

Installation and Operating Instructions

TST POWERMAXCR™ for '03-'07 Ram/5.9 Cummins® Engine

For the PMCR R37AP, these do not have a thermocouple and do not connect to the rail pressure sensor, so you can skip the steps regarding the thermocouple and rail pressure sensor. Make sure the red and yellow wires of the **POWERMAXCR™** are connected together or it will get false temperature reading causing it to go into over temperature cutback.

All PMCR R37AP units can be upgraded to a PMCR R49AP by just buying the R49AP remote (the R37AP can be traded in), no reprogramming is necessary. Upgrades to a R49AP include the thermocouple and rail pressure harness. Check the TST web site (www.tstproducts.com) or call for prices.

For the PMCR ECON, PMCR 75, and PMCR 95, these do not have a remote, do not have a thermocouple, and do not connect to the rail pressure sensor, so you can skip the steps regarding the remote, thermocouple, and rail pressure sensor. Make sure the red and yellow wires of the **POWERMAXCR™** are connected together or it will get false temperature reading causing it to go into over temperature cutback.

All PMCR units with no remote can be upgraded to a PMCR R37AP or PMCR R49AP by just buying the remote, no reprogramming is necessary. Upgrades to a R49AP include the thermocouple and rail pressure harness. Check the TST web site (www.tstproducts.com) or call for prices.

Note to dealers: Be sure and give these instructions to the customer when selling or installing any of the TST PowerMax units. This will be a great help to your customer and the TST staff. Thanks.

Using a Smarty with a PMCR: The Smarty can be combined with a PMCR and will improve the low end performance and extend the high end rpm range. You will have to experiment to find the best Smarty and PMCR settings for you. Start with the lower settings on each and work your way up to see which combination gives you the best performance. Please do not call TST and ask which settings give the best performance and/or fuel mileage, we don't know since all trucks and drivers are different.

Connecting the Power Wire of a Pusher Pump

On a 03 and early 04 Dodge:

DO NOT CONNECT A PUSHER PUMP POWER WIRE TO EITHER FUSE 36 OR 50 or to the "spare" fuse or relay. Doing so will destroy the circuit board in the **POWERMAXCR™** timing harness when the truck is running during Cool Down. If your pump has been moved to the tank, follow the instructions below for a 04 1/2 to 05 Dodge. Otherwise, make sure your pump kit has a relay to power the pump.

On a 04-1/2 and 05 Dodge:

DO NOT CONNECT A PUSHER PUMP POWER WIRE TO EITHER FUSE 36 OR 50 or to the "spare" fuse or relay. Doing so will destroy the circuit board in the **POWERMAXCR™** timing harness when the truck is running during Cool Down. Remove the Fuel Pump Relay. There should be 5 pins. Not all relays are labeled on the bottom, so use the drawing on the side of the relay to identify the pins. Pin 87 puts power to the transfer pump. Bend pin 87 out to the side so you can connect a mini female spade terminal and connect it to the pusher pump power wire. Connect the pusher pump ground to the battery ground.

On a 06 Dodge:

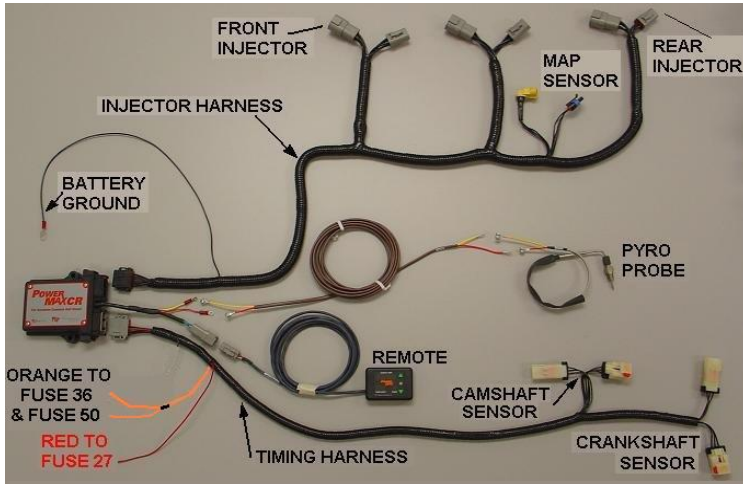
DO NOT CONNECT A PUSHER PUMP POWER WIRE TO EITHER FUSE 28 OR 32 or to the "spare" fuse or relay. Doing so will destroy the circuit board in the **POWERMAXCR™** timing harness when the truck is running during Cool Down. You will need to use an automotive relay to power the pump. Connect pin 85 of the relay to ground and connect either fuse 28 or 32 (either orange wire from the **POWERMAXCR™**) to pin 86 of the relay. Connect pin 30 of the relay to 12V battery and connect pin 87 of the relay to the pump power wire.

Start here for Installation Instructions

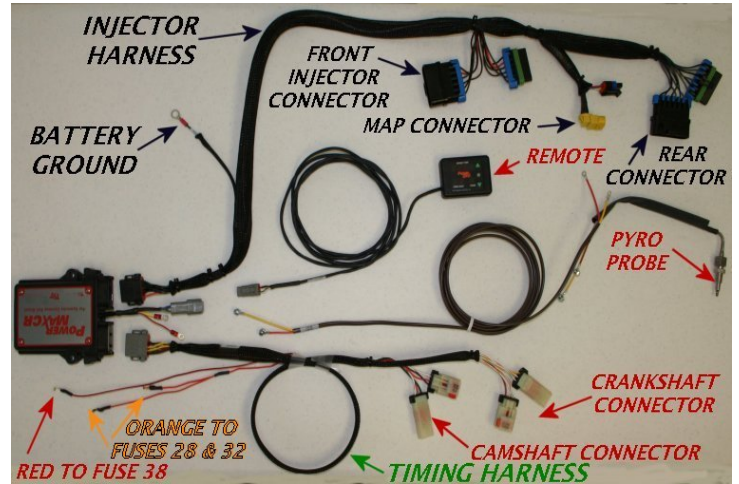
Thank you for purchasing the **TST POWERMAXCR™** computer for the Cummins Ram. When installed correctly, this unit is designed to give years of trouble free power enhancement to your engine. Let's begin with a list of items needed to install this unit.

