

XTL Lighting System

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LOVA troubleshooting is no longer available, but the information in this guide can be used to address most LOVA concerns.

XTL Electrical Information

The LUMACURVE XTL system maintains sign brightness and ensures delivery of a constant voltage to the 10V/20W halogen lamps at all constant current regulator (CCR) current steps without internal modification. This is true for high intensity (Style 3, 2.8A - 6.6A), medium intensity (Style 2, 4.8A - 6.6A) and Style 5 (5.5A fixed) dedicated sign circuits. The lamps authorized for use in this system are Standard Signs, Inc. (P/N # "XTL Quartz" with 10V/20W Bipin quartz halogen lamp & custom ceramic adapter base). They are available directly from Standard Signs, Inc.

***Important:** The LUMACURVE XTL lighting system is designed exclusively for FAA styles 2 & 3 operation on a series circuit together with non-sign fixtures, such as edge lights, where the sign brightness control components are necessary to maintain constant sign brightness regardless of CCR step. Non-sign resistive load must be present on the circuit for proper CCR operation. Design consideration should be given to CCR loading at all current steps. XTL Signs should NOT be installed on a circuit that powers only signs. For circuits dedicated to signs, please request LUMACURVE lighting systems designed for FAA style 5 operation.*

DO NOT CHANGE LAMPS WITH SIGN ENERGIZED.

A burned-out lamp causes an E610 controller to reach max power and exceed the lamps' rated voltage. Inserting a replacement lamp in an energized sign will shock the lamps and damage filaments.

Installation:

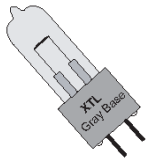
System lamp voltage is factory set but we recommend that one sign per CCR be spot checked with a DC voltmeter after installation. Lamp voltage is read across the white and brown leads at the sign terminal strip on the light bar (P/N #CLT 8A). If voltage varies from recommended settings (9.5V at lowest CCR step for all size signs), all signs on that circuit should be checked and adjusted. To adjust, turn the small screw in the upper left corner of the printed circuit board (E610) controller mounted on the inside of the end panel (P/N #CLT-4).

Note: The adjustment screw is designed only for fine-tuning and does not function as a dimmer. Signs must not be operated at less than 9.5 volts.

There is a 10-minute warm-up period for lamps to come to set voltage but sign brightness meets FAA specifications even at cold voltages.

*Isolation transformer wattage requirements may vary for each application.

