Heaters and Defrosters

Table of Contents

Sub-Headings

List of Figures

Heaters and Defrosters

Safety

The purpose of this safety summary is twofold. First, it is to help ensure the safety and health of individuals performing service on, or operation of, this Blue Bird bus. Second, it is to help protect equipment. Before performing any service or operating procedure on this bus, individuals should read and adhere to the applicable warnings, cautions and notes located throughout this Blue Bird Service Manual.

Warnings

Warnings apply to a procedure or practice that, if not correctly adhered to, could result in injury or death. Particular attention should be paid to sections of this manual where warnings appear.

Cautions

Cautions apply to a procedure or practice that, if not correctly adhered to, could result in destruction of equipment.

Notes

Notes are used to explain, clarify of otherwise give additional insight for a given subject, product or procedure. Please not that on occasion, notes, too, may advise of potential safety issues.

Introduction

This section contains maintenance and repair procedures for the coach heater and defroster system on a Blue Bird All American Series bus equipped with a Cummins ISB engine. However, the job is typical, and the instructions are correct with all engine options offered in the All American Series, allowing for some differences in detail (such as connections and locations of certain components). Some references in this section are made to Section 040—Cooling because the engine cooling system is the source of heat for the coach.

Note

For routine maintenance, allow the system to cool to the point where you can lay your hand on the engine without being burned.

Warning

The anti-freeze and water mixture in the system is toxic. It is also a skin irritant and an eye irritant. Always exercise caution when working around anti-freeze. Use appropriate protective gear including gloves, long sleeves, and eye protection. Releasing the pressure on a hot system can result in burns. Always release the pressure on the system very slowly using the vent cap before attempting to remove the radiator cap. Always work in a well-ventilated area.

General Specifications

Cummins ISB Engine

- Coolant capacity—15.3 quarts
- Thermostat (fully open)—190°
- Pressure cap—10 psig

Note

The actual capacity of your cooling system will vary, depending on the heater options installed on the vehicle. Allow approximately .17 gallon of coolant for each foot of coolant line.

Coolant Specification

50% water and 50% ethylene glycol based anti-freeze is typical

- The solution may be adjusted for expected temperatures up to 60%

ethylene-glycol and 40% water for temperatures below –30° F (-37° C)
- SCA—4 can be used as a supplemental cooling additive, if needed

Description of Operation

Control of the heater/defroster system is accomplished by a series of switches on the dash board of the bus. These controls are manipulated by the operator for the comfort of the passengers and to maintain safe visibility in cold weather. **Figure 1.**

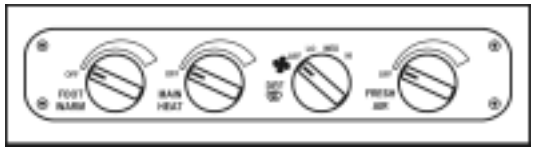

Figure 1—Control Panel

If there is no heat from the system, check to be sure the coach heater cut off valves are in the "ON" position. These valves are located at the top rear of the engine and on the transmission cooler. **Figure 2** and **Figure 3**. Both these valves must be open for the hot engine coolant to flow through the coach heater system.

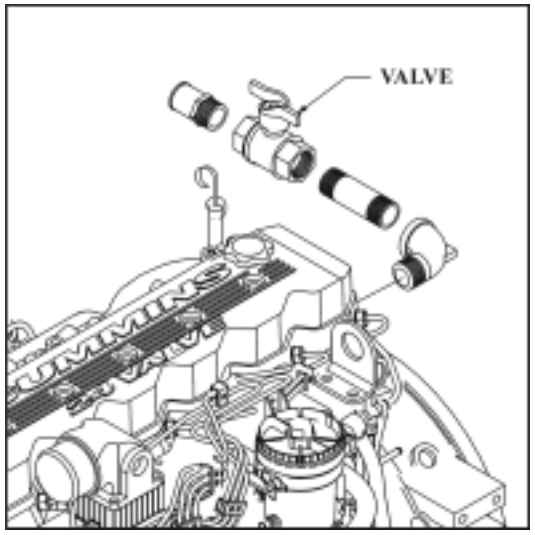

Figure 2—ISB Engine Heater Valve

The main heater has a 3-speed control switch for driver control of the air flow.

