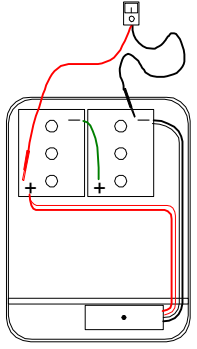


**Silent Sentinel Arrow Board Not Working**

**Select an Arrow**

- Turn **Selector Knob** to display a **Left Flashing Arrow**.



**Check Battery Voltage**

- Check the battery voltage, using a DC voltmeter
- Place Red lead on POS terminal of the left battery and the Black lead on the NEG terminal of the battery on the right.

Is battery voltage above 11volts?

**Recharge the Batteries**

- Charge units with **2 batteries** for **7 hours** using a **45 amp** charger.
- Charge units with **4 batteries** for **14 hours** using a **45 amp** charger.

**Reset Controller**

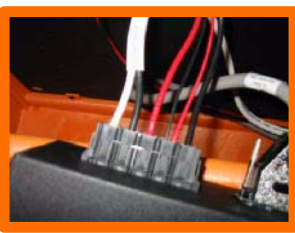
- Remove controller from divider plate.
- Disconnect the battery and solar array power connector from the controller. Wait one minute. Reconnect battery and solar array connector.
- NOTE: disconnecting the power to the controller will reset the microprocessor.

Is battery voltage above 12 volts?

Did arrow panel light?

**Controller has been Reset**

- Place unit back in service, if unit needs to be reset again, send controller back to the factory to have the reset circuit repaired.
- Call Solar Technology Customer Service for a RMA (Return Materials Authorization) The unit's serial number will be required.



**Check for Voltage at Controller**

- Check for Voltage across the thick red and black wires going to the controller ( power wires ).
- Check for Voltage at the thin red and black wires going to the controller ( sense wires ) there should be more than 11 volts.
- Inspect all electrical connections on the batteries.

Is there power at both power & sense wires?

**Repair Wires**

- Locate faulty connection.
- Inspect all connectors on battery terminals.
- Repair or replace bad wire harness.

Turn to page 2  
**A**

From page 1

A

More than 11 Volts Present at Controller

Are LEDs on Controller lit normally?

NO

YES



**Repair Controller**

- Send Controller back to the factory for repair.
- Call Solar Technology Customer Service for a RMA (Return Materials Authorization) The unit's serial number will be required.

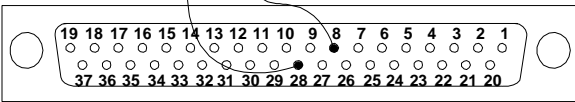
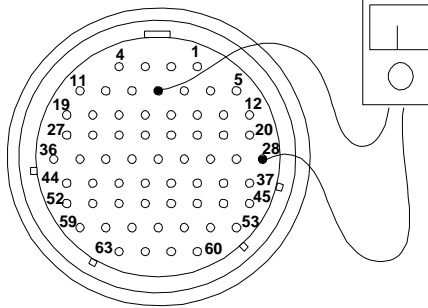


**Check Arrow Panel Connector**

- Inspect connector for corrosion or damaged pins
- Check for power from pin # 8 to pin # 28 on Arrow Panel Control Cable using a dc volt meter.



**WARNING**  
When testing for power be careful not to touch leads to each other or ground. Controller Damage could occur.



Is pulsating voltage present?

NO

YES

**Check Controller Connector**

- Inspect connector on rear of controller for corrosion or damaged pins
- Check for power from pin # 8 to pin # 28 using a dc volt meter.



Turn to Page 3

B

Turn to Page 4

C

YES

Is pulsating voltage present?

NO

**Repair Controller**

- Send controller back to the factory for repair.
- Call Solar Technology Customer Service for a RMA (Return Materials Authorization) The unit's serial number will be required.



