

## RSI Grip Heater Installation

### Parts Required

- RSI heater elements for hooked bars  
[http://www.rsiracing.com/product\\_info.php?cPath=0\\_30&products\\_id=207](http://www.rsiracing.com/product_info.php?cPath=0_30&products_id=207)
- (2) 1-Ohm power resistors (25W) – example Ohmite 825F1ROE-ND  
<http://search.digikey.com/scripts/DkSearch/dksus.dll?Detail?name=825F1R0-ND>



- Weather resistant double-sided tape – 3M product, Home Depot
- Wire (18 ga.) – two different colors – Radio Shack
- Small wire wrap, braided wire covering, or tubing – Radio Shack
- 5-inch section of aluminum angle (or something similar to mount the resistors on)
- Crimp-on wire connectors for 18 ga wire, butt and spade type – Radio Shack



- Wire tap-in squeeze connectors for 18 ga wire – Radio Shack  
<http://www.radioshack.com/product/index.jsp?productId=2104093>



- Cloth friction tape – Home Depot
- Aluminum flue tape – Home Depot
- Zip ties – Radio Shack, Home Depot
- Shrink tube for wire junctions – Radio Shack
- Fabric shrink tube (<http://www.mcmaster.com/> Search part #2587K15) or handlebar wrap (RSI)



Below I describe what I did to install RSI heater elements and what I would do differently given this experience. Skip to the end to see what I would do now and decide if you want to be a pioneer and implement this relatively simple variation.

### **Notes:**

1. My objectives for the project were to get hotter grips without overloading the system and continue to have control through the existing handlebar rocker switch.
2. I chose to leave the stock grips and heater elements in place in order to use the grips as an insulator between the RSI heater and the bars. If you wish to do something different you'll need to make adjustments to these instructions.
3. It's not a bad idea to take a digital picture of how things are assembled before you tear into something you'll need to put back together later.
4. Use a meter periodically to check that your connections are sound as you proceed with the install.
5. Use two different colors for the extension wires you will add to the RSI heaters. For example; use yellow on the white lead and black on the red/blue combination for each RSI heater element. It will be important to keep this consistent as you do the connections.
6. Remember that you are doing the same things for both grips. Keep your wire colors, connections, and routing consistent for both sides.
7. Before tearing into this check the resistance through the RSI units and the 1-Ohm resistors, make sure everything is as it should be before you start cutting wires.
8. Once you cut the wires you're on your own. I can only tell you this has worked on my sled for 126 miles, but I know nothing about its long-term effects or reliability.

### **The Short Version**

Instructions for those skilled in the art goes like this; Twist the RED and BLUE leads from the RSI heater together, add about 24-inches of wire to each lead (use a different color wire for the white and red/blue extension lines, do the same for each heater element), install two 1-Ohm power resistors on a piece of aluminum angle or bent sheet stock cut to fit on the upper cross-member of the headlight support, install this assembly on the upper cross-member of the headlight support with double sided tape and zip-ties, install the RSI heaters on the grips and cover them up, trace the leads from the existing grip heaters and unplug them, run the leads from each RSI heater along the same path as the existing heater lines, run one lead of each RSI heater thru a 1-Ohm power resistor, continue that lead from the opposite end of the resistor to the BLACK wire of the existing connector, run the other lead from the RSI heater to the RED/YELLOW wire of the same connector. Strap everything back in place, put your pants back on and go ride.

## The Long Version

1. Buy beer.
2. Prepare the RSI heaters by twisting the red and blue leads together and then add a 2-ft section of wire to the red/blue lead and the white lead. Use a different color for each lead, do both heater elements the same way. Use solder and cover with shrink tube or make the connections with end-to-end crimp on connectors. Stagger these connectors so they will be more compact in the wire wrap.