- | | | |
|--|-------------------------------------|-------------------------------|
| 1. Cummins Common Rail ISB diesel engine | 7. 9/32 in wrench or socket | 13. *Drill with 5/16 inch bit |
| 2. TST POWERMAXCR™ Computer | 8. 1/4 in wrench or socket | 14. *1/8—27 NPT pipe tap |
| 3. Fender covers | 9. 7/16 in or 11 mm open end wrench | 15. *Small mechanics magnet |
| 4. Work light | 10. Medium standard screwdriver | 16. * #2 Phillips screwdriver |
| 5. 1/2 in or 13 mm wrench or socket | 11. 18 mm wrench or socket | 17. * 3/8 in open end wrench |
| 6. 10 mm wrench or socket | 12. Pliers | 18. Electrical Tape |
- * Only required if installing remote with built in gauges.

1. Open kit to insure you have all the correct components. You should have a **TST POWERMAXCR™** computer, an optional remote control unit, an injector wiring harness, a timing sensor wiring harness (with optional rail pressure harness), zip ties, an optional brass elbow boost control with clamp, some Velcro®, and some alcohol cleaning wipes. If you are installing the unit that monitors exhaust temperature the kit should also contain a thermocouple probe and lead wire.



'03-'05 Dodge PowerMax kit



'06 Dodge PowerMax kit

2. Park vehicle in a safe, level work area, turn steering wheel hard right, engage parking brake. Open the hood and put the work light and fender covers in place.
3. Disconnect both negative battery cables using a 1/2 in or 13mm wrench or socket. Do not reconnect until installation is complete.
4. Clean underhood cover of FUSE & RELAY CENTER and attach the **POWERMAXCR™** computer using Velcro® as shown in **Figure 1a** for '03-'05 or **Figure 1b** for '06. This location was selected to keep the computer away from sources of high heat. The unit will automatically reduce power if it becomes too warm. Power will be restored when unit is cool. NOTE: On some trucks you may need to force the computer against the washer fluid tank so that it can sit flat on the cover of the FUSE & RELAY CENTER.



Figure 1a for '03-'05



Figure 1b for '06

5. Locate the engine MAP sensor on the top of the intake manifold cover, see **Figure 2**. Disconnect the engine electrical connector from the MAP sensor and plug the engine connector into the **TST** injector harness MAP connector. Plug the **TST** harness MAP connector into the engine MAP sensor.



Figure 2

6a. For '03-'05: Locate the three injector electrical connectors on the driver side of the rocker lever housing, see **Figure 3a** for '03-'05, unplug connectors and plug them into the appropriate **TST** injector wiring harness connectors. Plug the **TST** injector wiring harness injector connectors into the engine injector connectors on the driver side of the rocker lever housing. **NOTE:** The three injector connectors are identical. It is important that the **TST** injector connector farthest from the **POWERMAXCR™** computer be connected to the connector at flywheel end of the engine.



Figure 3a for '03-'05

6b. For '06: Locate the two injector electrical connectors on the driver side of the rocker lever housing, see **Figure 3b** for '06, unplug connectors and plug them into the appropriate **TST** injector wiring harness connectors. Plug the **TST** injector wiring harness injector connectors into the engine injector connectors on the driver side of the rocker lever housing. **NOTE:** The two injector connectors are identical. It is important that the **TST** injector connector farthest from the **TST** computer be connected to the connector at flywheel end of the engine.



Figure 3b for '06

7. Plug the large black connector from the **TST** injector wiring harness into the black connector port of the **POWERMAXCR™** computer. **NOTE:** This connector is slotted such that it will only fit one way, do not force. Make sure there are no wires in the path of any moving parts, such as belts, fans, or the power steering pump.

8. Take the **TST** timing sensor wiring harness and plug the large light gray connector into the appropriate light gray connector on the **POWERMAXCR™** computer. **NOTE:** This connector is slotted such that it will only fit one way, do not force. Route the rest of this harness downward near the front of the engine to the engine camshaft and crankshaft sensors. Make sure there are no wires in the path of any moving parts, such as belts, fans, or the power steering pump.

9. Working from under the vehicle, unplug the camshaft connector located directly below the injection pump. The driver side battery ground cable can be moved by loosening the 18 mm ground bolt at the block, don't forget to retighten the ground bolt. A red plastic tab must be slid to one side, then depress another tab to allow this connector to release. See **Figure 4** for details on releasing this connector. **Note:** The cam and crank connectors are identical, the installer may want to unplug the crank first to understand how the connector is released. Next plug the **TST** timing sensor wiring harness connector closest to the **POWERMAXCR™** computer into the camshaft position sensor. Plug the engine camshaft position sensor connector into the **TST** timing sensor wiring harness connector. Make sure all connectors snap into place and lock the red tab lock.

10. Repeat the above step for the crank position sensor using the connector farthest from the **POWERMAXCR™** computer. See **Figure 5**.

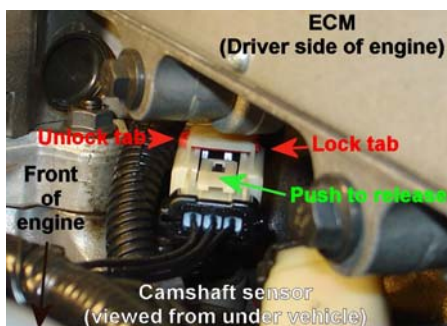


Figure 4



Figure 5

11. If your unit does not have the rail pressure option (only available for some **POWERMAXCR™** serial numbers 5000 and above), then skip to step 12. If your unit has the rail pressure option, locate the rail pressure sensor (the rail is on the driver side), unplug the factory harness rail pressure sensor connector, see **Figure 6**, and plug the **TST** rail pressure sensor connector to the rail pressure sensor, then plug the other end of the **TST** rail pressure sensor connector to the factory harness rail pressure sensor connector.

