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## Lightbar Service Manual Model LL274FHP

# Service Manual: Lightbar

### **Safety First!**

This service manual is for model LL274FHP Lightbar. It has been designed to enable a qualified field technician to diagnose and troubleshoot specific problems that may occur over the life of this product. It is important to understand that the design of this lightbar precludes the field repair of any electrical assembly. Failed components must either be replaced or returned to the factory for repair. The installation technician must read this manual completely prior to performing any service on this lightbar. Important information is contained herein that could prevent serious injury or damage.

- For this product to operate at optimum efficiency, a good electrical connection to chassis ground must be made. The recommended procedure requires the product ground wire to be connected directly to the **NEGATIVE (-)** battery post.
- This product contains strobe lights, halogen lights and high-intensity LEDs. Do not stare directly into these lights. Momentary blindness and/or eye damage could result.
- Use only soap and water to clean the outer lens. Use of other chemicals could result in premature lens cracking (crazing) and discoloration. Lenses in this condition have significantly reduced effectiveness and should be replaced immediately. Inspect and operate this product regularly to confirm its proper operation and mounting condition. Do not use a pressure washer to clean this product.
- It is recommended that these instructions be stored in a safe place and referred to when performing maintenance and/or reinstallation of this product.
- **FAILURE TO FOLLOW THESE SAFETY PRECAUTIONS AND INSTRUCTIONS COULD RESULT IN DAMAGE TO THE PRODUCT OR VEHICLE AND/OR SERIOUS INJURY TO YOU AND YOUR PASSENGERS!**

**For warranty information regarding this product, visit [www.whelen.com/warranty](http://www.whelen.com/warranty)**

# Table of Contents

Lightbar components .....	page 3
Electrical wiring	
Power Cable .....	page 6
Control Wires .....	page 6
Troubleshooting	
Opening the Lightbar .....	page 8
Replacing the Strobe Power Supply .....	page 8
Replacing the I/O Board .....	page 9
Diagnostic Flow Charts:	
All lamp failure (dead bar) .....	page 10
All strobe failure .....	page 11
Corner strobe failure .....	page 12
Inboard strobe failure .....	page 13
All halogen failure .....	page 14
Alley light failure .....	page 15
Take-down failure .....	page 16
All LED failure .....	page 17
Traffic Advisor Failure .....	page 18

## Illustrations

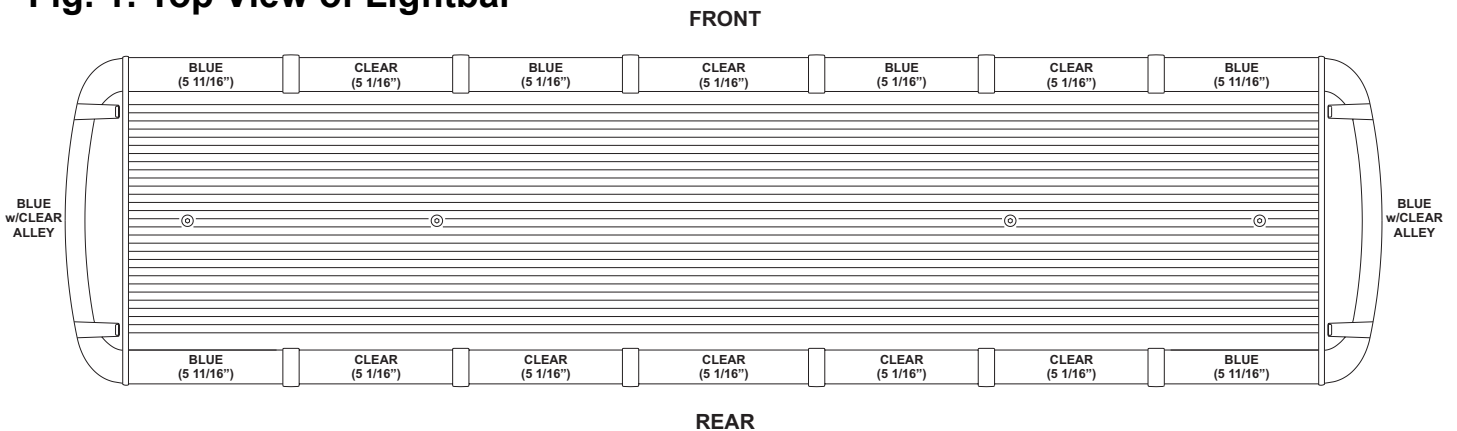
<i>Fig.1: Top view of lightbar .....</i>	<i>page 3</i>
<i>Fig. 2: Component Identification .....</i>	<i>page 4</i>
<i>Fig. 3: Exploded View of complete lightbar .....</i>	<i>page 5</i>
<i>Fig. 4: Main Power Wiring .....</i>	<i>page 6</i>
<i>Fig. 5: Endcap Removal View .....</i>	<i>page 8</i>
<i>Fig. 6: I/O Board Connections .....</i>	<i>page 9</i>

## Lightbar Components

The model LL274FHP lightbar is comprised of the following components:

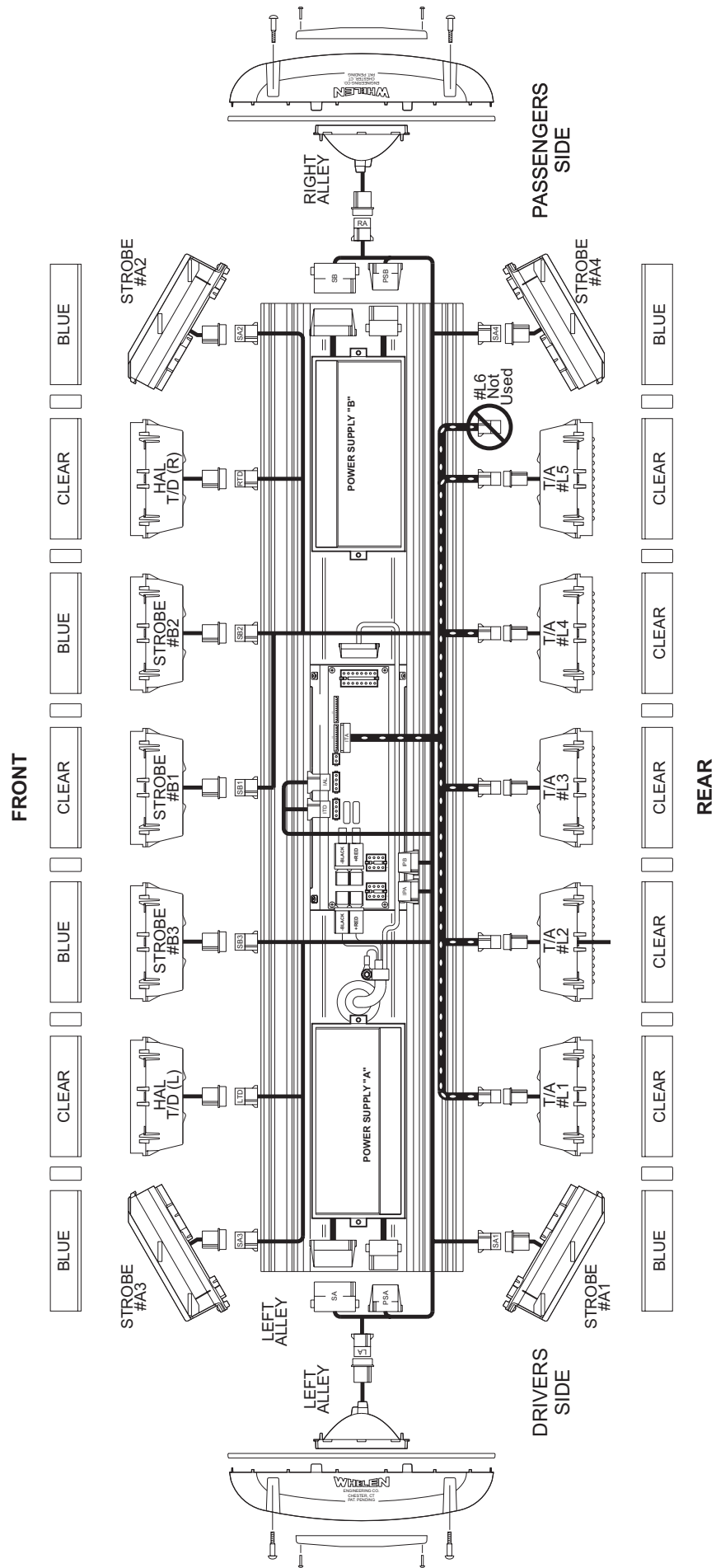
<u>Qty.</u>	<u>Description</u>	<u>Designation</u>
(3)	500-series Linear Strobe Module	#B1 / #B2 / #B3
(4)	Corner Strobe Assemblies	#A1 / #A2 / #A3 / #A4
(5)	500-series Amber LED Lightheads	#L1 / #L2 / #L3 / #L4 / #L5
(4)	500-series Halogen Snap-in Reflectors w/27 watt Halogen Lamps	
(10)	500-series Snap-in Reflector Housings	
(2)	Strobe Power Supplies	
(1)	LFL LC Input/Output (I/O) Board	
(2)	Endcap Gaskets	
(2)	Blue Endcaps w/Clear Alley Light Lens	
(4)	Blue Lens (5 11/16")	
(12)	Lens Dividers w/gaskets	
(8)	Clear Lens (5 1/16")	
(2)	Blue Lens (5 1/16")	