From Page 2

**B**

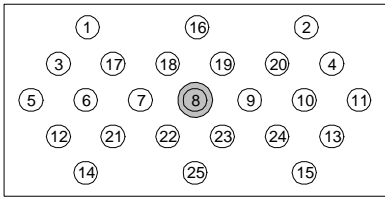
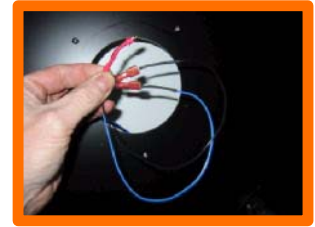
**Power at Arrow Panel Control Cable**

**Reconnect Arrow Panel Control Cable**

- Reconnect the arrow panel control cable to the arrow panel.

**Test LED Lamp**

- Remove the center lamp # 8
- Test for power across wires with **left arrow** selected. Note: Black is negative, blue is positive.



Is there flashing power?

NO

YES

**Check Wires for Continuity**

- Test the wire using a continuity tester from pin # 8 to the black wire of lamp # 8 and pin # 28 to blue wires of lamp # 8.

**Change LED Lamp**

- Change the lamp with a known good LED Lamp.

**Check the Remaining Lamps**

- Check the remaining lamps in the same manner. Wiring diagram available in manual.

Does lamp light?

YES

NO

Is there continuity?

YES

NO

**Retest Cable Connector**

- Bad connection between Arrow Panel control cable connector and the arrow panel harness connector.
  - Clean and inspect all pins.



**Change Arrow Panel Harness**

- Broken wires inside arrow panel
  - Change the arrow panel wire harness



**Call Customer Service**

- Call Solar Technology Customer Service department for additional assistance.



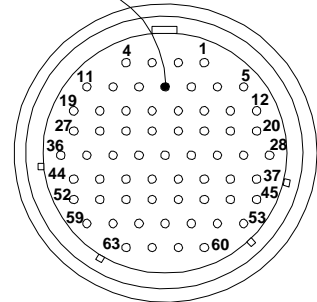
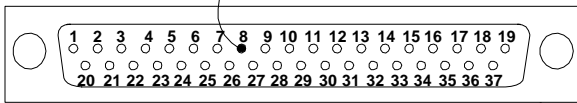
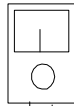
From Page 2

C

Power at Controller but not at Arrow Panel Control Cable

### Test Arrow Panel Control Cable

- Check wires of Arrow Panel Control Cable for continuity.  
Note: You will need a Continuity tester a paper clip and a magnifying glass.



Are there any open wires?

NO

YES

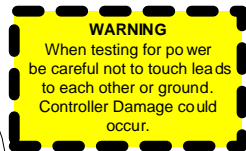
### Reconnect Cable to Controller

- Reconnect the Arrow Panel Control Cable to the Controller
- Test Arrow Panel connector for power using a dc volt meter.

### Replace Arrow Panel Control Cable

- Install known good Control Cable

End of Process



Is pulsating voltage present?

NO

YES

### Reconnect Cable to Arrow Panel

- Reconnect cable to Arrow Panel and if Arrow Panel does not light start test from the beginning.

End of Process

### Repair Controller and Cables

- Send the Battery harness, Controller and the Arrow Panel control harness back to the factory for repair.
- Call Solar Tech Customer Service for a RMA number. You will need the serial number of the unit.

End of Process

## Checking Arrow Board Charging Circuit

The following test assumes that the batteries need to be charged and there is enough sun to produce full voltage from the solar array. All battery terminal connections have been checked and verified good.

Approximate Amps for Solar panel on a sunny day with sun directly overhead.

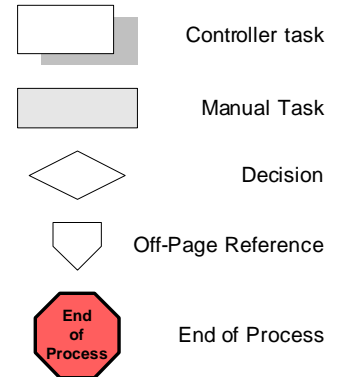
4.4 amps    75 Watt Solar panel

3.6 amps    50 Watt Solar panel

2.0 amps    30 Watt Solar panel

Note: These readings are typical under ideal conditions, bright sunny day with the sun directly overhead. Actual reading will probably be lower.