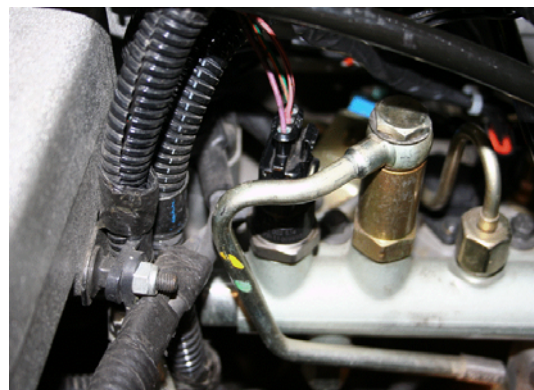


Figure 6

An important note on connecting a TST PowerMaxCR rail pressure harness to the truck.

The rail pressure connector on the stock harness will have a clip on it with a thumb tab to press when removing the connector. This clip is designed to keep the connectors from coming apart by snapping over a stub and it needs to connect to the correct side of the TST rail pressure harness connector. The stub on the correct side will be tapered so it is triangle shaped if you look at it from the side. The stub on the wrong side is not tapered and is oval shaped if you look straight down on it and rectangle shaped if you look at it from the side. See **Figure 6a** and **Figure 6b** below.



Figure 6a



Figure 6b

12a. For '03-'05: Remove cover from FUSE & RELAY CENTER and locate fuses 27, 36 and 50. See **Figure 7a for '03-'05**. Remove fuse 36 and install fuse tap supplied as shown in **Figure 8**. Connect the orange wire fuse tap of the TIMING HARNESS to fuse 36 and reinstall the fuse in cavity 36 with the fuse tap on the side closest to the drive side battery. Repeat this procedure for fuse 50. Connect the red wire from the TIMING HARNESS to fuse 27. Reinstall cover.

NOTE: If you have a pusher pump, **DO NOT CONNECT A PUSHER PUMP POWER WIRE TO EITHER FUSE 36 OR 50**. Doing so will destroy the circuit board in the **POWERMAXCR™** timing harness when the truck is running during Cool Down. See page 1 for instructions on how to connect the power to a pusher pump.

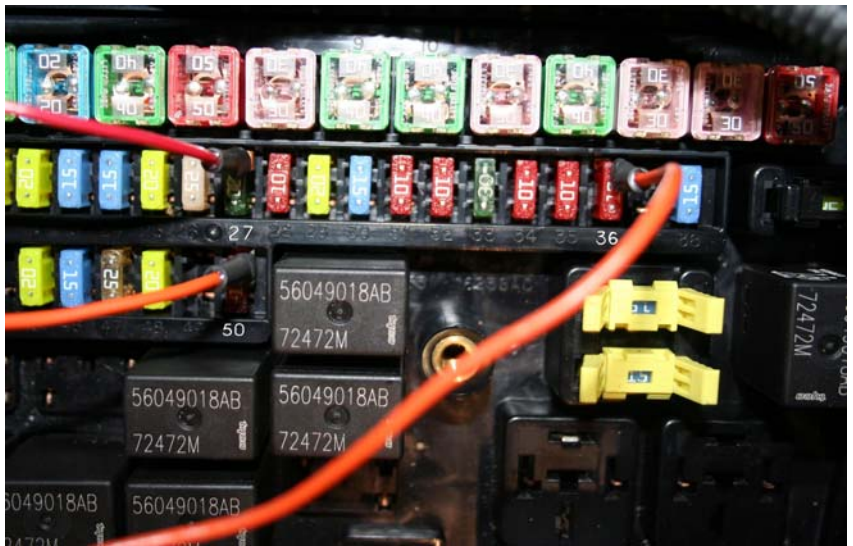


Figure 7a for '03-'05

12b. For '06: Lift cover on FUSE & RELAY CENTER and locate fuses 28, 32, and 38. See **Figure 7b for '06**. Remove fuse 28 and install fuse tap supplied as shown in **Figure 8**. Connect the orange wire fuse tap of the TIMING HARNESS to fuse 28 and reinstall the fuse in cavity 28 with fuse tap on the side closest to the driver side fender. Repeat this procedure for fuse 32 with fuse tap toward front of vehicle. Connect the red wire from the TIMING HARNESS to fuse 38 with tap toward driver side. Reinstall cover.

NOTE: If you have a pusher pump, **DO NOT CONNECT A PUSHER PUMP POWER WIRE TO EITHER FUSE 28 OR 32**. Doing so will destroy the circuit board in the **POWERMAXCR™** timing harness when the truck is running during Cool Down. See page 1 for instructions on how to connect the power to a pusher pump.

