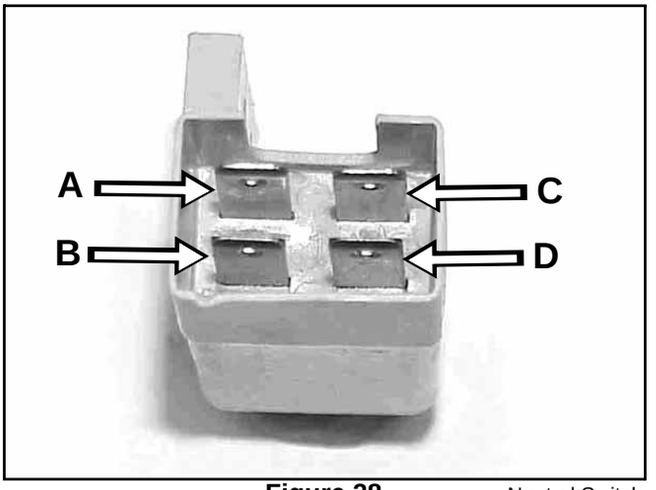


Figure 38 Neutral Switch

Note: Terminals on actual switch not labeled.

Plunger Not Depressed	Plunger Depressed
A/B Terminals - Open Circuit - No Continuity	A/B Terminals - Closed Circuit - Continuity
C/D Terminals - Open Circuit - No Continuity	C/D Terminals - Closed Circuit - Continuity

Switch, Neutral Adjustable - Plunger Type

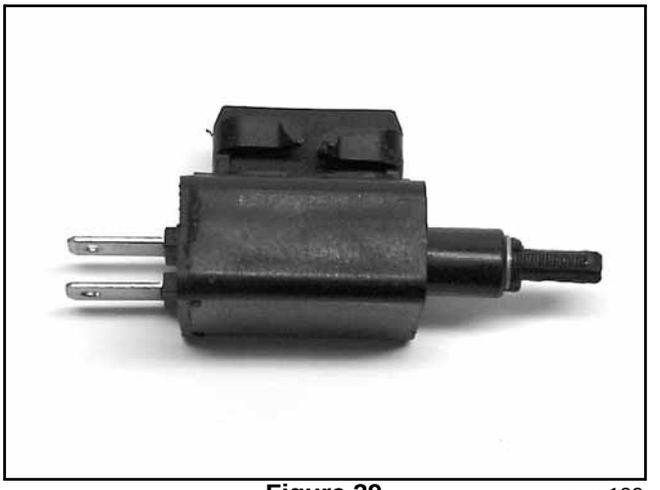


Figure 39 mvc-122

Purpose

Used to ensure the transmission is in neutral and the park brake is engaged. It is activated when the forward/reverse control handles are in the start position (Figure 39).

How it Works

This single pole plunger type switch has two terminals. When the forward/reverse control handle is in the start position (park position), it pushes on the plunger, closing the contact, and connecting the terminals.

Testing

1. Disconnect the switch from the wiring harness.

2. Using a VOM or test lamp, check first to ensure that there is NO continuity between either terminal, plunger out.

3. With the plunger pushed in, there should be continuity between the terminals.

Switch, PTO

Purpose

The PTO switch is typically used to turn on the Electric PTO Clutch and to function as part of the safety interlock system.

How it Works

When the PTO switch is pulled out to the “ON” position, contacts inside the switch electrically connect various terminals. One terminal is connected to the wire that goes directly to the electric clutch. When the PTO is pulled out to the “ON” position, voltage flows to the electric clutch and engages.

Testing

1. Disengage the PTO, set the parking brake, and turn the ignition to ***OFF*** and remove the key.
2. Disconnect the wiring harness from the PTO switch.
3. Press in on the locking tabs, on each side of the switch, and pull the switch out of the dash (towards the rear of the tractor).
4. Verify that there is continuity between the appropriate terminals in the “ON” and “OFF” positions, Figure 40.
5. Replace the switch if your test results do not correspond with those given in Figure 40.

Mount the PTO switch back into the dash and reinstall the wiring harness.

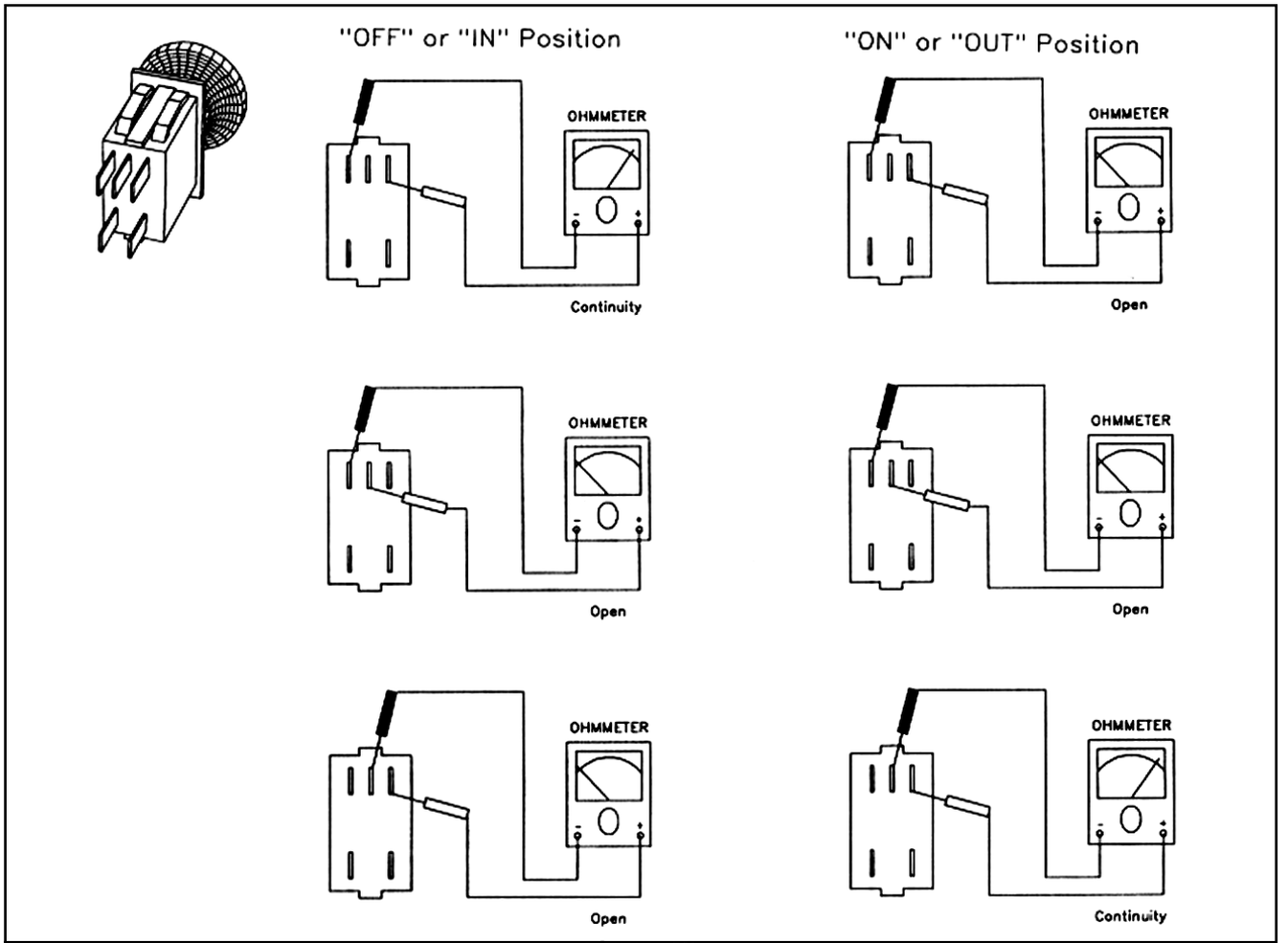


Figure 40

2-24

Switch, Reverse

Purpose

This switch works in the Key Choice™ Reverse Operating System circuit when the mower (PTO) is engaged.

How It Works

This single pole plunger type switch has two terminals. When the unit is shifted in reverse while the mower blade (PTO engagement lever) is engaged, the reverse switch opens and will stop the engine, unless the KeyChoice switch has been operated.

Testing

1. Disconnect the switch from the wiring circuit.
2. With a multimeter, check the continuity across the terminals. There should be continuity.
3. Depress the plunger on the switch and check the continuity across the terminals, there should be NO continuity (Figure 41).

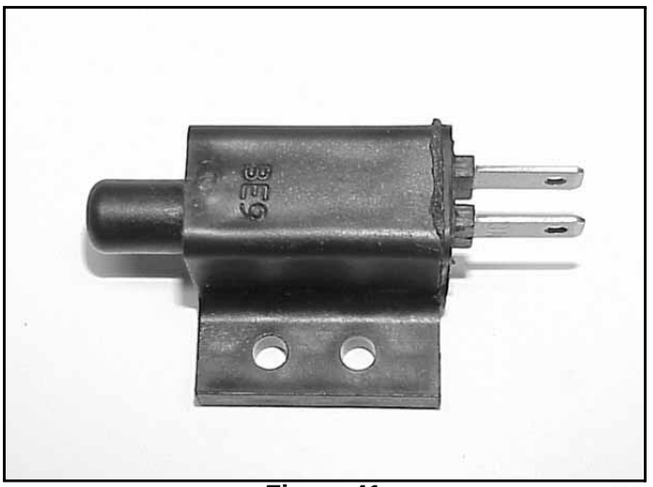


Figure 41 mvc-685

Switch, Seat

Purpose

The switch is in the safety circuit. If the engine is running and the operator vacates the seat with either PTO engaged or the parking brake off, the engine will shut down.

Seat switch (ribbon type) used on 2000 and prior models (Figure 42)

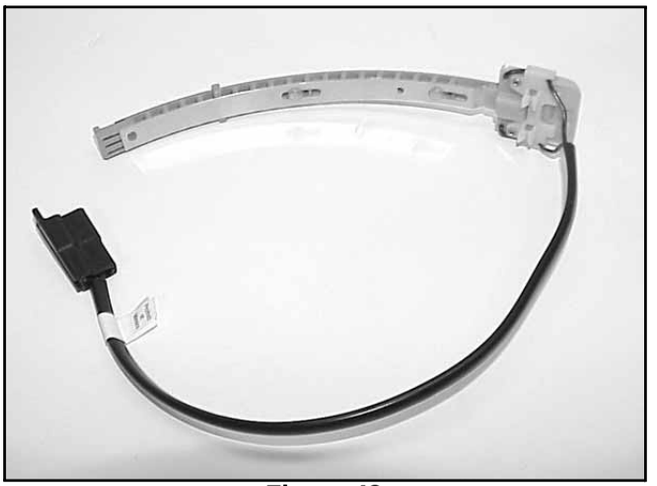


Figure 42 MVC-391x

Seat switch (mushroom type) used on 2001 and later models (Figure 43)

Figure 43 MVC-390x

How It Works

When the seat is vacated, the switch is open and there is no continuity between the two terminals. When the seat is occupied, the switch closes and there should be continuity between the two terminals.

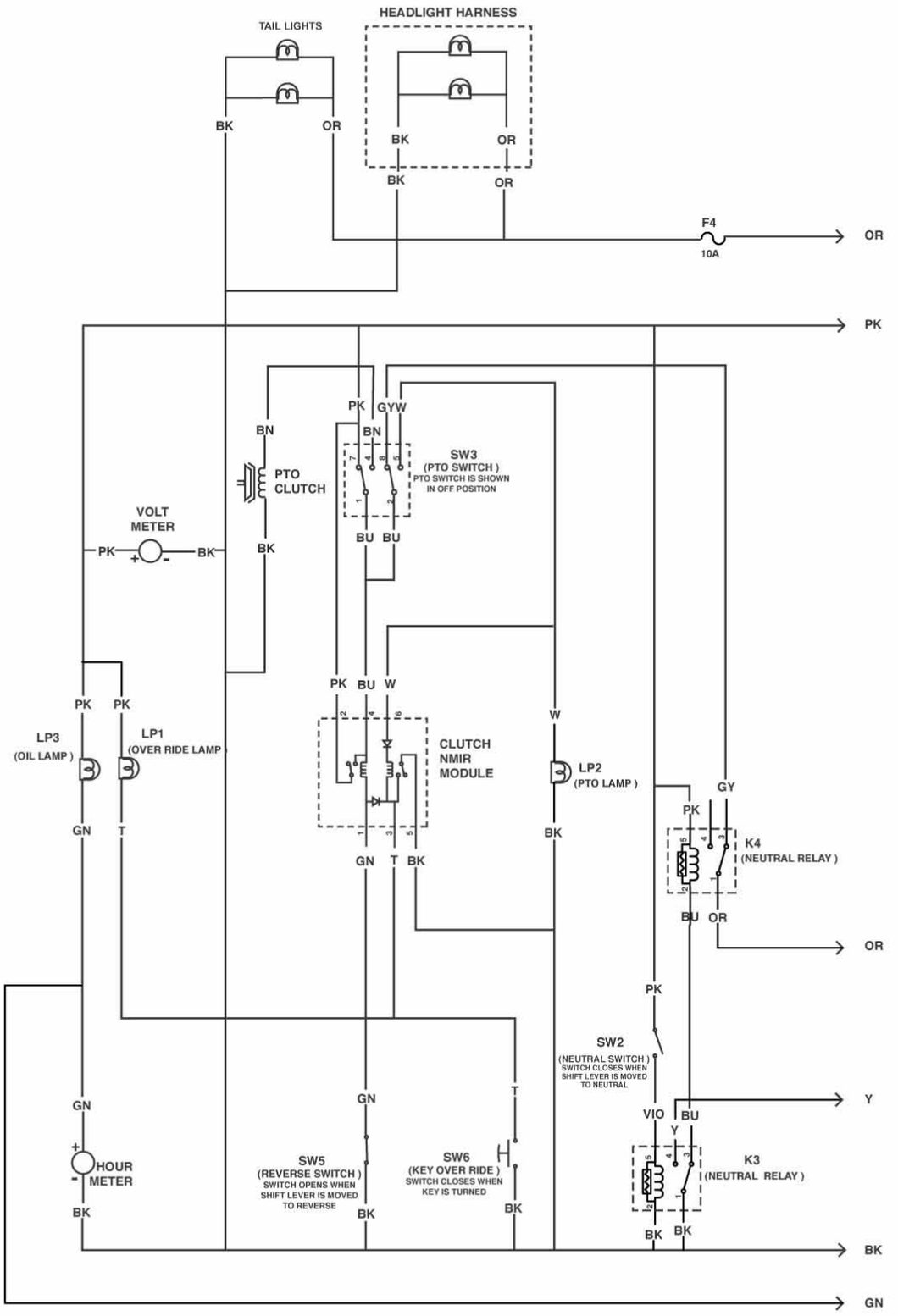
Testing

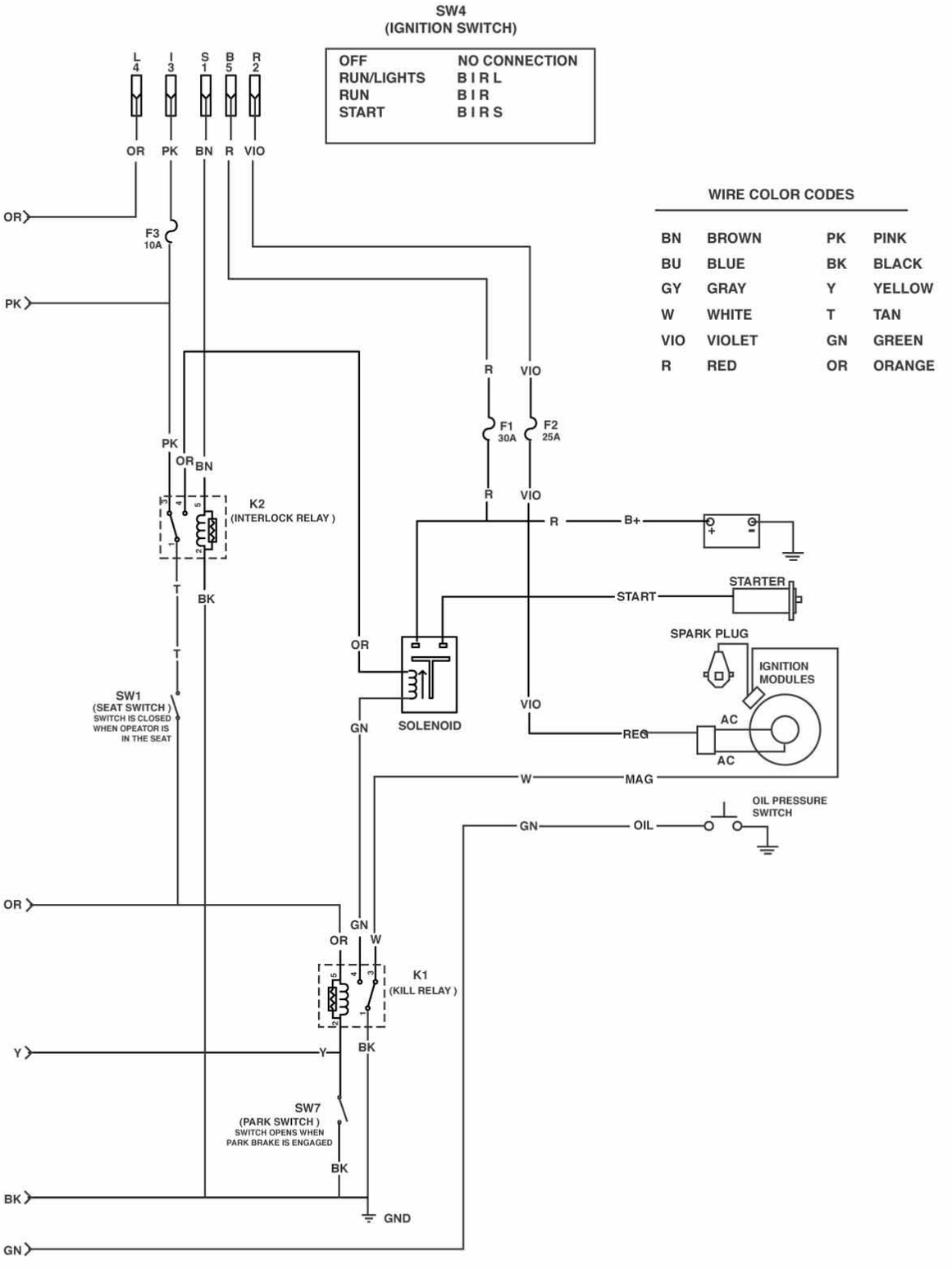
1. Disconnect the switch from the wiring harness.

2. With a multimeter, check the continuity between the two terminals of the switch. There should be NO continuity.

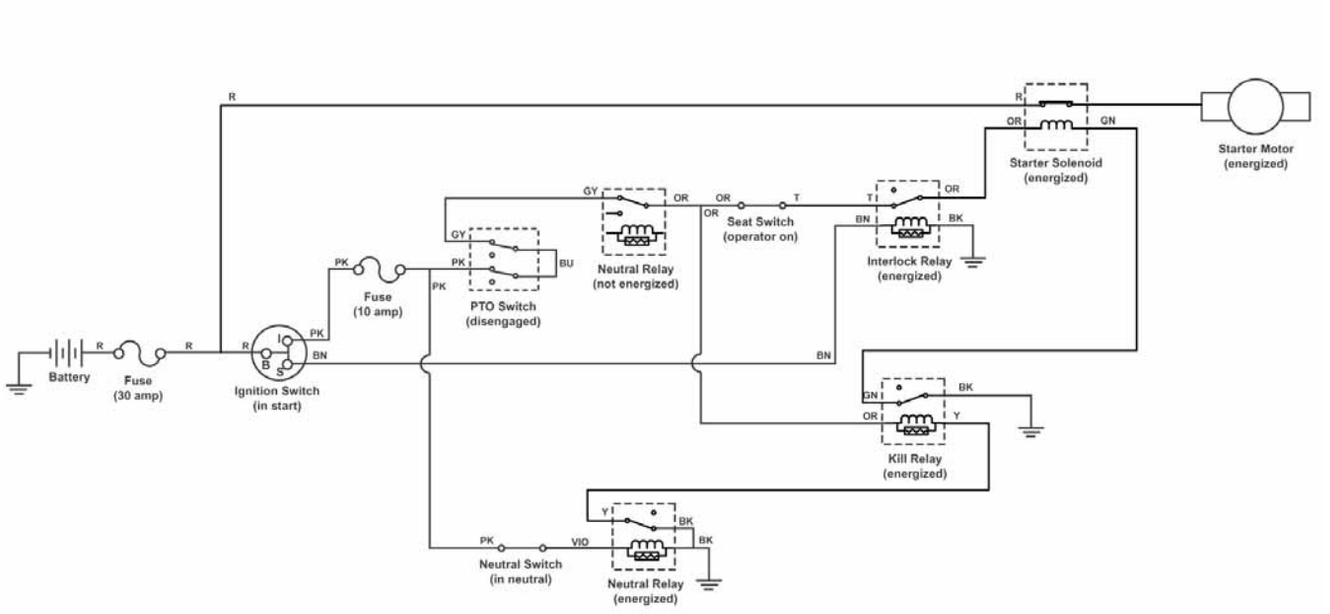
3. With weight or pressure on the seat, check the continuity again on the two terminals of the switch. There should be continuity.

Information List (2006 - 2007)


HEADLIGHT HARNESS
TAIL LIGHTS
BK
OR
BK
OR
BK
OR
F4
10A
OR
PK
PK
GYW
BN
BN
SW3
(PTO SWITCH)
PTO SWITCH IS SHOWN
IN OFF POSITION
PTO
CLUTCH
VOLT
METER
PK
BK
BK
BU BU
PK BU W
CLUTCH
NMIR
MODULE
GN T BK
W
LP2
(PTO LAMP)
BK
PK PK
LP3
(OIL LAMP)
LP1
(OVER RIDE LAMP)
GN T
GY
PK
K4
(NEUTRAL RELAY)
BU OR
OR
PK
SW2
(NEUTRAL SWITCH)
SWITCH CLOSES WHEN
SHIFT LEVER IS MOVED
TO NEUTRAL
Y
VIO
BU
Y
K3
(NEUTRAL RELAY)
BK BK
GN
HOUR
METER
BK
GN
SW5
(REVERSE SWITCH)
SWITCH OPENS WHEN
SHIFT LEVER IS MOVED
TO REVERSE
BK
T
SW6
(KEY OVER RIDE)
SWITCH CLOSES WHEN
KEY IS TURNED
BK
BK
GN

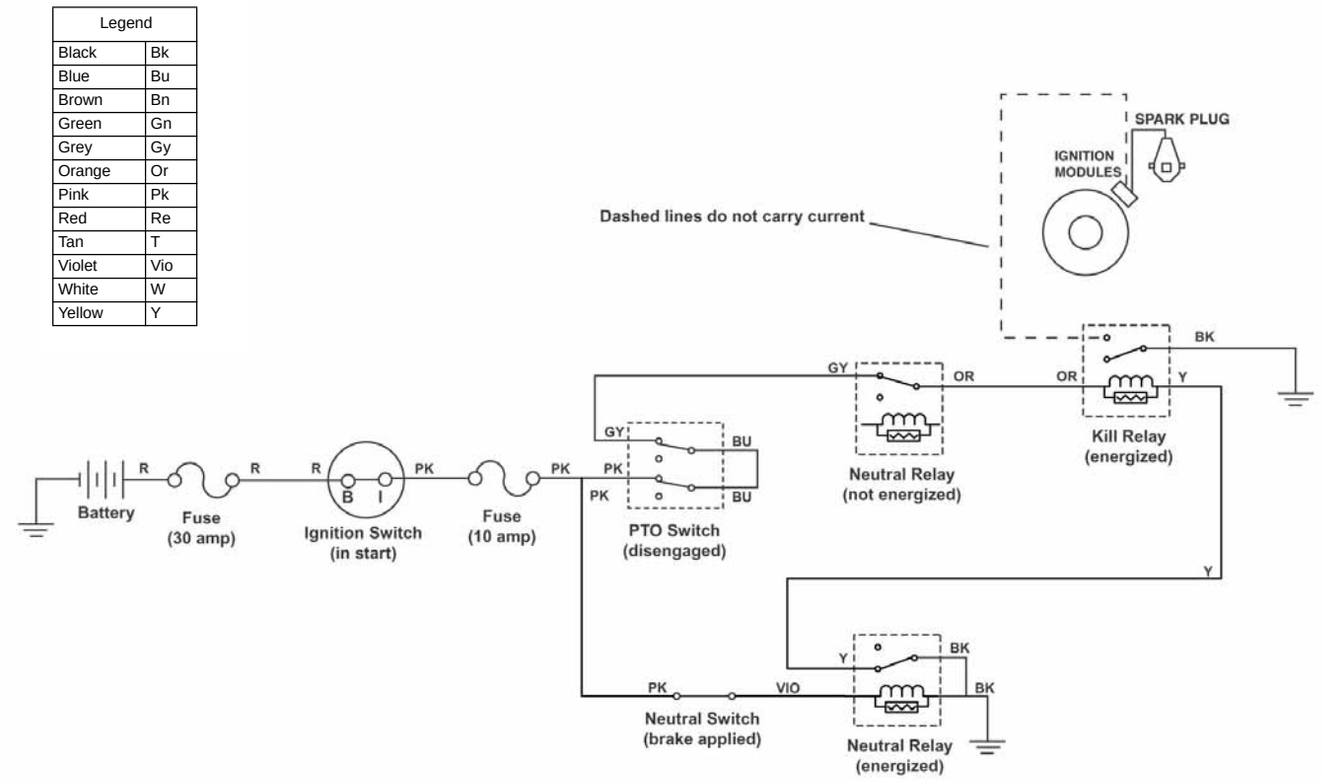

SW4
(IGNITION SWITCH)
OFF NO CONNECTION
RUN/LIGHTS B I R L
RUN B I R
START B I R S
L 4
I 3
S 1
B 5
R 2
OR PK BN R VIO
WIRE COLOR CODES
BN BROWN
BU BLUE
GY GRAY
W WHITE
VIO VIOLET
R RED
PK PINK
BK BLACK
Y YELLOW
T TAN
GN GREEN
OR ORANGE
F3 10A
F1 30A
F2 25A
K2 (INTERLOCK RELAY)
K1 (KILL RELAY)
SW1 (SEAT SWITCH) SWITCH IS CLOSED WHEN OPEATOR IS IN THE SEAT
SW7 (PARK SWITCH) SWITCH OPENS WHEN PARK BRAKE IS ENGAGED
SOLENOID
B+
START
STARTER
SPARK PLUG
IGNITION MODULES
AC
REG
MAG
OIL
OIL PRESSURE SWITCH
GND

Starter Motor Circuit
(ignition switch in "start")



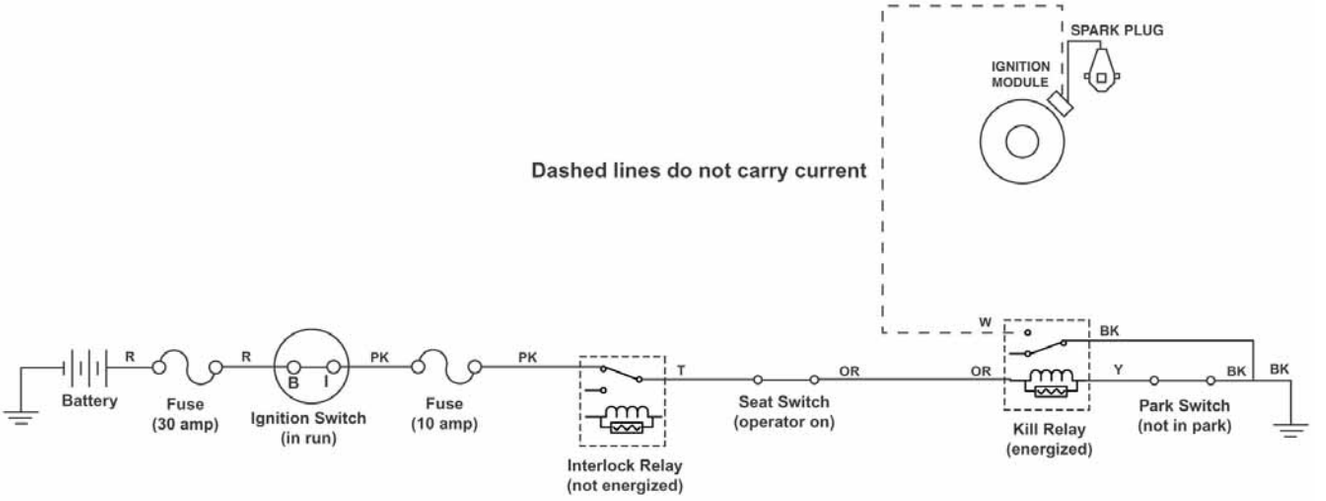
Spark Circuit
(ignition switch in "start" position)

Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y



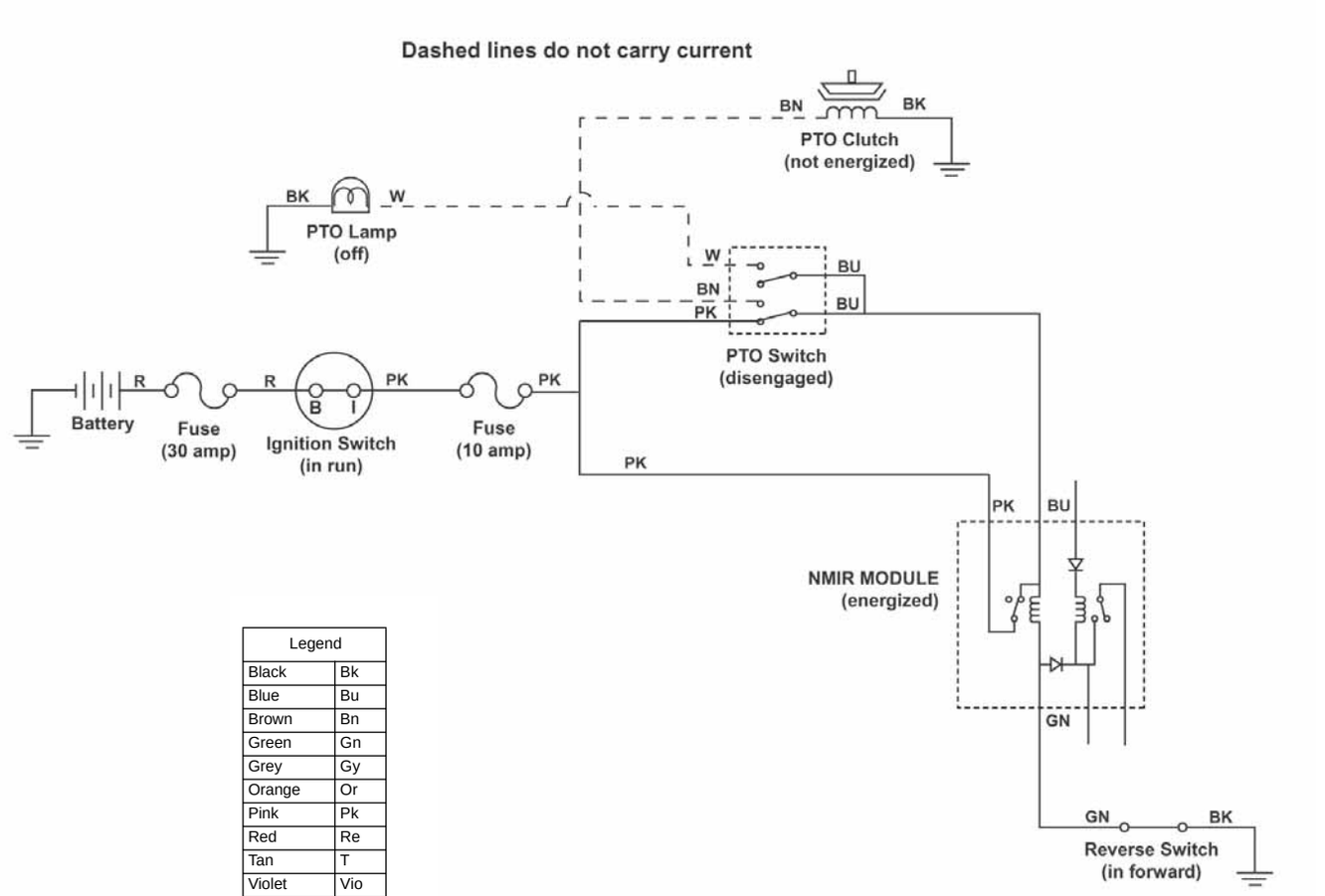
Circuits

Spark Circuit
(ignition switch in "run")



Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

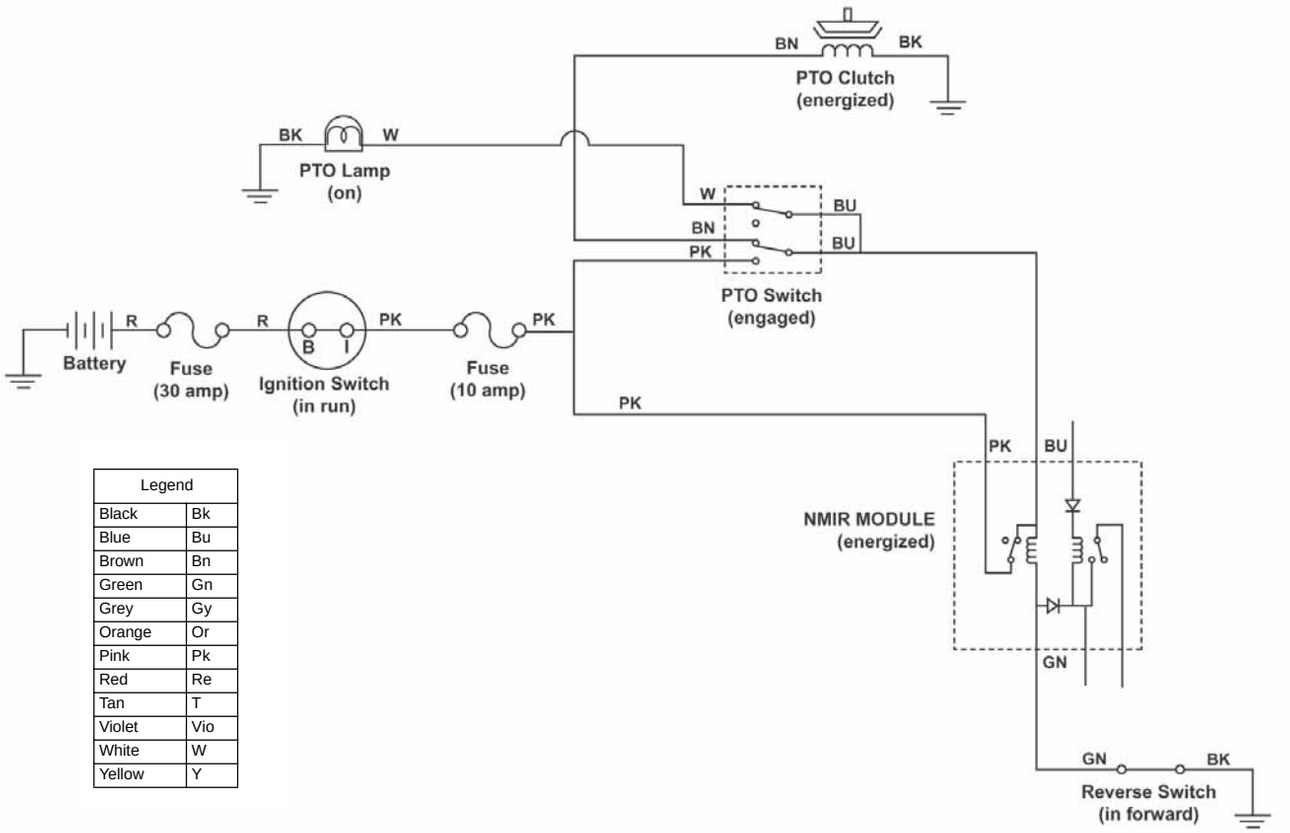
Reverse Operating System Circuit
(PTO "off", in forward)



Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Circuits

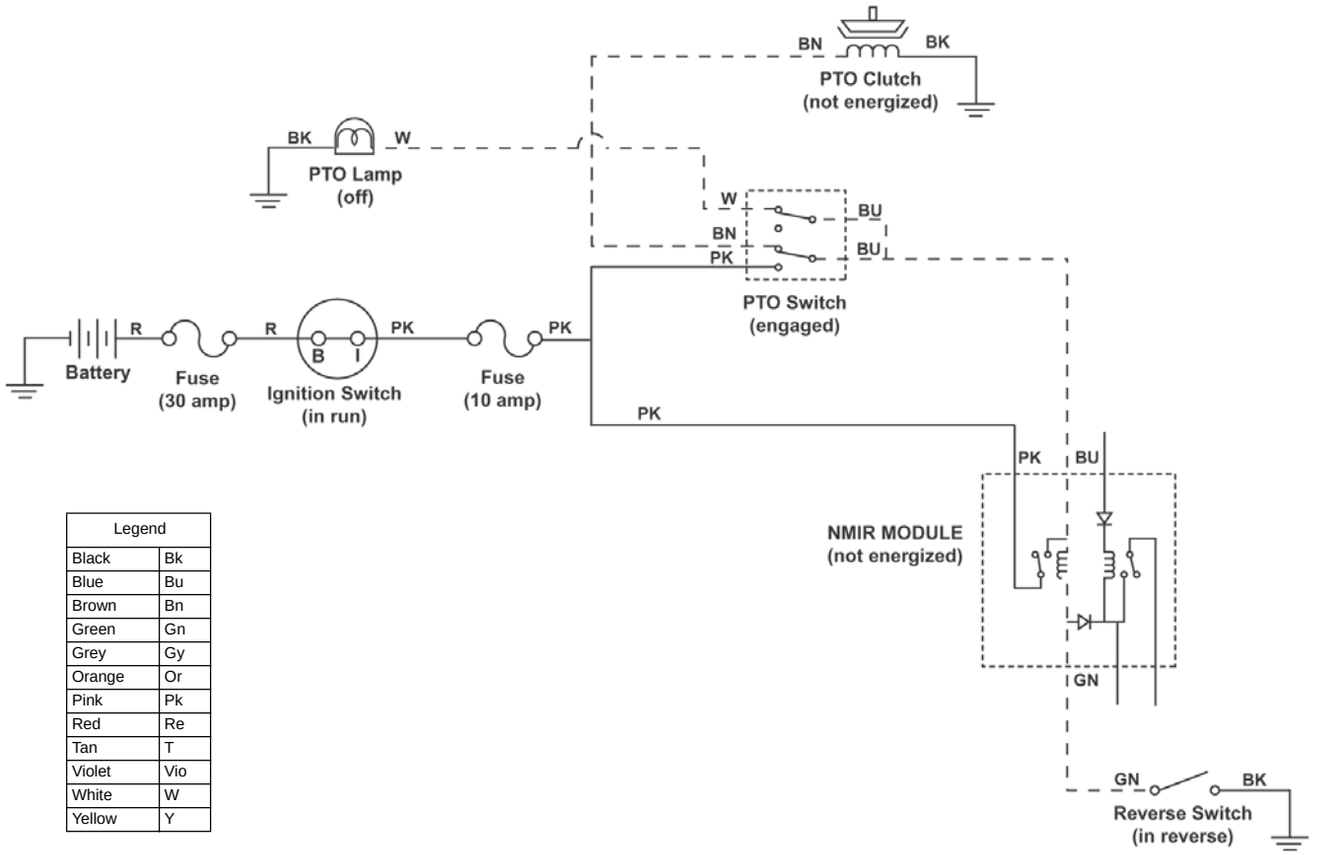
Reverse Operating System Circuit
(PTO "on", in forward)



Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Circuits

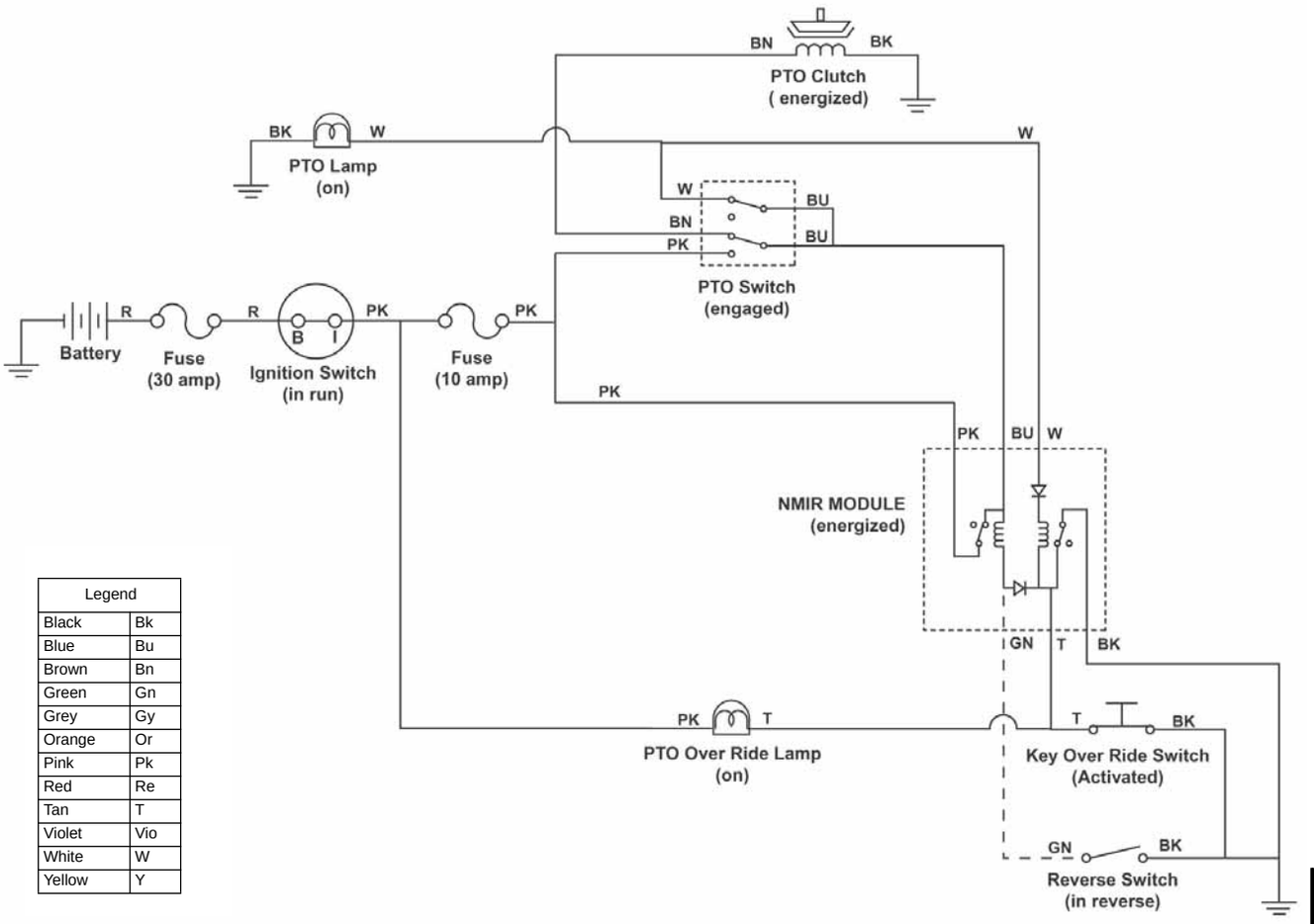
Reverse Operating System Circuit
(PTO "on", in reverse)



Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

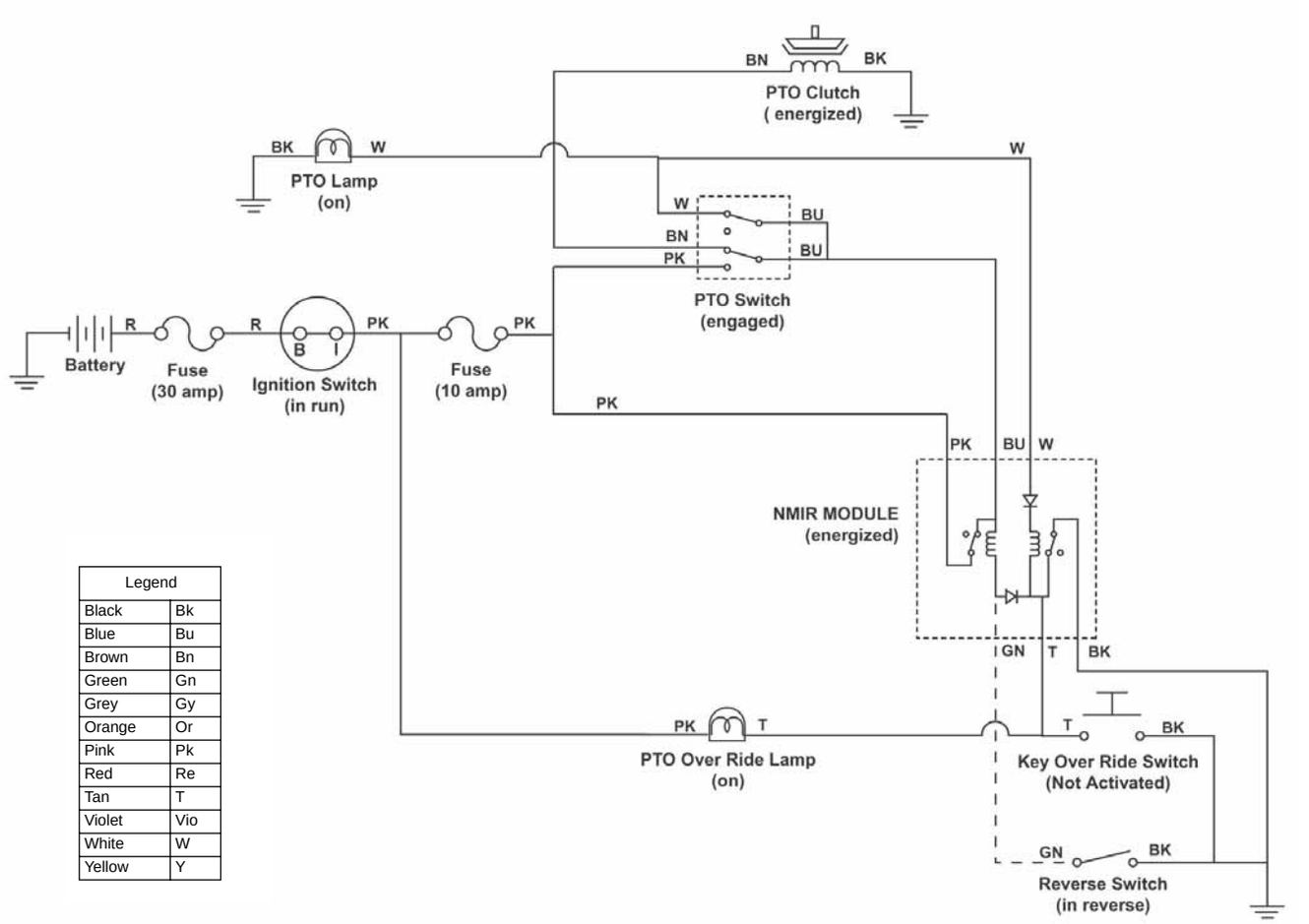
Circuits

Reverse Operating System Circuit
(Override key switch "activated")



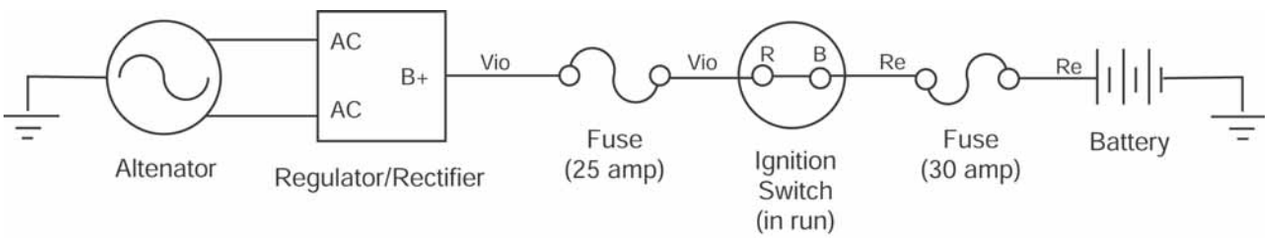
Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Reverse Operating System Circuit
(PTO "on", in reverse, override mode)



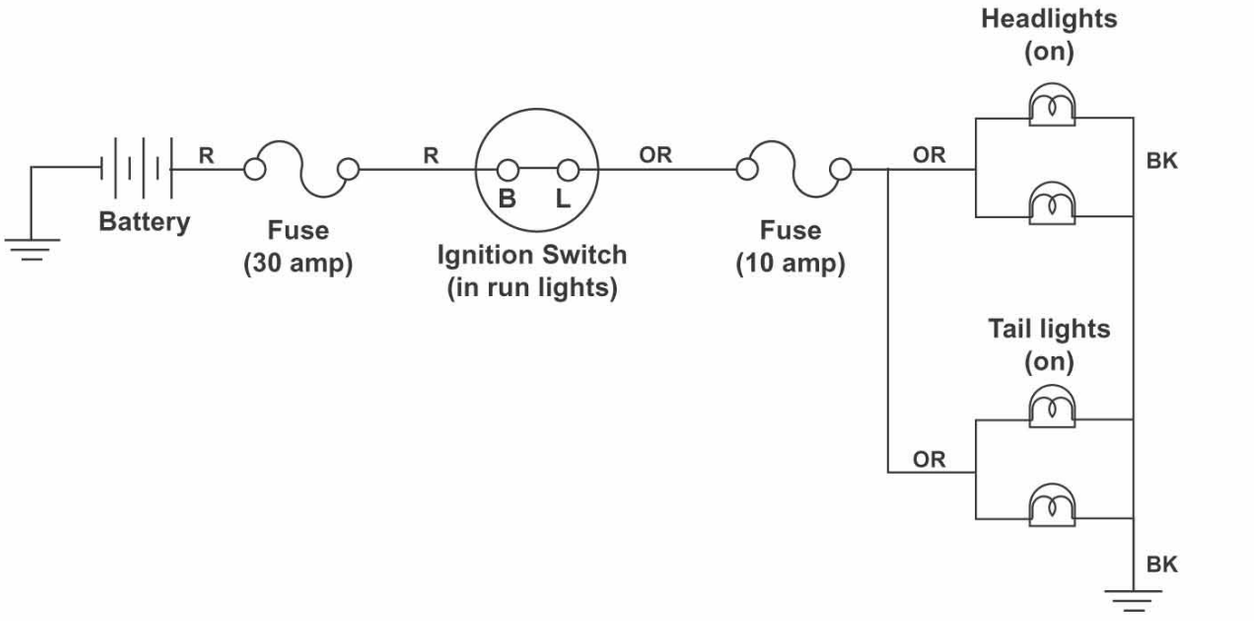
Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Battery Charge Circuit
(ignition switch in "run")

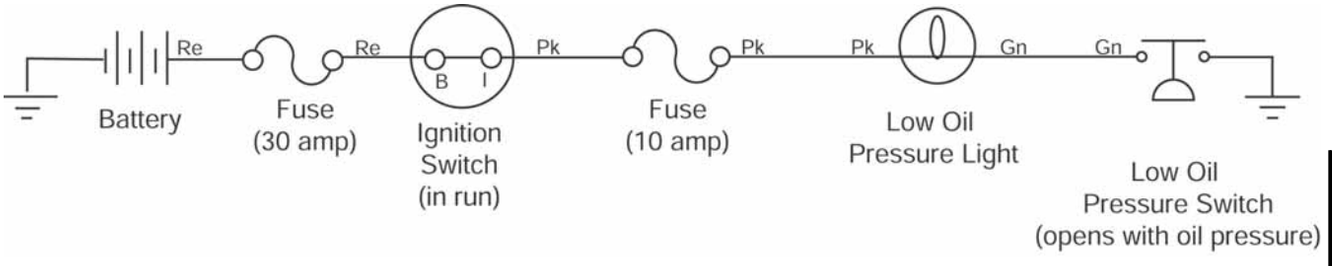


Circuits

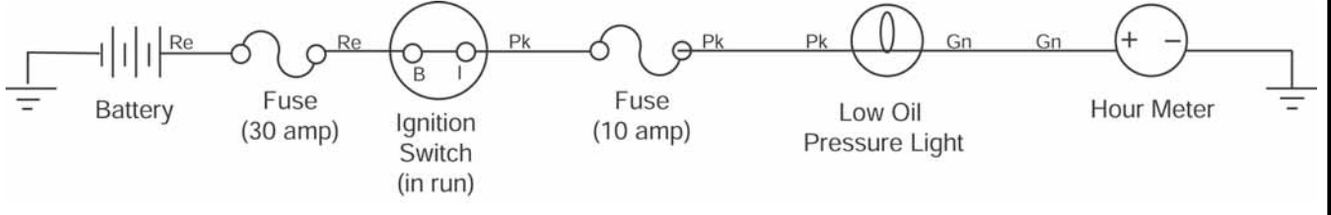
Light Circuit



Low Oil Pressure Light Circuit
(ignition switch in "run")



Hourmeter
(ignition switch in "run")



Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

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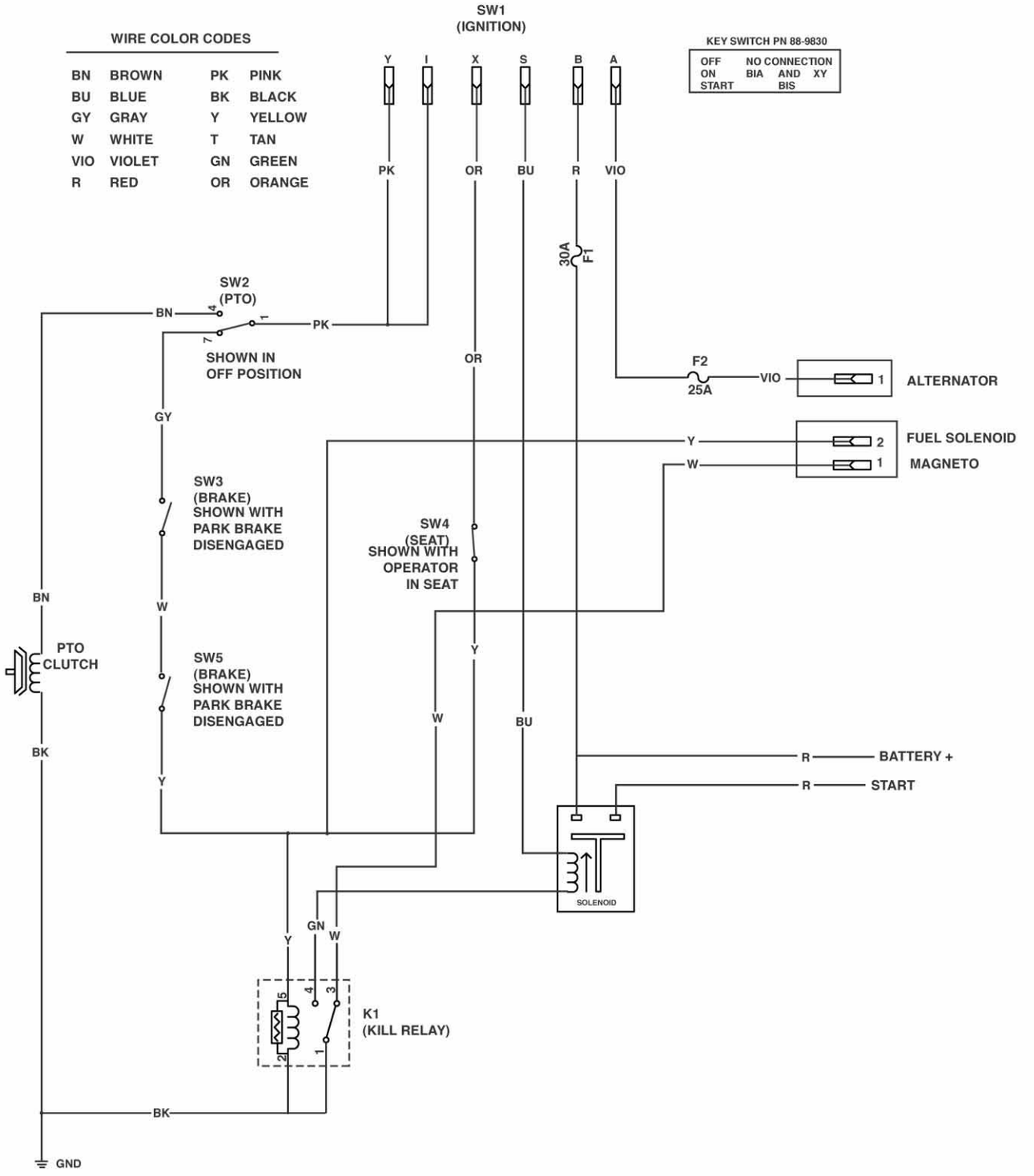
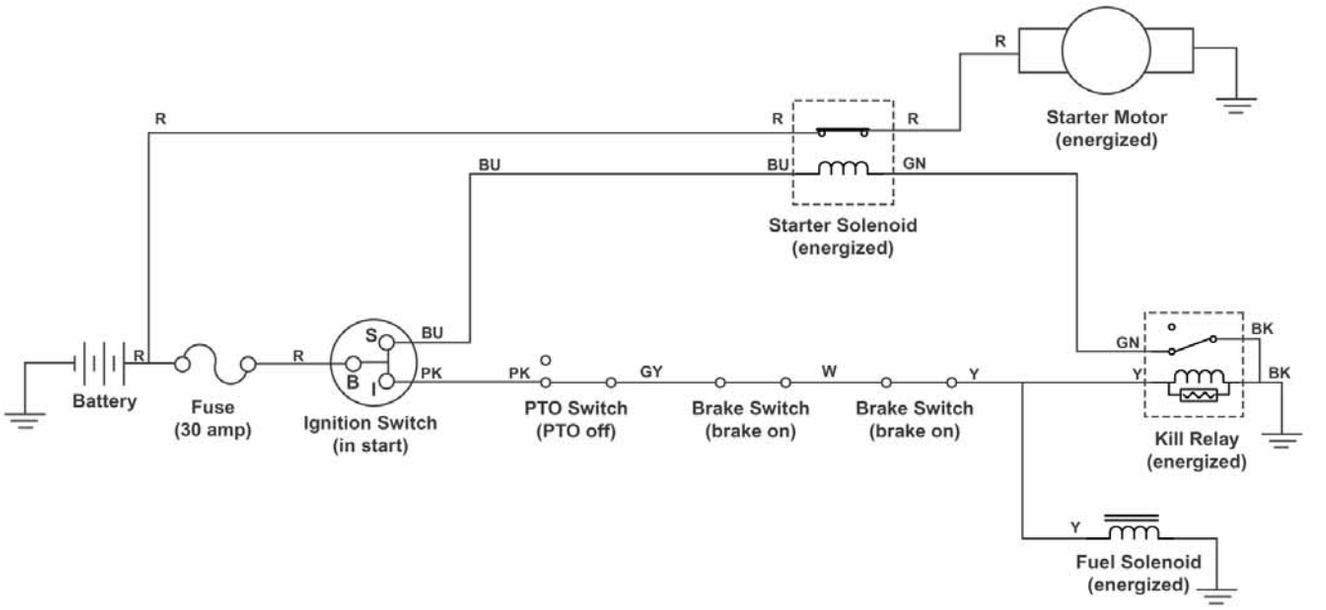
Information List (2006 - 2007)

