



80V Zero Turn Mower Troubleshooting Guide



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WARNING

**THIS MATERIAL IS INTENDED ONLY FOR
TECHNICIANS TRAINED IN ELECTRICITY!**

**Technicians should wear personal protective equipment,
such as rubber gloves, safety glasses, and hearing protection.**

Dangerous voltages /currents are present.

EXERCISE CAUTION AT ALL TIMES!

This guide assumes knowledge of basic electrical equipment such as
a [DMM \(Digital Multi Meter\)](#) to measure voltage, current, resistance, continuity, and diodes.

Using this Document

- Any [blue](#) text can be clicked on to jump directly to the page of that topic. (This document is also printer-friendly, so you can have it in front of you while servicing the mower.) If you print this document, we recommend printing it in *landscape mode* and in **color**
- A [Block Diagram](#) shows the general flow to visualize how the mower is connected and a chart shows general symptoms/solutions for repairs.
- [Electronics tips](#), [Terminology](#), and [Using a Digital Multi-Meter \(DMM\)](#) are included for the technician familiar only with gas machines.

ZTR Mower Overview

The RYOBI ZTR is completely electrical, consisting of 4 (30" & 42" models) or 5 (54" model) *brushless* motors (one for each blade and one for each rear wheel) and a controller for each motor.



RYRM8010
30" ZTR Mower

4 Brushless Motors
(2) Drive – (2) Deck



RYRM8021
42" ZTR Mower

4 Brushless Motors
(2) Drive – (2) Deck



RYRM8034
54" ZTR Mower

5 Brushless Motors
(2) Drive – (3) Deck



OP801720
80v 10Ah Battery



OP4012A1
40v 12Ah Battery



OP80RM
80v Super Charger

Brushless Motors Overview

Brushless motors operate quite differently than brushed motors with which you may be used to working. (e.g., a starter motor).

A *brushed* motor, like the one pictured to the right, can be quickly tested by applying voltage to the two terminals.



Brushed Motor Example



Brushless Motor Example
(Not actual motor in ZTRs)

Brushless motors can be recognized by 3 wires. These 3 wires require a *controller* to operate them and to “fire” these 3 phases in a precise fashion, like spark plugs firing a 3-cylinder gas motor.

Applying a voltage directly to these phases will cause damage.

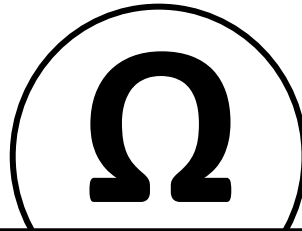
Digital Multimeter (DMM)

A DMM is a standard diagnostic tool that serves as a voltmeter, ammeter, and ohmmeter. We use this tool for various tests throughout this guide.



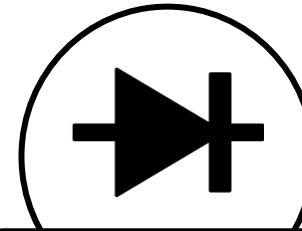
VOLTAGE is potential energy. For the purposes of this guide, we only deal with DC voltage, so make sure your DMM is set to the appropriate symbol.

When measuring **DC Voltage**, touch the **BLACK** probe to the ground and touch to the **RED** probe to voltage being measured.

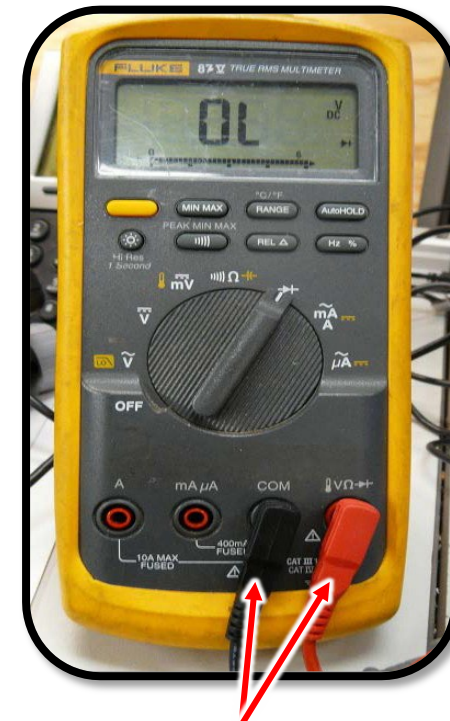


RESISTANCE is the opposition to flow of current. We will use resistance when measuring the **continuity** of a wire or connection for breaks.

When measuring **Resistance**, **Continuity**, or a **Diode**, touch the **BLACK** probe to one point and touch to the **RED** probe to the other point.



A **DIODE** is a device that allows current to flow in only one direction and blocks flow in the other direction. This mode is used to test diodes.



Please note where the **RED** and **BLACK** test leads are plugged in on the picture to the right.

COMPONENT LOCATIONS

Component Locations

RYRM8010 30" ZTR Mower



***NOTE**
Beeper, Drive Motor Controllers, Deck Motor Controllers, and Battery Booster are accessed via the Access Port.

Component Locations

RYRM8021 42" ZTR Mower
RYRM8034 54" ZTR Mower

Seat Switch
under seat

Access Port*
under seat

Brake Switch

Battery Booster
under Battery Box

Headlights

Charging Port

LCD Panel Display

iDRIVE Joystick

Control Panel

DC-DC Converter,
Main Relay,
& Mixing Board

***NOTE**
Beeper, Drive Motor Controllers,
Deck Motor Controllers, and TIC
are accessed via the Access Port.



Batteries Locations

RYRM8010 30" ZTR Mower



40v Batteries (2)

80v Batteries

**RYRM8021 42" ZTR Mower
RYRM8034 54" ZTR Mower**

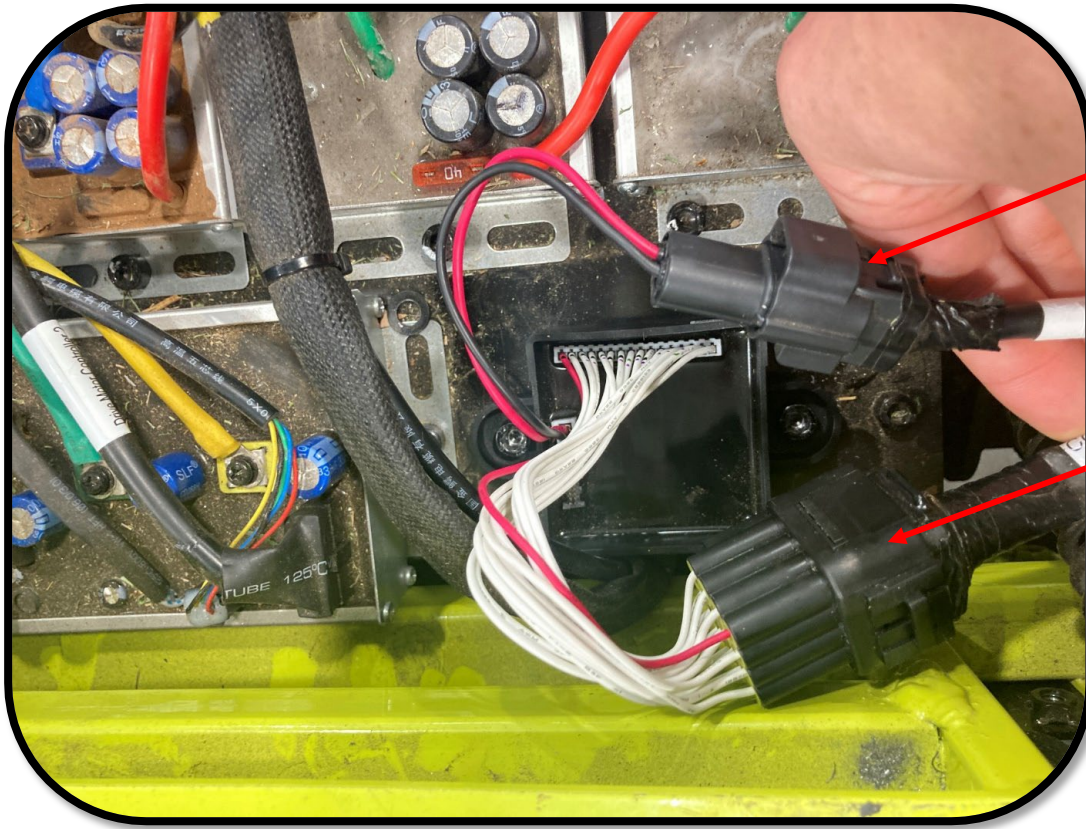


40v Battery (1)

40v Batteries (3)

80v Batteries

TIC Connections

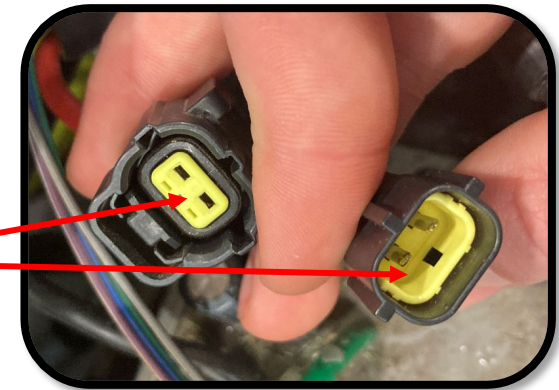


Pre-Charge Line

The TIC has 2 connections to the mower.

Main TIC Connector

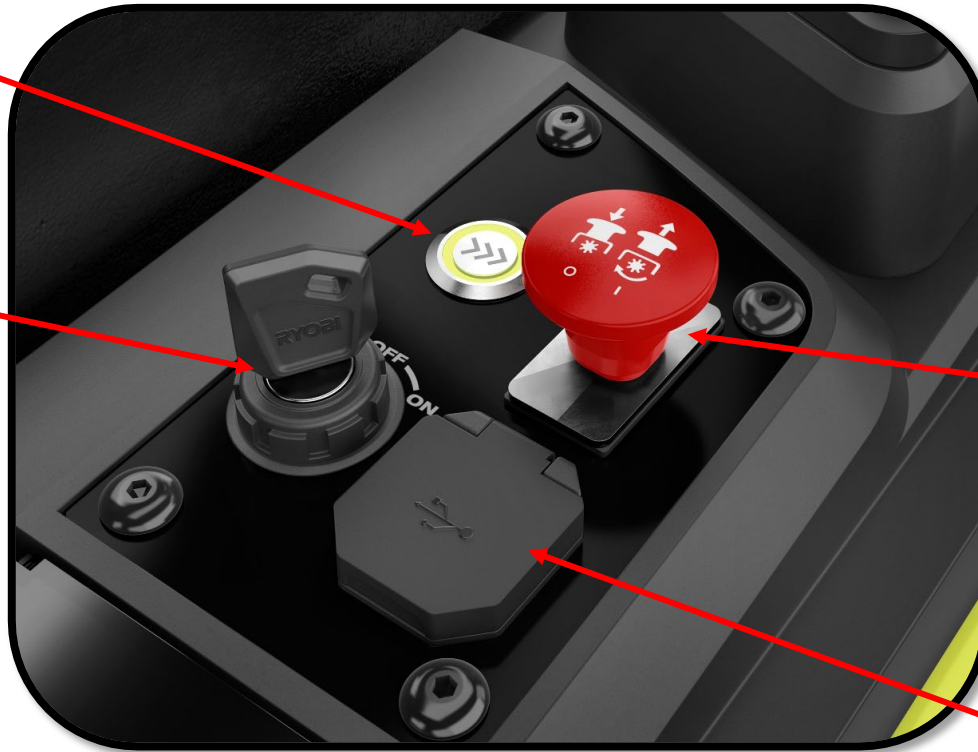
HELPFUL TIP
There are 2 yellow tabs in the Pre-Charge Line Connectors. These can fall out during repair. Make sure they are reinserted correctly if they do fall out.



Control Panel

Bagger Boost
30" & 42"
models only!