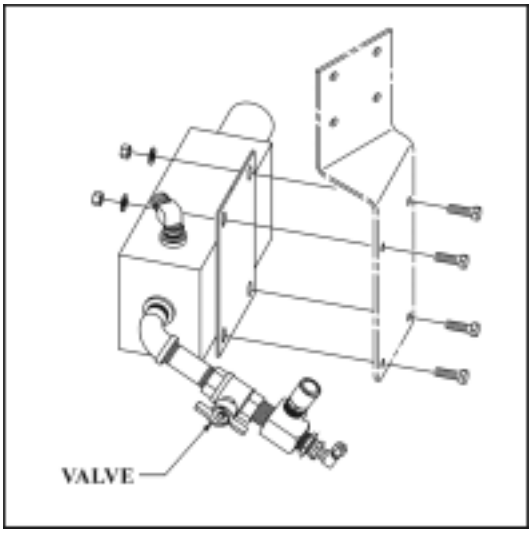

Figure 3—Valve

There is a provision for all the air flow from the main coach heater to be diverted through the defroster system to allow for rapid clearly of the windshield. This is accomplished by leaving the "Foot Warm" and "Main Heat" switches in the "OFF" position.

Heater Access

For access to the air delivery ports, see **Figure 4**.

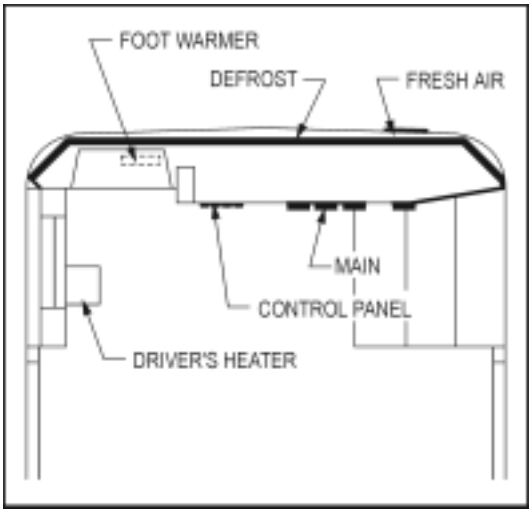

Figure 4—Controls

The front (main) heater can be accessed from either inside the coach, or from the outside. **Figure 5.** From outside the coach, access is just in front of the left front wheel. Access is also provided from the inside, at the dash panel near the stepwell. **Figure 5.**

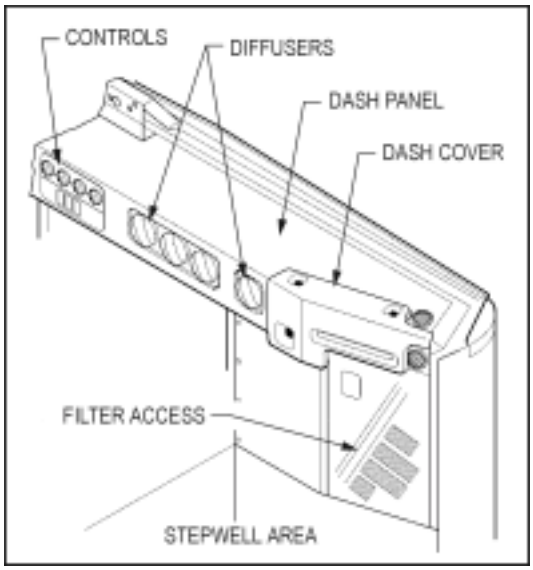

Figure 5—Filter Access

Defroster Operation

During initial engine warm up, the defroster blower motors are operated at low speed to pre-heat the glass. The air intake control should be set in the re-circulate position at this time.

