

TST Adjustable POWERMAX™ R46 Remote Installation Instructions



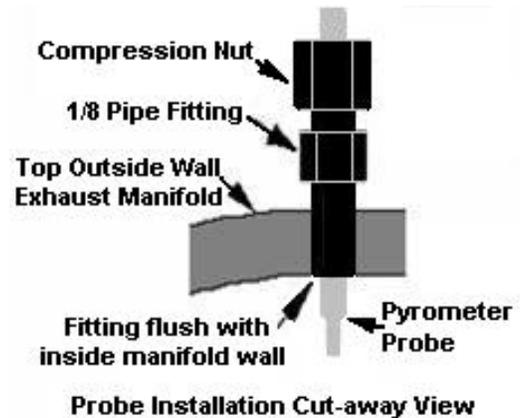
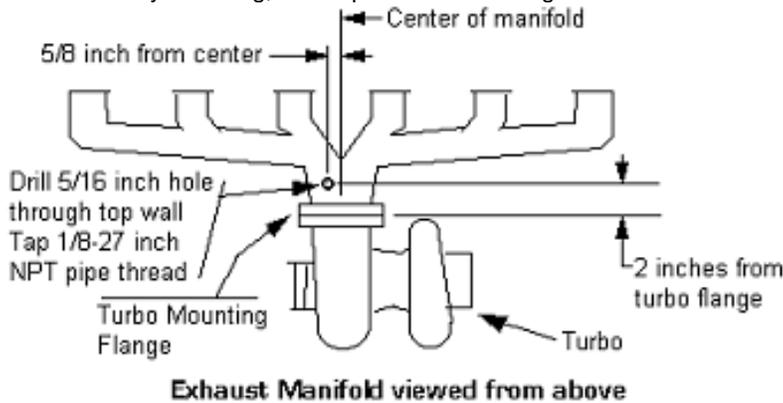
Installation of the **POWERMAX™ R46 Remote** is very simple and requires commonly available tools. Velcro™ is supplied with the remote so that it can be fixed mounted in any easy to view and reach location. **TST** installs these remotes on the lip of the instrument panel to the left of the heating/air conditioning control knob. The remote may be tucked away out of sight in the ashtray or about any location as long as the remote cord will reach the plug-in connector on the **POWERMAX™** main computer.

Once the desired location for the remote is determined, route the power cord so that it can be plugged into the phone-like connector on the back of the **POWERMAX™** main computer. Avoid pinching the power cord against sharp metal edges under the dash, avoid interference with throttle pedal, brake pedal, clutch, and parking brake linkages.

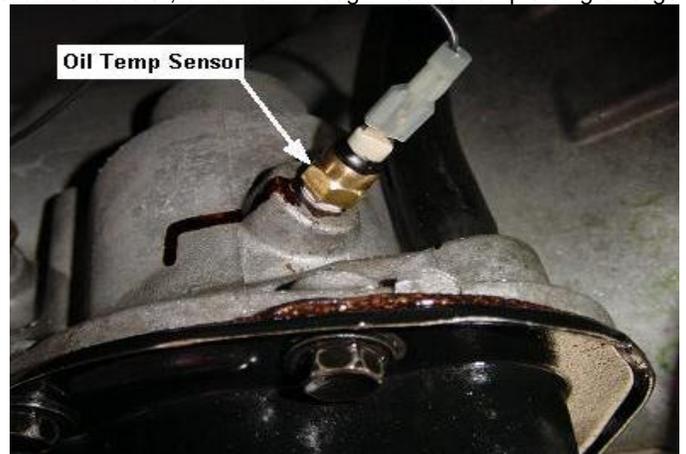
The exhaust thermocouple and oil temperature sensor must be installed for the **POWERMAX™ R46 Remote** features to work properly. The following tools/items are required:

Electrical tape	Medium #2 phillips screwdriver	5/16 inch or 8 mm wrench or socket
3/8 inch or 10 mm open end wrench	7/16 inch or 11 mm open end wrench	1/2 inch or 13 mm open end wrench
Center punch and hammer	Electric or air drill	5/16 inch drill bit
Small mechanic magnet	1/8 -27 inch tapered NPT pipe tap	Tap holder

1. Locate the point to install the thermocouple probe. The best place is to locate the probe in the exhaust manifold about two inches before the turbo flange gasket surface toward the engine. The exhaust manifold is a split passage design with 3 cylinders feeding each passage and a vertical internal web separating the two passages in the center thus the manifold is solid in the center. Locate a point two inches from the turbo mounting flange centered on the exhaust manifold, then move forward or rearward on the manifold 5/8 inch and center punch for drilling. Drill 5/16 inch diameter hole straight down through one wall. Tap threads using 1/8-27 inch tapered pipe tap. Tap depth is important. The bottom of the thermocouple 1/8 pipe fitting should be flush with the inside of the exhaust flow path. Tap a few turns and try the fitting, then tap further until fitting bottom is flush with manifold inside wall.