Key Switch

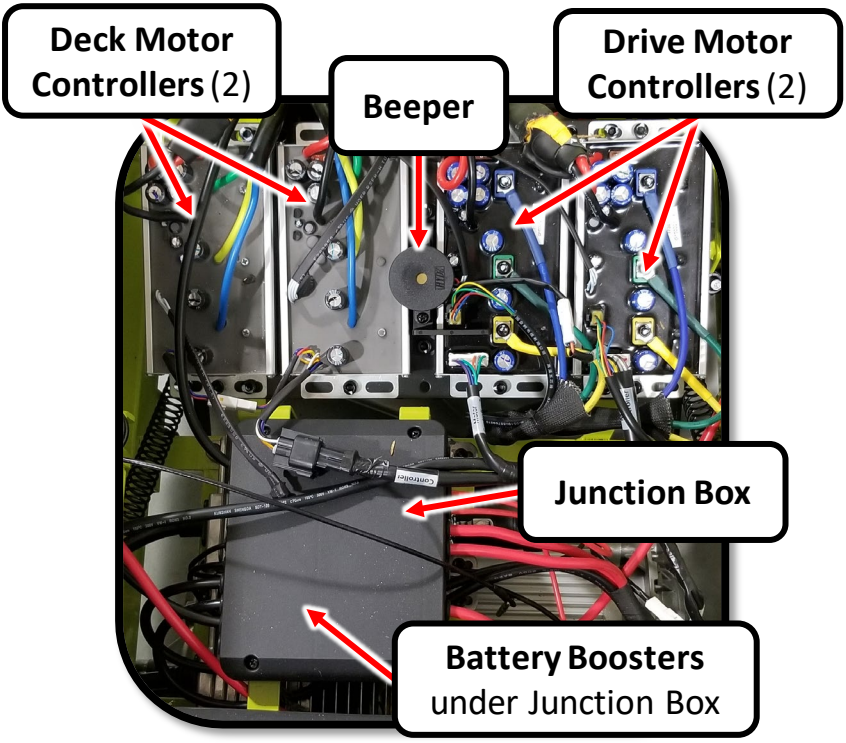


Blade Power Switch
a.k.a. "PTO" Switch

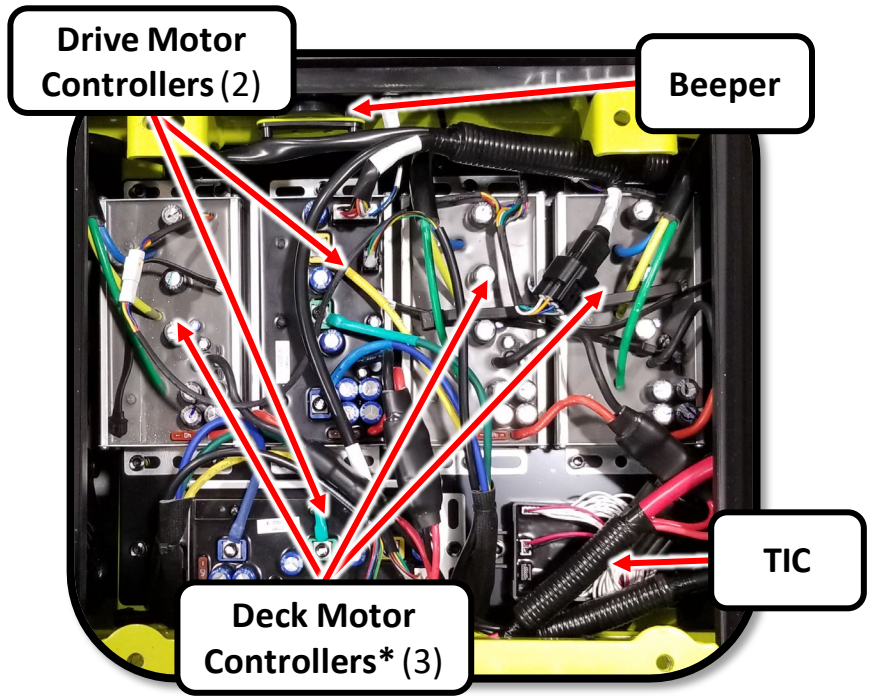
USB Charging Port

Controller Locations

MOWER FRONT



RYRM8010 30" ZTR Mower

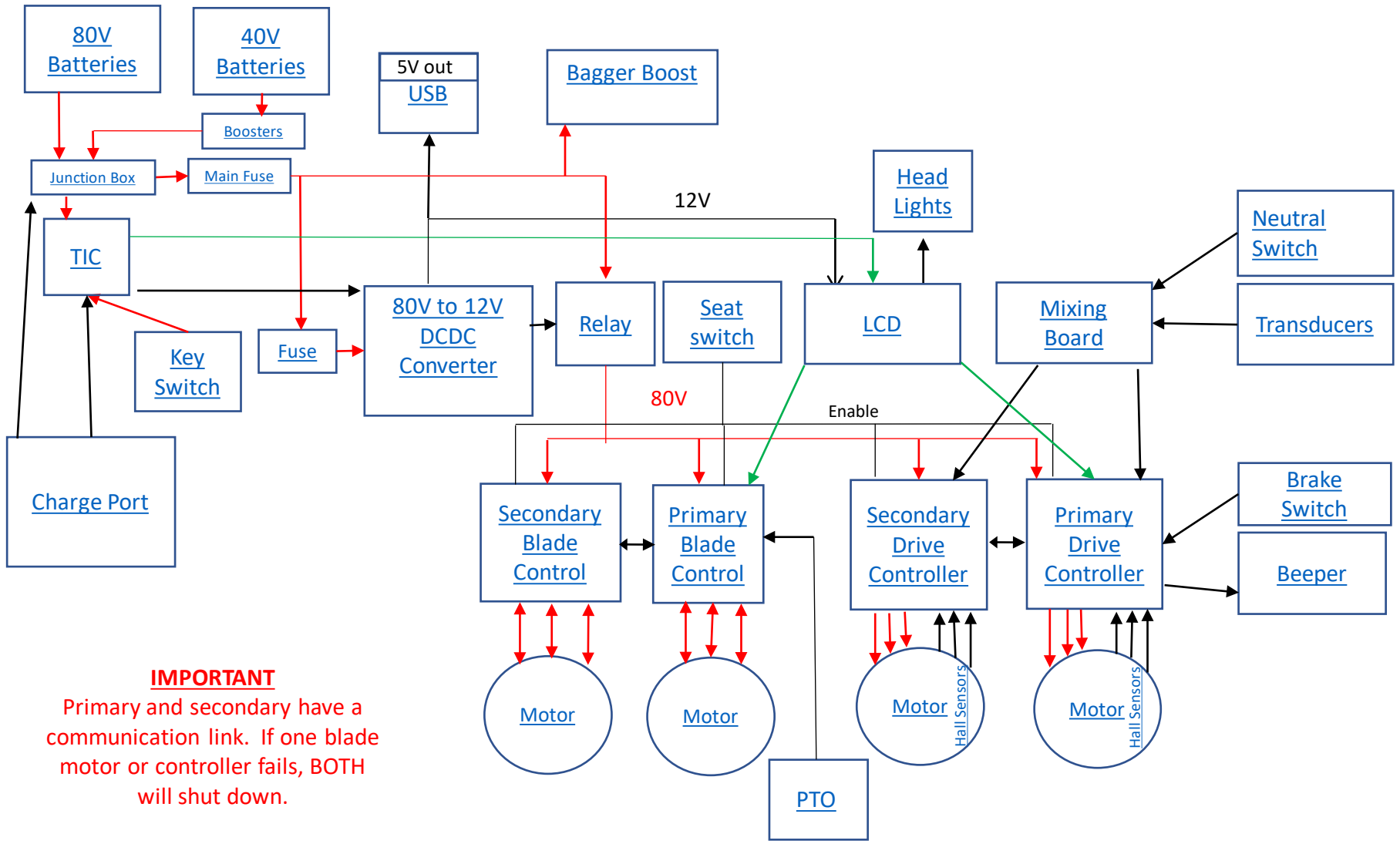


**RYRM8021 42" ZTR Mower
RYRM8034 54" ZTR Mower**

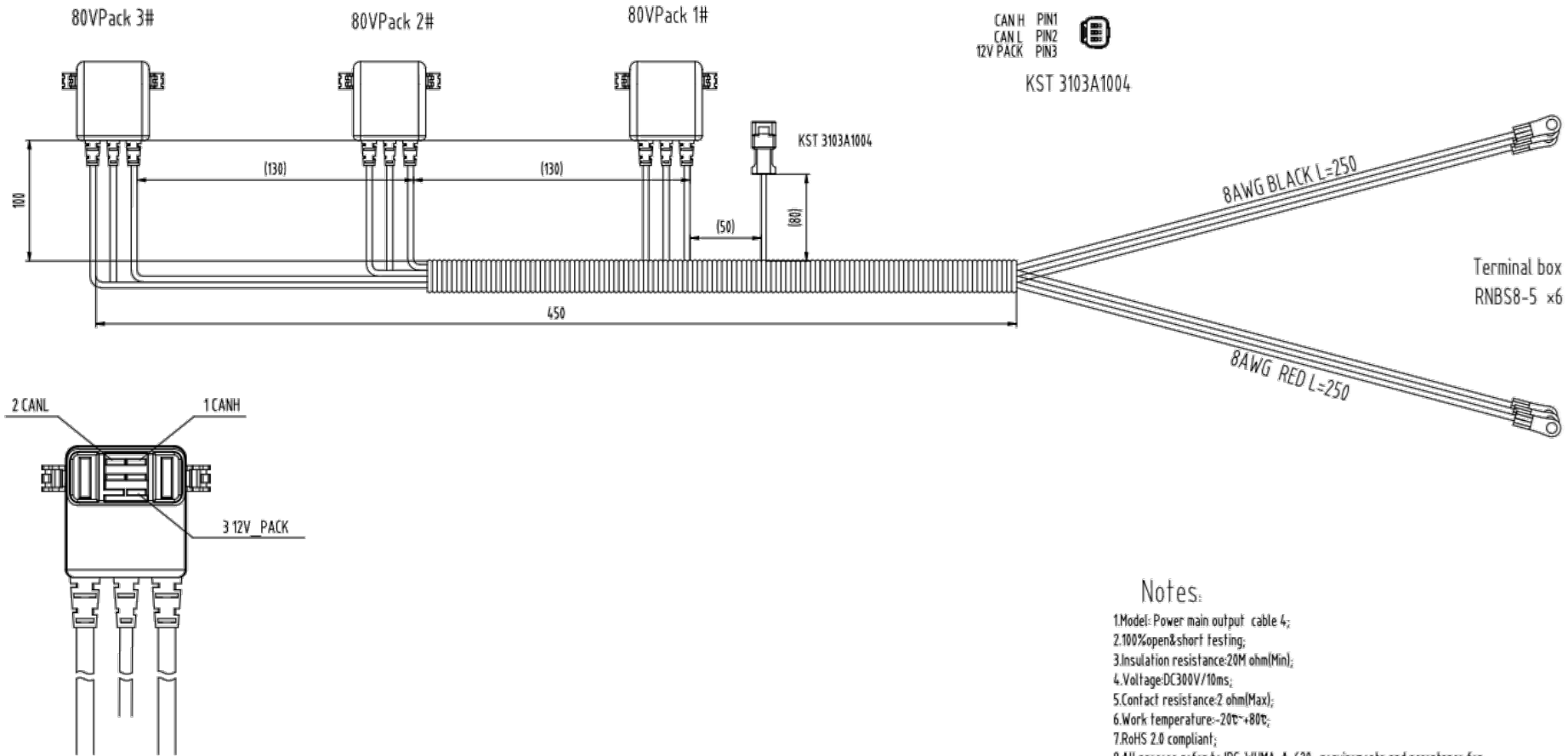
***NOTE**
The **RYRM8021** has (2) **Deck Motor Controllers**, not (3)

DIAGRAMS

Block Diagram: Control Flow



IMPORTANT
 Primary and secondary have a communication link. If one blade motor or controller fails, BOTH will shut down.



