

# Furnace Controller/ Altitude Compensator

## Installation Instructions

### Included in the Kit:

1 ea Furnace Controller  
4 ea #6 x 1/2" screws  
5 ea Wire Nuts  
1 ea Instructions

### Tools Needed:

Phillips screwdriver  
Wire cutter/stripper  
Drill  
1/4" Drill Bit  
3/8" Drill Bit  
Scissor  
Tape

Read through all instructions before starting to make sure you understand what must be done and that you have all the tools and materials to complete the repair.

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### Function of the Furnace Controller/ Altitude Compensator (FC/AC):

The FC/AC has two functions:

1. The Furnace Controller modulates the burner in the furnace to allow the furnace fan to run longer without overheating the furnace. This makes for more uniform heating and more efficient use of the furnace.
2. The Altitude Compensator boosts the voltage going to the furnace making the furnace fan turn faster, compensating for the thinner air at higher altitudes.

The Altitude Compensator may be set on HIGH at lower altitudes to boost the amount of warm air being blown into the cabin, but due to the small size of the cabin, this is usually not necessary.

## FURNACE CONTROL / BOOST for RAINDROP 560

1. Turn off the trailer's battery disconnect switch, or disconnect the battery.
2. Turn off the propane tank.
3. Open the furnace access cover in the front bulkhead. This is a small rectangular panel near the floor below the front storage doors. (you will need to remove the couch).
4. Pull out the wires that are bundled inside. ( should be Red, Brown, Yellow, White, Blue)
5. Cut out the template attached to instructions.
6. Tape the template into place, on the shelf, in the front storage compartment. (*see picture*) The template should be touching the back of the front bulkhead and aligned to one edge of the door opening.



7. Use an awl, punch, or phillips screw driver tip to mark the location of the two holes. Push the awl into the plus mark at the center of each hole to make a starting hole in the wood.
8. Remove the template.
9. Drill 3/8" holes down through the shelf where shown on the template. These holes will go through about one and a half inches (1½") of material.

10. Get the furnace Controller and make sure the sensor (small blue bulb on the end of two wires) is straight out from the circuit board.
11. Un-coil the wires.
12. Feed the wires down through the Wire hole in the shelf (identified on the Template)
13. Feel inside the furnace access opening and get the ends of the wires as you feed them in fully.
14. **Guide the probe into the 3/8" Probe hole, making sure that the probe goes in smoothly without bending.**
15. Add screws to the new furnace controller to hold it in place.
16. Go to step 17 on Page 4.



## **FURNACE CONTROL / BOOST for TEARDROP**

1. Turn off the trailer's battery disconnect switch, or disconnect the battery.
2. Turn off the propane tank.
3. Open the furnace access cover in the front bulkhead, This is a small rectangular panel near the floor below the front storage doors. (you may need to remove the mattress).
4. Pull out the wires that are bundled inside. (should be Red, Brown, Yellow, White, Blue)
5. Cut out the template attached to instructions.
6. Fold the template and tape into place, on the shelf and duct side, in the right side front storage compartment. (*see picture*) The template should be touching the back of the front bulkhead.
7. Use an awl, punch, or phillips screw driver tip to mark the location of the two holes. Push the awl into the plus mark at the center of each hole to make a starting hole in the wood.



8. Remove the template.
9. Drill a 1/4" hole into the duct area where shown on the template.
10. Drill a 3/8" hole down through the shelf where shown on the template. This hole will go through about one and a half inches (1½") of material.
11. Get the furnace Controller and make sure the sensor (small blue bulb on the end of two wires) is straight out from the circuit board.
12. Un-coil the wires.
13. Feed the wires down through the hole in the shelf identified in Step 10 above.
14. Feel inside the furnace access opening and get the ends of the wires as you feed them in fully.
15. **Guide the probe into the 1/4" hole (step 9), making sure that the probe goes in smoothly without bending.** Looking through the vent, you should be able to see the probe in the duct.
16. Add screws to the new furnace controller to hold it in place.

Continue...

