

Hydronic Heating for all RV's



A WORLD OF COMFORT



Espar Heater Systems

Espar Booth #730



... from Espar

- Steve Bayne

- National Account Manager RV and Marine
- Marine and RV heating since 1990

- Jim Rixen

- Rixen's Enterprises
- Espar Distributor
- Marine and RV heating since 1987

The History of Hydronic Systems



... from Espar

- Hydronic heating was developed in the 1700's
- In the mid 1800's the radiator was developed
- Hydronic heating in RV's started around 1990
- Hydronic heating has been primarily used in highline Class A RV's
- There are more than 10,000 systems in RV's today

Basic Principals



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- Hydronic heating involves the heating of a hot water and anti-freeze solution (system coolant) and distribution of the heat.
 - Space heating
 - Domestic water heating
 - Engine pre-heating
- Water can hold as much as 3500 times the amount of heat as the same volume of air.
- Hydronic heat is distributed more evenly to create a warmth throughout the heated space.
- Hydronic systems can be zoned to allow different temperatures in different areas.
- Hot air rises and cool air drops. The most efficient way to heat is distribution at floor level.
- Forced hot air dries out the air and typically has large temperature swings.

Hydronic Components



... from Espar

- Burner or Boiler – This heats the system coolant.
- Domestic water exchanger – This interfaces the domestic water with the system coolant.
- Air handler or fan unit – This transfers the heat from the system coolant to the space to be heated.
- Radiator – This will provide radiant heat to an area without noise or power consumption.
- Engine exchanger – This transfers heat between the system coolant and the engine coolant. The coolant circuits are independent from each other.
- Expansion tank – This allows the system coolant to expand when it is heated.
- Circulation pump – This circulates the system coolant for heat distribution.

Heat Sources



... from Espar

- There are (3) methods to provide heat in most systems. Each method varies depending on the heating system in use and some may be optional.
 - Burner – This is the main source.
 - Diesel
 - Gasoline
 - Propane
 - AC element(s) – They use AC voltage from shore power or a generator.
 - Engine waste heat – This is the transfer of heat from the hot engine coolant to the system coolant.

Fuel facts



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- Diesel
 - 129,500 BTU's per gallon
 - Not affected by ambient temperature
- Bio-Diesel (B20)
 - 127,250 BTU's per gallon
 - Higher gel point than standard deisel
- Kerosene
 - 128,100 BTU's per gallon
 - Cleaner than diesel
- Gasoline
 - 114,000 BTU's per gallon
- Propane (LPG)
 - 84,300 BTU's per gallon
 - Less efficient the colder the ambient temperature
 - Less efficient at low volume

Installations



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- **Manufacture**

- Manufacture (OEM) installed systems allow the best placement of components for heat distribution.

- **Replacement**

- Replacing a current system with a new unit or components.

- **Component Installation**

- Installing individual system components where possible.

- **Retrofit**

- This involves replacing the propane components with hydronic components.
- This can be accomplished at different levels.

Hydronic operation



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Switching on

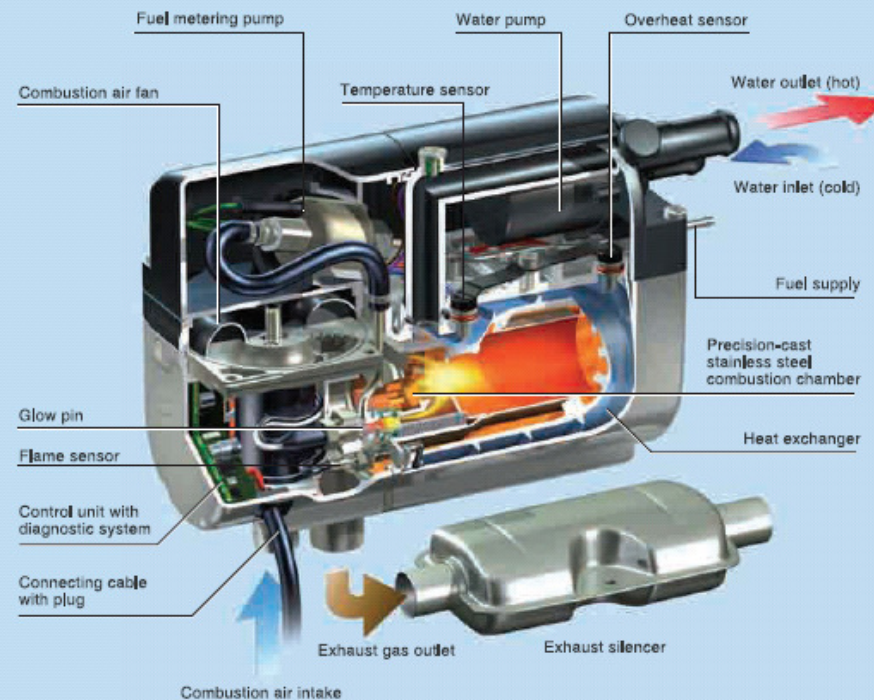
When the heater is turned on, the control element indicator light is illuminated. With water circulating and the glow pin activated, the combustion air fan, glow pin and fuel metering pump combine to activate combustion. As soon as a stable flame has formed the glow pin is turned off.