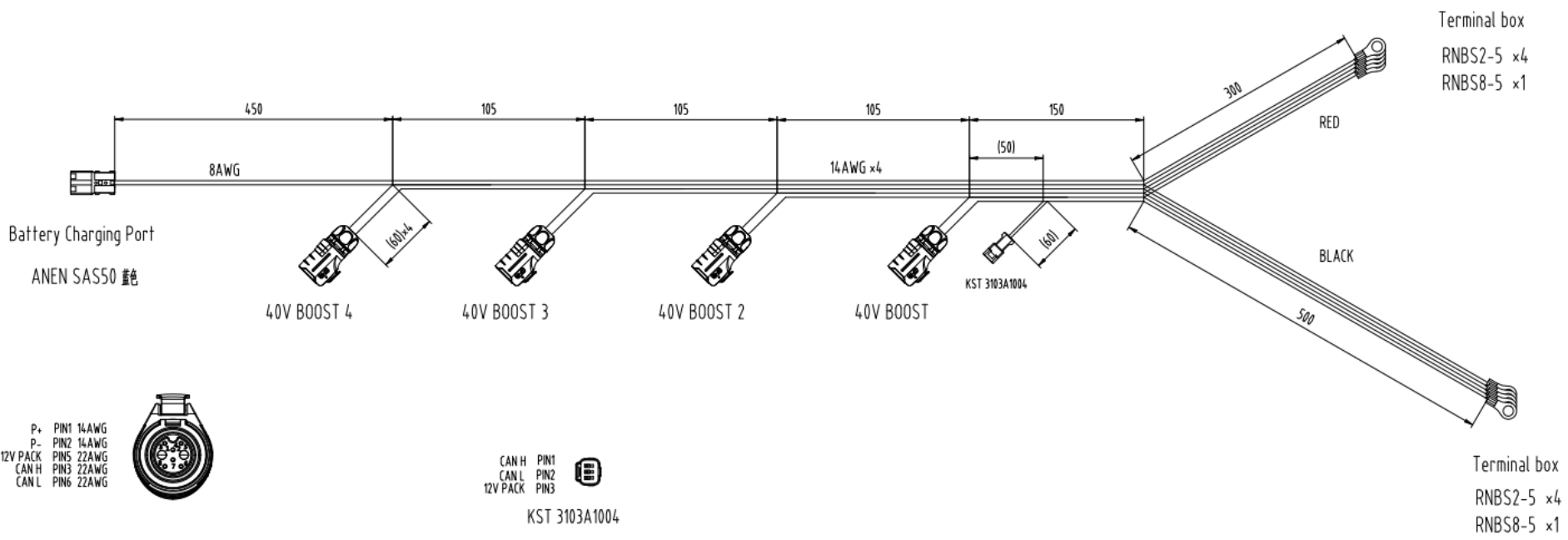
CAN H PIN1
CAN L PIN2
12V PACK PIN3



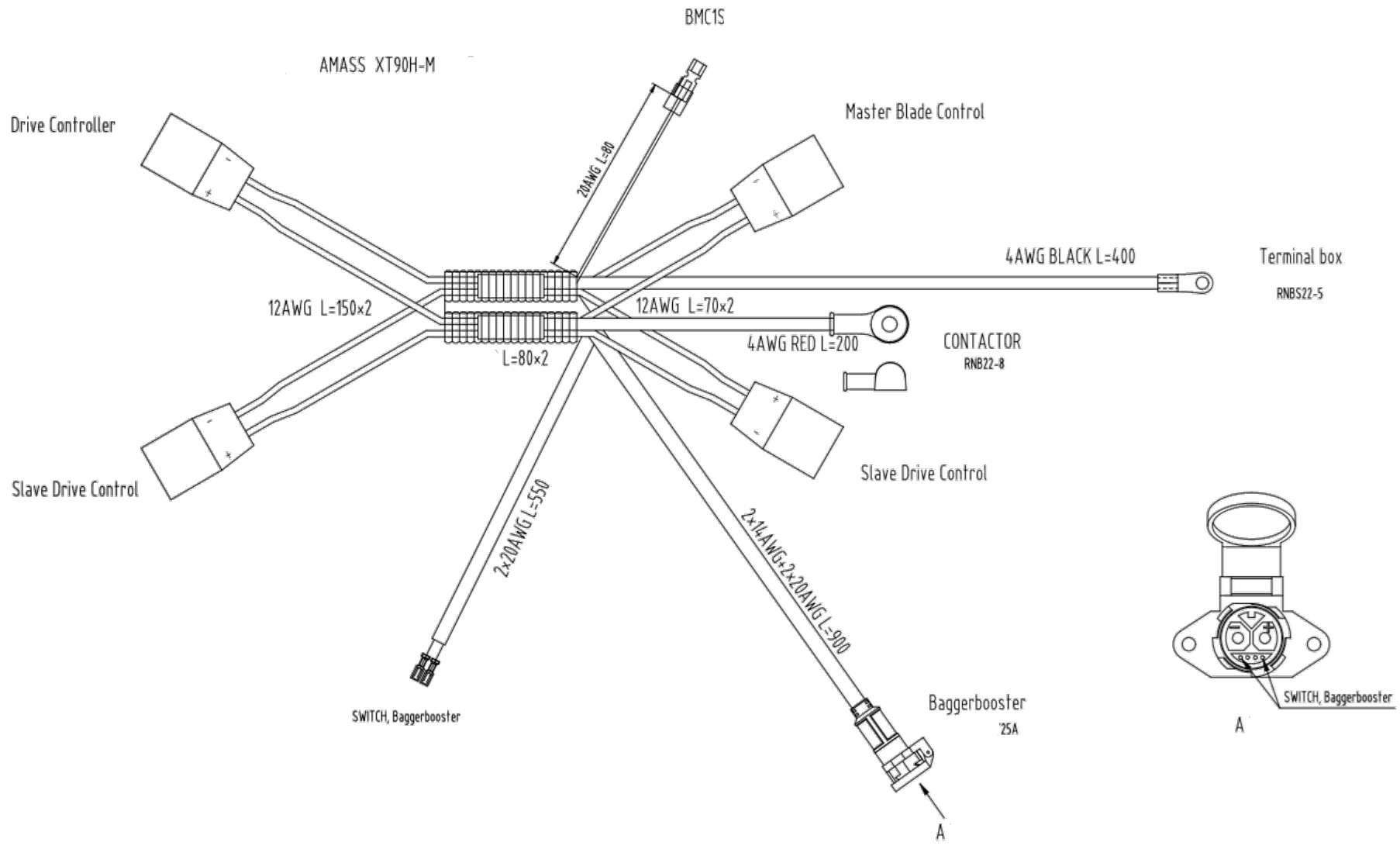
KST 3103A1004

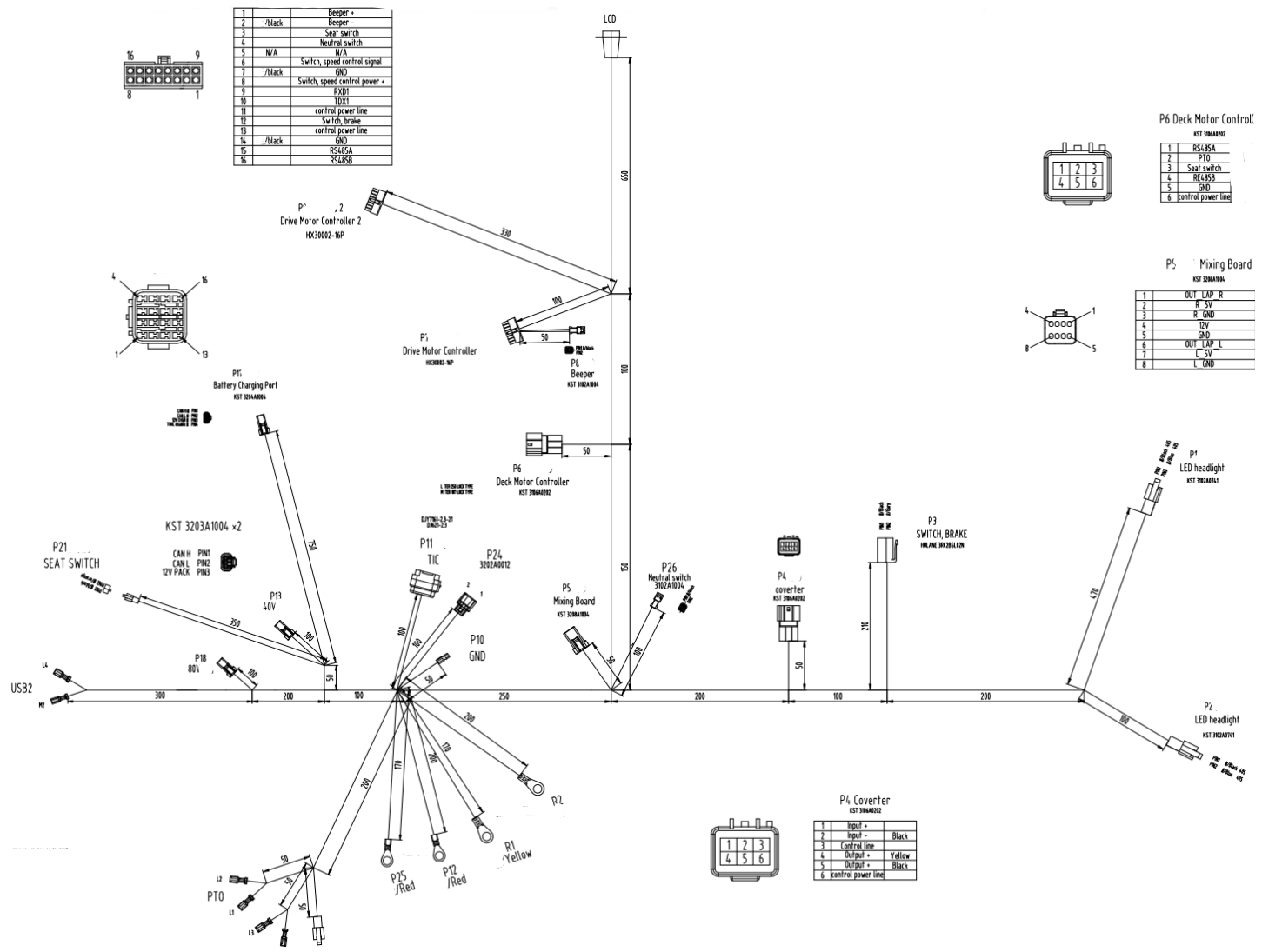
Notes:

1. Model: Power main output cable 4;
2. 100% open & short testing;
3. Insulation resistance: 20M ohm (Min);
4. Voltage: DC 300V / 10ms;
5. Contact resistance: 2 ohm (Max);
6. Work temperature: -20°C ~ +80°C;
7. RoHS 2.0 compliant;
8. All process refer to IPC-WHMA-A-620 <requirements and acceptance for cable and wire harness assemblies>;
9. 8 AWG wire and terminal tension > 50kgf, 12awg wire and terminal tension > 30kgf, 18awg wire and terminal tension > 10kgf



Controller Power Wiring Harness



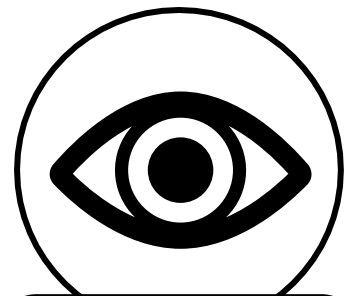


TROUBLESHOOTING

Troubleshooting: Introduction

A service person who has spent many years working on gas mowers may feel uneasy when working on the new generation of electric mower. If this sounds like you, fear not, you're not alone. This section is for you.

