18SP675Rev. – MBE 900 Grid Heater Relay Installation Instructions (P/N: A9061590004)

KIT DESCRIPTION

Kit P/N: A9061590004 includes a relay and bracket assembly for installation on all EPA04 and EPA07 MBE 900 engines currently equipped with a grid heater.

KIT CONTENTS

MBE 900 Grid Heater Relay Installation kit (P/N: A9061590004) contains contents listed in Table 1.

IMPORTANT!

EPA07 engines currently equipped with a 3.6 kW grid heater (P/N: A0001592404, **grey cover**) **must** replace that grid heater with a 2.7 kW grid heater (P/N: EA0001595204, **black cover)** *not included in relay kit)* and also update the MCM software to the latest version available on the server. Failure to update the MCM software may cause various fault codes and premature relay failure.

Part No.	Qty.	Description
A9061531340	1	Relay Bracket
A0045459205	1	Relay
A9061500056	1	Jumper Harness
A0005455402	1	Bus Bar
N910105006011	4	M6x70 Bolt
N910105006002	2	M6x12 Bolt
N916016020202	2	P-Clip
N910112008001	1	M8 Nut
18SP675Rev.	1	Installation Instructions

Table 1 MBE 900 Grid Heater Relay Installation Kit (P/N: A9061590004)

INSTALLATION PROCEDURE

1. Make sure that the engine is off (key OFF, engine OFF).
2. Disconnect the batteries.
3. Disconnect the electrical harness connector and electrical cables from the grid heater. Note routing of electrical harness and cables for reinstallation.

4. Remove mounting bolts securing the grid heater to the mixer housing. Remove and discard the attached relay ground bracket, if equipped. See Figure 1.

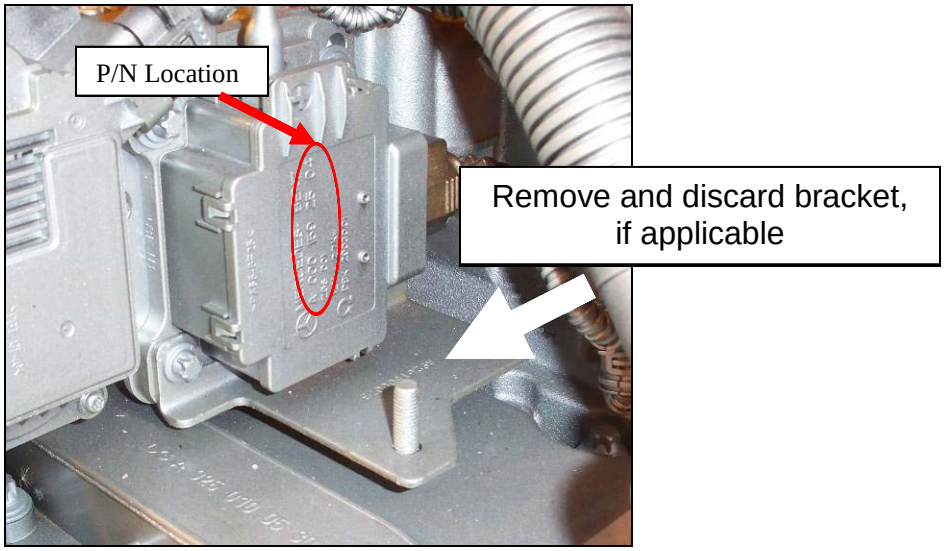


Figure 1 – Relay Ground Bracket to be Removed

5. Identify the current grid heater installed on the engine. If the engine is currently equipped with a 3.6 kW grid heater (P/N: EA0001592404), it must be replaced with a 2.7 kW grid heater (P/N: EA0001595204)..

Note:	The correct grid heater can be verified by a BLACK colored plastic cover (P/N: A0001592504 or A0001595204). If the cover is grey (P/N A0001592404), the grid heater **MUST** be replaced with the 2.7 kW grid heater (P/N: EA0001595204). Note that paint on the engine or discoloring may hide the true color of the grid heater. A small amount of paint may have to be scraped off the grid heater to find its true color.

