Problem: Heater Will Not Operate. EE8 Code Displayed.

WARNING

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Applies to: Toyostove Laser 30, 56, 60, 73 and OM-22/23.

What Does This Mean?

The EE8 error code is very precise and is only displayed when the circuit board detects a problem with the combustion blower motor. The blower motor supplies fresh air to the burner and blows the exhaust gases out of the heater. On the Laser 56, 60 and 73 the blower motor assembly is a box inside the heater that contains two fans and a motor. One fan pulls fresh air into the heater and the other fan draws the exhaust through the heat exchanger and pushes it outside through the flue pipe. The Laser 30 and OM-22/23 do not have a blower assembly box. The blower motor fan is mounted on the back of the heater inside a cover and draws fresh air into the heater and then pushes the combustion air/exhaust through the burner and out of the flue pipe.

What Can Cause an EE8 Error?

Several problems can cause the EE8 error.

1. Stuck blower fan. The motor is not spinning at all or not fast enough.
2. Defective motor. The motor is not working. Usually an open fuse inside the motor.
3. Loose or defective wiring. The wires that connect the motor to the circuit board are loose or damaged. Circuit board does not get signal from the functioning motor.

4. Defective circuit board. Circuit board is not activating the motor or not sensing that the motor is working properly.
5. Inverter output not compatible with main circuit board electronics. A pure/true sine wave inverter is required. Modified sine wave inverters will not work properly.

Laser 30 Component Voltage Readings

COMPONENT	READING TAKEN AT		Laser 30
Combustion Blower Motor	E on Main Circuit Board with motor connected	High	AC 72V
		Medium	AC 64V
		Low	AC 54V
Combustion Blower Motor Revolution Sensor (CN12)	Red (+) to Blue (-)		DC 5V
	White (S) to Blue (-) (in operation)		DC 2.5V

Oil Miser 22/23 Component Voltage Readings

COMPONENT	READING TAKEN AT		Oil Miser 22/23
Combustion Blower Motor	E on Main Circuit Board with motor connected	High	AC 102V
		Medium	AC 93V
		Low	AC 80V
Combustion Blower Motor Revolution Sensor (CN12)	Red (+) to Blue (-)		DC 5V
	White (S) to Blue (-) (in operation)		DC 2.5V

Laser 56/60/73 Component Voltage/Resistance Readings

COMPONENT	READING TAKEN AT		Laser 56/60/73		
Combustion Blower Motor Voltage	E on Main Circuit Board with motor connected	High	AC 98V		
		Medium	AC 75V		
		Low	AC 67V		
Combustion Blower Motor Revolution Sensor (CN12)	Red (+) to Blue (-)		DC 5V		
	White (S) to Blue (-) (in operation)		DC 2.5V		
Combustion Blower Motor Resistance	Connector E on blower motor with plug disconnected from main circuit board		L56	L60	L73
			16Ω	12Ω	9Ω

What Can Be Done to Correct This Situation?

1. Is the fan stuck? Remove the front cover. Turn on the heater and set the set temperature higher than the room temperature. Listen for the combustion blower. It should start at medium speed and then slow down to low but keep operating. If you do not hear the motor, it is probably stuck or not functioning.

   Unplug the stove. On the Laser 56, 60 and 73, remove the black rubber elbow that connects the blower assembly to the base of the heater (L30/OM-22/23 skip this step). Looking inside, you can see the intake blower wheel. Using a pencil or something similar, gently push on the blower wheel to free it up. Replace the black rubber elbow, and, using a shop-vac, vacuum out the flue from the outside of the building (the exhaust is the inner flue pipe). Plug the heater back in and turn it on. You should feel air movement from the outlet hole on the combustion blower assembly. If it does not spin freely, the motor is stuck, or the bearings are seized. In either case, the blower assembly must be replaced.

   To remove the blower motor assembly, remove the heat exchanger, the upper panels of the heater and the intake/exhaust connections (in the L30/OM-22/23,

the blower motor can be easily removed after removing the blower fan wheel). Remove the top of the blower case to expose the exhaust fan and exhaust cavity. If there is a lot of soot/condensate built up, you may be able to clean it up enough to get it working again. You can remove the fan from the motor shaft and clean it with hot soapy water. Clean the exhaust chamber. If you have a Laser 56 model E or F or a Laser 73 model H or I, check the bottom and top of this chamber. If it is pitted or shows signs of corrosion, the blower assembly may be replaced with a newer style blower assembly that has a stainless-steel liner in this chamber.

2. Is the motor defective? A safety fuse is installed in the electric combustion motor on all Laser heaters. On models produced before 1997 this fuse is a non-resetting, one-time fuse, so if this fuse has opened, the blower motor will have to be replaced. The fuse opens if the motor becomes too hot. Excessive heat is usually a result of extended operation of the heater with low voltage (brownout) conditions. This problem may also be caused by low power output from battery/inverter powered heaters. Newer model heaters have self-resetting fuses that will re-close after a short period of time. The heater will stop, display the EE8, but may be able to be re-started if proper power is available and the motor has cooled sufficiently. If this problem occurs often, there may be a problem with the power supply system. This should be corrected to protect the heater and other electric devices.

   To verify that the motor itself is defective, apply 120 VAC power directly to it (plug the blower motor lead E into K terminal on main circuit board, then plug in the heater). If the motor activates, proceed to #3. If it does not activate, it is defective, and the blower motor assembly must be replaced.

3. Is the wiring loose/defective? Two sets of wires connect the blower assembly and the main circuit board. The two larger gray wires supply power from the board. The motor will not spin if these wires are not properly connected to the board and the motor. The three red, white and blue wires transmit the signal from the motor revolution sensor to the circuit board. If the motor is spinning but an EE8 code is displayed, the wires may be loose or defective. Check the wires to be sure they are tightly connected to both the sensor and the circuit board. On the Laser 56, 60, and 73, the motor assembly must be taken out of the heater and the base

removed. Remove the two screws in front of the blower and remove any connections from the back of the heater. Then, lift the assembly out and remove the base plate. The wires will be clearly visible. It may also be necessary to check the continuity of the wires to be sure that the plastic connections on both ends are working.

4. Is the revolution sensor working properly? If the motor spins when it is activated but an EE8 code is displayed, it is possible that the sensor on the bottom of the blower motor is not working properly. Replace the blower motor, (you should also replace the exhaust blower wheel). The revolution sensor is on all new motors and cannot be purchased separately.

5. Is the circuit board defective? Check the main circuit board to be sure power is going to the blower assembly. Check power output on connection E. See above tables for correct voltage. If no power is detected while the heater is on and set temperature is above room temperature, replace the main circuit board. Be sure to unplug the heater before performing any work inside the cabinet. Be VERY CAREFUL to connect all wires to their proper position. Note that each wire connector has a corresponding connection on the circuit board. Many connectors are the same and can easily be plugged into the wrong spot. Be very careful about this task! If voltage is correct at blower motor plug, check the revolution sensor voltages.