Wiring Diagram

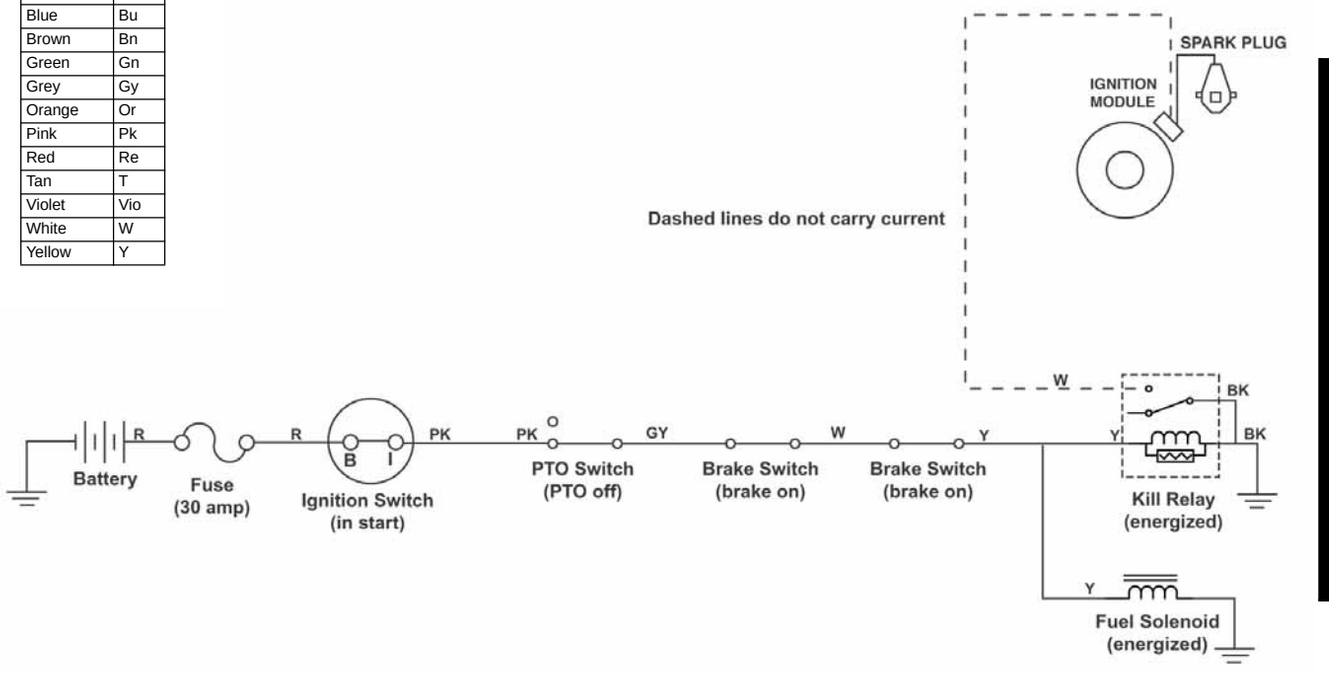


Starter Motor Circuit
(ignition switch in "start)



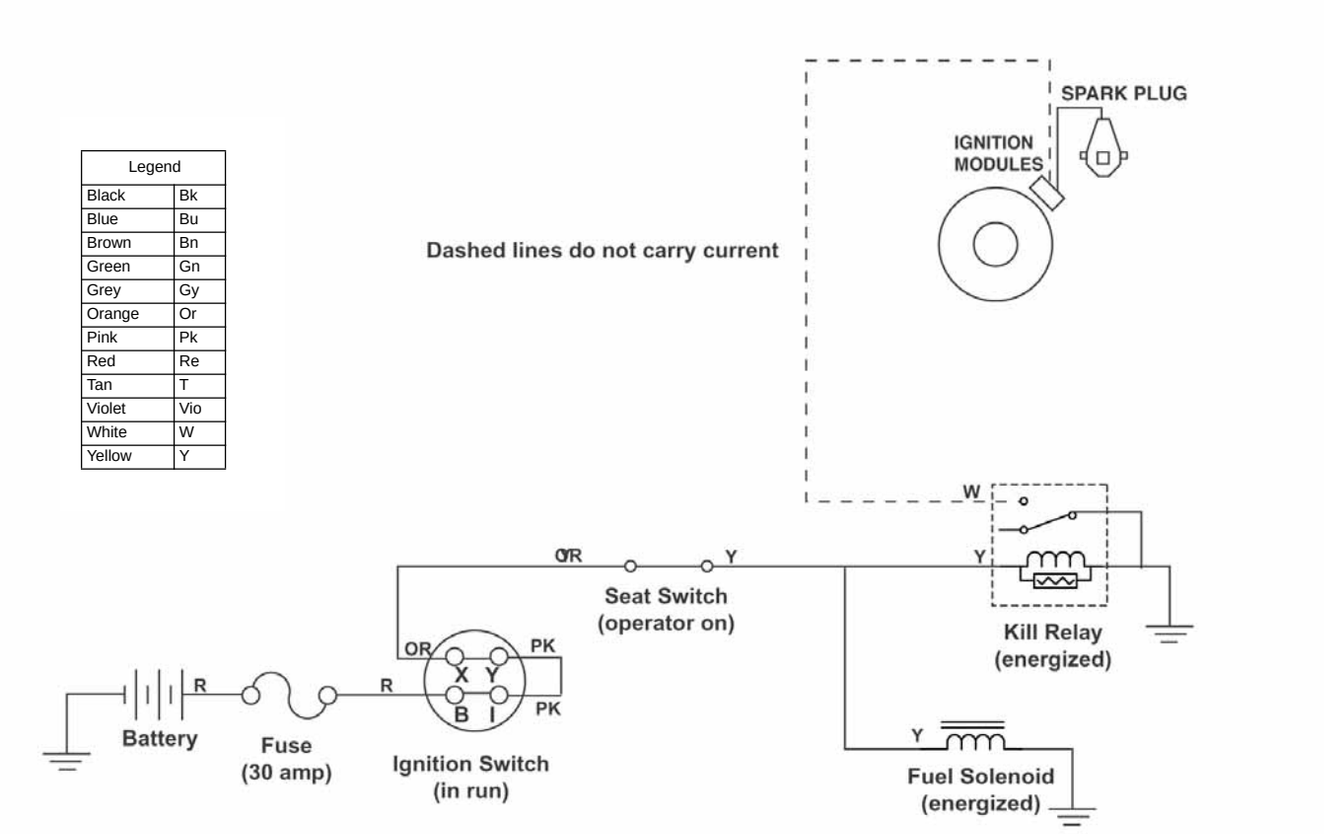
Spark Circuit
(ignition switch in "start")

Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

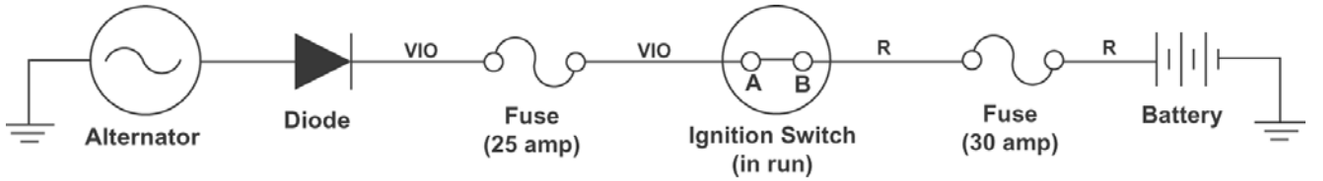


Circuits

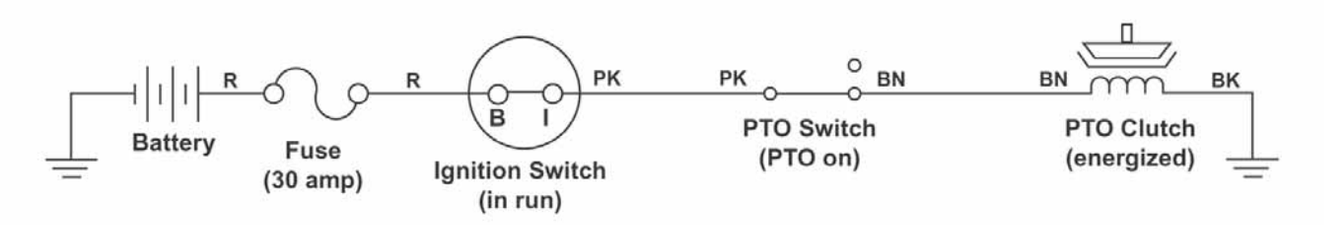
Spark Circuit
(ignition switch in "run")



Battery Charge Circuit
(ignition switch in "run")



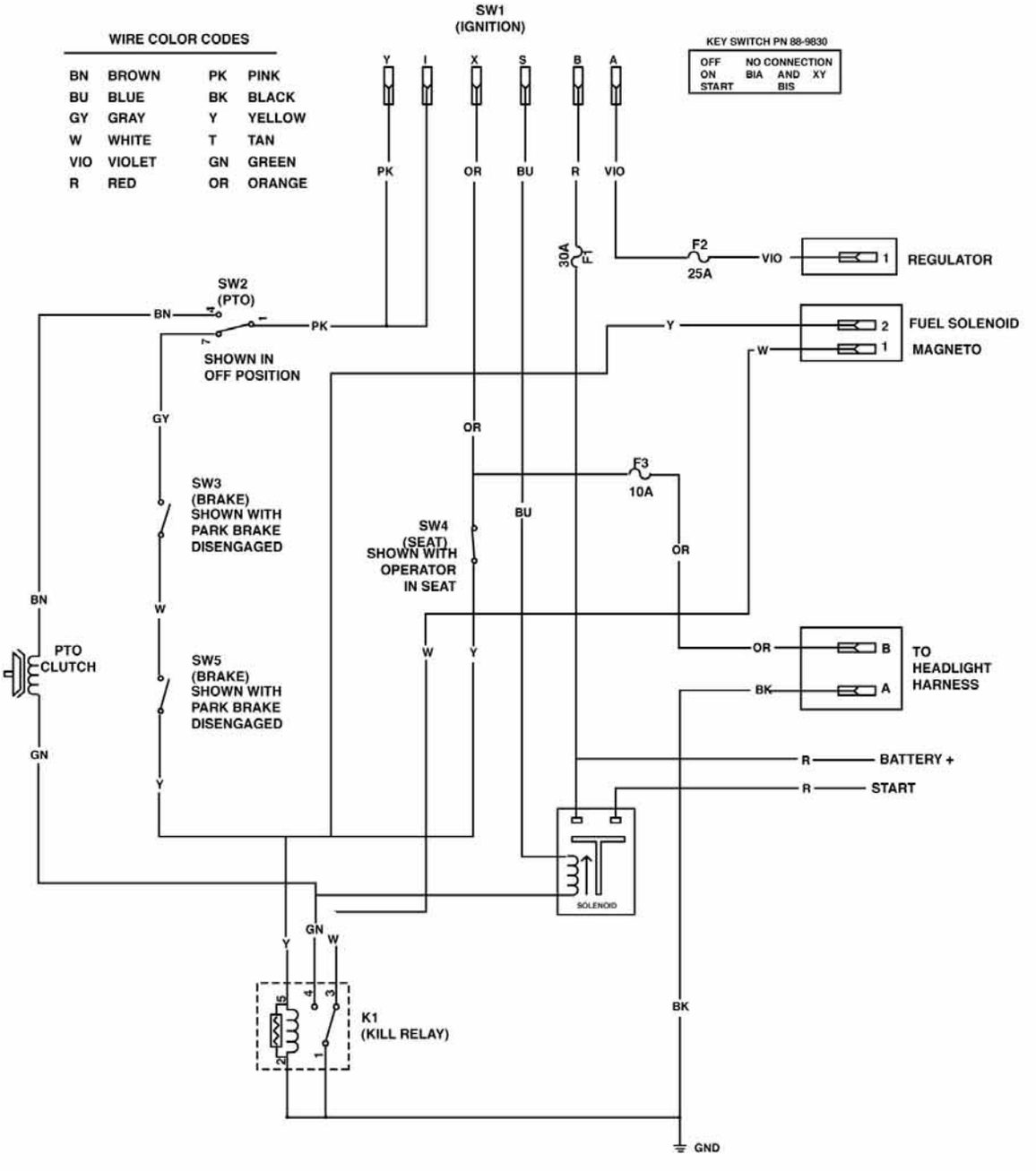
PTO Clutch Circuit
(ignition switch in "run")



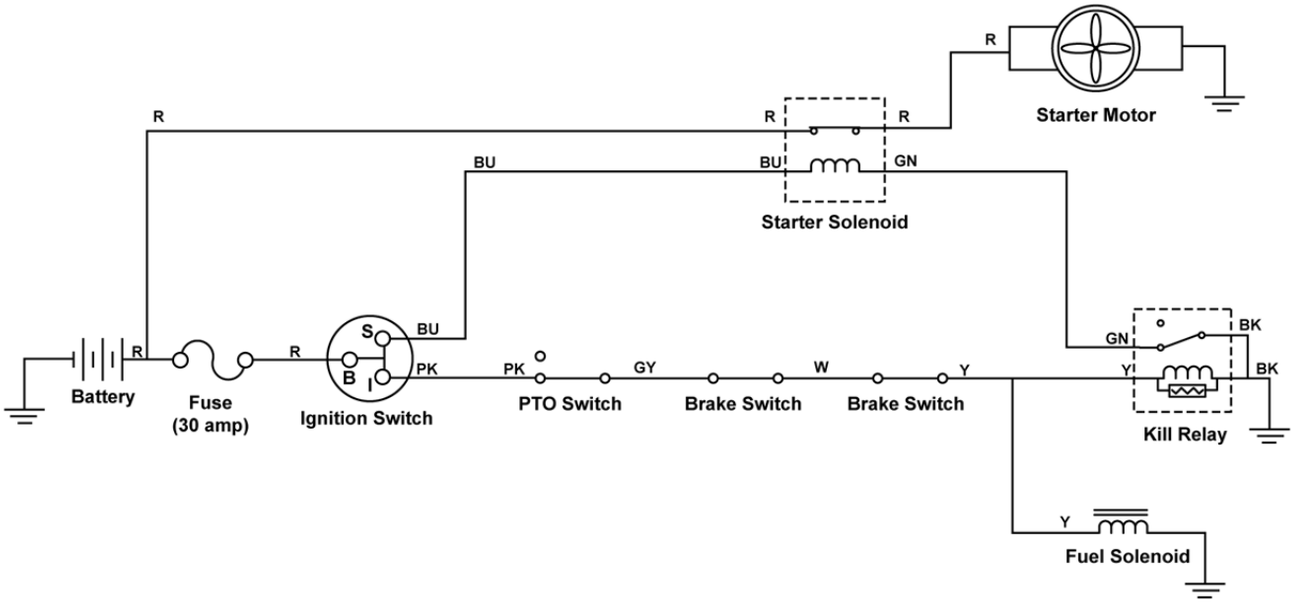
Circuits

Information List (2006 - 2007)

Wiring Diagram

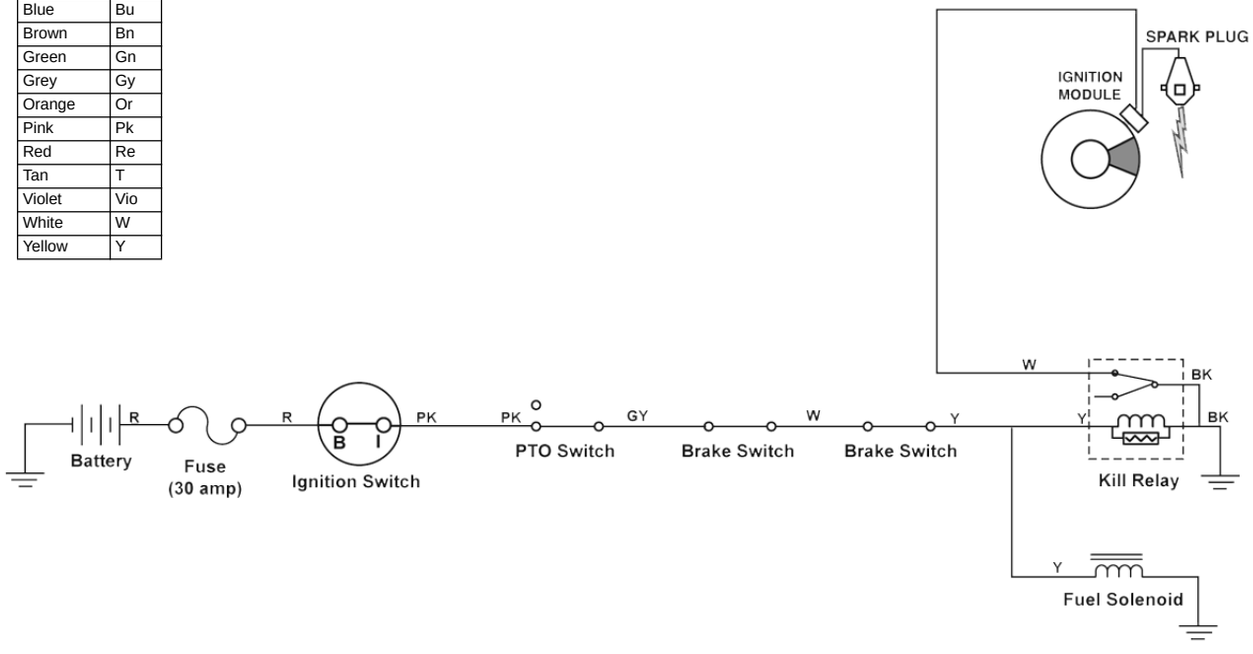


Starter Motor Circuit
(ignition switch in "start)



Spark Circuit
(ignition switch in "start")

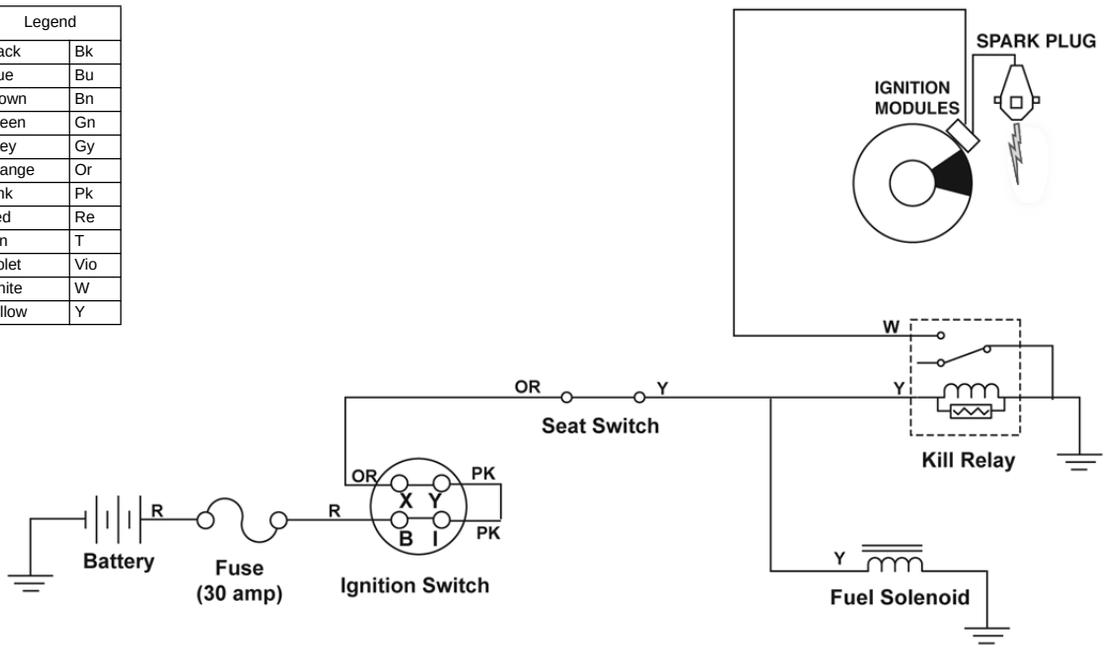
Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y



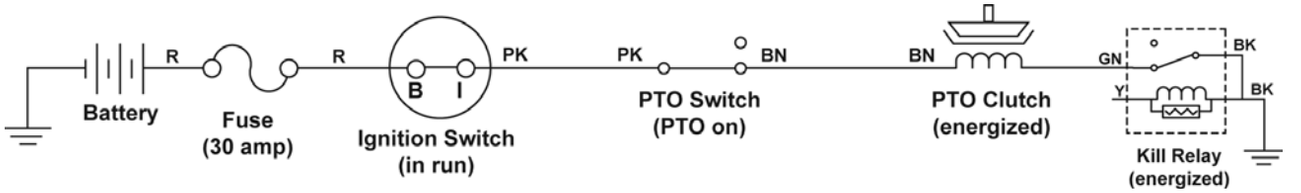
Circuits

Spark Circuit
(ignition switch in "run")

Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y



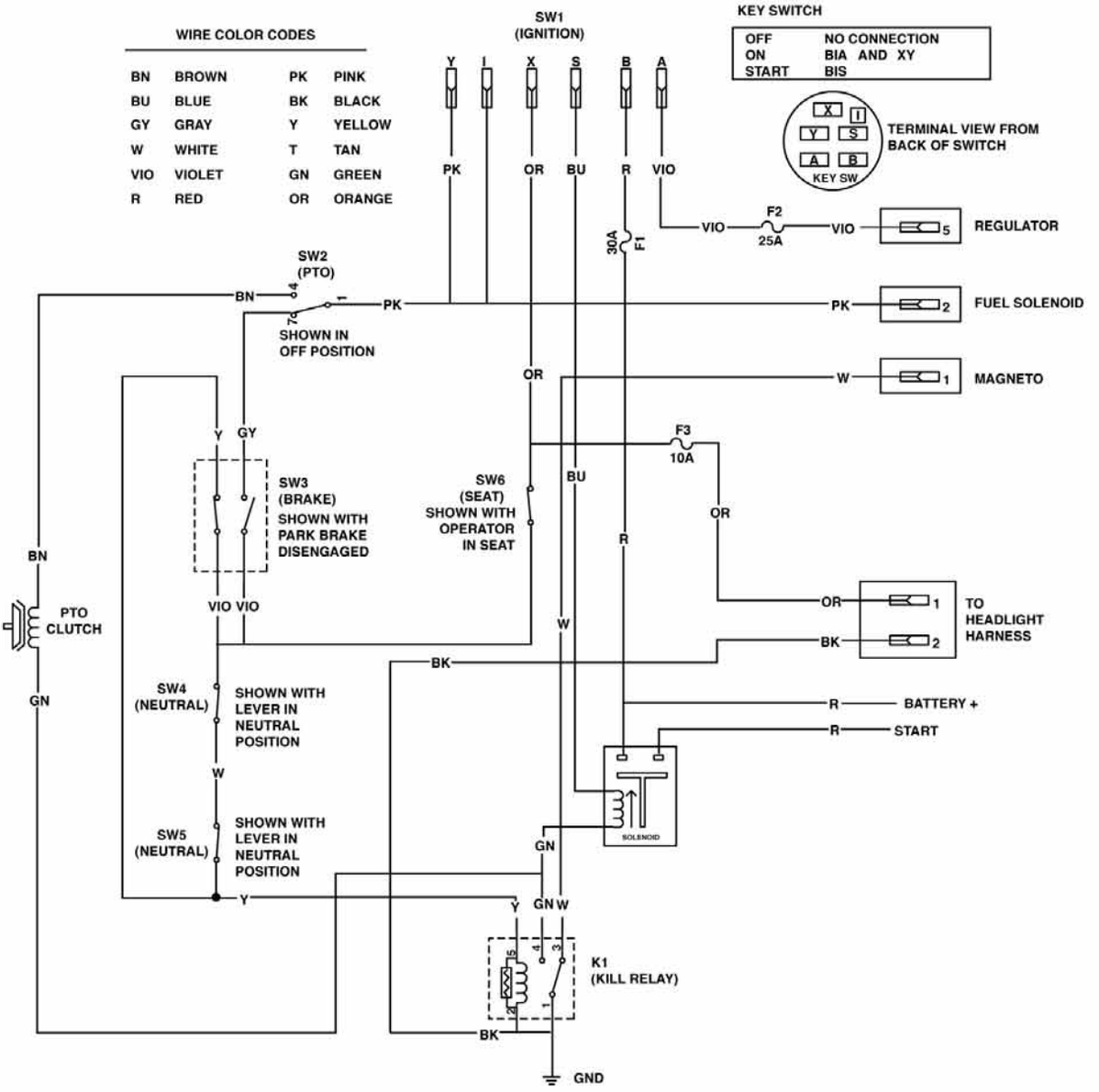
PTO Clutch Circuit
(ignition switch in "run")



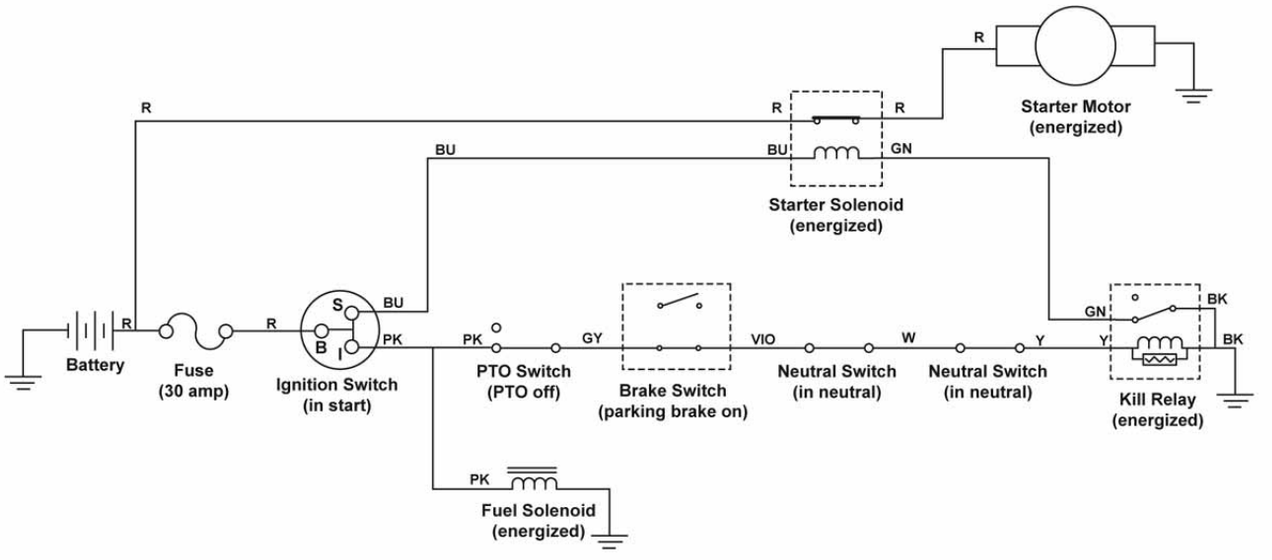
Circuits

Information List
(2006) ZX480,ZX525 (Int'l) ZX525
(2007) ZX440 (Int'l)

Wiring Diagram

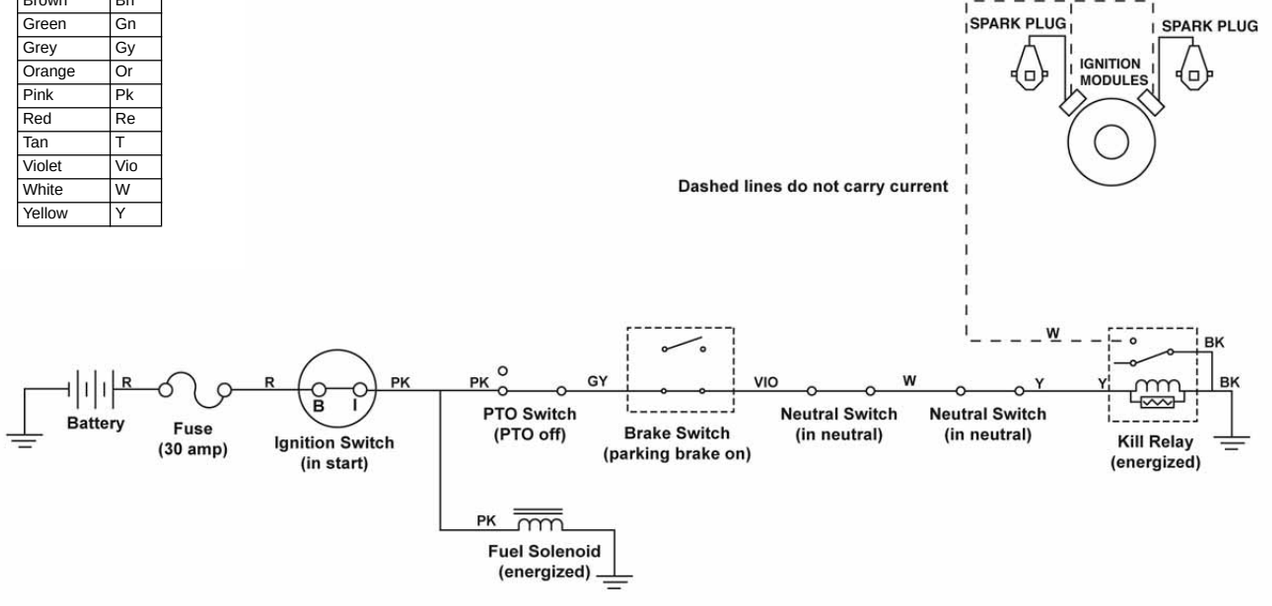


Starter Motor Circuit
(ignition switch in "start)



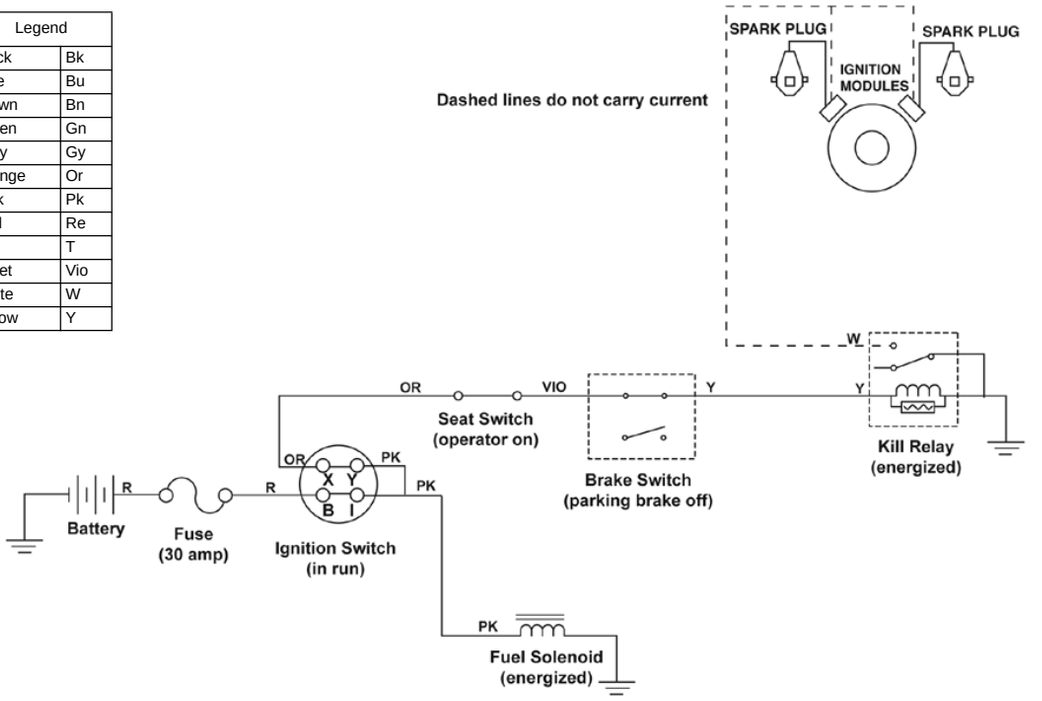
Spark Circuit
(ignition switch in "start")

Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

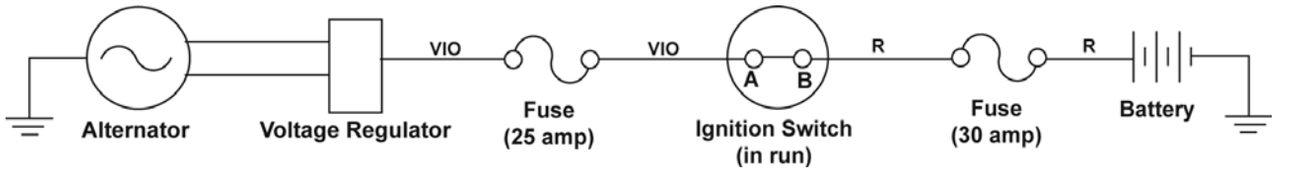


Spark Circuit
(ignition switch in "run")

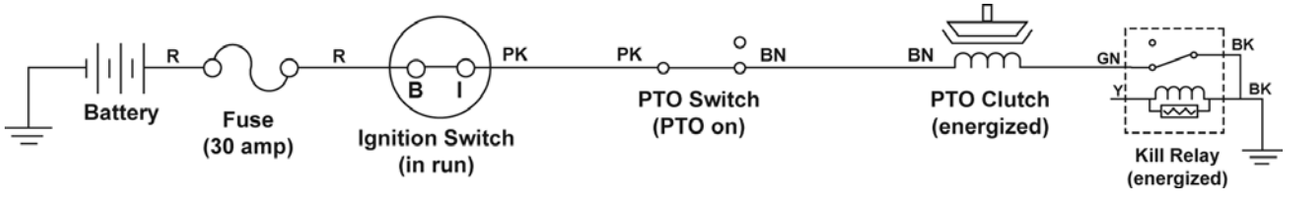
Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y



Battery Charge Circuit
(ignition switch in "run")



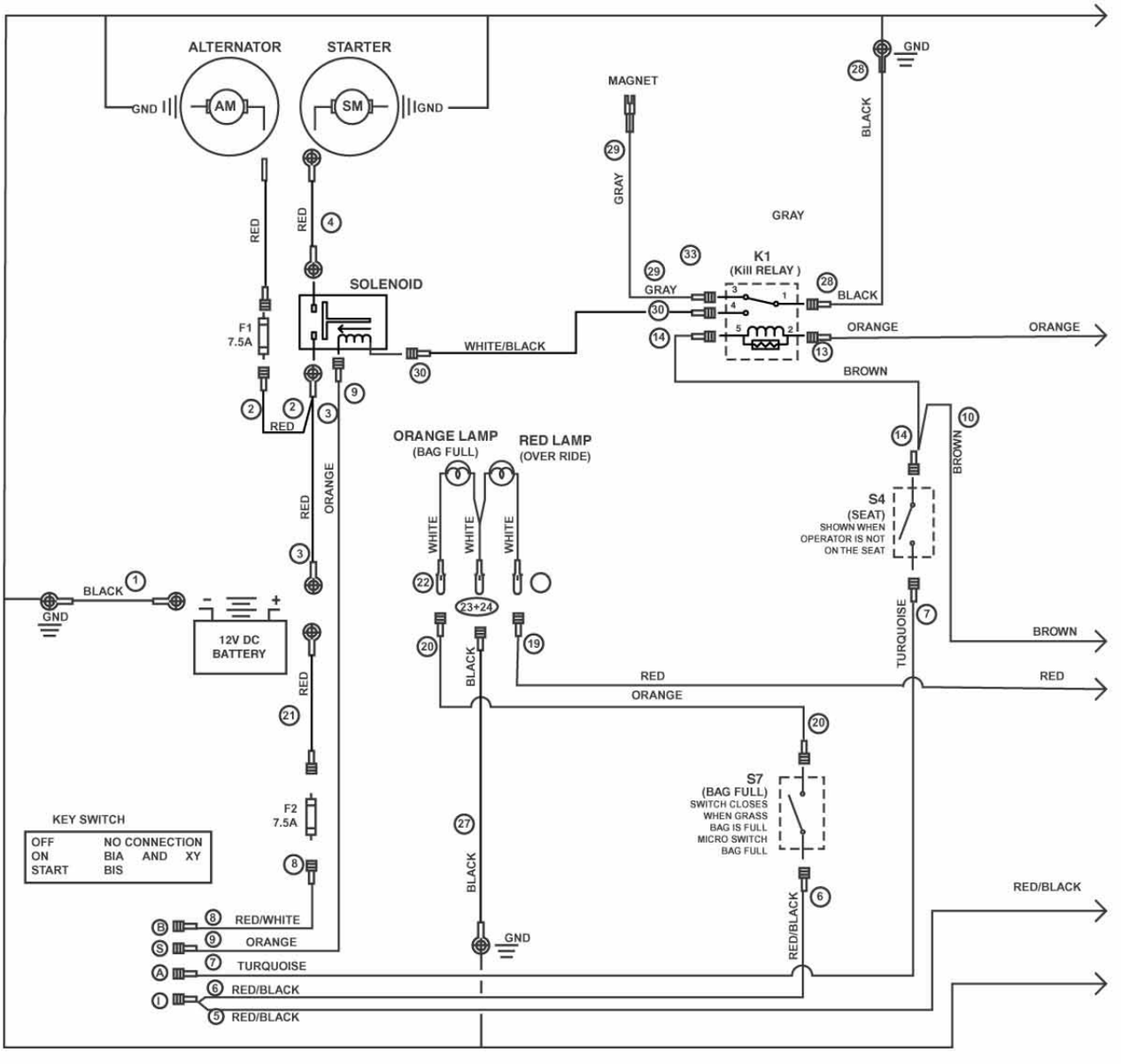
PTO Clutch Circuit
(ignition switch in "run")

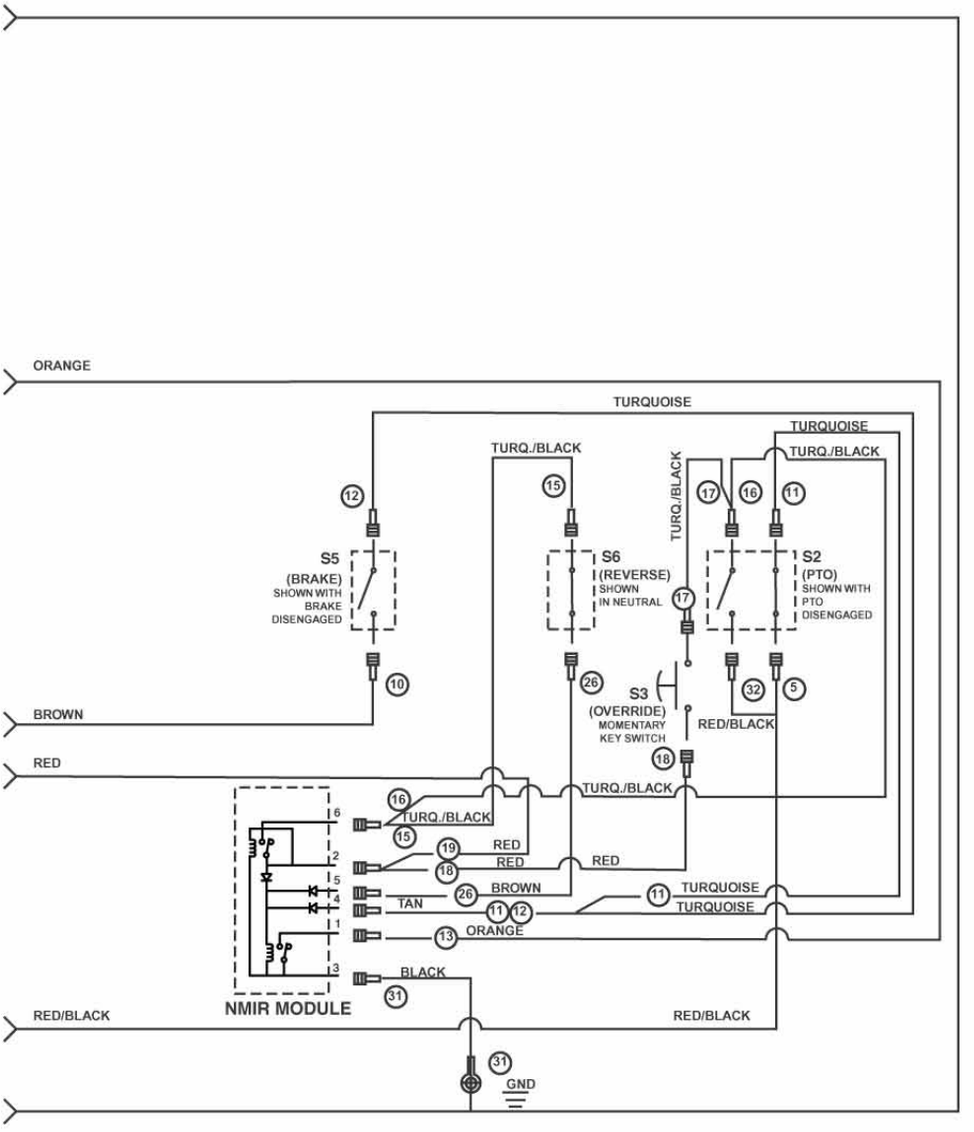


Circuits

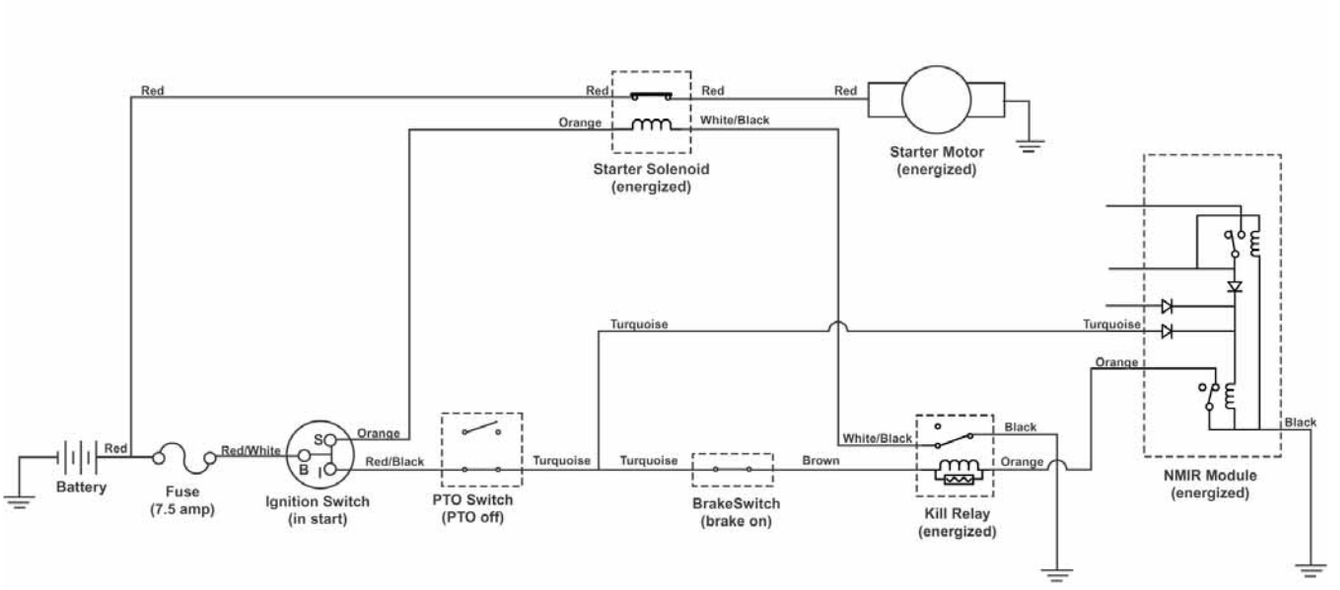
Information List (2006 - 2007)

Wiring Diagram

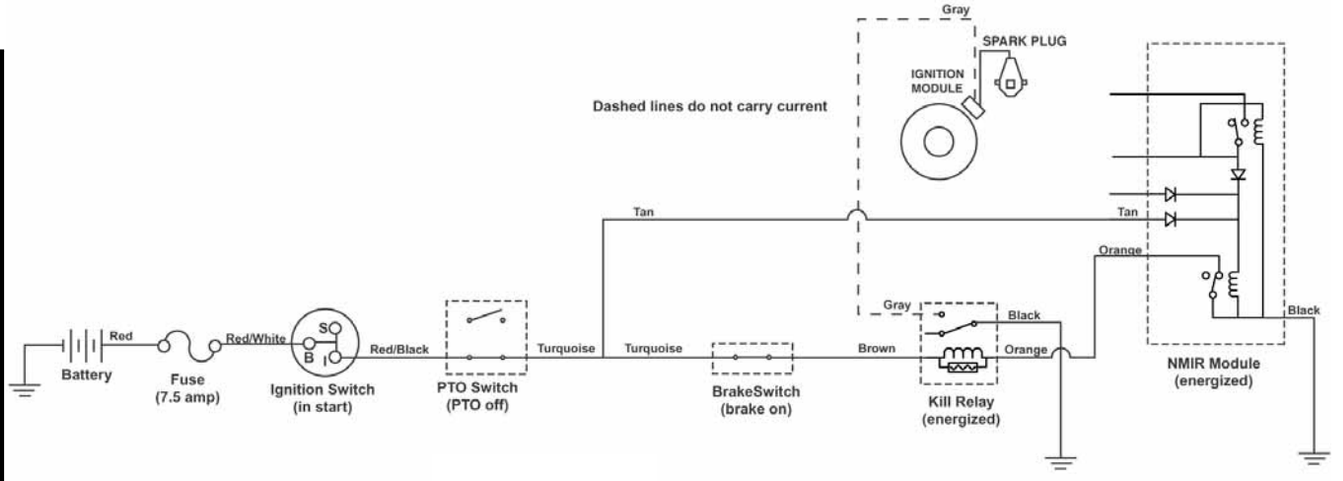



ORANGE
TURQUOISE
TURQUOISE
TURQ./BLACK
TURQ./BLACK
TURQ./BLACK
S5
(BRAKE)
SHOWN WITH
BRAKE
DISENGAGED
S6
(REVERSE)
SHOWN
IN NEUTRAL
S2
(PTO)
SHOWN WITH
PTO
DISENGAGED
S3
(OVERRIDE)
MOMENTARY
KEY SWITCH
RED/BLACK
BROWN
RED
TURQ./BLACK
TURQ./BLACK
RED
RED
RED
BROWN
TAN
TURQUOISE
TURQUOISE
ORANGE
BLACK
NMIR MODULE
RED/BLACK
RED/BLACK
GND

Starter Motor Circuit
(ignition switch in "start)

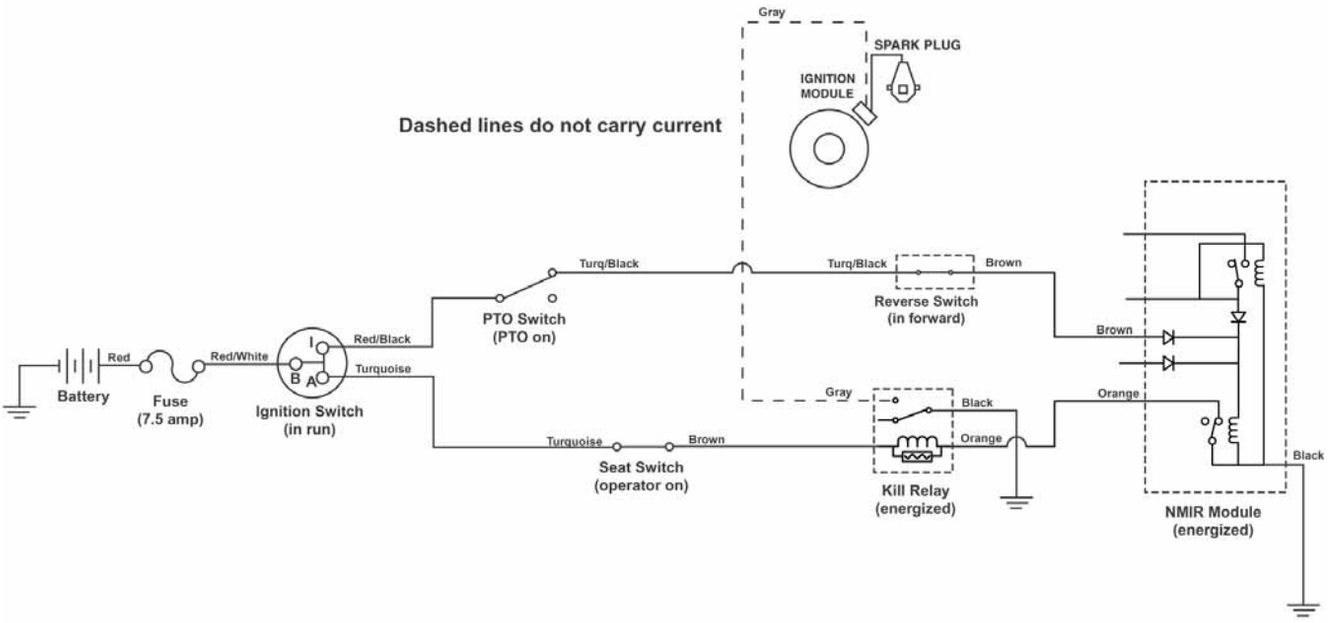


Spark Circuit
(ignition switch in "start")



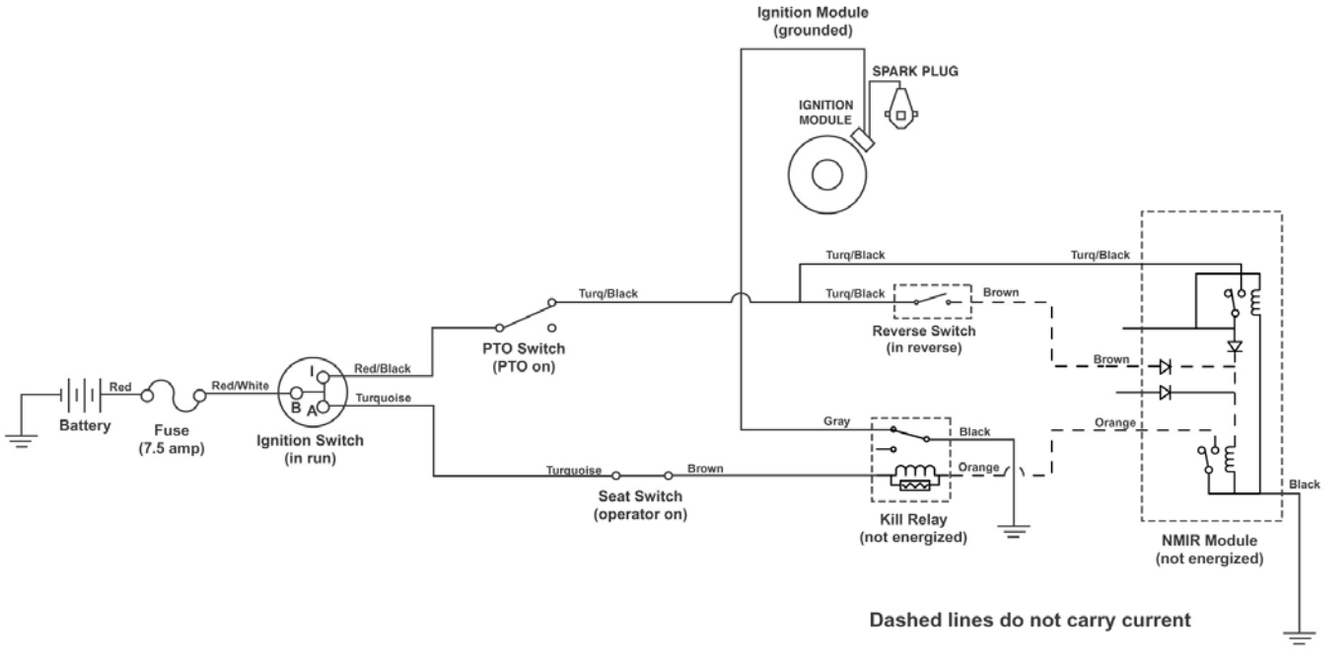
Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Spark Circuit
(ignition switch in "run")



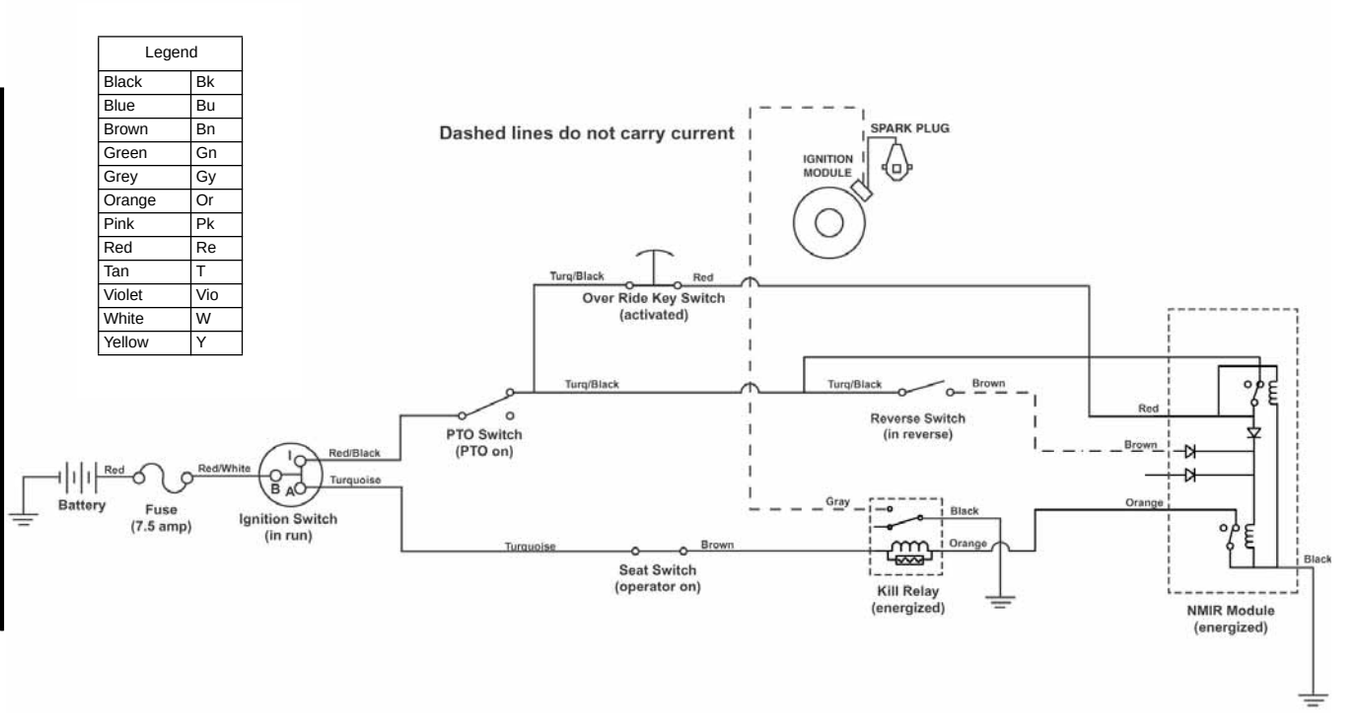
Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Spark Circuit
(in reverse, PTO "on")