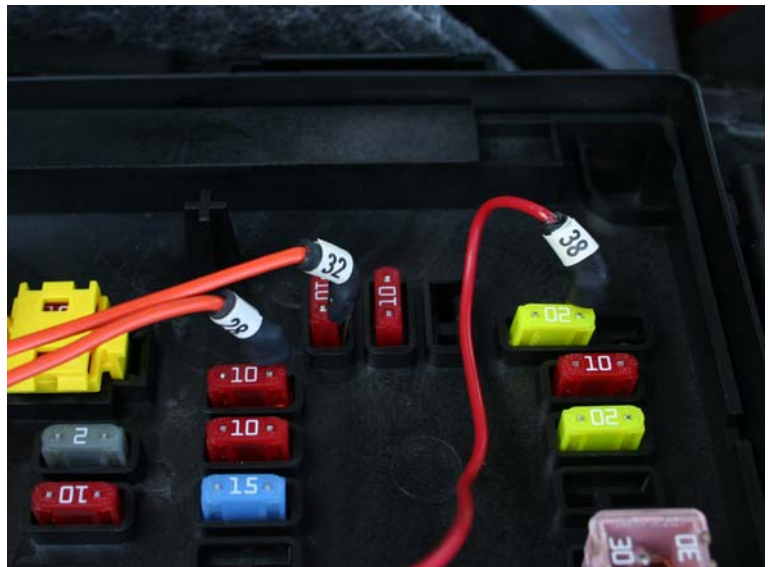


Figure 7b for '06



Figure 8



Figure 9

13. Connect the ring terminal for the battery ground wire from the INJECTOR HARNESS to the battery ground clamp bolt using the supplied 5/16-18 nut as shown in **Figure 9**.

NOTE: If you have installed a FASS or other similar pusher pump you may get a fault code P0647 for AC clutch problem. This problem can be resolved by cutting the ring terminal off the ground wire and extending the ground to the lower edge of the dash inside the cab. In this case, do NOT ground to the battery.

14. If your unit does not use a remote (such as the PMCR ECON, PMCR 75, or PMCR 95), skip to step 24. If you have a remote, determine a good location for the remote control inside the cab and Velcro® the remote in place. Take caution to choose a location that will provide easy visibility while driving without blocking the drivers forward view of the road. An example would be on top of the dash to the far left or on top of steering column as in the example shown in **Figure 10**.



Figure 10



Figure 11

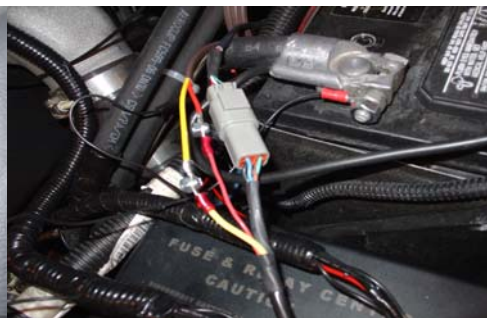


Figure 12

15. Route the remote wiring to the driver side door and then through openings to underhood as shown in **Figure 11**. Coil any excess wire and use zip ties to secure this wire so that it cannot be pinched by the door or hood hinge or support cylinder. Note the routing of the wire coming from the pop out panel on the left end of the dash and routing through the inner fender over a piece of foam and then into the underhood compartment.

16. Plug the remote connector into the gray 4-pin connector on the **POWERMAXCR™** computer (see **Figure 12**). Again, make sure all wires are secured under hood and out of the way of any moving parts that may damage wires if contact is made.

17. If your unit does not use a thermocouple (such as the R37AP, PMCR ECON, PMCR 75, or PMCR 95) make sure the red and yellow wires of the **POWERMAXCR™** are connected together or it will get false temperature reading causing it to go into over temperature cutback, then skip to step 24. Locate the point to install the thermocouple. The best place is in the exhaust manifold immediately after the number three port enters the log of the manifold such that you are measuring from three cylinders, see **Figure 13**.

18. Drill 5/16 inch diameter hole straight down vertically through one wall. Tap threads using an 1/8 -27 inch tapered pipe tap. Tap depth is important. The bottom of the thermocouple 1/8 pipe fitting should be flush with inside of the exhaust manifold, see **Figure 14**.

19. Use a mechanics magnet that will pass through the tapped hole to the bottom wall of the manifold to retrieve drill and tap shaving. Clean shavings from magnet, and search for more shavings until the magnet comes back clean.

20. Install the thermocouple 1/8 pipe fitting in hole and tighten with a 1/2 inch or 13mm wrench. Using a 3/8 or 10mm wrench, insure the thermocouple is securely attached to the pipe fitting.

21. Remove the terminal locknuts from the red and yellow wires of the thermocouple using #2 phillips and a 5/16 wrench or socket 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 against other metal under the hood.

22. Route the lead wire toward the firewall up and over the engine taking precaution to keep it away from hot and moving parts. Go over top of the brake booster, and then run directly to the **POWERMAXCR™** computer on top of the Fuse and Relay Center. **NOTE:** Do not cut the extra wire, simply coil any extra.

23. Attach the lead wire to the red and yellow wire coming out of the **POWERMAXCR™** computer box using terminals provided. If you don't have the type with the slide-on quick disconnects, use a #2 phillips and a 5/16 wrench or socket to tighten the connection, see **Figure 12**. Using electrical tape, tape both wires individually so they do not short out with each other or any other metal parts. Make sure you connect the red thermocouple lead to the red **POWERMAXCR™** wire and the yellow to the yellow **POWERMAXCR™** wire.



Figure 13

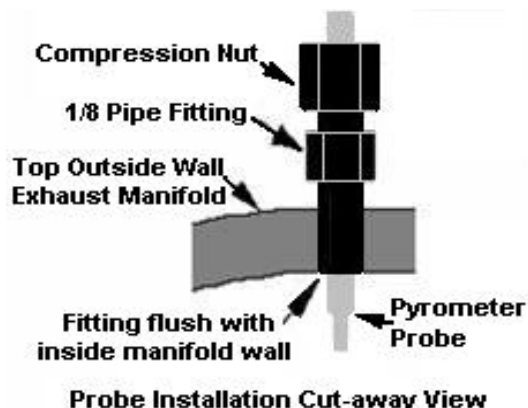


Figure 14

24. (This step is not required on the 2004.5 and later Rams with the 325 horsepower 600/610 torque engine, go to step 26.) Remove the air cleaner box and hose by removing 10 mm nut at the front of the vehicle and loosening the 9/32 inch screw on the turbo inlet hose clamp, see **Figure 15**. The air cleaner can be laid on the valve cover without disconnecting the air inlet temp sensor.