### Legend



### Turn Arrow Panel Off

The Arrow Selector Knob should be in the OFF position to test the Charging Circuit.  
NOTE: The Charging Circuit is always ON.

### Locate Unit in Direct Sun

- Locate unit outside in adequate sunlight.  
Note: You will not be able to check the charging circuit under shop lights.

### Measure Solar Array Charging Amps

- Remove Controller from the divider plate.
- Attach a DC digital clamp meter to the white wire from the Solar Array.
- Measure Amp reading.



### Compare Amp Reading to Chart

- Compare your Amp reading to the chart above.

Is Amp reading appropriate for the size solar array on the unit?

NO

Yes



### Measure Solar Array Amp Output (Dead Short Test)

- Disconnect the Power Connector from the Controller.
- Connect your DC clamp meter to the white wire from the Solar Array.
- Using a needle nose pliers short out the white and black wires from the Solar Array.  
Note: Do not leave wires shorted out longer than 15 seconds.



### Check Charging Current

- Measure the current from the Controller to the Battery Bank.
- Connect your DC clamp meter to the thick red wire that comes from the Controller to the Battery Bank.  
Note: Arrow Selector Knob should be in the off position for this test

Turn to Page 2

**A**

Turn to Page 3

**B**

From Page 1

**A**

**Amp Reading from Dead Short Test.**

Is Amp reading appropriate for the size solar array on the unit?

NO

YES

**Check Solar Panel Output Voltage**

- Check voltage across Solar Array Power Cable using a DC voltmeter.

Is there approximately 20 volts?

NO

YES

**Repair or Replace Solar Panel**

- Check Solar Panel for physical damage. If there is no obvious damage send Solar Panel back to the factory for repair.
- Call Solar Technology Customer Service for a RMA (Return Materials Authorization). The unit's serial number will be required.

End of Process

NO

Is there approximately 20 volts?

YES

**Repair or Replace Solar Array Power Cable**

- Check Power Cable for physical damage
- Check wires for continuity. If there is an open wire replace the Solar Array Power Cable.

End of Process

**Repair Controller**

- Double check battery terminal connections for loose wires and corrosion.
- Send the Controller back to the factory for repair.
- Call Solar Technology Customer Service for a RMA (Return Materials Authorization). The unit's serial number will be required.

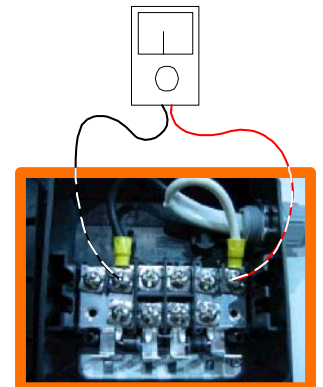
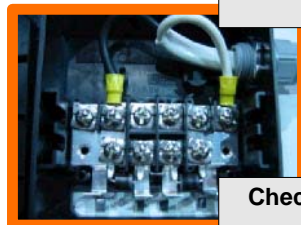
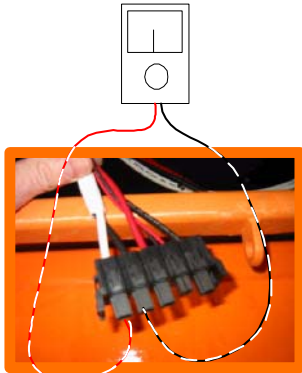
End of Process

**Check Solar Array Wire Connections**

- Open the junction box on the bottom of the solar panel.
- Inspect all wire connections, make certain wires are tight on the terminals and screws are tight on terminals.

**Check Solar Array and Power Cable**

- Check for voltage at Solar Panel power terminals.
- Check for voltage across the white and black wires of the Solar Panel power terminals using a DC voltmeter.



From Page 1  
**B**

**Check Charging Current.**

Is Amp reading similar to the solar array reading?

NO

YES

**Repair Controller**

- ♦ Send the Controller back to the factory for repair.
- ♦ Call Solar Technology Customer Service for a RMA (Return Materials Authorization) The unit's serial number will be required.