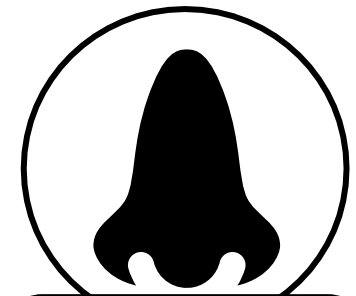
Keep in mind you were born with the most powerful troubleshooting tools:



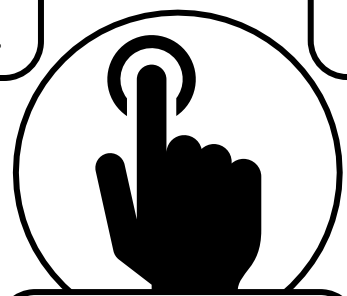
LOOK for signs of wear, deformation, disconnection, pinched wires, etc.



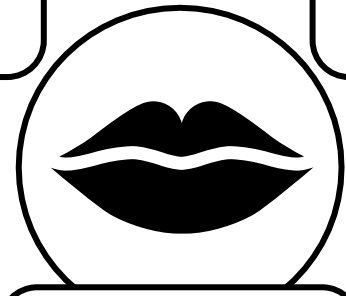
LISTEN for beeps (error codes), clicks (relays), squeals (bearings), etc.



SMELL for overheated components, oil leaks, and so on



FEEL (carefully) for overheating, cold components, vibrations, etc.



ASK for help or a second opinion if something is in question or doubt.

Pre-Repair/Post-Repair Checklist

1. Set **Parking Brake** & jack rear tires approx. 2" off the ground & support securely w/ jack stands.
2. Sit on mower to trigger the **Seat Switch**.
3. Release the **Parking Brake**.
4. Turn **Main Power Key** to the ON position.
5. The **LCD Screen** should display the RYOBI logo followed by the user interface.
6. Pull up on the **Joystick** to unlock it.
7. Push **Joystick** fully forward and hold. Rear wheels should rotate forward.
8. Pull **Joystick** rearward. Wheels should rotate in reverse.
9. Pull **PTO** knob up. The **Blade Motors** should run.
10. Push the **PTO** knob down and ensure **Blade Motors** stop.
11. Press **Drive Speed** button. The **Drive Speed** should change between high, medium, and low.
12. Press **Blade Speed** button. The **Blade Speed** should change between high, medium, and low.
13. Press **Headlights** button. Button should light and both **Headlights** should come on.
14. Check that **USB** has power by verifying blue indicator light is on.
15. Remove yourself from mower seat. Beeping should begin after 1 minute or less.
16. Connect **Charger** and verify charging indication is working with the **LCD** displaying charging.
17. Sit on mower to trigger the **Seat Switch**.
18. Attempt to start mower and drive away with **Charger** connected. This should not be possible.

- Follow the [Block Diagram](#) on the previous page.
- **CHECK FOR LOOSE AND/OR BAD CONNECTIONS.**
- Test the easiest components first, such as **Power, Key Switch, DC-DC Converter**, etc.
- Mower should be fully charged, if possible.
- **BEFORE** disassembly:
 - Attempt to power on the mower.
 - Click here if the [mower won't turn on](#).
 - Attempt to drive the mower.
 - Click here if the [mower won't drive](#).
 - Check if the [USB Indicator](#) and [Headlights](#) are functional.
 - This tests the 80V-12V converter.
- Remove [Control Panel](#) cover.
 - Test [Key Switch](#).
 - Check all other connections while panel is removed.

Use the [block diagram](#) as a guide.

Also refer to the [beep diagnostic code chart](#).

1. Test Charger by plugging it into the Charging Port on the mower and checking if batteries charge.
 - a. If necessary, further test the Charger and Charging Port. Replace if needed.
2. Test the Key Switch by turning the key. It should have a tactile “click” when turned on or off. Replace if needed.
 - a. When you turn the mower on, you should hear an audible “click” from the Main Relay. If not, test and replace as necessary.
3. Check the Main Fuse.
 - a. If blown, check for signs of a short circuit before replacing.
4. Check the LCD Display to ensure it activates when the mower is turned on.
 - a. If the LCD Display doesn’t activate, check the LCD connections. Replace if necessary.
5. Check if the mower will drive. If not, check the following, in order, testing drive function after each step:
 - a. Make sure the Seat Switch is functional and activated. Replace if necessary.
 - b. Test the iDRIVE System. Replace if necessary.
 - c. Test the Brake Switch. Replace if necessary.
 - d. Test the Drive Motor Controllers. Replace if necessary.
 - e. Test the Drive Motors and Hall Sensors. Replace if necessary.
6. Check if the blades engage. If not, turn off blades and check the following, in order, testing function after each step:
 - a. Make sure the Seat Switch is functional and activated. Replace if necessary.
 - b. Test the Deck Motors. Replace if necessary.
 - c. Test the Deck Motor Controllers. Replace as a set if either is found bad.
7. Press Headlights button. If headlights don’t work, check the following, in order, testing function after each step:
 - a. Test Headlights. Replace if necessary.
 - b. Check LCD Display connections. Replace LCD Display if necessary.

No Power to Mower

(Main Relay doesn't click)

- **LIKELY CAUSES: 80v Batteries; TIC**
- **Testing Steps: (check function after each step)**
 1. Turn mower off
 2. Unplug all 80v Batteries
 3. Insert (1) battery and attempt to turn mower on
 4. Repeat step 3. with each battery to test each battery
 - a. Replace any batteries found non-functional
 5. Replace the TIC
 6. Replace DC-DC Convertor
 7. Visually inspect wiring for any obvious loose connections
 8. Check fuses for continuity
 - a. 100A fuse is located in Junction Box
 - b. 4A fuse is located next to DC-DC Convertor

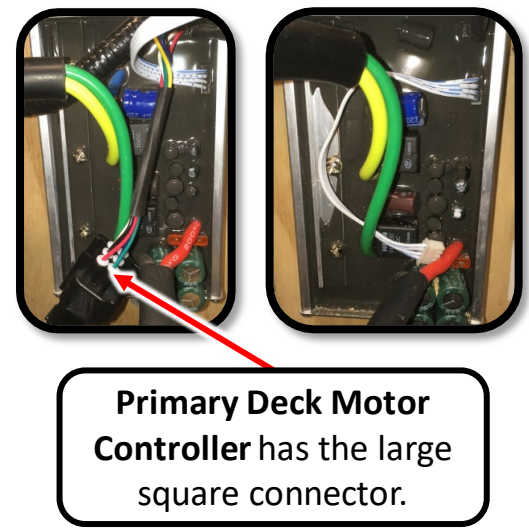
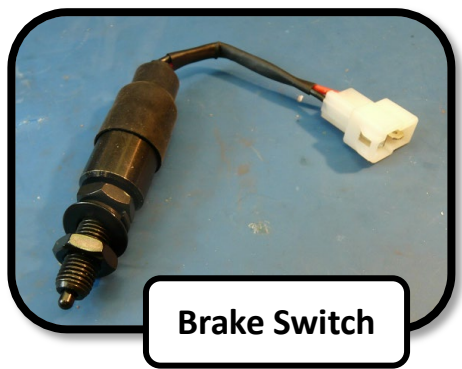
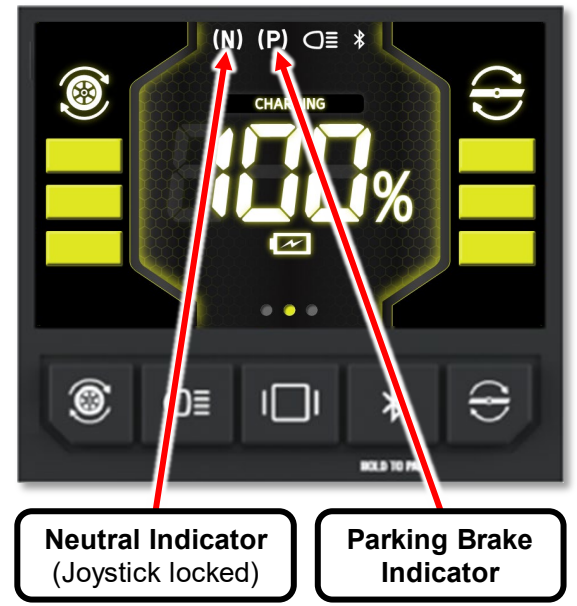
Mower Drive Non-Functional

- **LIKELY CAUSES: Mixing Board; Drive Motor Controller(s)** (Mower will turn on)
(Especially if mower beeps every once every two seconds when trying to drive)
- **Testing Steps: (check function after each step)**
 1. Ensure connections around Mixing Board are secure
 2. Replace Mixing Board
 3. Replace iDRIVE System
 4. Replace Primary Drive Motor Controller
 5. Replace Secondary Drive Motor Controller



Park / Neutral Light Malfunction

- **LIKELY CAUSES: Drive Motor Controller**
- **Testing Steps: (check function after each step)**
 1. Ensure connections and wiring are secure
 - a. Check **Brake Switch** connection
 - b. Check **Neutral Switch** connection
 - c. Check **LCD Panel** connection
 2. Replace **Primary Drive Controller**
 3. Replace **Secondary Drive Controller**



• Testing Main Fuse (100A 70v)

IMPORTANT: If fuse is blown, find source of problem before replacing the fuse.

• Testing Steps:

1. Disconnect **ALL** batteries
2. Open Junction Box to access the Main Fuse
3. Set **DMM** to **Resistance**
4. Test for **continuity** at the points indicated

Main Fuse Testing Points



Ensure the nuts are tight, but not overtight, as this can twist and break the fuse.

If fuse is blown, replace **ONLY** with the same physical size, Amperage, and Voltage.

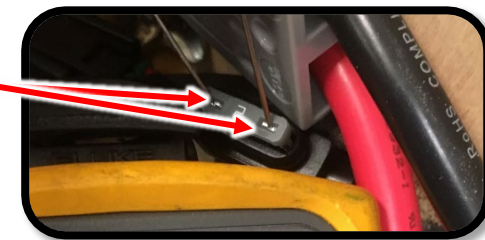
• Testing DC-DC Convertor Fuse (4A Automotive)

IMPORTANT: If fuse is blown, find source of problem before replacing the fuse.

• Testing Steps:

1. Remove rubber cap
2. Set **DMM** to **Resistance**
3. Test for **continuity** at the points indicated

DC-DC Convertor Fuse Testing Points



If fuse is blown, replace **ONLY** with a 4A Automotive-type fuse.

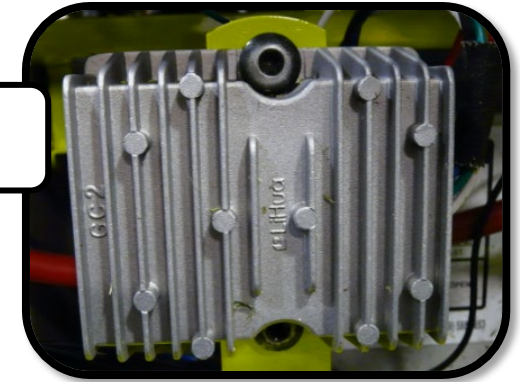
DC-DC Converter / Headlights

• Testing DC-DC Converter

• Testing Steps:

1. Power mower on
2. Set **DMM** to **DC Volts**
3. Check for **~80v** between the **RED** and **BLACK** wires
4. Check for **~12v** between the **BLUE** and **YELLOW** wires

DC-DC Converter



• Testing Headlight Assembly

• Testing Steps:

1. Power mower on
2. Turn on **Headlights**
3. Set **DMM** to **DC Volts**
4. Check for **~12v** at the harness

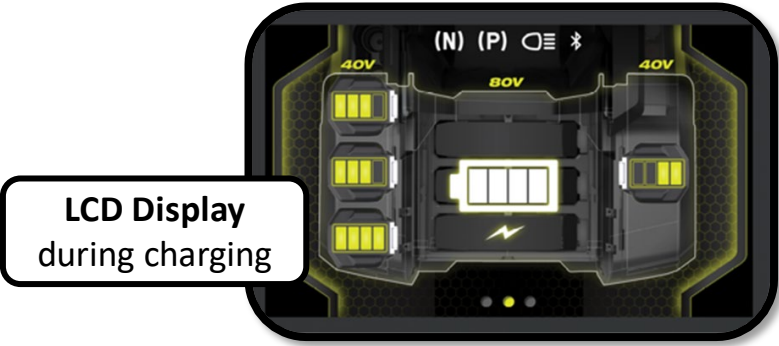
Headlight Assembly



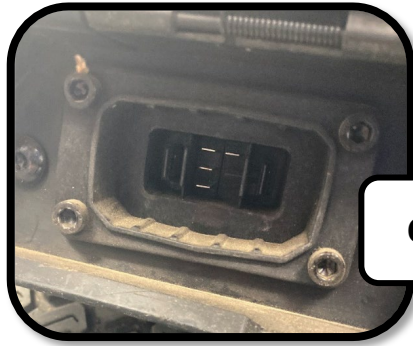
• **Testing Charging Port**

• **Testing Steps:**

1. Plug **Charger** into the mower while 80v batteries are installed
2. Check the **LCD Display** for charging status
 - a. If **LCD Display** doesn't power on, check connections to **LCD Display**
 1. If connections are secure, but **LCD Display** doesn't power on, replace **LCD Display**
 2. If **LCD Display** powers on, but doesn't show charging status, replace **Charging Port**
3. Check **Batteries** to ensure charging while in mower
 - a. If the **Batteries** don't appear to charge in mower, attempt to charge **Batteries** outside of mower
 1. If **Batteries** charge outside of mower, replace **Charging Port**
 2. If any customer **Batteries** don't charge outside of mower, attempt to charge known good **Batteries** on customer **Charger**
 - a. If known good **Batteries** charge properly, replace any customer **Batteries** found bad
 - b. If known good **Batteries** don't charge, replace customer **Charger**



LCD Display
during charging



Charging Port

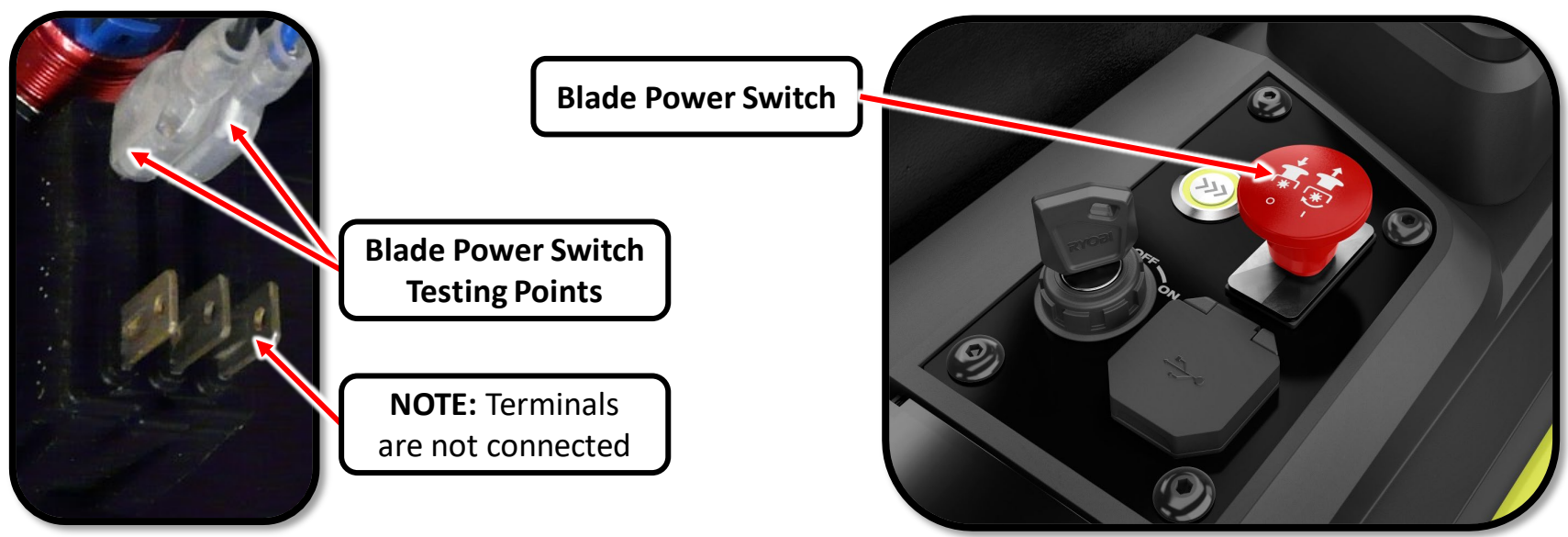
Blade Power (PTO) Switch

• Testing Blade Power (PTO) Switch

• Testing Steps:

1. Disconnect main power from mower
2. Set **DMM** to **Resistance**
3. Test for **continuity** at the points indicated
 - a. With the switch pulled out (closed), you should get very low resistance or **Continuity**
 - b. With the switch pushed down (open), you should get very high resistance or no **Continuity**

NOTE: Make sure spade lugs are secure. They should be locked in place and should not come loose if when pulling on the wires.



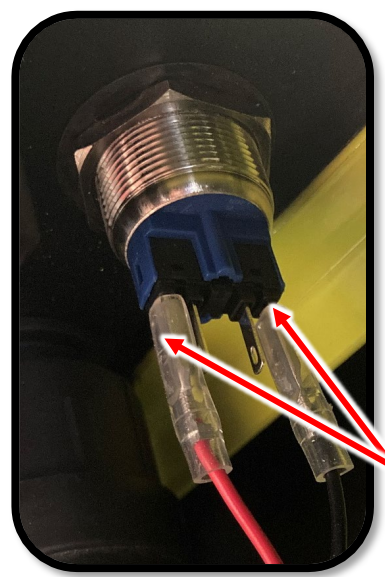
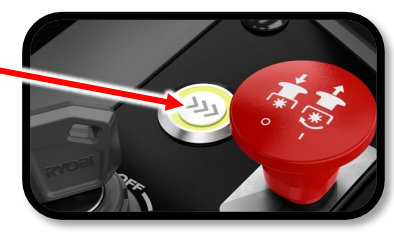
Bagger Boost Switch

• Testing Bagger Boost Switch

• Testing Steps:

1. Disconnect all batteries and charger from mower
2. Set **DMM** to **Resistance**
3. Test for **continuity** across input terminals
 - a. With the switch pushed down (open), you should get very high resistance or no **Continuity**
 - b. With the switch released (closed), you should get very low resistance or **Continuity**

Bagger Boost Switch



Bagger Boost Switch terminals under caps

Bagger Boost Port
Bagger Boost should run for a max of 30 sec after activation, or until the user shuts down the blower. After the second press, boost will start locking out for up to 60 sec to avoid overheating. If not activated for 10 min, the lockout will reset.

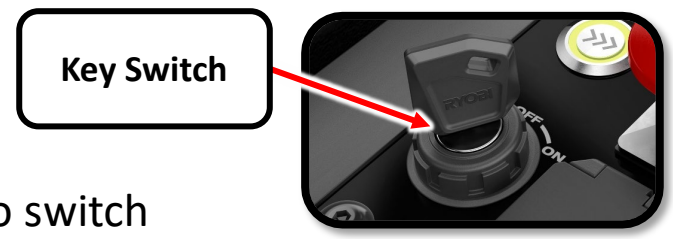


Key Switch / USB Port

- **Testing Key Switch (operates at 12v)**

- **Testing Steps: (Wires Connected)**

1. Set **DMM** to **DC Voltage**
2. Measure **Voltage** between the two wires going into switch
 - a. With the switch set to **OFF**, you should get approximately 12v
 - b. With the switch set to **ON**, you should get approximately 0v



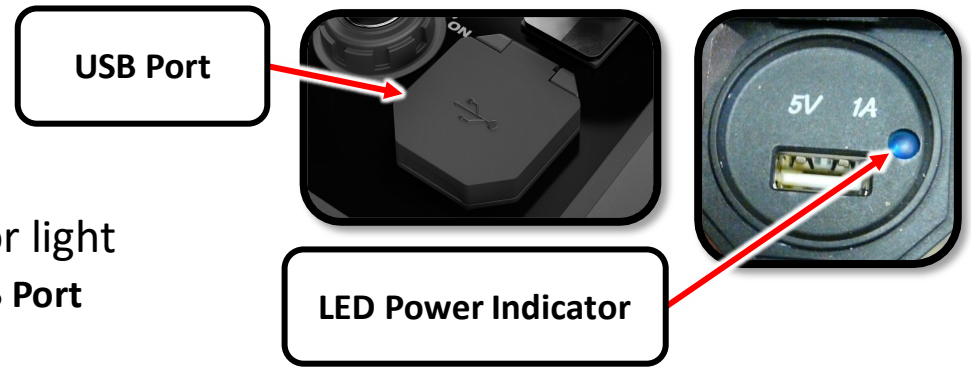
- **Testing Steps: (Wires Disconnected)**

1. Set **DMM** to **Resistance**
2. Test between the two wires going into switch
 - a. With the switch set to **OFF**, you should get no **Continuity**
 - b. With the switch set to **ON**, you should get **Continuity**

- **Testing USB Port**

- **Testing Steps:**

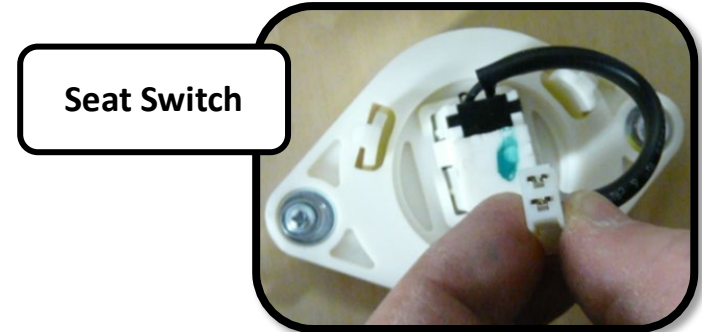
1. Power mower on
2. Check **USB Port** LED power indicator light
 - a. If light does not come on, replace **USB Port**



• **Testing Seat Switch**

• **Testing Steps:**

1. Power mower off
2. Set **DMM** to **Resistance**
3. Disconnect **Seat Switch** connectors
4. Test for **continuity** across input terminals
 - a. With the switch pushed down, you should get very low resistance or **Continuity**
 - b. With the switch released, you should get very high resistance or no **Continuity**



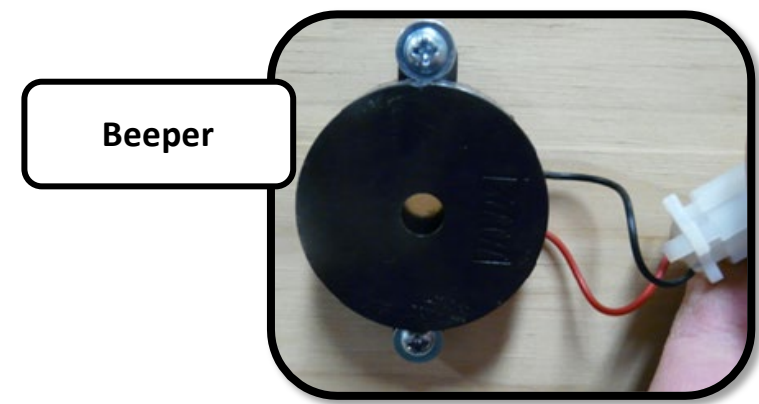
• **Testing Beeper**

• **Testing Steps: (on mower)**

1. Power mower on
2. Remove yourself from the seat
3. Beeper should activate within 1 minute

• **Testing Steps: (at harness)**

1. Set **DMM** to **DC Volts**
2. Remove yourself from the seat
3. Place probes in harness socket
4. Measurement should alternate between 0 and 5v-12v