Figure 15



Figure 16



Figure 17

25. Next remove the hose clamp on the wastegate hose shown in **Figure 16** and remove the stock crimped hose clamp with pliers and the brass elbow. Install the brass elbow supplied and reinstall the hose using the new hose clamp supplied, see **Figure 17**.

26. Check all charge air cooler hoses on both sides of the engine to be sure they are not leaking, that they are under the hose clamps, and the clamps are tight. Then reinstall the air cleaner and tighten clamp and holddown nut removed in step 24.

27. Double check to make sure all the connections are made. Reconnect both battery ground cables. Remove any tools, lights etc. from under hood. Turn key to run and observe the remote display, if it lights then you have 12 volts connected, if not then recheck the remote and the 12 volt connections. Then start engine and let idle. If engine starts and continues to run then you have likely hooked it up correctly. If truck does not start, recheck the cam and crank sensor connections; and insure that the TIMING HARNESS connector is snapped into the **POWERMAXCR™** computer.

R37AP REMOTE INSTRUCTIONS (FOR R49AP COOL DOWN REMOTE SEE PAGES 8 - 10)

The R37AP (Adjustable Program) will display and control power and torque settings, control which program is selected (economy, standard, or twin turbos), and control if Electronic Boost Limit is on/off.

POWER Shown as "8" in **Figure 18**, this display shows the currently selected power setting at 2900 engine rpm. Setting "0" is stock horsepower, setting "1" turns on the timing advance feature which reduces exhaust gas temperature, improves fuel economy, and adds about 35 extra horsepower at the wheels. Each additional setting adds about 20 more horsepower at the wheels. Towing on the higher power level setting is not recommended due to stress on the vehicles drive train. The power level can be changed any time the key is on (even under power) by pressing the green up or down arrow. If the Power digit blinks, see step 17 of these instructions.

TORQUE ENHANCEMENT Torque enhancement (tE) is the lower digit, shown as "4" in **Figure 18**. Press the gray button once and the torque number starts flashing and while flashing pressing the green arrows change the tE level. The tE level is best described as an adjustment for adding additional torque in the lower rpm range (1200-1800). This is a "0" to "9" level setting similar to the Power Level setting. The higher the "tE" number, the higher the mid-range torque will be without increasing horsepower at top rpm. Pressing the up green arrow increases the torque output of the engine by about 60 pound-feet per click, pressing the down arrow decreases output torque by 60 pound-feet per click. The POWER Level setting must be on "2" or higher before any extra torque is added.

ADJUSTABLE PROGRAM The program can be adjusted by pushing the gray button 2 times from the main screen. As shown in **Figure 19** it will show a "P" in the POWER screen, and in the TORQUE screen it will show either a "E" = economy, "1" = standard, "5" = late twin turbos, or "3" = early twin turbos. The twin turbos (twins) program fuels more at lower boost in order to help spool the turbo up faster. It is not just for twin turbos, but is for any bigger turbo. The standard program goes to full fueling at 32 psi boost. There are 2 versions of the twins program. The late "tt05" twins program for the 04-1/2 to 06 Dodge goes to full fueling at 24 psi boost, and the early "tt03" twins program for the 03 to 04 Dodge goes to full fueling at 12 psi boost. The 03 to 04 Dodge program will work on a 04-1/2 to 06 Dodge, but there may be excessive smoke. The Economy program "Econ" maximizes for fuel economy rather than for power. You will have to experiment to find the best Power and Torque Enhancement settings for you. Start with P=2 and TE=0 and try a few combinations up to P=3 and TE=3. Please do not call TST and ask which settings give the best fuel mileage, we don't know since all trucks and drivers are different. The example in **Figure 19** shows the program is set to "1" which is the standard program.

TURBO BOOST The next screen controls the turbo high boost before fueling cut back begins. This setting is designed to help save the stock turbo from over boost damage. We recommend a setting of 35 psi to effectively reduce exhaust temperature without destroying the turbo. At idle, no boost will be present. You only get boost pressure while accelerating or under a load. Normal driving at a steady speed, pressure will vary between 2 to 15 P.S.I. Under a load or accelerating, boost can go as high as 40 P.S.I. The default boost limit setting with the R37 is 35 psi and the value is not adjustable. The boost limit can be turn "OFF" by pushing the gray button twice from the main screen. As shown in **Figure 20** it will show a "b" in the POWER window and a "1" or "0" in the TORQUE window. "1" turns the boost limiting feature "ON" and "0" turns the boost limiting feature "OFF".



Figure 18



Figure 19



Figure 20

R49AP Remote Operation Instructions

The R49AP (Adjustable Program) will display exhaust temperature and turbo boost pressure. It also lets the user set the maximum power, the maximum torque, the maximum exhaust gas temperature, the maximum turbo boost pressure, the shut down exhaust gas temperature, the shut down idle time, control timing advance, and control which power program is selected (standard, twin turbos, or economy). If your unit has the rail pressure option, it will also display and control rail pressure.

POWER, EGT, BOOST The main default screen (see **Figure 22**) shows the current exhaust gas temperature (“587” F), the current turbo boost (“2” psi), and the current horsepower setting (Power Level “4”) of the PowerMaxCR. At the main screen the green arrows can be used to increase or decrease the maximum horsepower the engine can produce. The power display shows the currently selected power setting at 2900 engine rpm. Setting “0” is stock horsepower, setting “1” turns on the timing advance feature which reduces exhaust gas temperature, improves fuel economy, and adds about 35 extra horsepower at the wheels. Each additional setting adds about 20 more horsepower at the wheels. Towing on the higher power level setting is not recommended due to stress on the vehicles drive train. The power level can be changed any time the key is on (even under power) by pressing the green up or down arrow.