**Fig. 1: Top View of Lightbar**

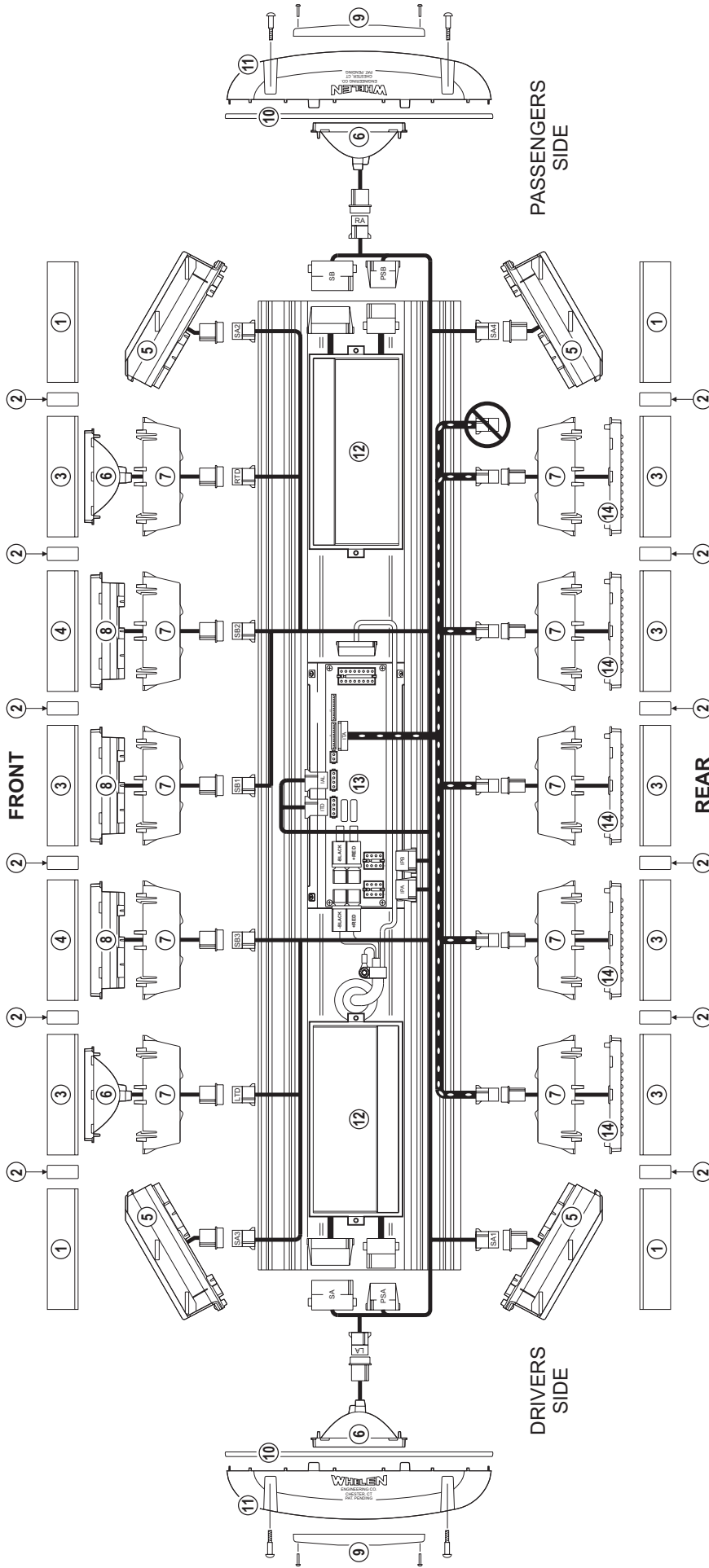


“Fig. 1: Top View of Lightbar” (page 3) shows lens length and location. Refer to “Fig. 2: Component Identification” (page 4) for an overall view of the lightbar with individual lighthead designations. Refer to “Fig. 3: Exploded View” (page 5) for an exploded view along with each components corresponding part number.

Fig. 2: Component Identification



**Fig. 3: Exploded View**



ITEM	QTY.	PART NUMBER	DESCRIPTION	ITEM	QTY.	PART NUMBER	DESCRIPTION
1	4	68-196333B02	LENS, BLUE (5 1/16")	8	3	02-0363292-00	500-SERIES LINEAR STROBE
2	12	02-0342791-00	DIVIDER, LENS (w/GASKET)	9	2	68-1963237-30	LENS, CLEAR (w/OPTICS)
3	8	68-196333C01	LENS, CLEAR (5 1/16")	10	2	38-0283572-00	GASKET, ENDCAP
4	2	68-196333B01	LENS, BLUE (5 1/16")	11	2	01-0483566-23	ENDCAP, BLUE (INCLUDES 9 & 10)
5	4	02-0363332-00	STROBE, CORNER LINEAR	12	2	01-0289098-00	POWER SUPPLY, LFL412 STROBE
6	4	02-0383584-00	REFLECTOR, SNAP-IN 500-SERIES HAL.	13	1	01-0289116-00	ASS'Y, LFL I/O BOARD
7	10	11-483564-000	HOUSING, SNAP-IN LIGHTHEAD	14	5	01-0463265-1A	ASS'Y, 500-SERIES LED (AMBER)
				15*	4	HZ7SN12	BULB, SNAP-IN HALOGEN