6. Mount the relay (P/N: A0045459205) to the relay bracket (P/N: A9061531340) using supplied M6x12 bolts (P/N: N910105006002). Torque fasteners to 15 N·m (11 lb·ft).
7. Install the relay bracket and 2.7 kW grid heater (P/N: EA0001595204) to the mixer housing using new M6x70 bolts (P/N: N910105006011) as shown in Figure 2. Torque bolts to 10 N·m (7 lb·ft).

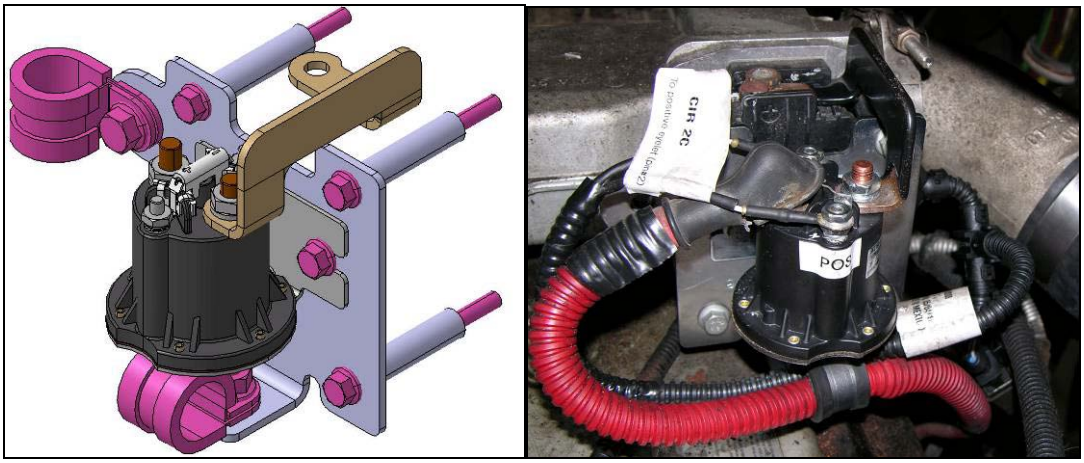


Figure 2 – Relay and Bracket Assembly

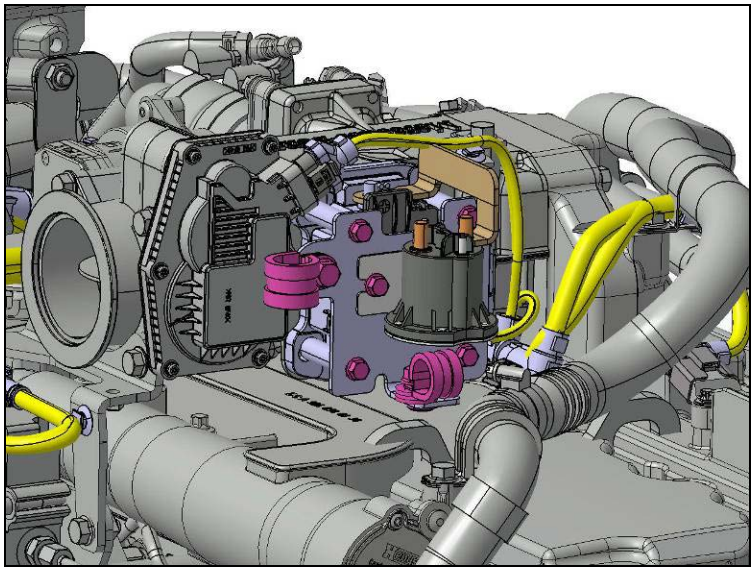


Figure 3 – Relay and Bracket Assembled to Engine (EPA07 shown)

8. Connect the supplied electrical jumper harness (P/N: A9061500056) in series between the engine electrical harness and the grid heater.

9. Attach the relay signal wires from the electrical jumper harness to the relay terminals as shown in Figure 4. Torque fasteners to 2 N·m (15 lb·in.).

