

## Third Generation Thermoelectric Unit Team Initial Test Plan

Performing this initial test should help you gain a feel for the thermoelectric system as well as aid you later on during the design phase. This is meant to be a procedure that will allow your team to see the real time characteristics of the thermoelectric as conditions change.

### Equipment Required

- Two digital multi meters (one for voltage and one for current)
- Large yellow multi meter for reading the thermocouples
- Lump charcoal
- Existing thermoelectric unit
- The matching stove for the unit
- A pot (with water in it when testing)
- Stove skirt
- Power Supply
- Electrical leads
- Lighter Fluid
- Lighter
- Cinderblock
- Rheostat (red box with two variable resistors)
- Ceramic insulation

### Procedure

1. Attach thermoelectric unit to the stove and insulate the thermocouple ends as well as where the heat conduction rod enters the stove
2. Move necessary equipment outside so the test can be performed
3. Place the stove on top of a cinderblock or something to keep it off the pavement
4. Fill the stove with charcoal and fill the pot with water
5. Properly line up the skirt and set it in position
6. Connect the power supply to the fan leads and set the power supply to 12 volts
7. Connect the multi meter measuring current in series with the positive lead of the thermoelectric and one terminal of the rheostat
8. Connect the multi meter measuring voltage to the two leads of the thermoelectric
9. Connect the other terminal the rheostat to the negative lead of the thermoelectric
10. Set the rheostat to 4 ohms
11. Pour some lighter fluid on the charcoal
12. Light the fire and turn the power on to the fan if it's not already on
13. Let the fire burn for about 45 seconds before putting the pot on the stove
14. After a few minutes the temperature on the hot side should be increasing fairly quickly, the temp on the cold side will increase as well but at a slower rate
15. Take note of the voltage increase as the temperature difference increases

16. When the temp reaches near steady state ( $\sim 235\text{C}$  hot side and  $\sim 100\text{C}$  cold side) walk the rheostat up and down in resistance while watching the voltage and current
17. If the setup is left long enough there will also be a thermal change with the resistive load, the temperature difference will change