\* NOT SHOWN

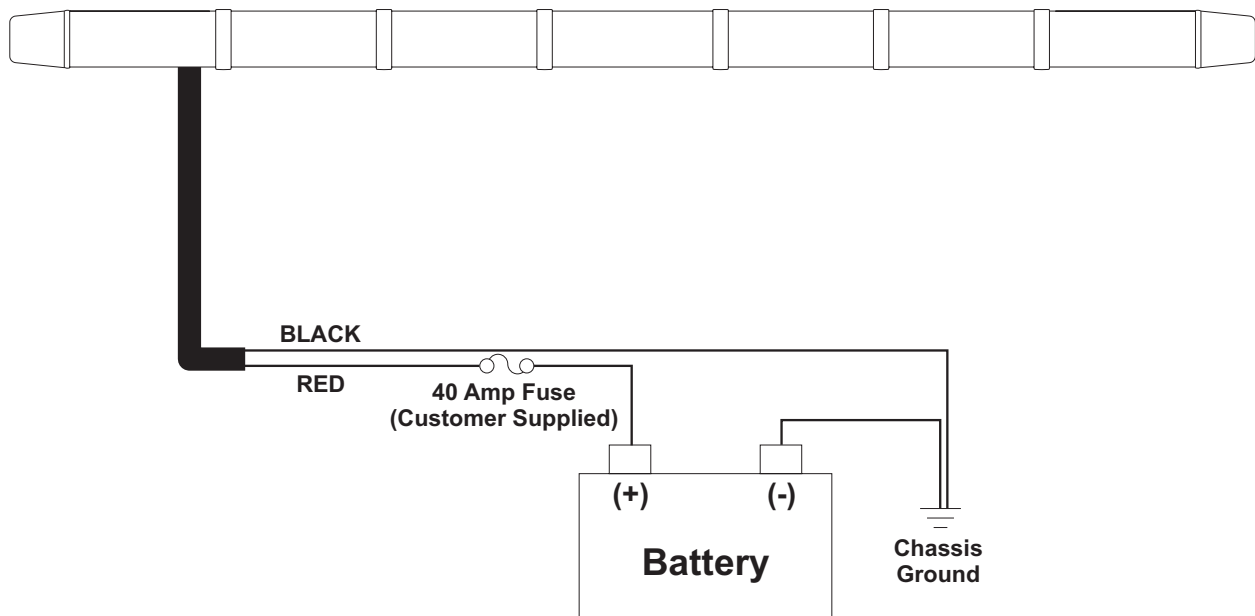
## Wiring

### Power Cable

The Power Cable contains a 8 AWG Black wire and a 8 AWG Red wire. Connect the BLACK wire directly to chassis ground (typically adjacent to the vehicle battery). Connect the RED wire, **fused @ 40 amps** (customer supplied), to the POSITIVE battery terminal. IMPORTANT! There should not be more than 2 (two) feet of wire between the fuse and battery.

**WARNING! All customer supplied wires that connect to the positive terminal of the battery must be sized to supply at least 125% of the maximum operating current and FUSED at the battery to carry that load. DO NOT USE CIRCUIT BREAKERS WITH THIS PRODUCT!**

**Fig. 4: Main Power Wiring**



### Control Wire Functions

The control wires (22 AWG) are used to activate specific lightbar functions. These wires should be connected to a customer supplied control head or switched output. Any control wire that requires +12VDC for activation must be fused using a 1 Amp fuse (customer supplied). Please note that the current draw values shown represent the amount the lightbar will draw through the main power cable with the corresponding control wire active. These values are cumulative (Yellow + Green = 14 Amps Current Draw).

<u>Color</u>	<u>Activates</u>	<u>Current Draw</u>	<u>Function</u>
Green	Strobe	9 Amps	Applying +12VDC to this wire activates: Corner Strobes <b>A2 &amp; A3</b> Inboard Strobes <b>B2 &amp; B3</b>
Grey	Strobe+LED	5 Amps	Applying +12VDC to this wire activates: Corner Strobes <b>A1 &amp; A4</b> LED <b>L2 &amp; L4</b>
Blue	Strobe+LED+Halogen	26 Amps	Applying +12VDC to this wire activates: Corner Strobes <b>A1, A2, A3 &amp; A4</b> Inboard Strobes <b>B1, B2 &amp; B3</b> LED <b>L2 &amp; L4</b> Both Take-Down Lights (flashing) Both Alley Lights (flashing)

<b>Yellow</b>	<b>Halogen</b>	2.5 Amps	Applying +12VDC to this wire activates: Passenger side Alley Light (steady on)
<b>White</b>	<b>Halogen</b>	2.5 Amps	Applying +12VDC to this wire activates: Driver side Alley Light (steady on)
<b>White/Black</b>	<b>Halogen</b>	5 Amps	Applying +12VDC to this wire activates: Both Take-Down Lights (steady on)
<b>White/Brown</b>	<b>LED</b>	.75 Amps (3A Peak)	Applying +12VDC to this wire activates: LED <b>L1, L2, L3, L4 &amp; L5</b>
<b>White/Red</b>	<b>Strobe+LED</b>	19 Amps	Applying +12VDC to this wire activates: Corner Strobes <b>A1, A2, A3 &amp; A4</b> Inboard Strobes <b>B2 &amp; B3</b> LED <b>L1, L2, L4 &amp; L5.</b>
<b>White/Orange</b>	<b>Strobes</b>	9 Amps	Applying +12VDC to this wire activates: Corner Strobes <b>A1, A2, A3 &amp; A4</b>
<b>White/Yellow</b>	<b>LED</b>	1.1 Amps (3A Peak)	Applying +12VDC to this wire activates: "Sequence:Left" Pattern (LED's).
<b>White/Green</b>	<b>LED</b>	1.1 Amps (3A Peak)	Applying +12VDC to this wire activates: "Sequence:Right" Pattern (LED's). <b>Note: White/Yellow + White/Green = "Split" pattern</b>
<b>White/Blue</b>	<b>Strobe Flash Pattern</b>	N/A	Applying +12VDC to this wire changes the active strobe's pattern to "Action Flash™".
<b>White/Violet</b>	<b>Strobe Flash Pattern</b>	N/A	Applying +12VDC to this wire changes the active strobe's pattern to "Longburst".
<b>Violet</b>	<b>Low Power</b>	N/A	Applying +12VDC to this wire places the bar into Low Power operation mode.
<b>No Color</b>	<b>RF Drain</b>	N/A	Connect to chassis ground.
<b>Brown</b>	<b>No Function</b>	N/A	

## Troubleshooting

This section will outline the necessary diagnostic procedures for determining the probable cause for component failure within your lightbar. Disassembly of the lightbar may be required in order to perform specific diagnostic tests and for component removal and/or replacement. Although the process is not difficult, it does require focused attention to ensure proper re-assembly. It is a good idea to keep careful notes documenting the procedure. All components **MUST** be returned to their original mounting location **WITH THEIR ORIGINAL ELECTRICAL CONNECTIONS IN TACT** before reassembly.