End of Process

**Charging Circuit OK**

- ♦ Charging Circuit checks out OK
- ♦ Call Solar Technology Customer Service if additional assistance is needed.

End of Process

**Battery Charge Table**  
 Approximate Time required to charge a battery bank from shut down mode.

<b>75 Amp. Charger</b>	
2 Batteries	4 Hours
4 Batteries	8 Hours
<b>45 Amp. Charger</b>	
2 Batteries	7 Hours
4 Batteries	14 Hours
<b>30 Amp. Charger</b>	
2 Batteries	10 Hours
4 Batteries	20 Hours
<b>10 Amp. Charger</b>	
2 Batteries	30 Hours
4 Batteries	60 Hours

**Check for Bad Battery**

**Charge Battery Bank Fully.**

- Charge Batteries fully for accurate testing.  
 Note: Refer to Battery Charge table for charging times.

**Test Batteries with a Hydrometer.**

- Check the Specific Gravity level of every cell of each battery.  
 Note: Hydrometers can be purchased at a local auto supply store.

**Legend**

- Controller task
- Manual Task
- Decision
- Off-Page Reference
- End of Process



Is specific gravity reading even on all cells of each battery?

Is specific gravity reading above 1225?

**Replace Battery**

- Replace any battery that has one cell with a lower specific gravity reading than the other cells of the same battery.

**Replace All Batteries not Holding a Charge**  
 Batteries not holding a charge.

- Replace any Battery with a Specific Gravity Reading under 1225.

Turn to Page 2  
**A**



From Page 1

**A**

**Specific Gravity Reading above 1225.**

**Load Test Batteries.**

- ◆ Disconnect jumper wires from Batteries.
- ◆ Load test Batteries individually.  
Note: Tester should be set to 6 volts (if required)



Did battery pass the load test?

NO

YES

**Replace Bad Battery.**

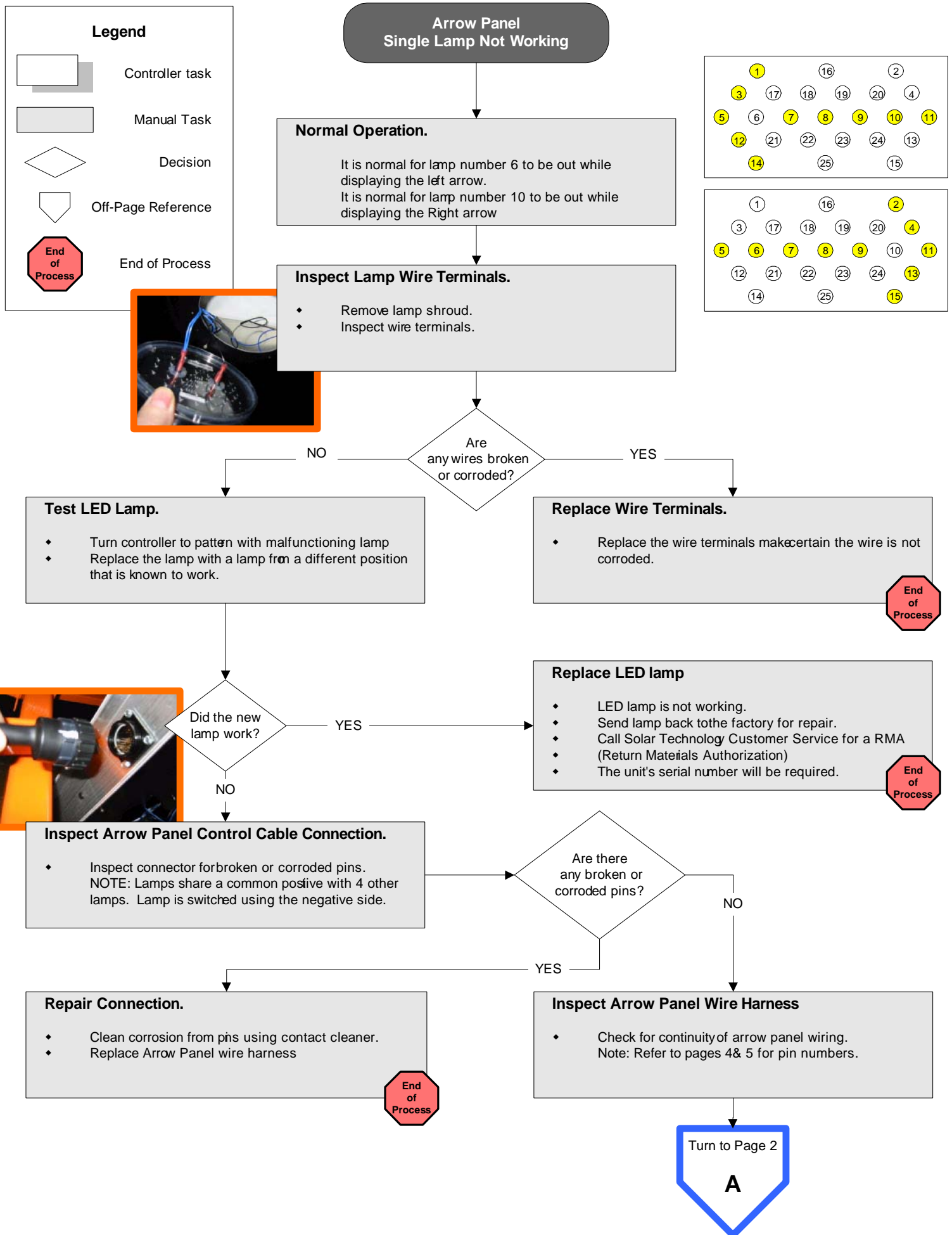
- ◆ Replace any battery that did not pass the load test with a 6 volt GC-2 type deep cycle battery.