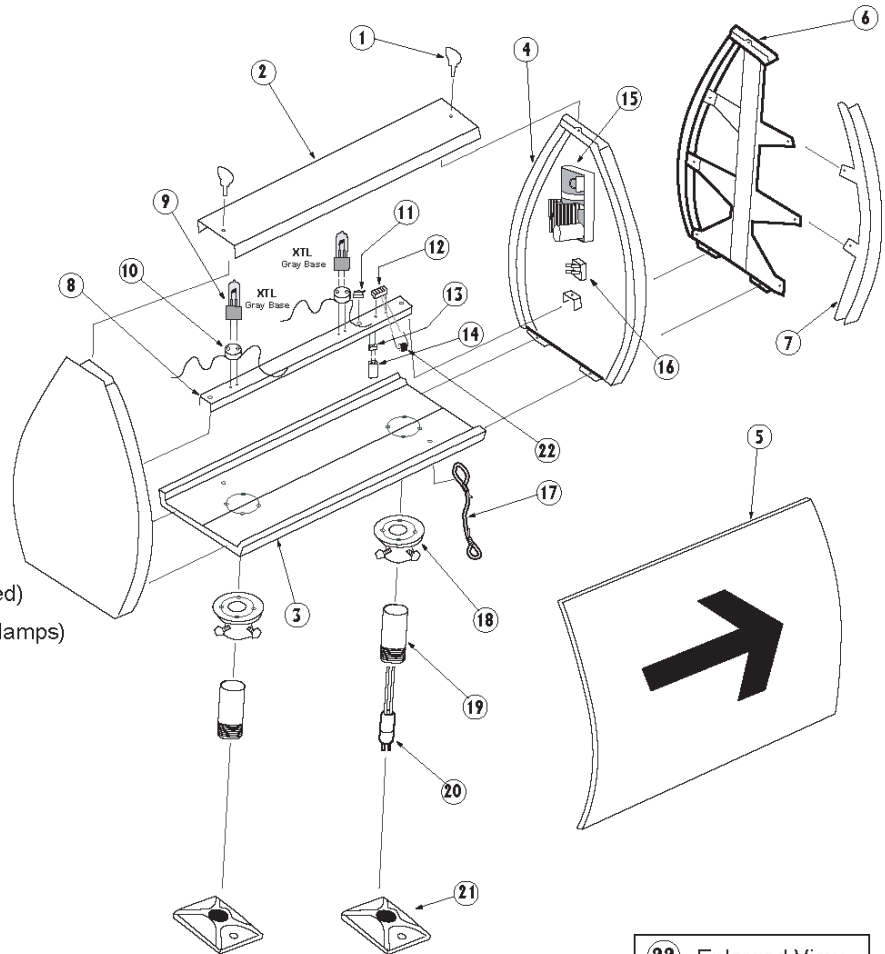
XTL Parts List & Diagram



XTL Lighting Systems

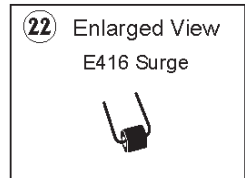
(Gray Base 10V/20W quartz halogen lamps)

Item	Description
1.	340/345 Turn Fastener
2.	*CLT-2 Cover
3.	*CLT-3 Base
4.	*CLT-4 End Panel
5.	*CLT-5 Legend Panel ¹
6.	*CLT-6 Multi-Module Insert (Tree)
7.	*7-B Face Insert Channel ² (Track)
8.	*8-A Light Bar
9.	XTL Quartz XTL 10V/20W Quartz Lamp
10.	E400A Lampholder
11.	480 Cable Clamp
12.	420 Terminal Strip
13.	420 Terminal Strip (section)
14B.	E611 Capacitor for E610 (2 required)
15B.	E610 PCB Controller, 75 Volt (1-8 lamps)
16.	E540 Bridge Rectifier 35A/1000V
17.	190-3/16" Tether
18.	130 Slipfitter
19.	*140 6" Frangible Coupling
20.	430 Cord & Plug
21.	15 Floor Flange
22.	E416 Surge Protector



One lamp systems only require:

E550 Resistor 3 OHM 25w (and mounting brackets)



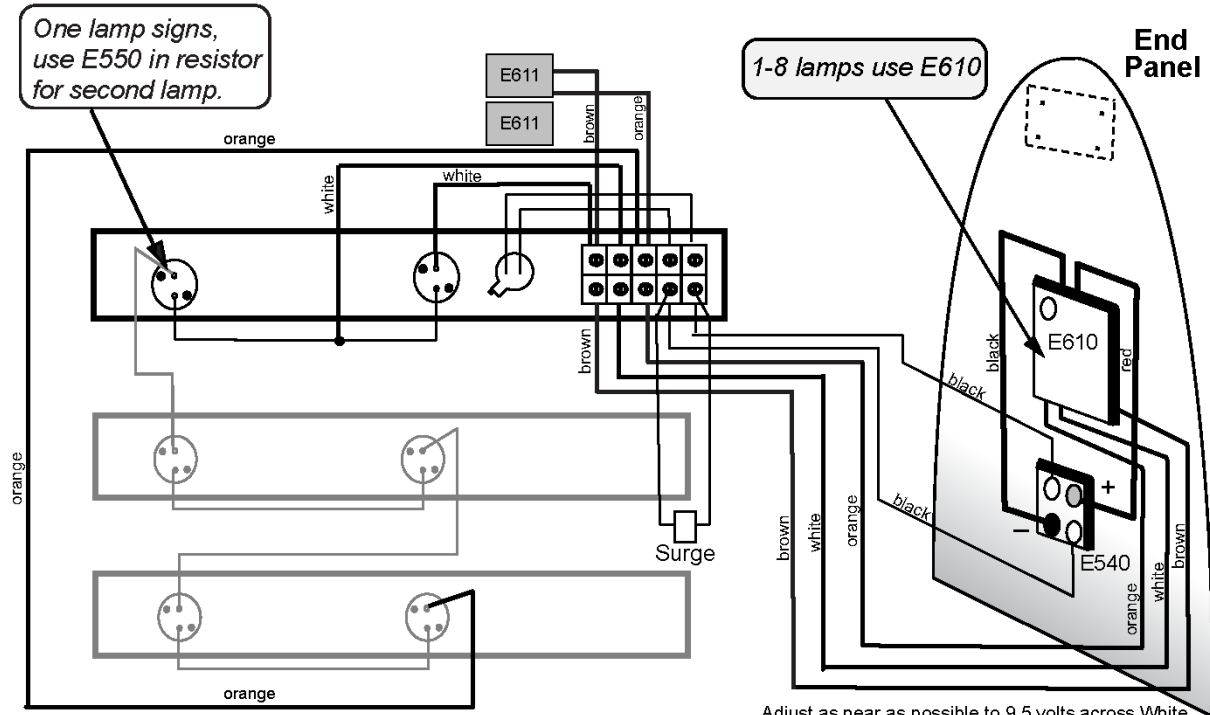
*Prefix part number with one of the following sign sizes: "S" (small/ size 1), "M" (medium/ size 2), "L" (large/ size 3 & 5)