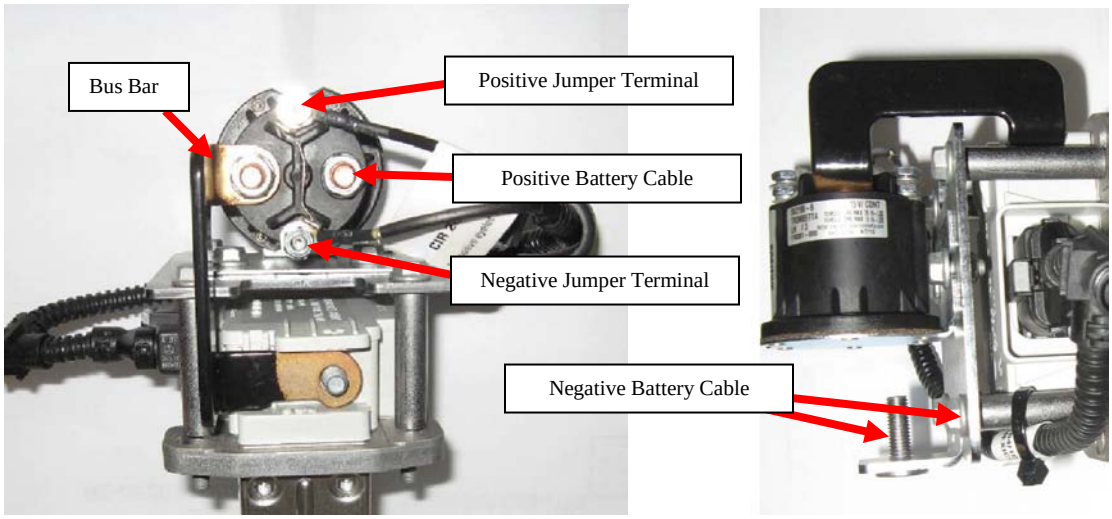


Figure 4 – Grid Heater Relay Wiring

10. Connect the positive battery cable to the relay terminal as shown in Figure 4. Torque nut to 4 N·m (35 lb·in.).
11. Attach the bus bar (P/N: A0005455402) from the terminal of the relay to the positive stud of the grid heater as shown. Torque relay nut to 4 N·m (35 lb·in.); torque grid heater nut to a maximum 25 N·m (18 lb·ft).
12. Connect the negative battery cable to the relay bracket stud (or under one of the bracket mounting bolt heads, depending on original configuration).Torque nut to 15-18 N·m (11-13 lb·ft).

Note: Route the electrical cables similar to OEM configuration. Mounting tabs on the relay bracket and supplied P-clips (P/N: N916016020202) may be used for securing the cables. Ensure no wires are rubbing on the bus bar.

13. Reconnect the batteries.
14. Apply protective dielectric coating to all electrical cable connections using 3M™ 1602 Scotch™ Insulating Spray (or equivalent).
15. For EPA07 only: If the grid heater was originally a grey cover 3.6 kW grid heater (P/N A0001592404), replaced with a black cover 2.7 kW grid heater (P/N A0001595204), reprogram the MCM with latest software in DDRS. Verify the correct parameters have been changed. See figure 5.

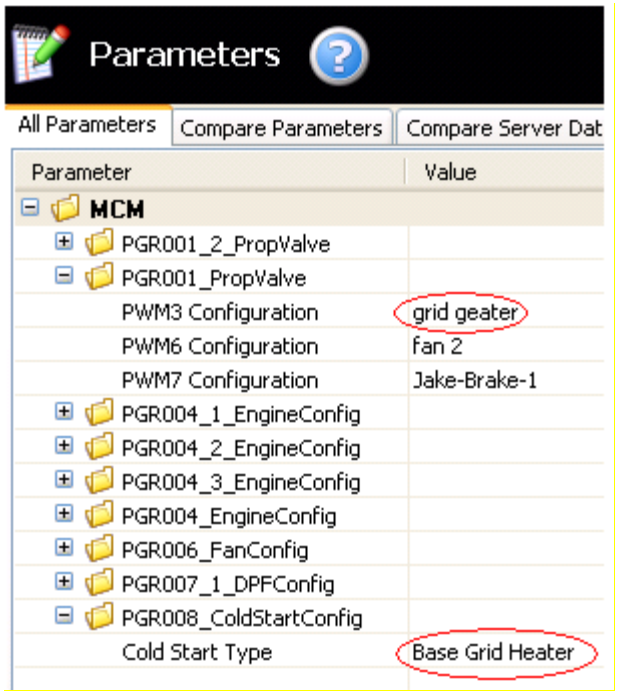


Figure 5 – EPA 07 Parameter change verification

16. **For EPA04 only**: Reflash the PLD using the "Replace PLD" button in MBE Reprogramming System. Then verify the correct parameters are set in the PLD and VCU. See figure 6.