When passengers are in the coach, the air intake control should be in the "Fresh Air" position.

Heater Core Filter

A filter, located in the filter access panel at the stepwell, is provided to protect the heater core from dirt and contamination that would hinder air flow through the core. **Figure 5**.

Warning

When using compressed air to clean the heater core, do not exceed 30 psig. Wear eye protection and be certain not to direct compressed air at self or others.

The heater core will be most efficient if it is kept clean and free of dust. The core can be cleaned by either compressed air or vacuum. Any damaged fins should be straightened with a fin comb, to prevent restriction of air flow.

Driver's Heater

The adjustable diffusers can be directed toward the driver's position. The auxiliary (driver's) heater, located under the driver's seat, has a 2-speed fan motor control. Warm air can be directed to the driver's left and around the steering column. **Figure 4** and **6.**

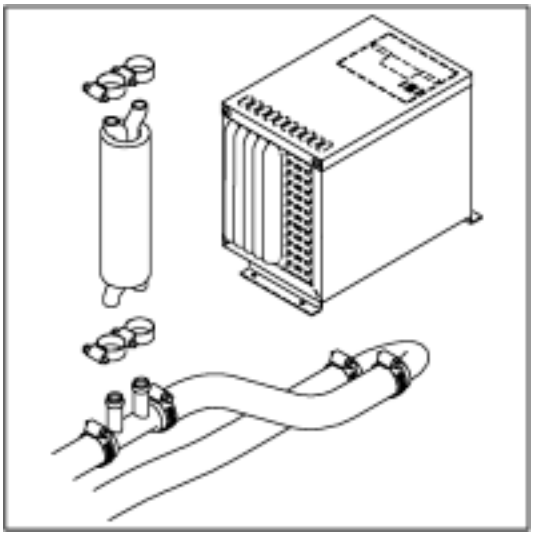

Figure 6—Driver's Heater

Under Seat Heater

The under seat passenger area heater can be either mounted underneath a seat or on the floor of the coach, under a passenger seat. The location will depend on the options chosen at the time of manufacture. The underneath seat heater has a filter to help keep the heater core clean. This filter will require periodic maintenance to remain effective, and to prevent restriction of warm air flow into the passenger area of the coach. **Figure 7**.

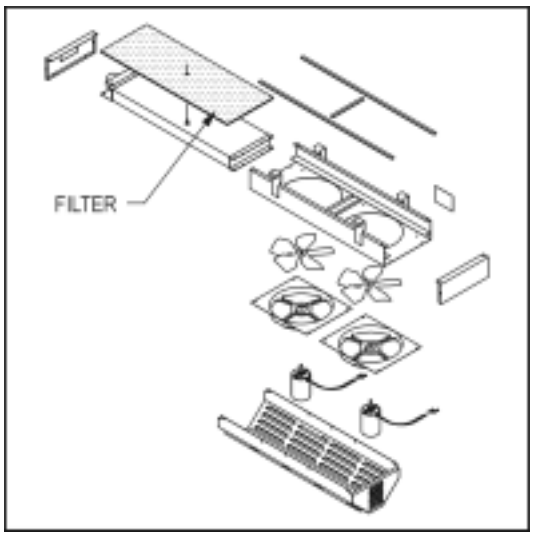

Figure 7—Under Seat Heater

Auxiliary Water Pump

Optionally, an auxiliary booster pump is located in the coach heater system, to help maintain circulation at a rate sufficient to provide warm air to the coach. **Figure 8**.