**Batteries Check OK.**

- ◆ Place unit back in service.
- ◆ Inspect Charging Circuit if you suspect you have a problem.
- ◆ Refer to the Arrow Board Charging Circuit Flow Chart.

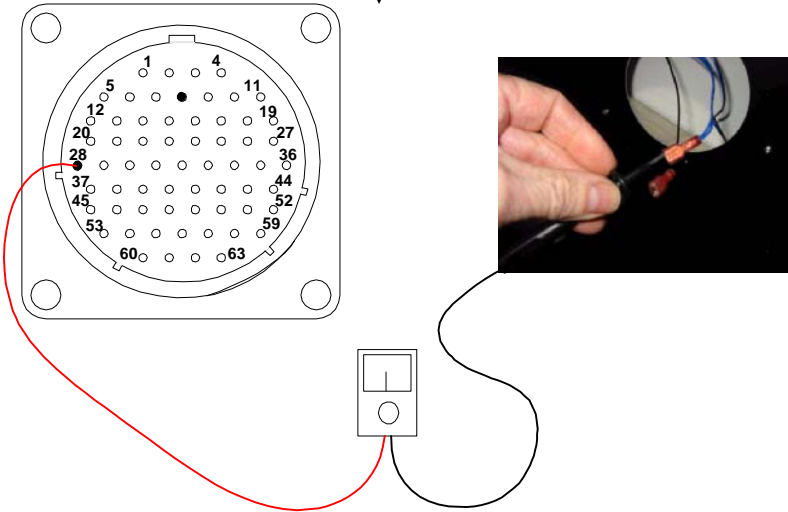




From page 1  
**A**

**Check Arrow Panel Wire for Continuity.**

- Refer to page 4 and 5 for pin numbers associated with the wires to the lamp that is not working. For this example we will use lamp number 8. The blue wire (pos) goes to pin number 28. The black wire (neg) goes to lamp number 8.



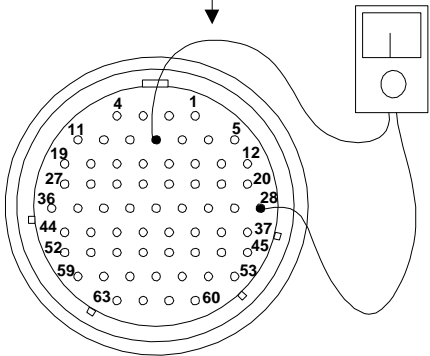
Is there continuity at both wires?