## COMMON INSTRUCTIONS FOR 550 TEARDROP AND 560 RAINDROP

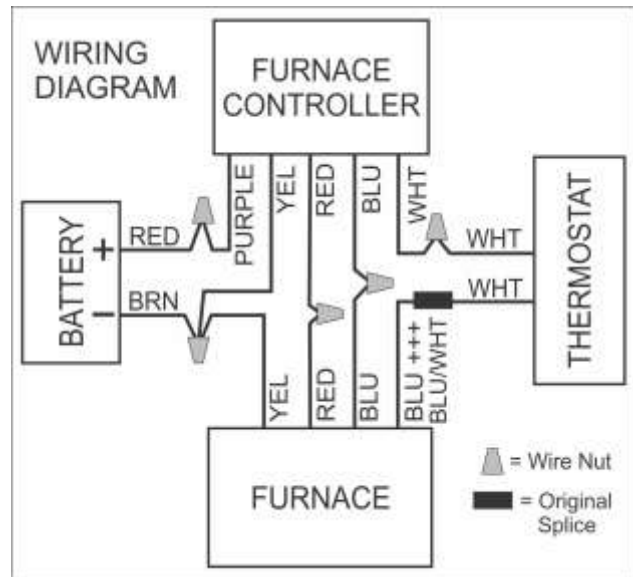
17. Look at the wires going to the furnace. (*Original wires, not the ones you just added*)
18. Find the two blue wires coming from the furnace that are spliced to two white wires.
19. One of the blue wires has a white stripe OR a marker on it showing several plus marks (+++++++).
20. You want the wire WITHOUT the stripe or plus marks!
21. Cut the wires as close to the splice as you can, eliminating the original splices.
22. Strip about 1/4" of insulation off the ends of the wires as you make the connections. Twist the bare ends of the wire together. Use screw on wire nuts to make the connections. (orange or small blue size)
23. Splice the cut off BLUE wire (WITHOUT stripe or plus marks) coming from the furnace to the BLUE wire coming from the controller board.
24. Splice the cut off WHITE wire to the WHITE wire coming from the Controller.
25. Leave the BLUE wire (WITH stripe or plus marks), connected to one of the white wires.
26. Look at the wires going to the furnace. Find the RED wire spliced to a RED wire.
27. Cut both RED wires close to the splice, eliminating the splice.

28. Splice the RED wire coming **from the furnace**, to the RED wire coming from the Controller.
29. Splice the remaining RED wire (not from furnace) to the PURPLE wire coming from the Controller.
30. The last loose wire should be a YELLOW wire coming from the Controller.
31. Look at the wires going to the furnace. Find the YELLOW wire spliced to a BROWN wire.
32. Cut out the splice connecting the YELLOW wire to the BROWN wire.