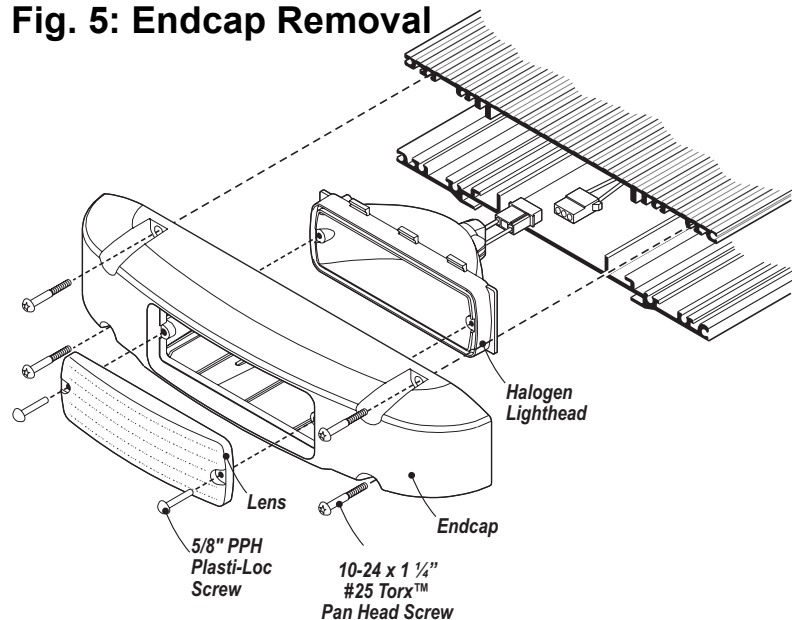
**WARNING! THIS PRODUCT CONTAINS HIGH VOLTAGE. DISCONNECT THE LIGHTBAR FROM POWER AND WAIT 10 MINUTES BEFORE PERFORMING ANY DISASSEMBLY PROCEDURES.**

### Opening the Lightbar

**Tools Required:** #20 Torx™ head screwdriver  
#25 Torx™ head screwdriver

1. Using the #25 Torx™ head screwdriver, remove the 4 endcap screws from each endcap.
2. Remove the endcaps and endcap gasket from the extrusion. If the alley light is not being tested it may be unplugged and the endcap assembly may be moved away from the work area.
3. Remove all lenses and dividers. **It is important to note the location of each lens and divider so that each may be returned to their original location.**
4. Slide the 4 corner strobes out of the extrusion.
5. Using the #20 Torx™ head screwdriver, remove the 4 screws located on the top of the lightbar extrusion. Remove the top of the extrusion from the lightbar.

**Fig. 5: Endcap Removal**



### Replacing the Strobe Power Supply

1. Locate and disconnect the 8-position and 12-position power supply connectors.
2. Slide the power supply out of the extrusion.
3. Slide the replacement power supply into the extrusion, using the same extrusion guide tracks as the original.

**Caution:** It is very important to visually confirm that no wires are being pinched between the power supply and the extrusion.

4. Reconnect the two connectors disconnected in step 1.



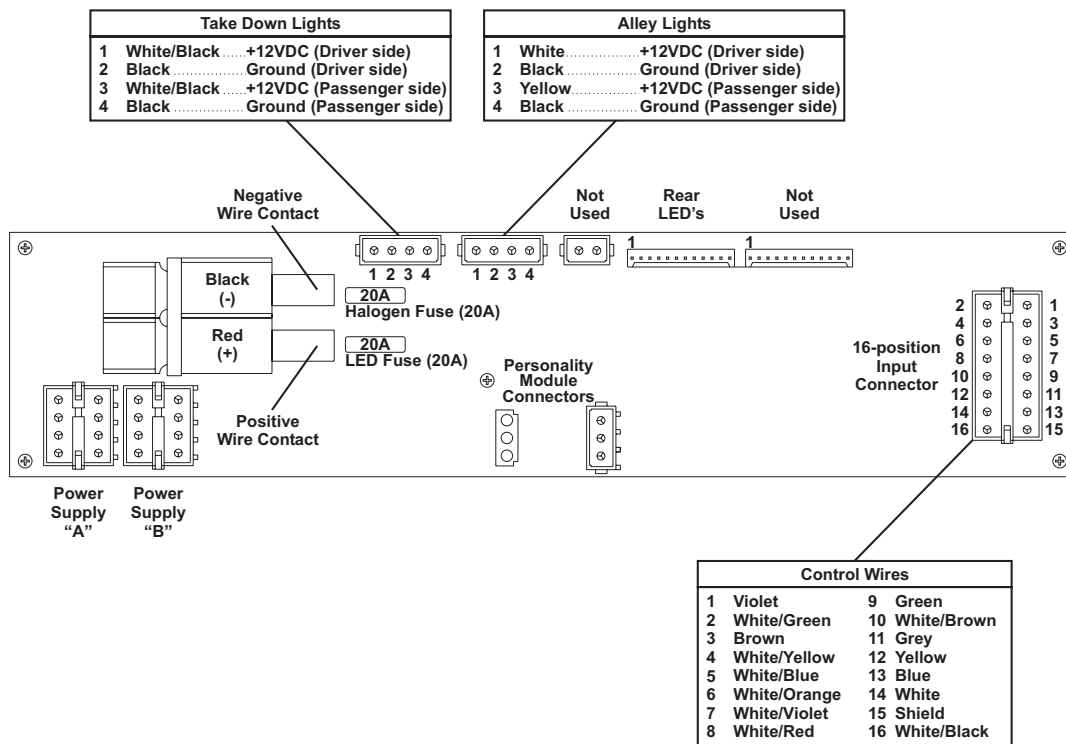
## Replacing the LFL LC I/O Board

1. Remove the main power fuse installed at the vehicle battery. This will remove all voltage from the lightbar.
2. Record the location of where each connector plugs into the I/O board. Beginning with the main voltage cables, unplug each connector from the I/O board.
3. Locate and remove the 5 Phillips-head screws used to secure the I/O board to its mounting plate.
4. Carefully lift the I/O board up and away from the mounting plate.

**Note:** Remnants of insulating material may remain on the mounting plate after the board has been removed. These remnants must be completely removed from the mounting plate prior to installation of the new I/O board.

5. Install the new I/O board onto the mounting plate using the original mounting hardware.
6. Return all the connectors to their original location.