YES

NO

**Check for Power at Arrow Panel Control Cable.**

- Test for power across the appropriate pins using a volt meter. In this case pin # 8 is neg. and pin # 28 is pos. Note: lamps share a common positive with 4 other lamps. Lamp is switched by the negative side.



**Repair or Replace Arrow Panel Wire Harness.**

- Locate open wire and repair or
- Replace arrow panel wire harness

End of Process



**WARNING**  
When testing for power be careful not to touch leads to each other or ground. Controller Damage could occur.

Turn to page 3  
**B**

From page 2  
**B**

Is there pulsating power?

NO

YES

**Check for Power at Controller.**

- Remove the Controller from the divider plate.
- Remove the Arrow Panel Control Cable.
- Test for power across the appropriate pins using a volt meter. In this case pin # 8 is neg. and pin # 28 is pos.

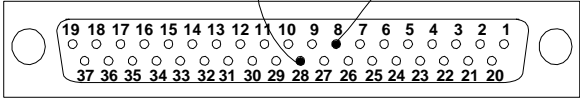
**Bad Connection at Arrow Panel Control Cable.**

- Check for a bad connection between the Arrow Panel Control Cable and the Arrow Panel Connector.
- Look for any corroded pins
- Look for terminals that are not fully inserted into the Arrow Panel Control Cable (female terminal).

End of Process



**WARNING**  
When testing for power be careful not to touch leads to each other or ground. Controller Damage could occur.



Is there pulsating power?

NO

YES

**Repair Arrow Board Controller.**

- Send Controller back to the factory for repair.
- Call Customer Service for a RMA number. The units serial number will be required.

End of Process

**Replace Arrow Panel Control Cable.**

Open wire in Arrow Panel Control Cable

- Repair or Replace the Arrow Panel Control Cable.