33. Splice the BROWN, and two YELLOW wires together.

34. Double check all connections.

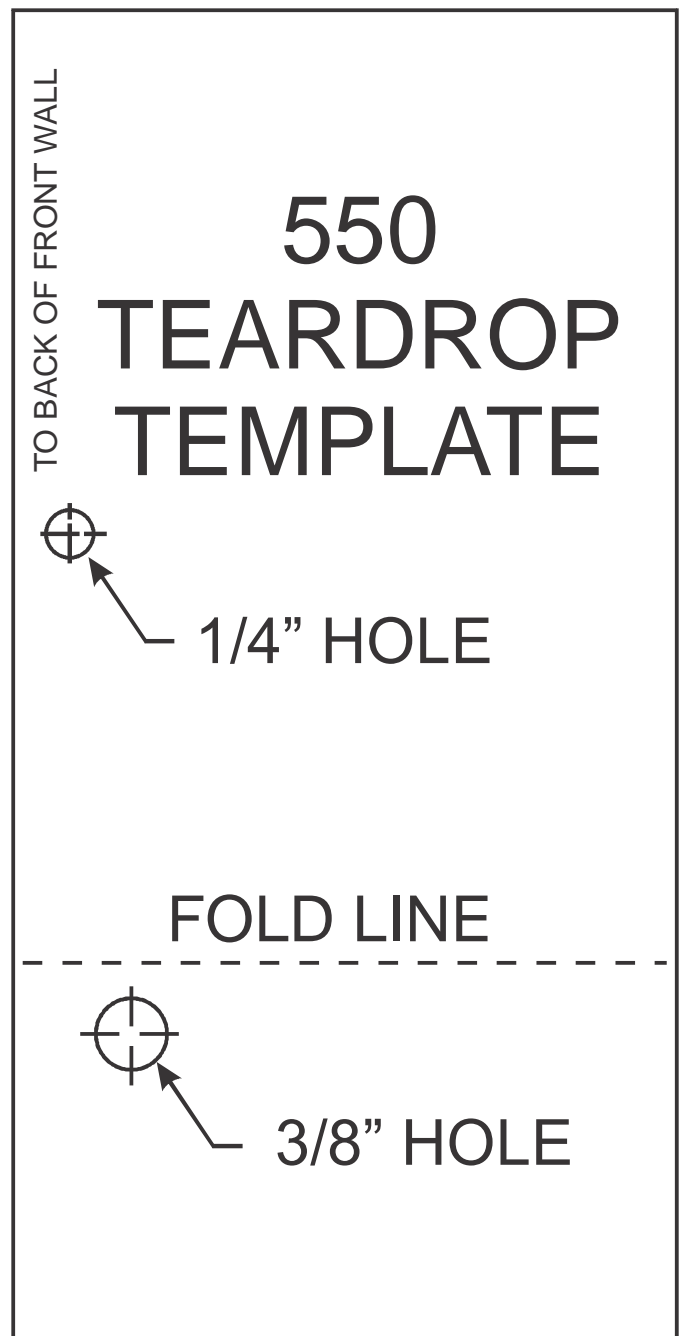
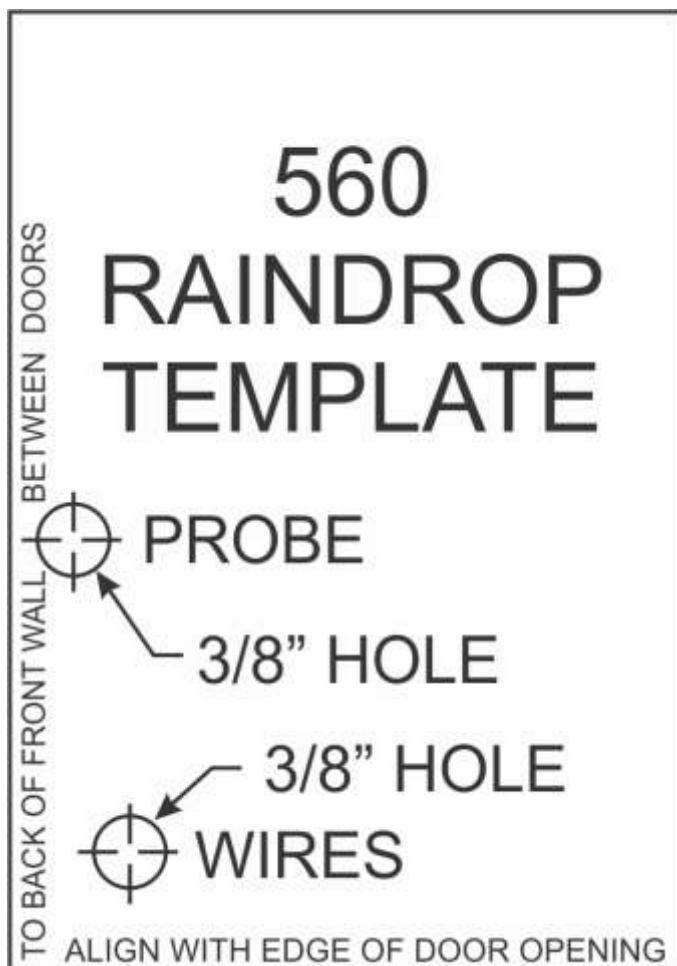
- Controller BLUE to furnace BLUE (without stripe or plus marks)
- Controller WHITE to trailer WHITE
- Controller RED to furnace RED
- Controller PURPLE to trailer RED
- Controller YELLOW to furnace YELLOW to BROWN.
- Original splice, furnace BLUE (with stripe or plus marks) to trailer WHITE.



