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 11 volts?
- NO
- 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.
- YES
- 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.

Did arrow panel light?
- NO
- Repair Wires
  - Locate faulty connection.
  - Inspect all connectors on battery terminals.
  - Repair or replace bad wire harness.
- YES
- 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 then 11 volts.
- Inspect all electrical connections on the batteries.

Is there power at both power & sense wires?
- NO
- NO
- Turn to page 2
- YES
- Restart the Test From the Beginning
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.

END of Process

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.

Is pulsating voltage present?

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.

END of Process

NO

YES

Is pulsating voltage present?

Turn to Page 3

B

Turn to Page 4

C

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

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.

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

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.

NO

YES

Reconnect Arrow Panel Control Cable
- Reconnect the arrow panel control cable to the arrow panel.

Test LED Lamp
- Change the lamp with a known good LED Lamp.

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.

YES

NO

End of Process
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.

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

Are there any open wires?
- NO
- YES

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

Replace Arrow Panel Control Cable
- Install known good Control Cable

Is pulsating voltage present?
- NO
- YES

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.

WARNING
When testing for power be careful not to touch leads to each other or ground. Controller Damage could occur.
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 for 75 Watt Solar panel
- 3.6 amps for 50 Watt Solar panel
- 2.0 amps for 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.

---

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.

---

Decision

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

NO

---

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 longer than 15 seconds.

YES

---

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
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 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.

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.

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.

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.

Is there approximately 20 volts?
- NO
- 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.
Check Charging Current.

Is Amp reading similar to the solar array reading?

NO

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

YES

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.

- 75 Amp. Charger
  2 Batteries: 4 Hours
  4 Batteries: 8 Hours

- 45 Amp. Charger
  2 Batteries: 7 Hours
  4 Batteries: 14 Hours

- 30 Amp. Charger
  2 Batteries: 10 Hours
  4 Batteries: 20 Hours

- 10 Amp. Charger
  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 each cell of each battery.
  Note: Hydrometers can be purchased at a local auto supply store.

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

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

Is specific gravity reading above 1225?

YES

Replace All Batteries not Holding a Charge
- Batteries not holding a charge.
  - Replace any Battery with a Specific Gravity Reading under 1225.

NO

End of Process

End of Process

Turn to Page 2
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
  Replace Bad Battery.
  - Replace any battery that did not pass the load test with a 6 volt GC-2 type deep cycle battery.

- YES
  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.

End of Process
**Arrow Panel Single Lamp Not Working**

**Normal Operation.**
- It is normal for lamp number 6 to be out while displaying the left arrow.
- It is normal for lamp number 10 to be out while displaying the Right arrow.

**Inspect Lamp Wire Terminals.**
- Remove lamp shroud.
- Inspect wire terminals.

**Test LED Lamp.**
- Turn controller to pattern with malfunctioning lamp.
- Replace the lamp with a lamp from a different position that is known to work.

**Replace Wire Terminals.**
- Replace the wire terminals make certain the wire is not corroded.

**Replace LED Lamp**
- LED lamp is not working.
- Send lamp back to the factory for repair.
- Call Solar Technology Customer Service for a RMA (Return Material Authorization)
- The unit's serial number will be required.

**Inspect Arrow Panel Control Cable Connection.**
- Inspect connector for broken or corroded pins. NOTE: Lamps share a common positive with 4 other lamps. Lamp is switched using the negative side.

**Repair Connection.**
- Clean corrosion from pins using contact cleaner.
- Replace Arrow Panel wire harness

**Inspect Arrow Panel Wire Harness**
- Check for continuity of arrow panel wiring. Note: Refer to pages 4 & 5 for pin numbers.

**End of Process**
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.

1 4
12
5
11
19
20
28
27
36
37
45
53
60 63
59
52
44

Is there continuity at both wires?

Check for Power at Arrow Panel Control Cable.
- Test for power across the appropriate pins using a voltmeter. 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.

YES

Repair or Replace Arrow Panel Wire Harness.
- Locate open wire and repair or
- Replace arrow panel wire harness

NO

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
Is there pulsating power?

**NO**

**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 voltmeter. In this case pin # 8 is neg. and pin # 28 is pos.

**YES**

**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**

**NO**

**Repair Arrow Board Controller.**
- Send Controller back to the factory for repair.
- Call Customer Service for a RMA number. The unit's serial number will be required.

**YES**

**Replace Arrow Panel Control Cable.**
- Open wire in Arrow Panel Control Cable
- Repair or Replace the Arrow Panel Control Cable.

**End of Process**

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

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

**Check Photocell.**
- Place a flashlight over the Photocell.

**Did lamps get brighter?**

**NO**

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

**YES**

**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.

**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?**

**NO**

**Replace Photocell.**
- Replace the Photocell with a known good Photocell.

**YES**

**Turn to Page 2**
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

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.

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.
The unit’s serial number will be required.

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.

Are any pins damaged or corroded?

Is there continuity on both wires?

NO

YES

Turn to Page 3

End of Process

End of Process

End of Process

End of Process
From Page 2

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
- Replace Arrow Board Control Cable.
  - Replace Control Cable with a known good cable.

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

End of Process

End of Process