COOL DOWN If the gray button is pressed once from the main screen (when in either Set Cool Down mode or Auto Cool Down mode), the Cool Down display is shown like **Figure 23** below. With the engine running, turning the ignition key to “OFF” at this point starts the Cool Down cycle for the turbo. A “C” is displayed in the POWER level position on the remote to indicate the Cool Down program has been selected. The engine continues to run until either the exhaust gas temperature (“587” F in **Figure 2**) reaches the “Cool Down degrees” (280 F in the example) or the set idle time (“6.0” minutes in **Figure 23**) is achieved. If the gray button is pressed again while at the Cool Down screen, the engine immediately shuts off. See the Cool Down Mode description on the next page for more information on how the Set Cool Down mode and Auto Cool Down modes differ and how to select one or the other.

TORQUE ENHANCEMENT If the gray button is pressed a second time from the main screen, the “tE” or “torque Enhancement” setting is displayed. (Torque level “2” in **Figure 24**). The tE level is best described as an adjustment for adding additional torque in the lower rpm range (1200-1800). Again this is a “0” to “9” level setting similar to the Power Level setting. The higher the “tE” number, the higher the mid-range torque will be without increasing horsepower at top rpm. Pressing the up green arrow increases the torque output of the engine by about 60 pound-feet per click, pressing the down arrow decreases output torque by 60 pound-feet per click. The POWER Level setting must be on “2” or higher before any extra torque is added.

COOL DOWN TEMPERATURE Pressing the gray button a third time from the main screen brings up the “Cool Down degrees” screen “Cd”, shown as “280” in **Figure 25**. The green arrows can be used to move this temperature up or down in 10 degree increments. The default is 300 F. This function can be turned off by setting it to “OFF”.

COOL DOWN TIME Pressing the gray button a fourth time from the main screen brings up the “Cool Down time” screen “Ct”, shown as “6.0” in **Figure 26**. The green arrows can be used to move this idle time up or down in tenth of a minute increments. The default time is 4 minutes. This function can be turned off by setting it to “OFF”. From this screen, pressing the gray button again goes back to the main screen.



Figure 22



Figure 23



Figure 24



Figure 25



Figure 26

These are the most commonly used screens. However, the R49AP also has many more features in the Upper Level Control screens, which are described on the next 2 pages.

R49AP Remote Operation Instructions (continued)

UPPER LEVEL CONTROL SCREENS From the Cool Down screen, pressing the up green arrow button takes you to a set of screens to display and control rail pressure (optional), Cool Down mode, Electronic Boost Limit, EGT Cutback, Timing Advance, and the Adjustable Program (AP). Use the gray button (center button) to scroll through the screens.

RAIL PRESSURE GAUGE This screen is optional and will only display if you have the rail pressure option (only available for some **TST POWERMAXCR™** serial numbers 5000 and above). It will show “rP” (rail pressure) in the bottom left display and the top display will show the rail pressure in thousands. For example, see **Figure 27** which shows “15,500” P.S.I. From this screen the down arrow will go back to the main screen or the gray button will go to the next Upper Level Control screen, which is Rail Pressure Control.

RAIL PRESSURE CONTROL This screen is optional and will only display if you have the rail pressure option (only available for some **TST POWERMAXCR™** serial numbers 5000 and above). It will show “rP” (rail pressure) in the bottom left display, the bottom right display will show “L” (Level), and the top display will show the rail pressure increase, OFF (stock, no rail pressure increase), 1, 2, . . . up to 9 levels. For example, see **Figure 28** which shows “OFF”, and **Figure 29** which shows level “1”. On the Economy program only: the last level is rail pressure reduction, which shows “-9”. This is for when you need to reduce smoke. It reduces rail pressure to cut power about in half. On all other programs, level 9 is the maximum rail pressure increase. **On the tt05/tt03 programs: Warning, rail pressure levels 8 and 9 will exceed both the sensor and bypass valve limits and will most likely blow the bypass valve.** See page 11 for more details on setting the rail pressure level.

COOL DOWN MODE This screen adjusts the Cool Down mode, Set or Auto. The default is Auto mode. The up arrow will select Auto mode and the down arrow will select Set mode. When in Set mode, the top display will show “SEt”, the bottom left display will show “Cd” (cool down), and the bottom right display will show “S” (for Set). When in Auto mode, the top display will show “Auto”, the bottom left display will show “Cd” (cool down), and the bottom right display will show “A” (for Auto). See **Figure 30** which shows “SEt” mode, and **Figure 31** which shows “Auto” mode. When in Set mode, it will not go to the Cool Down screen unless you press the gray button one time from the main screen. It will not keep the engine running when the key is turned off unless it is at the Cool Down screen. When in Auto mode, it is not necessary to press the gray button to keep the engine running when the key is turned off, as long as the actual EGT has been above the Cool Down Temperature it will keep the engine running. If the key is turned off from the main screen, it will automatically start the timer (as long as the engine is idling), then after the truck idles for 1 minute (at 800 rpm or less) it will automatically switch to the Cool Down screen and continue the timer and the engine will keep running until either the EGT goes below the Cool Down Temperature or the timer goes to 0. If key is off and the EGT goes below the Cool Down Temperature, either while in the main screen or in the Cool Down screen, the engine will shut off. If the key is on and the truck idles for 1 minute, such as when sitting in traffic, then the R49 will automatically switch to the Cool Down screen, but as long as the key is on, the engine will not shut off if the EGT goes below the Cool Down Temperature or the timer times out. You can press the gray button 4 times and switch back to the main screen manually, or let it do it automatically when you start driving again (the R49 can sense when the engine is under load again). When the key is off and the R49 is at the Cool Down screen, you can shut the engine off at any time by pressing the gray button. Note: When the key is turned off from the main screen it will keep the engine running only if the actual EGT has been at least 25 degrees above the Cool Down Temperature for at least 15 seconds.