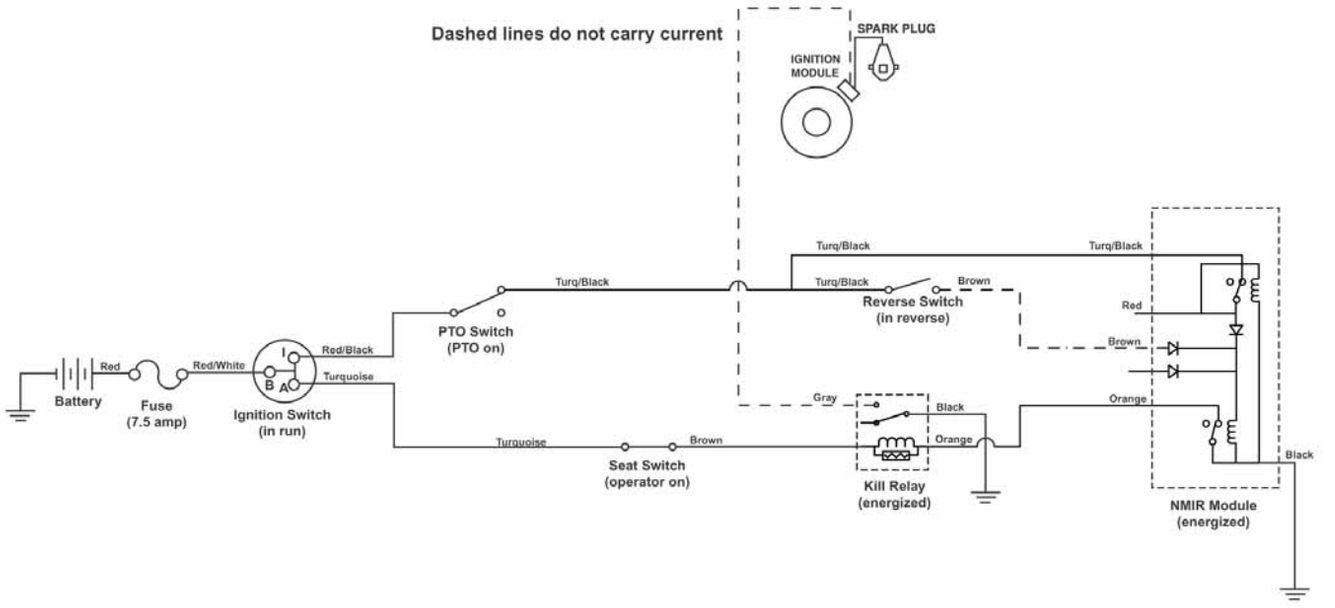
Spark Circuit
(in reverse, override key switch activated)

Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y



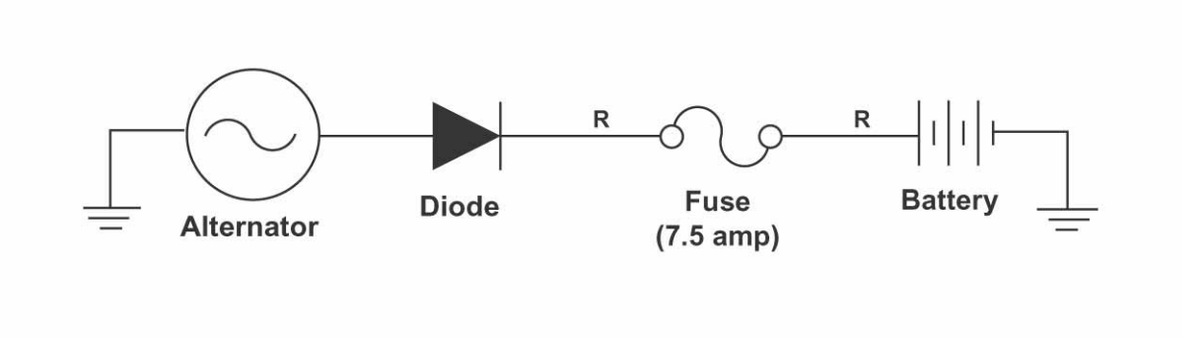
Circuits

Spark Circuit
(in reverse, PTO "on", override mode)



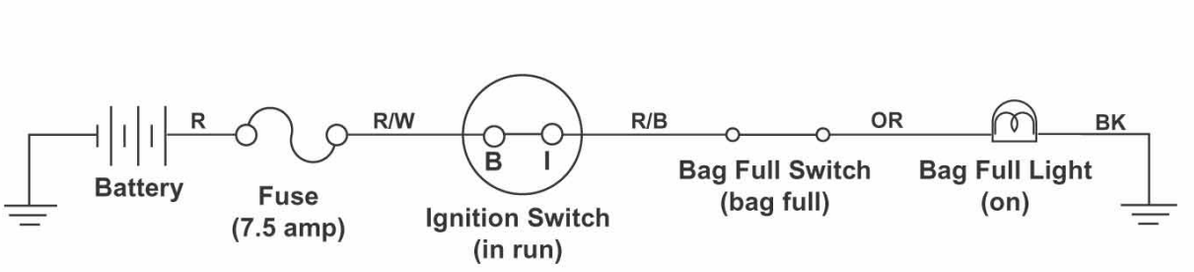
Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Battery Charge Circuit



Bag Full Circuit

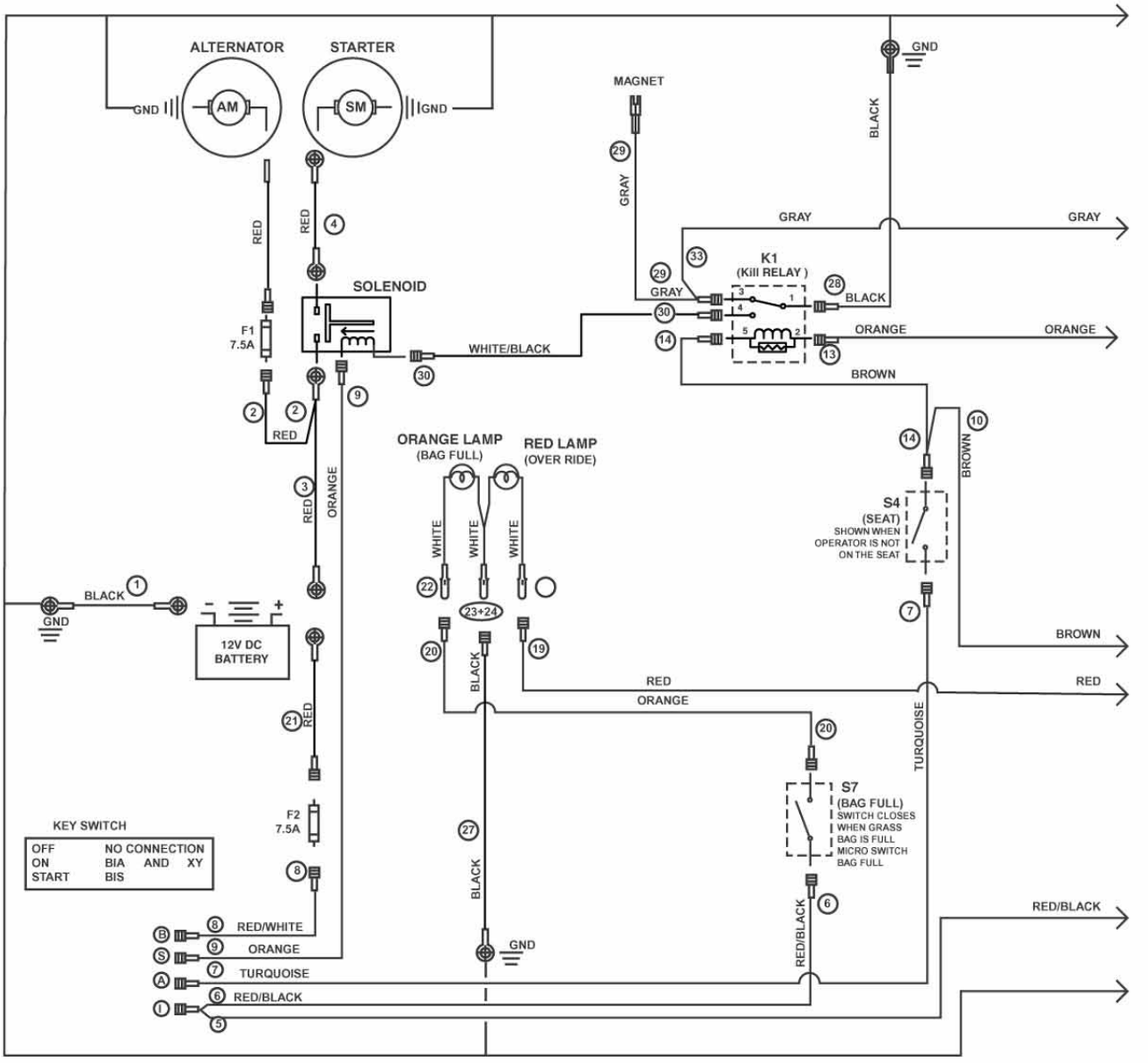
(ignition switch in "run")

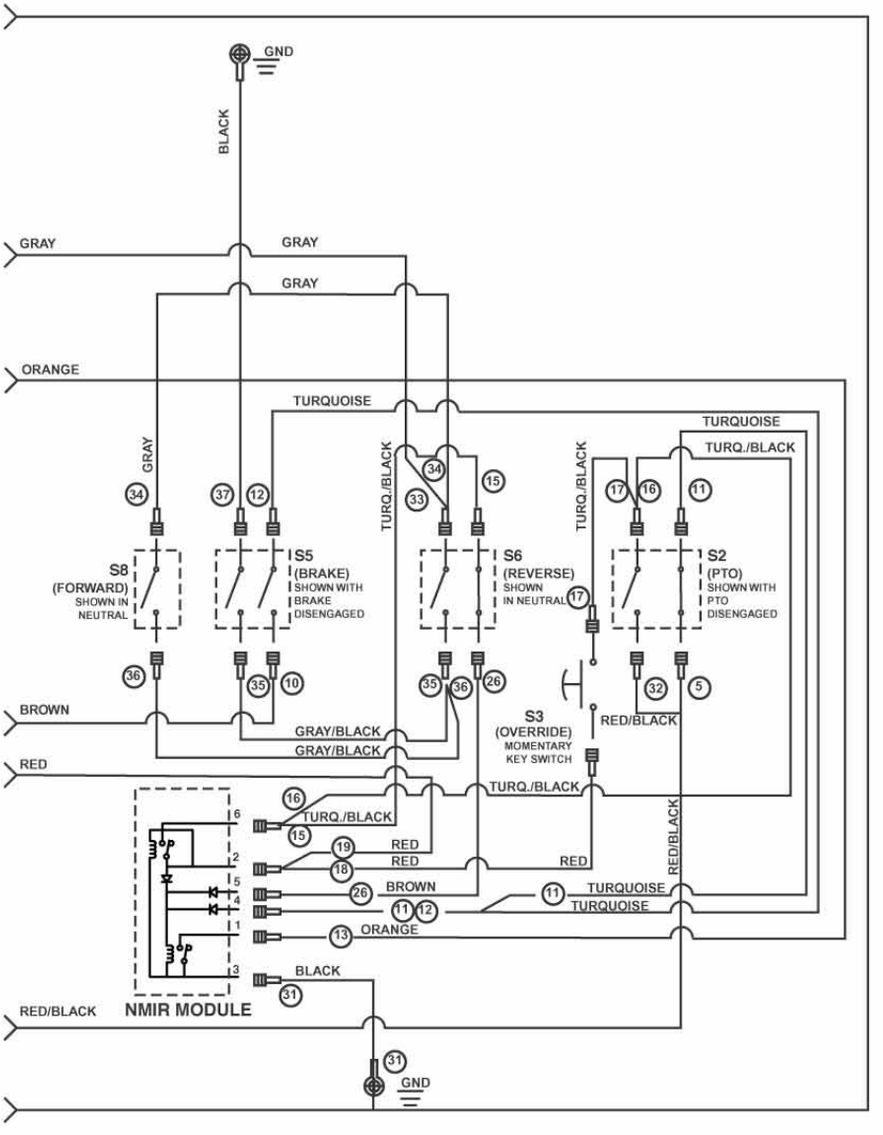


Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

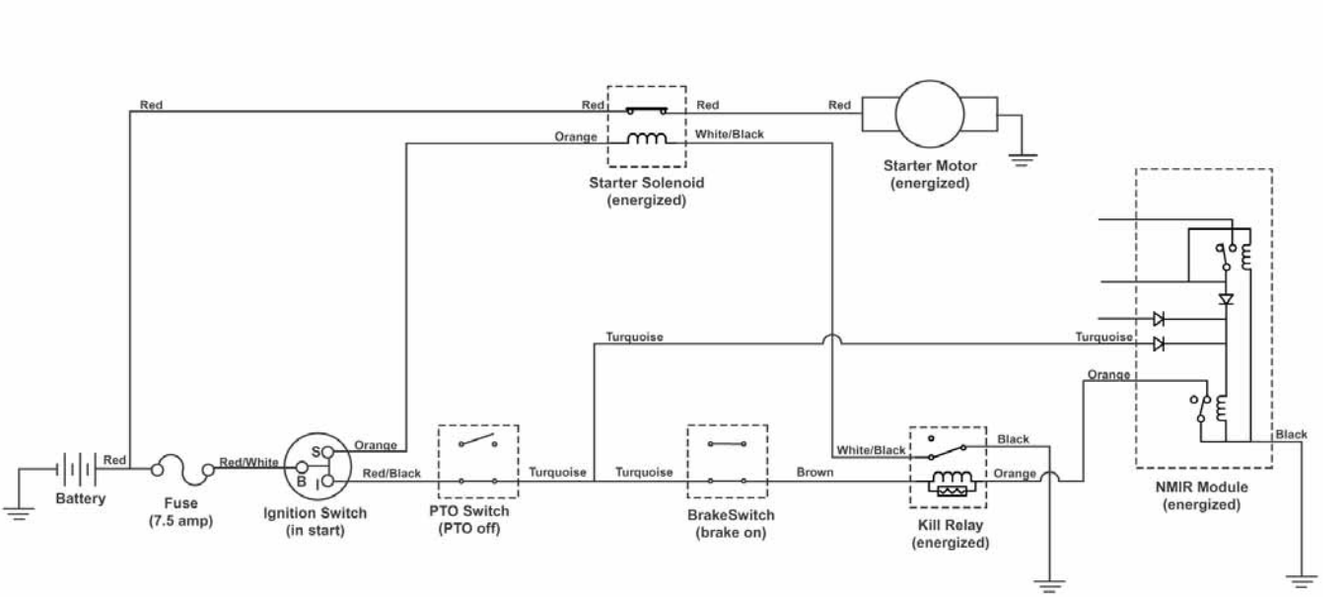
Information List (2006 - 2007)

Wiring Diagram

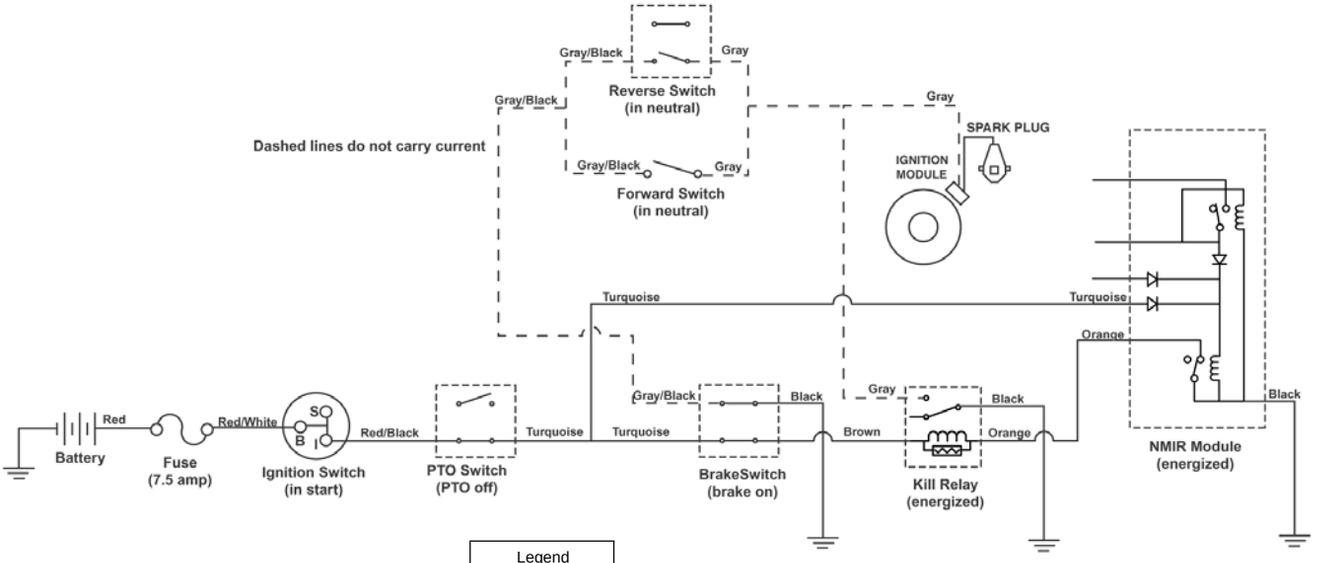



GND
BLACK
GRAY
GRAY
GRAY
ORANGE
TURQUOISE
TURQUOISE
TURQ./BLACK
TURQ./BLACK
TURQ./BLACK
GRAY
S8
(FORWARD)
SHOWN IN
NEUTRAL
S5
(BRAKE)
SHOWN WITH
BRAKE
DISENGAGED
S6
(REVERSE)
SHOWN
IN NEUTRAL
S2
(PTO)
SHOWN WITH
PTO
DISENGAGED
S3
(OVERRIDE)
MOMENTARY
KEY SWITCH
BROWN
RED
GRAY/BLACK
GRAY/BLACK
RED/BLACK
TURQ./BLACK
TURQ./BLACK
RED
RED
RED
RED/BLACK
BROWN
TURQUOISE
TURQUOISE
ORANGE
BLACK
NMIR MODULE
RED/BLACK
GND

Starter Motor Circuit
(ignition switch in "start)

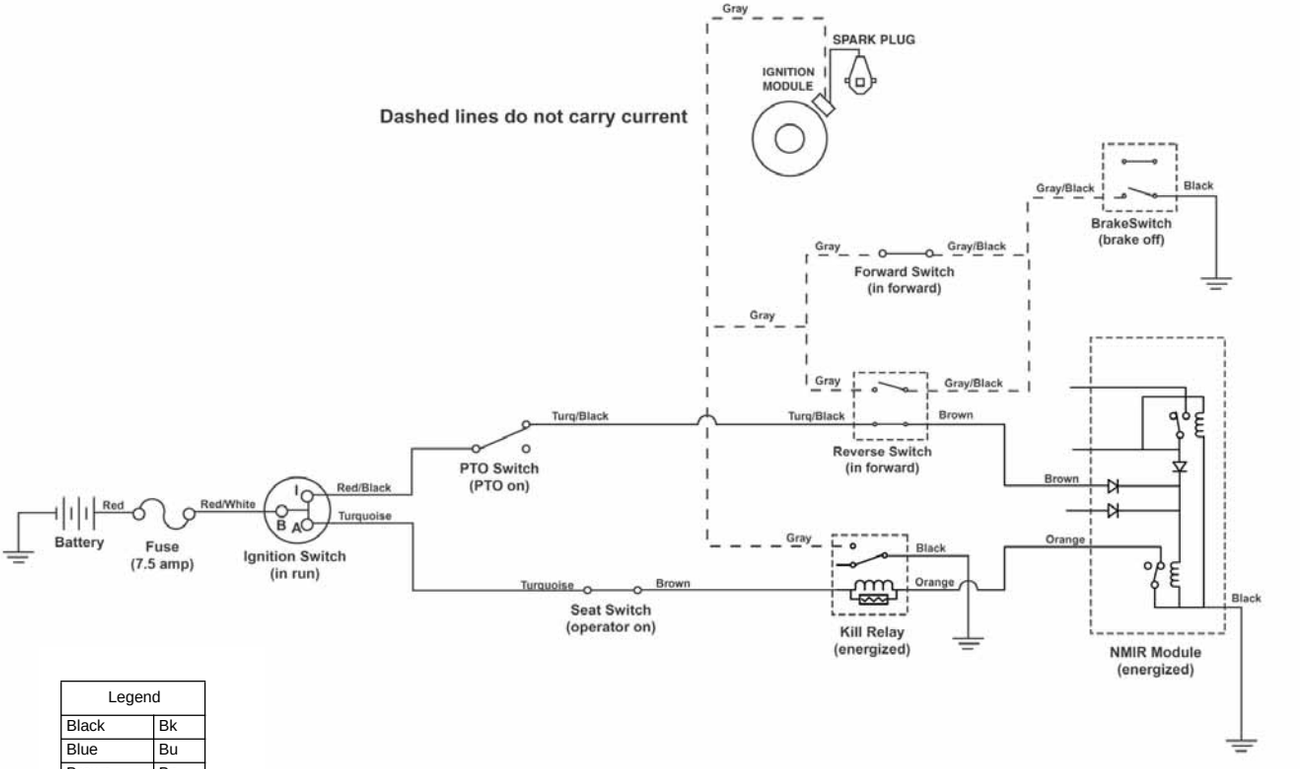


Spark Circuit
(ignition switch in "start")



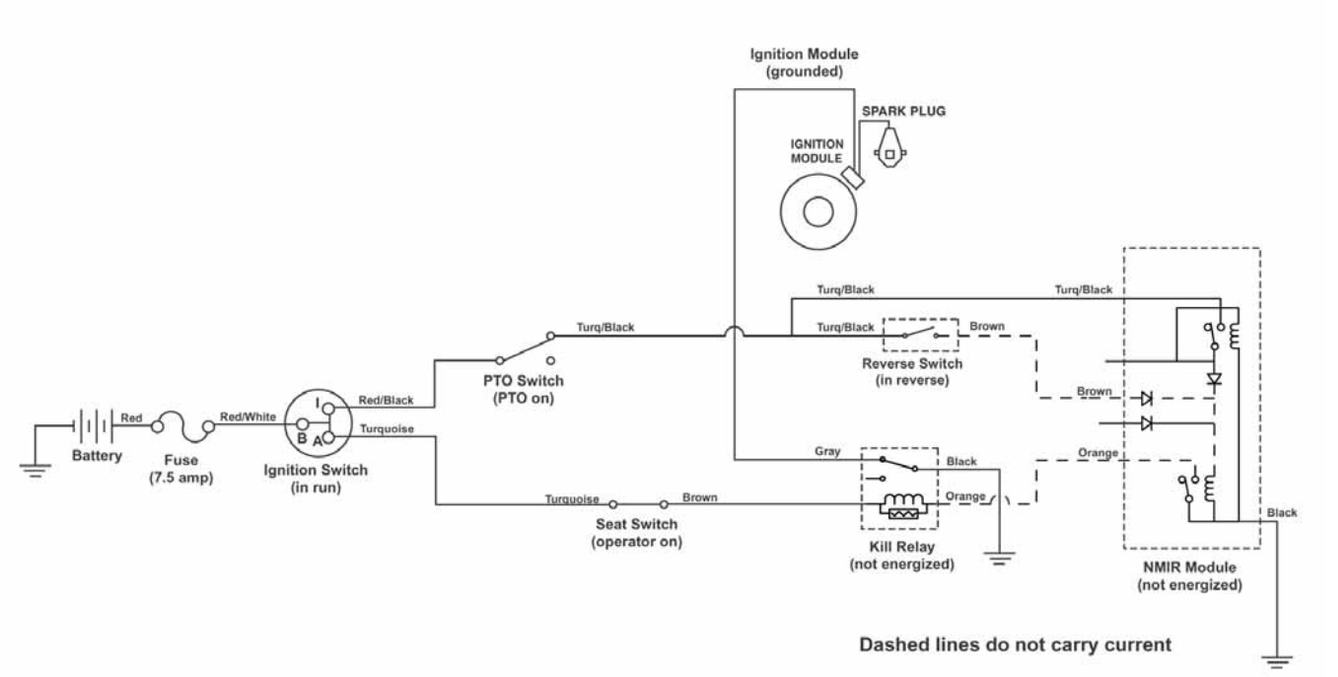
Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Spark Circuit
(ignition switch in "run")

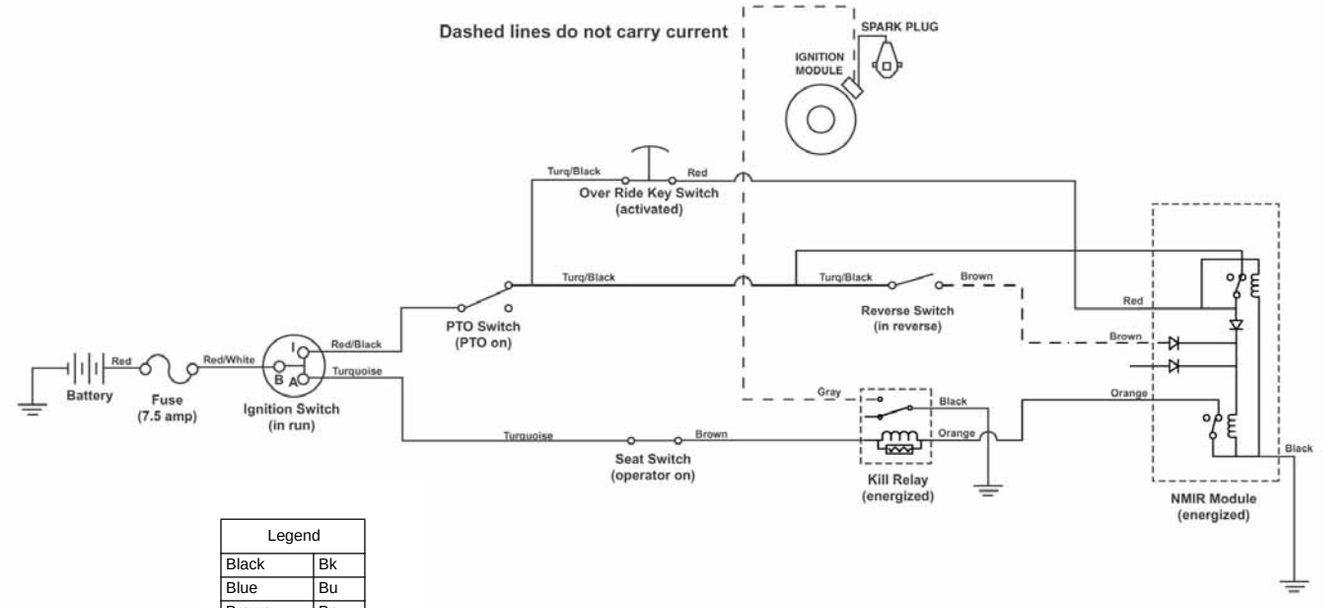


Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Spark Circuit
(in reverse, PTO "on")



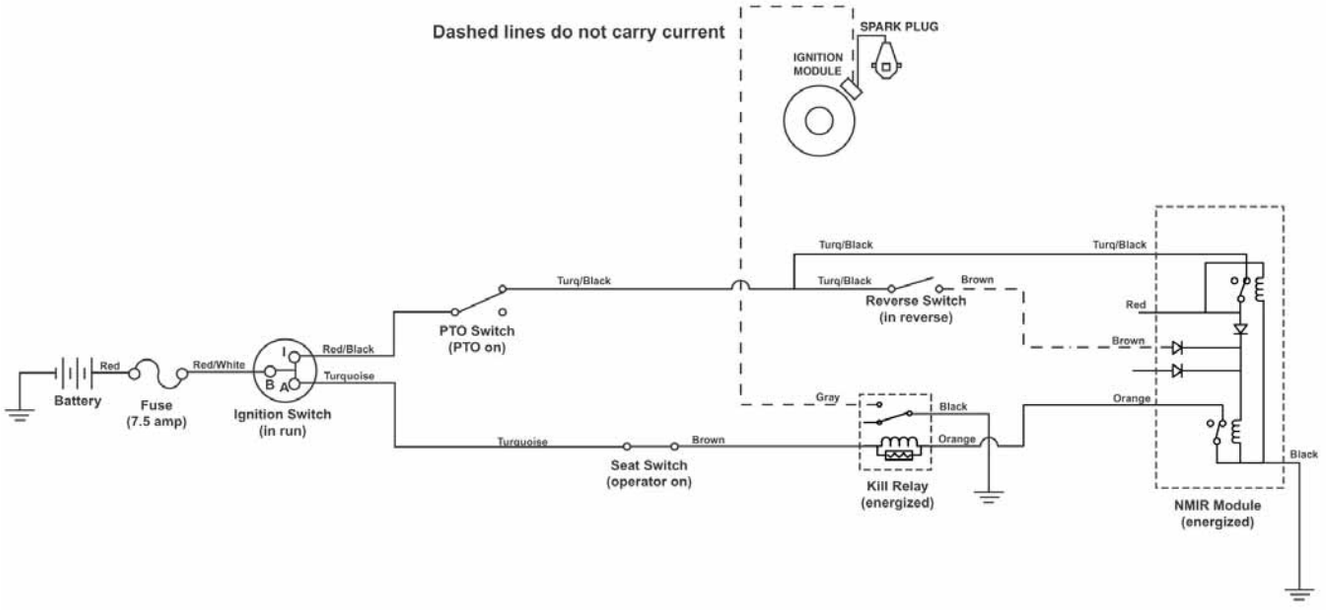
Spark Circuit
(in reverse, override key switch activated)



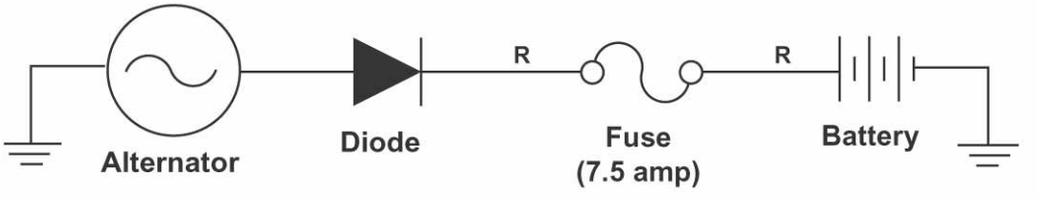
Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Spark Circuit

(in reverse, PTO "on", override mode)

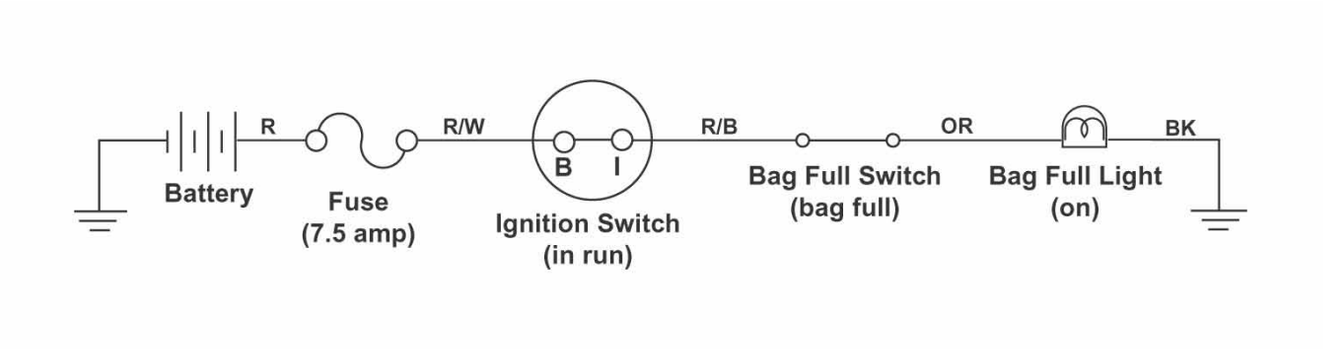


Battery Charge Circuit



Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

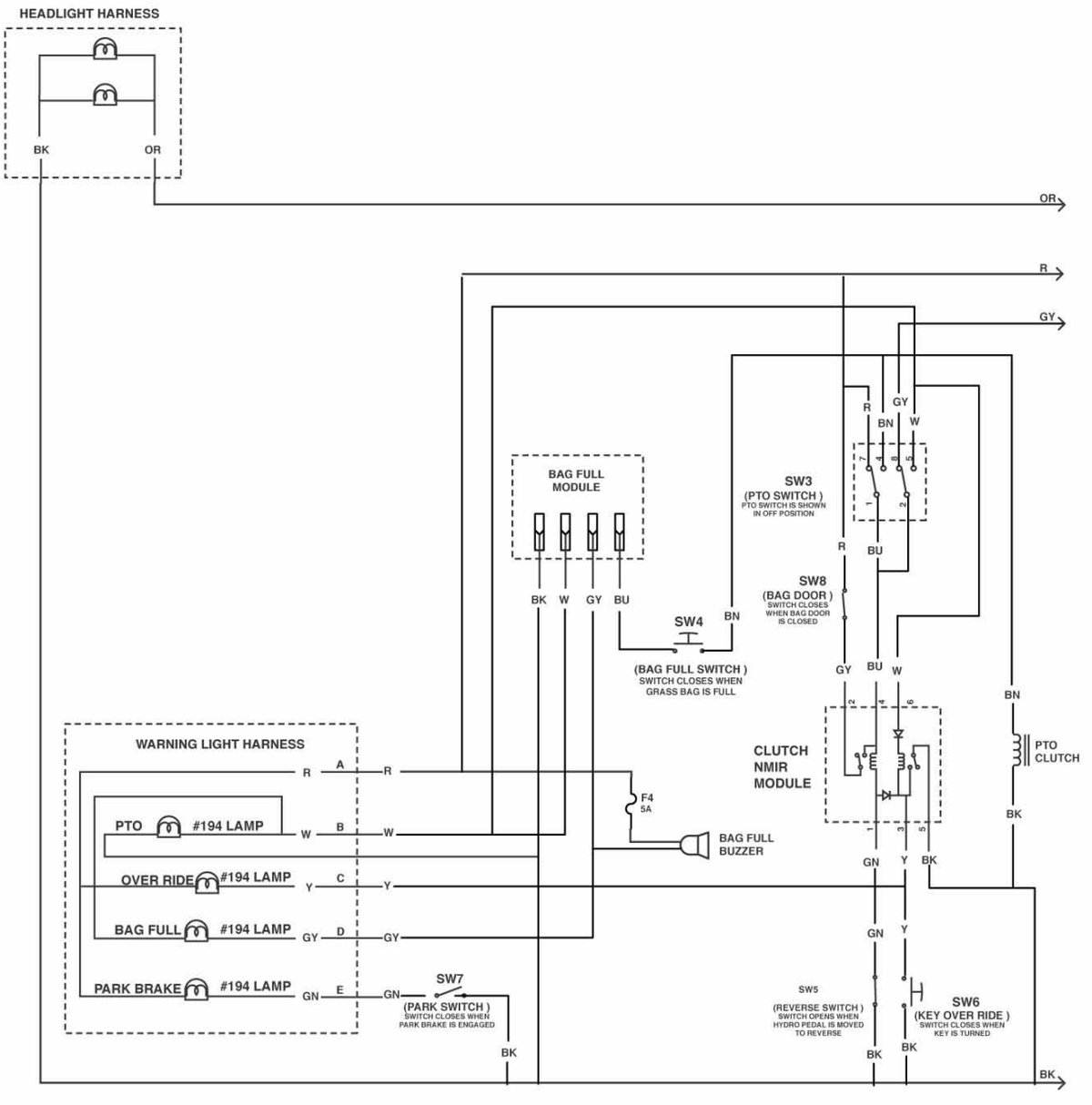
Bag Full Circuit
(ignition switch in "run")

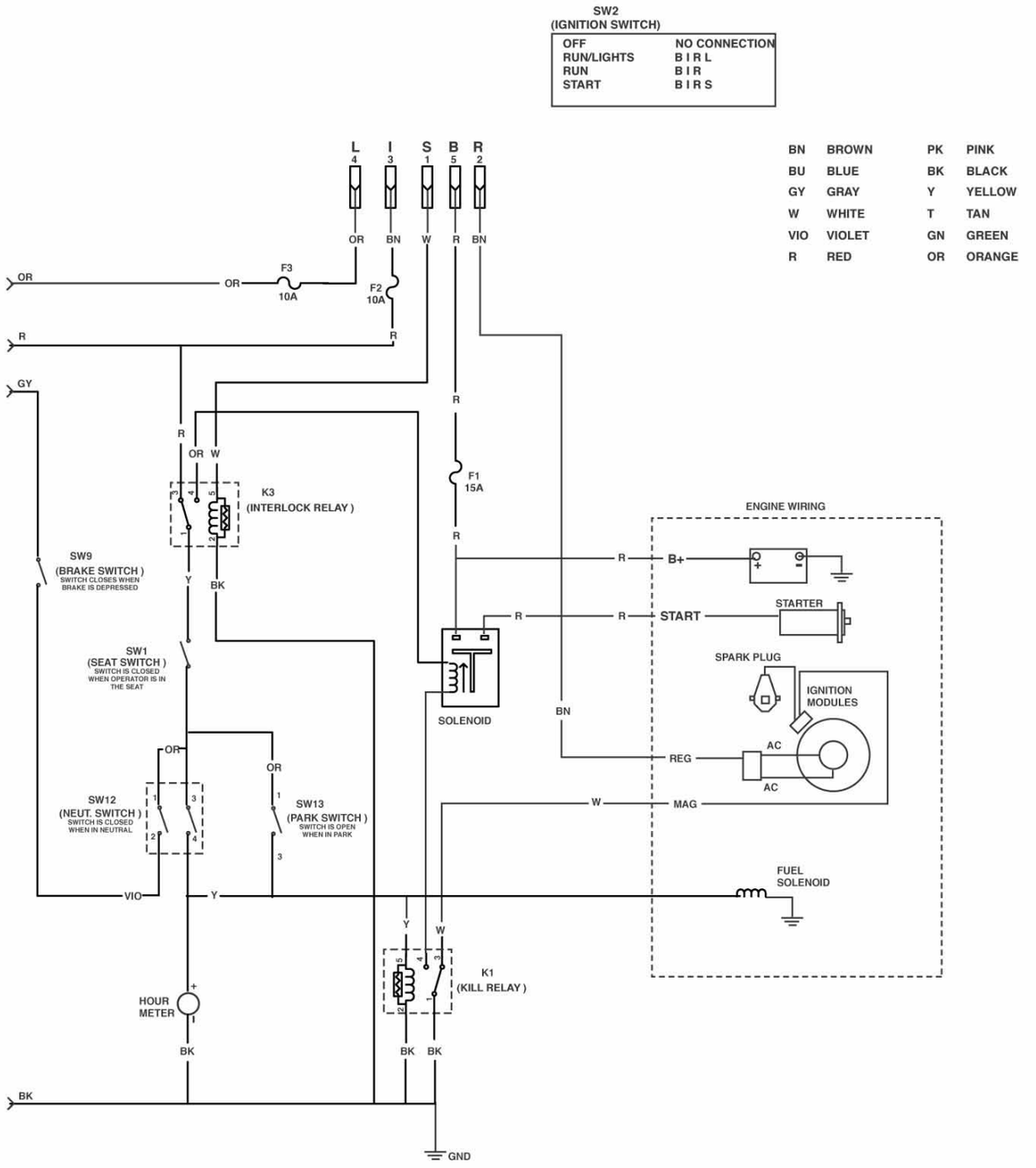


Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

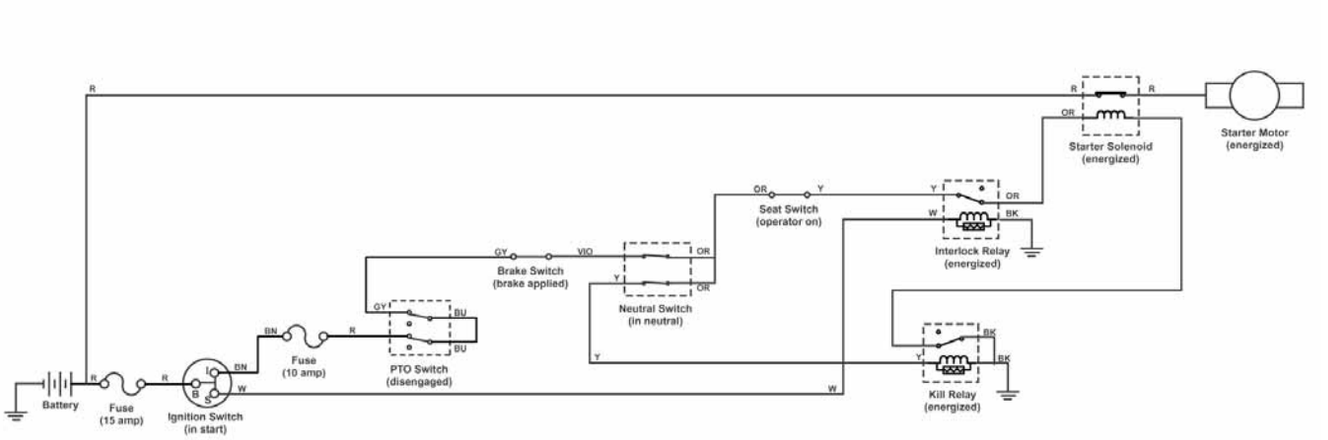
Information List (2006 - 2007)

Wiring Diagram

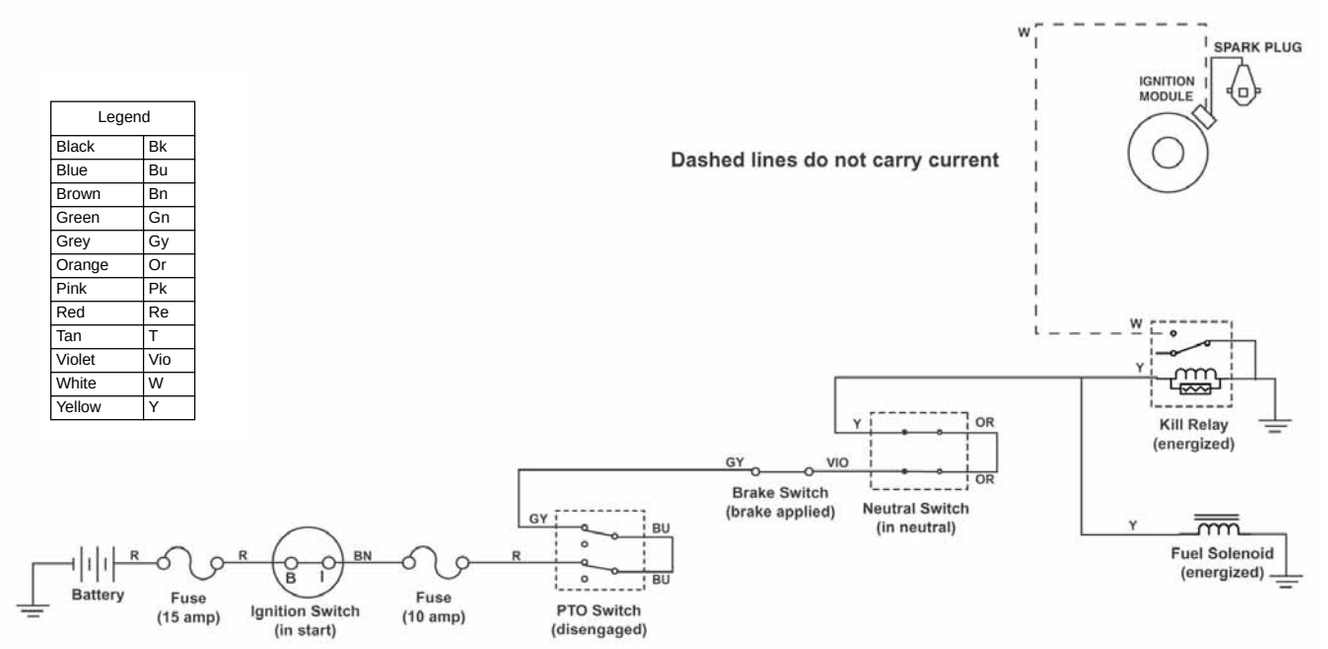



SW2
(IGNITION SWITCH)
OFF NO CONNECTION
RUN/LIGHTS B I R L
RUN B I R
START B I R S
L 4
I 3
S 1
B 5
R 2
BN BROWN
BU BLUE
GY GRAY
W WHITE
VIO VIOLET
R RED
PK PINK
BK BLACK
Y YELLOW
T TAN
GN GREEN
OR ORANGE
F3
10A
F2
10A
F1
15A
K3
(INTERLOCK RELAY)
SW9
(BRAKE SWITCH)
SWITCH CLOSES WHEN BRAKE IS DEPRESSED
SW1
(SEAT SWITCH)
SWITCH IS CLOSED WHEN OPERATOR IS IN THE SEAT
SW12
(NEUT. SWITCH)
SWITCH IS CLOSED WHEN IN NEUTRAL
SW13
(PARK SWITCH)
SWITCH IS OPEN WHEN IN PARK
SOLENOID
ENGINE WIRING
B+
START
STARTER
SPARK PLUG
IGNITION MODULES
AC
REG
MAG
FUEL SOLENOID
K1
(KILL RELAY)
HOUR METER
GND

Starter Motor Circuit
(ignition switch in "start")

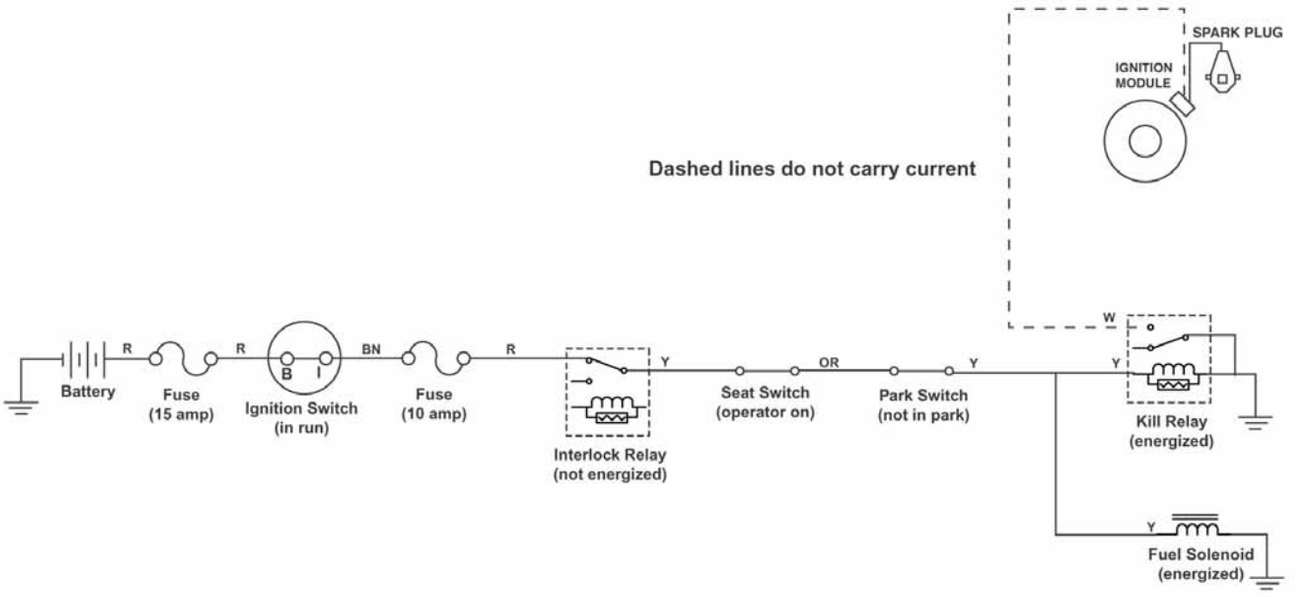


Spark Circuit
(ignition switch in "start" position)



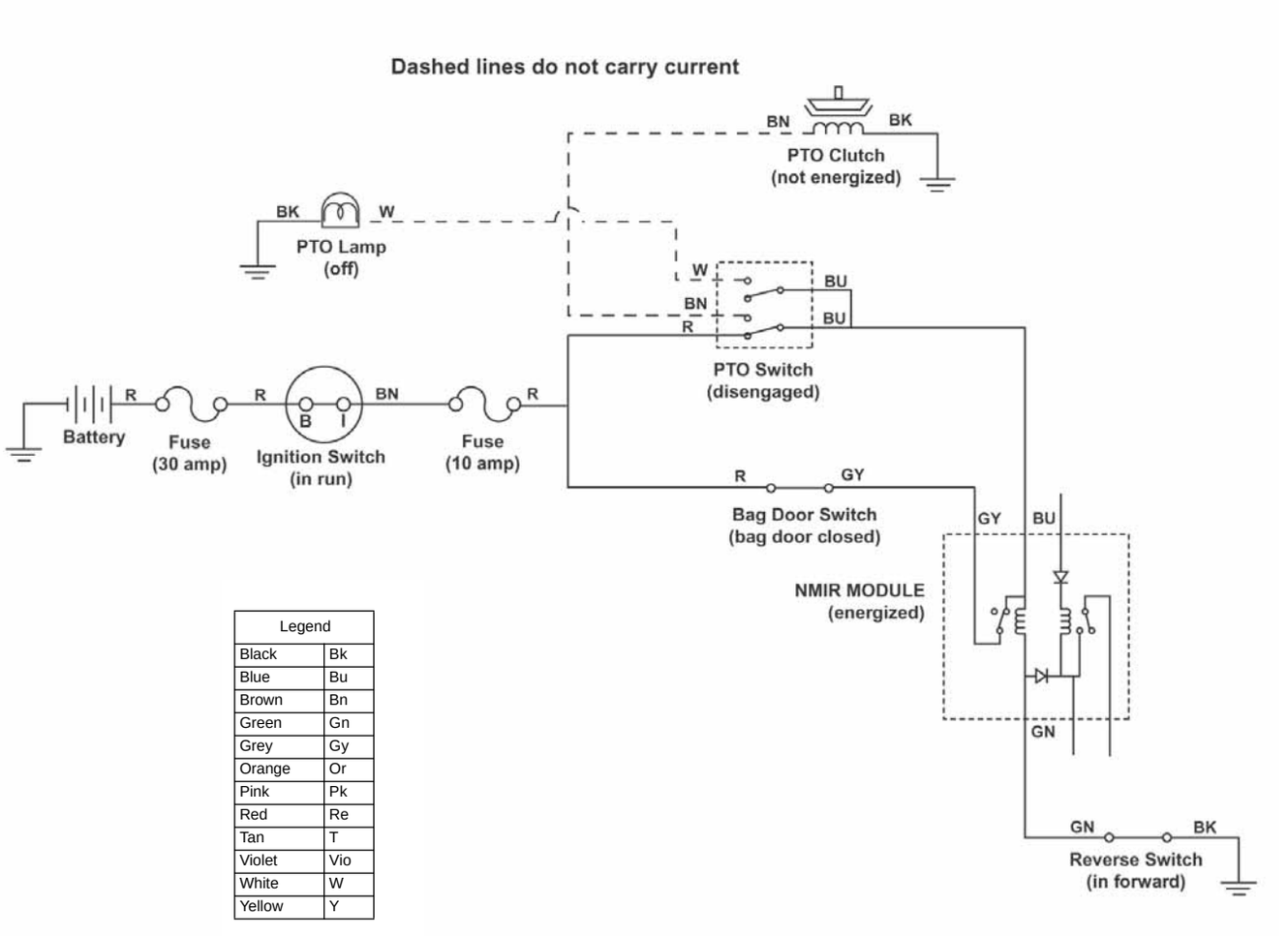
Circuits

Spark Circuit
(ignition switch in "run")



Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

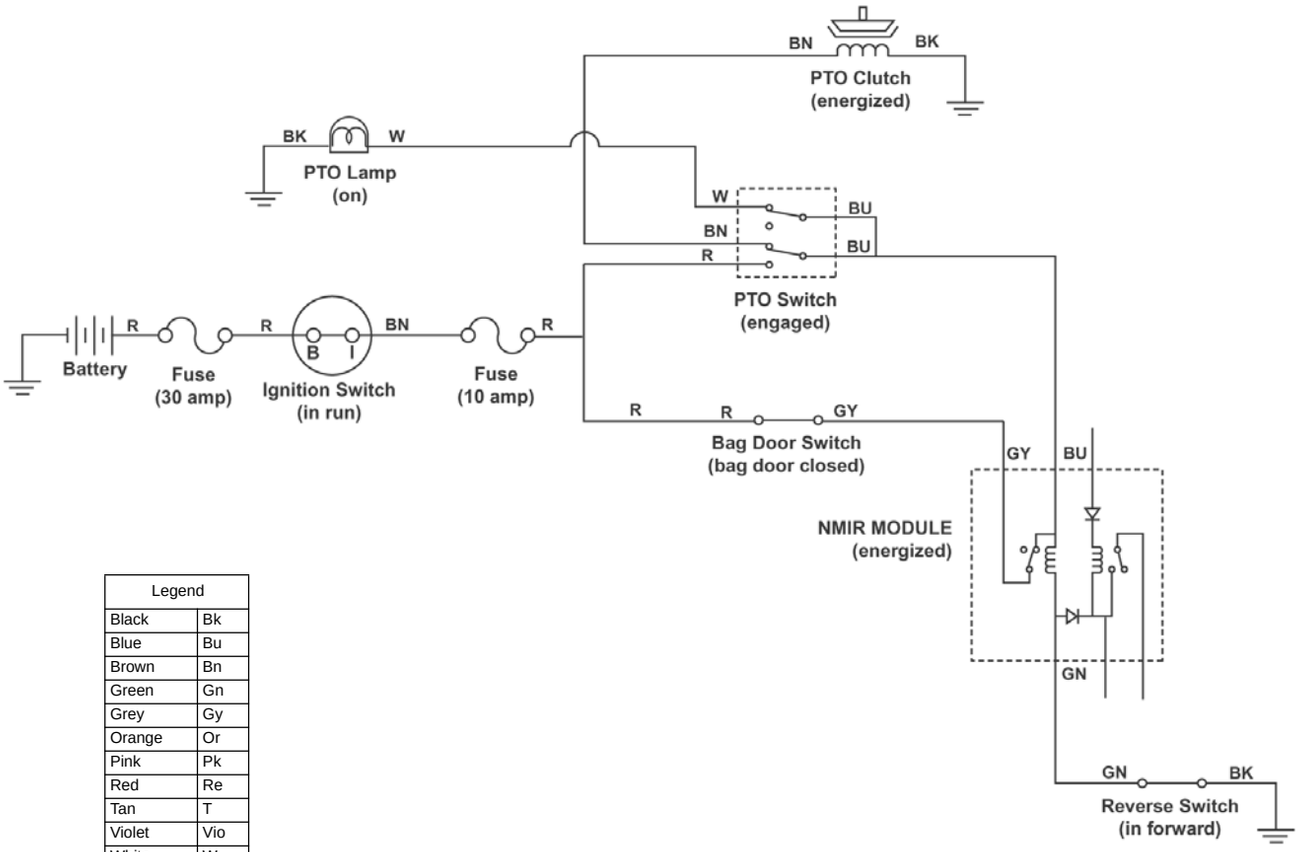
Reverse Operating System Circuit
(PTO "off", in forward)



Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Circuits

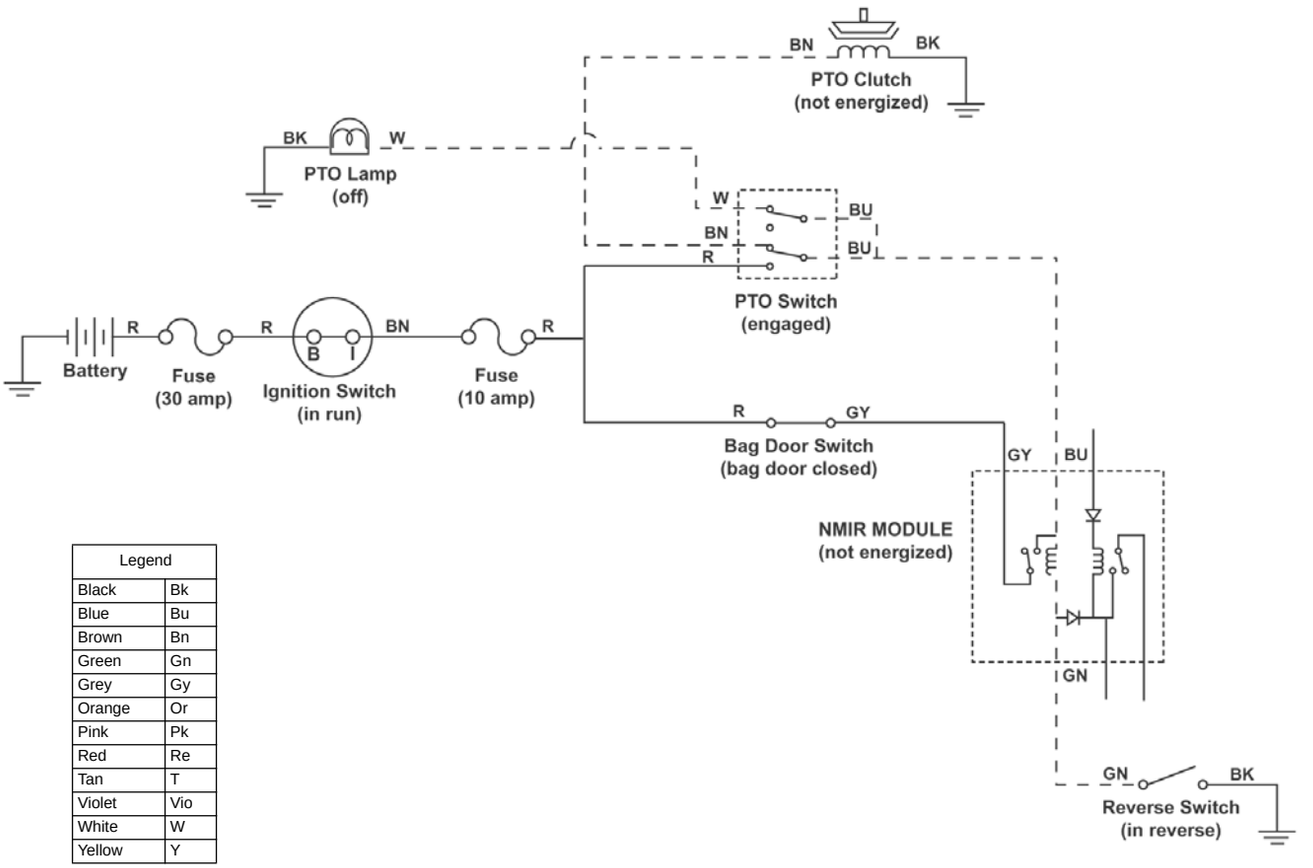
Reverse Operating System Circuit
(PTO "on", in forward)



Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Reverse Operating System Circuit

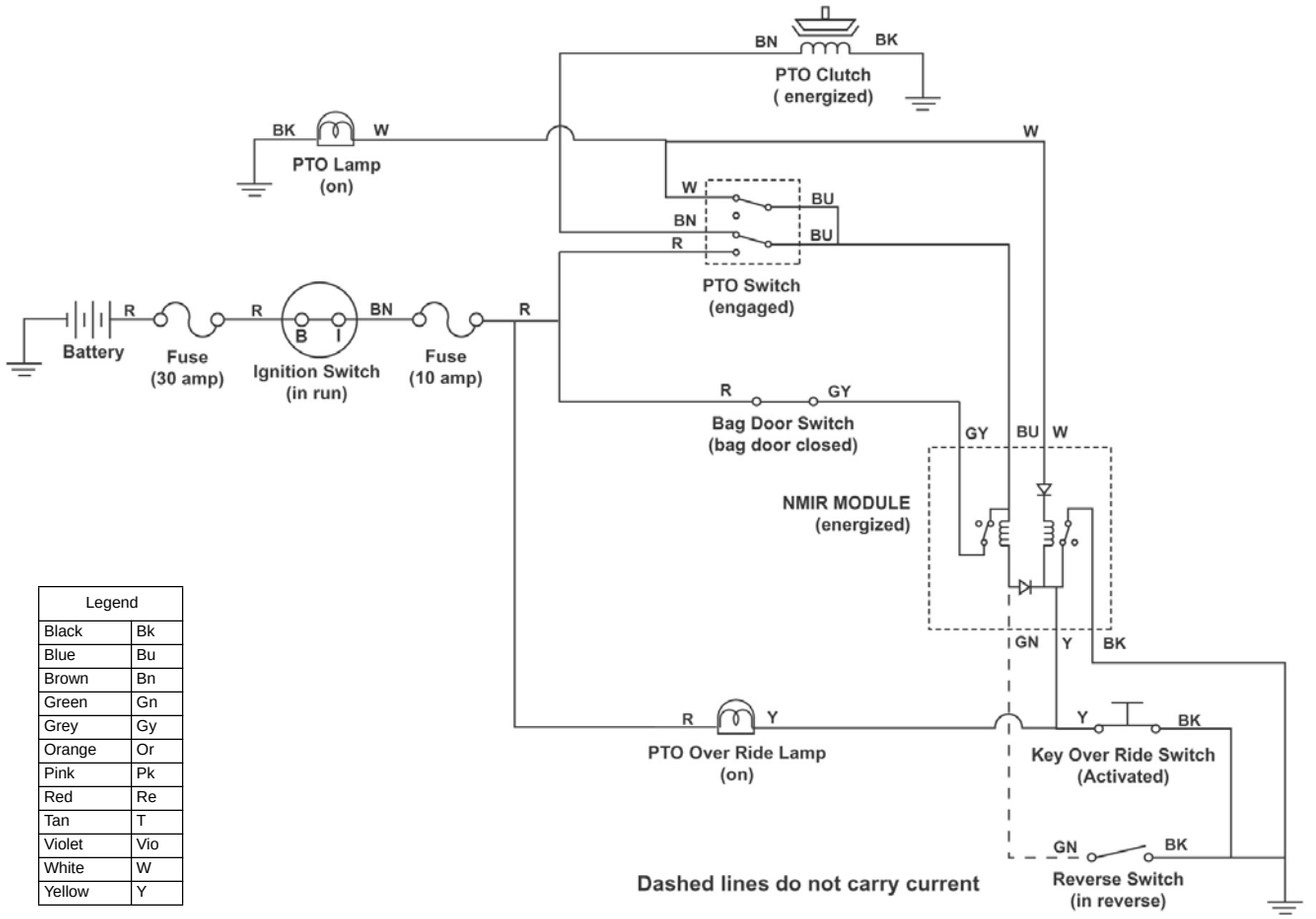
(PTO "on", in reverse)



Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Circuits

Reverse Operating System Circuit
(Override key switch "activated")

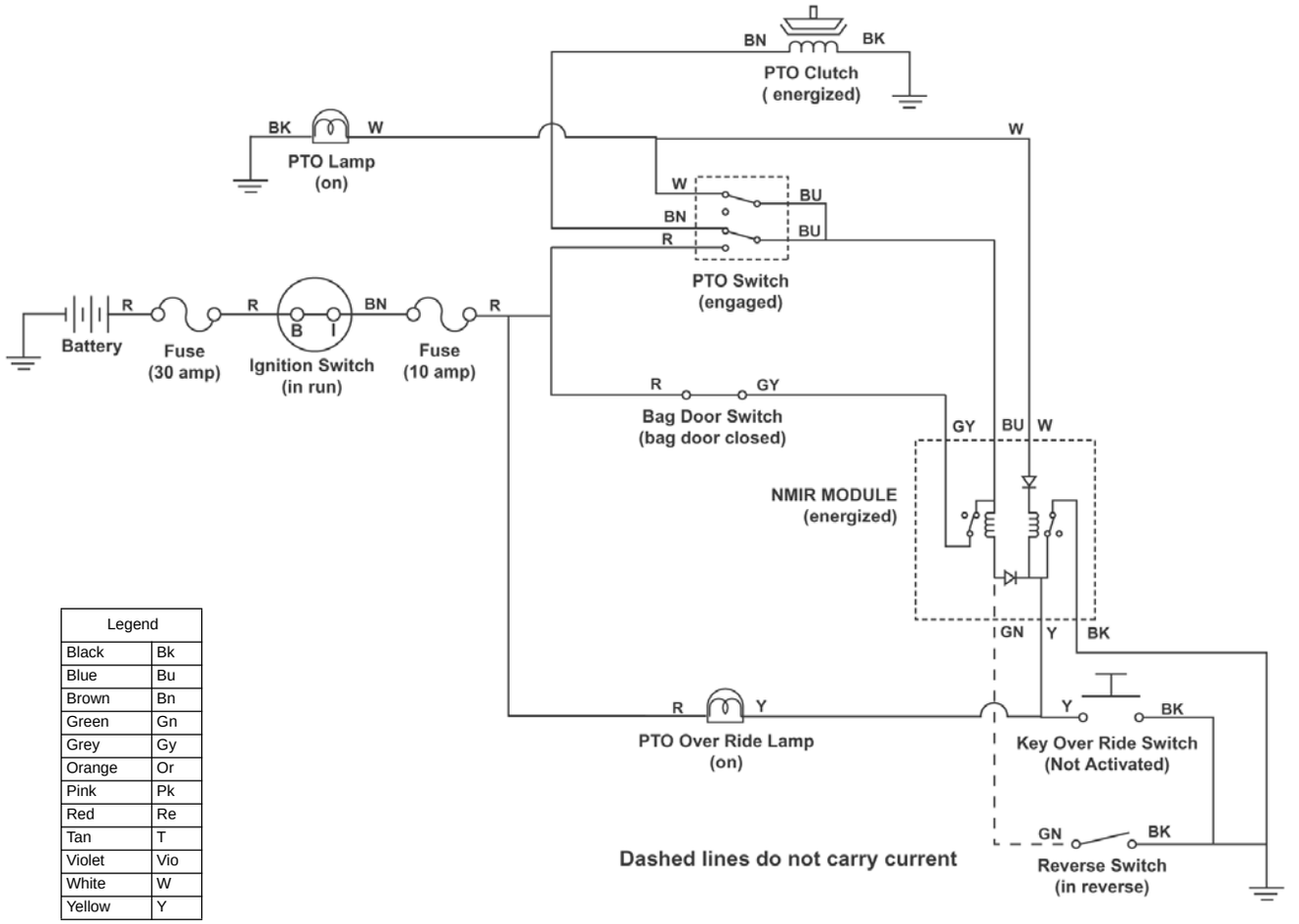


Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Circuits

Reverse Operating System Circuit

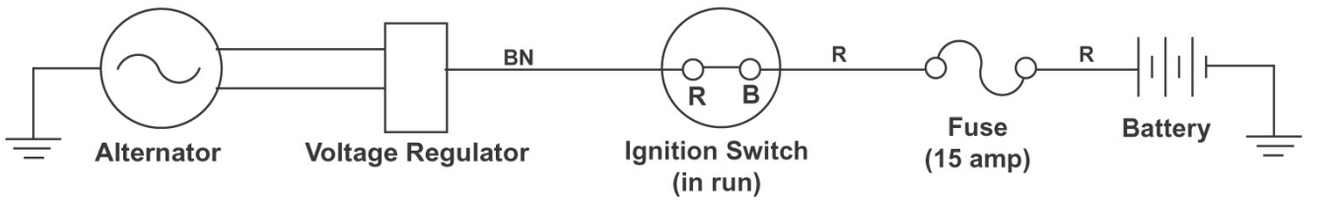
(PTO "on", in reverse, override mode)



Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

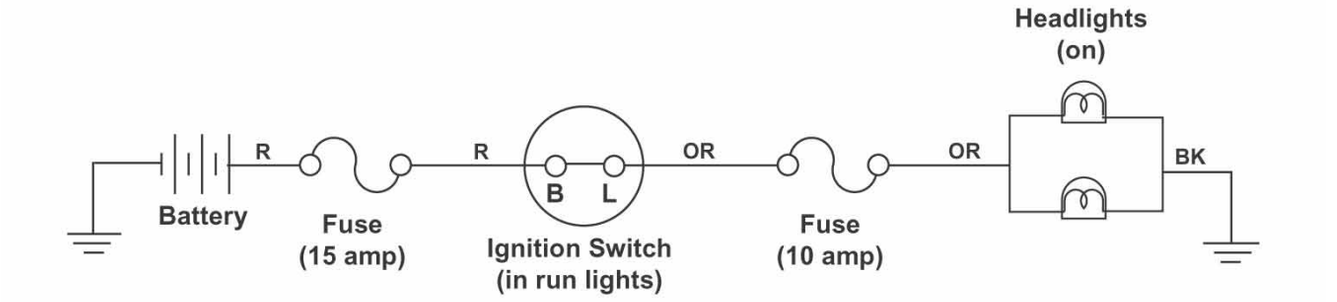
Charging Circuit

(ignition switch in "run")

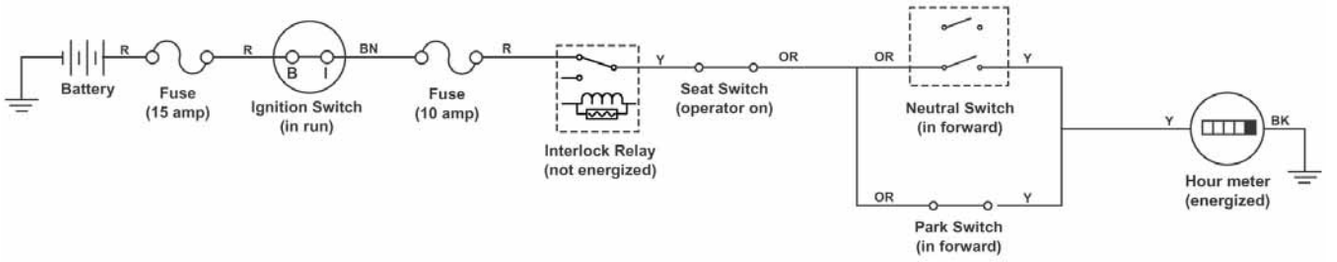


Circuits

Light Circuit
(ignition switch in "run/lights")

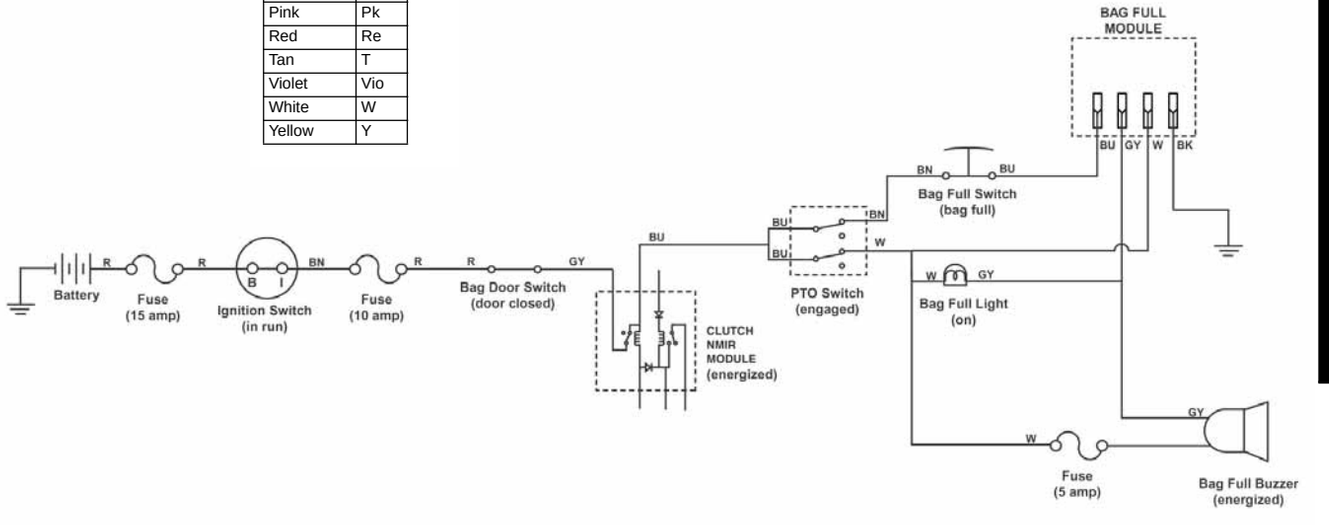


Hourmeter Circuit
(ignition switch in "run")



Bag Full Circuit
(ignition switch in "run")

Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y



Circuits

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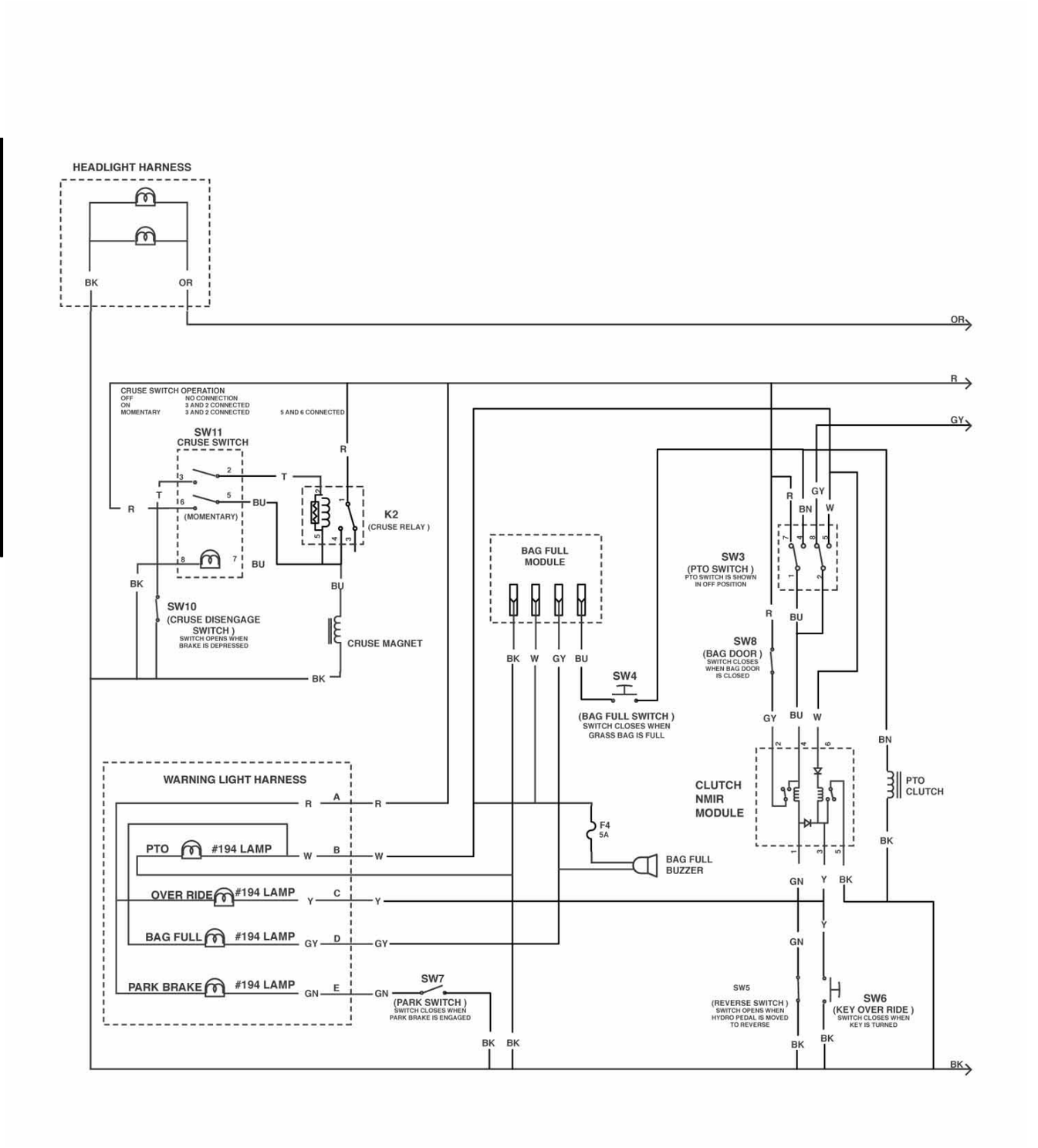
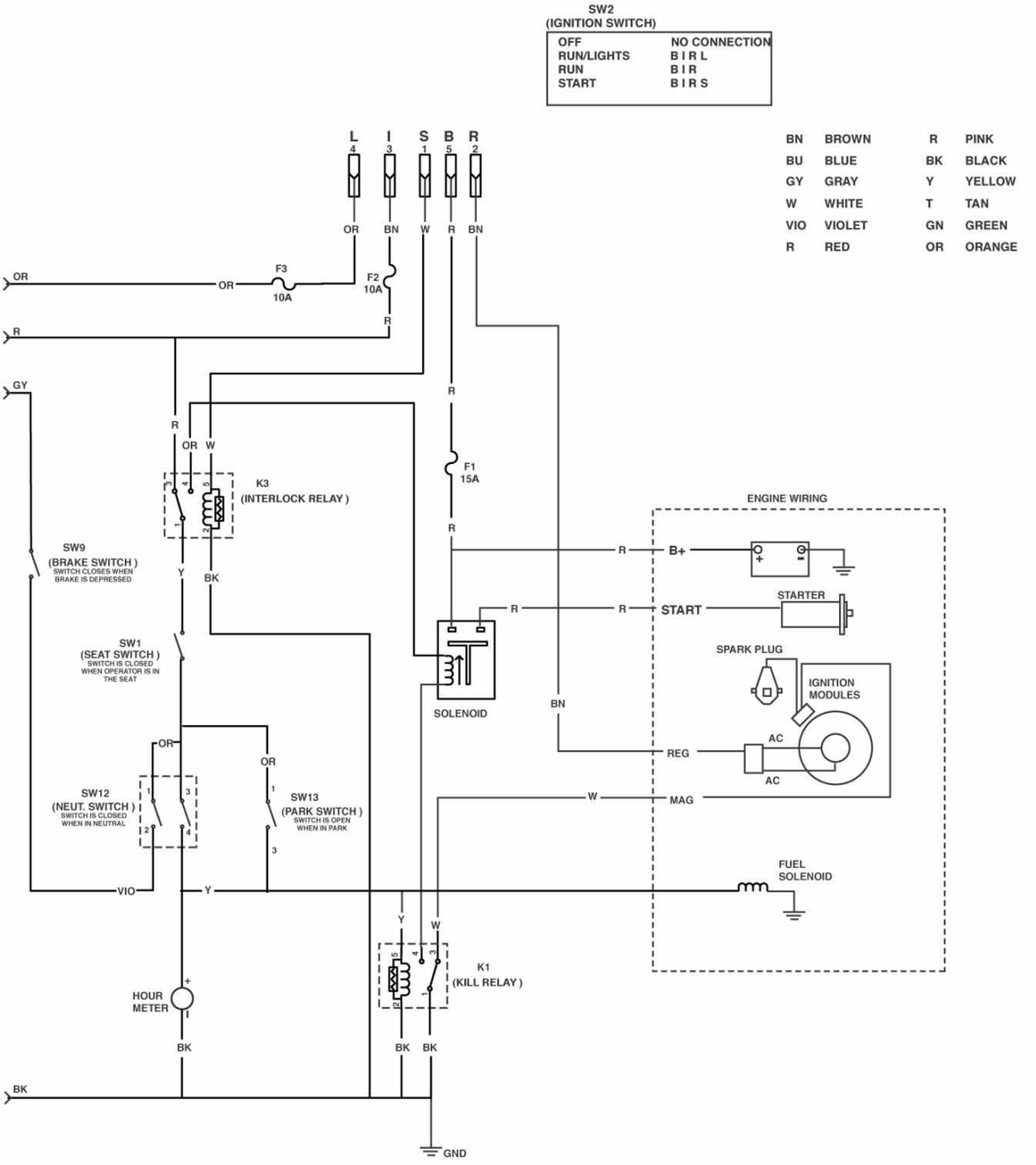
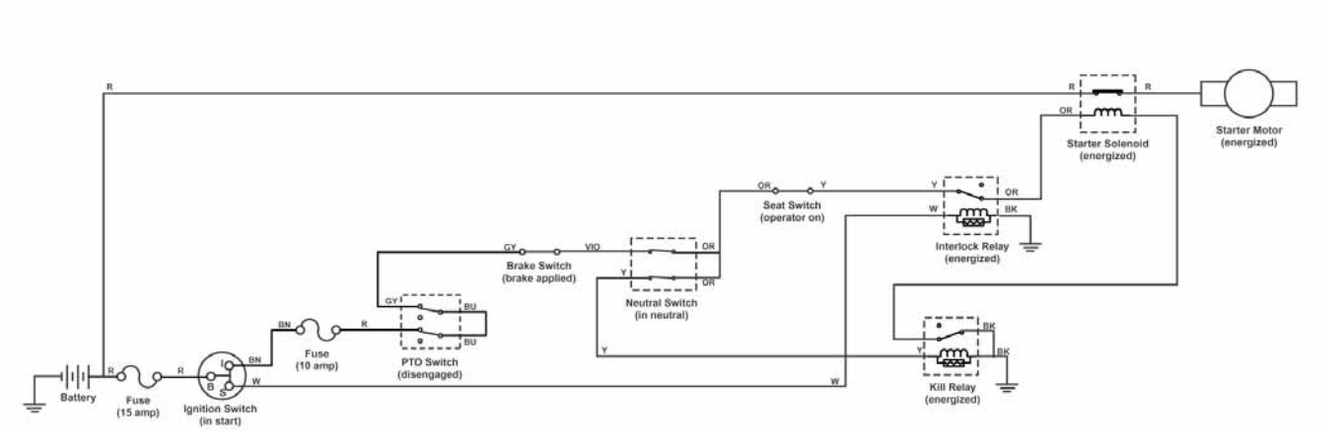
Information List (2006 - 2007)

Wiring Diagram



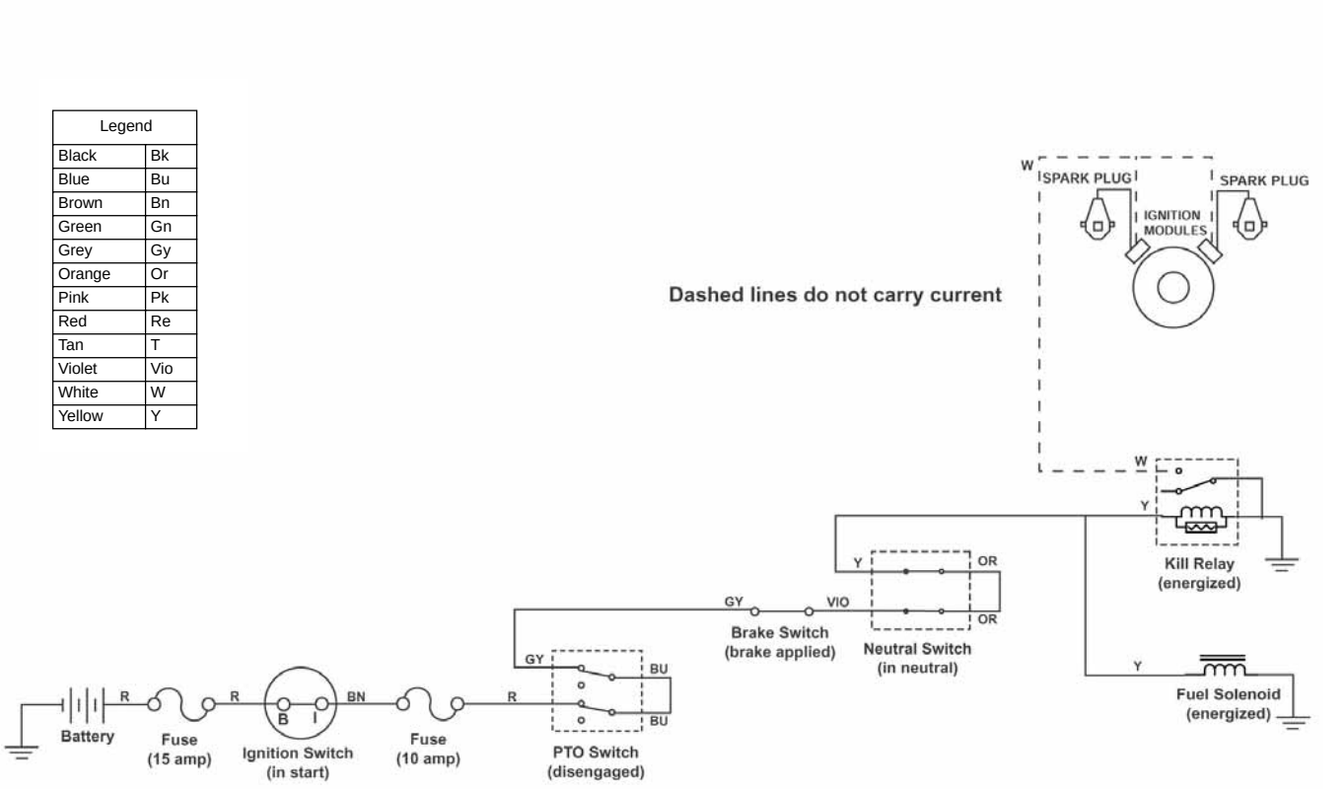

SW2
(IGNITION SWITCH)
OFF NO CONNECTION
RUN/LIGHTS B I R L
RUN B I R
START B I R S
L 4
I 3
S 1
B 5
R 2
BN BROWN
BU BLUE
GY GRAY
W WHITE
VIO VIOLET
R RED
R PINK
BK BLACK
Y YELLOW
T TAN
GN GREEN
OR ORANGE
F3
10A
F2
10A
F1
15A
K3
(INTERLOCK RELAY)
SW9
(BRAKE SWITCH)
SWITCH CLOSES WHEN BRAKE IS DEPRESSED
SW1
(SEAT SWITCH)
SWITCH IS CLOSED WHEN OPERATOR IS IN THE SEAT
SW12
(NEUT. SWITCH)
SWITCH IS CLOSED WHEN IN NEUTRAL
SW13
(PARK SWITCH)
SWITCH IS OPEN WHEN IN PARK
SOLENOID
K1
(KILL RELAY)
HOUR METER
ENGINE WIRING
B+
STARTER
START
SPARK PLUG
IGNITION MODULES
AC
REG
MAG
FUEL SOLENOID
GND

Starter Motor Circuit
(ignition switch in "start")

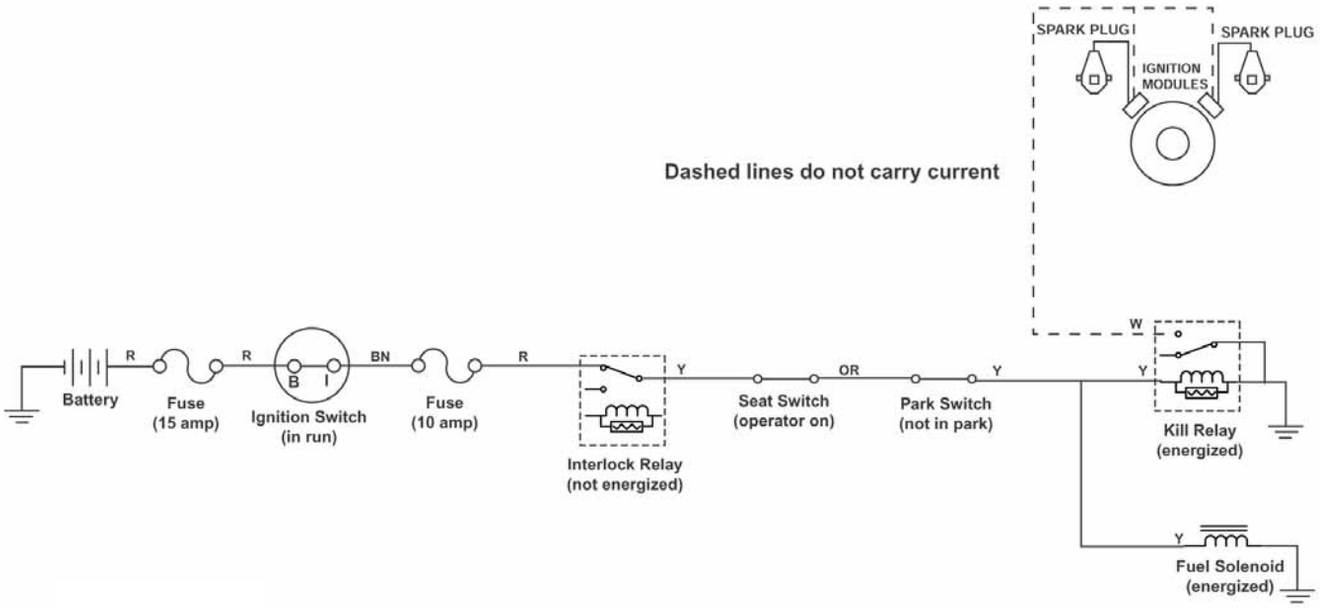


Spark Circuit
(ignition switch in "start" position)

Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

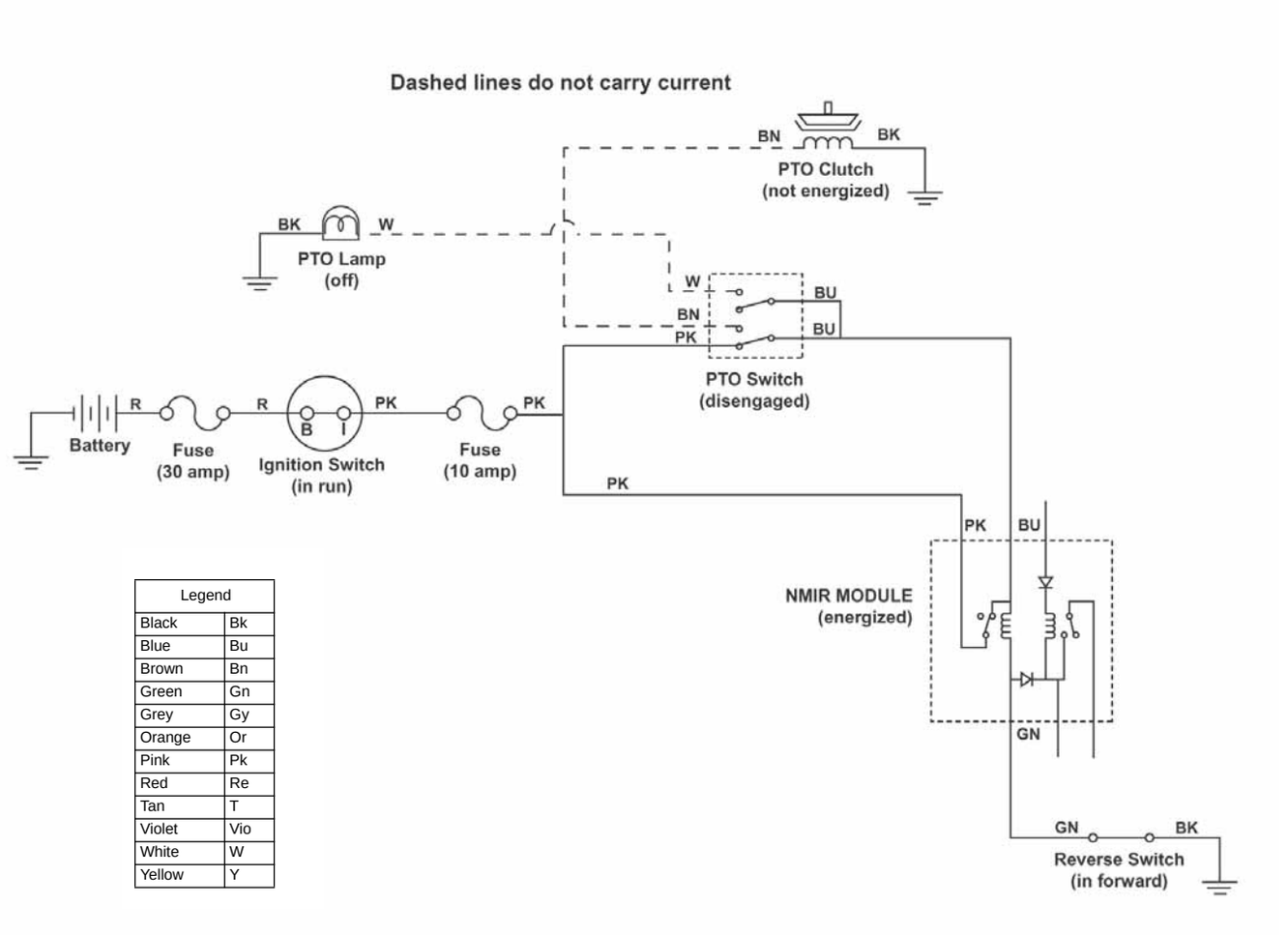


Spark Circuit
(ignition switch in "run")



Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

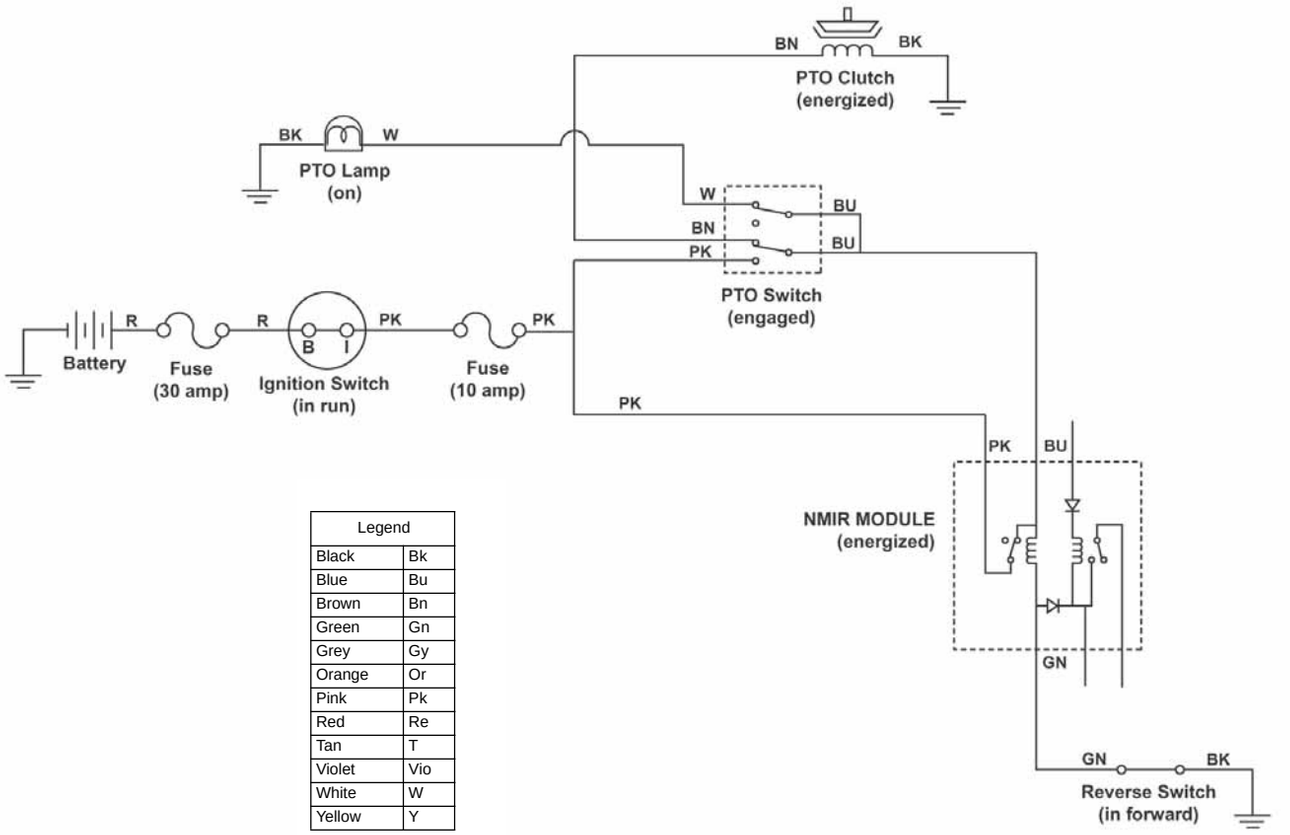
Reverse Operating System Circuit
(PTO "off", in forward)



Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Circuits

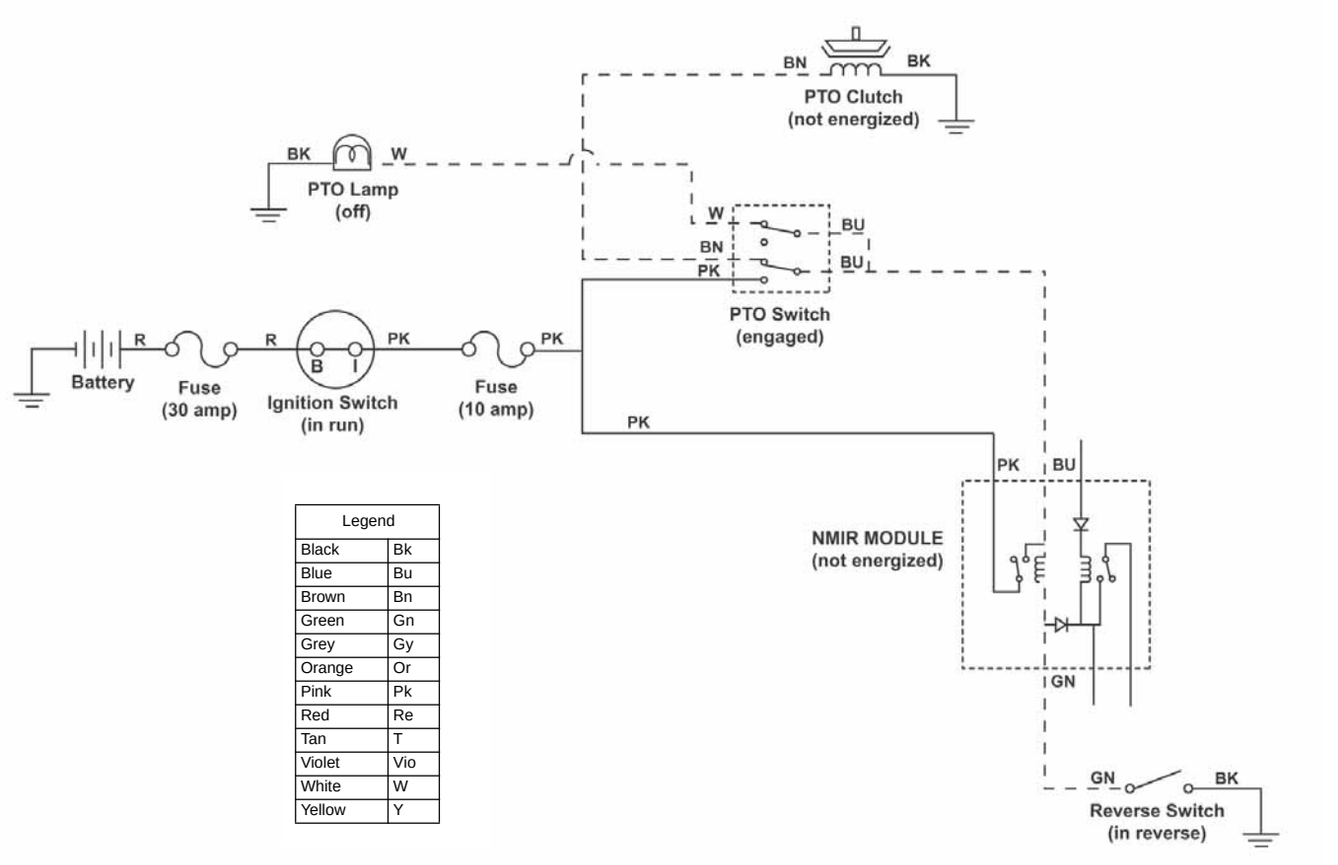
Reverse Operating System Circuit
(PTO "on", in forward)



Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Circuits

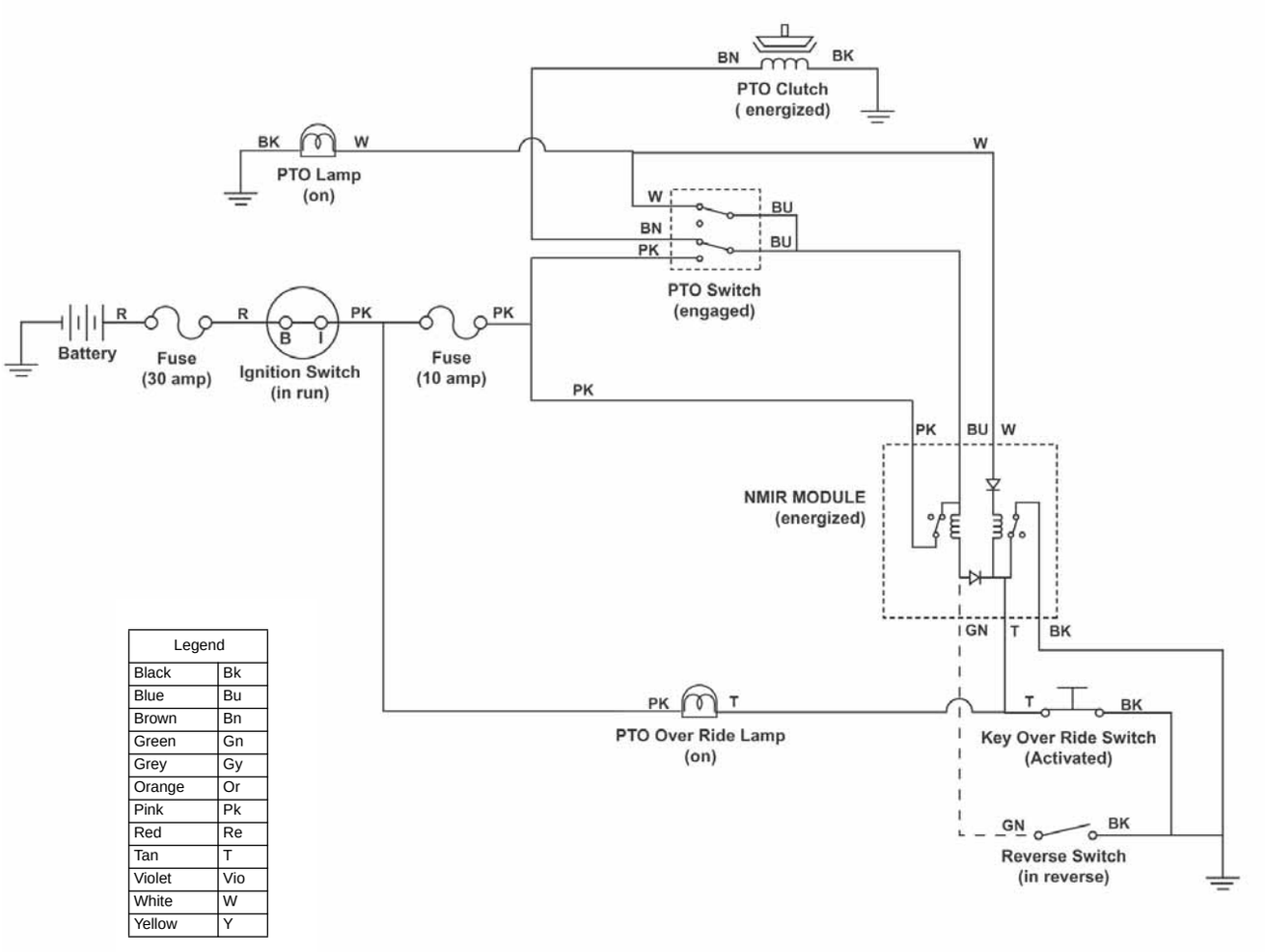
Reverse Operating System Circuit
(PTO "on", in reverse)



Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Circuits

Reverse Operating System Circuit
(Override key switch "activated")

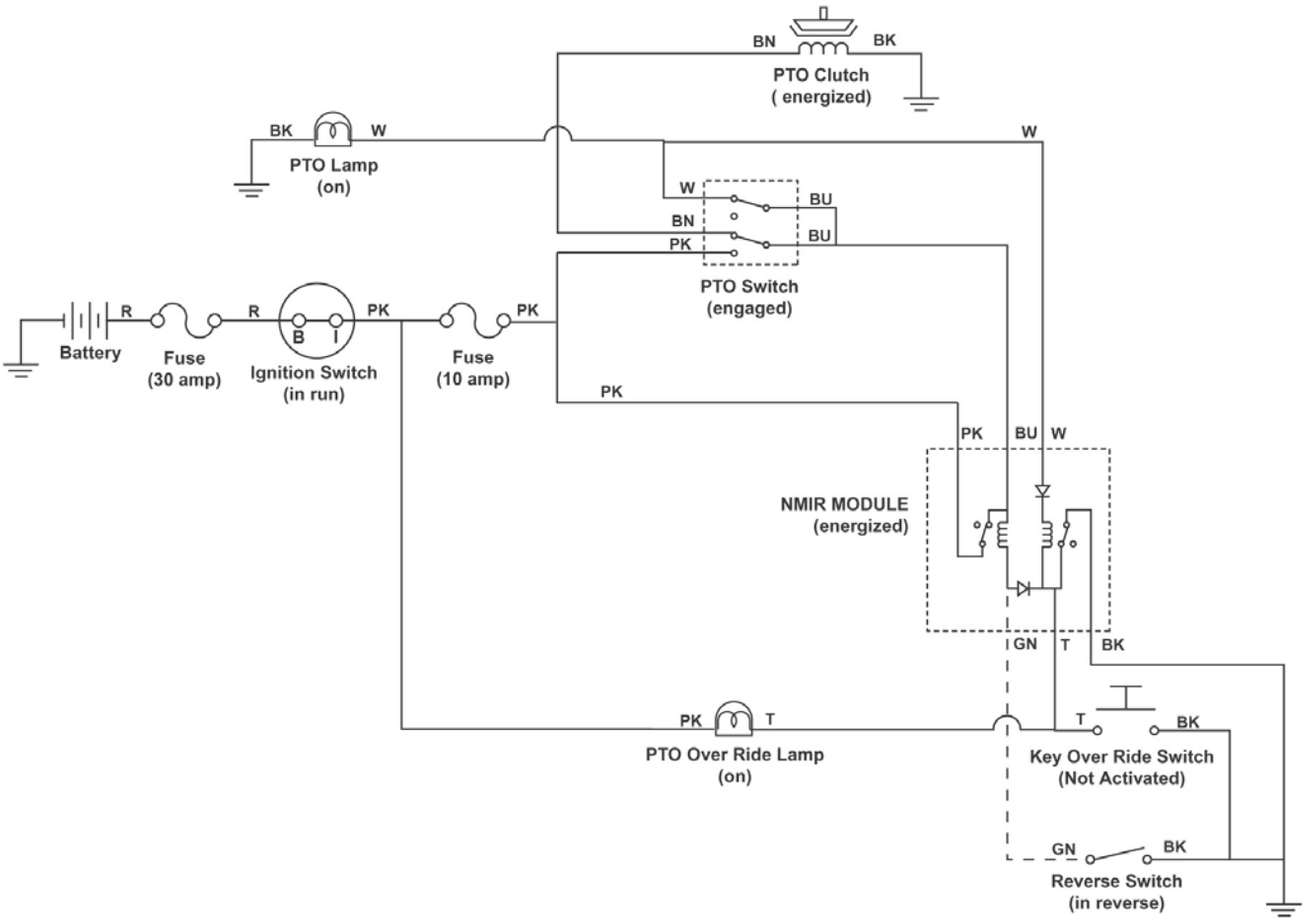


Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Circuits

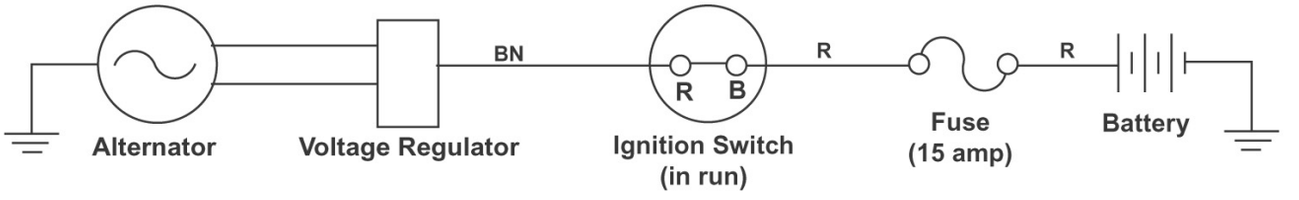
Reverse Operating System Circuit

(PTO "on", in reverse, override mode)



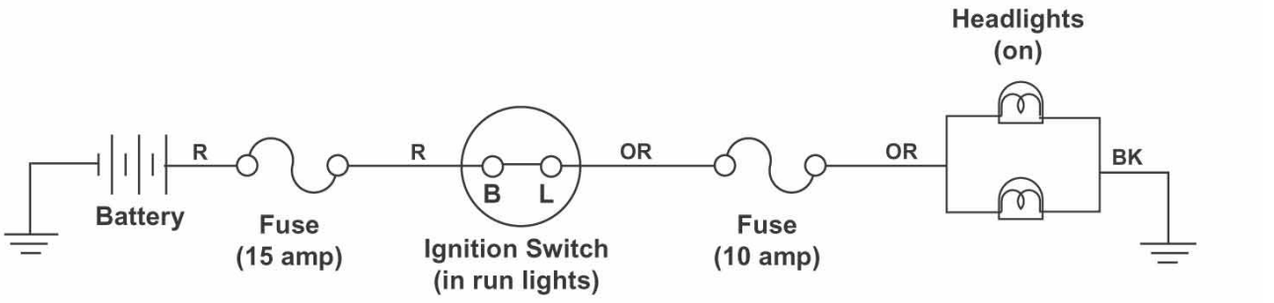
Charging Circuit

(ignition switch in "run")

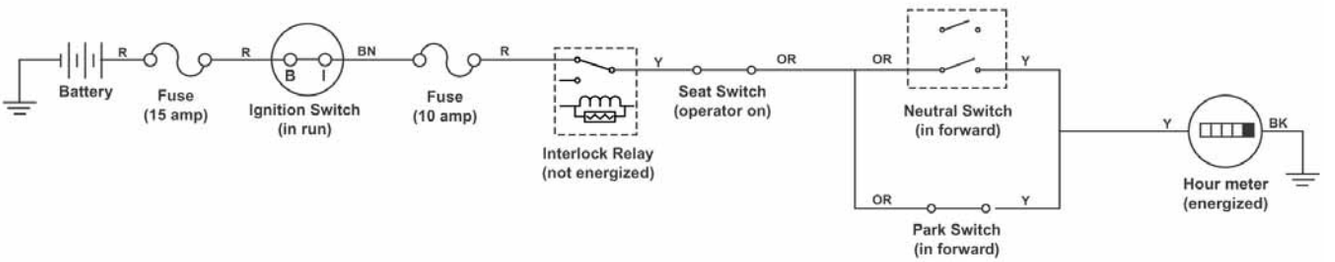


Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

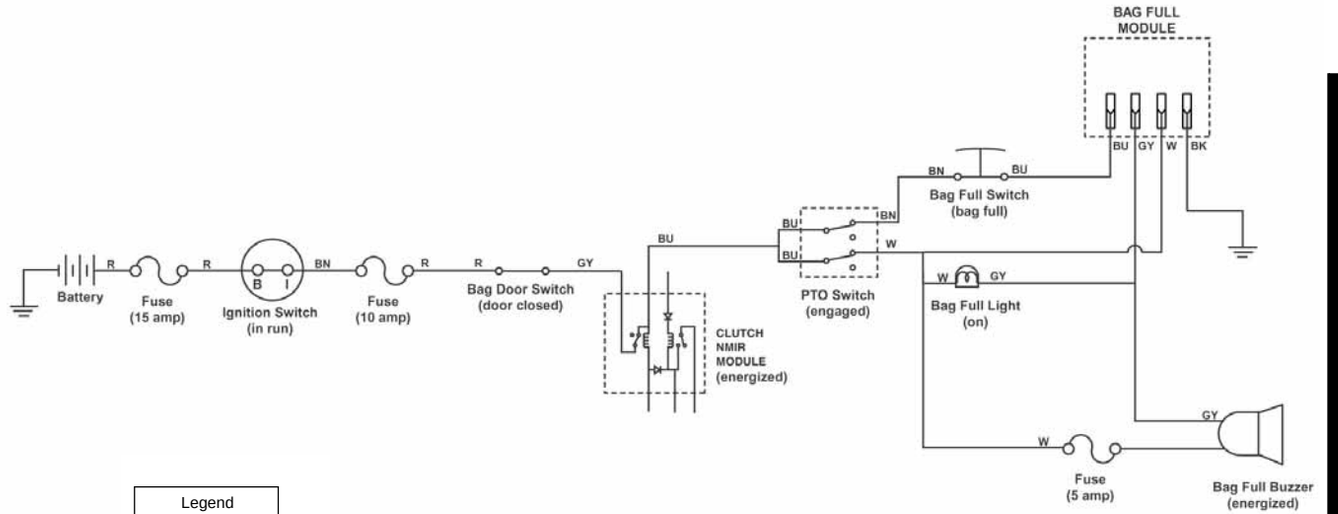
Light Circuit



Hourmeter Circuit

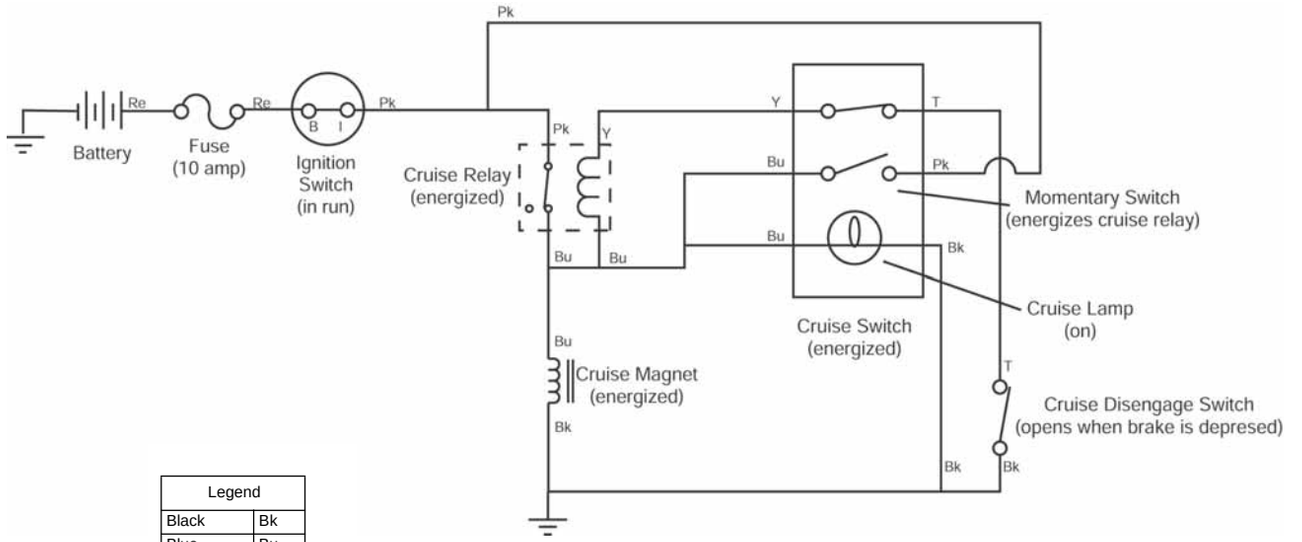


Bag Full Circuit



Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

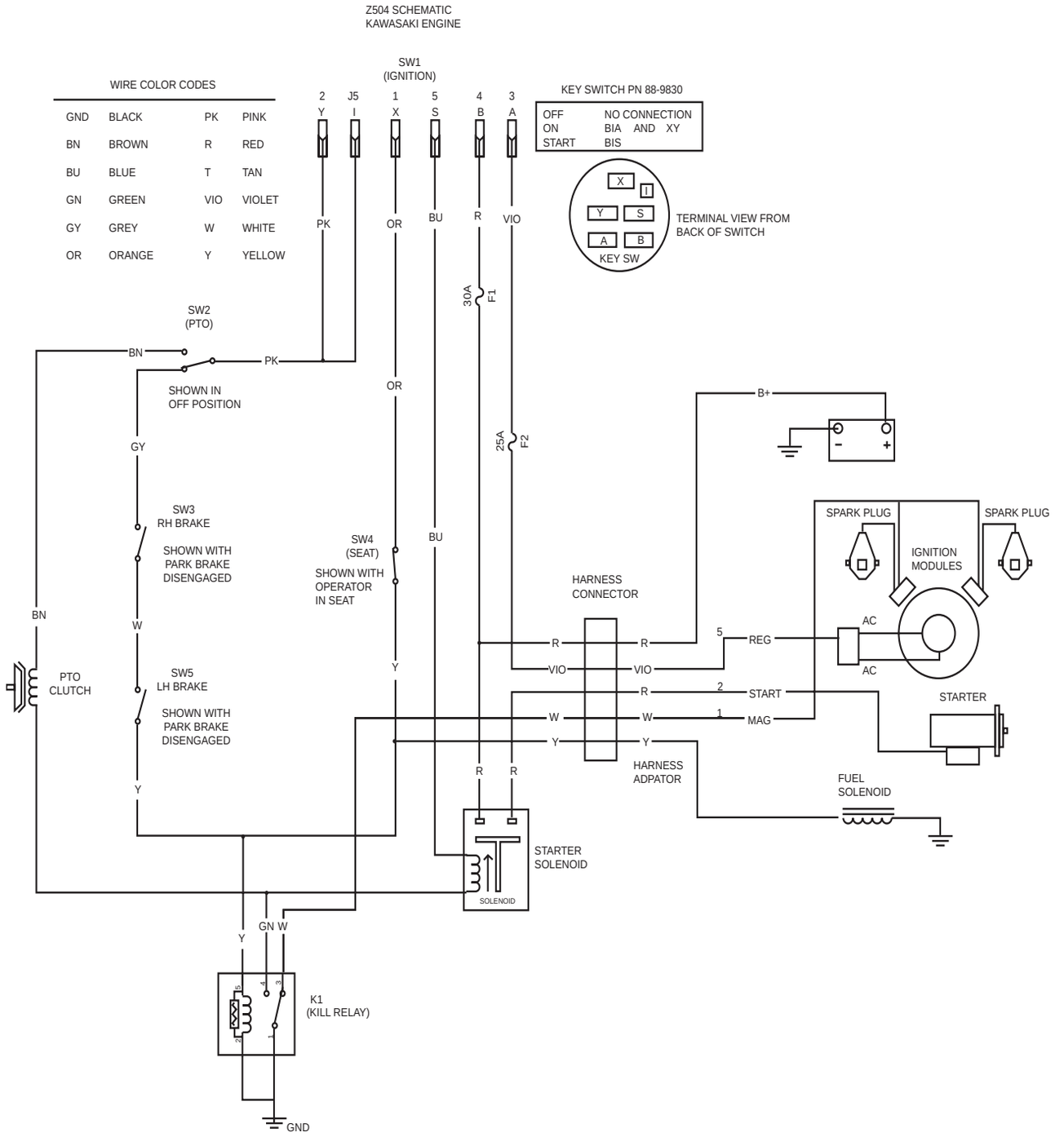
Cruise Control Circuit
(ignition switch in "run")