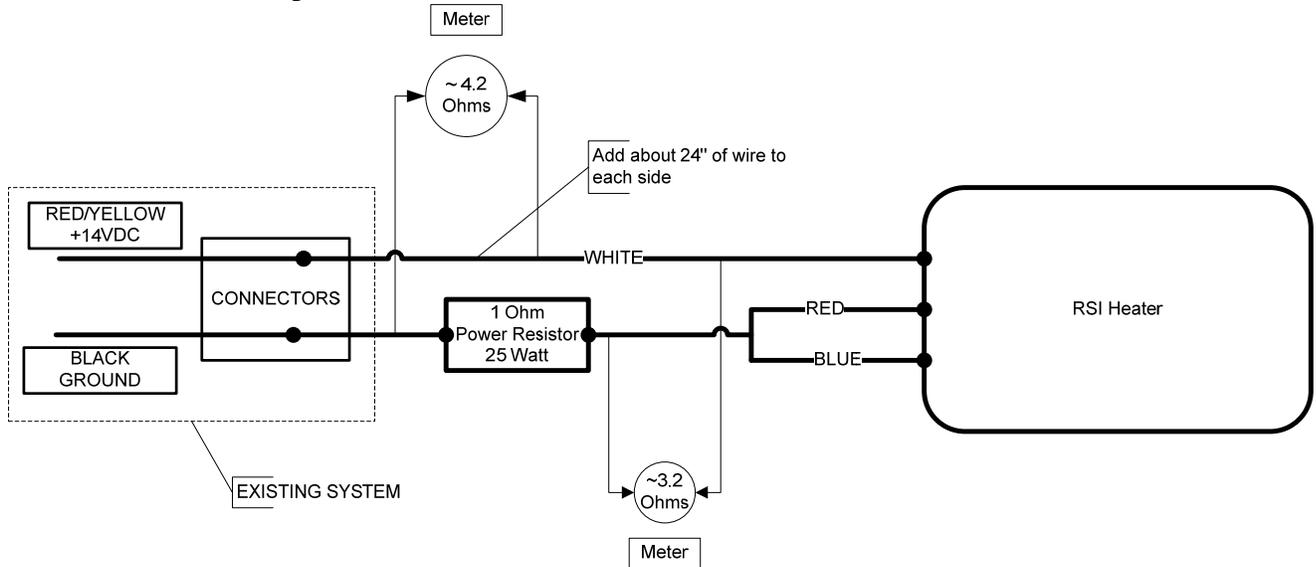


Figure 1, RSI only heater configuration.

3. Slide a section of shrink tube, braided cable covering or spiral cable wrap over the wire leads coming off the RSI heater elements. Secure this in place near the RSI heater with tape or shrink tube.

4. Sand the ribs off the stock grips using a strip of medium grit sandpaper. This is to provide a smooth surface for mounting the RSI heaters.



**Figure 2, Ribs gone.**

5. Remove the upper body panel
6. Remove the panel holding the key switch and speedo pod. You'll need to unplug the wire connector to the ignition switch in order to move this panel out of the way. You can let the panel dangle on its connection to the speedo pod.
7. Find the two rubber boots either side of the headlight assembly and remove all the zip ties holding them in place. Note where the zip ties come from so you can put them back in their proper locations later.
8. Remove the spilt tubes carrying wires to the handlebar controls. Note the wires from the left grip go into the boot on the right of the headlight, right grip – left boot.
9. Slide the boots up to expose the connectors.
10. Trace the wires from each stock grip heater back to the collection of connectors and unplug those for each grip heater. Both of these are two-wire connectors. Make sure you haven't traced back the thumb warmer line – it has also goes into a two-wire connector but a different style.

For a reason I can't remember I wanted to use the connectors from the stock heaters on the RSI heaters so I cut off the connector ends on the grip side, leaving 2-3 inches of wire on each. I then attached these to the leads from the RSI heaters, keeping the wire color orientations consistent on each. This is unnecessary and can be omitted if you use tap-in squeeze connectors to join the extensions added to the RSI heater to a spot below the stock connector. My suggestion is to use the squeeze connectors for your install and leave the connector on the stock heater lines.

11. Remove the paper covering the adhesive and layout the RSI heaters on the grips, adjust the position along the grips until you get the best fit and fewest wrinkles in the heater element. Use some cloth friction tape (vinyl tape might melt) to secure each end of the heater to the grip – the adhesive backing on the RSI heaters won't stick to the sanded grip.