TURBO BOOST This controls the maximum turbo high boost “Hi b” before fueling cut back begins. For example, see **Figure 32** which shows the boost limit set to “36” P.S.I. This setting is designed to help save the stock turbo from over boost damage. We recommend a setting of 35 psi to effectively reduce exhaust temperature without destroying the turbo. At idle, no boost will be present. You only get boost pressure while accelerating or under a load. Normal driving at a steady speed, pressure will vary between 2 to 15 P.S.I. Under a load or accelerating, boost can go as high as 40 P.S.I. The default boost limit setting is 35 P.S.I. Use the arrows to raise or lower this setting. Setting below 35 turns off the boost limit, which is not recommended for a stock turbo. Setting this function to “OFF” may result in turbo damage. Turning this function “OFF” is only recommended for aftermarket turbos that have been approved for higher boost settings. Be aware that the **POWERMAXCR™** reads the boost value from the stock MAP sensor, which has a maximum of 40 P.S.I. When power is being decreased due to high boost, the 2 boost dots will begin to flash.

EGT CUTBACK This is the high exhaust gas temperature “Hi t” setting screen. For example, see **Figure 33** which shows the temperature set to “1350”. Pressing the up green arrow raises the maximum exhaust temperature, pressing the lower green arrow lowers the maximum exhaust gas temperature. The default is 1350 F, but the recommended maximum is 1400 F for the 555 or less torque engines and 1450 F for those engines greater than 555 torque. This function can be turned off by setting it to “OFF”. If the probe is installed after the turbo, exhaust temperature limit should be set at 1000 degrees. If the maximum exhaust temperature is exceeded while driving, the **POWERMAXCR™** will automatically decrease the additional power. Once a safe temperature is reached, the added power will be restored automatically. When power is being decreased due to high exhaust temperatures, the 4 exhaust gas temperature dots will begin to flash.



Figure 27



Figure 28



Figure 29



Figure 30



Figure 31



Figure 32



Figure 33

R49AP Remote Operation Instructions (continued)

UPPER LEVEL CONTROL SCREENS (continued)

ADJUSTABLE TIMING ADVANCE DEGREES This screen controls the Adjustable Timing Advance (ATA) degrees. The up arrow will increment the degrees in 3 degree increments and the down arrow decrement the degrees. To turn the Timing Advance to OFF, go down one click from 3 degrees. When in Auto mode, the top display will show the degrees limit, the bottom left display will show "Ad" (Advance), and the bottom right display will show "A" (Auto). When in Set mode, the top display will show the set degrees, the bottom left display will show "Ad" (Advance), and the bottom right display will show "S" (Set). For example, see **Figure 34** which shows "OFF" in Auto mode, and **Figure 35** which shows a timing advance limit of "12" degrees in Auto mode. Setting the timing advance degrees to "OFF" in either Auto mode or Set mode will turn off timing advance.

ADJUSTABLE TIMING ADVANCE MODE This screen controls the Adjustable Timing Advance (ATA) mode. The default is Auto mode with a limit of 12 degrees, which is the optimum for the **TST POWERMAXCR™** if not stacked with any other product. In Auto mode the timing advance varies from 0 to the set limit based on rpm and boost. With ATA in Auto mode, the user can adjust the timing advance limit in increments of 3 degrees up to 18 degrees or turn it to OFF (0 degrees). With ATA in Set mode, the timing advance is not based on rpm or boost, but will stay at the Set value selected by the user. In Set mode, the user can adjust the timing advance in increments of 3 degrees up to 18 degrees or turn it to OFF (0 degrees). Be aware that when in Set mode if the timing advance is changed too often it could confuse the Dodge ECM and set trouble codes, such as a P0336. The up arrow will select Auto mode and the down arrow will select Set mode. When in Auto mode, the top display will show "Auto", the bottom left display will show "Ad" (Advance), and the bottom right display will show "A" (for Auto). When in Set mode, the top display will show "Set", the bottom left display will show "Ad" (Advance), and the bottom right display will show "S" (for Set). For example, see **Figure 36** which shows timing advance in "Auto" mode, and **Figure 37** which shows timing advance in "Set" mode.

ADJUSTABLE PROGRAM This screen controls the Adjustable Program (AP). Use the up or down arrow to select the desired program: the Standard program "Stnd", the early twins "tt03", the late twins "tt05", or the Economy program "Econ" (for improved fuel mileage). For example, see **Figure 38** which shows "Stnd", **Figure 39** which shows "tt03", **Figure 40** which shows "tt05", and **Figure 41** which shows "Econ". The twin turbos (twins) program fuels more at lower boost in order to help spool the turbo up faster. It is not just for twin turbos, but is for any bigger turbo. The standard program goes to full fueling at 32 psi boost. There are 2 versions of the twins program. The late "tt05" twins program for the 04-1/2 to 06 Dodge goes to full fueling at 24 psi boost, and the early "tt03" twins program for the 03 to 04 Dodge goes to full fueling at 12 psi boost. The 03 to 04 Dodge twins program will work on a 04-1/2 to 06 Dodge, but there may be excessive smoke. The Economy program "Econ" maximizes for fuel economy rather than for power. You will have to experiment to find the best Power and Torque Enhancement settings for you. Start with P=2 and TE=0 and try a few combinations up to P=3 and TE=3. Please do not call TST and ask which settings give the best fuel mileage, we don't know since all trucks and drivers are different.

DONE From this screen the down arrow will go back to the main screen or the gray button will loop back to the beginning of the Upper Level Control screens. For example, See **Figure 42**.



Figure 34



Figure 35



Figure 36



Figure 37



Figure 38



Figure 39



Figure 40



Figure 41



Figure 42

REMOTE CONTROL SETTINGS

1. The PowerMax has 9 different power levels that can be adjusted while driving without stopping the vehicle. Torque Enhancement (tE) is a 0 to 9 adjustable setting that allows additional torque in the lower rpm ranges on top of the torque already being added by the **POWERMAXCR™**. To adjust this setting, use the green up and down arrows to the desired number. **Note:** The higher the tE is set, the higher the stress on clutches, transmissions, and drive train.