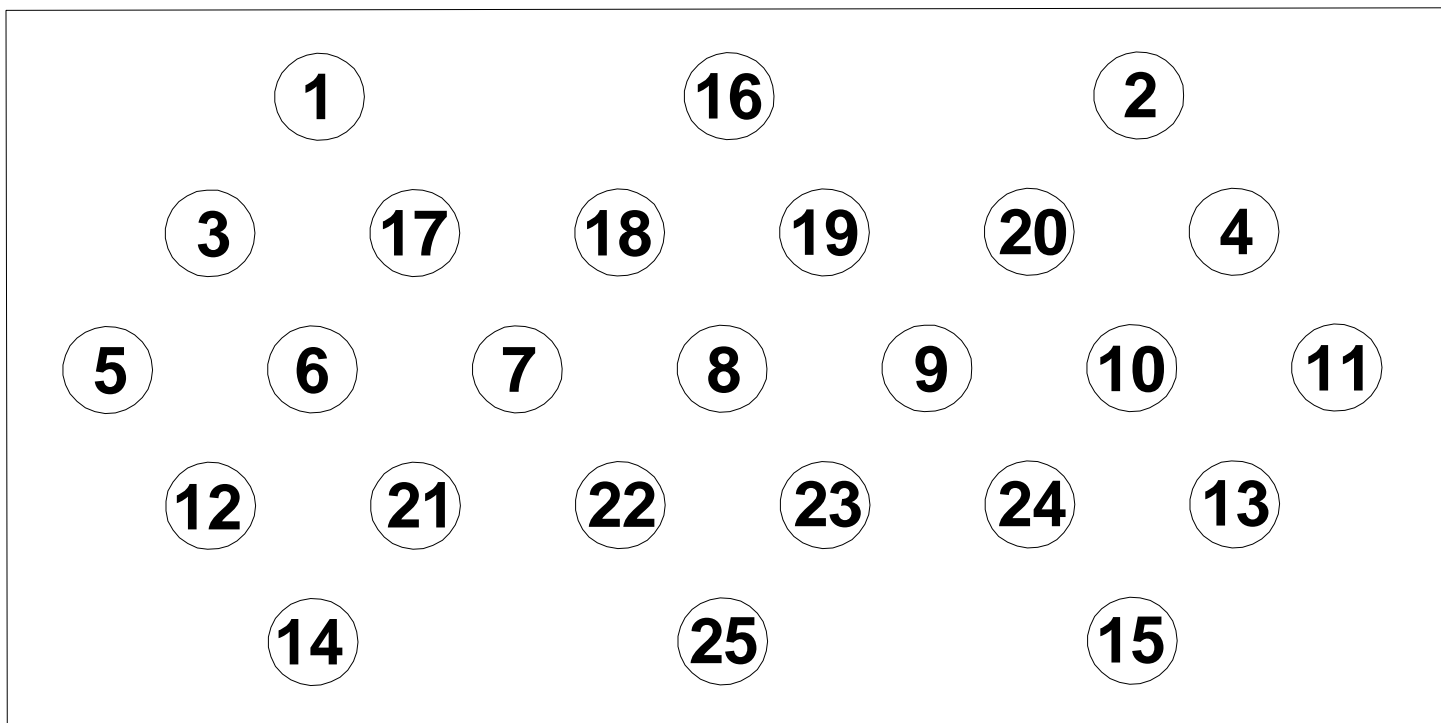
End of Process

## Connector Pin Designations

<u>Pin #</u>	<u>Wire Color</u>	<u>Function</u>
1	Brown	Lamp # 1
2	Red	Lamp # 2
3	Orange	Lamp # 3
4	Yellow	Lamp # 4
5	Green	Lamp # 5
6	Blue	Lamp # 6
7	Violet	Lamp # 7
8	Grey	Lamp # 8
9	White	Lamp # 9
10	White/Red/Red	Lamp # 10
11	White/Brown	Lamp # 11
12	White/Red	Lamp # 12
13	White/Orange	Lamp # 13
14	White/Yellow	Lamp # 14
15	White/Green	Lamp # 15
16	White/Blue	Lamp # 16
17	White/Violet	Lamp # 17
18	White/Grey	Lamp # 18
19	Red/Yellow	Lamp # 19
20	White/Black	Lamp # 20
21	White/Black/Brown	Lamp # 21
22	White/Black/Red	Lamp # 22
23	White/Black/Orange	Lamp # 23
24	White/Black/Yellow	Lamp # 24
25	White/Black/Green	Lamp # 25
26	White/Black/Blue	Common Positive Lamps 1,3,5,12,14
27	White/Black/Violet	Common Positive Lamps 2,4,11,13,15
28	White/Black/Grey	Common Positive Lamps 6,7,8,9,10
29	Red/Green	Photocell Positive 5 Volts
30	Red/Black	Common Positive Lamps 16,17,18,19,20
31	Tan	Common Positive Lamps 21,22,23,24,25
32	Pink	Common Positive Rear panel lamps
33	White/Red/Brown	Photocell Signal
34	White/Red/Black	Rear panel left
35	White/Red/Green	Rear panel center
36	White/Red/Blue	Rear panel right
37	White/Red/Violet	Low Battery Indicator

} as viewed  
from front of  
arrow panel

# Lamp Position Numbers



**Legend**

- Controller task
- Manual Task
- Decision
- Off-Page Reference
- End of Process

**Arrow Panel Lamps Appear Dim**

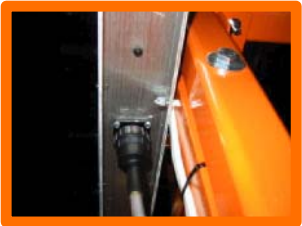
**Check Arrow Board Aiming.**

- Aim Arrow Board at traffic using the Sighting Tubes. Note: Vehicle should be visible in Sighting Tubes.



**Clean Photocell.**

- Clean inside of Photocell using a wet Qtip or corner of a rag. Note: Photocell must be kept clean



Did lamps get brighter?