¹ Specify one of the following sign types: L-858Y ("Y"ellow), L-858R ("R"ed), L-858L ("L"ocation), or Blank/ Black

² Specify one of the following track colors: (B) Black, (Y) Yellow or (R) Red

XTL Wiring & Load Chart

XTL Wiring Diagram (Style 2 & 3)



*Additional modules shown in gray are daisy chained to the power leg module.

Sign Size & Module Length		XTL Lighting Systems						
		FAA Style 2 (4.8A-6.6A) XTL 20W Quartz			FAA Style 3 (2.8A-6.6A) XTL 20W Quartz			
Module Length	Lamps	Isol Xfmr	Max VA	Pwr Factr	Isol Xfmr	Max VA	Pwr Factr	
Size 1, 1-mod	1	100W	71	0.89	100W	71	0.89	
	2-mod	2	100W	79	0.93	200W	78	0.92
	3-mod	3	200W	102	0.93	300W	107	0.91
	4-mod	4	200W	127	0.93	300W	131	0.92
Size 2, 1-mod	2	100W	79	0.93	200W	78	0.92	
	2-mod	4	200W	127	0.93	300W	131	0.92
	3-mod	6	300W	167	0.93	500W	174	0.92
	4-mod	8	300W	214	0.94	600W**	222	0.93
Size 3, 1-mod	2	100W	79	0.93	200W	78	0.92	
	2-mod	4	200W	127	0.93	300W	131	0.92
	3-mod	6	300W	167	0.93	500W	174	0.92
	4-mod	8	300W	214	0.94	600W**	222	0.93
Size 5, 1-mod	2	100W	79	0.93	200W	78	0.92	
Size 4, 1-mod	4	200W	127	0.93	300W	131	0.92	

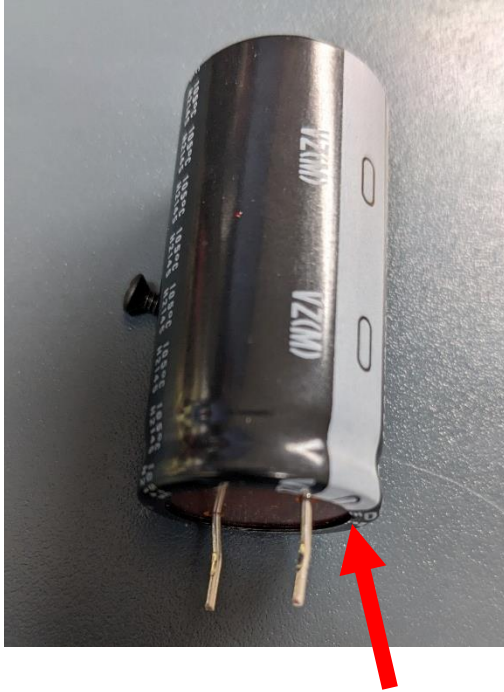
* For less than ideal circuits, we recommend an upsized transformer to ensure adequate power to the sign.

**A Siamese pigtail with two male L-823 plugs and one tennis ball female receptacle is supplied with these signs for connection to two isolation transformers making the required wattage sum.