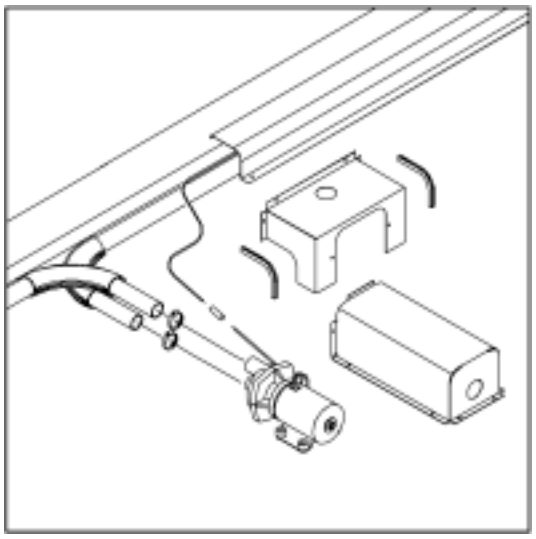

Figure 8—Auxiliary Heater (Heavy Duty Option Shown)

Routine maintenance should include checking the hose clamps at the auxiliary pump and testing the operation of the pump.

1. Remove hardware, as necessary, to remove the covers.
2. Turn the heaters on and check to be sure the pump is operating.

If the pump does not operate, make sure the electrical system is providing 12 volts at the pump motor. If there is a 12 volt potential available at the motor, it will be necessary to remove and replace it.

Auxiliary Pump Removal

1. Clamp off the heater hoses near the auxiliary pump to prevent coolant spill. Be careful not to cut or damage the hoses.

Warning

The anti-freeze and water mixture in the system is toxic. It is also a skin irritant and an eye irritant. Always exercise caution when working around anti-freeze. Use appropriate protective gear including gloves, long sleeves, and eye protection. Releasing the pressure on a hot system can result in burns. Always release the pressure on the system very slowly using the vent cap before attempting to remove the radiator cap. Always work in a well-ventilated area.

2. Remove hose clamps at the auxiliary pump. **Figure 8**. Tag the hoses for later installation.
3. Disconnect the wiring harness from the pump.
4. Remove capscrews and washers as necessary to remove the pump/motor assembly from the coach floor.
5. Repair or replace the pump motor.

Installation of Auxiliary Pump

Installation of the auxiliary pump/more assembly is accomplished in the reverse order of the removal instructions above.

1. Install capscrews and washers to mount the motor/pump assembly to the coach floor.

2. Connect the wiring harness.
3. Connect the engine coolant hoses. Torque to 45 in-lbs (5.08 Nm) for new hoses. Torque old hoses to 34 in-lbs (3.84 Nm).

Caution

Be careful to install the coolant hoses in the correct position. If installed backwards, the pump will retard the flow of hot coolant through the heater system and operation will be impaired. See Step 2 above under "Removal of Auxiliary Pump".

4. Test the pump for proper operation.
5. Install covers.

Recharge Heater Coolant Lines

The heater line must be refilled with coolant prior to normal operation. If the heater system has been turned off for the summer, carefully check the hoses and clamps prior to refilling.

Note

The following steps are for first of season and not meant for initial fill or re-fill.

1. Make sure the radiator and surge tank are both full of coolant.
2. Start the engine and let it run until the radiator is warm to the touch.
3. Open the coach heater hose valves located at the rear of the engine and at the transmission cooler.
4. Allow the motor to run to fill the heater hoses.
5. Turn off the engine and check the coolant level in the radiator and the surge tank. Fill if necessary.

Warning

Release the pressure on the radiator slowly by use of the vent. Never release the radiator cap without using the pressure release lever to vent the pressure.

Note

To initially fill a system, there may be other steps required prior to the following procedures.

1. Start the engine and operate it at between 2000 and 3000 rpm.
2. Place the open end of the bleeder tube into the open radiator fill opening.
3. Open the valve in the bleeder line.
4. Add coolant mixture to the radiator as necessary.
5. Run with the bleeder valve open until all air is purged from the system.
6. Refill the radiator as necessary.
7. When the bleeder line runs pure coolant, turn off the bleeder valve.
8. Replace the radiator cap.
9. Run the engine until it reaches operating temperature and the thermostat opens.
10. Fill the coolant system, including the surge tank.