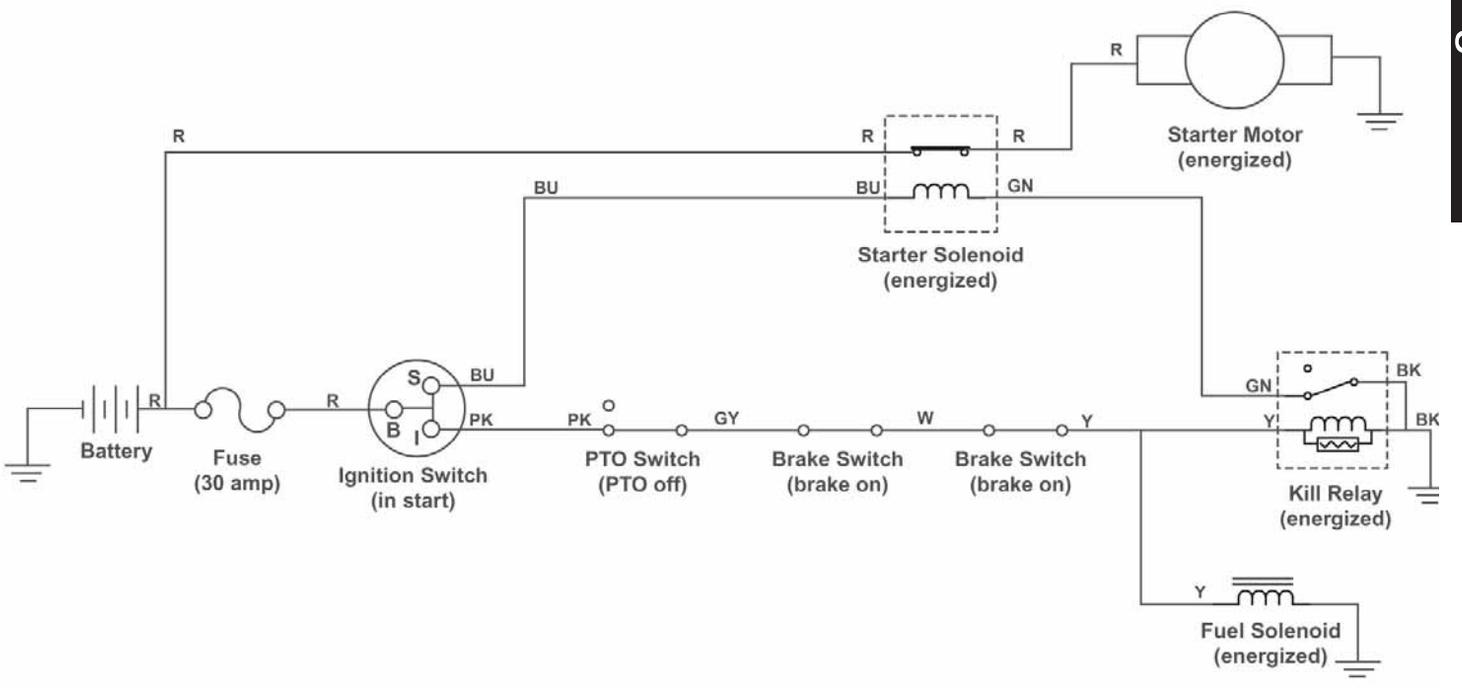
Legend	
Black	Bk
Blue	Bu
Brown	Bn
Green	Gn
Grey	Gy
Orange	Or
Pink	Pk
Red	Re
Tan	T
Violet	Vio
White	W
Yellow	Y

Information List (2007)

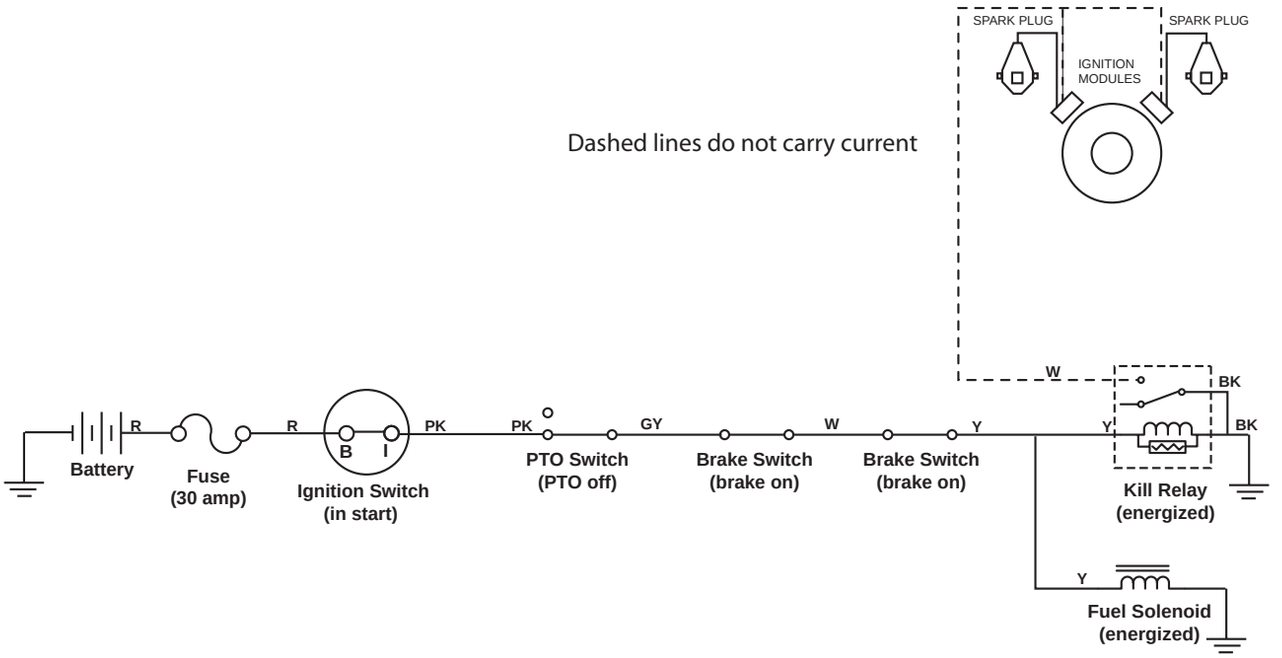
Wiring Diagram



Starter Motor Circuit
(ignition switch in "start")

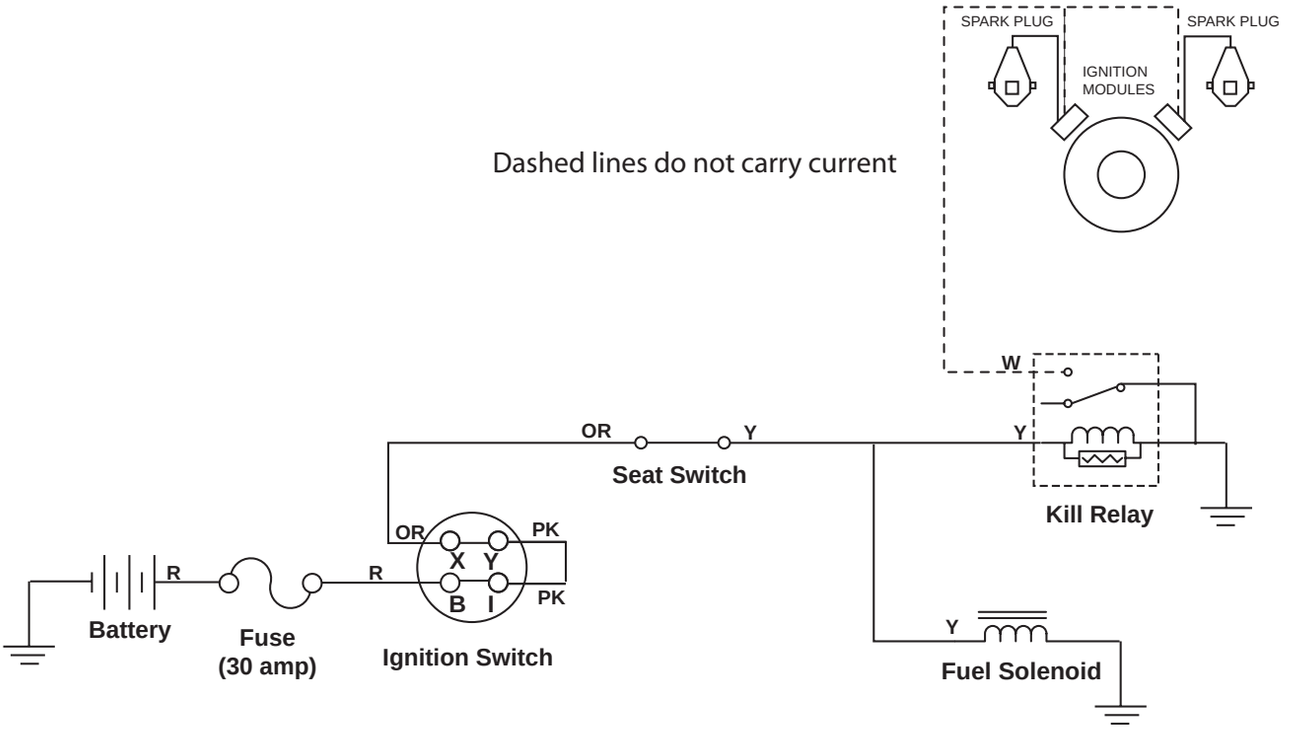


Spark Circuit
(ignition switch in "start")

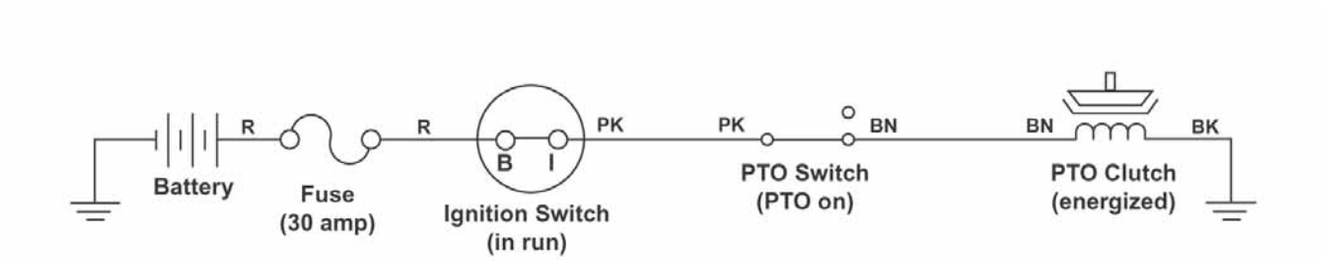


Circuits

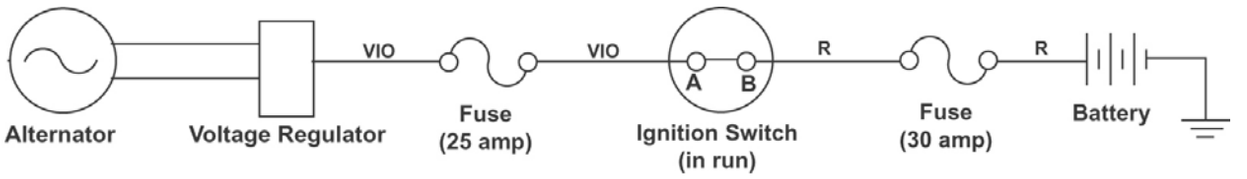
Spark Circuit
(ignition switch in "run")



PTO Clutch Circuit
(ignition switch in “run”)



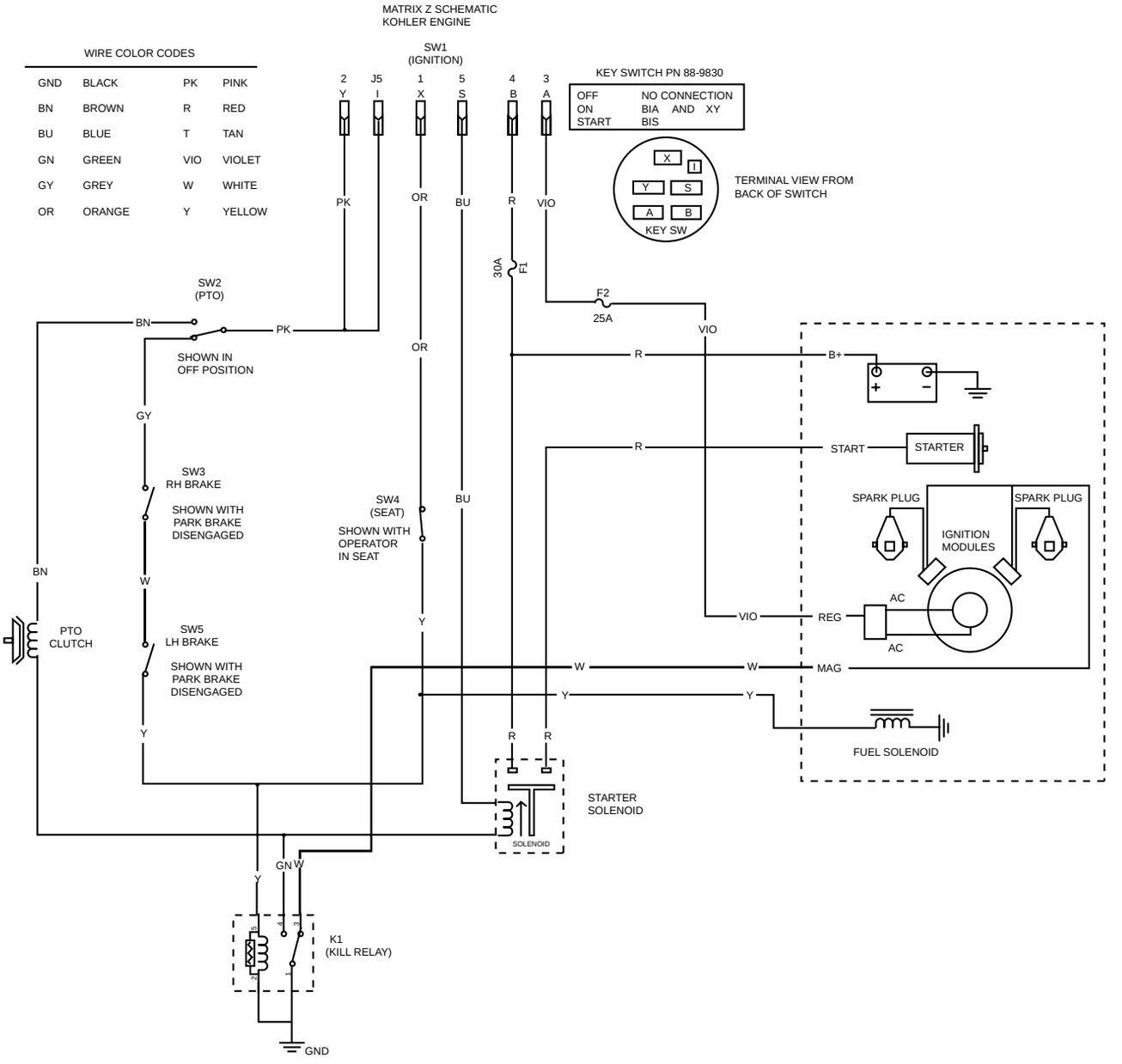
Battery Charge Circuit
(ignition switch in “run”)



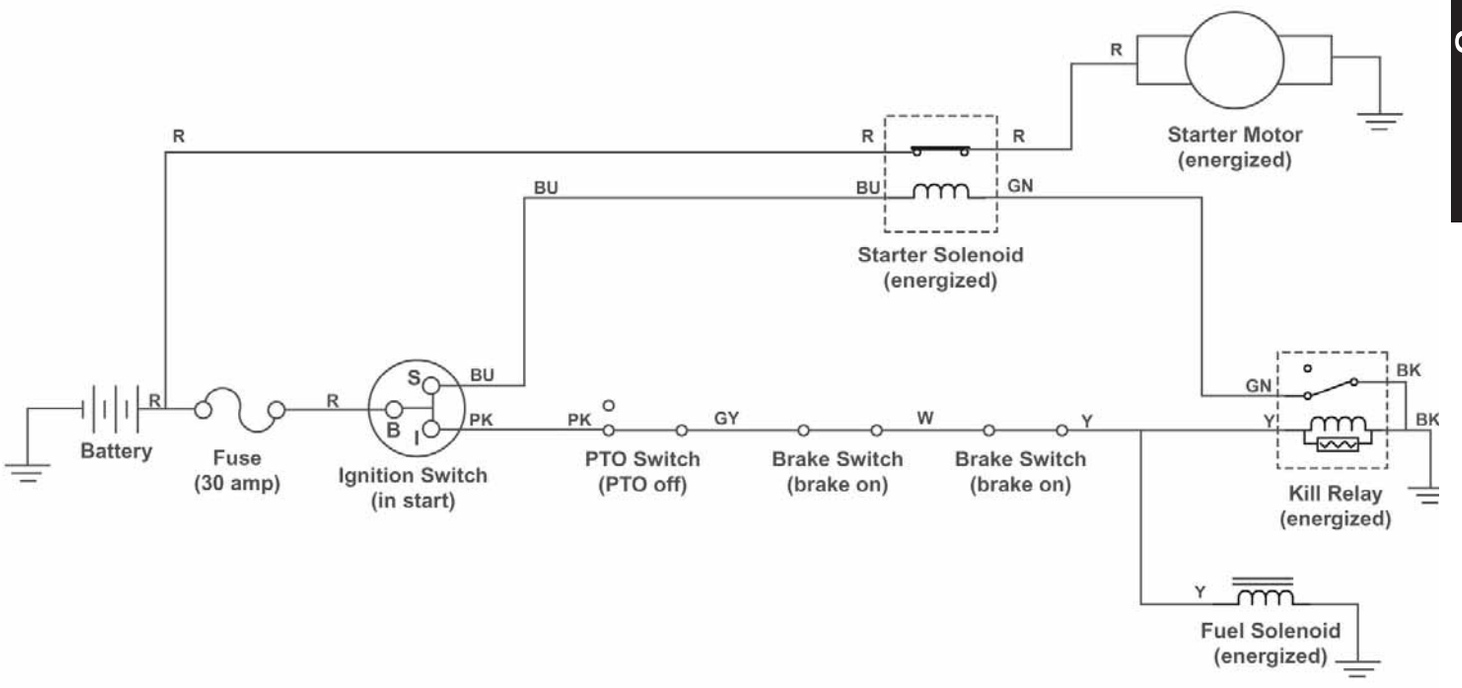
Circuits

Information List (2007)

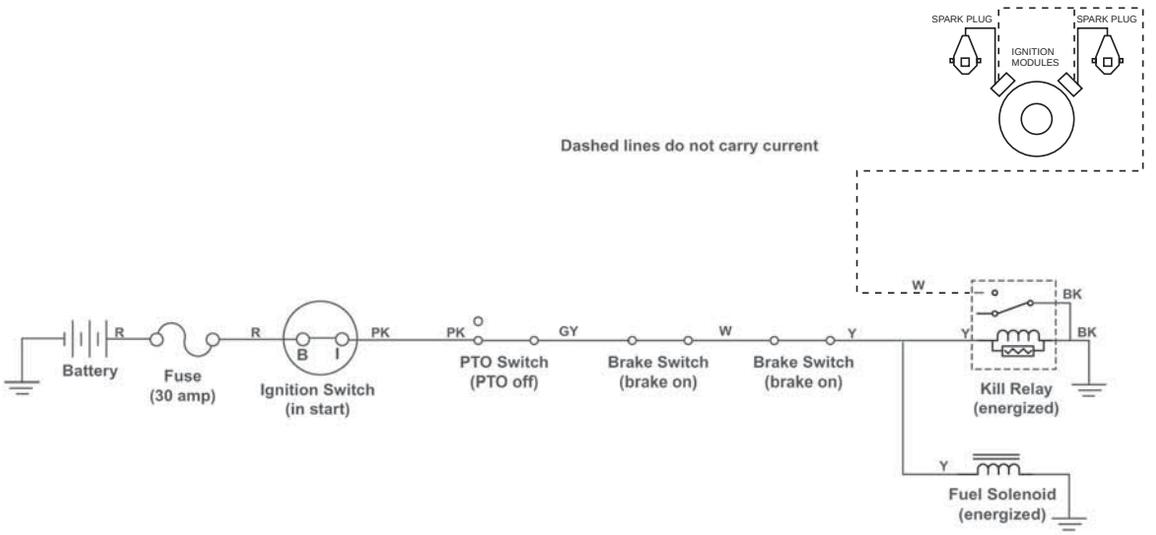
Wiring Diagram



Starter Motor Circuit
(ignition switch in "start")

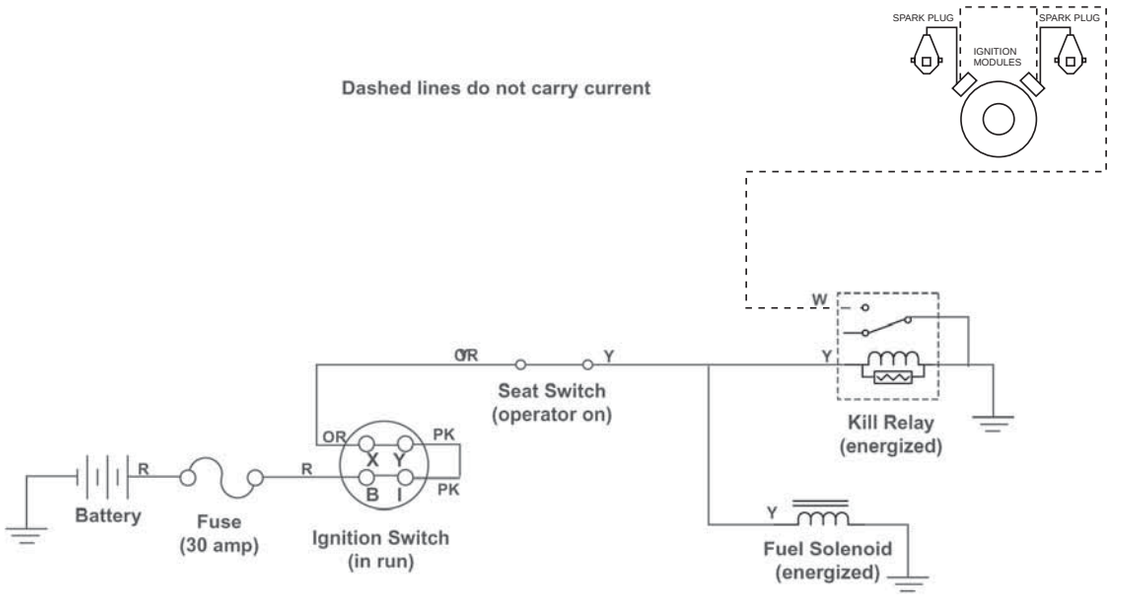


Spark Circuit
(ignition switch in "start")

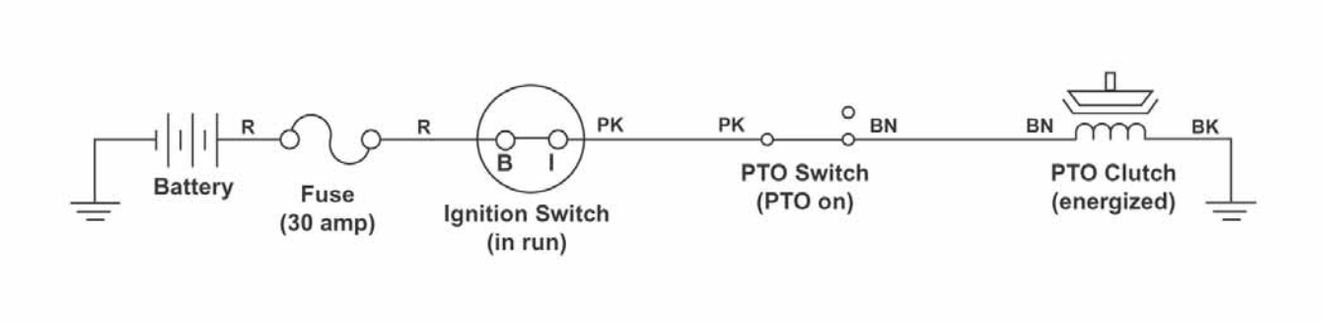


Circuits

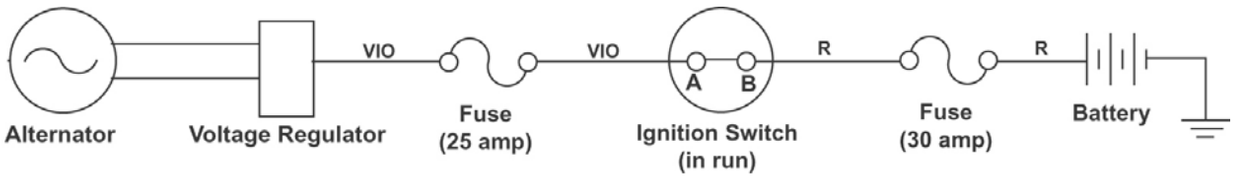
Spark Circuit
(ignition switch in “run”)



PTO Clutch Circuit
(ignition switch in “run”)



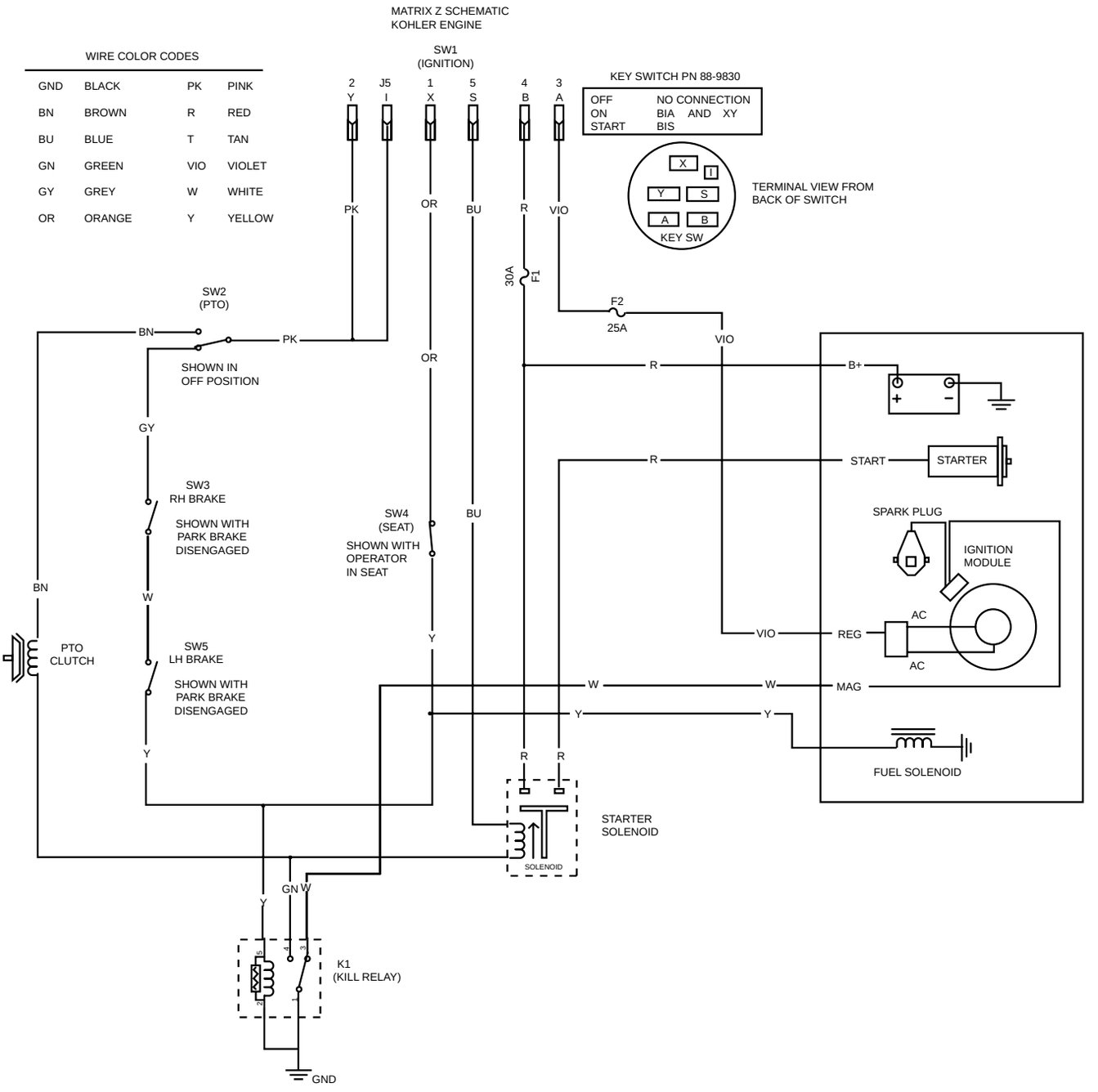
Battery Charge Circuit
(ignition switch in “run”)



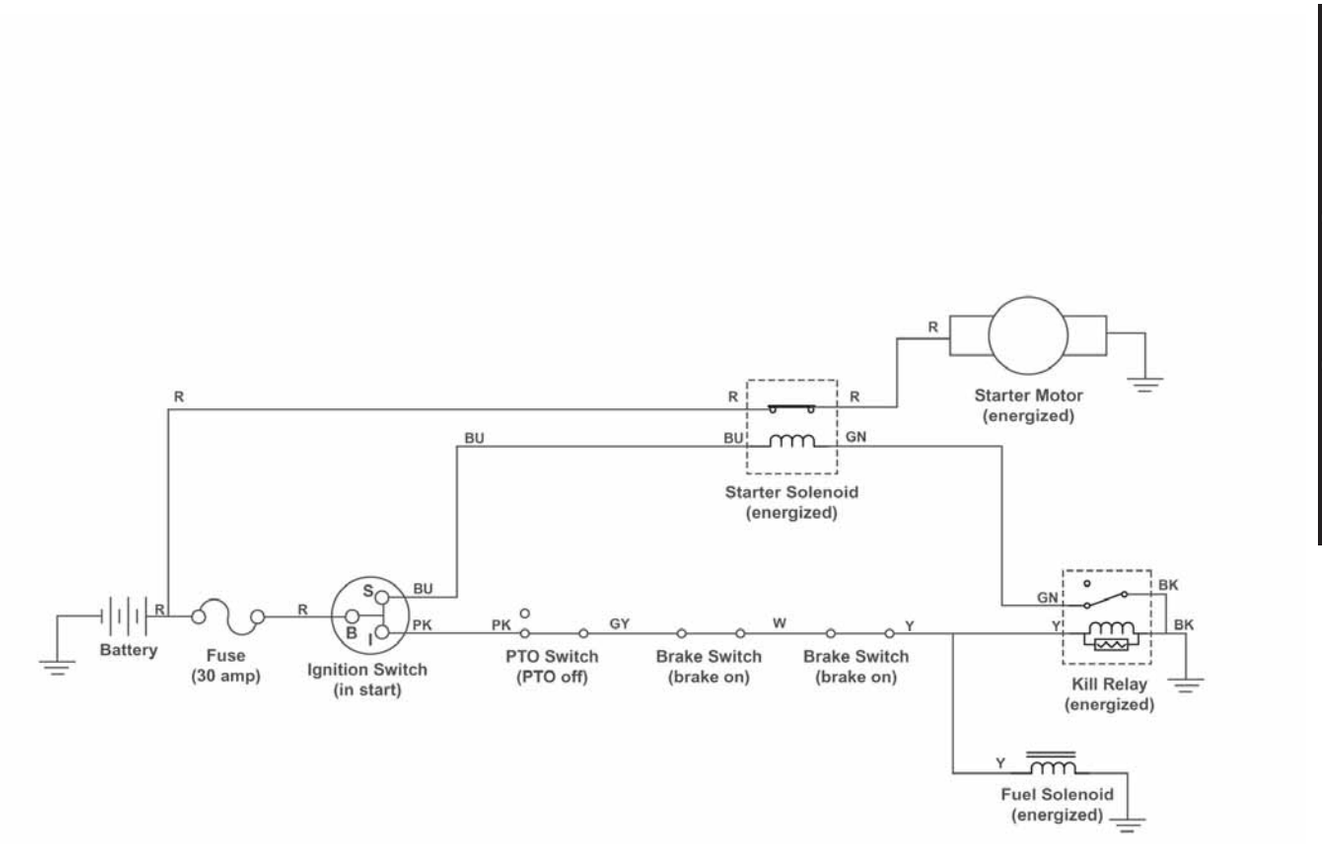
Circuits

Information List (2007)

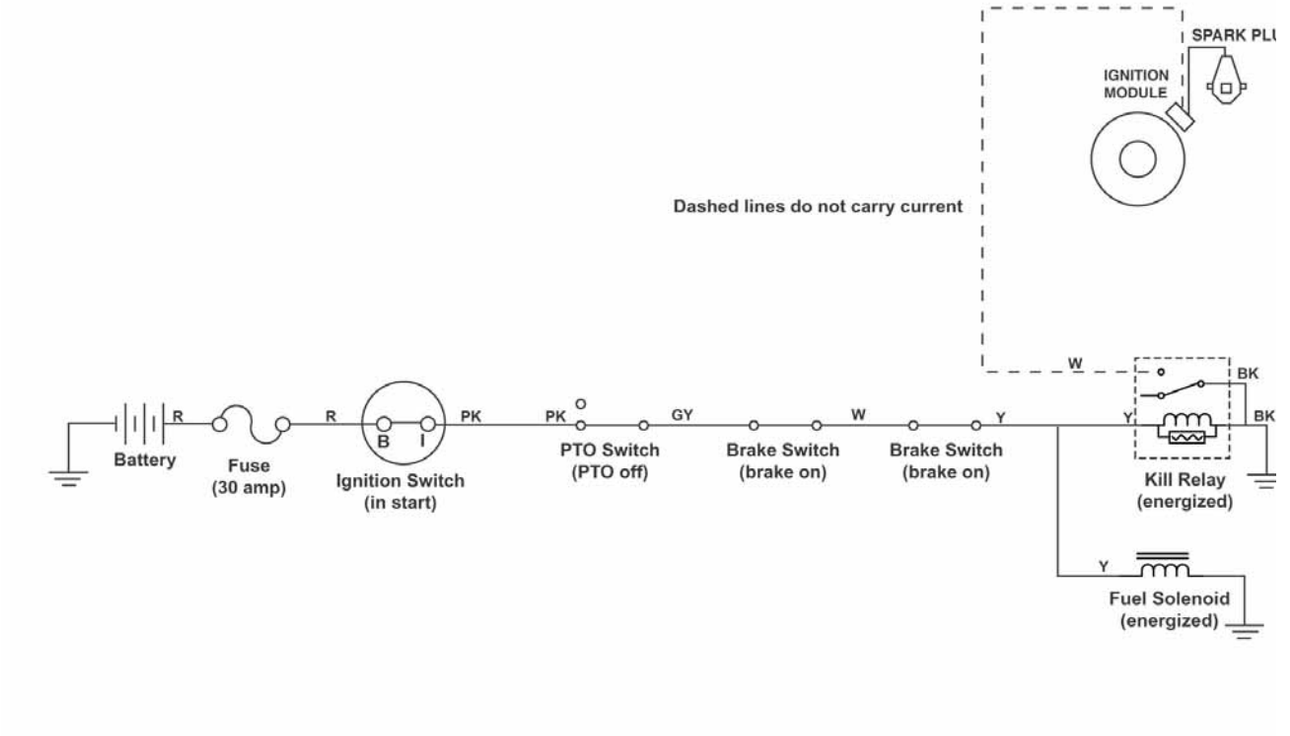
Wiring Diagram



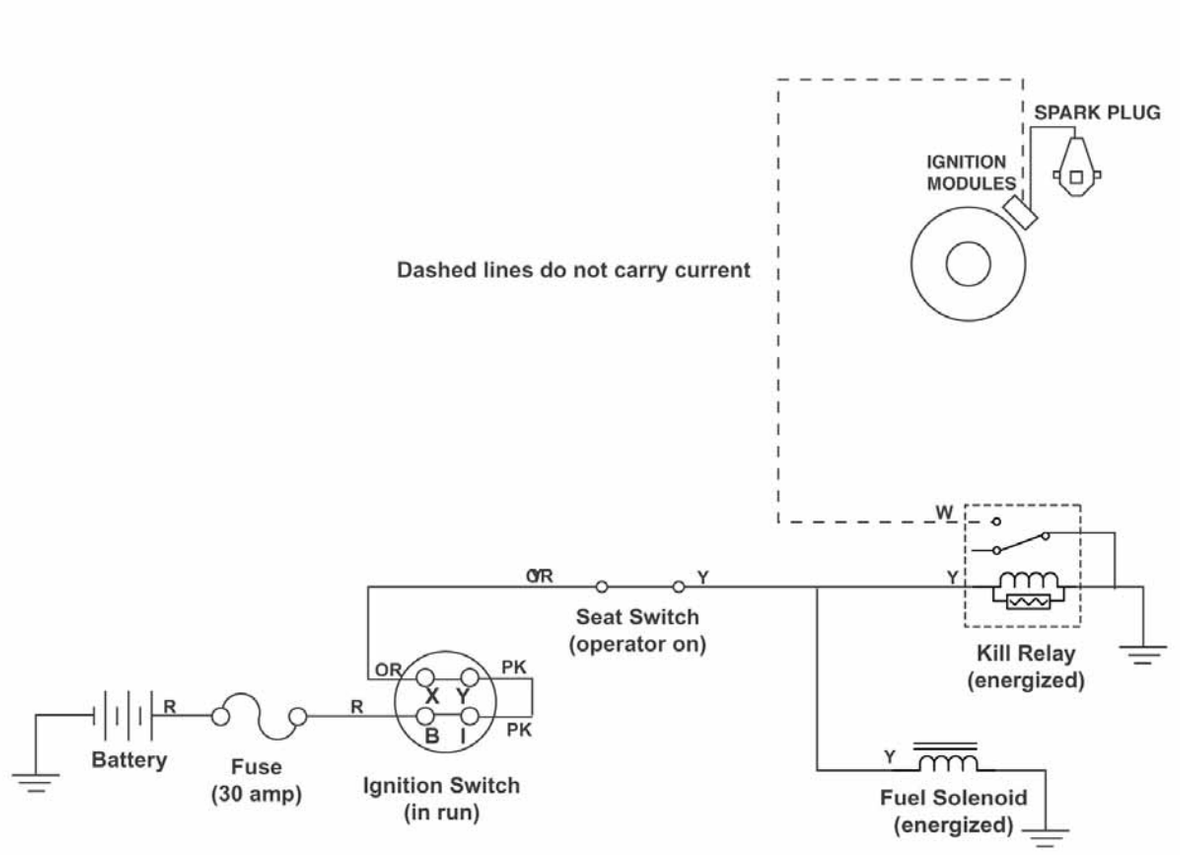
Starter Motor Circuit
(ignition switch in "start")



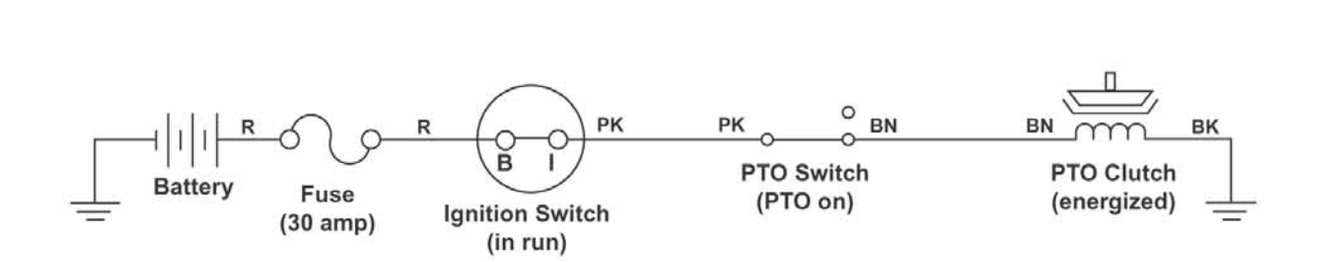
Spark Circuit
(ignition switch in "start")



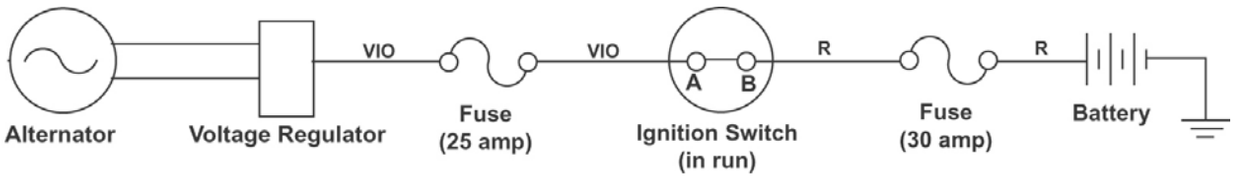
Spark Circuit
(ignition switch in "run")



PTO Clutch Circuit
(ignition switch in "run")



Battery Charge Circuit
(ignition switch in "run")



Circuits

TABLE OF CONTENTS

CHAPTER PAGE

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TIME SAVERS

Table of contents

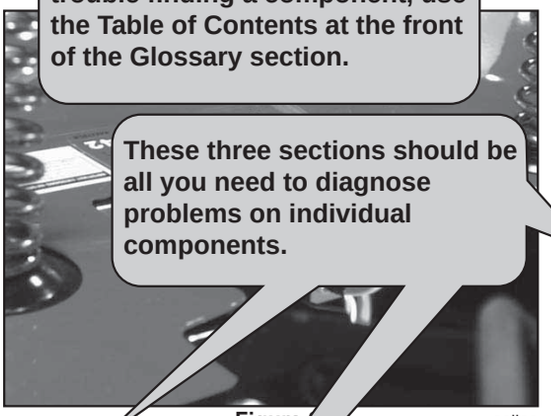
The Glossary contains information on virtually every electrical part used on Toro riding products.

Solenoid, Starter

The components are listed alphabetically by noun, followed by any adjectives. If you have trouble finding a component, use the Table of Contents at the front of the Glossary section.

Loc

The der ass



These three sections should be all you need to diagnose problems on individual components.

Figure solloc

Purpose

The solenoid's purpose is simply to connect the battery to the starter motor when the ignition switch is turned to "START". The solenoid is used to protect the ignition switch from the high current drawn by the starter motor.

How it Works

The solenoid has two primary 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 bar type switch (Figure 9). Because it has a large contact area with the contact terminals it can easily handle the high current loads required by the starter motor.

When 12 volts is applied to the coil, it becomes an electromagnet. This quickly pulls the bar toward contacts and closes the switch. When power is removed from the coil, the spring loaded bar returns to its "normally open" position. The solenoid closes and opens the switch very quickly. This minimizes the "arcing" that can damage other types of switches.

The ignition switch is protected because only a small amount of current is needed to activate the coil.

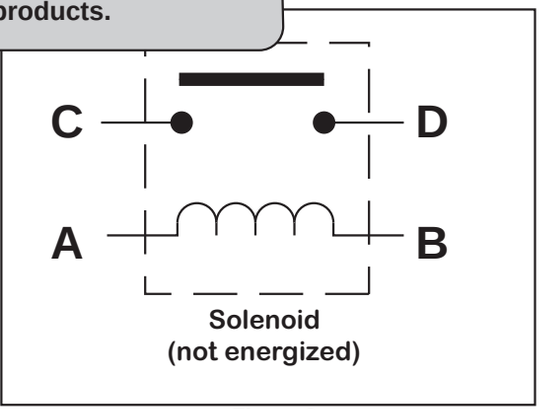


Figure 9 start sol

Testing

1. Disconnect the solenoid from the wiring harness.
2. With a multimeter (ohms setting), check to ensure that terminals "c" and "d" are open (no continuity) (Figure 10).
3. Apply +12 VDC to terminal "a" and ground mounting tab "b". Terminals "c" and "d" should now be closed (continuity) (Figure 10).
4. You should be able to hear the solenoid switch "click" when you make the connection.

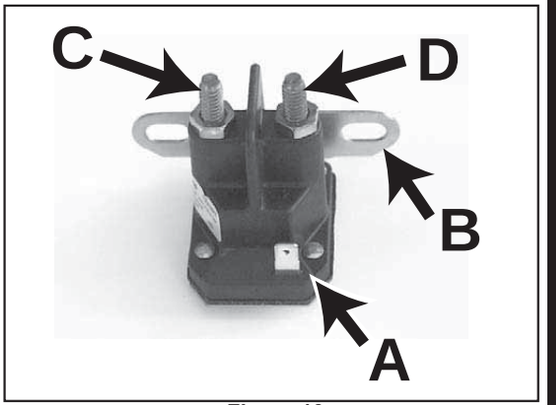


Figure 10 start sol

(A) & (B) Coil Terminals	(C) & (D) Contact Terminals

2

Each product series has its own section including:
- Info List
- Wiring Diagrams
- Circuit Diagrams

LX420, LX460

Image helps you quickly identify product sections.

The "Info List" is the first page of each product section.

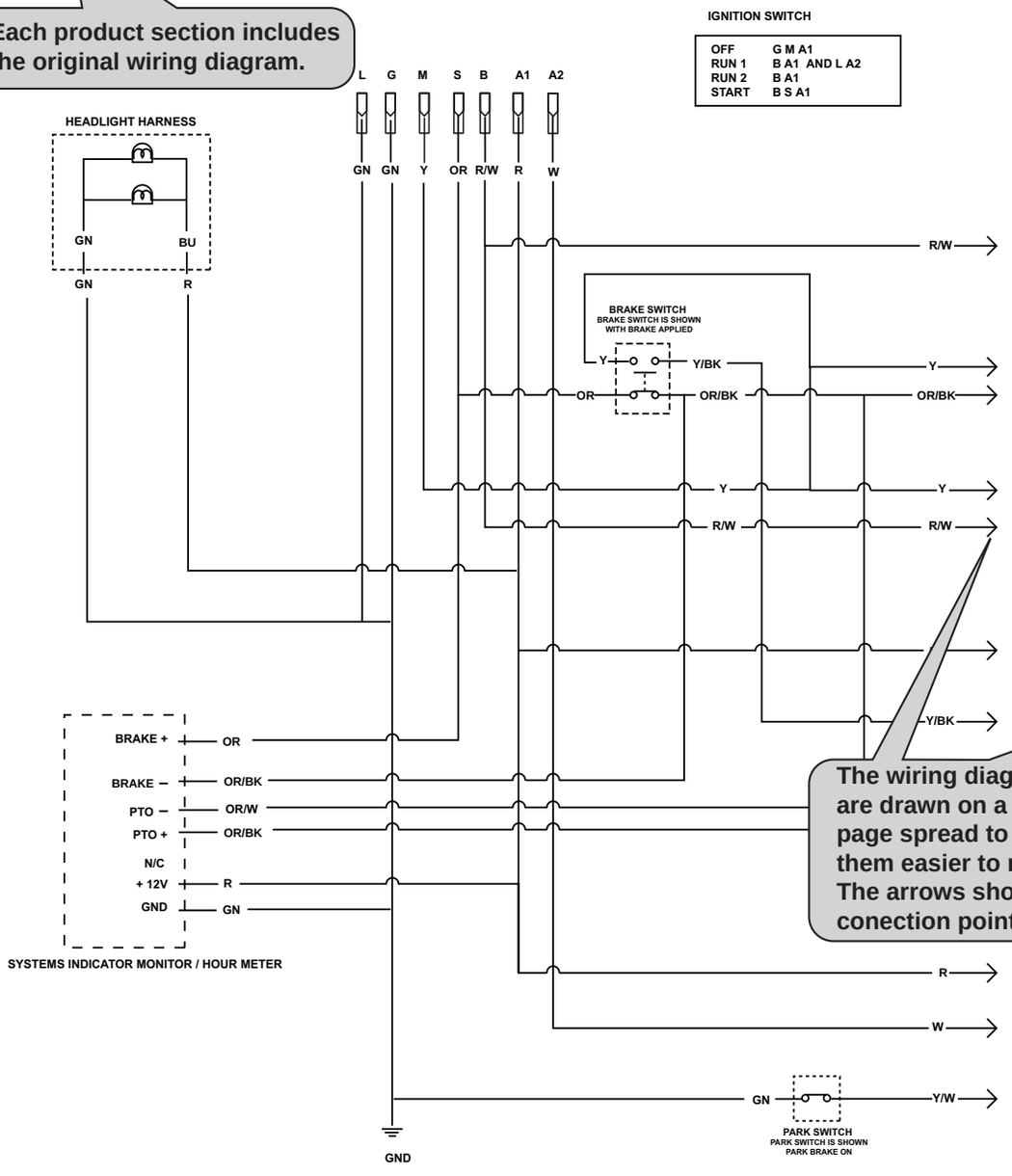
Each product section has its own "Table of Contents" to keep things simple.

LX420 Information List (2006)
LX460 Information List (2006)

LX420, LX460 2006

Wiring Diagram

Each product section includes the original wiring diagram.



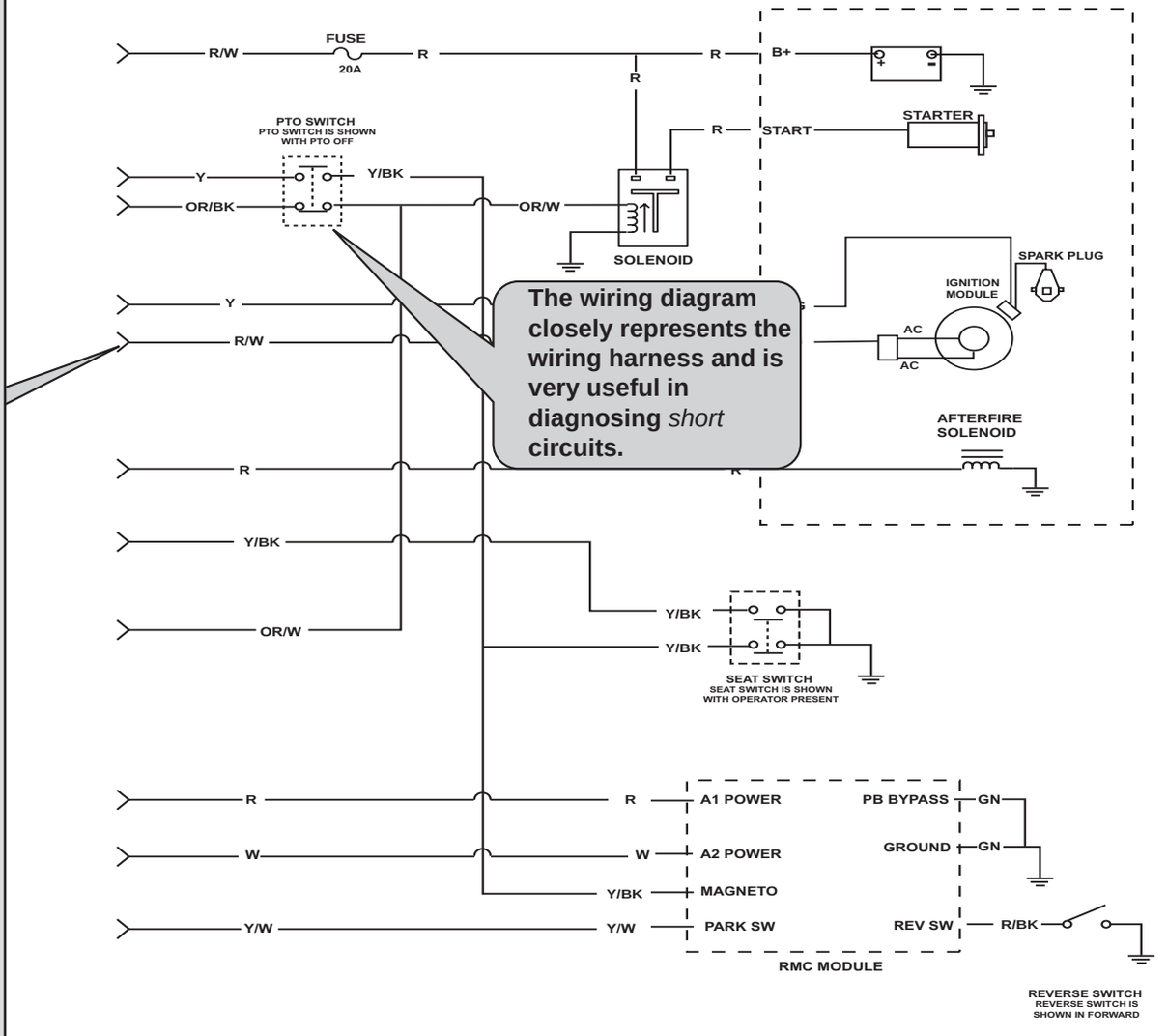
The wiring diagrams are drawn on a two page spread to make them easier to read. The arrows show the conection point.