E611 Capacitor Wiring

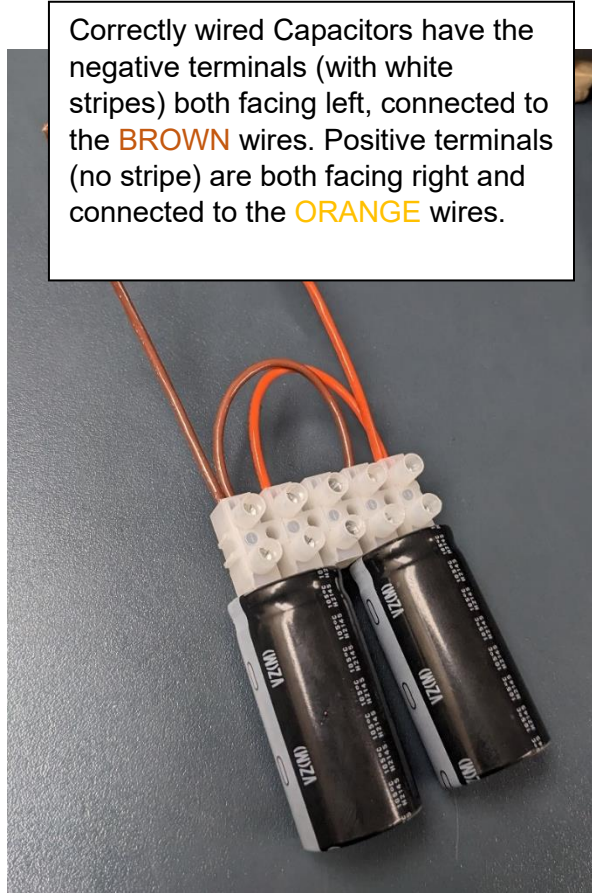
The E610 controller for the XTL system requires (2) E611 capacitors.

E611 is an Electrolytic Capacitor and is polarity sensitive. They have a Positive (+) terminal and a Negative (-) terminal, and it is important to connect them correctly.



NEGATIVE terminal is on the same side as the white stripe with the dash on it

Correctly wired Capacitors have the negative terminals (with white stripes) both facing left, connected to the **BROWN** wires. Positive terminals (no stripe) are both facing right and connected to the **ORANGE** wires.



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XTL Troubleshooting Guide

WARNING: Before working on Lumacurve airfield signs, the sign must be deenergized unless otherwise instructed. Failure to do so could result in a burned surge protector, damage to internal sign parts, or injury.

We recommend the following steps to identify non-functioning Lumacurve XTL electrical components:

1. Check External Switch

If the sign has an external switch, check that the switch is in the “on” position.

2. Visual Check of Sign Electrical Components

Melted parts or obvious burn marks (surge protection potentially) may require replacement.

3. Check Lamps

Replace bad lamps. If lamps are being replaced more frequently than expected, you may need to adjust the controller to recommended voltage settings.
See *Maximizing XTL Lamp Life*.

4. Check Bridge Rectifier

Replace bridge rectifier if bad. Use heat sink compound.

5. Check Controller

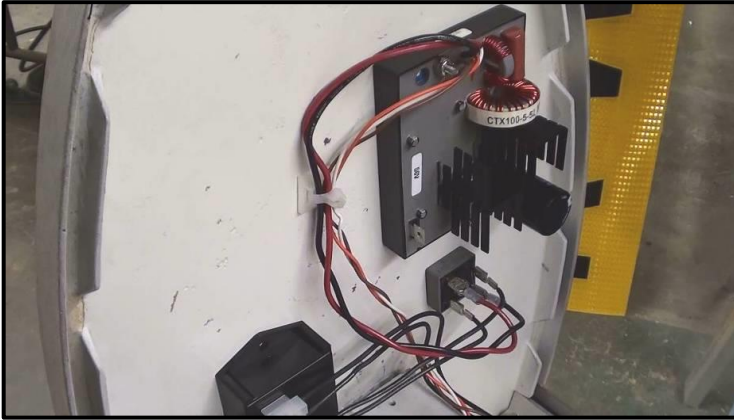
Replace controller if necessary.

6. Check Isolation Transformer

If controller and bridge are good, the isolation transformer may be the source of problems. Ensure the transformer is appropriately sized and performing properly.

 Find our video version of checking the bridge and controller on [our Youtube channel, here](#).