**Fig. 6: I/O Board Connections**



## Diagnosis

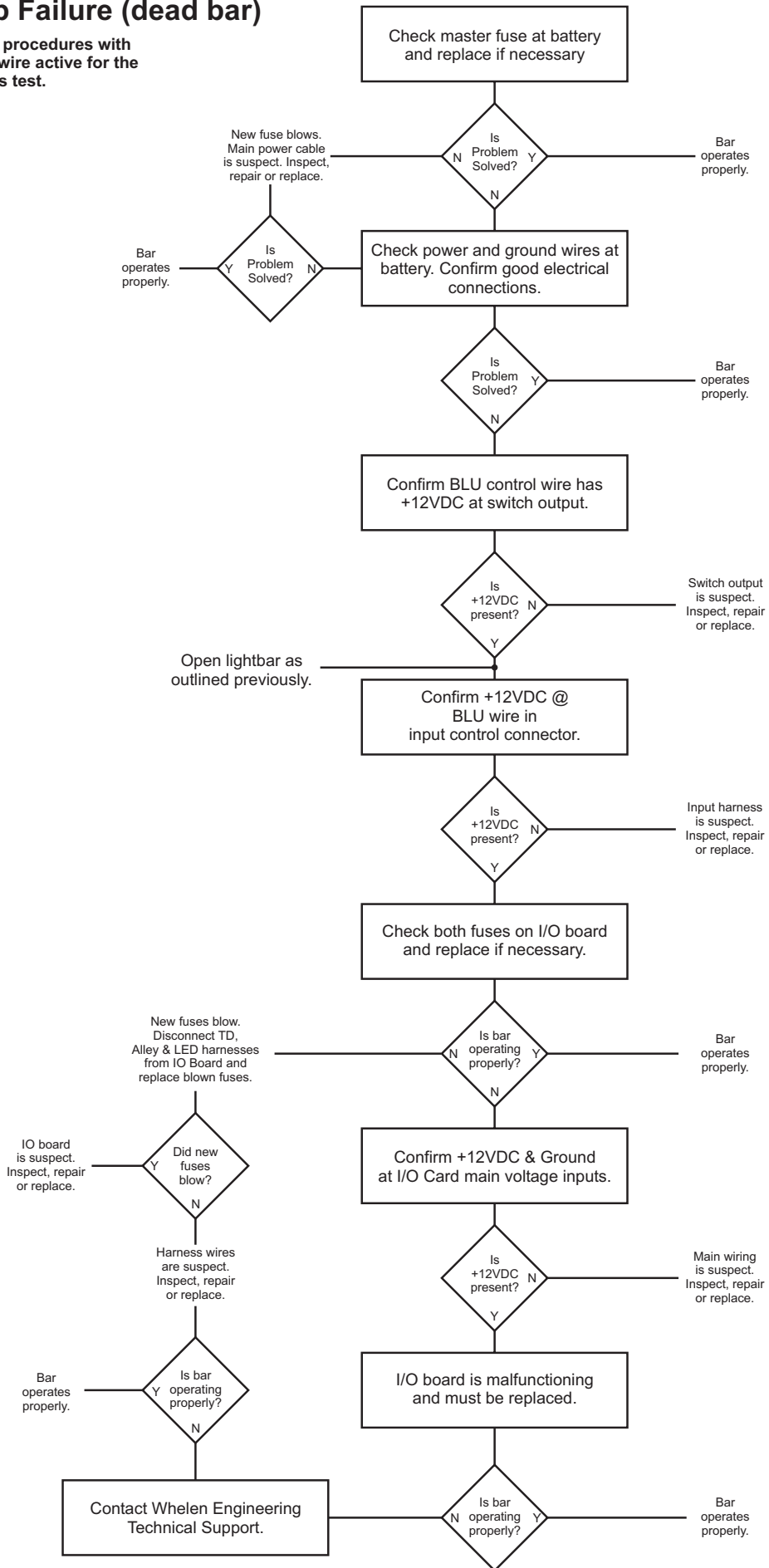
The following section will present diagnostic flow charts designed to allow service personnel to isolate the probable cause for specific lightbar failures.

**WARNING!** High Voltage is present within the lightbar! The diagnostic procedures outlined herein should not be attempted by anyone other than trained and experienced service technicians.

**Note:** When measuring voltages within the lightbar, clip the Negative lead from your volt meter to the BLACK, 8 AWG wire contact at the I/O board (see Fig. 6).

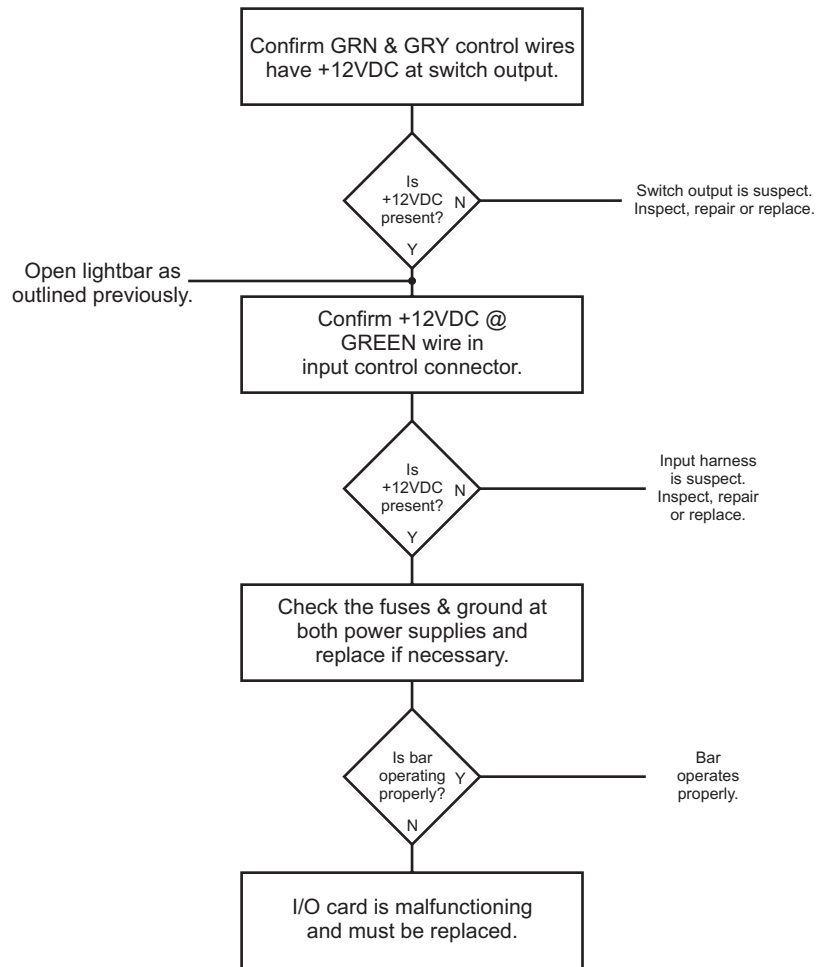
# All Lamp Failure (dead bar)

Perform these procedures with BLUE control wire active for the duration of this test.