35. Turn ON Battery disconnect switch and turn ON the Propane.
36. Turn the Thermostat up until the furnace fan starts.
37. Toggle the switch on the Controller. One position should make the furnace fan run at a higher speed. The other position it should run slower.
38. Set the switch at the lower speed position.
39. Look in the hole in the case of the Furnace Controller. The LED light on the Furnace Controller should be ON.
40. Wait for the furnace to ignite. (this may take several minutes) If the furnace turns off without igniting, check that the propane is turned on. Turn the thermostat to the OFF position, then turn the Thermostat up until the furnace fan starts again. If the furnace does not ignite after three attempts, recheck the wiring connections and make sure the propane tank is not empty.
41. Let furnace run until the LED shuts OFF this will take 5-20 minutes depending on the outside temperature. (this turns off the furnace burner flame)
42. Watch until the LED turns back ON. (this should take 30 seconds to 2 minutes)

43. The furnace will take about 1 minute to re-ignite the burner. If you listen closely, you may hear the burner ignite. Otherwise, feel at the exhaust, (outside trailer) the exhaust will get much hotter after the burner ignites.
44. After a few ON/OFF cycles of the burner, Switch the controller switch to the High speed position.
45. Let the furnace run for several more ON/OFF cycles then switch the controller switch back to LOW.
46. Let furnace run for about 30 minutes OR until the thermostat is satisfied.
47. The burner should cycle ON and OFF every few minutes until the interior temperature reaches the setting of the thermostat. Then the furnace should shut off completely.

If you have any questions or the Controller does not function as outlined above, contact Camp-Inn at 608-565-7443.



## OPERATION OF THE ALTITUDE COMPENSATOR

*NOTE: The Furnace Controller portion will modulate the burner at higher and lower altitudes, automatically as needed.*

At lower altitudes, below 4000 ft. in elevation, you should run the furnace with the Altitude Compensator switch set in the LOW speed position.

At higher altitudes, above 4000 ft. try the furnace first with the Altitude Compensator switch set in the LOW speed position.

IF the furnace shuts down after about **30-45 seconds**:

- Turn OFF the thermostat.
- Switch the Altitude Compensator switch to the HIGH position.
- Turn ON the thermostat and set to the desired temperature.
- If the furnace again shuts down after 30-45 seconds, with the Altitude Compensator switch at the HI speed position, there are a couple possible reasons:
  - You are at too high an elevation for the furnace to operate, even with the boost.
  - There is another failure in the furnace.

If the furnace runs for **1-2 minutes** and then shuts down, switching the Altitude Compensator to HIGH, - WILL NOT HELP! If the furnace runs for **1-2 minutes** and then shuts down, it is because the burner did not ignite. This can be for a couple of reasons:

- The propane is turned off. (turn on the propane)
- You are out of propane. (fill tank)
- There is air in the propane lines. (turn off the thermostat and turn it on again to flush out lines. If after the third attempt, the furnace still does not ignite, there is probably another problem.)
- You are at too high an elevation for the burner to ignite properly. (move to lower altitude)
- If none of the above fixes the problem, there may be another failure in the furnace. (have furnace checked by trained RV Technician)

If the furnace does ignite, there may still be problems at higher elevations.

- As the altitude increases, the air is thinner and has less oxygen. This causes the flame to burn “rich” (not enough oxygen to burn the all of the propane (LP) ).

- A “rich” burning flame will create more soot. This may show up as a blackened exhaust area on the side of the trailer.
- Excess soot may foul the igniter. (the furnace must be removed from the trailer to clean the igniter.)
- Running the furnace at lower altitudes will help to burn off some accumulated soot and may help to keep the igniter cleaner and prevent fouling of the igniter.
- *If the igniter is fouled, the furnace will not ignite even at lower altitudes, until the igniter has been cleaned.*

- If the furnace will be used almost exclusively at higher altitudes, smaller orifices may be ordered from Suburban furnace and installed by a trained RV Technician to adjust the air/fuel mixture to make it more “lean”.

- If you put in a “lean” orifice, the furnace may not ignite or burn properly at lower altitudes.

- There will be an altitude where even a “lean” orifice and the Altitude Compensator set to HIGH will cease to function. This altitude is unknown and has not been tested.