12. **Optional:** I put aluminum flue tape of the exposed portion of the heater elements to help diffuse heat and reduce hotspots. This is probably more effective in theory than in practice and can be omitted if you choose.
13. Wrap the heater elements with a layer of the cloth friction tape to secure them on the grips.
14. Cover the heaters with fabric shrink tube, cloth bar tape or the gel-type bar tape.



**Figure 3, With fabric heat shrink in place.**

15. Prepare a bracket to hold two 1-Ohm power resistors. Drill mounting holes for small screws or rivets to hold the resistors in place on the bracket. I used a section of aluminum angle, but aluminum sheet stock bent to about 90-deg would work too.



**Figure 4, Bracket with resistors mounted.**

16. Position the bracket on the upper cross-member of the headlight assembly to identify where to drill two small holes that a zip tie will pass through. You want the holes to miss the cross-member.
17. Apply some (preferably) weather resistant double-sided tape to the cross-member.
18. Install the bracket with the resistors on the cross-member over the tape and secure with zip ties.

19. Run one lead from the RSI heater to one end of a resistor. Leave some slack in the wires to allow for handlebar movement. Cut and route wires as needed, avoid sharp edges or anything that might wear on the wires with vibration.
20. Attach a section of wire to the opposite end of the same resistor and run this wire to the BLACK line of the existing connector. Do this for both RSI heater elements. I used spade connectors between the wires and resistors but soldering is probably a better option.
21. Use a squeeze connector to make the connection between BLACK wire going into the power supply connector and the lead coming from the RSI heater through the resistor.
22. Run the other lead from the RSI heater element to the RED/YELLOW line of the existing connector.
23. Use a squeeze connector to make the connection between RED/YELLOW wire going into the connector and the lead coming directly from the RSI heater. Do this for both RSI heater elements.
24. Check all connections and inspect any bare wires or other spots that might short.
25. If it all looks good, set the panel with the speedo pod back in place and reconnect the ignition socket.
26. Cross your fingers and start it up. In about 2-minutes at idle you should feel a little something at the bar hooks.

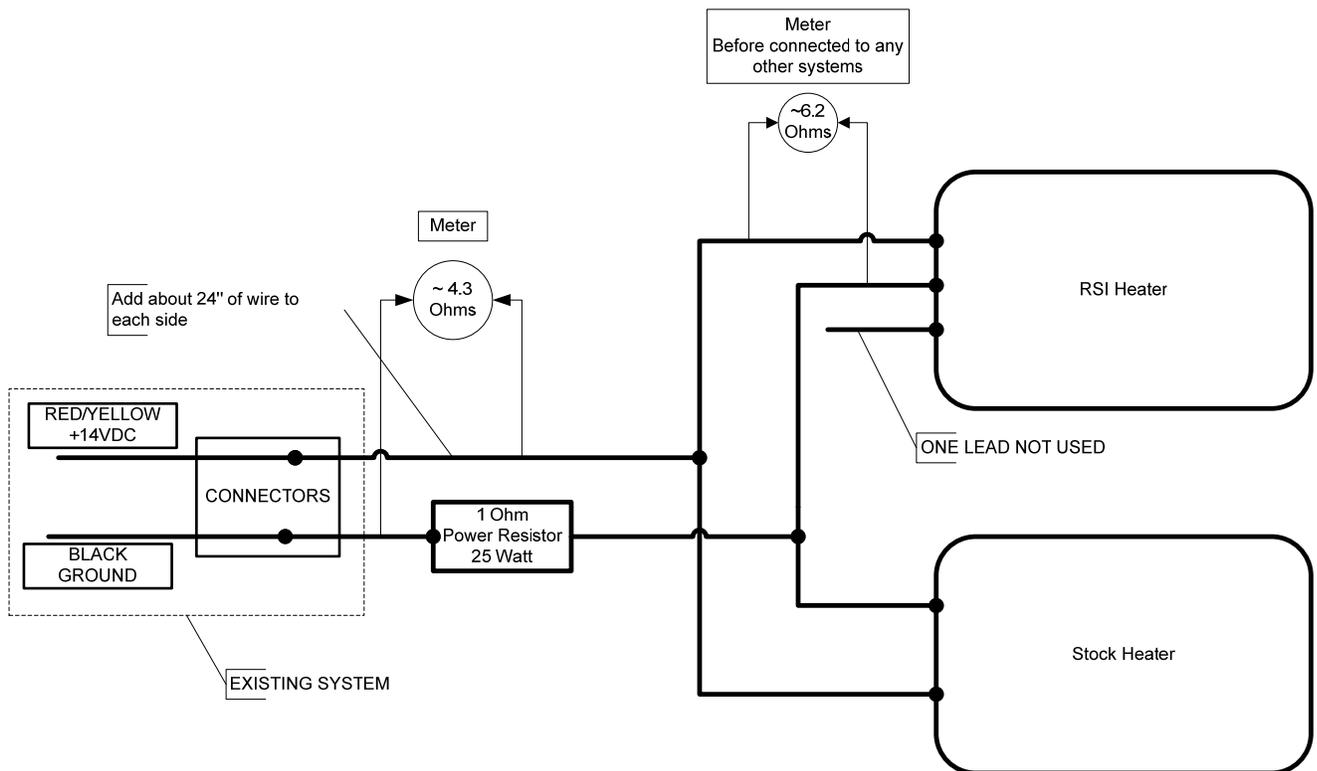
If you see an error code it probably means you've got a bad connection some where. Start at the squeeze connectors and work toward the grips looking for loose or shorted connections. If this doesn't solve your problem disconnect the lines at the squeeze connectors and use a meter to check the resistance in each grip. You want to see something like 4.2-Ohms on each side. If this is FUBAR something went bad in your extension wire connections or in the heater elements. It's a do-over now.