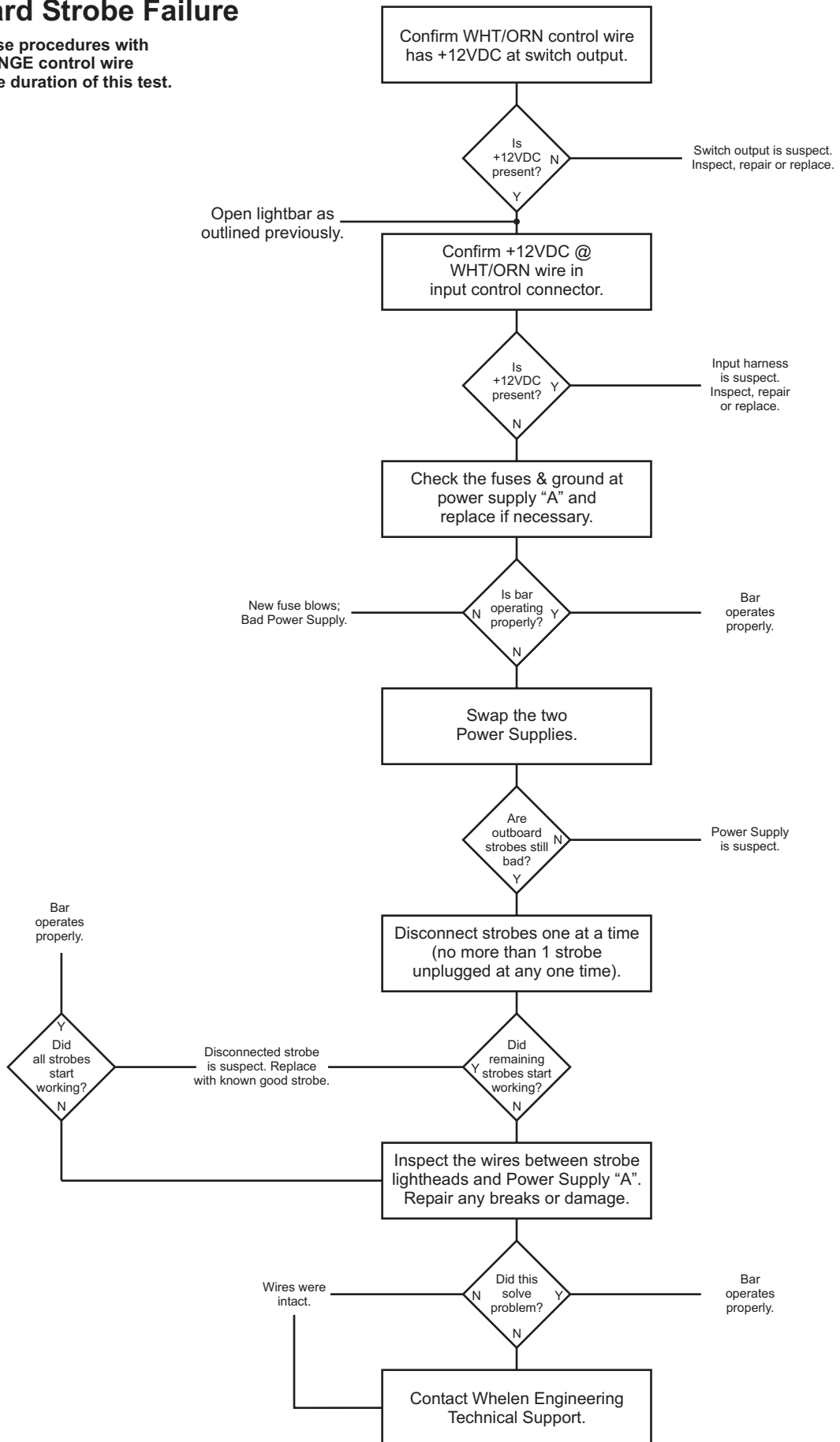
# All Strobe Failure

Perform these procedures with GREEN & GREY control wire active for the duration of this test.



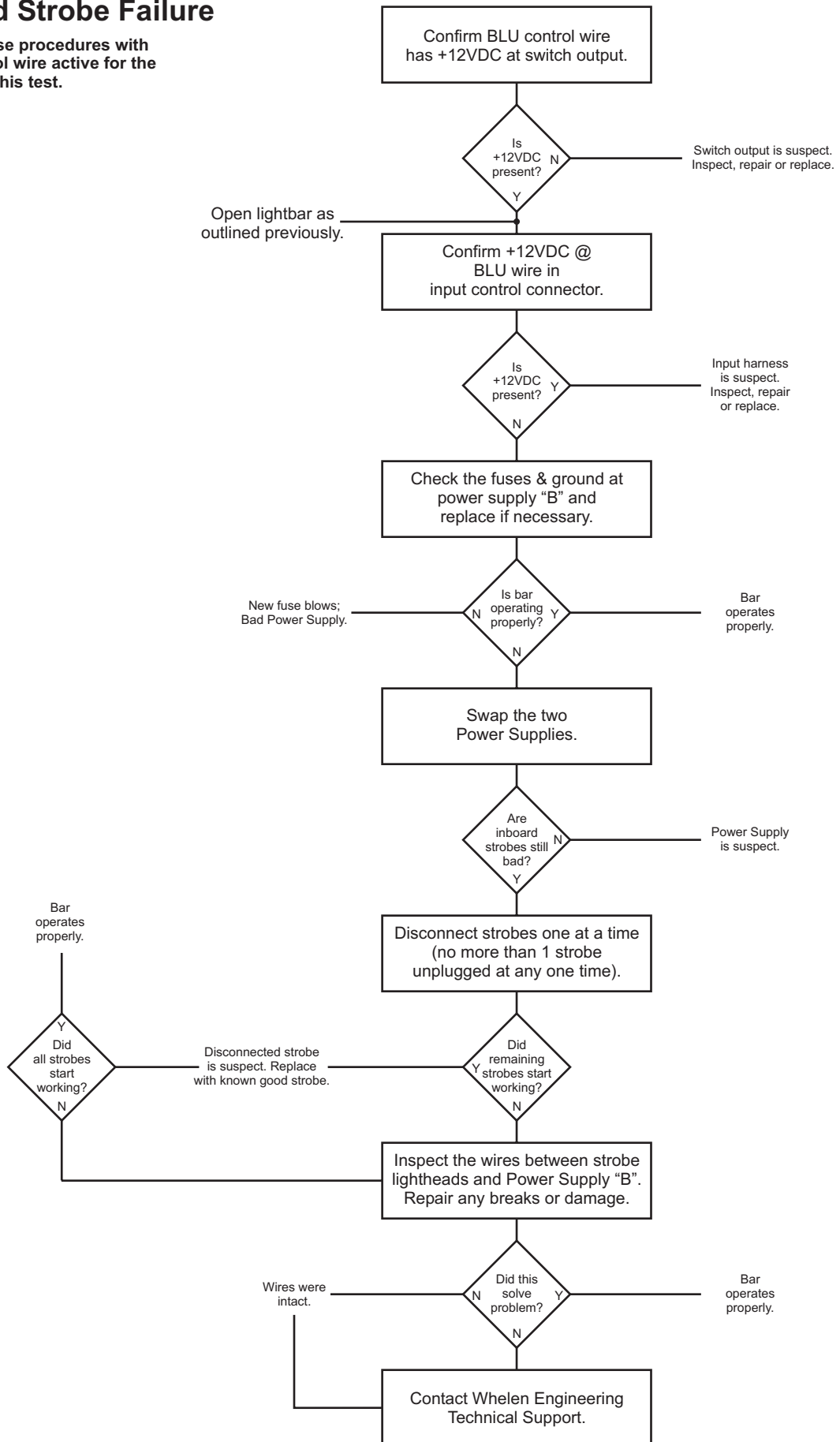
# Outboard Strobe Failure

Perform these procedures with **WHITE/ORANGE** control wire active for the duration of this test.



