Lawnbott “No Signal”/Blackout Troubleshooting Guide

The Lawnbott “No Signal” error can be the most difficult problem to resolve. There are two types of “No Signal” errors, persistent and intermittent. Persistent means the Lawnbott display shows “No Signal” as soon as it tries to sync to the signal after backing out of the base.

Intermittent “No Signal” is when the Lawnbott loses the signal, tries to re-sync, is unable to re-sync, but keeps trying. Since it occasionally finds the signal, it does a 360 degree spin, or pauses, re-syncs the signal but may still lose it again. The intermittent “No Signal” usually happens in the middle of the yard in a particular place.

The first step in troubleshooting signal problems is to find out what the transmitter lights are doing. The transmitter is one of the modules that came with your Lawnbott. It is usually the one that is plugged into the white connector to the base, unless you have a disturbance filter connected in between.

There are two types of sinusoidal transmitters and a few types of digital (TX) transmitters. The sinusoidal transmitter is a black module, let’s call each type old or new. The TX transmitter comes in a clear plastic box (you can see the circuit board).

FIXED RED: **OLD:** Broken transmitter **NEW:** “Robot in the base” **TX:** Break in Perimeter Wire
FIXED ORANGE: **OLD:** Transmitter Reset of about 5 seconds
FIXED GREEN: **OLD:** There is a break in the perimeter wire, on rare occasions – bad transmitter
FLASHING RED: **OLD:** Too short perimeter less than 30 feet of wire
BLINKING RED FAST (4x per second): **TX** Indicates transmitter is set to 48V and the wire is ok, however, if the ohms reading is correct and the dip switch is set to 24V, the transmitter is faulty. Contact us for switch settings.
BLINKING RED SLOW (1X per second): **TX** Indicates transmitter is set to 24V, the transmitter and wire are likely ok.
FLASHING GREEN/ORANGE **OLD:** Perimeter wire probably ok. Check chart in Intermittent Signal Section
FLASHING YELLOW: **NEW:** You have the new sinusoidal transmitter. The perimeter wire is likely okay.

Please note the “New” Sinusoidal transmitter has a startup sequence of about 12 seconds that indicates the power settings of the transmitter. Contact us for details.

Digital Multimeter Training

It is important to know how to use a digital multimeter to measure ohms for continuity tests. You can watch YouTube tutorial to come up to speed. Here are a few important things to keep in mind:

a) Set the meter on the lowest ohms (Ω) setting, usually 200 ohms or 20 ohms whenever you are measuring continuity (i.e. that something is connected).
b) Set the meter in the thousands of ohms range (Kohms), whenever you are trying to measure high resistance.
c) If the meter shows a vertical line on the left or “OL”, it means overload or resistance too high to be measured. If you are expecting to measure something, it means either you are not making good contact with the probes, the meter is set wrong, or the meter range needs to be increased (i.e. instead of setting it on 200 ohms, it should be set on 200 Kohms).
d) Make sure the black probe is plugged in the “Com”/GND/Triangle pointing down terminal. Make sure the red probe is plugged into the Volts/Ohms/ Ω terminal. Do not use Amps (A) for any of these tests.
e) Whenever you are trying to measure continuity, get in the habit of touching the black and red probes together and see something close to zero ohms on the display (0.5 ohms is a good reading).
f) ***Important*** Make sure you change the dial on the meter if you decide to measure Volts. If you try to measure Volts with the meter set on ohms, it could cause too much current to flow through the meter and may damage it. Do not touch the probes together when trying to measure Volts. It will just cause confusion.

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Persistent "No Signal"

1) Check the transmitter lights. Most likely you will see a steady green light. This means there is either a break in the wire (most likely) or there is a problem with the transmitter or power supply. If you see flashing lights (some number of green flashes followed by some number of orange flashes), the transmitter believes it is detecting the wire loop, so the problem could be inside the robot. However, it is possible that the perimeter wire is not making good contact inside the base at the red and black connector terminals. The signal could travel through the air and "trick" the transmitter into believing it is connected. Therefore, the lights would still flash, but there really isn't a connection. See "check the continuity of the base" below, if you cannot determine another cause.

2) Check the continuity on the wire. Use a multi-meter. Set the dial to 0-200 ohms (usually an omega Greek letter - Ω). Make sure the probes are connected to the meter in order to measure ohms. Touch the two probes together. You should get something close to 0 ohms (like 0.5 ohms). This tells you the meter is set up properly. If you do not get close to 0 ohms, check the settings, the probe connections and the batteries in the meter. Usually the problem will be operator error, if not, then it could be a bad meter – get another one.