Parameter Location	Parameter Name	Correct Setting
PLD Group 3 Parameter 6	Proportional Valve 6 (PV6)	Future grid heater *e.g. EPA04 MBE 4000
VCU Group 2 Parameter 6	Grid heater	Grid heater in MR-PLD

Figure 6 – Parameter verification

Verifying Proper Operation of the Grid Heater and Relay Assembly

Once the hardware has been installed to the engine, care must be taken to ensure that the grid heater and relay function properly. Activating the grid heater using DDRS (EPA07) for more than two seconds will result in a fault code and will disable the grid heater.

With the correct grid heater installed and the MCM programmed, the grid heater should energize and stay on continuously (not cycle) during the following verification test. If the relay is audibly heard cycling, verify that the MCM has been programmed with the latest version of software available on the server. Reprogramming will correctly parameterize the MCM for the 2.7 kW grid heater.

NOTICE:
"Exporting before" and "Importing parameters after" an MCM re-flash may cause improper parameterization.

Verification requires that the ambient air temperature be simulated to a very low value in order to activate the grid heater. Either an Instrument Gauge Tester or a 20k Ohm resistor must be used to simulate this low ambient temperature.

1. Ensure engine coolant temperature is at 70° C (160° F) or lower. **For EPA 04 Engines only:** disconnect the Coolant Temperature Sensor from the Engine Sensor Harness.
2. Disconnect the Intake Manifold Pressure/Temperature Sensor. See Figure 7.

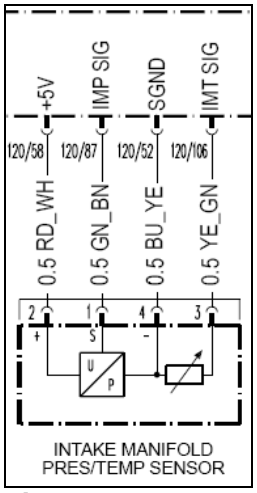


Figure 7 – EPA07 Intake Manifold Pressure/Temperature Sensor Schematic

3. Using Connector Test Kit J-48476, install male blade terminals J-48476-25 to pins 3 and 4 of the harness side Intake Manifold Pressure/Temperature Sensor connector.

Note: Exercise care when installing the blade terminals to the connector to avoid spreading or damaging the connector terminals.

4. Install a 20k ohm resistor between the two blade terminals. An Instrument Gauge Tester (commercially available) set to the appropriate resistance may be utilized in place of a 20k ohm resistor. See Figures 8 and 9.