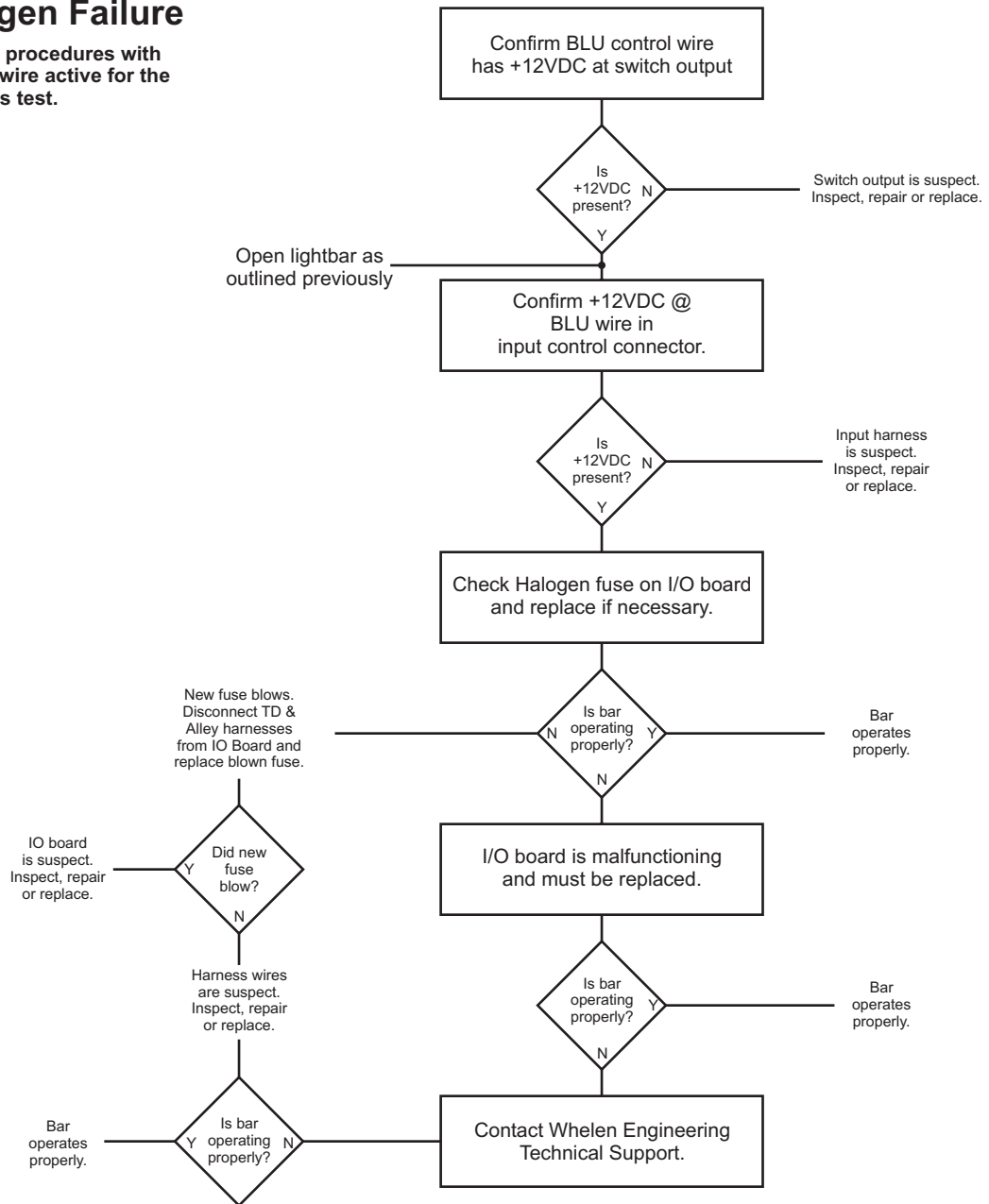
# Inboard Strobe Failure

Perform these procedures with BLUE control wire active for the duration of this test.



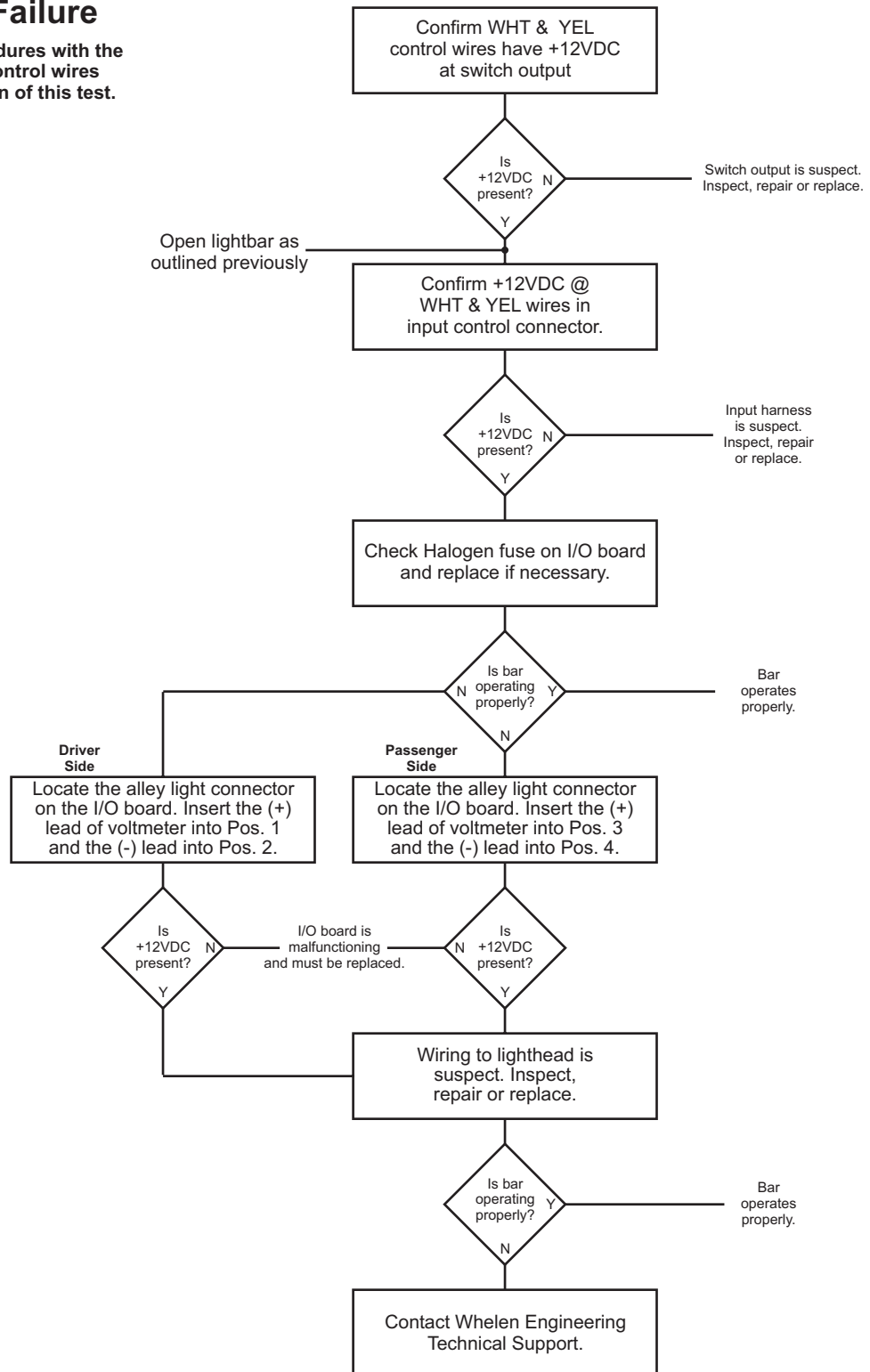
# All Halogen Failure

Perform these procedures with BLUE control wire active for the duration of this test.



