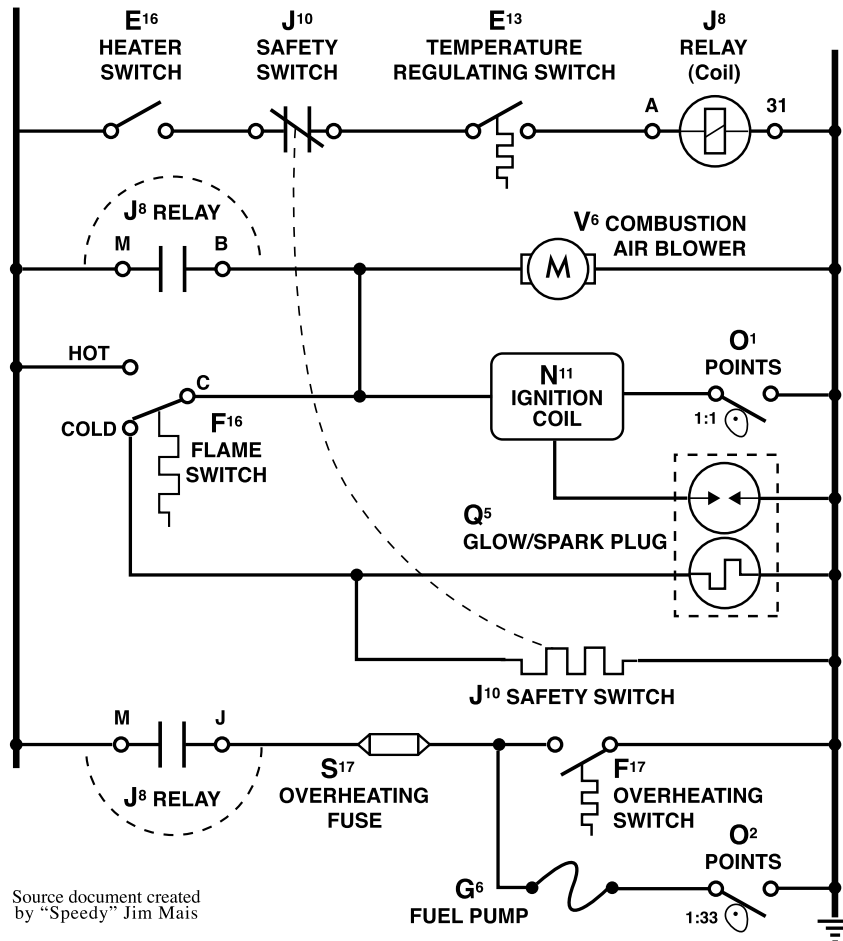


# Eberspächer BN-4 Heater Ladder Diagram

Type 1 / Model 181

+12 VOLT



Source document created  
by "Speedy" Jim Mais

## NOTES

IF the heater switch is on  
AND the safety switch has not been tripped  
AND the temperature regulating switch has been set:

THEN the relay coil will be energized and the relay activated.

IF the relay is energized:

THEN current will flow to the combustion air blower, the ignition coil and spark plug element. As the blower turns, the ignition points will close and the spark plug will fire once per revolution.

IF the heater is cool,  
AND the relay is energized:

THEN the flame switch will be closed on the COLD contact, the glow plug will heat up, and the safety switch heater will begin to heat.

IF the heater is warm,  
AND the relay is energized:

THEN the flame switch will be closed on the HOT contact, current will cease to flow to the glow plug element and the safety switch heater.

IF the heater is warm,  
AND the relay is *not* energized:

THEN the flame switch will be closed on the HOT contact, current will flow to combustion blower. The heater will cool down and unburned fuel vapors will be vented from the heater.

IF the heater does not warm up within a predetermined time:

THEN the safety switch heater will trip the safety switch, and current will cease to flow to the relay coil, shutting the heater off.

IF the relay is energized:

THEN current will flow to the fuel pump and fuel pump points. As the blower turns, the fuel pump will dose out one measure of fuel for every 33 revolutions of the blower.

IF the heater temperature rises above a predetermined safe limit:

THEN the overheating switch will short to ground, causing the overheating fuse to blow, and thereby stopping the fuel pump.

Be advised: **This is not a circuit diagram.** It is a ladder diagram, the purpose of which is to illustrate the relationships among components in a system. In the case of the BN-4 heater, in addition to giving a general overview, this diagram helps to highlight how the safety features work. Consider the safety switch. It is a failsafe for several components. If the heater does not warm up within a predetermined time after being turned on, the safety switch will turn the heater off. Suppose the blower isn't turning, or the coil isn't firing, or the spark or glow plugs are fouled, or the

points are dirty, any of which would prevent the heater from working properly. Any of these circumstances would cause the safety switch to trip and turn the heater off. This prevents a potentially dangerous accumulation of fuel in the heater. In the case of the heater temperature becoming too high, the overheating switch will prevent the flow of fuel into the heater by disabling the fuel pump. The flame switch allows the blower to keep spinning even after the heater has been turned off to help lower the temperature and vent unburned fuel from the heater.