Configuring Battery Boosters

• Configuring Battery Boosters

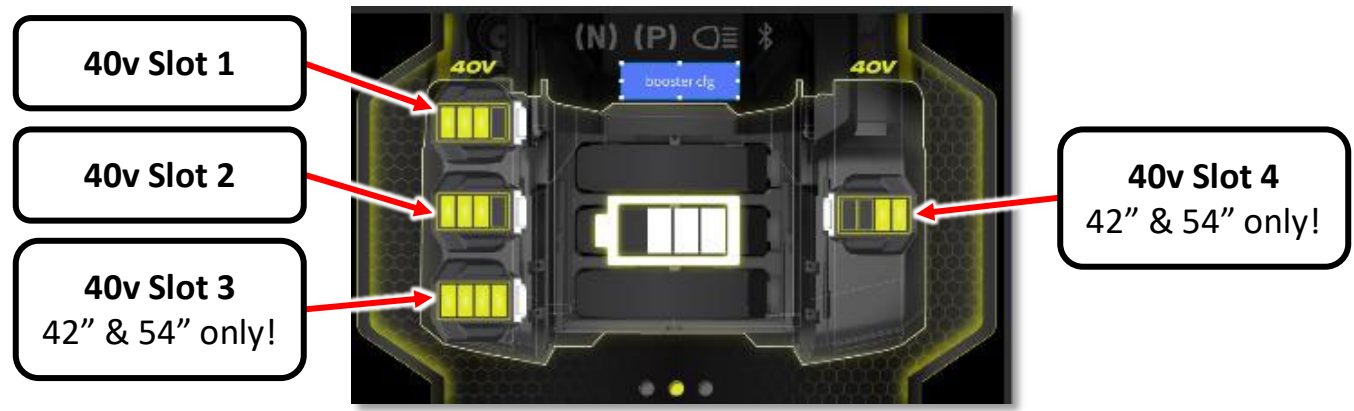
Required if a Battery Booster is replaced

• Configuring Steps:

1. Remove all **40v Batteries**
2. Enter **Booster Configuration Mode** (see picture to the right)
3. Insert **40v Battery** into top left location (marked **1** on position on below picture) and wait for battery SOC data to appear for slot
4. Repeat for remaining **40v Batteries** in order indicated below
 - a. Mower may power down. This is normal. Turn key off, then on again. Mower will return to **Booster Configuration Mode**.
5. Exit **Booster Configuration Mode** (see picture to the right)

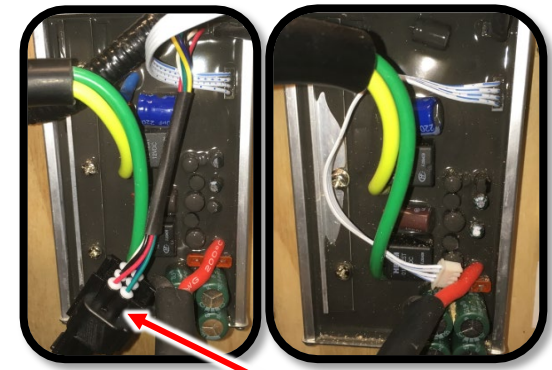


Hold **Drive Speed, Mode, and Blade Speed** buttons for 10 seconds to enter or exit **Booster Configuration Mode**



Beep Codes

BEEP #	DESCRIPTION	CHECK	IF NOT SOLVED...		
1	Angle Sensor not at neutral	Wiring and connections; ensure solid connection and no loose wires	Replace Mixing Board	Replace both Drive Motor Controllers	Replace iDRIVE
2	Over Current	Return Joystick to neutral	Replace both Drive Motor Controllers		
3	Motor Stall	Return Joystick to neutral	Turn mower off; push unit by hand to see if easily pushed; if not, check which side is harder to push	Lift mower up to allow rear wheels to spin freely; check each wheel and replace Drive Motor/Transmission Assembly on binding side	
4	Seat Switch open	Use hand to push down center of seat and repeat	Check Seat Switch connection and wiring	Disconnect Seat Switch and short circuit the male terminal; if resolved, replace Seat Switch	
5	Under Voltage	Fuel gauge if battery was charged above 5%; if not, charge unit			
7	Over Temperature	Return Joystick to neutral	Wait 30 minutes and repeat	Replace Drive Motor Controllers	
8	Hall Sensor fault	Return Joystick to neutral	Check connectors; unplug and plug in again	Replace Drive Motor/Gearbox Assembly for affected side	
10	Com Port	Turn key off, then back on	Replace Drive Motor Controllers		
11	Com Port	Turn key off, then back on	Replace Drive Motor Controllers		
13	Self Test	Check Charger connection; unplug and plug in again; tug on wires to see if loose	Turn mower off; push unit by hand to see if easily pushed; if not, replace Drive Motor Controllers		
17	Angle Sensor failure	Return Joystick to neutral	Check Angle Sensor connections	Replace control lever assembly	
19	AD Error	Return Joystick to neutral	Replace control lever assembly		
20	CPU Error	Turn key off; return Joystick to neutral; turn key on	Replace Drive Motor Controllers		



Primary Deck Motor Controller has the large square connector.



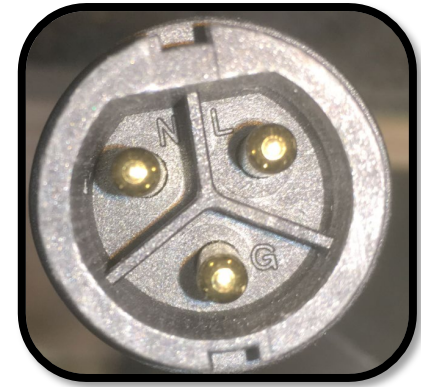
- **Testing Deck Motor Controller**
- Testing Steps: (resistance of output)
 1. Set **DMM** to **Resistance**
 2. Test for **continuity** between any two terminals
 3. Test for **continuity** between other terminals
 4. Measurements should be nearly identical
 - a. Typical resistance should be between 18K-20M Ohms

- Testing Steps: (power and ground to output)
 1. Set **DMM** to **Diode**
 2. Connect black lead of **DMM** to heavy **RED** wire (ground)
 3. Sequentially connect the red probe to each pin
 - a. Measurement should be ~0.48v for each pin

- **Testing Deck Motors**

- **Testing Steps:**

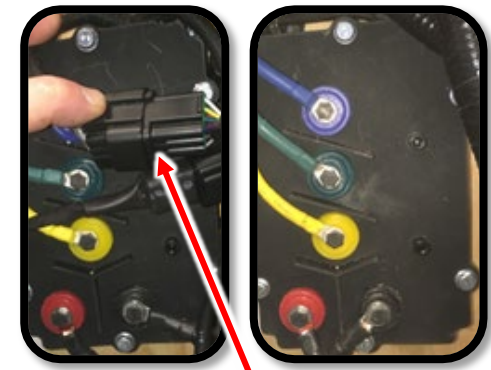
1. Set **DMM** to **Resistance**
2. Test for **continuity** between any two pins
3. Test for **continuity** between other pins
4. Measurements should be nearly identical
 - a. Typical resistance should be ~0.1 Ohm



NOTE: Ignore the **N**, **L**, and **G** labels on the connector. These are **NOT** for neutral, line, and ground. **Never connect to AC Power!**

- **Testing Drive Motor Controller**
- **Testing Steps: (resistance of output)**

1. Set **DMM** to **Resistance**
2. Test for **continuity** between any two terminals
3. Test for **continuity** between other terminals
4. Measurements should be nearly identical
 - a. Typical resistance should be ~18.5K



Primary Deck Motor Controller has the large square connector.

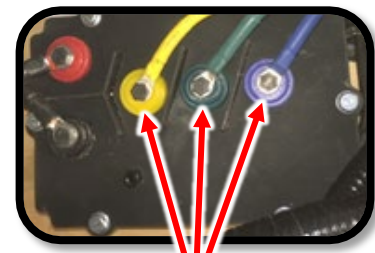
- **Testing Steps: (power and ground to output)**

1. Set **DMM** to **Diode**
2. Connect black lead of **DMM** to heavy **BLACK** wire
3. Sequentially connect the red probe to each heavy phase wire
 - a. Measurement should be OL or OPEN for each heavy phase wire
4. Connect black lead of **DMM** to heavy **RED** wire
5. Sequentially connect the red probe to each heavy phase wire
 - a. Measurement should be ~0.45v for each heavy phase wire

• **Testing Drive Motors**

• **Testing Steps:**

1. Unbolt heavy phase wires from **Drive Motor Controller**
2. Set **DMM** to **Resistance**
3. Test for **resistance** between heavy **GREEN** & **YELLOW** wires
4. Test for **resistance** between heavy **GREEN** & **BLUE** wires
5. Measurements should be nearly identical
 - a. Typical resistance should be ~0.1 Ohms

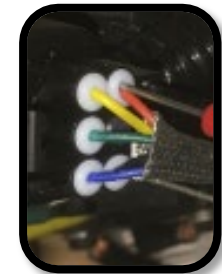


Deck Motor Controller Phase Wires

• **Testing Drive Motor Hall Sensor**

• **Testing Steps:**

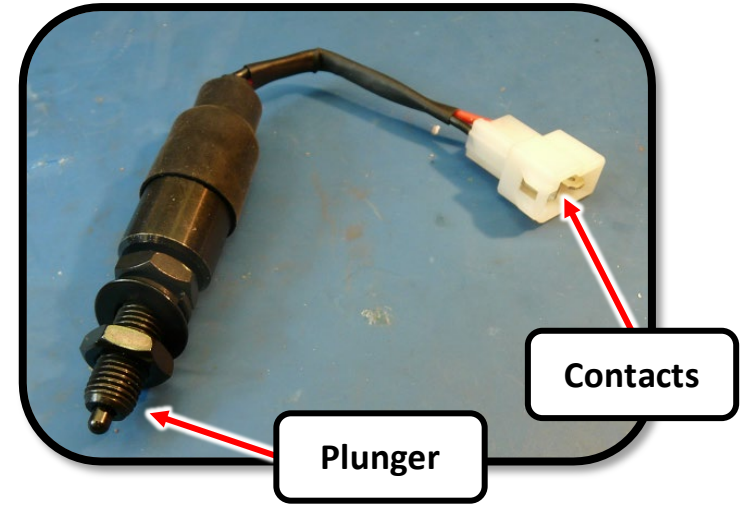
1. Power mower on and raise rear-end so wheels don't move mower
2. Set **DMM** to **DC Volts**
3. Measure with red probe to **RED** wire and black probe to **BLACK** wire
 - a. Measurement should be 4v-5v
4. Move red probe to **YELLOW** wire and slowly rotate motor
 - a. Voltage should jump between 0v and 4v-5v
5. Repeat with **GREEN** and **BLUE** wires



• **Testing Brake Switch**

• **Testing Steps:**

1. Set **DMM** to **DC Volts**
2. Disconnect **Brake Switch** connector
3. Measure between **RED** & **BLACK** terminals on mating connector of the harness
 - a. Nominal voltage should be 3.2v when plunger depressed and 0v when plunger released



• **Testing Steps: (testing independently)**

1. Power mower off
2. Set **DMM** to **Resistance**
3. Disconnect **Brake Switch** connector
4. Test for **continuity** across **RED** & **BLACK** contacts
 - a. With the plunger released, you should get very low resistance or **Continuity**
 - b. With the plunger depressed, you should get very high resistance or no **Continuity**

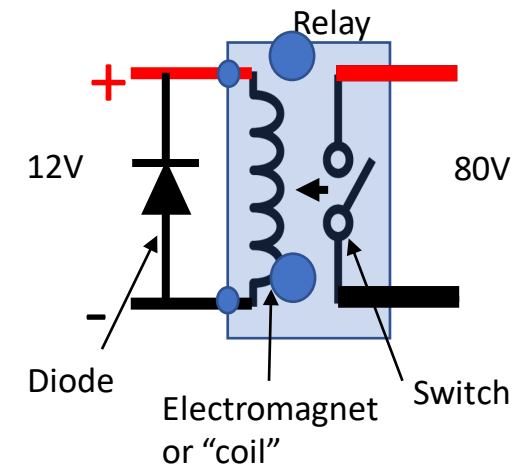
Relay Overview

A **Relay** consists of an electromagnet and a switch operated by the electromagnet within a single package.

When 12v is supplied to the two small terminals on the left of the relay, it causes the switch to close and supply 80v to the mower.

When 12v is absent, the switch will automatically open. This causes the mower to shut off.