Routine Maintenance of Coolant Hoses

Routine maintenance is confined to periodically checking the cooling level and adding small amounts, if necessary. You should also inspect the connections and fittings in the system if coolant is required frequently.

1. Check the coolant reservoir (surge tank) for cracks. Section 040—Cooling.
2. Check all the hose clamps for leaks; heat in the system may cause the connections to become loose. **Figure 9.** Torque all hose clamps to 34 in-lbs (3.84 Nm).

Note

For new hoses, torque hose clamps to 45 in-lbs (5.08 Nm). Check every 1,000 miles for leaks and torque maintenance (34 in-lbs.)

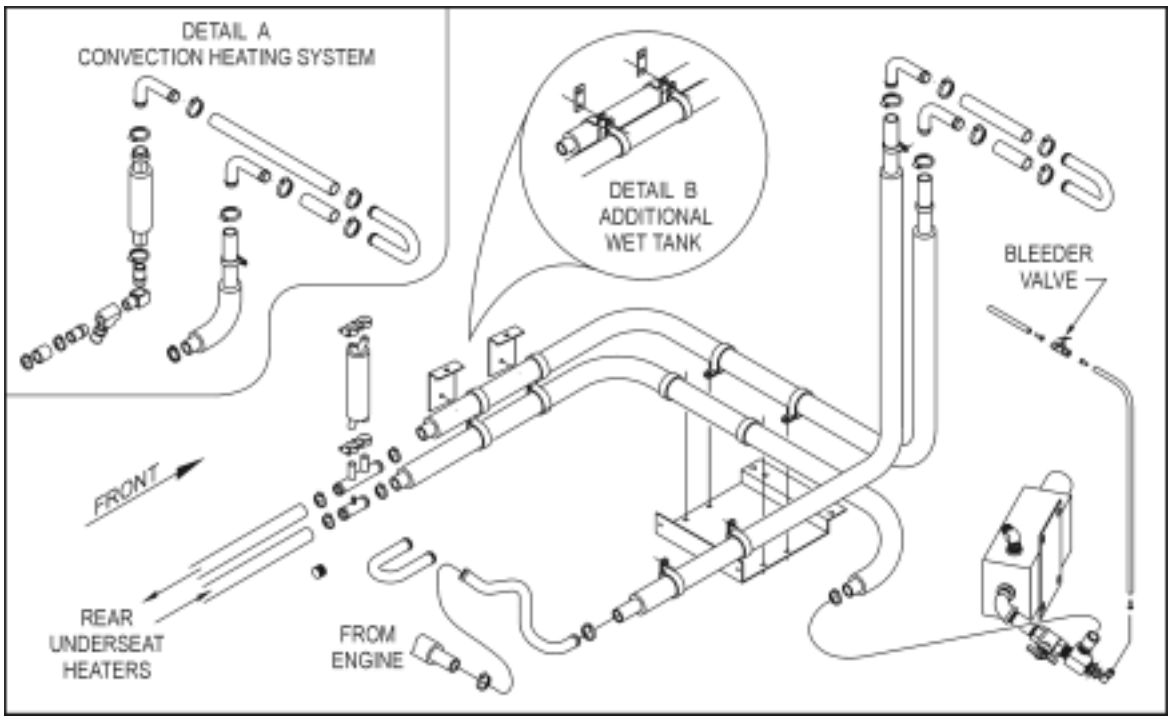

Figure 9—Heater Piping

Routine Fan and Motor Maintenance

1. Operate each fan motor separately to be sure they all operate properly.
2. Inspect each squirrel cage or blade fan for damage. Repair or replace any fan that is damaged or vibrating to prevent damage to associated components.