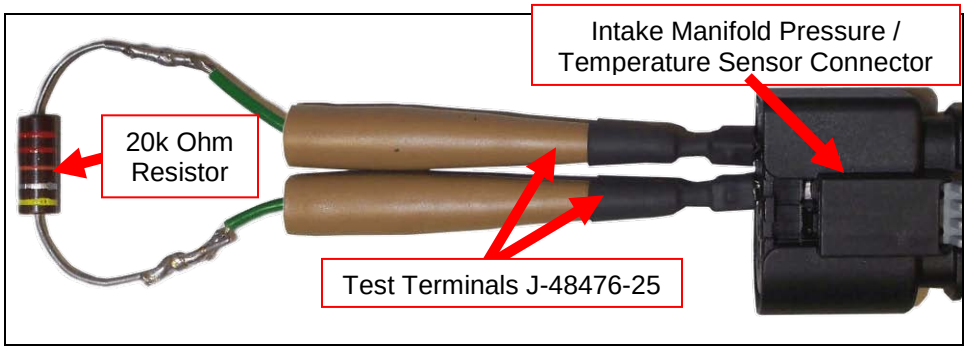
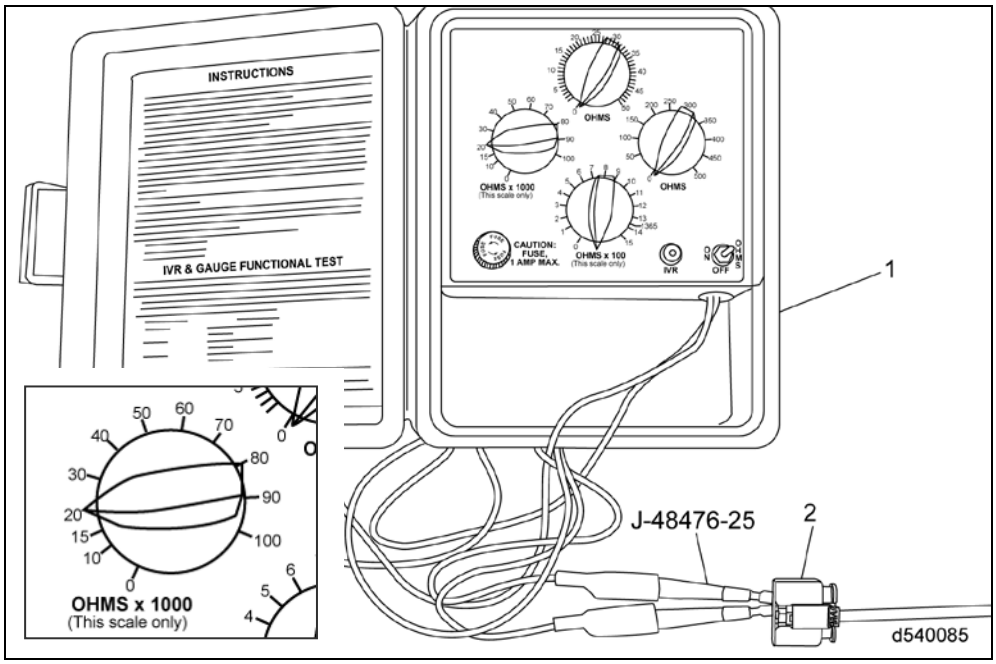


Figure 8 – 20k Ohm Resistor with J-48476-25 Plugged into Wiring Harness Connector



1. Instrument Gauge Tester 2. Inlet Manifold Pressure/Temperature Sensor Connector

Figure 9 – Instrument Gauge Tester set to 20k Ohms with J-48476-25 Terminals Plugged into Wiring Harness Connector

5. Connect DDRS 7.X (EPA07) or DDRS 6.X (EPA04) to the vehicle.
6. Turn the ignition ON and monitor the voltage on the positive stud of the grid heater using a voltmeter. The voltmeter should display battery voltage when the grid heater is activated. If the relay is cycling on and off, ensure the MCM was reprogrammed correctly.

Note: A fault code for the Intake Manifold Pressure sensor will be Active with the sensor unplugged.

7. The assembly is operating properly when the voltage check is verified and the vehicle does not set any fault codes for the grid heater.

Note: If the vehicle sets a fault code for the grid heater, ensure the MCM is programmed correctly and that all connections have been made according to the provided instructions otherwise refer to the proper troubleshooting for the fault code.

POST INSTALLATION TROUBLESHOOTING DIAGNOSTICS		
Symptoms or Code(s)	**Possible Cause / (Solution)**	**Additional Notes:**
Relay Clicks On and Off rapidly at ~ 3 - 4 Hz when enabled	Wrong Grid Heater parameterization. (Re-Flash MCM with 11.4 software in step 15).	"Exporting before" and then "Importing parameters after" a MCM re-flash can cause this issue.
729/7 GH Defect; GH Not Enabled	Typically because polarity of relay control jumper cable is reversed or not connected. (Verify Steps 8 & 9).	See Figure 4 for proper jumper terminal polarity or Relay Control Jumper Cable.
698/4 GH Circuit Failed Low; GH Not Enabled	HSW1 of jumper cable at MCM or Grid heater is open circuit. (Verify control jumper connections; Review Steps 8 & 9)	Relay Control Jumper Cable p/n: A9061500056 may be defective.

8. Turn ignition Off.
9. Remove the Connector Test Kit terminals and resistor.
10. Reconnect the Intake Manifold Pressure/Temperature sensor.
11. **For EPA 04 engines only:** Reconnect the Coolant Temperature Sensor to the Engine Sensor Harness.
12. Clear accompanying fault code(s) and release vehicle.

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