**Check Photocell.**

- Place a flashlight over the Photocell.



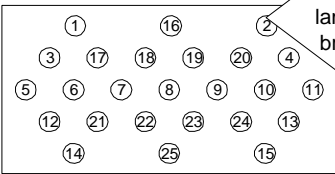
**Keep Photocell Clean.**

- Make cleaning the Photocell part of a routine maintenance program.



**Clean Lamps**

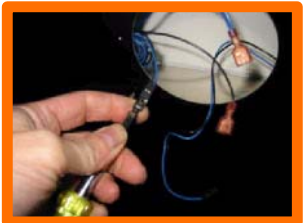
- Clean the lens of the lamps using a soft cotton cloth.
- Call Solar Technology Customer Service for further assistance if lamps are still not bright enough.



Did lamps get brighter?

**By-Pass Photocell.**

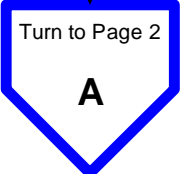
- Remove lamp #15 to expose the wires to the Photocell.
- Disconnect the Photocell wire connector.
- Jump the two terminals of the Photocell wire harness.



Did lamps get brighter?

**Replace Photocell.**

- Replace the Photocell with a known good Photocell.



From Page 1

**A**

Lamps do not get Brighter After Shorting Out Terminals.



**Check Control Cable Connections.**

- Disconnect Arrow Panel Control Cable from Arrow Panel look for any damaged or corroded pins

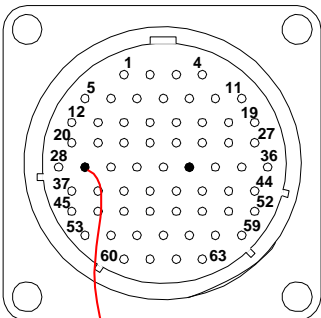
Are any pins damaged or corroded?

NO

YES

**Check Photocell Wire Harness.**

- Test Arrow Panel wire harness photocell wire circuit for continuity.
- Check continuity from pin # 29 to the blue wire.
- Check continuity from pin # 33 to the black wire.



**Clean Corrosion from Pins.**

- Clean corrosion from pins using a spray type electronics cleaner.
- Apply dielectric grease to connector to prevent further corrosion

End of Process

**Broken or Damaged Pins.**

- The pins in this connector cannot be serviced in the field.
- Replace the Arrow Panel wire harness.
- Send the Arrow Panel harness back to the factory for repair.
- Call Solar Technology Customer Service for a RMA (Return Materials Authorization) The unit's serial number will be required.

End of Process



Is there continuity on both wires?

NO

YES

Turn to Page 3

**B**

**Replace Arrow Panel Harness.**

- Open wire in harness.
- Remove Arrow Panel from unit.
- Remove the rear skin of the Arrow Panel.
- Replace the Arrow Panel Wire Harness.

End of Process



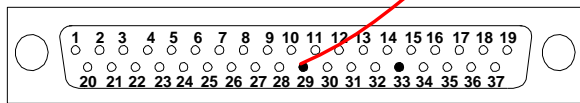
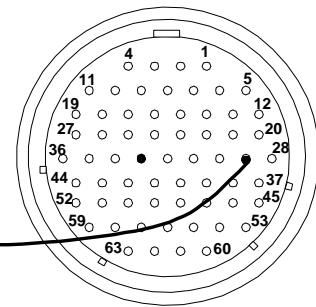
From Page 2

**B**

**Arrow Panel Wire Harness Continuity.**

**Check Arrow Board Control Cable.**

- ♦ Remove connector from the controller.
- ♦ Check for continuity from pin # 29 to pin # 29
- ♦ Check for continuity from pin # 33 to pin # 33



Is there continuity on both wires?

NO

YES

**Replace Arrow Board Control Cable.**

- ♦ Replace Control Cable with a known good cable.

End of Process

**Repair Controller.**

- ♦ Send Controller back to the factory for repair
- ♦ Call Solar Technology Customer Service for a RMA (Return Materials Authorization)  
The unit's serial number will be required.

End of Process