While it is standard practice to add a diode across the electromagnet to suppress spikes, the diode is internal to the relay on these models and should require no maintenance.



When you turn the mower on/off, you should hear an audible “click” when the relay engages/disengages.

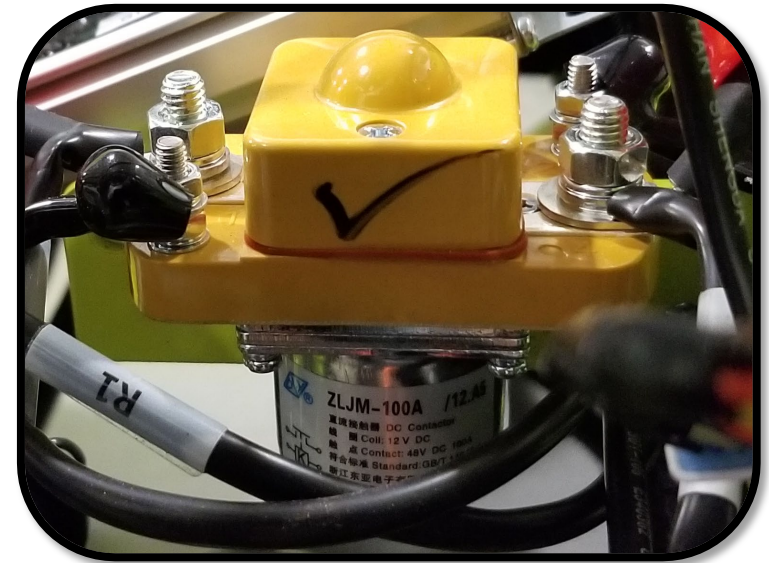
If USB and headlights work, the relay is good

If the relay “chatters”, check all connections and bolts are tight.

• **Testing Main Relay**

• **Testing Steps:**

1. Power the mower on.
2. You should hear an audible “click” as the Main Relay activates
3. Set **DMM** to **DC Volts**
4. Measure between two small terminals (under the black caps)
 - a. Nominal voltage should be ~12v

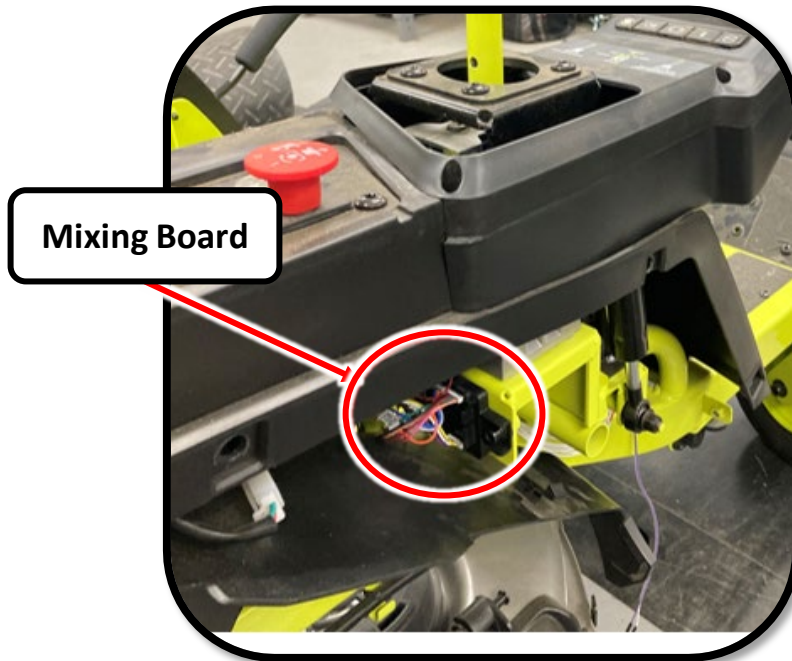


• **Testing Steps: (independent of mower)**

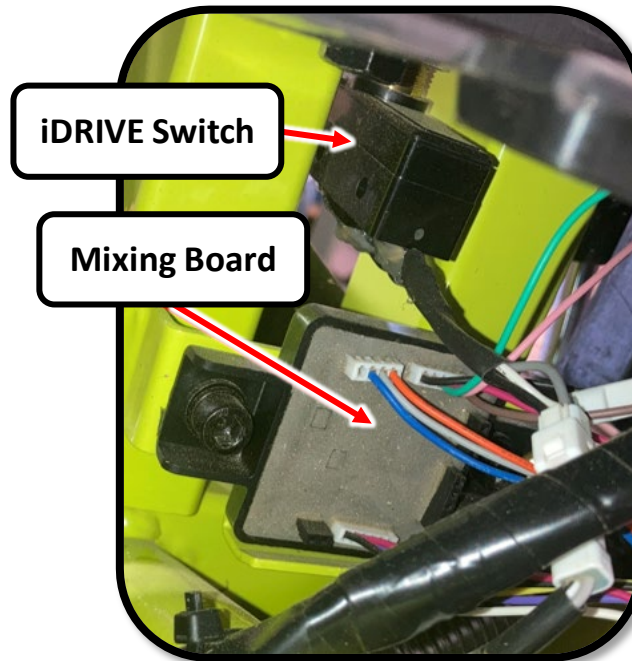
1. Set **DMM** to **Resistance**
2. Connect **DMM** to the large terminals
3. Apply 12v to the small terminals
4. You should hear an audible “click” as the Main Relay activates
5. Measure **Resistance** at the large terminals
 - a. Nominal resistance should be ~1.5 Ohms

Mixing Board Location

The **iDRIVE** has two angular transducers that measure the X and Y position of the joystick. It also has a switch that closes when the joystick is pressed in, placing the mower in neutral. These signals are sent to a **mixing board** located near the subassembly that transcribes the X and Y positions (0 – 5v analog signal) into left and right wheel control signals (0 – 5V analog signal).



RYRM8010 30" ZTR Mower



RYRM8021 42" ZTR Mower
RYRM8034 54" ZTR Mower

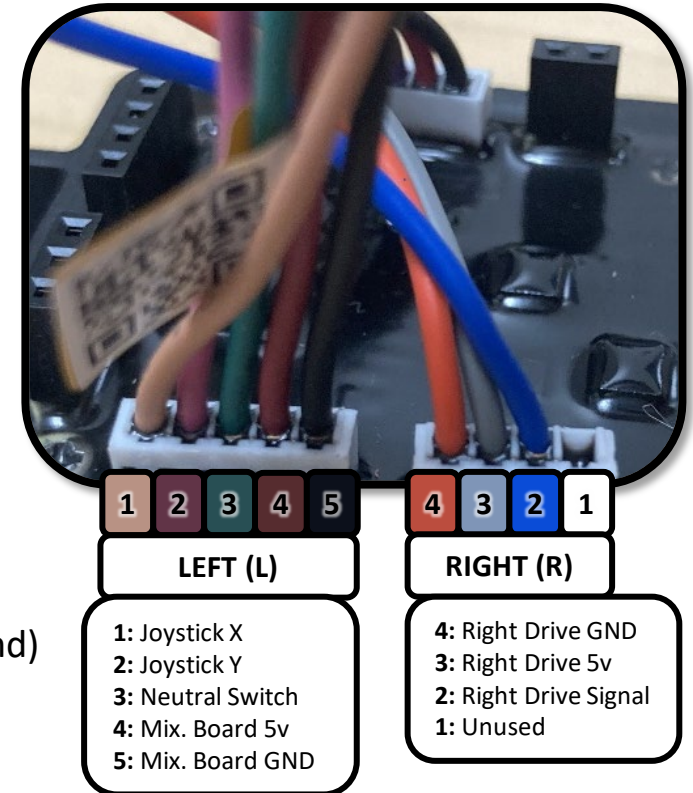
IMPORTANT NOTE

Epoxy potting may have seeped into the header ports and totally insulated all metal from DMM probes. There should be some copper exposed, but if there is no exposed copper, either replace the **Mixing Board** to see if the problem persists or cut away some insulation on the wire to access metal. Make sure to re-secure all wire insulation if any is cut away.

• **Testing Mixing Board**

• **Testing Steps:**

1. Set **Parking Brake**
2. Set **Joystick** to neutral position
3. Remove necessary panels for access to **Mixing Board** and **iDRIVE**
4. Power mower on
5. Set **DMM** to **DC Voltage** and use smallest probe tips available
6. Test **Angular Transducers**
 - a. Place black **DMM** lead onto socket **L5** (Mixing Board Ground)
 - b. Place red **DMM** lead onto socket **L1** (Joystick X Axis)
 - c. Pull **Joystick** out of neutral position
 - d. Move **Joystick** left to right
 1. Sweeping voltage should measure 0v-5v; replace if necessary
 - e. Move red **DMM** lead onto socket **L2** (Joystick Y Axis)
 - f. Move **Joystick** forward to backward
 1. Sweeping voltage should measure 0v-5v; replace if necessary
 - g. Move red **DMM** lead onto socket **L3** (Neutral Switch)
 - h. Move **Joystick** into and out of neutral position
 1. Reading should switch between **continuity** and **no continuity** as appropriate; replace if necessary

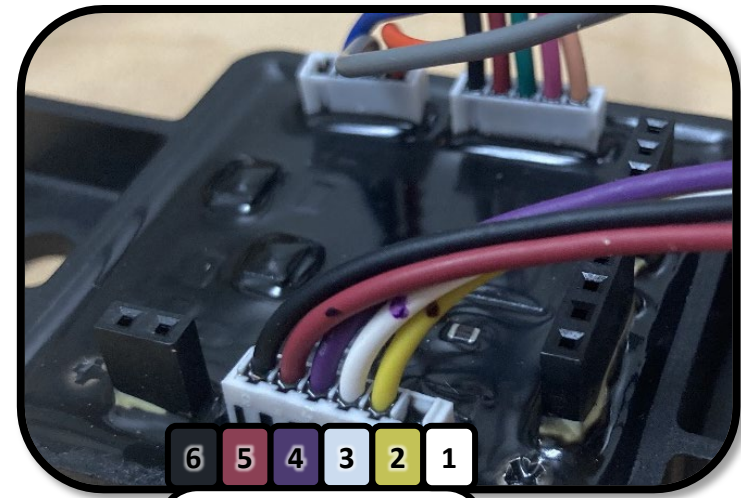


• **Testing Mixing Board (continued)**

• **Testing Steps:**

7. Test left wheel **Drive Motor Controller**

- a. Set **Joystick** to neutral position
- b. Place black **DMM** lead onto socket **4** (Left Drive Ground)
- c. Place red **DMM** lead onto socket **2** (Left Drive Signal)
 - 1. Voltage should measure ~2.4v; replace if necessary
- d. Pull **Joystick** out of neutral position
- e. Move **Joystick** forward to backward
 - 1. Sweeping voltage should measure 1.5v-4.8v; replace if necessary



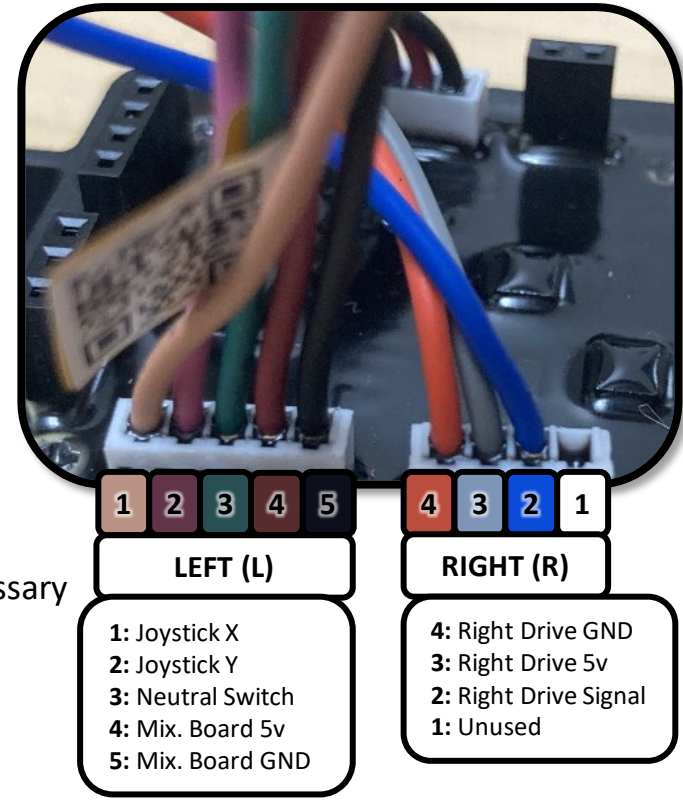
6	5	4	3	2	1
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6: Mixing Board Ground
 5: VIN (12v)
 4: Left Drive Ground
 3: Left Drive 5v
 2: Left Drive Signal
 1: Unused