Heating

Depending on the heating requirement, the heating device controls output in three levels, "High", "Low" and "Off". If the heat requirement in the "Low" level is too low, the heating device is turned off automatically. The water pump continues running during this "Control pause".

Switching off

When the heater is finally turned off, the control light goes out and fuel supply stops. The glow pin is re-energized for an afterglow period to burn off any combustible residue. The fan and water pump continue running for 3 more minutes to facilitate cooling. Then the heating device and water pump switch off.



System Performance



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- System design
- Water throughput
- Bleeding of air
- Fuel system
- Wire size
- High Altitude operation
- Exhaust system
- Service clearances
- Hose connections (pex)

Water Circuits



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- Series system – this is a common simple system where the system coolant flows from one component to the next and returns to the heater. A robust system pump can push air through the system essentially purging it without the use of air bleeds.
- Parallel system or Flow and Return (two pipe system) – There is one main coolant loop that flows from the heater and returns. The components are installed with tees. The feed to a component is in the first half of the loop and the return from the component is into the second half of the loop. All components receive a feed line before any return lines are integrated into the main loop. Balancing valves are used to provide even coolant flow to all components.
- Manifold system – The output from the heater flows into a large manifold. From the manifold smaller coolant lines feed specific components, in series or parallel, and then into a return manifold. The return manifold returns to the heater. Balancing valves are used to provide even coolant flow to each system loop.

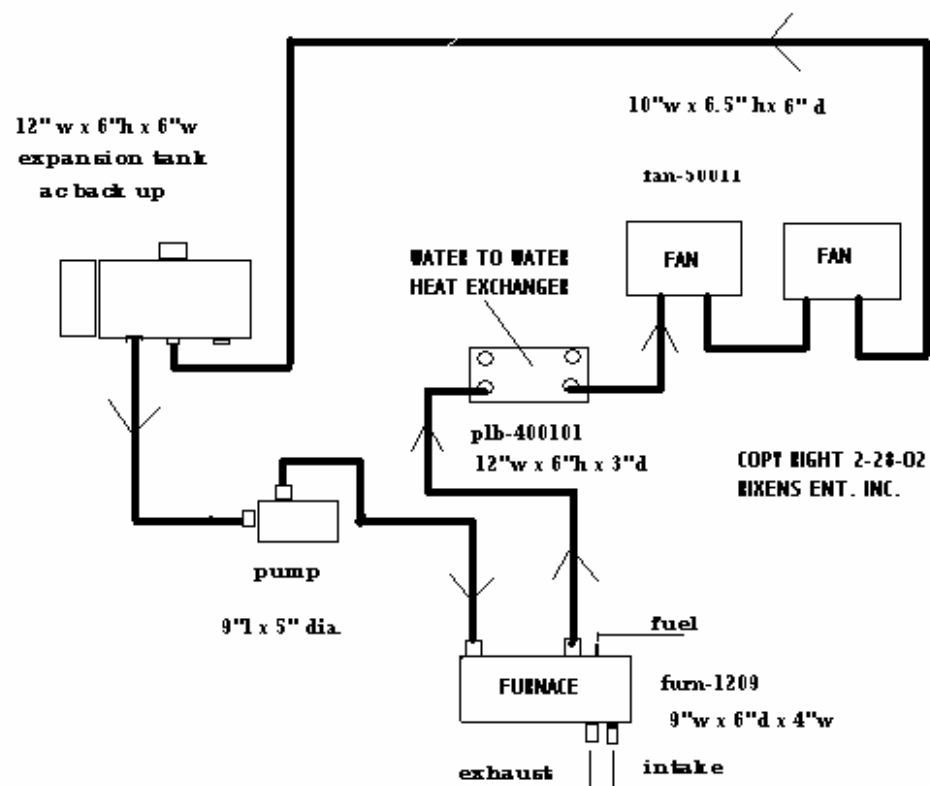
Series System



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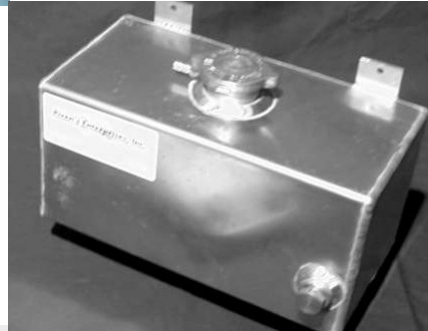
PLUMBING D-5 - FURNACE HEATING LOOP