2006 LX420, LX460

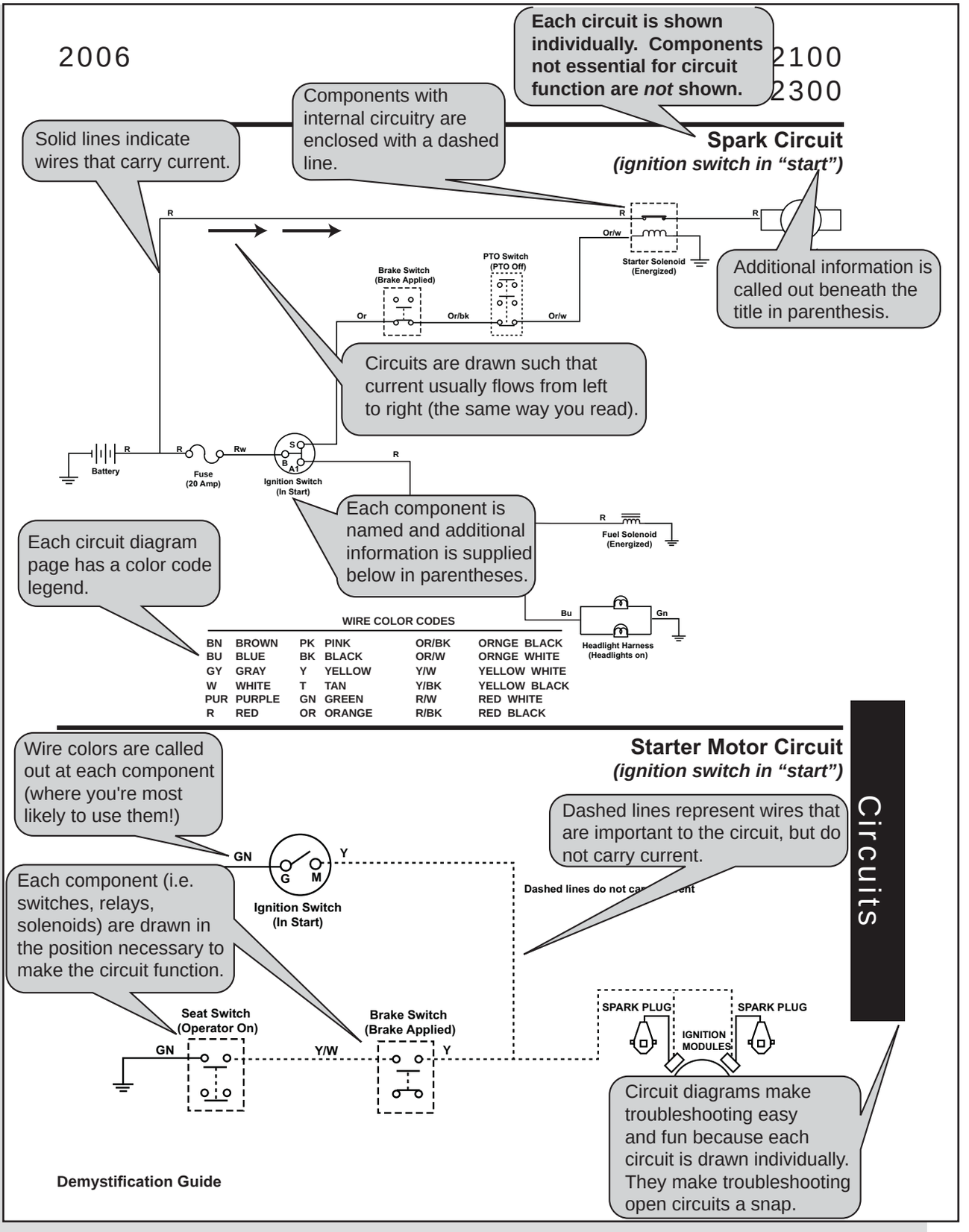
Wiring Diagram

WIRE COLOR CODES

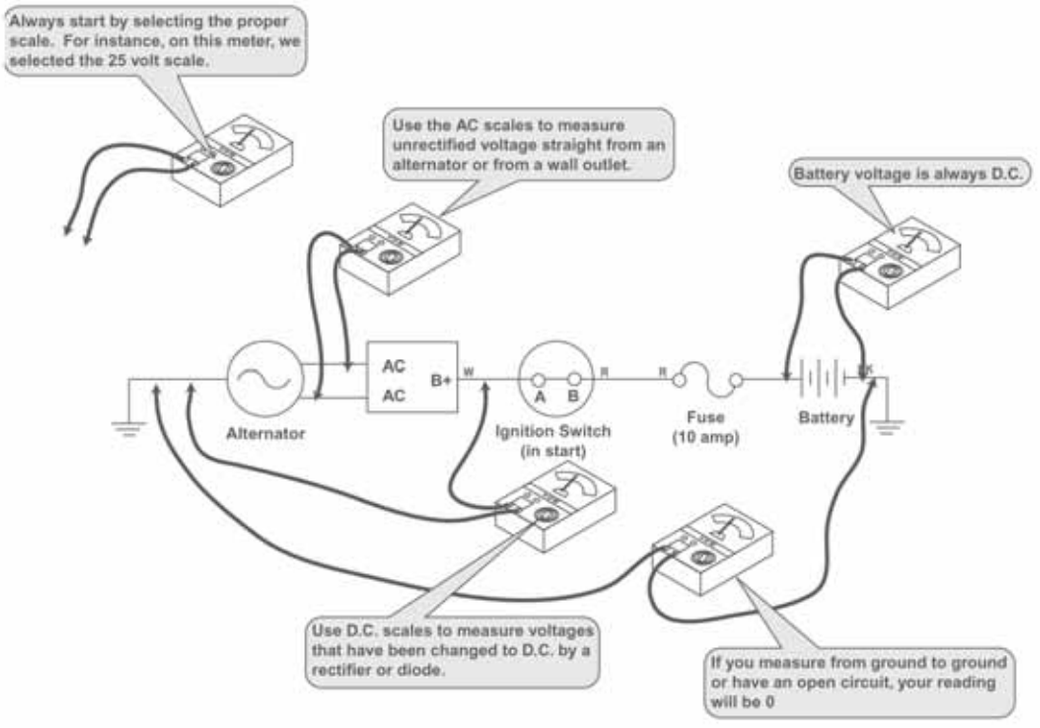
BN	BROWN	PK	PINK	OR/BK	ORNGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORNGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK



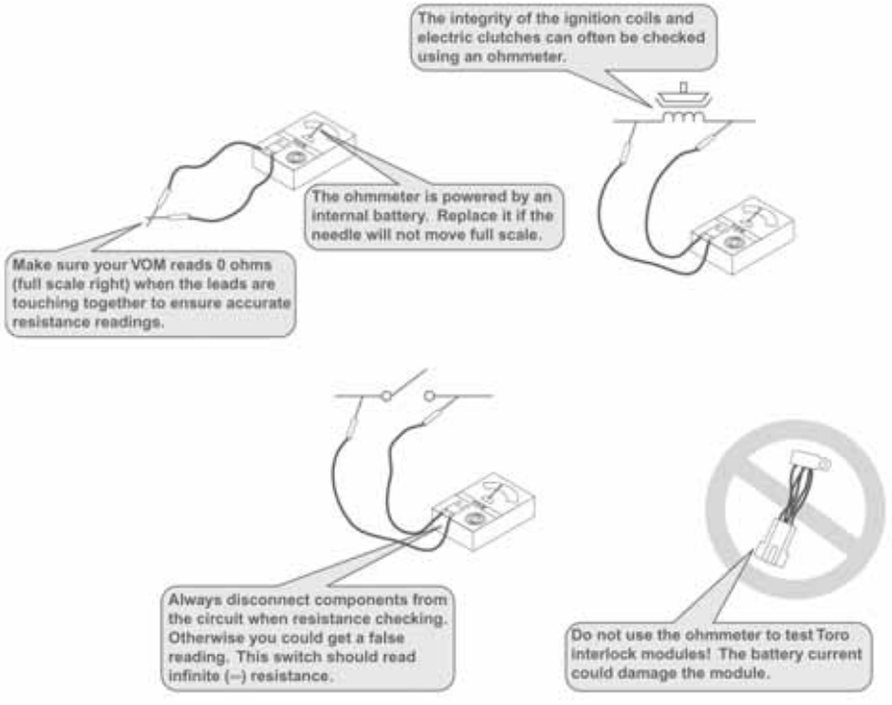
The wiring diagram closely represents the wiring harness and is very useful in diagnosing *short* circuits.


2006
2100
2300
Each circuit is shown individually. Components not essential for circuit function are *not* shown.
Components with internal circuitry are enclosed with a dashed line.
Solid lines indicate wires that carry current.
Spark Circuit
(ignition switch in "start")
Additional information is called out beneath the title in parenthesis.
Circuits are drawn such that current usually flows from left to right (the same way you read).
Each component is named and additional information is supplied below in parentheses.
Each circuit diagram page has a color code legend.
Battery
Fuse (20 Amp)
Ignition Switch (In Start)
Brake Switch (Brake Applied)
PTO Switch (PTO Off)
Starter Solenoid (Energized)
Fuel Solenoid (Energized)
Headlight Harness (Headlights on)
WIRE COLOR CODES
BN BROWN
BU BLUE
GY GRAY
W WHITE
PUR PURPLE
R RED
PK PINK
BK BLACK
Y YELLOW
T TAN
GN GREEN
OR ORANGE
OR/BK ORNGE BLACK
OR/W ORNGE WHITE
Y/W YELLOW WHITE
Y/BK YELLOW BLACK
R/W RED WHITE
R/BK RED BLACK
Starter Motor Circuit
(ignition switch in "start")
Wire colors are called out at each component (where you're most likely to use them!)
Dashed lines represent wires that are important to the circuit, but do not carry current.
Each component (i.e. switches, relays, solenoids) are drawn in the position necessary to make the circuit function.
Seat Switch (Operator On)
Brake Switch (Brake Applied)
Ignition Switch (In Start)
SPARK PLUG
SPARK PLUG
IGNITION MODULES
Circuit diagrams make troubleshooting easy and fun because each circuit is drawn individually. They make troubleshooting open circuits a snap.
Demystification Guide
Circuits

1 Checking Voltage

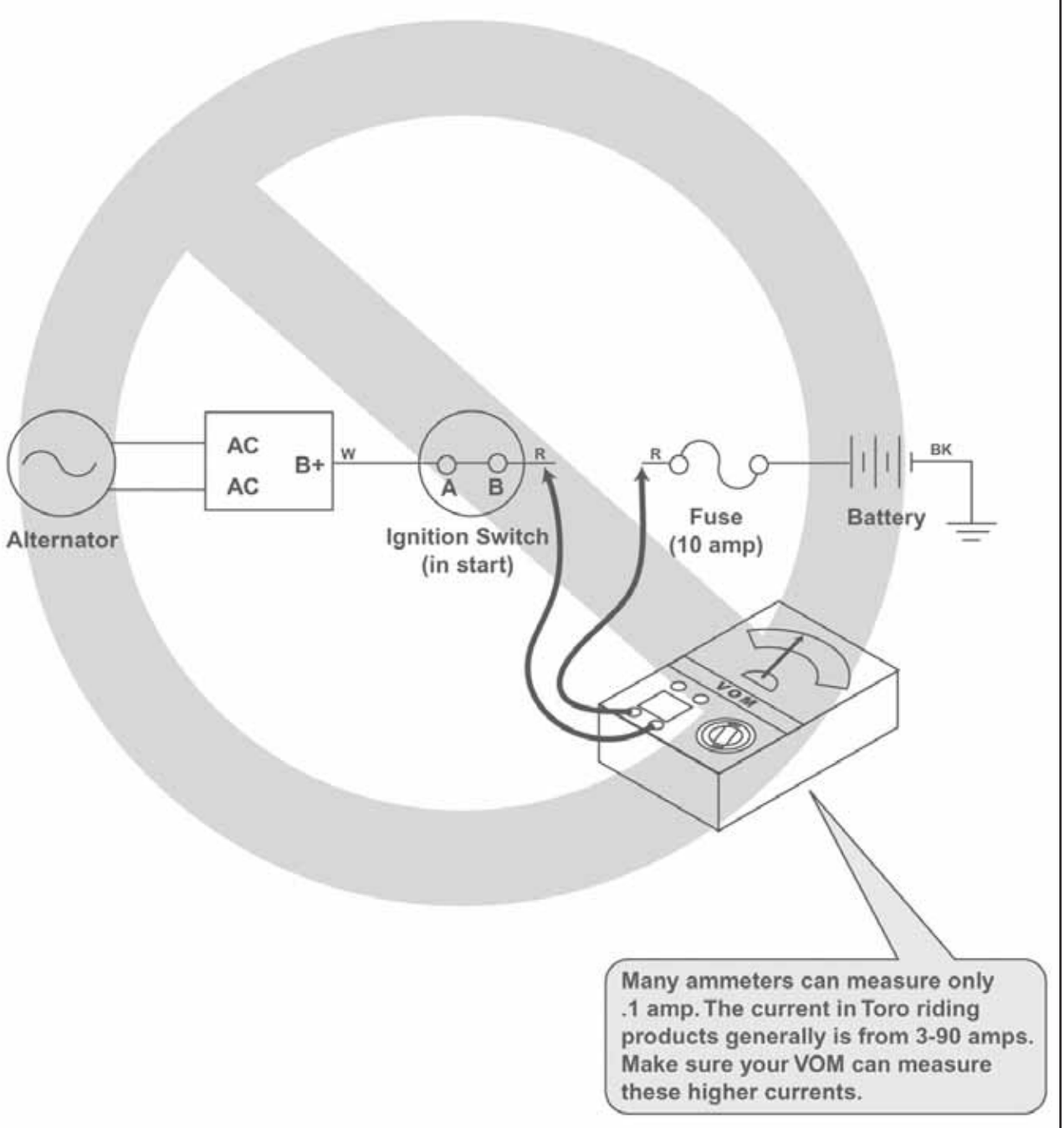


2 Checking Resistance

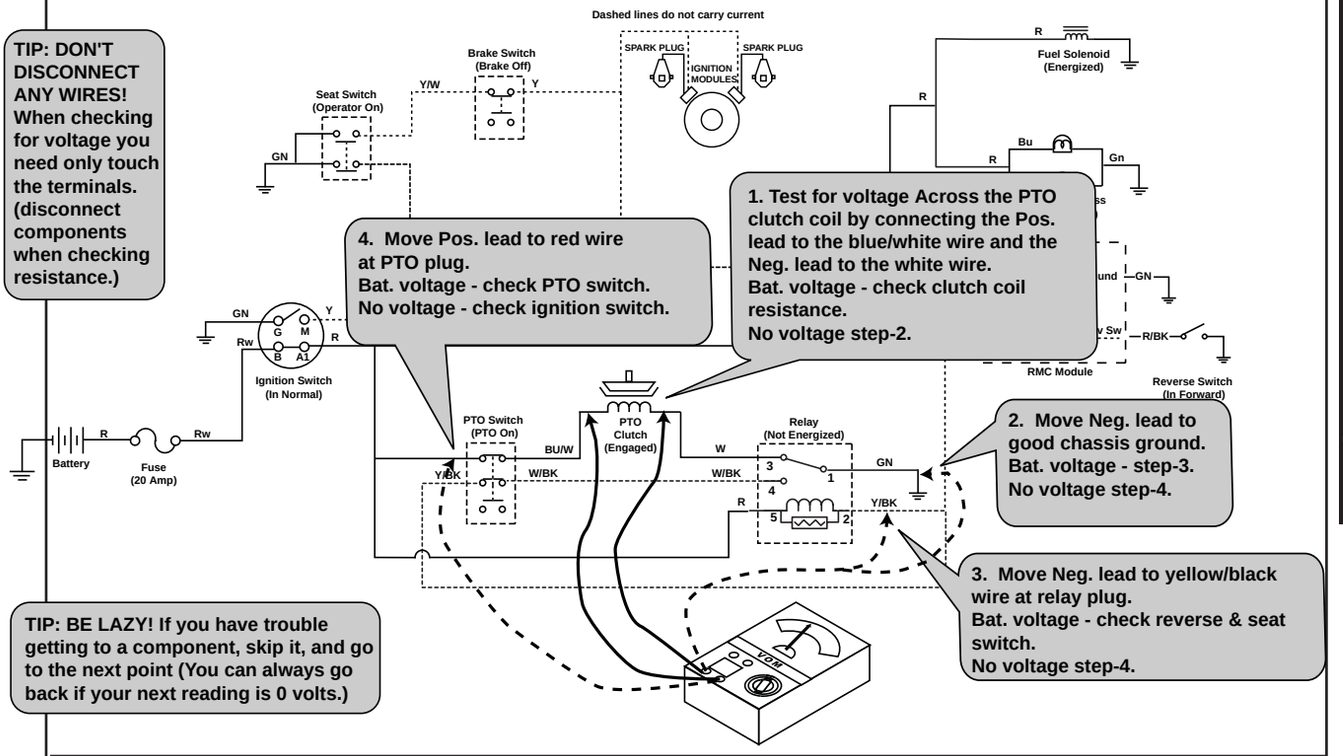


What about checking current?

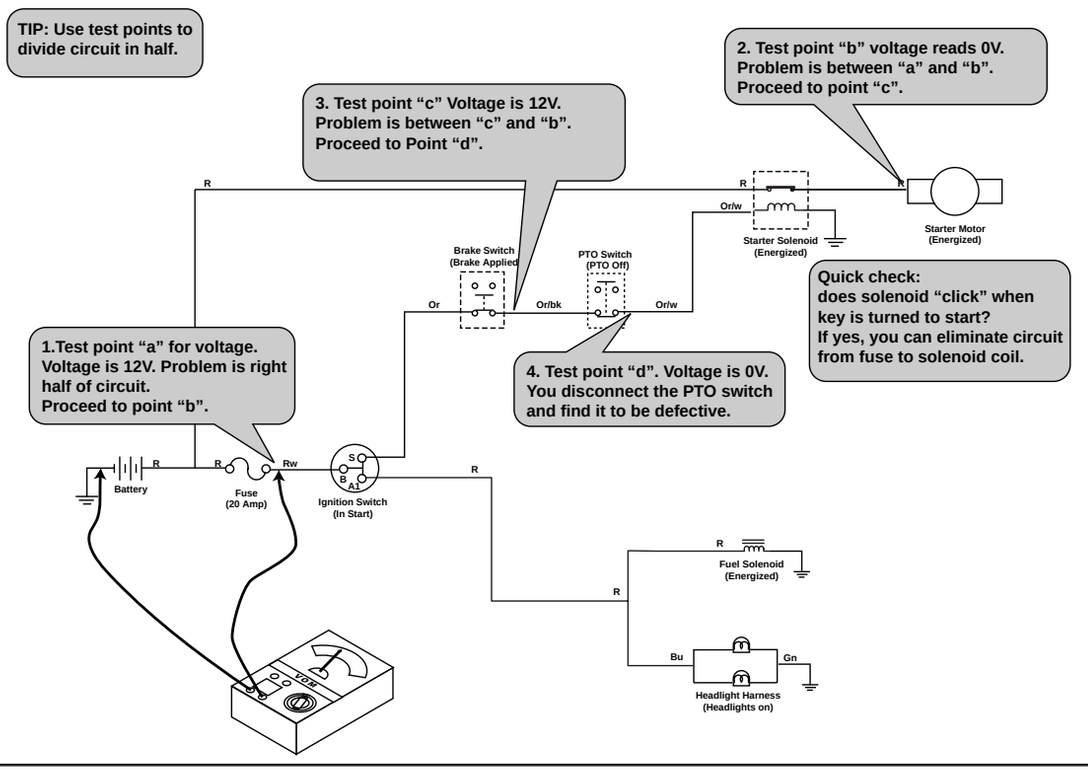
3



Sample Problem: GT2100 electric clutch will not engage



Sample Problem: LX420 will not crank



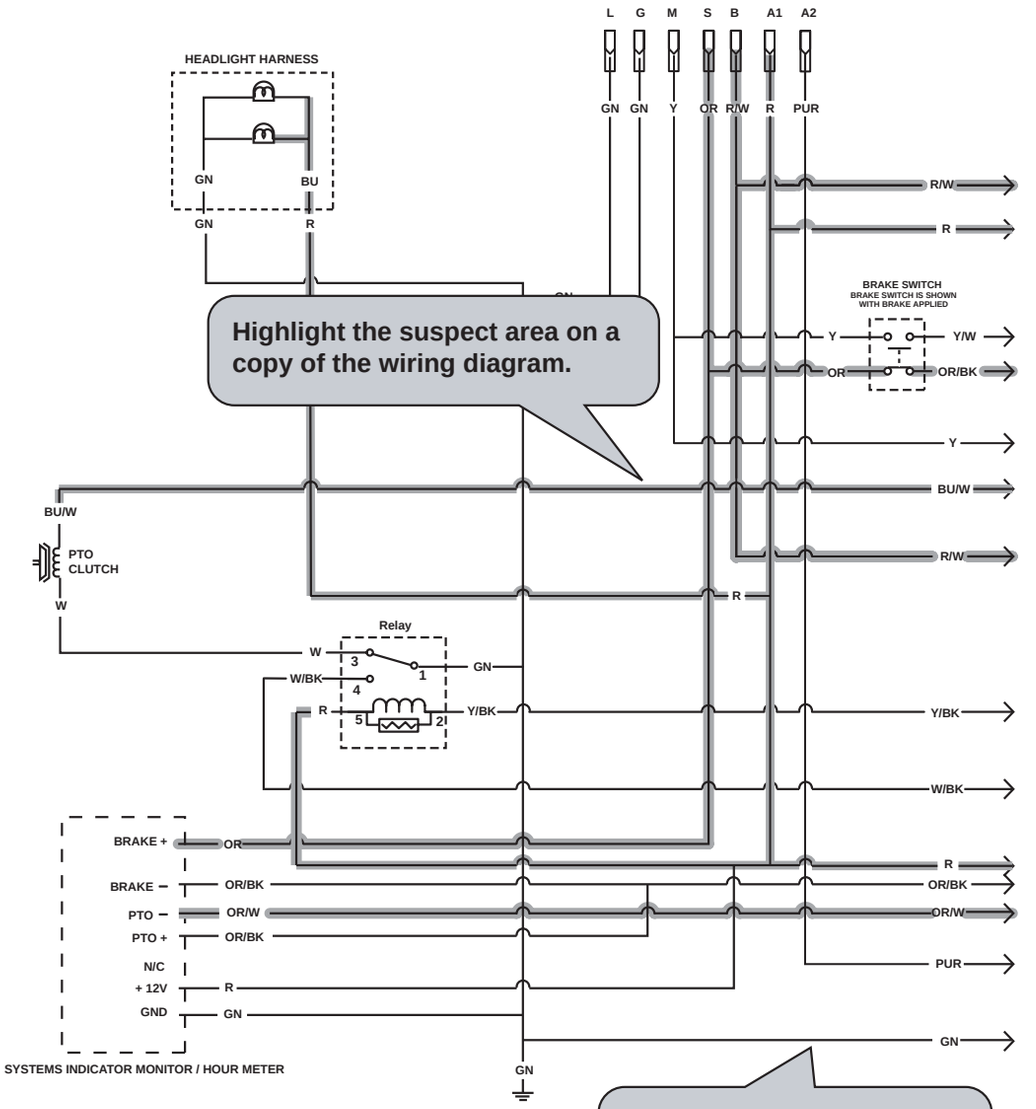
Sample Problem: This GT tractor won't turn over. The customer parked it in the garage and turned it off. When he tried to start it a week later, he heard one click. After that, nothing would happen when he turned the key.

We know it's a short because we found the 20 amp fuse blown.

Step 1. Interview the customer. Any information we get will help isolate the problem.

IGNITION SWITCH

OFF	G M A1
RUN 1	B A1 AND L A2
RUN 2	B A1
START	B S A1



Highlight the suspect area on a copy of the wiring diagram.

Eliminate the green wires as possibilities because they're *supposed* to go to ground.

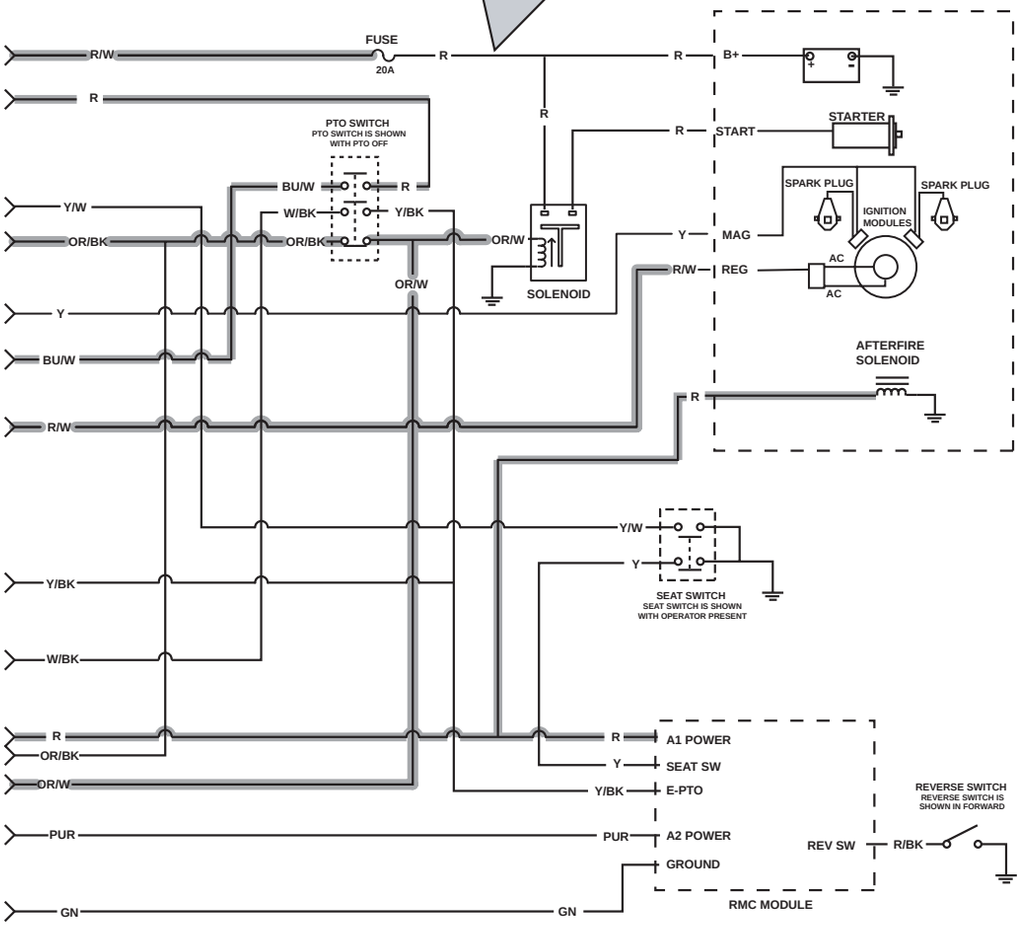
Step 2. Isolate the suspect area. Notice what we did to the wiring diagram below.

If the short was between the battery and the 20 amp fuse, we would have melted these wires.

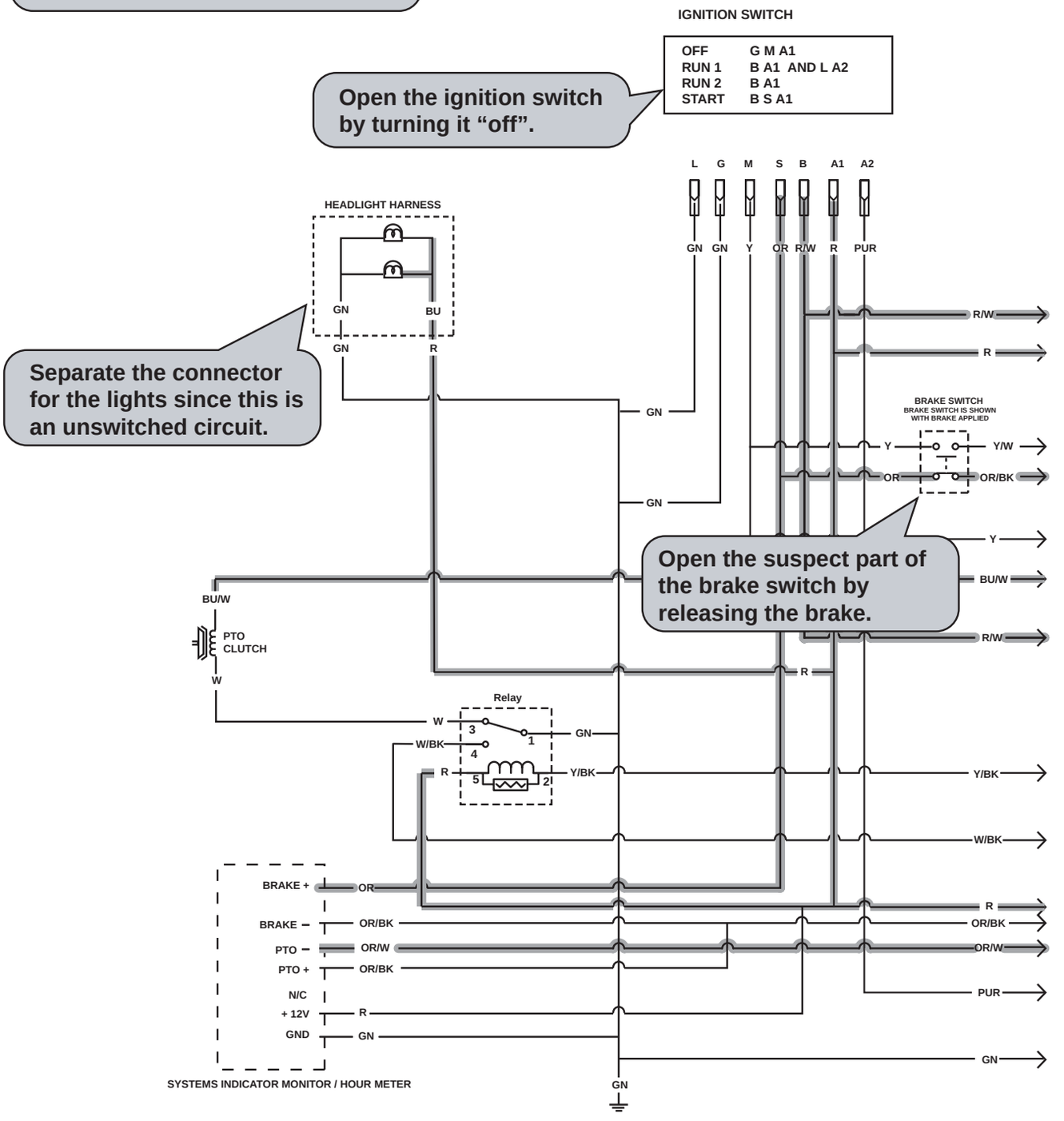
WIRE COLOR CODES

BN	BROWN	PK	PINK
BU	BLUE	BK	BL
GY	GRAY	Y	YE
W	WHITE	T	TA
PUR	PURPLE	GN	GR
R	RED	OR	OR

OR/BK ORANGE, BLACK

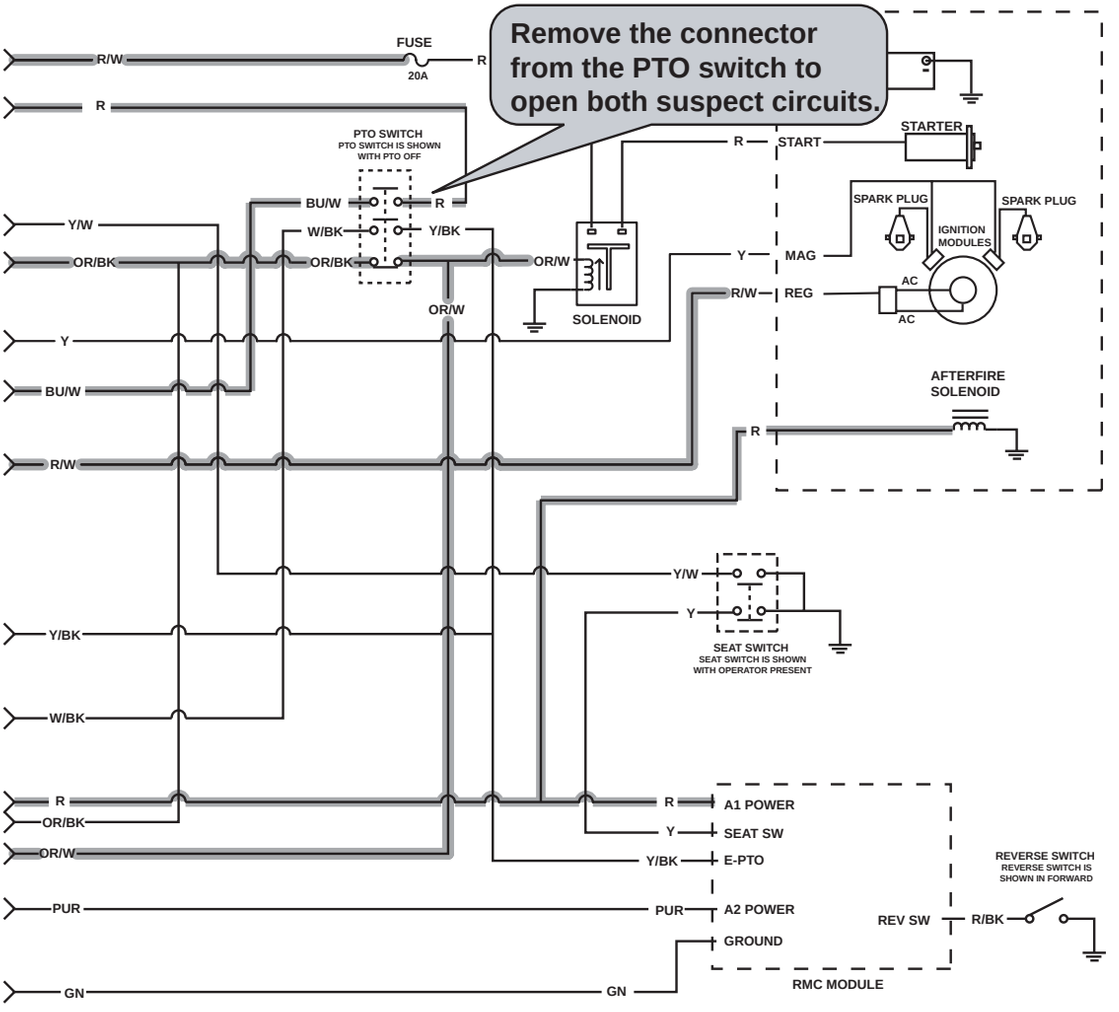


Step 3. Break the suspect area down into “mini-circuits”. Do this by unplugging unswitched circuits and by opening all Switches.



WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK

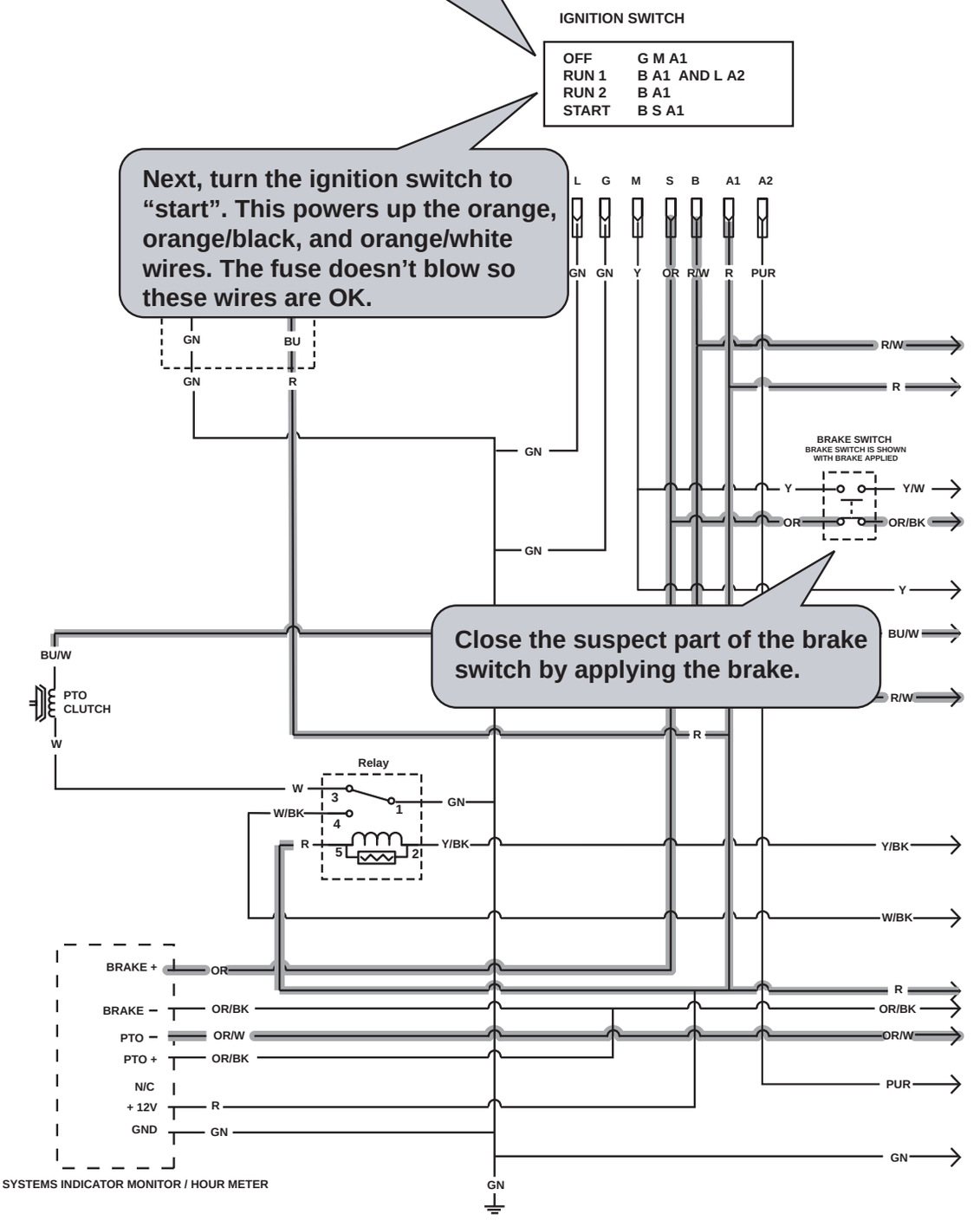


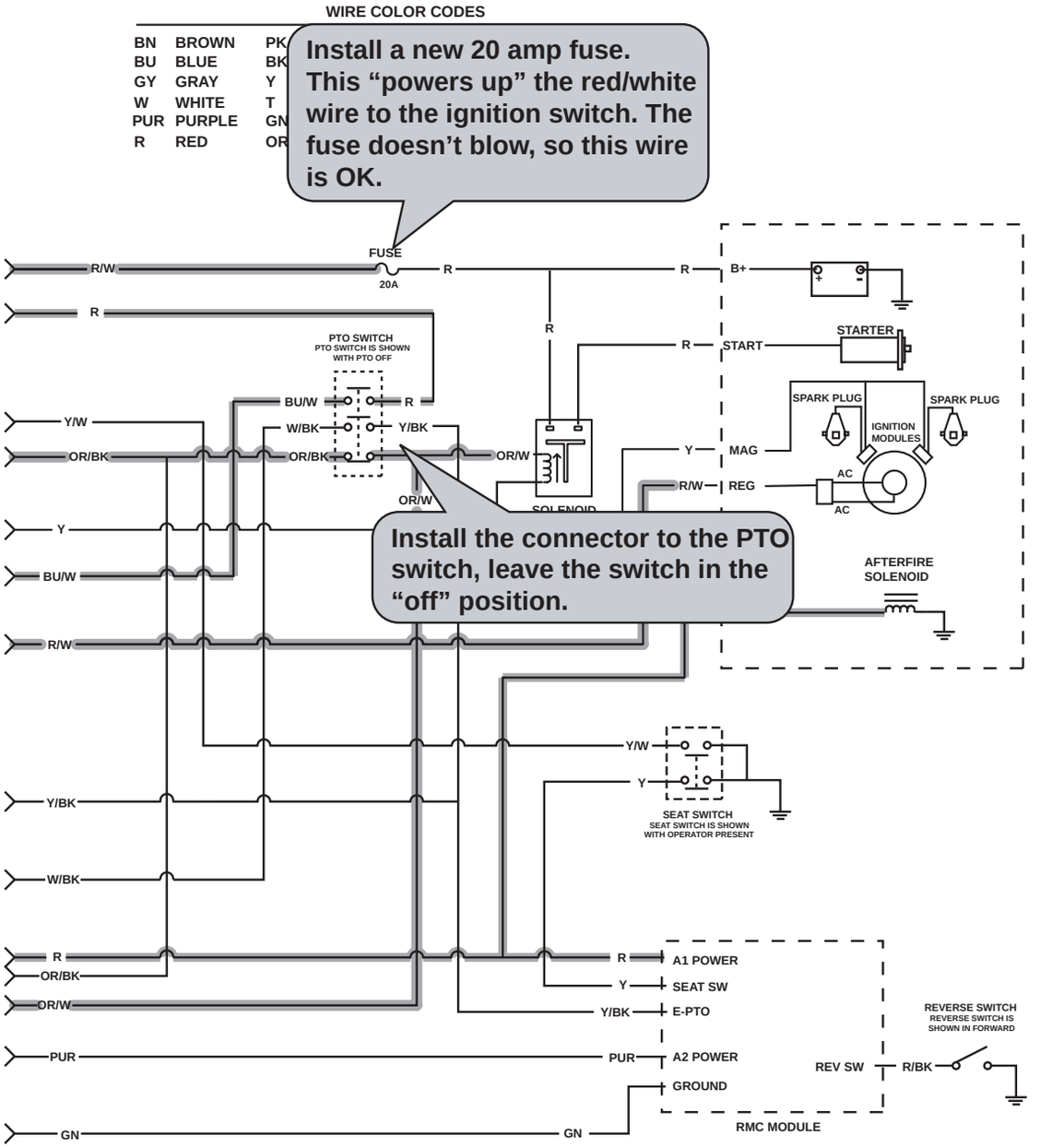
Step 4. Power up the mini-circuits one at a time, beginning with the one closest to the battery.

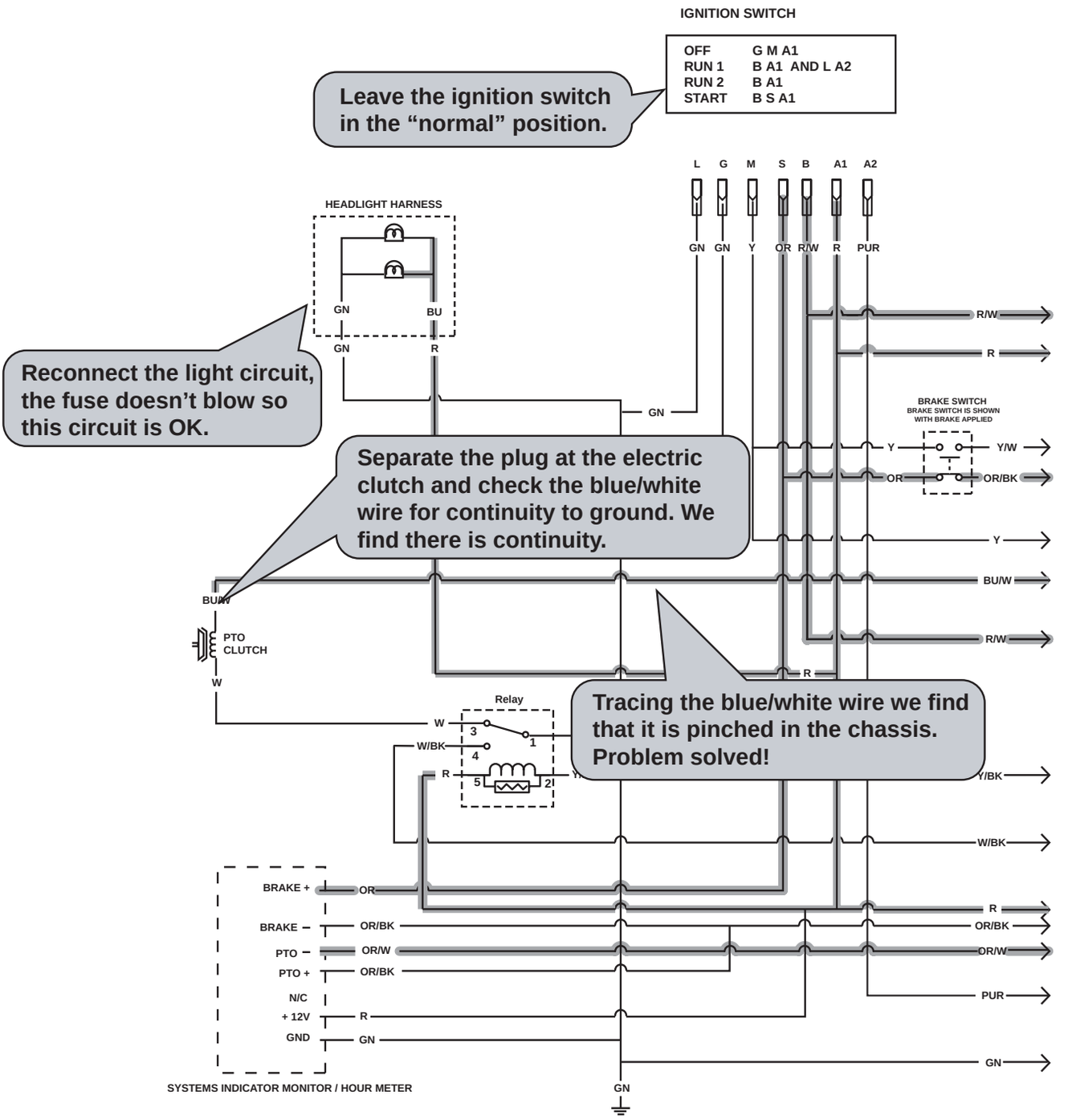
When the ignition switch is turned to “normal”, the 20 amp fuse doesn’t blow. This means the red wires are OK.

Next, turn the ignition switch to “start”. This powers up the orange, orange/black, and orange/white wires. The fuse doesn’t blow so these wires are OK.

Close the suspect part of the brake switch by applying the brake.




WIRE COLOR CODES
BN BROWN
BU BLUE
GY GRAY
W WHITE
PUR PURPLE
R RED
PK
BK
Y
T
GN
OR
Install a new 20 amp fuse. This “powers up” the red/white wire to the ignition switch. The fuse doesn’t blow, so this wire is OK.
FUSE
20A
R/W
R
PTO SWITCH
PTO SWITCH IS SHOWN WITH PTO OFF
BU/W
W/BK
OR/BK
Y/W
Y
BU/W
R/W
Y/BK
W/BK
OR/W
SOLENOID
B+
START
STARTER
SPARK PLUG
SPARK PLUG
IGNITION MODULES
MAG
REG
AC
AC
AFTERFIRE SOLENOID
Install the connector to the PTO switch, leave the switch in the “off” position.
SEAT SWITCH
SEAT SWITCH IS SHOWN WITH OPERATOR PRESENT
A1 POWER
SEAT SW
E-PTO
A2 POWER
GROUND
RMC MODULE
REVERSE SWITCH
REVERSE SWITCH IS SHOWN IN FORWARD
REV SW
R/BK
PUR
GN


IGNITION SWITCH
OFF G M A1
RUN 1 B A1 AND L A2
RUN 2 B A1
START B S A1
Leave the ignition switch in the “normal” position.
L G M S B A1 A2
GN GN Y OR R/W R PUR
HEADLIGHT HARNESS
GN BU
GN R
Reconnect the light circuit, the fuse doesn’t blow so this circuit is OK.
GN
BRAKE SWITCH
BRAKE SWITCH IS SHOWN WITH BRAKE APPLIED
Y Y/W
OR OR/BK
Separate the plug at the electric clutch and check the blue/white wire for continuity to ground. We find there is continuity.
BU/W
PTO CLUTCH
W
Relay
W
3
1
W/BK
4
R
5
2
Tracing the blue/white wire we find that it is pinched in the chassis. Problem solved!
R/W
R
Y
BU/W
R/W
R
Y/BK
W/BK
BRAKE + OR
BRAKE – OR/BK
PTO – OR/W
PTO + OR/BK
N/C
+ 12V R
GND GN
SYSTEMS INDICATOR MONITOR / HOUR METER
R
OR/BK
OR/W
PUR
GN
GN

WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK

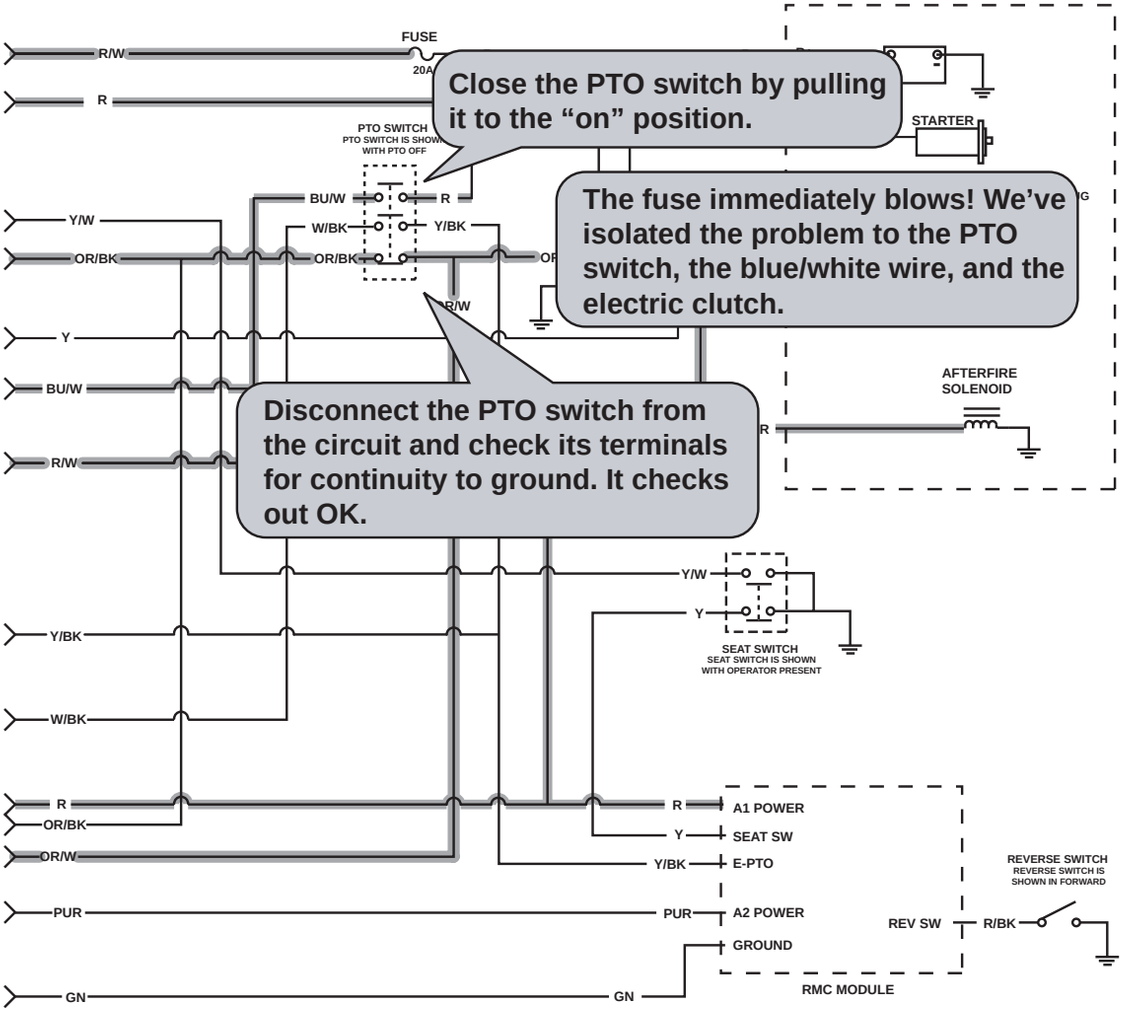


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Table Of Contents

DESCRIPTION

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Clutch, Electric PTO

Purpose

This clutch electrically controls the engagement and disengagement of the Power Take Off (PTO) pulley.

How It Works

The PTO clutch is composed of three major components; the field, the clutch plate, and the friction plate. The clutch plate always turns with the engine. The field is a coil of wire on an iron core, which becomes an electromagnet when power is applied. The friction plate can slide up and down on the crankshaft axis. It is normally spring loaded so that it is not in contact with the clutch plate and is pressed against the brake material opposite the clutch. When power is applied, the friction plate is drawn toward the clutch plate and the two rotate as one.

Testing

If the electric PTO clutch is not engaging or is suspected as a cause of electrical problems, use the troubleshooting steps. These procedures will help you determine if the clutch has failed or is the cause of the electrical problem.

Coil Resistance Measurement

1. Disengage the PTO, set the parking brake, turn the ignition key to ***OFF*** and remove the key.

2. Disconnect clutch wire connector.

3. Set the multimeter or volt/ohm meter to check resistance (ohms).

4. Connect the meter lead wires to the wires in the clutch connector (Figure 1).

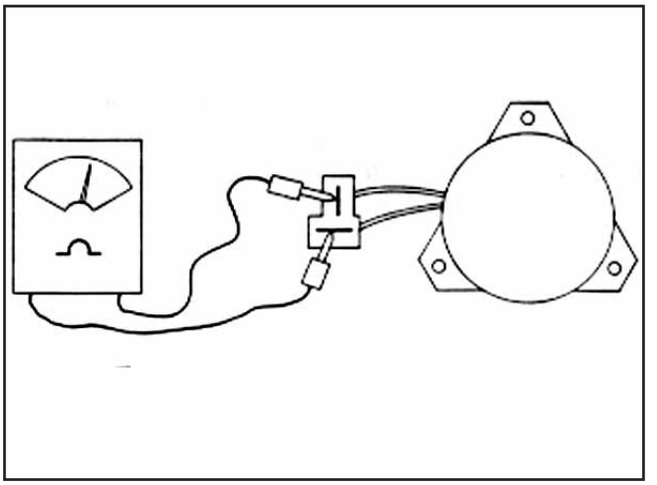


Figure 1 3-6

5. The meter should read 2.84 ohms plus or minus 5%. If the reading is above or below these readings, the field has failed and needs to be replaced. If the reading is within these limits, measure the clutch current draw.

Measuring Clutch Current Draw

1. Disengage the PTO, set the parking brake, and turn the ignition to ***OFF***.

2. Disconnect the clutch wire connector.

3. Set the multimeter to check amps (10 amp scale).

4. Connect the positive meter lead to the tractor terminal (1) of the clutch wire, (Figure 2).

5. Connect the negative meter lead to the corresponding wire terminal (3), (Figure 2).

6. Connect a short jumper lead from terminal (2) to (4), (Figure 2).

7. Turn the ignition switch to the “RUN” position and the PTO switch to the “ON” position.

8. If the meter reading is 3.5 amps or above, the system is functioning properly. If the meter reading is below 3.5 amps, check the electrical system for problems (i.e., the battery, ignition switch, PTO switch, or wiring harness may be malfunctioning).

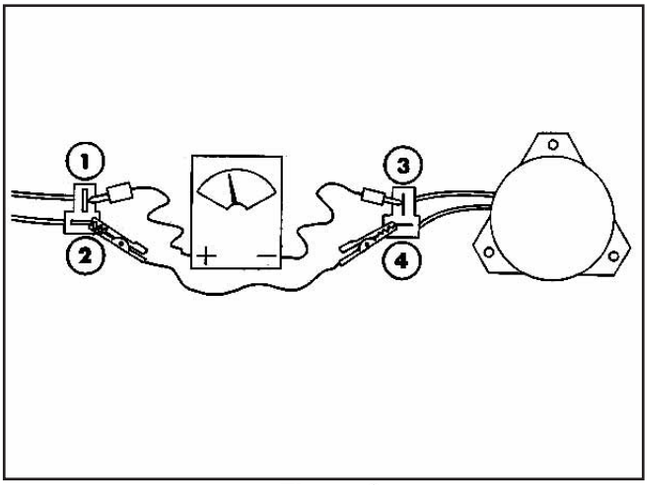


Figure 2 3-7

Clutch Burnishing Procedure

The clutch should be burnished as part of the pre delivery service, or whenever a new clutch is installed. Burnishing polishes the clutch plate, allowing for smooth clutch engagement.

With a PTO driven attachment installed (i.e., mower, snowthrower, or tiller), run the engine at half throttle. Engage and disengage the clutch 5 times (10 seconds on/10 off).

Fuse

Location

The 20 amp fuse is located at the right side of the fuel tank. It is wired in series between the battery positive terminal and the “B” terminal of the ignition switch (Figure 3).

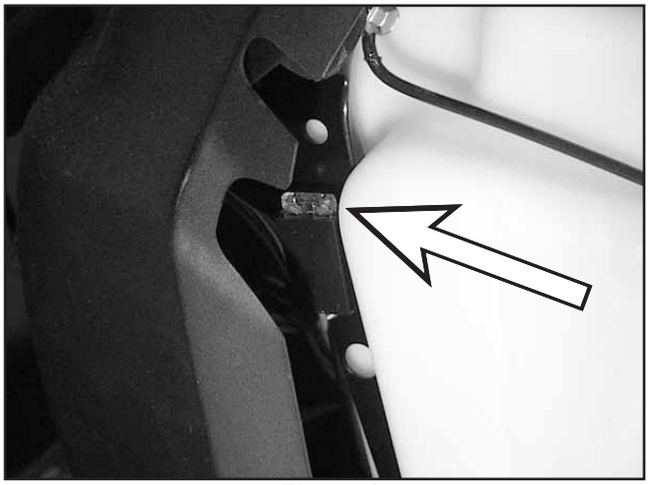


Figure 3 fuseIII

Purpose

Fuses are electrical safety valves that protect wiring and electrical components from damage from high current flow by creating an open circuit.

Fuses are rated for a specific current flow (amps).

Never connect a jumper wire across a fuse. Never connect additional fuses in parallel.

Always use the proper fuse. Always find and correct the reason for a blown fuse.

Testing

A blade type fuse may be checked visually. If the loop (A) is open, the fuse is blown. If in doubt, the fuse may also be tested with an ohmmeter (Figure 4).

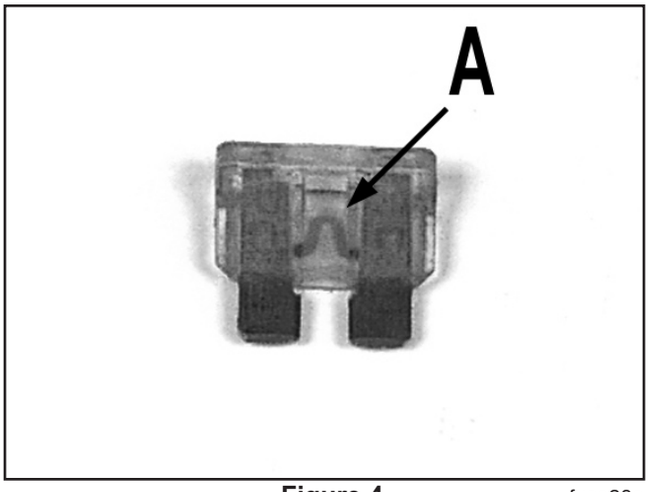


Figure 4 fuse20a

RMC Module

This interlock feature is provided to prevent unintentional engine-powered attachment operation in reverse. If the tractor is shifted into reverse while the mower blade or other Power Take Off (PTO) driven attachment is engaged, the electric clutch will disengage or the engine will stop, depending on the model. **DO NOT MOW WHILE BACKING UP UNLESS ABSOLUTELY NECESSARY.** If you need to mow while in reverse or use other PTO drive attachments (such as a snowthrower), this interlock feature may be temporarily deactivated.