• Testing Mixing Board (continued)

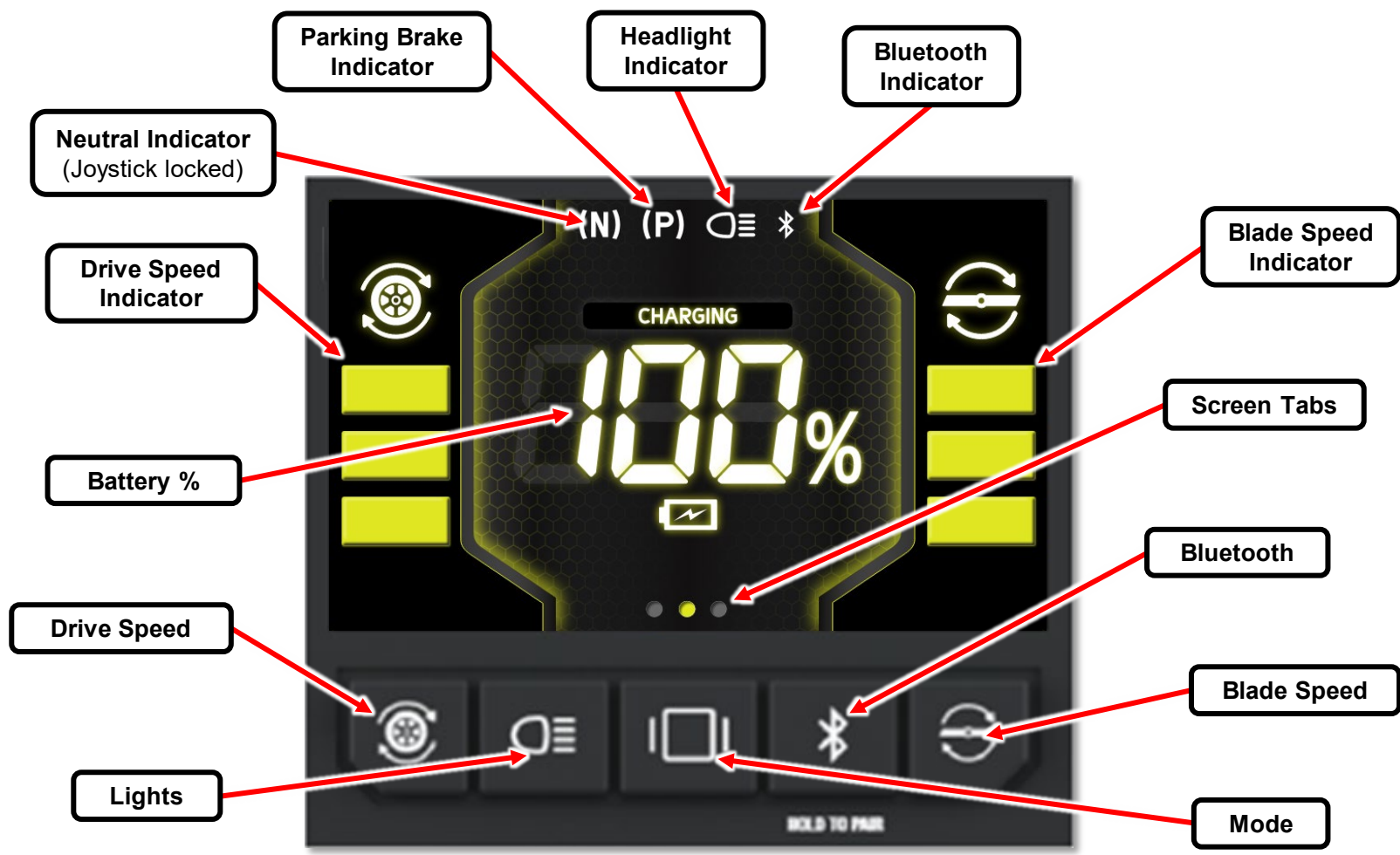
• Testing Steps:

- 8. Test right wheel **Drive Motor Controller**
 - a. Set **Joystick** to neutral position
 - b. Place black **DMM** lead onto socket **R4** (Right Drive Ground)
 - c. Place red **DMM** lead onto socket **R2** (Right Drive Signal)
 - 1. Voltage should measure ~2.4v; replace if necessary
 - d. Pull **Joystick** out of neutral position
 - e. Move **Joystick** forward to backward
 - 1. Sweeping voltage should measure 1.5v-4.8v; replace if necessary

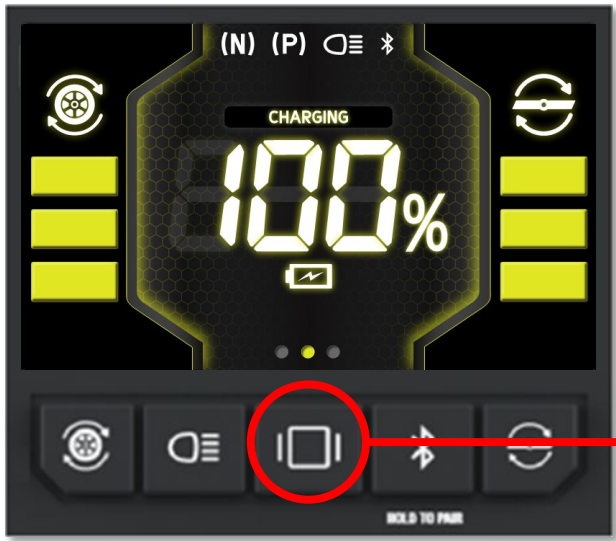


LCD DISPLAY

Main Dashboard



**After booting up/powering on, defaults to Main Dashboard.
After 20s of no inputs, GUI will default to Main Dashboard.**



Main Dashboard

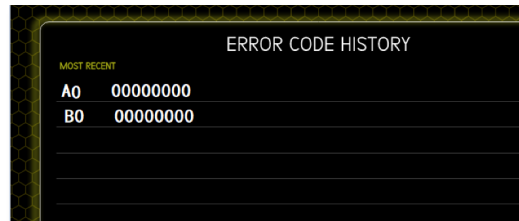
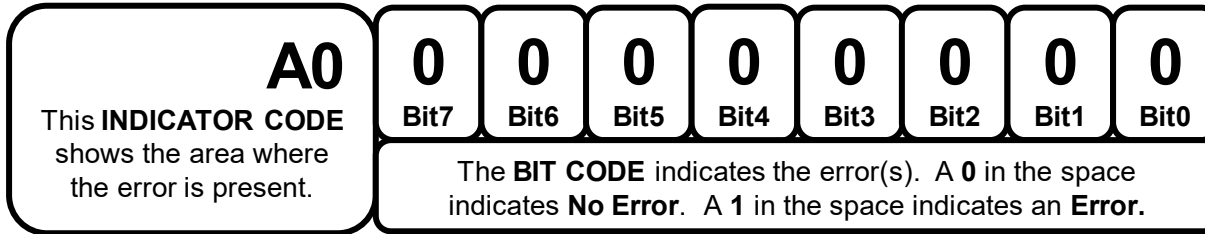
If you press and hold the **Mode Button** for 10s, the **Error Code History** is accessed.



Error Code History

To return to the **Main Dashboard**, press and hold the **Mode Button** for 10s. The **Lights Button** cycles up through the menu and the **Bluetooth Button** cycles down through the menu.

EXAMPLE ERROR CODE: A0 0000000



INDICATOR CODE KEY	
CODE	MEANING
A0	Drive Controller data0
A1	Drive Controller data1
B0	Deck Controller data0
B1	Deck Controller data1
B2	Deck Controller data2
B3	Deck Controller data3
B4	Deck Controller data4
B5	Deck Controller data5
B6	Deck Controller data6
C0	Permanent Battery Failure

INDICATOR CODE	MEANING	BIT	MEANING
A0	Drive Controller data0	7	Motor Hall Sensor fault
		6	Over-temperature
		5	Communication failure
		4	Under voltage
		3	Seat Switch failure
		2	Motor stall
		1	Overcurrent
		0	Unit operating; key on, accelerator not in "zero" location – NOT AN ERROR

Error Codes

INDICATOR CODE	MEANING	BIT	MEANING
A1	Drive Controller data1	7	NOT USED
		6	Over-voltage protection
		5	NOT USED
		4	NOT USED
		3	CPU self-test failure
		2	Primary & Secondary self-test fault
		1	AD acquisition failure
		0	Accelerator failure
B0	Deck Controller data0	7	Undervoltage protection (primary)
		6	Overvoltage (primary)
		5	Temperature protection (primary)
		4	Blocking protection (primary)
		3	Motor failure
		2	Low speed protection (primary) (Controller will be protected when speed is under 50 RPM & current over 80% of limit)
		1	MCU self-test fault (primary)
		0	NOT USED
B1	Deck Controller data1	7	Current sense circuit fault (primary)
		6	high bridge MOSFET fault (primary)
		5	low bridge MOSFET fault (primary)
		4	high & low bridge MOSFET shorted fault (primary)
		3	Communication failure 1
		2	Communication failure 2
		1	Communication failure 3
		0	Communication failure 4

Error Codes (continued)

INDICATOR CODE	MEANING	BIT	MEANING
B2	Deck Controller data2	7	Seat Switch is not closed
		6	PTO switch is not closed
		5	Error with the seat and PTO logic
		4	F gear
		3	R gear
		2	RMO enable flag
		1	NOT USED
		0	NOT USED
B3	Deck Controller data3	7	Undervoltage protection (secondary control 1)
		6	Overvoltage protection (secondary control 1)
		5	Temperature protection (secondary control 1)
		4	Stall protection (secondary control 1)
		3	Motor out of step (secondary control 1)
		2	Low speed protection (secondary control 1)
		1	MCU self-test fault (secondary control 1)
		0	NOT USED
B4	Deck Controller data4	7	Current sense circuit fault (secondary control 1)
		6	High bridge MOSFET fault (secondary control 1)
		5	Low bridge MOSFET fault (secondary control 1)
		4	High and low bridge MOSFET short circuit fault (secondary control 1)
		3	Communication failure 1
		2	Communication failure 2
		1	Communication failure 3
		0	Communication failure 4

Error Codes (continued)

INDICATOR CODE	MEANING	BIT	MEANING
B5	Deck Controller data5	7	Undervoltage protection (secondary control 2)
		6	Overvoltage protection (secondary control 2)
		5	Temperature protection (secondary control 2)
		4	Stall protection (secondary control 2)
		3	Motor out of step (secondary control 2)
		2	Low speed protection (secondary control 2)
		1	MCU self-test fault (secondary control 2)
		0	NOT USED
B6	Deck Controller data6	7	Current sense circuit fault (secondary control 2)
		6	High bridge MOSFET fault (secondary control 2)
		5	Low bridge MOSFET fault (secondary control 2)
		4	High and low bridge MOSFET short circuit fault (secondary control 2)
		3	Communication failure 1
		2	Communication failure 2
		1	Communication failure 3
		0	Communication failure 4
C0	Permanent Battery Failure	7	NOT USED
		6	NOT USED
		5	NOT USED
		4	40v Battery 4
		3	40v Battery 3
		2	40v Battery 2
		1	40v Battery 1
		0	80v Battery

07.19.2022: Guide complete and ready for distribution (MLB)