2. Use a small mechanics magnet that will pass through the tapped hole to the bottom wall of the manifold to retrieve drill and tap shavings. Clean shavings from magnet and search for more shavings until the magnet comes back clean.
3. Install thermocouple 1/8 pipe fitting in hole and tighten with a 1/2 inch or 13 mm open end wrench. Using a 3/8 inch or 10 mm open end wrench, insure the thermocouple is securely attached to the pipe fitting.
4. Remove the terminal locknuts from the red and yellow wires of the thermocouple and attach the matching color to the end of the long thermocouple wire that has the red wire longer than the yellow wire. Slide the shrink-wrap tubing over the exposed terminals so they cannot short out against other metal under hood components.
5. Route the lead wire toward the firewall taking precaution to keep it away from hot and moving parts. Route the wire next to the main wiring harness that runs along the top of the firewall over the top of the brake booster, and then through the firewall piercing a large rubber grommet in the firewall beside the brake booster canister. **NOTE: Do NOT cut or splice the thermocouple lead wire as it is special wire that provides correct reading to the gauge. Simply coil any excess wire out of the way. If the thermocouple wire is too short, call factory for longer leads.**
6. From under the dash, retrieve the thermocouple long lead wire and attach the ring terminal ends to the appropriate ring terminals on the **POWERMAX™** wiring harness. Using the supplied screws and nuts, attach the **red** wire to the **negative** terminal and the **yellow** wire to the **positive** terminal.
7. Next install the oil temperature sensor. The original intent of this sensor was to measure automatic transmission temperature but the sensor can also be used to measure engine oil, manual transmission, or differential temperatures. The supplied sensor has a 1/8-27 pipe thread and will fit existing threaded holes in the automatic transmission or engine oil filter housing by removing an existing pipe plug.



Right front view of automatic transmission

8. The spade terminal end plugs onto sensor and the ring terminal end connects to the main wiring harness black wire with ring terminal inside the cab. Route oil sensor wire from the sensor through the rubber firewall grommet, keeping wire away from moving, hot, or sharp edged parts.

9. Tape exposed terminal ends so they do not short electrically to ground.



Right front view of engine

TST Adjustable POWERMAX™ R46 Remote Operating Instructions

Operation of the ***R46 Remote*** is very simple. The ***POWERMAX™*** main computer should be installed first and tested to insure it is operating properly. Once the main computer is operating correctly, plug the remote power cord into the phone connector of the main computer. The switch on the main computer must be in the "on" position for the remote to show a power level. The exhaust and oil temperature readouts, and the boost reading should light with the ***POWERMAX™*** turned on or off. These readouts will not give accurate readings until the engine is running.

The ***R46 Remote*** has four digital L.E.D. (light emitting diodes) that show EXHAUST TEMP (EGT) in degrees F, OIL TEMP in degrees F, TURBO BOOST pressure in psig, and POWER LEVEL (if the ***POWERMAX™*** is switched on). A green fuel L.E.D. glows brighter as the ***POWERMAX™*** adds more fuel. If the switch on the ***POWERMAX™*** main computer is "off", the digital L.E.D. for POWER LEVEL will be off (unlit). With key on and the main computer switched "on", the POWER LEVEL single digit L.E.D. indicates the power level setting with "0" being stock power and "9" being the highest power level. Use the green up arrow switch to move up one level at a time or the green down arrow switch to move down one level per push of the switch, the switch must be released between each level change. Levels "1" through "9" equally split the power increase. Power levels may be changed with the engine off or running at any speed/load.

It is recommended that the maximum exhaust gas temperature (EGT) limit be set at 1250 F (default) if the thermocouple probe is installed in the exhaust manifold. If the probe is installed after the turbo then the maximum exhaust gas temperature should be set below 900 F. The maximum exhaust gas temperature control may be turned off by setting the maximum temperature below 500 F. To set the maximum exhaust gas temperature, click the gray center button until the OIL TEMP L.E.D. readout reads "EGT". Use the up or down green arrows to move to the desired maximum exhaust gas temperature then push and hold down the center gray button until the word save "SAU" appears.

The oil temperature maximum should be around 260 F (default) unless 100% synthetic oil is used which may allow +300 F. The oil temperature control may be turned off by setting the temperature below 100 F. The maximum oil temperature limit is set by pushing the center gray button until the OIL TEMP readout reads "OIL". Use the up and down green arrows to reach the desired temperature then push and hold down the center gray button until the word save "SAU" appears.