Before deactivating this feature, be sure there are no children present on or near property where you are using the tractor and that are likely to appear while you are mowing or operating an attachment. Be extra observant after you have chosen to deactivate the interlock feature because the sound of the tractor's engine might prevent you from being aware that a child or bystander has entered the area where you are operating the tractor.

Once you are sure you can safely mow in reverse or operate an attachment, deactivate the reverse operating system by turning the key switch, to the reverse caution position, which arms the module, then depressing the reverse push button. A red light to the left of the push button comes on indicating that the PTO will remain engaged with the transmission in reverse. Once activated it stays in this mode **WITH YOUR MOWER BLADE OR ATTACHMENT OPERATING WHENEVER YOU BACK-UP**, and the dash light stays on until the key switch is placed in the normal mowing or stop position, or the operator leaves the seat.

Location

The RMC module is located on the back of the instrument panel in the same housing as the keyswitch (Figure 5).

Figure 5 mod_keysw

Systems:

There are two different “shutdown” systems used in the Reverse Operating System. One system is used with the electric (PTO) clutch - when the tractor is shifted to reverse while the mower blade or other PTO driven attachment is engaged the electric clutch will disengage. The other system is used with the manual (PTO) clutch - when the tractor is shifted to reverse while the mower blade or other PTO driven attachment is engaged, the engine will stop.

How It Works

On units equiped with manual PTO clutch

The reverse switch is wired in series between the module and ground. When the Module is not activated (indicator light off) the reverse and magneto terminals of the module are connected together. If the shift lever is placed in reverse, the magneto is connected to ground through the PTO switch, RMC module, and reverse switch, shutting down the engine. Pressing the reverse push button (Figure 6) with the key switch in the reverse caution position activates the reverse caution mode (indicator light on). This disconnects the reverse switch terminal from the magneto, allowing the engine to continue run in reverse.

On units equiped with electric PTO clutch

The reverse switch is connected in series between module and ground. When the Module is not activated (indicator light off) the switch is internally connected to the E-PTO terminal. If the shift lever is placed in reverse, the relay coil is connected to ground through the RMC module and reverse switch, energizing the relay. This opens the normally closed contacts removing the ground from the electric clutch, causing it to disengage. The normally open contacts are now closed, providing a second ground path to the coil through the PTO switch, keeping the relay energized. This prevents re-engagement of the electric clutch until PTO is cycled off.

Pressing the reverse push button (Figure 6) with the key switch in the reverse caution position activates the reverse caution mode (indicator light on), disconnecting the reverse switch terminal from the E-PTO terminal, allowing the electric clutch to remain engaged.

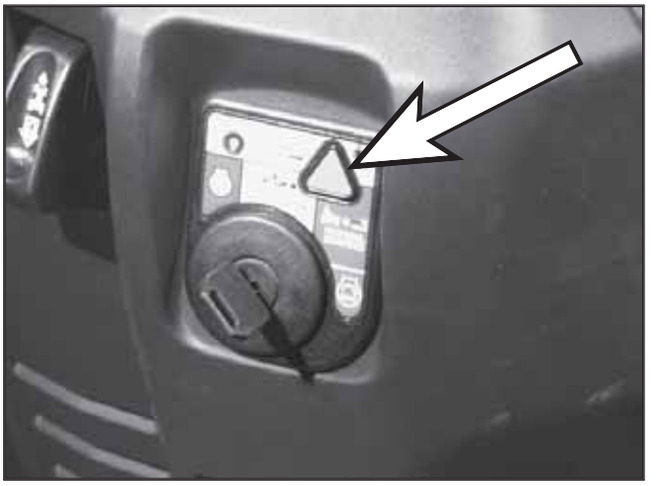


Figure 6 keysw

Testing

Testing the RMC system – Manual PTO - keyswitch in “Normal”

1. Start the engine; place the keyswitch in the normal position.

2. With the seat occupied, place the PTO lever in the “on” position.

3. With the brake applied, move the shift lever to the reverse position.

4. The engine should shut down.

Testing the RMC system – Manual PTO - keyswitch in "Reverse Caution" Unactivated (Indicator light off)

1. Start the engine; place the keyswitch in the reverse caution position.
2. With the seat occupied, place the PTO lever in the "on" position.
3. With the brake applied, move the shift lever to the reverse position.
4. The engine should shut down.

Testing the RMC system – Manual PTO - keyswitch in "Reverse Caution" Activated (Indicator light on)

1. Start the engine; place the keyswitch in the reverse caution position.
2. Press the reverse push button.
3. With the seat occupied, place the PTO lever in the "on" position.
4. With the brake applied, move the shift lever to the reverse position.
5. The engine should continue to run.

Testing the RMC system – Electric PTO - keyswitch in "Normal"

1. Start the engine; place the keyswitch in the normal position.
2. With the seat occupied, pull the PTO switch to the "on" position.
3. With the brake applied, move the shift lever to the reverse position.
4. The electric clutch should disengage.
5. Place the shift lever in forward.
6. The electric clutch should remain disengaged.
7. Cycle the PTO switch off and on.
8. The electric clutch should re-engage.

Testing the RMC system – Electric PTO - keyswitch in "Reverse Caution" Unactivated (Indicator light off)

1. Start the engine; place the keyswitch in the reverse caution position.
2. With the seat occupied, pull the PTO switch to the "on" position.
3. With the brake applied, move the shift lever to the reverse position.
4. The electric clutch should disengage.
5. Place the shift lever in forward.
6. The electric clutch should remain disengaged.
7. Cycle the PTO switch off and on.
8. The electric clutch should re-engage.

Testing the RMC system – Electric PTO - keyswitch in "Reverse Caution" Activated (Indicator light on)

1. Start the engine; place the keyswitch in the reverse caution position.
2. Press the reverse push button.
3. With the seat occupied, pull the PTO switch to the "on" position.
4. With the brake applied, move the shift lever to the reverse position.
5. The electric clutch should remain engaged.

Testing the RMC module

It is not practical to test the RMC module directly. If the RMC system is not functioning as described above, it will be necessary to test the inputs to, and outputs from, the module. If the inputs are correct but the outputs are not, replace the module.

Note: Be sure the battery is fully charged before testing.

Electric PTO Clutch

Symptom:

The electric clutch does not disengage when shifting into reverse with the reverse caution mode not activated.

OR
The electric clutch does not disengage when the operator leaves the seat with the PTO on.

Connect an ohmmeter between the E-PTO terminal at the module (yellow/black wire) and ground. With the key in the “ON” or “Reverse Caution” position, PTO switch on, and the seat occupied the meter should show continuity when the shift lever is placed in reverse, or the operator gets out of the seat.

a) Continuity: the module is OK, check the relay or associated wiring.

b) No continuity: Remove the connector from the module (Figure 7). Using a multimeter check the electrical circuits for the conditions listed in the table below.

If the circuit conditions are met, replace the module.

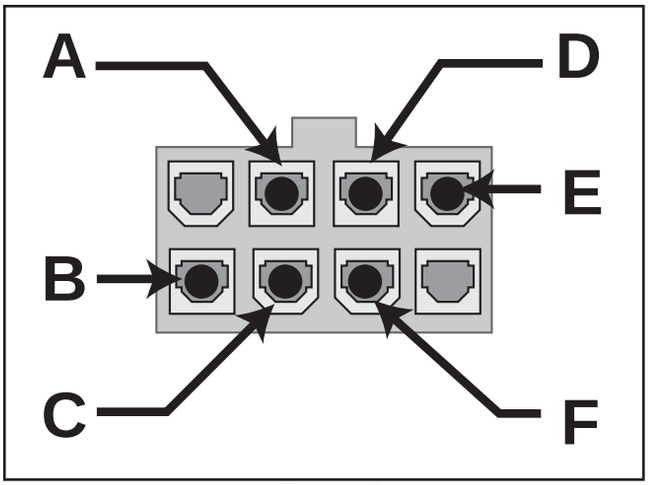


Figure 7 RMCPlugElec1

Circuit Testing - Electric PTO

Terminal	Wire Color	Connected to	Condition
A - (E-PTO)	Yellow/Black	Relay coil PTO switch	RMC module output, provides ground to relay
B - (A1 Power)	Red	A1 term of keyswitch	B+ w/ key in “normal” or “Rev. Caution”
C - (Seat Sw)	Yellow	Seat switch	Ground operator on Open operator off
D - (Reverse Sw)	Red/Black	Reverse switch	Ground in reverse Open in forward
E - (Ground)	Green	Chassis	Connected to ground
F - (A2 Power)	Purple	A2 Term. of keyswitch	Ground in Rev. Caution Open otherwise

Manual PTO Clutch

Symptom:

The engine does not shut down when shifting into reverse when the reverse caution mode is not activated.

OR

The engine does not shut down when the operator leaves the seat with the PTO on.

Connect an ohmmeter between the magneto terminal (yellow/black wire) at the module and ground. With the key in the “ON” or “Reverse Caution” position, PTO engaged, and the seat occupied the meter should show continuity when the shift lever is placed in reverse, or the operator gets out of the seat.

a) Continuity: the module is OK, check the associated wiring.

b) No continuity: Remove the connector from the module (Figure 8). Using a multimeter check the electrical circuits for the conditions listed in the table below.

If the circuit conditions are met, replace the module.

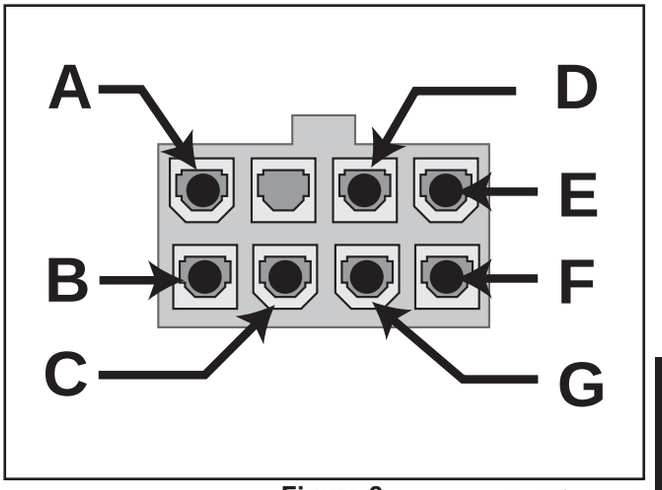


Figure 8 RMCPlugMan1

Circuit Testing - Manual PTO

Terminal	Wire Color	Connected to	Condition
A - (Magneto)	Yellow/Black	Seat Switch PTO switch	RMC module output, provides ground to magneto through PTO switch
B - (A1 Power)	Red	A1 term of keyswitch	B+ w/ key in “normal” or “Rev. Caution”
C - (Park Sw)	Yellow/White	Park switch	Ground Park brake latched Open Brake off
D - (Reverse Sw)	Red/Black	Reverse switch	Ground in reverse Open in forward
E - (Ground)	Green	Chassis	Connected to ground
F - (PB Bypass)	Green	Chassis	Connected to ground
G - (A2 Power)	White	A2 Term. of keyswitch	Ground in Rev. Caution Open otherwise

Relay (Electric PTO)

Location

The relay is part of the wiring harness and is located behind the fuel tank near the PTO connector (Figure 9).

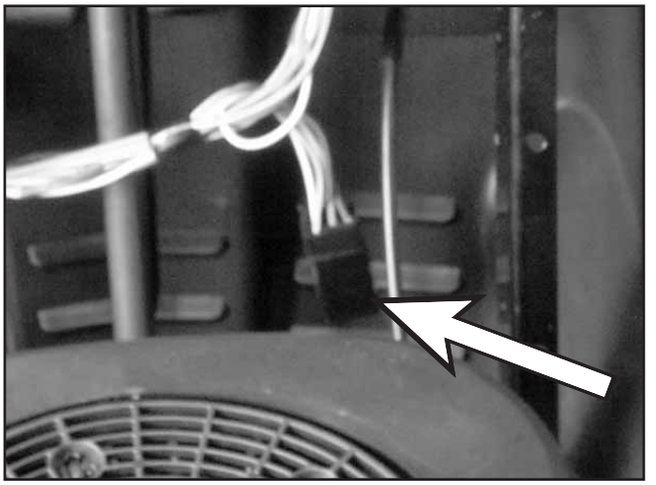


Figure 9 relay1

Purpose

The relay disconnects the electric PTO clutch from ground when the PTO is engaged and the shift lever is in reverse, stopping the blades, unless the reverse caution mode has been activated.

How It Works

The relay is an electrically activated single pole double throw switch.

A common terminal (E) connects the ground wire of the PTO clutch to ground through the normally closed contact (A). Voltage is supplied to the positive side of the coil (D) from the A1 terminal of the keyswitch (Figure 10).

Placing the shift lever in reverse energizes the relay by providing a ground connection to the coil from the reverse switch, through the module, and PTO switch. This opens the normally closed contacts, disconnecting the PTO clutch from ground.

Testing

1. Disconnect the relay from the harness.

2. Verify the coil resistance between terminals B and D with a multimeter (ohms setting). Resistance should be approximately 105 ohms. There should be continuity between terminals A and E (Figure 10).

3. Connect multimeter (ohms setting) leads to relay terminals E and C. Ground terminal B and apply +12 VDC to terminal D. The relay should make and break continuity between terminals E and C as 12 VDC is applied and removed from terminal D (Figure 10).

4. Connect multimeter (ohms setting) leads to relay terminals E and A. Apply +12 VDC to terminal D. With terminal B still grounded, the relay should break and make continuity between terminals E and A as 12 VDC is applied and removed from terminal D (Figure 10).

5. Disconnect voltage source and multimeter leads from relay terminals.

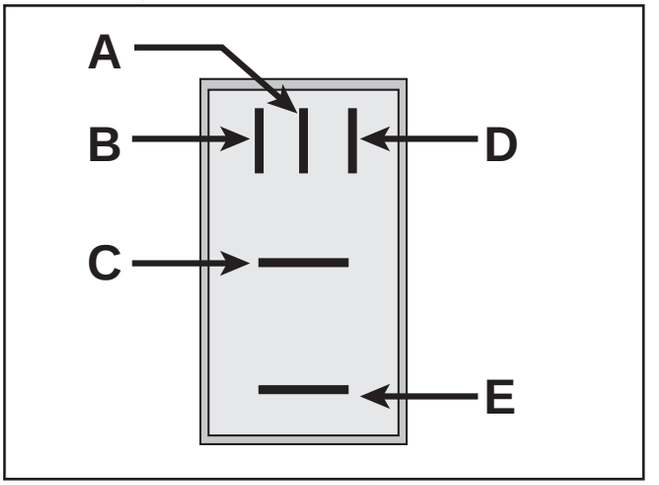


Figure 10 relay terminals1

A Norm. closed contact	B Coil Negative
C Norm. open contact	D Coil Positive
E Common contact	

Solenoid, Starter

Location

The starter solenoid is located under the rear fender behind the battery. Remove the battery and battery tray to access the solenoid (Figure 11).

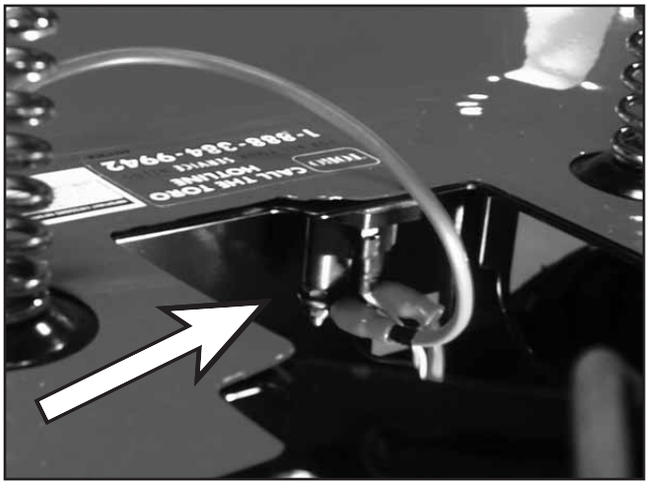


Figure 11 solloc

Purpose

The solenoid's purpose is simply to connect the battery to the starter motor when the ignition switch is turned to "START". The solenoid is used to protect the ignition switch from the high current drawn by the starter motor.

How It Works

The solenoid has two primary parts (Figure 12):
1. A coil of wire wrapped around an iron core.

2. A bar type switch.

When 12 volts is applied to the coil, it becomes an electromagnet. This quickly pulls the bar toward the contacts and closes the switch. Because the contact terminals have a large contact area it can easily handle the high current loads required by the starter motor. When power is removed from the coil, the spring loaded bar returns to its "normally open" position. The solenoid closes and opens the switch very quickly. This minimizes the "arcing" that can damage other types of switches.

The ignition switch is protected because only a small amount of current is needed to activate the coil.

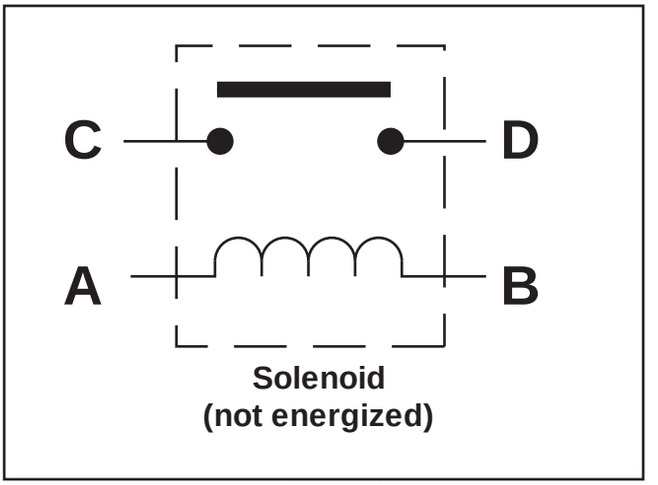


Figure 12 start sol

Testing

1. Disconnect the solenoid from the wiring harness.

2. With a multimeter (ohms setting), check to ensure that terminals "C" and "D" are open (no continuity) (Figure 13).

3. Apply +12 VDC to terminal "a" and ground mounting tab "B". Terminals "C" and "D" should now be closed (continuity) (Figure 13).

4. You should be able to hear the solenoid switch "click" when you make the connection.

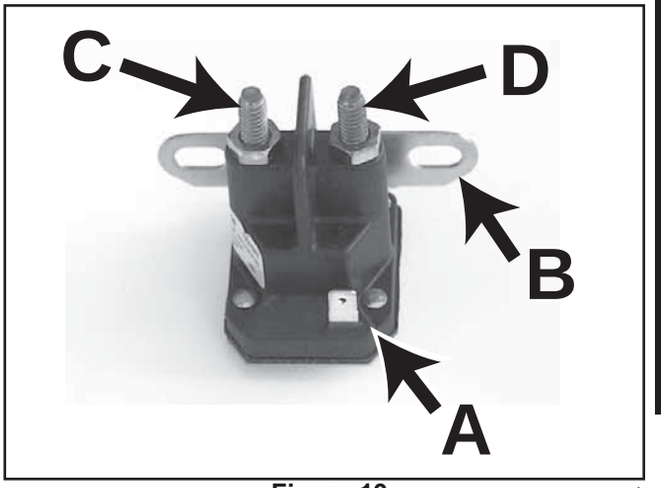


Figure 13 start sol

(A) & (B) Coil Terminals	(C) & (D) Contact Terminals

Switch, Brake

Location

The brake switch is attached to the tractor frame, under the fuel tank, near the base of the brake lever (Figure 14).

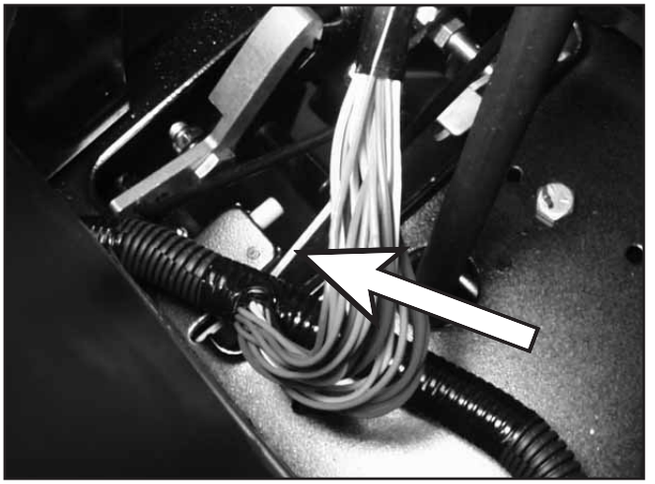


Figure 14 tbrakesw

Purpose

As part of the safety interlock system the brake switch has two sets of terminals; one pair prevents the engine from cranking if the brake is not applied. The other pair causes the engine to shut down if the operator gets off the seat with the brake released.

How It Works

The plunger is depressed when the brake is applied, closing contacts “C” and “D”. This allows voltage from the key switch to pass through the brake switch to the PTO switch, then on to the start solenoid to crank the engine.

Applying the brake also causes a second set of contacts (“A” and “B”) to open. This prevents the magneto from connecting to ground and shutting the engine down if the operator gets off the seat.

Testing

1. Disconnect the switch from the wiring harness.

2. Using a multimeter, follow the procedures listed below (Figure 15).

Note: Terminals on actual switch not labeled.

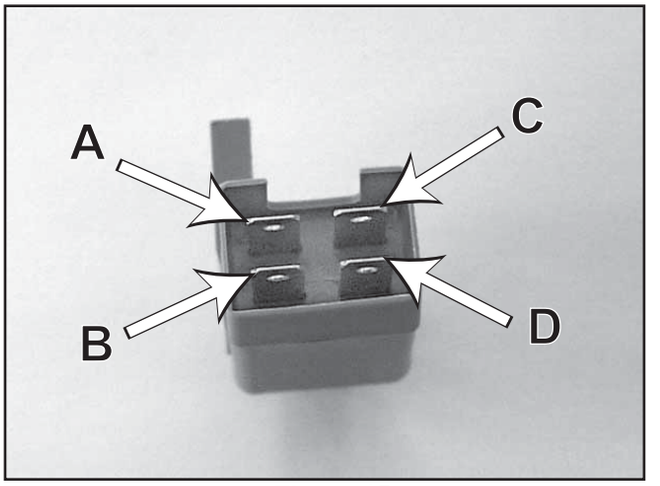


Figure 15 manptoterm

Plunger Not Depressed	Plunger Depressed
A&B Terminals – Closed Circuit – Continuity	A&B Terminals – Open Circuit – No Continuity
C&D Terminals – Open Circuit – No Continuity	C&D Terminals – Closed Circuit – Continuity

Switch, Parking Brake (Manual PTO)

Location

The parking brake switch is located under the fuel tank near the locking lever (Figure 16).

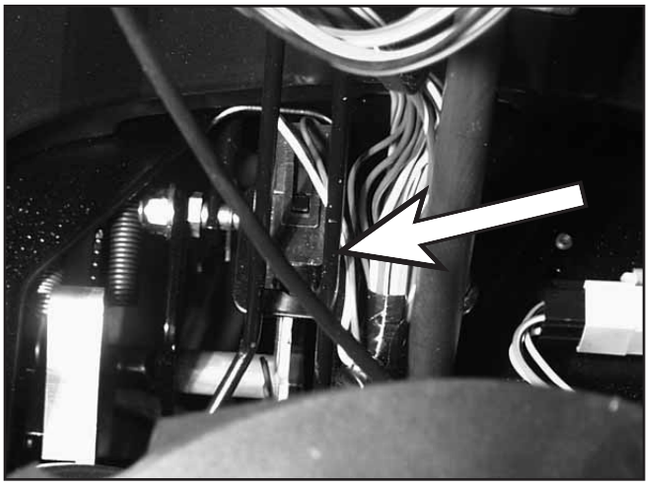


Figure 16 prkbrksw

Purpose

The parking brake switch is part of the safety interlock system. The engine will shut down if the operator leaves the seat without engaging the parking brake.

How It Works

When the parking brake is latched, the plunger is depressed, closing the contacts (figure 17).

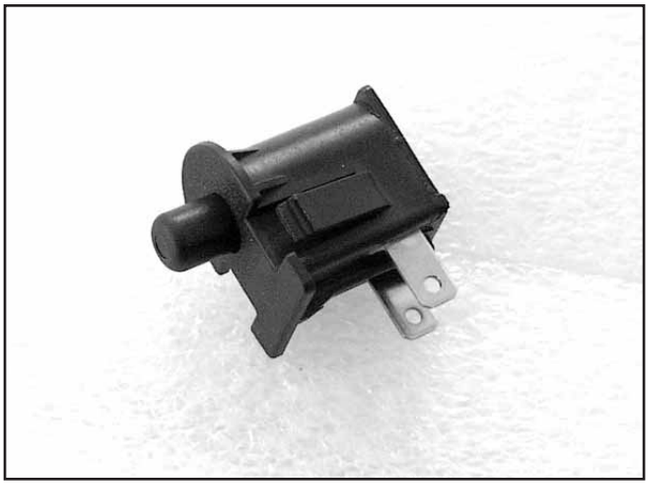


Figure 17 parkbrkswcu

Testing

1. Disconnect the switch from the wiring harness.

2. Use a ohmmeter to test continuity between the terminals (figure 17).
   Plunger out – no continuity
   Plunger in - continuity

Switch, Key

Purpose

This component provides the proper switching for the starter, ignition, accessories, and safety circuits (Figure 18).

Figure 18 keysw

How It Works

Detents inside the switch give it 4 positions: STOP, REVERSE CAUTION, NORMAL MOWING, and START. The START position is spring loaded so the cylinder automatically returns to NORMAL MOWING once the key is released.

Testing

1. Disconnect the switch from the wiring harness.

2. Verify that continuity exists between the terminals listed for each switch position. Verify that there is NO continuity between terminals not listed for the switch position (Figure 19).

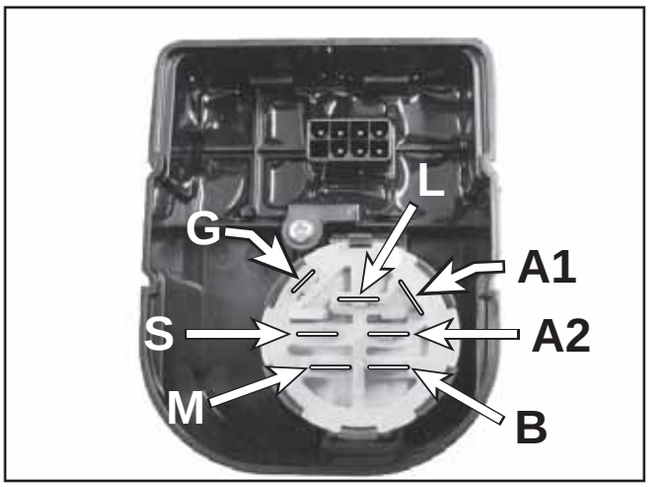


Figure 19 swign

Position	Condition
Off	G+M+A1
Reverse Caution (Run 1)	B+A 1 & L+A 2
Normal Mowing (Run 2)	B+A 1
Start	B+S+A 1

Switch, Reverse

Location

Units equipped with constant velocity transmissions (CVT)

The reverse switch is attached to the underside of the tractor next to the reverse lever (Figure 20).

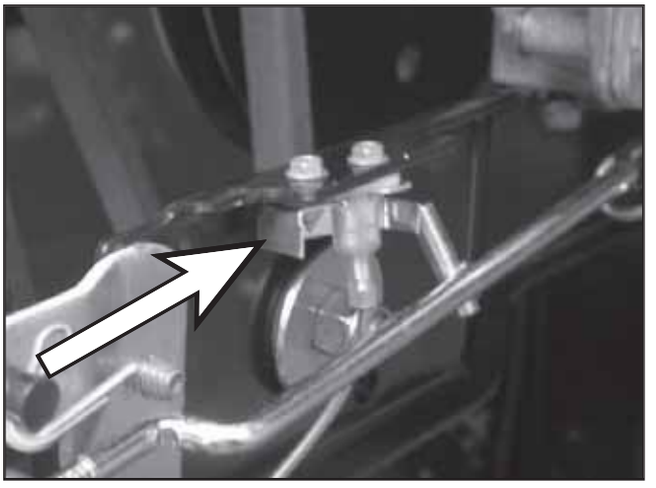


Figure 20 trevsw

Units equipped with hydrostatic transmissions

The reverse switch is located on the right side of the transmission near the brake (Figure 21).

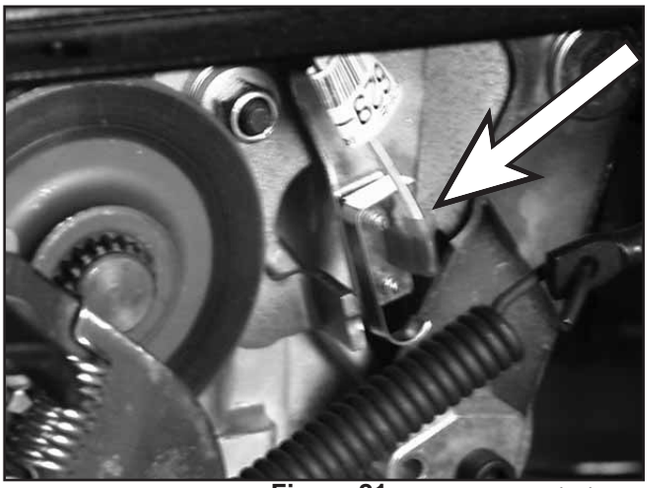


Figure 21 swhydrorev

Purpose (All units)

Provides ground signal to RMC module when the shift lever is in reverse.

How It Works

The reverse switch is a metal tang, which is connected to ground when the reverse lever contacts it.

Testing (All units)

1. Disconnect the switch from the wiring harness.

2. Using a multimeter, check for continuity between the switch terminal and ground. With the shift lever in forward, there should not be continuity.

3. Place the shift lever into reverse. There should be continuity.

Switch, Seat (Electric PTO Clutch)

Purpose

Shuts the engine down if the operator gets off the seat with the brake not applied.

Disengages the PTO Clutch if the operator gets out of the seat with the PTO engaged.

Figure 22 tseatswl

How It Works

The seat switch consists of a pair of normally closed contacts (Figure 22), which open when the operator is on the seat. One contact is connected in series to the magneto through the brake switch. If the operator vacates the seat while the engine is running, and the brake released, the contacts close, and the magneto is grounded, stopping the engine.

The other contact is connected to the relay through the RMC module. If the operator gets off the seat with the brake applied and the PTO engaged, the relay coil is connected to ground, energizing the relay. This opens the relays, normally closed contacts, disconnecting the electric clutch from ground, causing it to disengage.

Testing

1. Disconnect the switch from the wiring harness.

2. With a multimeter, check for continuity between the switch terminals and ground. There should be continuity.

3. Recheck for continuity with someone in the seat. There should not be continuity,

Switch, Seat (Manual PTO Clutch)

Purpose

To shut the engine down if the operator gets off the seat while the engine is running with the PTO engaged or the brake released.

Figure 23 tseatsw

How It Works

The seat switch consists of a pair of normally closed contacts which open when the operator is on the seat (Figure 23). One contact is connected in series to the magneto through the brake switch. If the operator vacates the seat while the engine is running, and the brake released, the contacts close and the magneto is grounded, stopping the engine.

The other contact is connected in series to the magneto through the PTO switch. If the operator gets off the seat with the PTO engaged and the brake applied, the contacts close, connecting the magneto to ground, stopping the engine.

Testing

1. Disconnect the switch from the wiring harness.

2. With a multimeter, check for continuity between the switch terminals and ground. There should be continuity.

3. Recheck for continuity with someone in the seat. There should not be continuity.

Switch, PTO (Electric PTO)

Purpose

The PTO switch is used to engage the electric clutch (Figure 24).

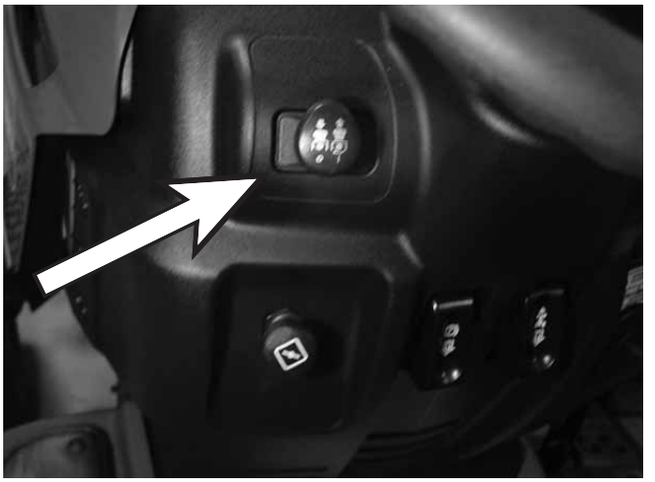


Figure 24 tseatsw

It is also part of the safety circuit:
1. Prevents the engine from cranking with the key switch in the start position when the PTO switch is on.

2. It is part of the circuit that prevents the electric PTO clutch from re-engaging after moving the shift lever in and out of reverse without activating the reverse caution mode.

3. It is part of the circuit that prevents the electric PTO clutch from re-engaging if the operator gets off and back on the seat.

How It Works

The PTO switch uses three sets of contacts:
(Figure 25)
1. A – Com (normally closed)
   Wired in series between the brake switch and start solenoid. Preventing power from reaching the starter solenoid when the PTO switch is on.

2. B – Com (normally open)
   Connected in series between the relay coil and the normally open relay contact. Once the relay is energized these contacts provide a ground path to the relay coil preventing it from de-energizing until the PTO is switched off.

3. C – Com (normally open)
   Connected in series between the A1 terminal of

the ignition switch and the electric clutch. Pulling the switch to the on position closes these contacts providing voltage to the electric clutch.

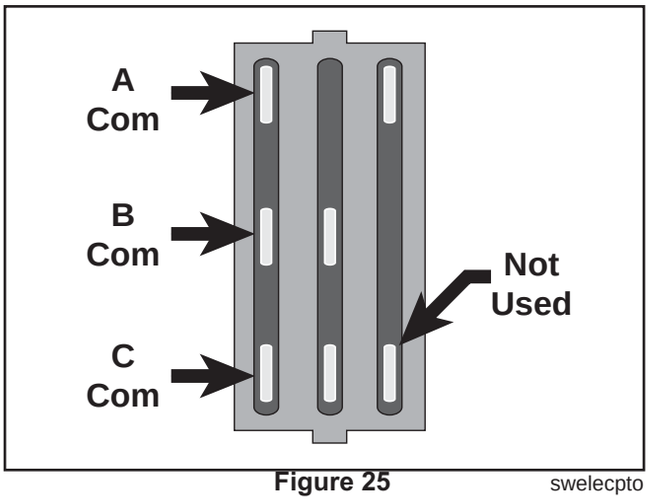


Figure 25 swelecpto

Testing

1. Remove the PTO switch from the tractor.

2. Connect an ohmmeter across each pair of terminals and check for continuity with the switch in the “OFF” and “ON” positions.

3. Replace the switch if the results do not correspond to the description given above.

Switch, PTO (Manual PTO)

Location

The manual PTO Switch is located under the hood near the base of the actuation rod (Figure 26).

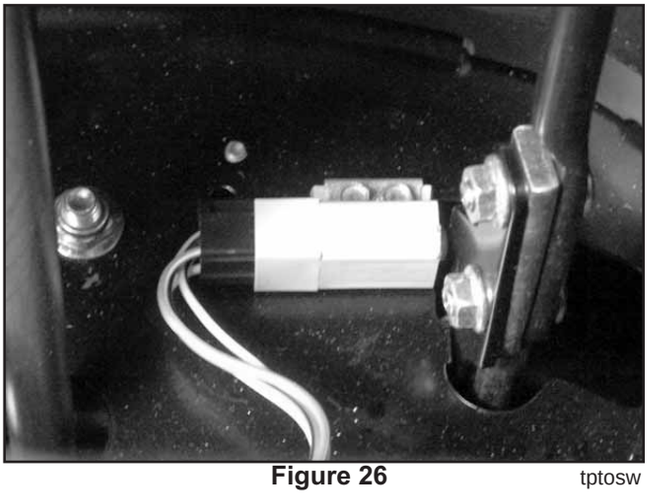


Figure 26 tptosw

Purpose

Part of the safety interlock system:
1. Prevents the engine from cranking if the PTO lever is in the engaged position.

2. Shuts the engine down if the operator gets off the seat with the PTO lever in the engaged position, or the shift lever is placed in the reverse position without activating the reverse caution mode.

How It Works

This double pole plunger type switch has four terminals, one pair normally open, and the other pair normally closed. When the PTO lever is in the off position the plunger is depressed.

Testing

1. Disconnect the switch from the wiring harness.

2. Using a an ohmmeter, follow the procedures listed below (Figure 27):

Note: Terminals on actual switch not labeled.

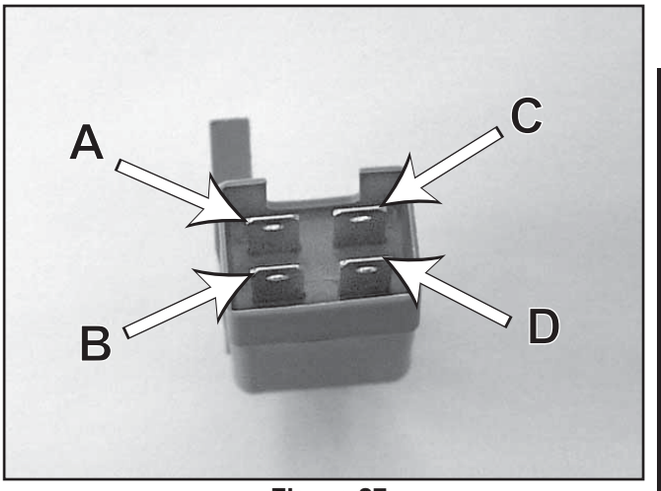


Figure 27 manptoterm

Plunger Not Depressed	Plunger Depressed
A&B Terminals – Closed Circuit – Continuity	A&B Terminals – Open Circuit – No Continuity
C&D Terminals – Open Circuit – No Continuity	C&D Terminals – Closed Circuit – Continuity

Systems Indicator Monitor / Hourmeter

Purpose

Lights on the monitor panel are used to indicate the position of the brake and PTO controls, as well as the condition of the battery charging system. The LCD at the center of the panel displays accumulated engine hours and flashes when maintenance is due (Figure 28).

Figure 28 start sol

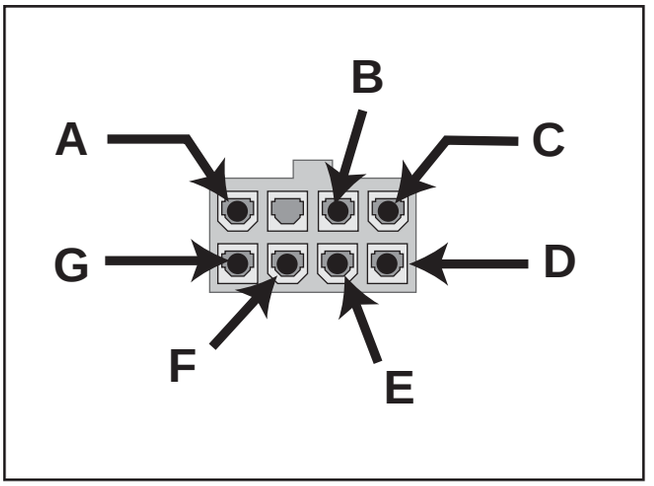


Figure 29 hourmeterplug

How It Works

The Systems Indicator Monitor/Hourmeter is a solid state device. Battery voltage from the A1 terminal of the keyswitch powers the unit and runs the hourmeter. An internal circuit monitors battery voltage and causes the battery LED to light when battery voltage falls below a specified level. Additional sensing circuits monitor the status of the brake and PTO switches. When the brake is applied or the PTO is engaged, contacts in the switches close, completing the sensing circuit and lighting the appropriate LED.

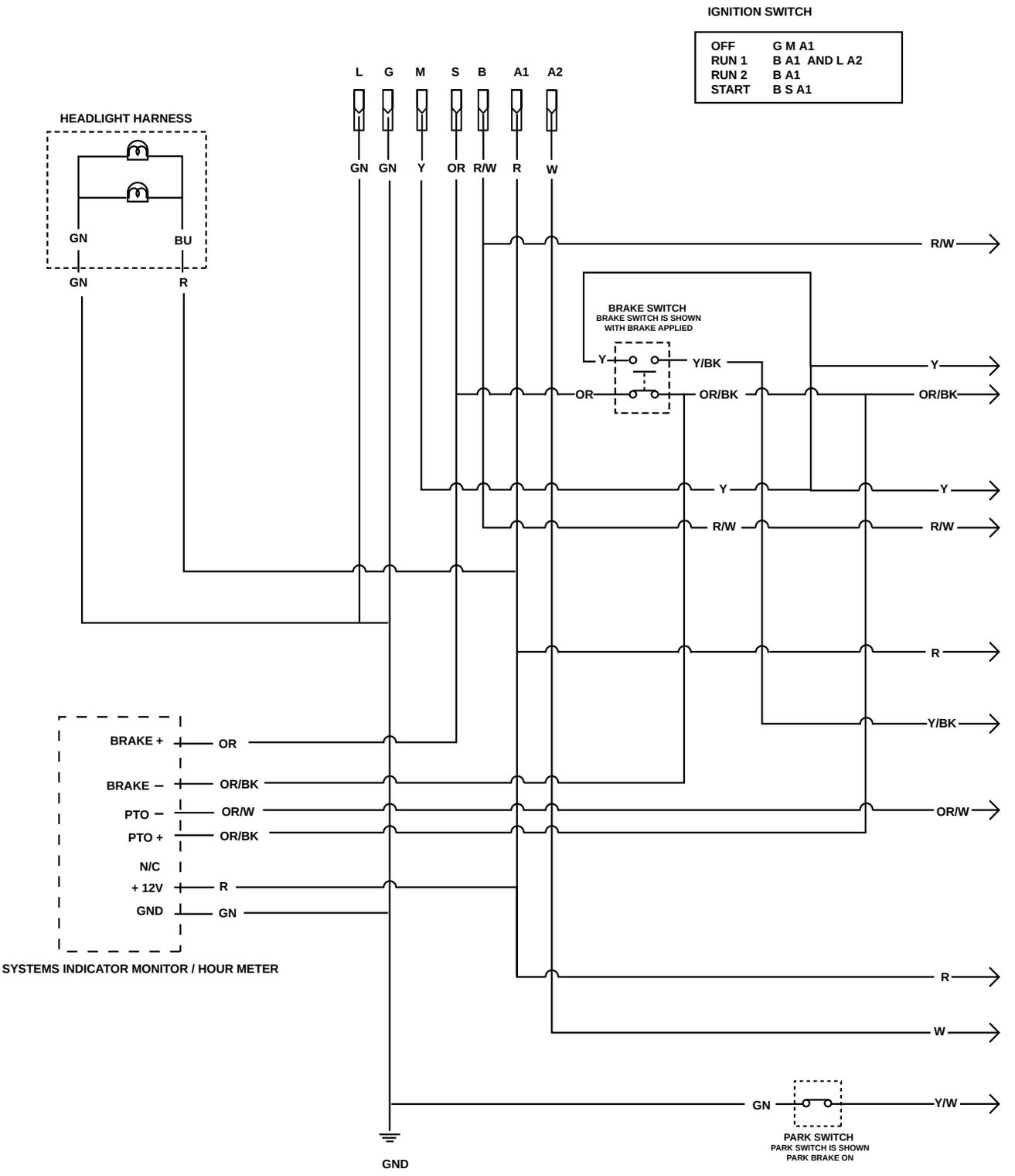
Testing

Testing the Systems Indicator Monitor/Hourmeter directly is not practical. If it is not functioning correctly, test the inputs to the unit at the wiring harness connector and replace the monitor if the inputs are correct.

Note: The following tests are performed with the engine off.

LX420 Information List (2006)
LX425 Information List (2007)
LX460 Information List (2006)
LX465 Information List (2007)

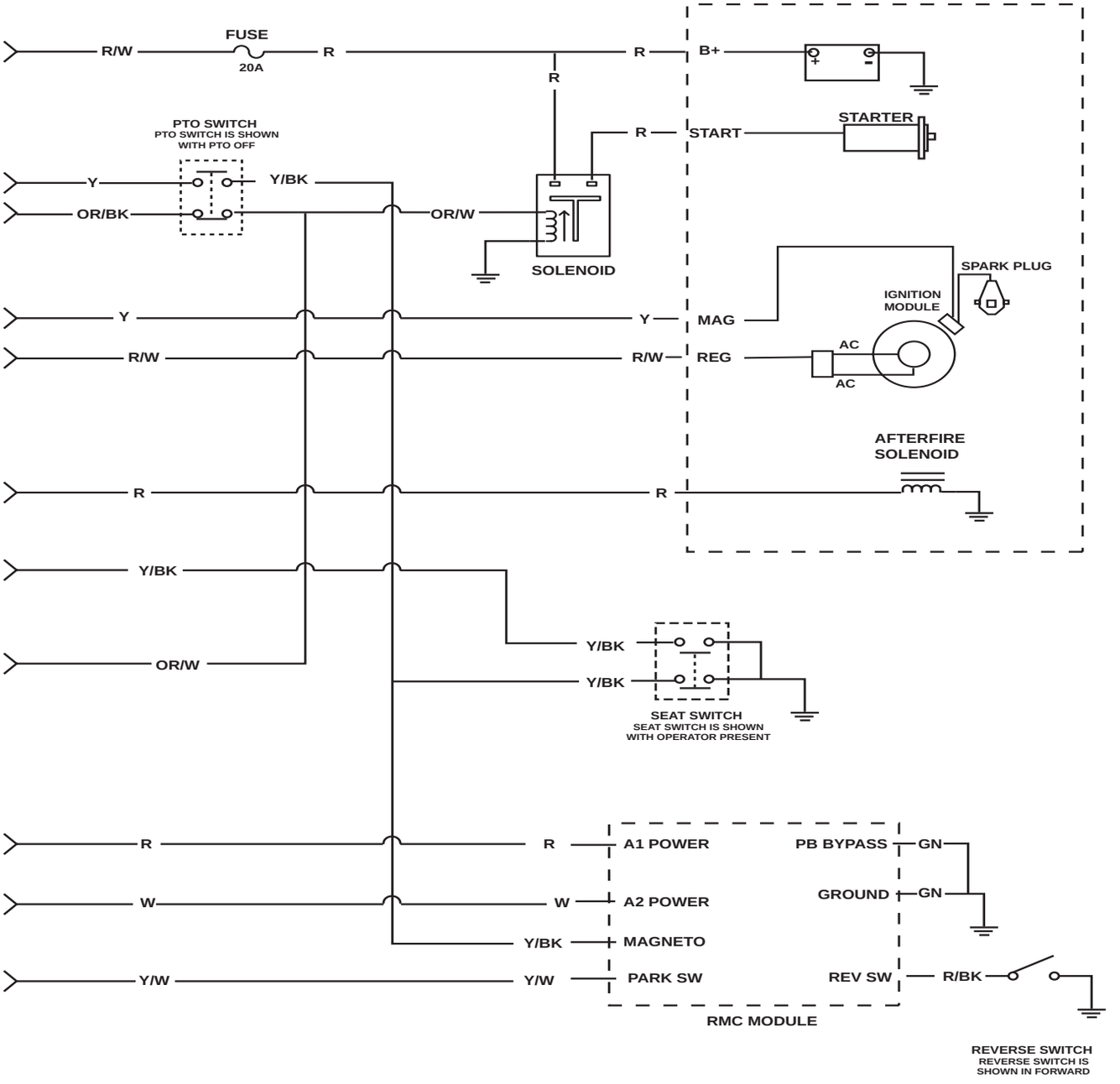
Wiring Diagram



Wiring Diagram

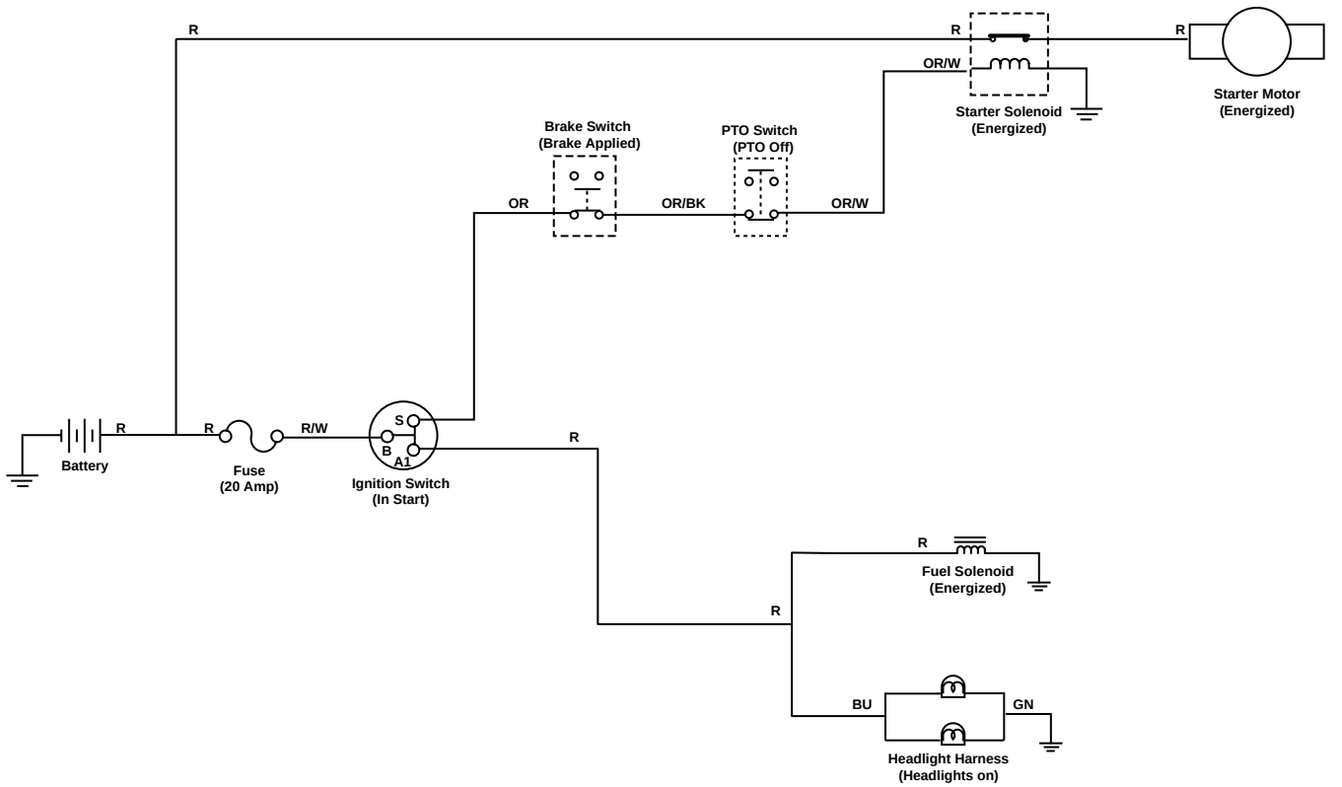
WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK



Wiring Diagram

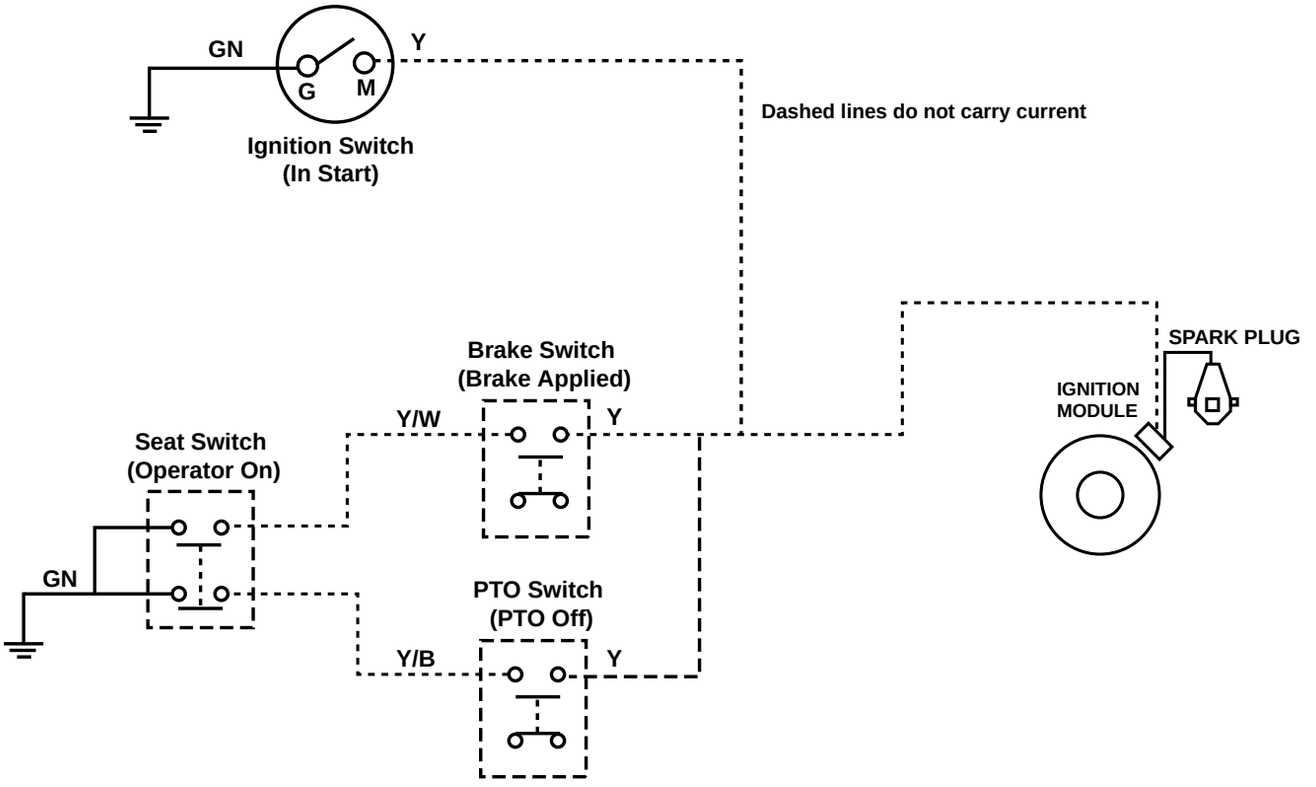
Starter Motor Circuit
(ignition switch in “start”)



WIRE COLOR CODES					
BN	BROWN	PK	PINK	OR/BK	ORANGE/BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE/WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW/WHITE
W	WHITE	T	TAN	Y/BK	YELLOW/BLACK
PUR	PURPLE	GN	GREEN	R/W	RED/WHITE
R	RED	OR	ORANGE	R/BK	RED/BLACK

Circuits

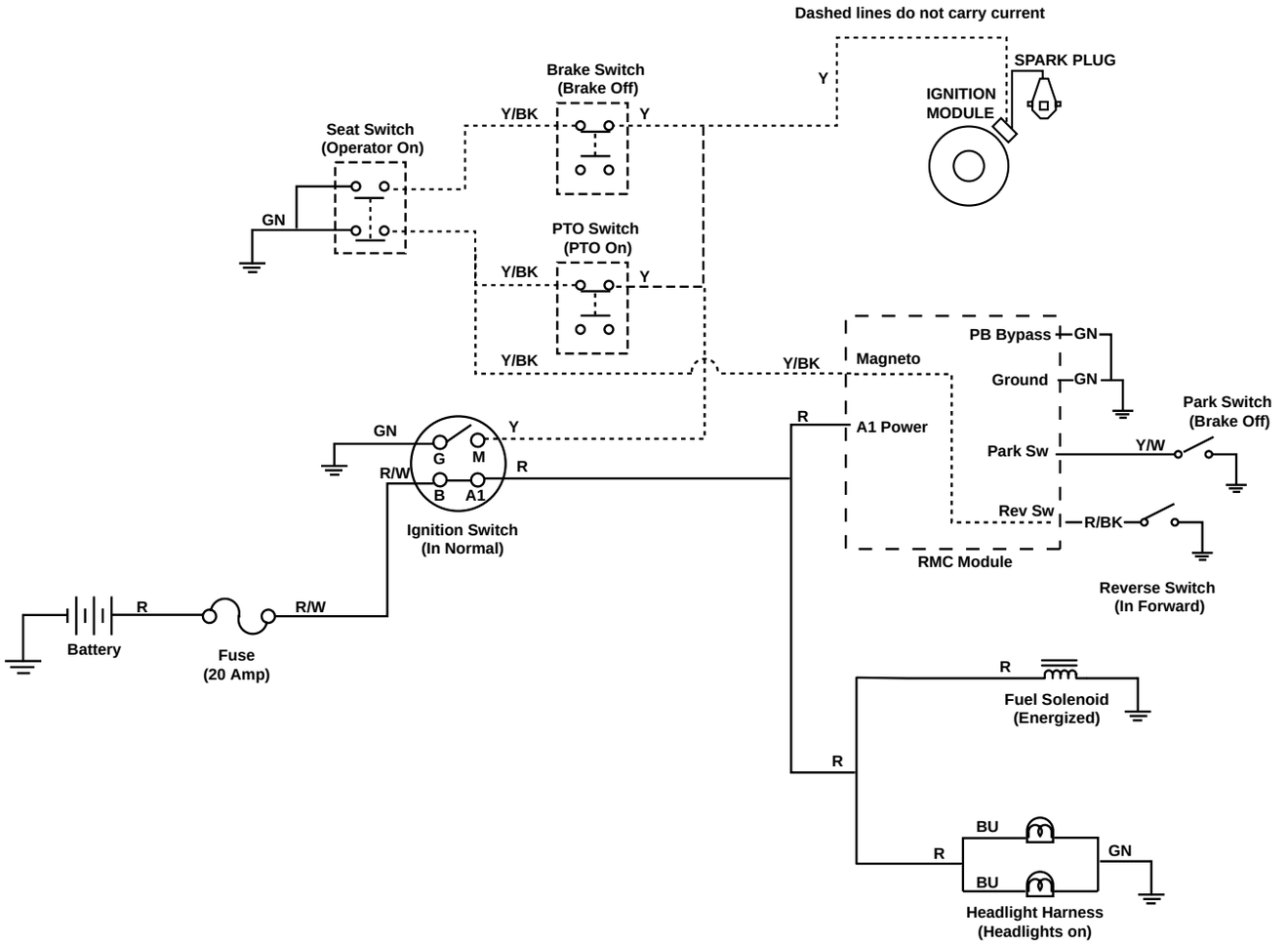
Spark Circuit
(ignition switch in "start")