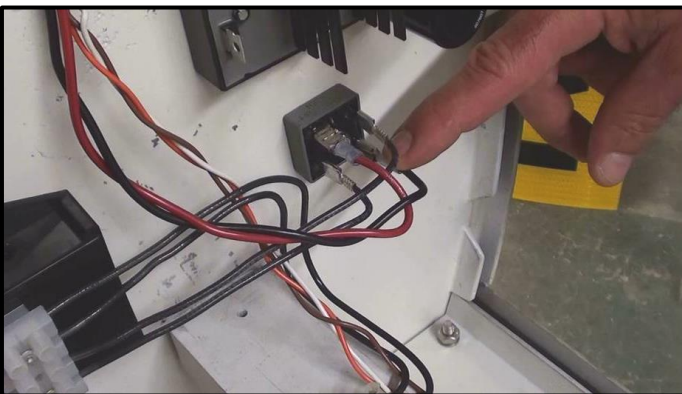
Get Familiar with XTL System Components



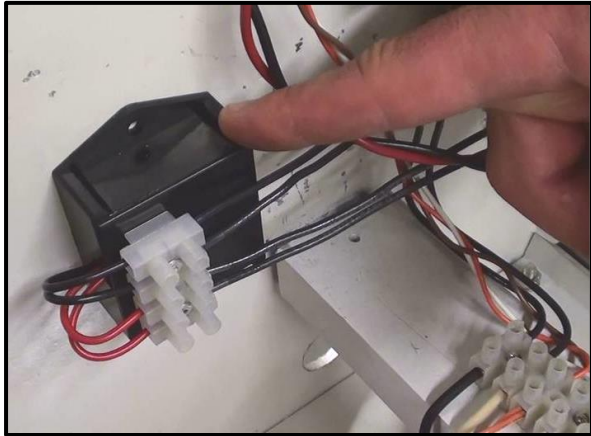
Left: **XTL electrical components** are mounted on the end panel closest to the power cord.



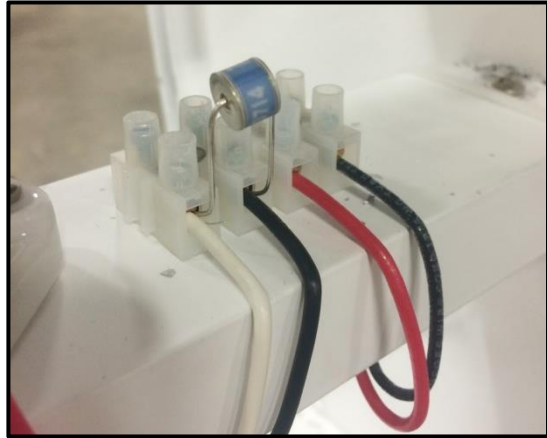
Left: **E410 (50V) or E610 (75V) Controller**
Located on the top right of the end panel.



Left: **Bridge rectifier**
Located below the controller
on the lower right side of the end panel



Above: XTL surge protector (prior to Aug 2011)



Above: surge protector (after Aug 2011)

Use a True RMS Multimeter

The True RMS readings fluctuate less and are more accurate than a regular Multimeter. We are using a Fluke True RMS Multimeter (model 87 V) to troubleshoot the components.



Above: Fluke True RMS Multimeter (model 87 V)

Check Lamps

First thing: check the sign lamps. A multimeter can be used to test a lamp for continuity. You may have a lamp tester (no longer available) as pictured.



Above: **XTL Lamp 10V/20W** (Grey base)



Above: **Lamp Tester** (no longer available)

De-energize the sign and replace bad lamps before further testing.

Do not touch the lamp's globe! Dirt or oils from your fingers will greatly reduce lamp life. New lamps come in individual plastic bags; leave the bag over the lamp during installation. Remove the bag before powering up the sign. Dirt and oils can be cleaned from the globe using rubbing alcohol.

WARNING: the use of non-OEM replacement lamps may damage electrical components and cause premature lamp failure. Only OEM Lumacurve lamps will maintain FAA photometric requirements and factory warranties.

Important note:

XTL lamps have gray bases and labeled "PRT# XTL";

LOVA lamps have white bases and labeled "PRT# LOVA".

They are not interchangeable but you can adjust your E610 controller to accommodate LOVA.

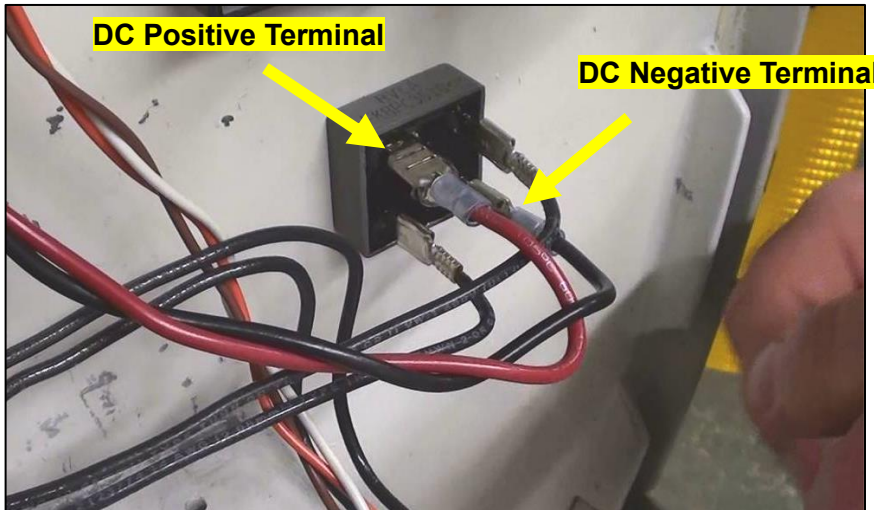
If no lamps are burned out, continue to check for faulty XTL electrical components.