MCS5 Component System

Hydronic 5

- Diesel or Gasoline
- 12 or 24 VDC
- Efficient heat stages high/low
 - 17,100/8,200 BTU output
- 4.2/1.9 amp draw
- .16/.07 gph fuel consumption
- 8.6"l x 3.4"w x 6.2"h
- 5.07 lbs.

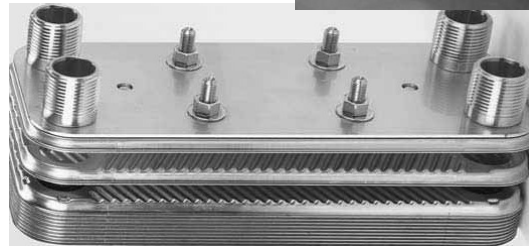


AC Electric

- 1500 watt element
- Patented technology
- System fill point w/cap
- Expansion Tank
- 6"w x 12"l x 6"h
- 6.5 lbs.

Demand Hot Water

- 1 gpm continuous hot water
- 95% efficient heat transfer
- Double wall plate exchanger
- CSA and UL listed
- No maintenance
- Patented technology
- 5"w x 12"l x 1"h
- 6 lbs.



System Pump

- 8 gpm
- 7.83"l x 4.5"w x 4.56"h
- 4.5 lbs.

MCS5 Component Installation



Propane Retrofit



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- 2003 Monaco Diplomat 40 PDT
- Removal of both propane heaters and hot water heater
- Installation of MCS 12



Propane units



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– Front heater zone

- Unit located in streetside slide under sink



– Rear heater zone

- Unit located curbside under refrigerator



– Water heater

- Unit located curbside in bedroom closet



MCS Module



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- The Module was placed in the bedroom closet.



MII 12 Burner



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- The burner was placed into a streetside bay.

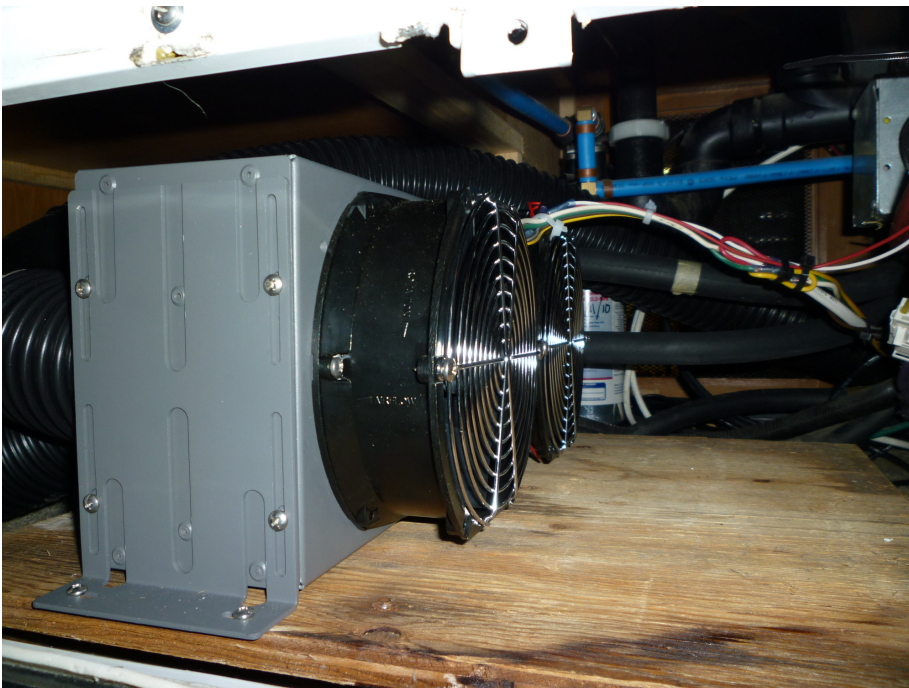


Front/Rear heating zones



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- Purpose designed air handlers replaced the propane heaters and utilized existing ducting.





... from Espar

THANK YOU

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