WIRE OLOR ODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK

Spark Circuit
(ignition switch in "Normal", PTO "on")

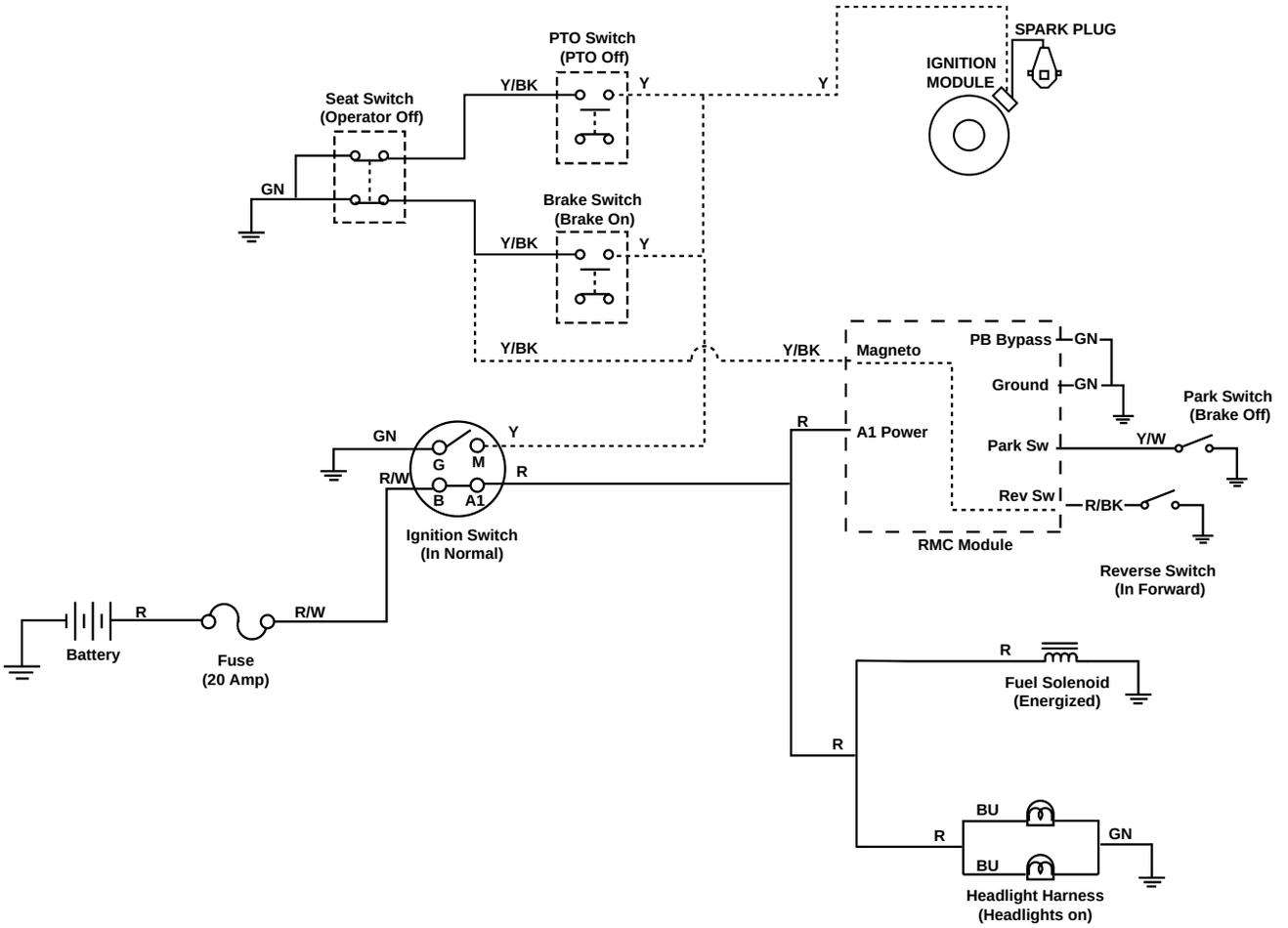


WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK

Spark Circuit

(ignition switch in "Normal", operator "off", brake "on", PTO "off")

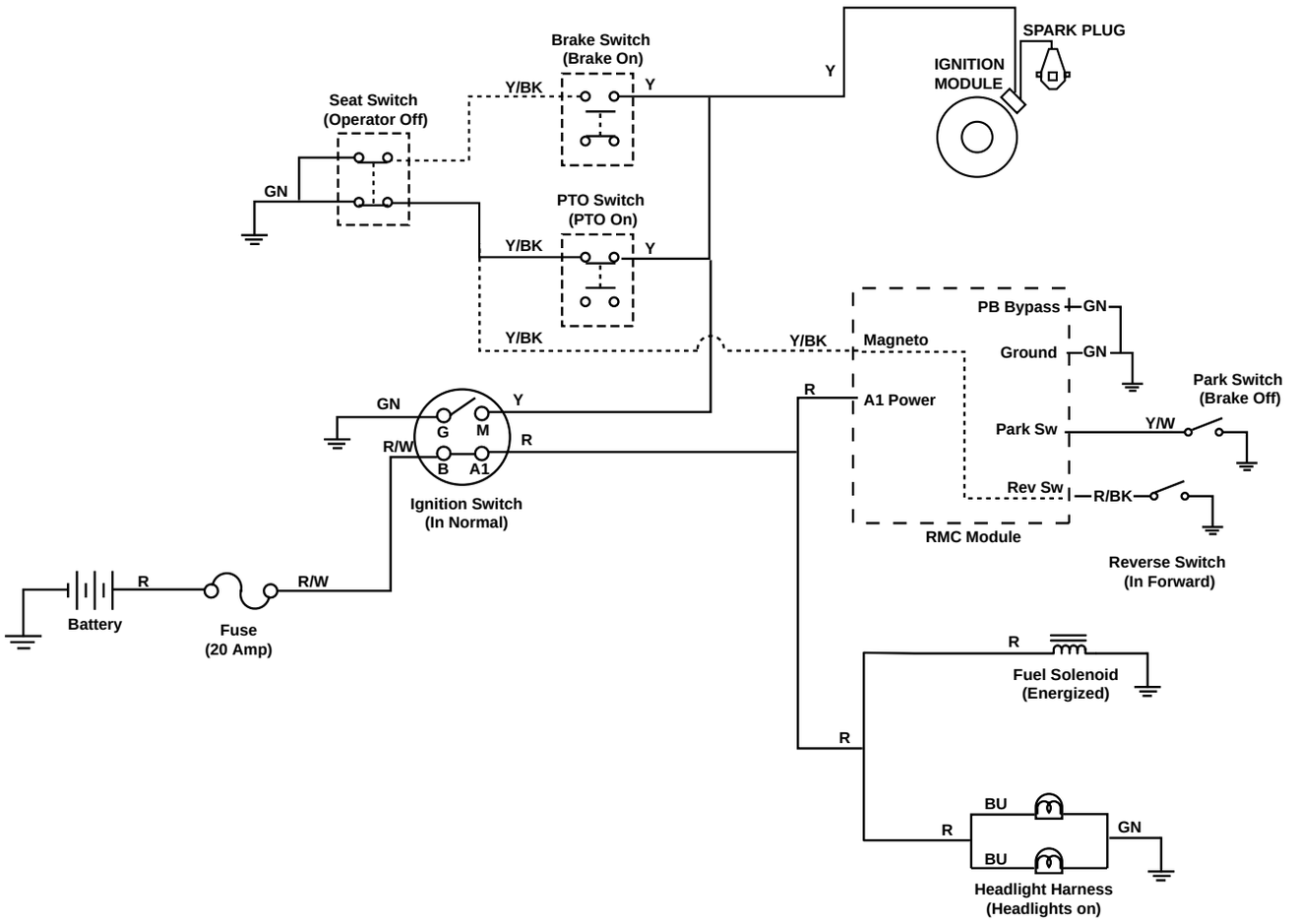


WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK

Spark Circuit

(ignition switch in "Normal", operator "off", brake "on", PTO "on")

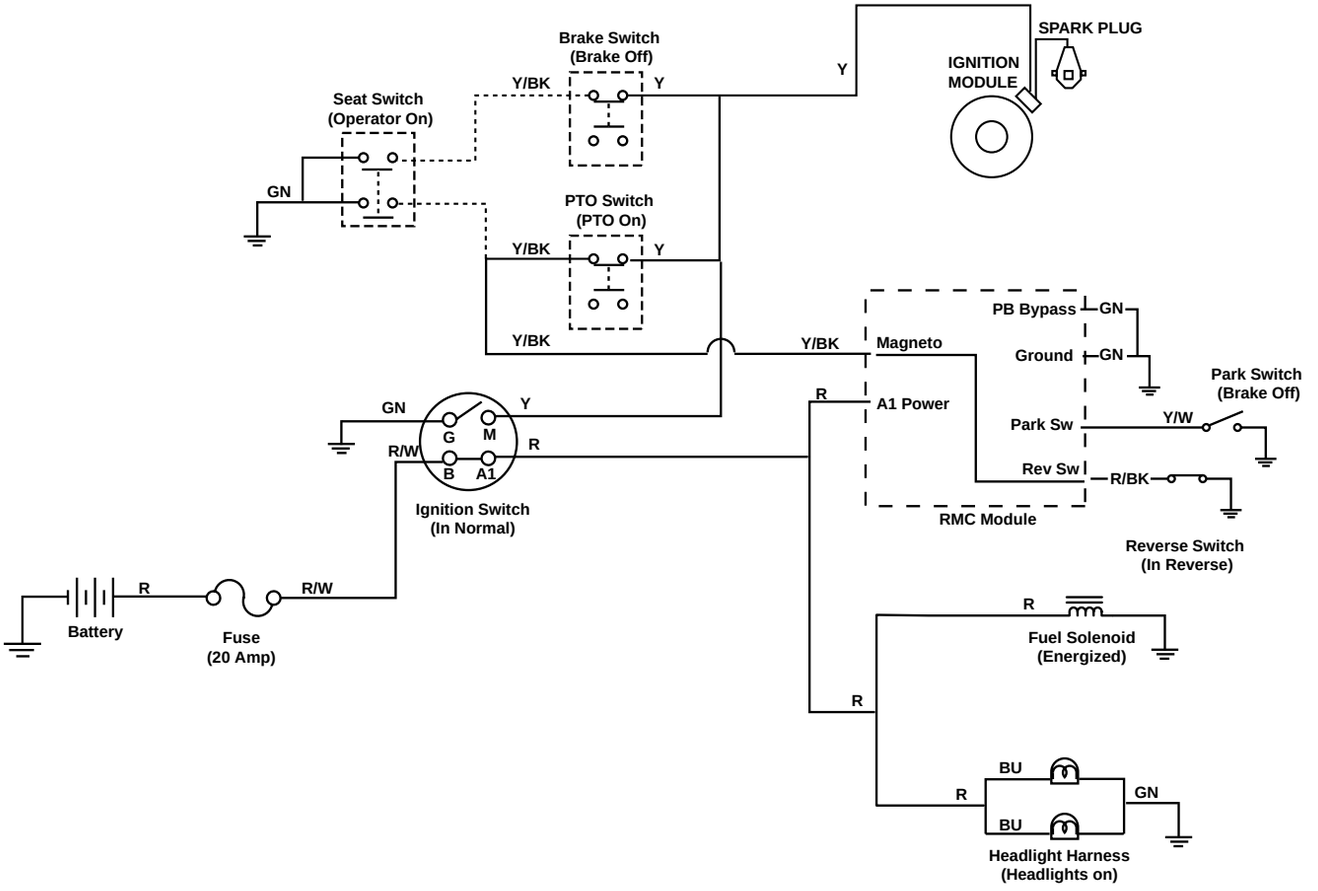


WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK

Reverse Operating System

(ignition switch in "Normal", PTO "on", transmission in "reverse")

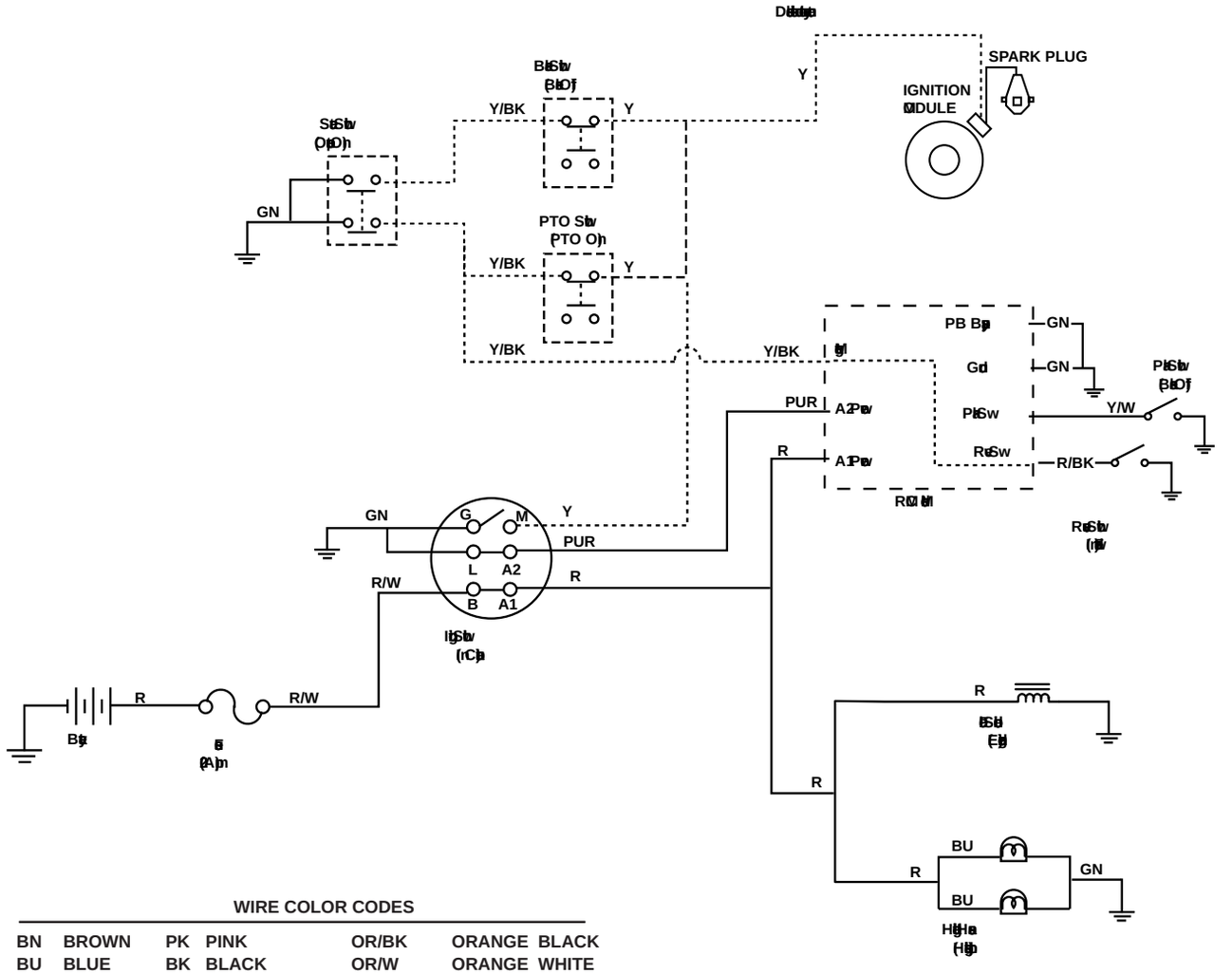


WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK

Reverse Oprerating System

(ignition switch in "Reverse Caution", PTO "on")



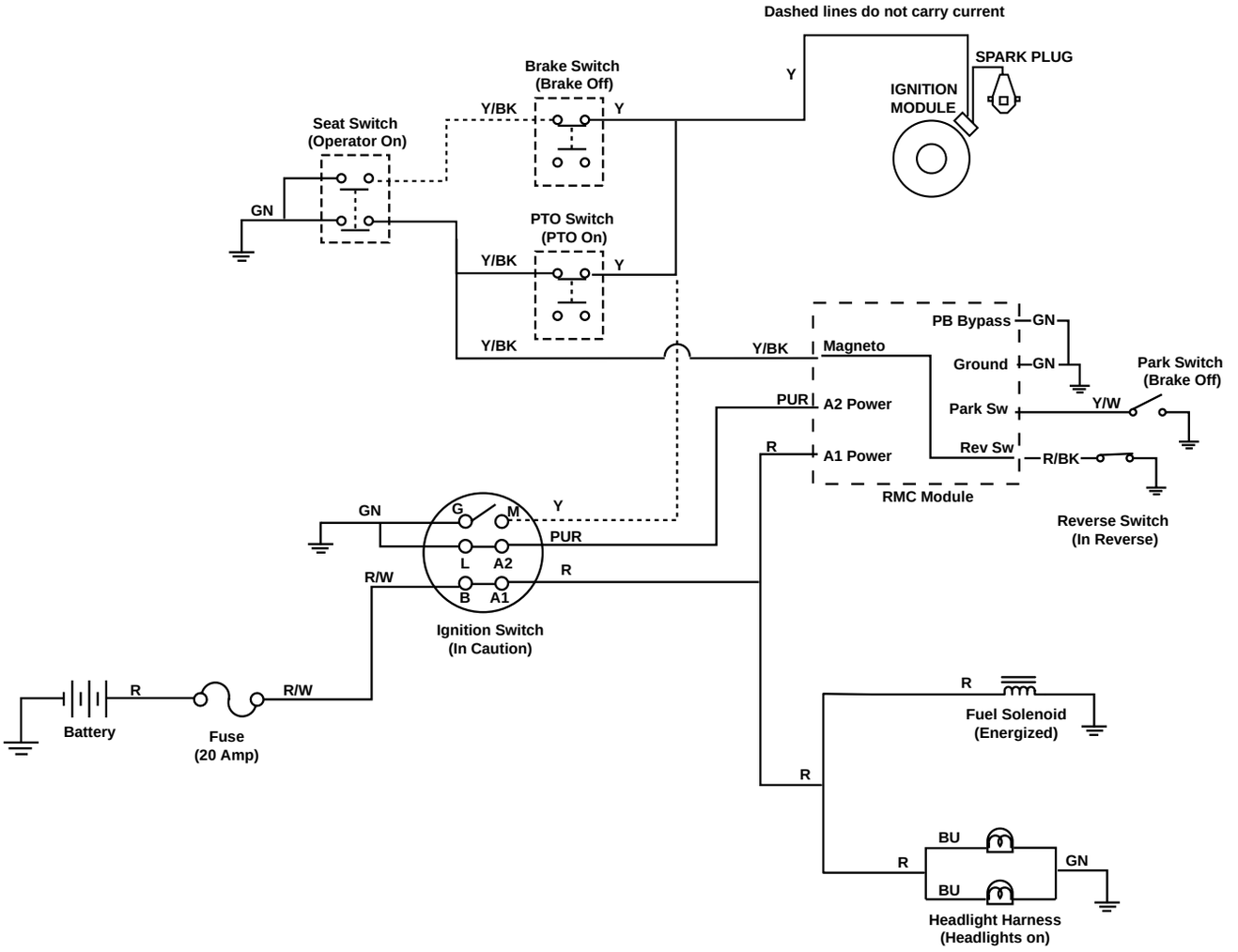
WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK

Circuits

Reverse Operating System

(ignition switch in "Reverse Caution", transmission in "reverse", PTO "on")

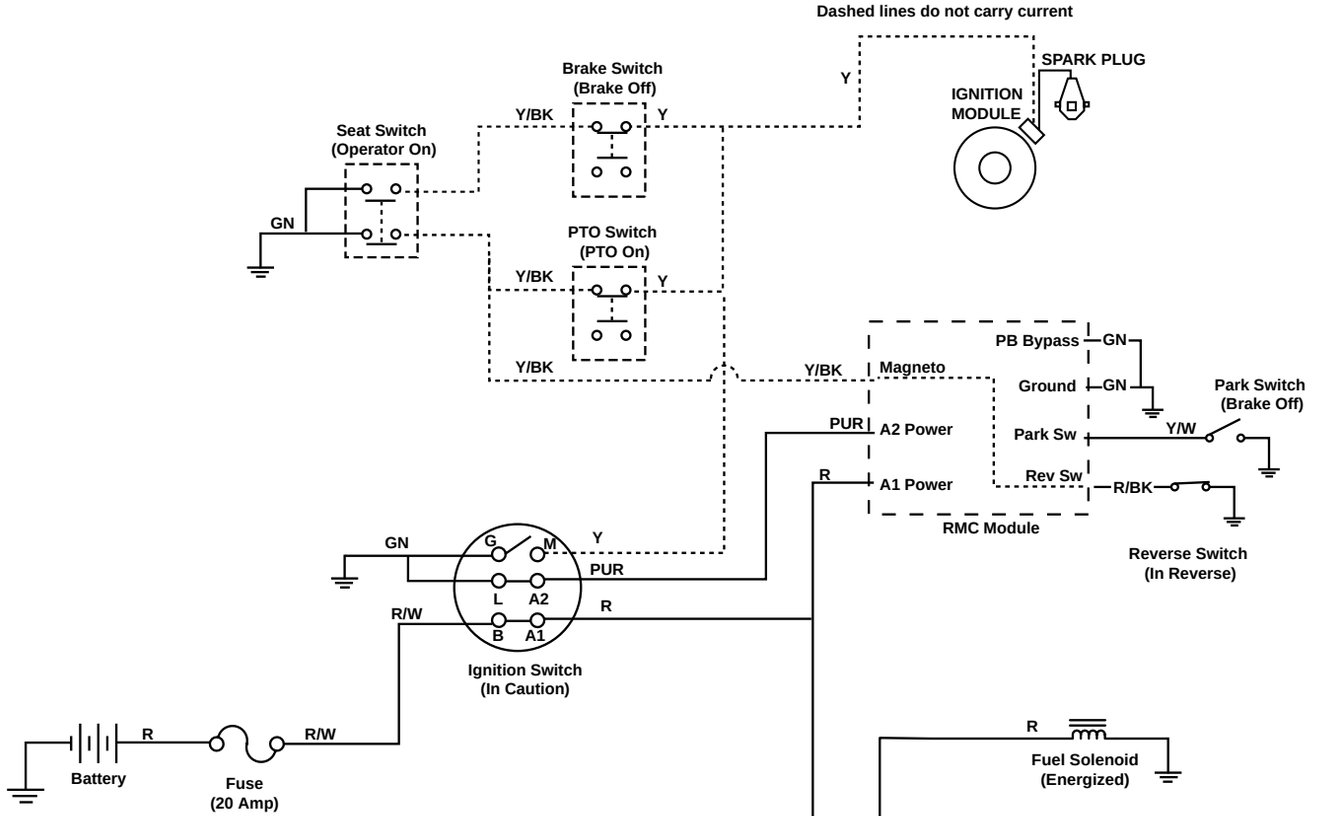


WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK

Reverse Operating System

(ignition switch in "Reverse Caution", RMC "activated", transmission in "reverse", PTO "on")



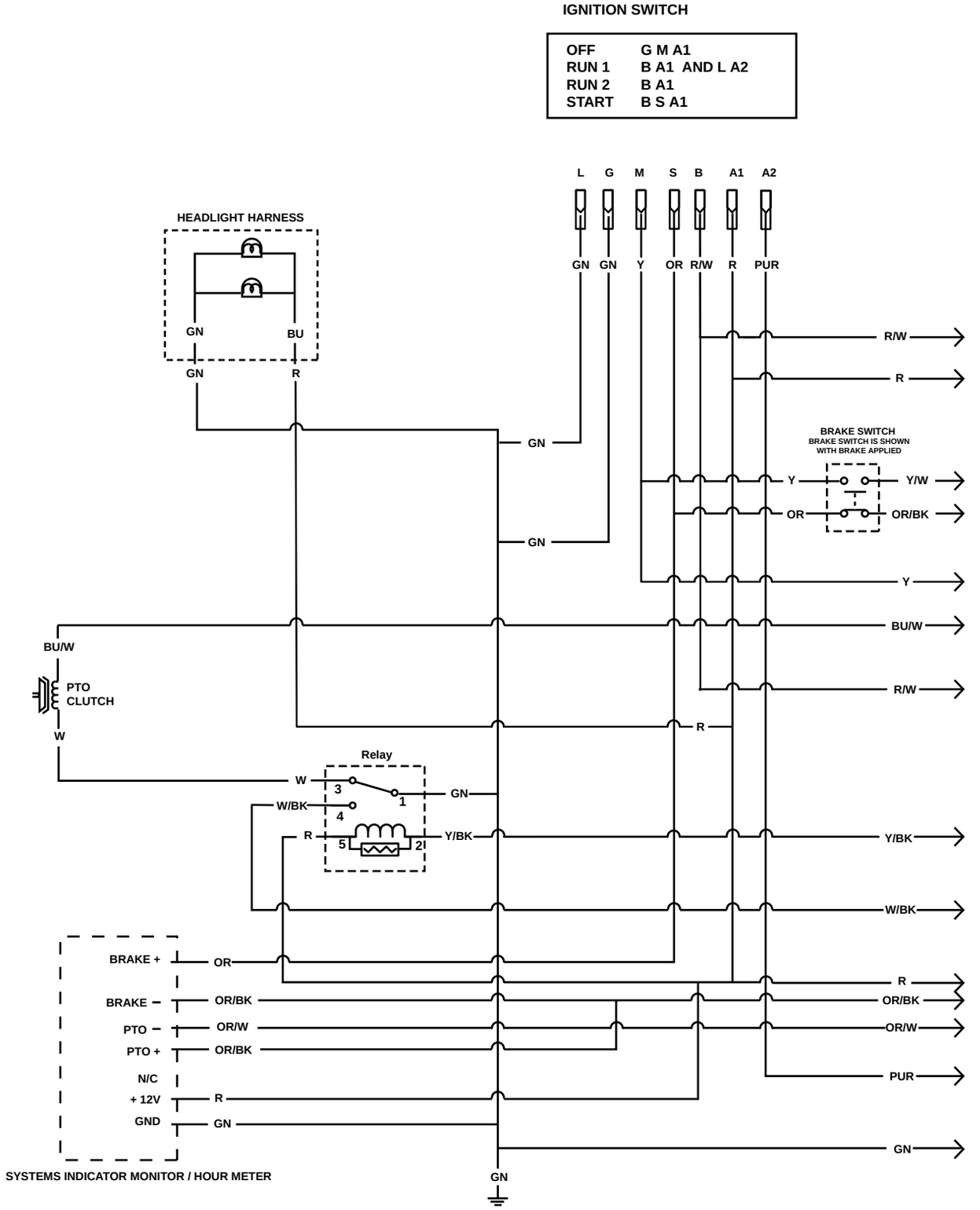
WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK

Circuits

LX500 Information List (2006 - 2007)
GT2100 Information List (2006 - 2007)
GT2100 Information List (2006 - 2007)
GT2100 Information List (2006 - 2007)

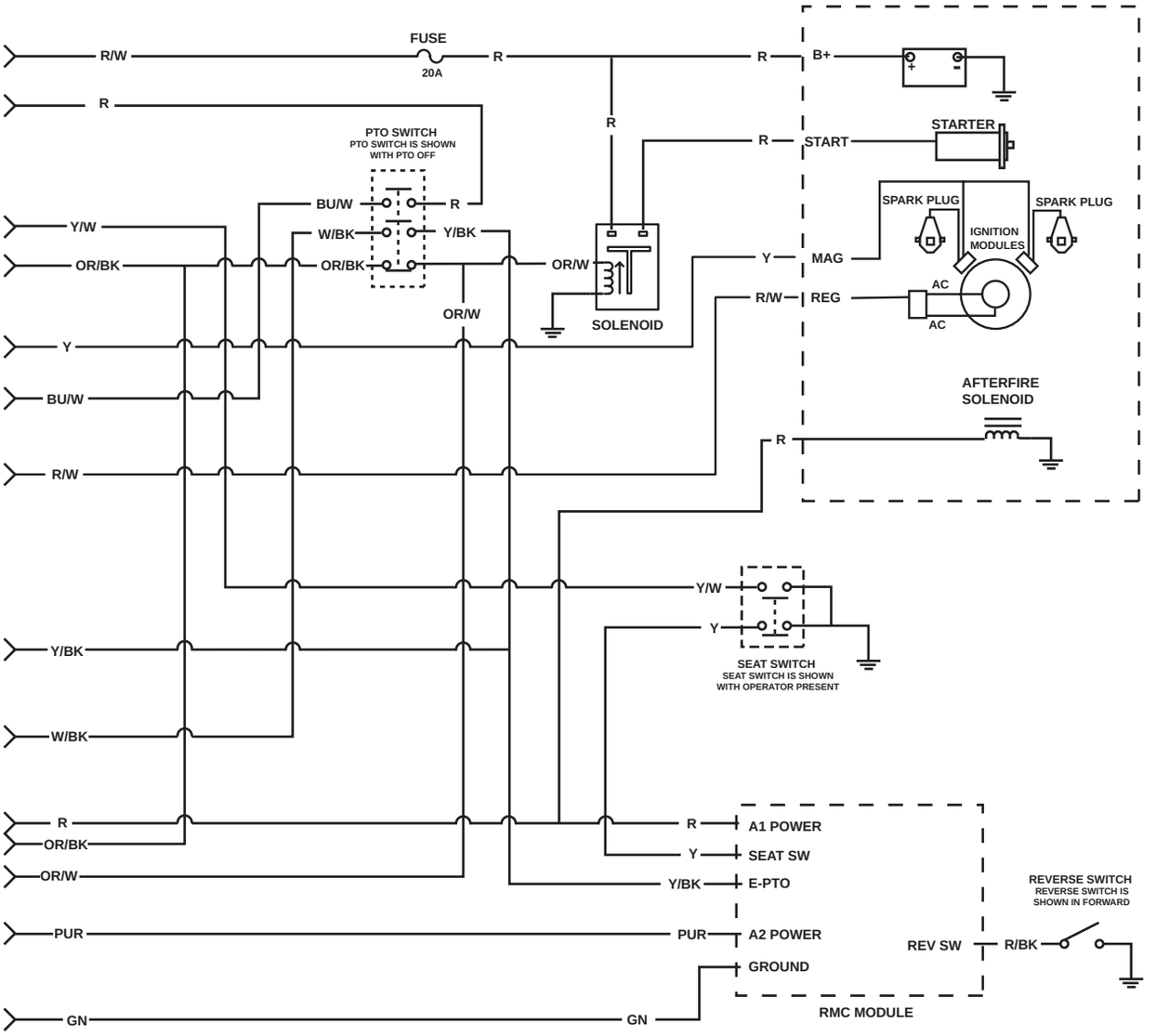
Wiring Diagram



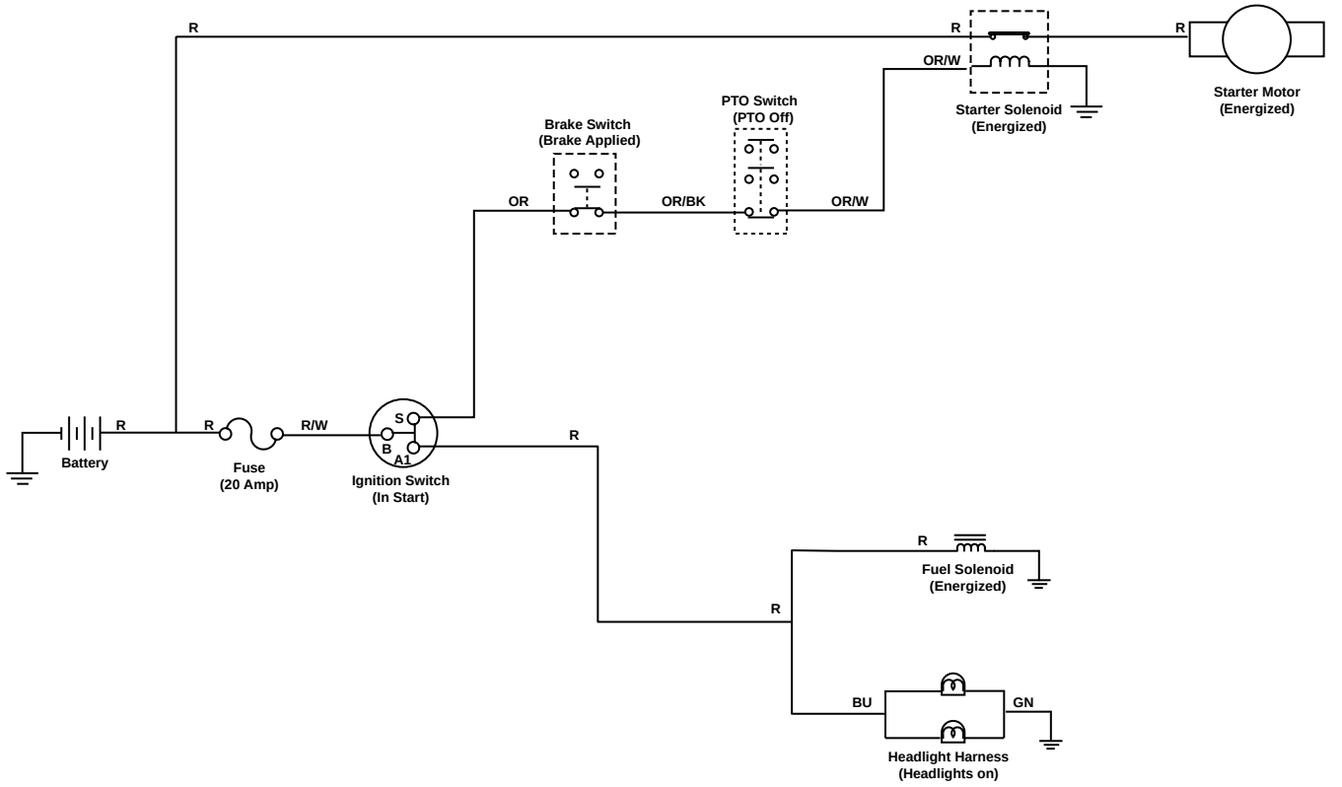
Wiring Diagram

WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK



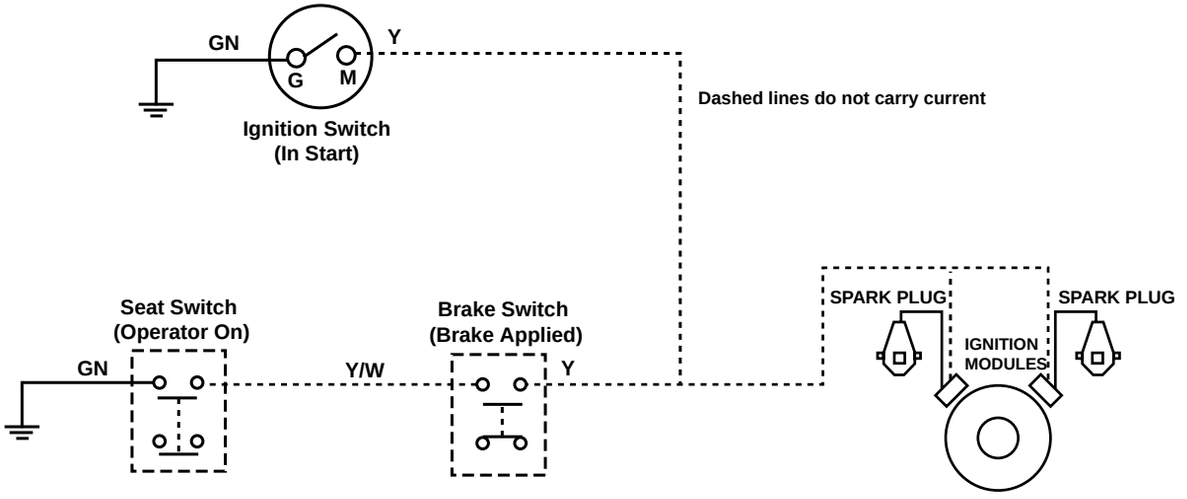
Starter Motor Circuit
(ignition switch in “start”)



WIRE COLOR CODES					
BN	BROWN	PK	PINK	OR/BK	ORANGE/BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE/WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW/WHITE
W	WHITE	T	TAN	Y/BK	YELLOW/BLACK
PUR	PURPLE	GN	GREEN	R/W	RED/WHITE
R	RED	OR	ORANGE	R/BK	RED/BLACK

Circuits

Spark Circuit
(ignition switch in "start")

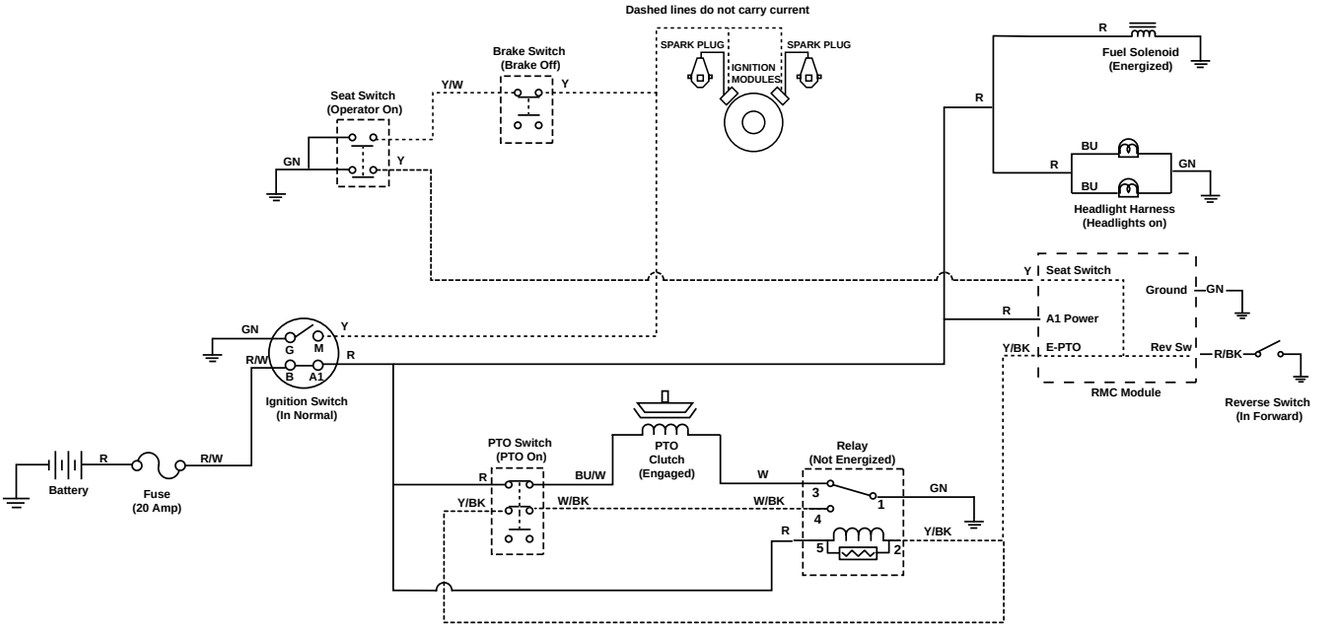


WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE/BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE/WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW/WHITE
W	WHITE	T	TAN	Y/BK	YELLOW/BLACK
PUR	PURPLE	GN	GREEN	R/W	RED/WHITE
R	RED	OR	ORANGE	R/BK	RED/BLACK

Circuits

Spark Circuit
(ignition switch in "Normal", PTO "on")



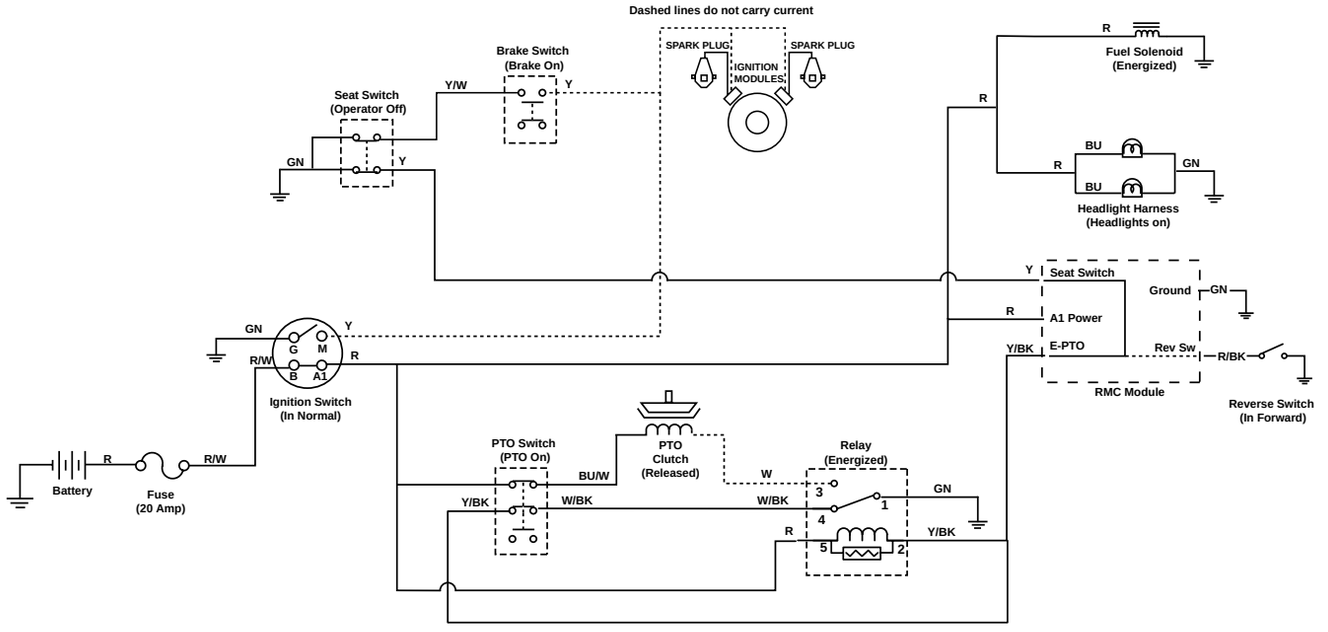
WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK

Circuits

PTO Circuit

(ignition switch in "Normal", operator "off", brake "on")

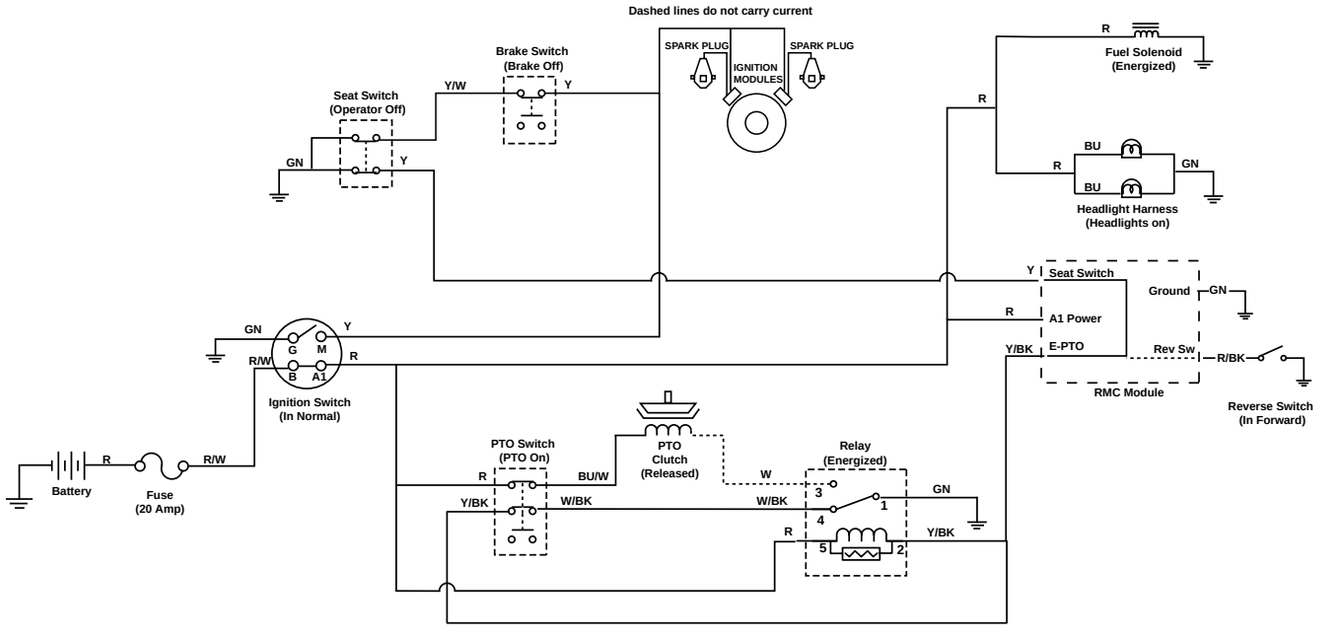


WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK

PTO Circuit

(ignition switch in "Normal", operator "off", PTO "on")

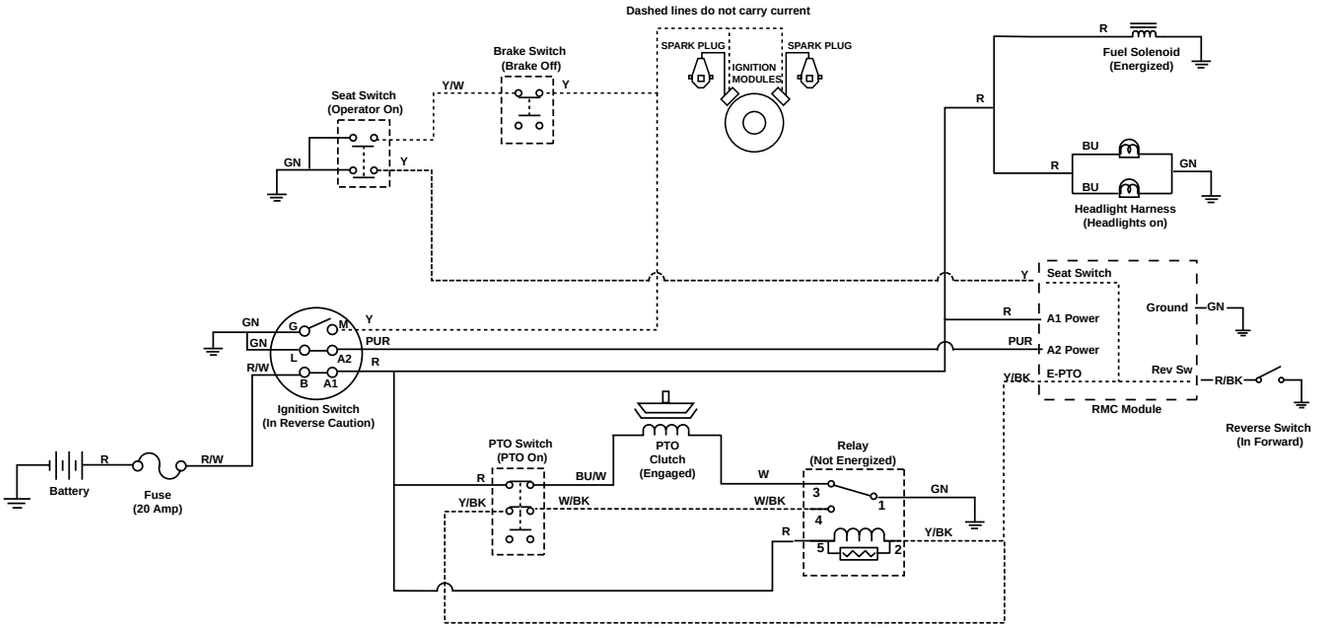


WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK

Reverse Operating System

(ignition switch in "Reverse Caution", PTO "on", transmission in "foward")



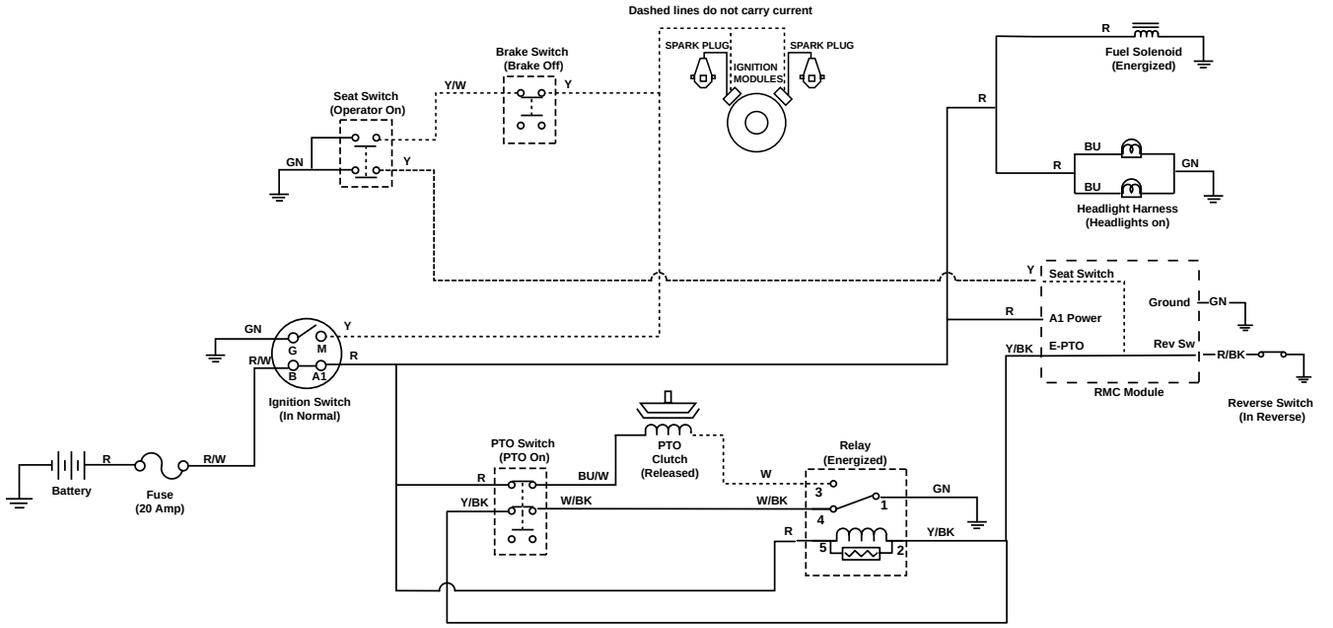
WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK

Circuits

Reverse Operating System

(ignition switch in "Normal", PTO "on", transmission in "reverse")



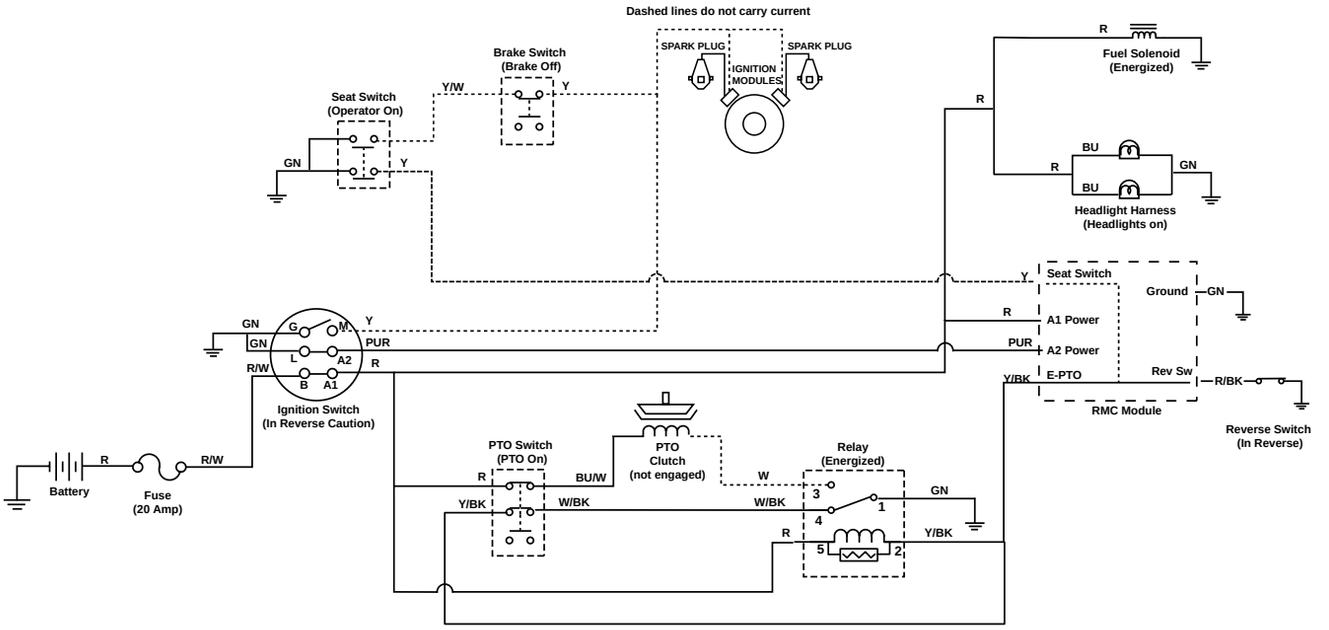
WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK

Circuits

PTO Circuit

(ignition switch in "Reverse Caution", PTO "on", transmission in "reverse")

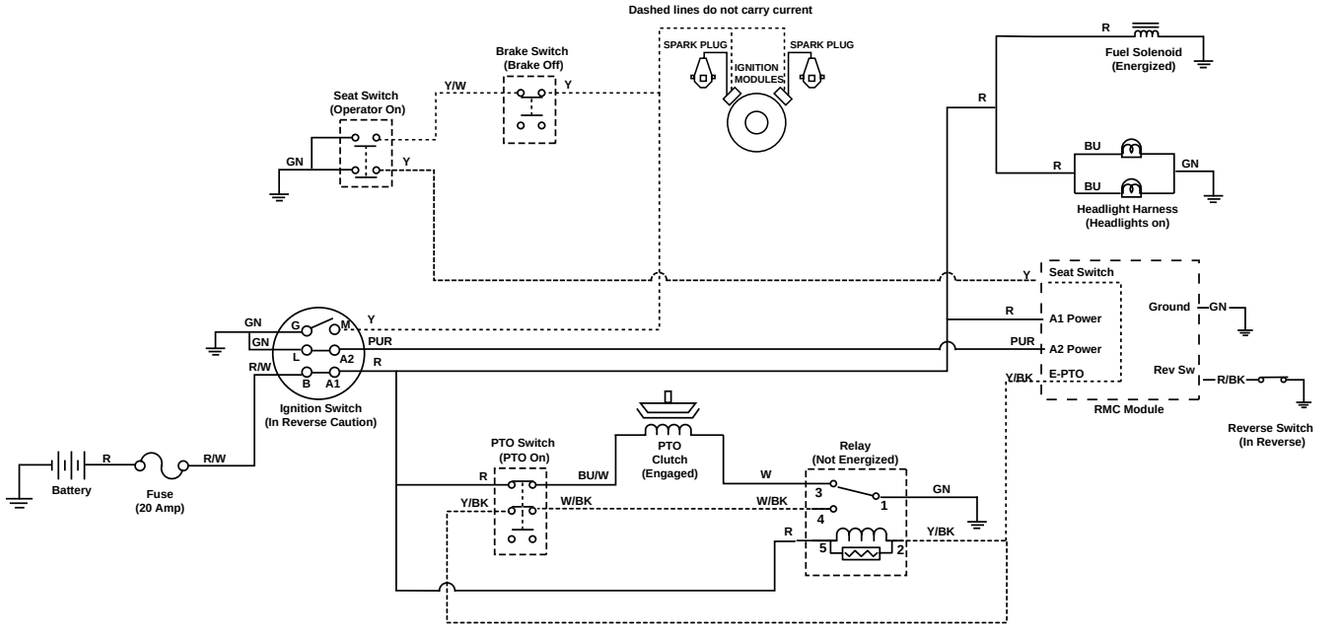


WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK

PTO Circuit

(ignition switch in "Reverse Caution", RMC "activated", PTO "on", transmission in "reverse")



WIRE COLOR CODES

BN	BROWN	PK	PINK	OR/BK	ORANGE BLACK
BU	BLUE	BK	BLACK	OR/W	ORANGE WHITE
GY	GRAY	Y	YELLOW	Y/W	YELLOW WHITE
W	WHITE	T	TAN	Y/BK	YELLOW BLACK
PUR	PURPLE	GN	GREEN	R/W	RED WHITE
R	RED	OR	ORANGE	R/BK	RED BLACK