27. Starting near the grips bundle up the RSI power lines with stock heater lines. Remember to leave some slack to allow for handlebar rotation.
28. Collect and bundle the wires into the split tube removed earlier.
29. Reposition the rubber boots and secure in place with the zip ties removed earlier.
30. Zip tie or tape any floppy wires down.
31. Replace the speedo pod panel, connect the ignition socket.
32. Replace the upper body panel
33. Go ride.

## **What I Would Do Differently**

The existing stock heater (resistance of about 7-Ohms) can be combined in parallel with the HIGH leg of the RSI heater (resistance 6.2-Ohms) to provide very nearly the same level of output as the setup described above. The benefit of this is it allows the RSI heaters to run at a wattage output in the middle of their capacity, versus at the high end, which should help extend the life of the units. This setup will still require the use of the 1-Ohm resistors in order to keep the current draw to a reasonable level. I used 2 resistors because each must dissipate about 11 Watts, about half their capacity.

To implement this DO NOT combine the RED and BLUE wires. Instead identify the lead combination that measures about 6.2-Ohms. Add extension wires to this set. Cap the remaining lead with tape or shrink tube to prevent it from shorting. This remaining lead will NOT be used. Do the rest of the install as described above EXCEPT leave the stock grip heaters plugged in to the power supply connector. Use a squeeze connector to tap one line from the RSI heater into the RED/YELLOW line of the stock grip heater. Do this for both grips. Cut the BLACK line 2-3 inches above the connector. Combine the remaining line from the RSI heater with the cut end of the line going to the stock heater and add enough wire to this joint to reach one end of a resistor. Run a line from the other end of the same resistor back to the short section left extending from the connector. Use crimp-on terminals or solder and shrink tube make the connection. Again, do this for both sides. When you're done, separating the power supply connector will disable both heater elements on one grip. Measuring the resistance at the connector should give you something like 4.2 to 4.5 Ohms, which is a close match to the RSI only setup described above. If you see 7-8 Ohms one of the heater elements is faulty or not in the circuit because of a bad connection.



**Figure 5, Plan B configuration.**

I think this is a cleaner setup and it should be easier on the RSI heaters. Some energy will be lost to the handlebars but my experience with the setup first described suggests you'll have plenty to spare. This will give you a backup if one heater element fails on a ride, but it will only be about as good as the stock grips are now – which is not very good at all.

Good luck.