   Once you know the meter is working properly, take the cover off the base to expose the perimeter wires. Take the ***perimeter wire ends out*** of the red and black base connectors. Touch the probes on the wires, you should have one probe on each wire. If the wire is fine, we expect 3-10 ohms (or a bit more if you have a very large yard). This chart is a good rule of thumb for what you should see:

   600 ft Perimeter Wire: 2.8 ohm
   1200 ft Perimeter Wire: 5.6 ohm
   1800 ft Perimeter Wire: 8.4 ohm

   If you see a much higher resistance, there could be a partial break or water may have leaked in at a splice or at a break in the insulation. You will see greenish corrosion in the wire where the problem is. The section of corroded wire has to be replaced.

   However, since the steady green light is telling you there is a cut, you will probably see OL on the meter, or a straight vertical line, that means "overload" (too much resistance) – disconnected. The only way to solve the problem is to find the break in the wire. ***Visit our web site to purchase an inexpensive tool (for non-buried wire) to help you find the break.***

3) Check the continuity of the Base If the meter measured the correct resistance on the wire, but you still have the steady green light, or possibly (but less likely) the flashing green/orange lights, the problem is either the transmitter itself or the wiring between the transmitter and the connector for the perimeter wire in the base. This would happen rarely and the only way to trouble shoot it is to bring the white connector close to the base, or tap into the wires near the white connector if the base cable is buried (call for details).

Important: *Turn the power off on the power supply before disconnecting the white cable. Do not turn the power back on until the cable has been securely re-connected. Misalignment of the cable while the power is on can cause sparks and can damage the transmitter.*

The measurements are a bit tricky because you are trying to determine continuity between the perimeter wire and the red/black terminals and also the perimeter wire and the rectangular connector at the end of the 20 foot white cable. Follow these steps:

a) Put one probe on the perimeter wire that goes into the red or black base connector. You may have to adjust the perimeter wire so part of the exposed metal is held by the connector terminal and part sticks out so you can put the probe on it.

b) Touch the other probe to the blue and brown wires (one at a time) in the white connector. One of them will measure as connected (close to zero ohms). Then repeat with the other base connector (red or black base connector to blue and brown base cable wires). If you get no connection the first time, try the other one (i.e. corresponding to red or black). It is unlikely both will be disconnected. If you see that both are disconnected, most likely you are doing something wrong (such as not touching the metal in the connector). If your probes don't fit in the white connector, you can use some other metal to extend the metal out so you can touch it, such as a metal paperclip. Make sure the metal pins of the white connector are inside the white connector fully. A pin pushed out will definitely cause a problem.

c) Let's say the meter confirmed the perimeter wires are not connected to the terminals inside the white rectangular connector. A possible cause is a poor connection somewhere between the white connector and the base connector (the one with the red and black terminals).

   The wires are held by pressure. If the wire is bare copper, oxidation of the wire over time can cause it to become disconnected. We offer premium perimeter wire that has a tinned coating to reduce/eliminate oxidation. Nevertheless, if you are sure the base connector is applying enough pressure to the metal of the perimeter wire, it could be that the wires need to be re-stripped and re-connected so metal that had not been exposed to air would be touching the connector. It would be a good idea to shine-up the connector contacts as well by attaching some fine sandpaper to a tool.

   It is also possible the base connector (red/black terminals) is faulty and needs to be replaced.

If the base continuity is fine, then it is possible the transmitter went bad, but this is unlikely since usually steady green or flashing lights does not usually mean it went bad. Make sure you double check the measurements before replacing the transmitter.

4) Check the receiver, sensor wire & coil in the robot Take the cover(s) off and/or open the hood. Locate the receiver card. It is the small circuit board that is about 2"x2". It should be attached to the motherboard by a connector. Make sure it is on tight and that it has not fallen off. It would not hurt to remove the receiver, clean the contacts with alcohol and scrub lightly with a dry toothbrush. Then re-install it. We did have a case once where that's all we did to fix it. Check the sensor coil cable, too.

Disconnect it from the receiver and coil and put the probes on the metal conductors at the connector. They should not be connected (OL on the meter, no change). Now check the coil while it is disconnected. It should be about 33 ohms.

Intermittent "No Signal"

1) If this is a new installation and the problem always occurs in the same spots, most likely the maximum wire length and/or wire-to-wire distance specification has been violated. If you have a sinusoidal transmitter, you may purchase a signal booster. See our installation guide for wire specifications or contact us.