Check Bridge Rectifier

If lamps are healthy, let's test the bridge rectifier.

Warning: the power must be off to perform this test.

1. With the power off, pull the wires off the bridge rectifier. The red and black intertwined wires are DC from the controller. The other two black wires are AC from the surge protector. Note that the red wire on the upper left side is connected to the positive terminal. The positive terminal is always 90°, or perpendicular, to the other three terminals.



Above: **Bridge rectifier** with DC leads identified

2. Next, set the Multimeter to a diode setting and place the meter's negative lead on the positive terminal of the bridge rectifier (90° from the other three terminals). Then place the positive lead on the negative terminal of the bridge rectifier (diagonal from the positive terminal).



Above & Right: Testing the **Bridge rectifier**
(multimeter on diode setting)



You are looking for one of two possible voltage readings:

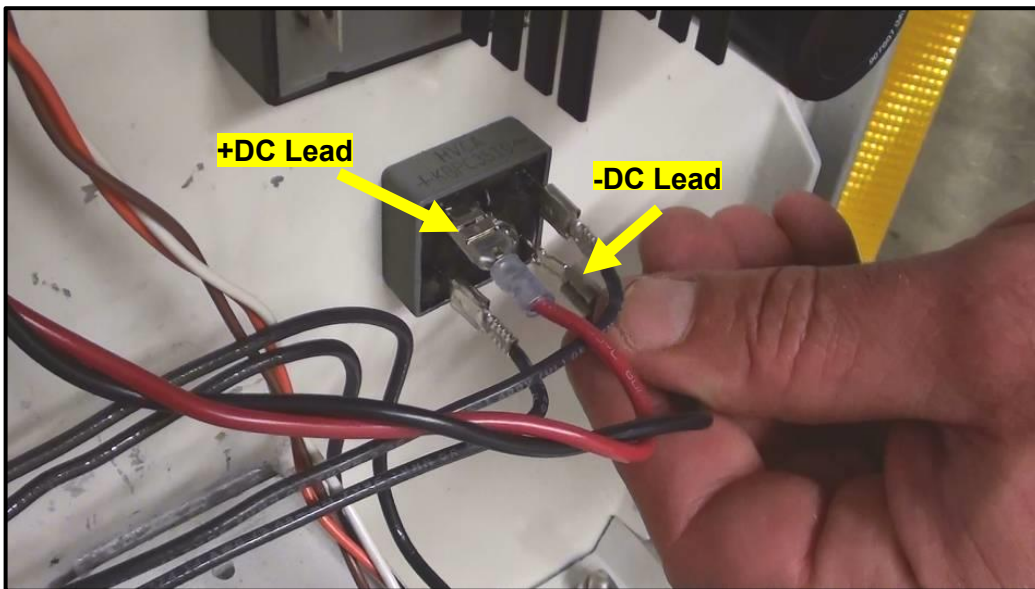
1.0 volt (approx.) the Bridge Rectifier is good.

0.5 volt (approx.) the Bridge Rectifier is not good.

Note: Meter readings are typically more precise than what is required for this test.
Round up the reading to the nearest 1/10th volt.

3. Reconnect the bridge rectifier wires.

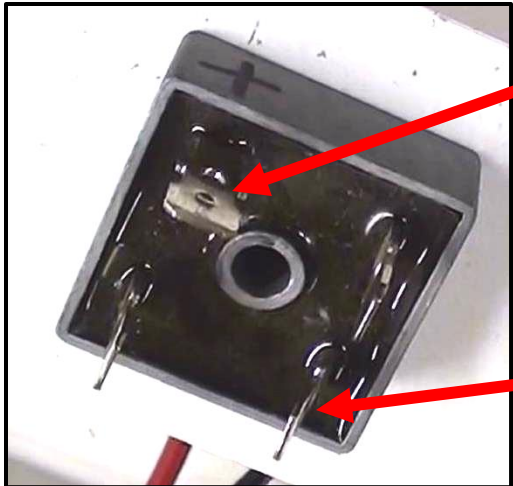
Warning: Do not mistakenly reverse the positive and negative DC wires from the controller (twisted red and black wires) to the bridge rectifier.



Above: Reconnecting the **Bridge rectifier leads** (Do not reverse DC Leads!)

Review: Identifying a faulty bridge rectifier

The positive terminal is normally on the upper left side of the bridge rectifier. It will be the terminal turned 90 degrees from the other three.