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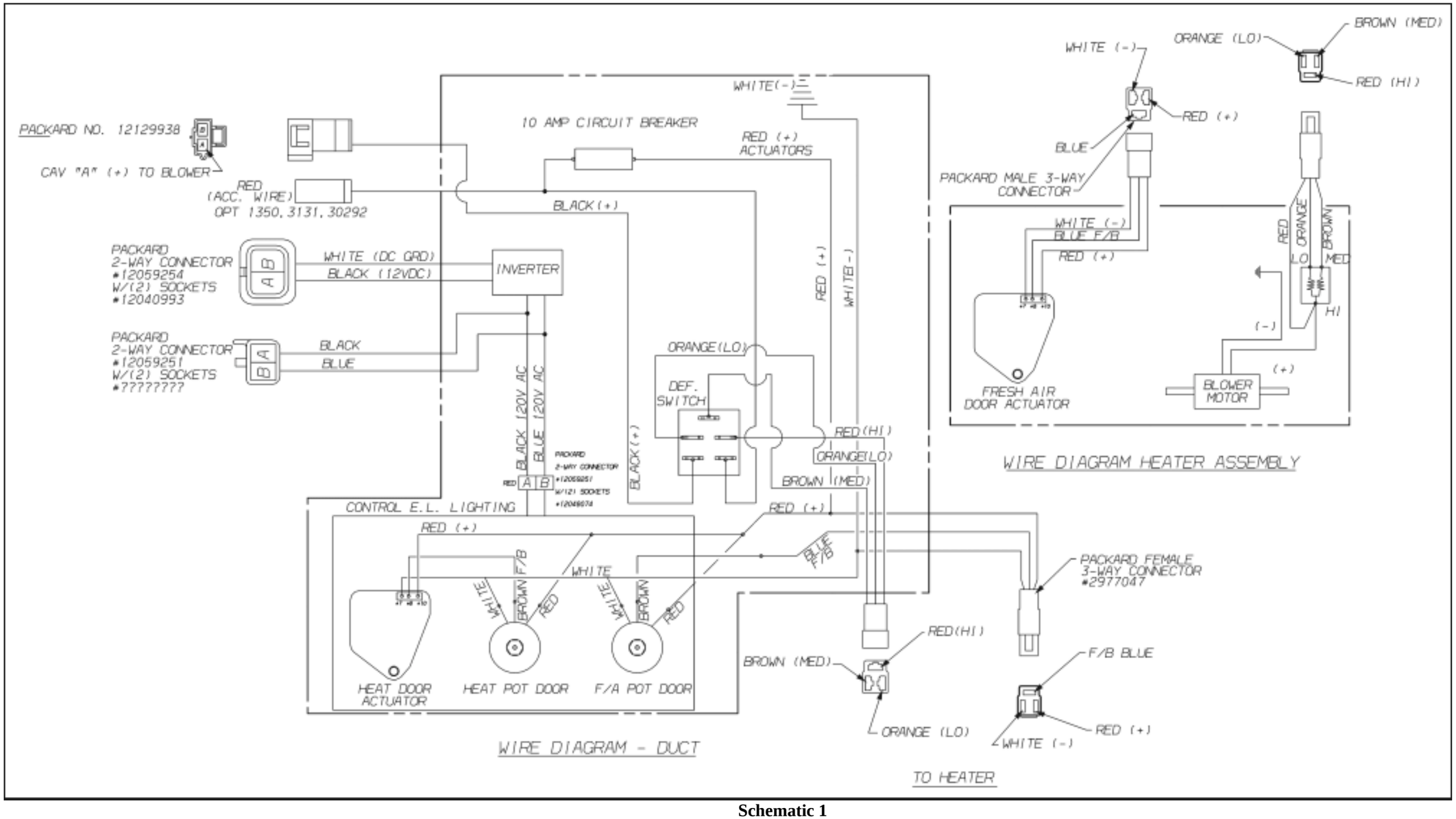

Schematic 1

Back to Top