2) Check the transmitter lights. **OLD** transmitter: Most likely you will see some number of green blinking lights and some number of orange blinking lights. If you see a steady green light, follow the steps under "Persistent No Signal", above. Count the number of green blinks followed by orange blinks, write them down.

   The LED meanings for the **OLD** sinusoidal transmitter are as follows:
   - Green is related to the length of the perimeter wire.
   - Orange should always be 9/10 flashes, otherwise you need to install a signal booster (48V). The following examples explain:

     o 120 ft wire: 2 green 10 orange
     o 1800 ft wire: 10 green 10 orange
     o 2100 ft wire: 10 green 8 orange

   If the number of blinks does not match the length of the wire then it could mean there is a partial break in the wire. The other two transmitter types do not have the above LED meanings.

3) Check the Power Supply Voltage The transmitter requires a steady 27-29.5 V DC in order to operate properly. This voltage comes from the power supply and goes to the transmitter at the round connector. It is hard to measure the voltage at the round connector, though. The same voltage is available at the recharging base at the plates. It is much easier to measure it there. Put your meter on Volts DC and the range on 200V. DC could be indicated by two flat lines. AC is usually shown by a squiggly line. Do not set the meter on AC.

   Press the charge (also known as "Work/Home") button on the robot to make it come out of the base. Do it during the robot's mowing time, or change the work schedule so it will try to mow.

   Hold one probe on each recharging plate. If you get a negative reading, simply swap the probes on the plates. Hold the probes there for 10 seconds or more, or for as long as you see the robot losing its signal (i.e. if you see the robot lose its signal every 30 seconds, be sure to hold the probes for 30 seconds or more). The voltage should remain steady at 27V (lead acid batteries) or 29.2-29.5V (lithium Ion batteries). If it does not hold steady, the power supply could have failed.

   If you suspect the power supply might be bad, you will need to measure the voltage at the round connector, even though it is difficult. For your safety, wrap the probes in masking tape so that only the very tip sticks out. You do not want to accidently short power and ground (you will see some sparks). Then get the probe onto the pins so that you are measuring the voltage. Hold it the length of time you would normally see the robot lose its signal. If you hold it long enough and the voltage stays steady, then it is more likely that the transmitter failed.

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4) Check for Partial Break in Wire Measure the continuity of the wire by following the step in #2 "Persistent No Signal", above. Look at the chart in step #2, above. Is the reading indicating the approximate length of the wire installed? If not, there is likely a partial break in the wire.

5) Check for Partial Connection to Ground Another way the signal can be disrupted is if water leaks into one of the splices. The way to check this is to measure continuity with the ground. Here are the steps:

    a) Stick a long handled screwdriver into the ground near the base

    b) Clip/touch the black lead of the multimeter to the metal of the screwdriver

    c) Take both ends of the wire out of the base.

    d) Set the multimeter on the KOhms range (this stands for thousands of ohms).

    e) Take the red lead of the multimeter and clip/touch it to one end of the wire. Also measure the other end. Both times you should get a reading in the KOhms range. The amount does not matter. We are just trying to verify that the measurement is high resistance. Anything less than 1 KOhms indicates a possible water leak. You would get a different result on a dry day than on a wet day.

    f) You can also visually inspect each splice to look for the problem. Stress increases on the wire over time as the wire gets pulled to the surface of the ground or deeper, if buried. If you have just twisted the wires together, there is a good chance that stress on the wire has pulled them apart, creating a partial connection. Our outdoor wire connectors are the solution. They are gel-filled tubes that insulate the wire twisted in a wire connector and inserted in the gel. Find them on our web site or call to order.

6) Blade Motor Off Test Check what happens in the trouble spot when the blade motor is turned off. Follow the Lawnbott and press the "-" key to turn the blade motor off. Wait until it goes to the trouble spot. Does the problem go away? Usually the problem goes away because the blade motor creates electrical noise that makes it harder for the receiver to pick up the signal. If the blade motor is off and you still get the "no signal" problem, it could mean either the transmitter or receiver card is bad or there is a poor connection somewhere.

7) Think about when the problem started If your Lawnbott was working fine and all of a sudden you started getting the "no signal" problem in the middle of the yard, think about any changes that were made around that time. Has there been any digging near the wire? Did you move anything around? Were any repairs made to your Lawnbott (replace motors or anything else)? Sometimes the problem is related to the last change made. In one case, we saw a different result when a different style of blade motor was used. In another case, we got a different result when a disturbance filter was connected. The manufacturer indicated that worn motor brushes can cause signal interference. Contact us about inexpensive motor brush replacement.