When the set exhaust gas temperature limit is exceeded, all decimal points flash on the EXHAUST TEMP display to indicate the ***POWERMAX™*** computer is reducing added fueling to reduce temperature. If the TURBO BOOST decimal points are flashing, the ***POWERMAX™*** computer is cutting stock power in an effort to maintain the proper temperature. If oversized injectors have been added the ***POWERMAX™*** may not be able to cut stock fueling enough to maintain a safe temperature. If the set oil temperature limit is exceeded, the OIL TEMP decimal points flash indicating that the ***POWERMAX™*** is cutting fuel in an attempt to reduce oil temperature.

If the ***R46 Remote*** is unplugged from the main computer, the computer continues to operate at the last level used for POWER LEVEL, EXHAUST TEMP, and OIL TEMP. For example, if level "0" is indicated and the remote is then unplugged, the ***POWERMAX™*** main computer will not add any power. If level "5" is indicated and the remote is unplugged, the ***POWERMAX™*** main computer will stay at level "5". If temperature was set at 1200 F then it remains at 1200 F.

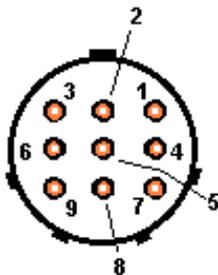
TST Adjustable POWERMAX™ R46 Remote Troubleshooting Instructions

Symptom	Check
R46 EXHAUST TEMP reads "2Hot"	Exhaust temperature above 1700 F or wire disconnected
R46 OIL TEMP reads "CLd"	Oil temperature too cold to register
Power cuts off early	EXHAUST TEMP set too low
Remote will not change power level	Connection at injection pump is bad Fuse is blown in the POWERMAX™ wiring harness
Red (power) light only at POWERMAX™	MAP voltage output is too high (above 2 volts) No 12 volt key/crank is available
No remote display	No 12 volt key/crank is available No MAP sensor ground
No remote display of Power Level	POWERMAX™ computer switched off at main computer
Green (fuel) light extremely bright Blowing 5 Amp fuse constantly	No MAP sensor ground No MAP sensor ground Loose Scotchlock™ connection at injection pump
Remote flickering very dim with POWERMAX™ computer "off"	No or poor engine ground connection
Truck stumbles or runs rough while accelerating	Check for loose connection at injection pump wire Check lift pump pressure, must be 3psi or higher
Engine runs rough at idle	MAP sensor coated with oil or defective

Check all Scotchlock™ and grabbers very carefully. They often look like they're making contact, but are not. The best thing to do is disconnect all connections with Scotchlock™ or grabbers and use a Posi-Tap or solder the wires together.

Check the fuse. When you check the fuse it may look good but still be blown, so either check it with an ohm meter or replace it with a new one. Replace it with a 5 amp fuse.

TST PowerMax Engine Harness Connector Pin Out



- 1 12 Volt Keyed Run and Start (key-on 12 volts)**
 - 2 MAP Boost Sensor to Cummins ECM**
 - 3 MAP Signal from engine (key-on .5 volts '98-'2000) ***
 - 4 Oil Temperature Sender # ** (1.0 volts '01-'02) ***
 - 5 Engine Ground**
 - 6 Thermocouple positive (yellow) #**
 - 7 MAP Boost Sensor Ground**
 - 8 Thermocouple negative (red) #**
 - 9 Fused Injection Pump Signal (5 Amp Max)**
- * Engine Off (key-on 12 volts) *
- # Not used with R35 remote
- ** Not used with R45 remote

The female side of the pin connector has terminals 1-9 engraved on the connector. Do not start truck while the **POWERMAX™** is not connected. With the key tuned to the run position, engine NOT running, check the following, with the **POWERMAX™** wiring harness unplugged in cab of truck, with a digital volt/ohm meter.

Using Pin# 5 as ground, Pin# 1 should measure battery voltage 11 to 14 volts DC. If no voltage, check the 12 volt Scotchlock™ connection between the **POWERMAX™** wiring harness and the vehicle harness underhood.

Using Pin# 5 as ground, Pin# 9 should measure battery voltage 11 to 14 volts DC. If no voltage, check the Scotchlock™ connection at the injection pump, and the fuse in the **POWERMAX™** main wiring harness.

Using Pin# 8 as ground, Pin# 6 should measure less than .0085 volts or 8.5 milli-volts if temperature is below 400 F.

Using Pin# 7 as the ground, Pin# 3 should measure 1.05 volts DC on 2001-2002 vehicles and 0.5 volts DC on 1998-2000 vehicles.