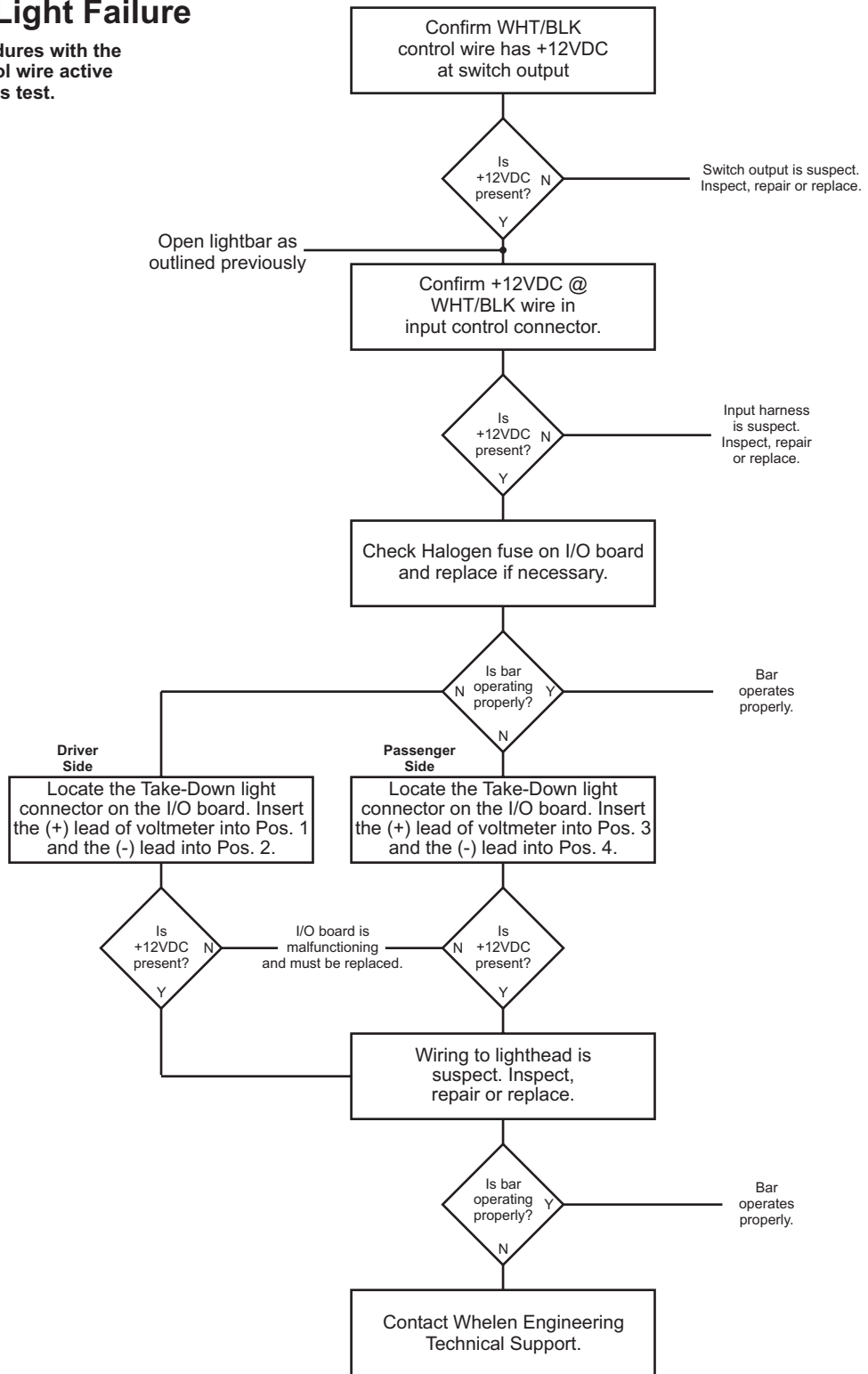
# Alley Light Failure

Perform these procedures with the **WHITE & YELLOW control wires active for the duration of this test.**



# Take-Down Light Failure

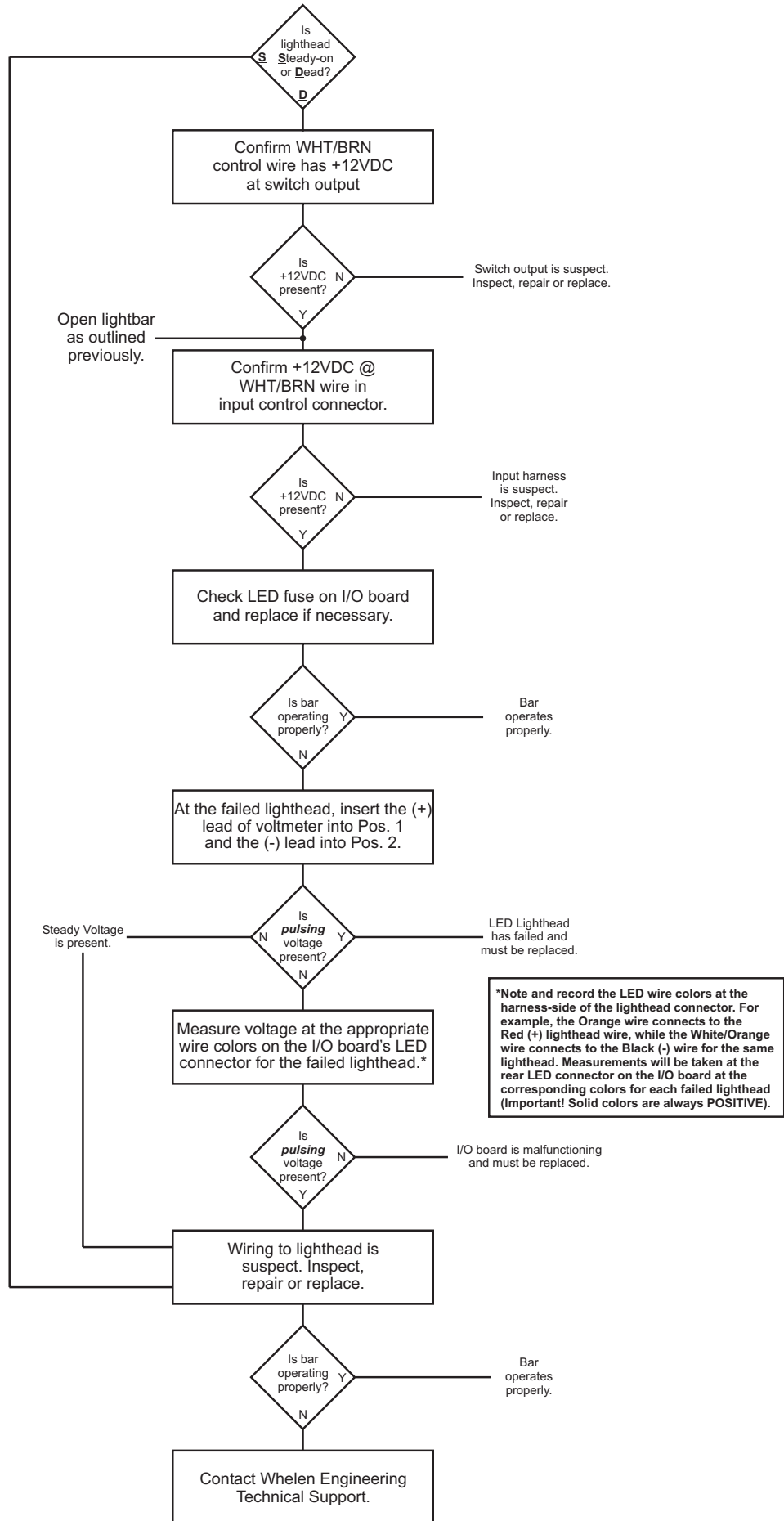
Perform these procedures with the **WHITE/BLACK** control wire active for the duration of this test.





# LED Lighthead Failure

Perform these procedures with the WHITE/BROWN control wire active for the duration of this test.



**\*Note and record the LED wire colors at the harness-side of the lighthead connector. For example, the Orange wire connects to the Red (+) lighthead wire, while the White/Orange wire connects to the Black (-) wire for the same lighthead. Measurements will be taken at the rear LED connector on the I/O board at the corresponding colors for each failed lighthead (Important! Solid colors are always POSITIVE).**

# LED Traffic Advisor Failure

Perform these procedures with the appropriate control wire active for the duration of this test  
 (WHITE/YELLOW - sequence to LEFT  
 WHITE/GREEN - sequence to RIGHT  
 Both active - Split).