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8) Try disconnecting the disturbance filter **OLD** Sinusoidal Transmitter The disturbance filter is a third black box that is connected to the transmitter. It shipped with some (but not all) older LawnBott models. Its purpose is to eliminate a buzz you may hear on AM radio stations. It is not essential. It reduces the signal slightly, so if you have a signal problem, it is good to disconnect it. (Note, some models do not have the disturbance filter. The new sinusoidal transmitter has a disturbance filter built-in).

9) Check All Splices You may have been given poor advice or made wrong assumptions about how to connect the wire splices. A poor connection could result in corrosion due to water leaking in or breakage due to stress. Solve this issue by using our outdoor wire connectors at all splices. Purchase them on our web site or call.

10) Try a different wire loop You can isolate the yard's wire by temporarily installing a separate wire loop. This is a standard test, but it is not foolproof for troubleshooting the "no signal" problem because the new loop can have too many differences with the original loop. For example, shorter length will have a lower resistance (resistance affects the signal strength), a different shape affects how the signal appears in the loop, etc.

This test is very important if you suspect the transmitter or power supply is failing. If you see the same problem in the small loop, then you know the problem cannot be the installed wire.

If you decide to do this test, you will need to make the loop with at least 50 feet of wire. ***Important:*** When you do this test, make sure you remove your yard's wires from the base and then connect the new loop. It is best if the transmitter is powered down when you swap the wires.

11) Software Update: Make sure you have software later than March 9, 2011 (models LB21XX, LB32XX and similar models). We were told that a change was made to the software that improves communication between the mother board and the receiver card on the March 9, 2011 release that could affect how the signal is syncing.

12) Verify you have the latest available receiver card***:*** The latest available receiver card is distinguishable from the older ones because it has an LED on it and the other ones do not. If your Lawnbott has not had the receiver card changed and is older than 2011, it has the old one. Send a photo to us if you are unsure and we will determine if it is the latest one.

13) Go to a Different Installation Contact your dealer to see if there is another Lawnbott installation in your area. The dealer can check with the homeowner to see if it would be all right to bring your Lawnbott over. Verify that the other homeowner has the same transmitter type as you (sinusoidal or TX). See what it does, first using the other installation's electronics and then with your electronics (one at a time). That is, first change out the power supply, see what it does. Then change out the transmitter, see what it does. You may also ship your Lawnbott to your dealer for a similar test. Bear in mind, however, that smaller lawns with a different wire length could behave differently and the test may not prove or disprove anything.

14) Wire Loop Usually the intermittent "no signal" problem that occurs in the middle of the yard can be resolved with a wire loop if nothing else works. Splice in some wire placed 1mm apart, like you are running the wire to go around a tree. Run the wire to the place that has the problem and make an 8" circle. The signal in the circle should not cancel because the forward and backward wires are not parallel to each other. This puts the signal in the middle of the yard, but it also increases the resistance on the wire, which reduces the signal strength slightly. Unfortunately, the grass will grow in

the circle and you will have to trim it manually. If the number of orange blinks on the transmitter go below 10, you may have to purchase a signal booster after putting in the wire loop.

15) Purchase a Signal Booster Anyway If you do not want to put in the wire loop, you could always go ahead and purchase the signal booster anyway. Sometimes it helps, but sometimes it doesn't. It really depends what is causing the problem in the first place. Note, the maximum length allowed for the perimeter wire with the signal booster is 1KM or 1,000m or 3,280ft according to Zucchetti. We recommend using a signal booster when the perimeter wire is over 500m/ ~1500ft.

16) Next Steps Hopefully the problem is resolved by checking 1-12. If not, contact us for more ideas. If you are dealing with a trouble spot in one or a few places in the yard, it is probably easiest at this point to go ahead and add a "satellite" wire loop (see step #15) that will bring the signal close to the trouble spot. Or add another zone if you can, since this will also bring more signal where needed.

Note that a partially connected cable anywhere in the base/transmitter/power supply and possibly inside the robot could cause a signal problem. Sometimes a partial connection may not be visible to the naked eye and the meter may not detect it because it is partially connected. Just keep it in mind as a last resort if you have tried everything else. One instance, a customer did not notice right away that one of the metal pins inside the white connector on the base got pushed out so it was only partially connected. This caused a signal problem.

17) The last resort is to start changing parts. If your Lawnbott is under warranty, you should be able to try another receiver card. If it Is out of warranty, you may send us your transmitter, power supply and even your Lawnbott to try on our lawn for a small fee, plus shipping.