Pos DC Terminal

Note: Turned 90° from the other three terminals.

Neg DC Terminal

Note: Diagonal from Pos Terminal

Above: Identifying the **Positive (+) DC Lead**



Above: Testing the **Bridge Rectifier**

Close to 1.0 Volt DC (.995 in this example) is a healthy bridge rectifier!

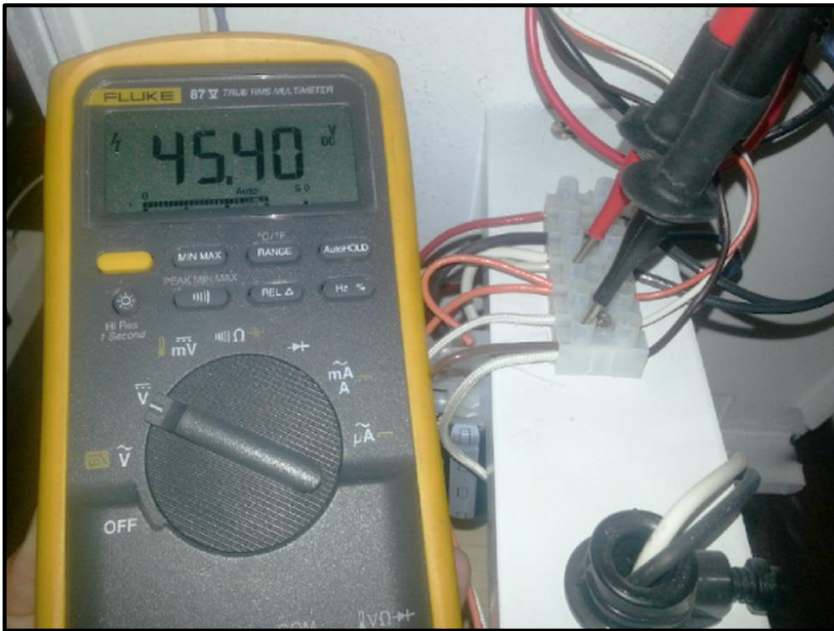
Place the meter's positive lead on the negative terminal, and the negative lead on the positive terminal. You are looking for a full 1.0 volt across it. On this example (as shown on the meter above) there is about 0.955 volts. This signifies a healthy bridge rectifier.

If the reading is close to 1.0 volt then the bridge is good, closer to 0.5 then the bridge is faulty.

Check Controller

Finally, we will check the controller for healthy functionality.

1. With the sign energized, remove one lamp. This will cause an open circuit on the load side of the controller and the controller will go to maximum power.
2. Set the meter to DC volts.
At the terminal strip, locate the orange and brown wires coming from controller.
3. Take a meter reading by touching the meter's positive (+/red) lead to the set screw of the orange wire and the negative (-/black) lead to set screw of the brown wire.



Above: Checking open circuit DC voltage (orange & brown wires)

You are looking for a voltage reading greater than the sum of the voltage of all the lamps in the sign.

For example: if the sign has (4) XTL lamps at 10V each, the controller should be putting out 40V minimum. (4 lamps multiplied by 10V per lamp) A sign with (6) XTL lamps at 10V each, the controller should be putting out a minimum of 60V.

Conclusion

The airfield sign should light if the following components are functioning properly:

1. All lamps are good or have been replaced
2. The bridge rectifier reads a voltage of 1V
3. The controller is putting out appropriate voltage for the number of lamps
4. The surge protection system shows no visual signs of damage (charring or melting)
5. The isolation transformer is the correct size and performing properly

Maximizing XTL Lamp Life

Incandescent lamp filaments gradually deteriorate. Expected XTL lamp life ranges 1,000-3,000 hours, or roughly 2-9 months. To maximize XTL lamp life, operate lamps within their halogen cycle and minimize unnecessary electrical shock.

Recommendations:

1. Use only Lumacurve brand (OEM) lamps.

Using Lumacurve OEM lamps ensures the proper value of electrical resistance. The sensor wire from the E410/E610 controller reacts to the measured resistance and changes the output of power to the lamps. A non-Lumacurve lamp may deviate from the system design and cause premature failure.

Warning: Per FAA Advisory Circular 150/5340-26C:

“3.6.6 Use of Original Equipment Manufacturer (OEM) Part.

The use of non-OEM parts or lamps in FAA approved equipment is strongly discouraged. The FAA has strict specifications for approval of all airport lighting equipment and use of non-OEM parts or lamps in such equipment or systems can render the equipment to be functionally non-FAA approved. This could possibly lead to serious liability consequences in case of an aircraft incident at an airport following these practices. In the case of runway and taxiway lighting fixtures, the use of a generic, non-approved lamp can render the photometric output of the fixture out of specification with disastrous results in light output and, consequently, safety of low visibility operations.”

2. Change lamps with the power off.

Changing lamps “hot” shocks the filament arm (rated for 30V max). A burned lamp in an energized sign causes the controller to reach maximum power and exceed the lamp’s rated voltage. Change a lamp with the power off, then power up the sign to ensure a “Soft Start.” The E410/E610 will gradually ramp up power to the lamps and eliminate shock to the filaments.

3. Change all the sign lamps at the same time.

Installing a new lamp in a sign with older or “used” lamps causes the new lamp to burn out prematurely. When one lamp has reached the end of its rated life, it’s likely the other lamps are also approaching failure. Changing all the lamps saves both time and money by increasing lamp life and reducing multiple visits to the sign.

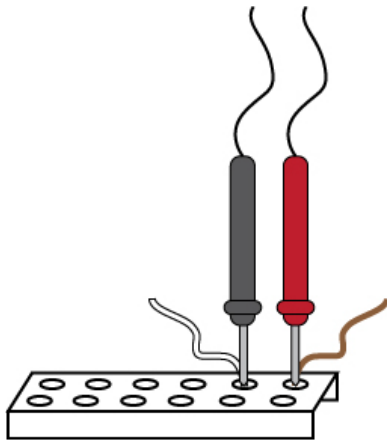
Tip: Keep good records. Write the service date on the lamp base or lightbar with a permanent marker. When a lamp fails, you'll know if the lamp has failed prematurely or reached the end of its expected life based on your records. "Used" bulbs, of roughly the same number of hours burned, can be reassigned to another sign to finish out their life.

4. Check and adjust controller voltage periodically.

Controllers set too high or too low push XTL lamps outside the halogen cycle, which greatly reduces lamp life.

How to Measure and Adjust Voltage:

- Set the CCR (constant Current Regulator) at the low step (4.8A for style 2 circuits, 2.8A for style 3). Sign must be powered on.
- Use a true RMS multi-meter set at volts DC.
- Identify the brown and white wire coming from the controller and place the meter probes on the terminal strip set screws for these wires.
- Locate the adjustment screw (potentiometer) on the top left corner of the controller and adjust the power to the lamps to 9.5V volts **minimum**. This applies for all size signs with XTL lamps.



Above: Using multimeter probes to measure DC volts from the brown and white wires.



Above: Using a flathead screw driver to adjust the power 9.5V DC at the lowest step.

Warning: Signs that remain powered with a burned-out lamp for an extended period will burn out controllers and bridge rectifiers!

Other Sources of Problems

1. Confusing XTL and LOVA Lamps. *These lamps are NOT INTERCHANGEABLE. See LOVA.*
2. Aging or damaged circuits. *Deteriorating cable causes losses to ground which adversely affect sign performance and lamp life.*
3. Bad or incorrectly sized isolation transformers
4. Voltage spikes
5. Bad connections. *Check for loose wires.*

Still Having Significant Problems?

Convert any existing Lumacurve sign to LED with a drop-in LED upgrade kit. Lumacurve signs are built to last 50 years - protect your investment and boost performance by upgrading to LED lighting. Our state-of-the-art LED lighting system drastically improves energy efficiency as well as delivering 25x the lamp life of incandescent. Find out more here: <https://lumacurve.com/led-upgrade/>

Maintaining 12V/20W LOVA Signs



The E410 controller for the LOVA system is no longer available.

The E610 controller (from the XTL system) can be adapted to power 12V LOVA lamps. To do so, you must adjust the XTL controller output to 11.5V DC on the lowest step to accommodate LOVA lamps. You will also need (2) E611 capacitors for the E610 controller.

XTL lamps have gray bases and labeled "PRT# XTL";
LOVA lamps have white bases and labeled "PRT# LOVA".

To adjust the E610 controller:

- At the low step on your regulator (4.8A for style 2 circuits, 2.8A for style 3), identify the brown and white wire coming from the controller.
- Place the meter probes (set to DC volts) on the terminal strip set screws for these wires to measure.
- Locate the adjustment screw on the top left corner of the controller and adjust the power to the lamps to **11.5V volts minimum for LOVA**.

Note: Four module LOVA signs 2 and 3 will need an additional E610 controller – two controllers total, with the accompanying E611 capacitors. Please contact us if you need a wiring diagram.