SUGGESTED SETTINGS

- Power Level **0-3** Good for empty trucks and when towing heavier loads.
tE Level **0-3** Use this as the highest setting for stock 47RE and 48RE automatic.
- Power Level **4** Good for empty trucks and when towing lighter loads.
tE Level **4** Use this as the highest setting for stock 5 spd manual clutch.
- Power Level **5** Good for when you really want a big increase in power. Not recommended for
tE Level **5** for towing applications due to stress on the drivetrain. Use this as the highest setting for stock 6 speed manual clutch.
- Power Level **6-9** Exhaust temperatures will be extreme. Aftermarket clutches
tE Level **6-9** required for manuals and valve body and torque converter upgrades for automatics.
Fuel pressure monitoring suggested and auxiliary pusher pump likely required.

A good rule of thumb to go by is to keep the sum of the power level and the torque enhancement level, under a total of **6** when towing. For example; if the power level setting is on **4** the tE level should be set no higher than level **2**, which equals a total of **6**. These are only suggested setting. Driver ability, road conditions, and amount of weight should all be a factor when choosing a power level.

2. The PowerMax with the R49AP has 9 different rail pressure levels that can be adjusted while driving without stopping the vehicle. Level 0 is OFF (stock, no rail pressure increase). Levels 1 through 9 will increase the rail pressure on the Standard and tt05/tt03 programs. Level 9 on the Standard program will raise the rail pressure (it will about double it at lower RPM) to try to keep it near the maximum stock pressure (about 23k psi). Keep in mind that the stock CP3 pump will not keep up the needed volume if the Rail Pressure, Power, and/or Torque Enhancement are turned up too high. **On the tt05/tt03 programs, level 9 will much more than double the rail pressure under some conditions: Warning, rail pressure levels 8 and 9 will exceed both the sensor and bypass valve limits and will most likely blow the bypass valve.** The tt05/tt03 programs, rail pressure levels 8 and 9 are intended for engines with modified CP3 pumps and modified rail pressure bypass valves. On the Economy program only: the last level is rail pressure reduction, which shows “-9” (levels 0-8 are the same as the Standard program). Level “-9” is for when you need to reduce smoke (to help compensate for oversized injectors, etc). It reduces rail pressure to cut power about in half. You will have to experiment to find the best Power, Torque Enhancement, and Rail Pressure settings for you. Start low and work your way up to see which combination gives you the best performance. Please do not call TST and ask which settings give the best performance, we don't know since all trucks and drivers are different.

WARRANTY AND DISCLAIMER

TST PRODUCTS INC. WARRANTS THAT ITS PRODUCT WILL BE FREE OF FUNCTIONAL DEFECTS AND WILL PROVIDE THE ADVERTISED POWER INCREASE FOR TWO YEARS, PROVIDED THEY ARE USED IN ENGINES THAT ARE IN MECHANICALLY GOOD CONDITION. TST HIGHLY RECOMMENDS THE USE OF BOOST AND PYROMETER GAUGES WHEN INCREASING ENGINE POWER.

TST DOES NOT WARRANT THE ENGINE, DRIVETRAIN OR BALANCE OF THE VEHICLE IN ANY WAY. TST SHALL NOT BE RESPONSIBLE FOR ANY MISUSE OR UNSAFE ACTS PERFORMED BY CUSTOMER, WHETHER DIRECTLY OR INDIRECTLY RESULTING FROM THE INCREASE IN ENGINE POWER.

CAUTION: THE INCREASE IN ENGINE POWER MAY EXCEED THE CAPABILITY OF THE STOCK TRANSMISSION, CLUTCH AND/OR OTHER PARTS IN THE VEHICLE DRIVE TRAIN. THE ORIGINAL VEHICLE MANUFACTURER MAY VOID ITS WARRANTY ON THE ENGINE AND/OR DRIVETRAIN WHEN STOCK POWER IS ALTERED.

WARNING: WHILE THE ADDITIONAL POWER WILL MAKE IT POSSIBLE TO CLIMB HILLS AND PULL GREATER LOADS FASTER, IT DOES NOT IN ANY WAY IMPROVE OR AFFECT BRAKING ABILITY. USE EXTREME CAUTION WHEN PULLING HEAVY LOADS AND/OR TOPPING HILLS AT HIGH SPEEDS

Before contacting TST tech support, have the PMCR serial number available. This information is needed for us to identify the software and hardware on your units.

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812-342-6741, then press 3 for tech support. Make sure you have the POWERMAXCR™ serial number available. Do not use the product information and sales line for tech support.

PMCR Bypass Connector

The PMCR Bypass Connector (see Figure 43) can be used in place of the **POWERMAXCR™** computer to allow the truck to run in stock form without removing the harnesses. Use it if you need to send your PowerMaxCR computer back to TST for a program update/change, or replacement in the event of a failure. You can also use it to troubleshoot. If the truck runs normally with the Bypass Connector in place of the PowerMaxCR computer, then the harnesses are probably OK.

NOTE: Boost fooling is NOT done when the bypass is used, thus you may get overboost fault codes if you have turned up boost using a boost elbow or other method.



Figure 43

TROUBLESHOOTING THE **POWERMAXCR™**

PowerMaxCR for 2003 - 2006 5.9L Cummins Common Rail Engines:

Remote does not light and/or engine will not start.

Check that both the PMCR 12 volt source wires are hooked to the correct fuses in the Fuse and Relay Center. Make sure the fuses are not blown.

What does "bt" mean on the R47?

Box Temperature, which is the temperature of the PMCR under hood module. Not used on newer models.

NOTE: Engines codes can be read in the odometer by turning ignition key to the run position 3 times in a row and leave in the run position, do not start engine. Not all codes set a MIL or Check Engine Light. The check engine light will normally go out in a few restarts if the fault is cured, however the code will still be present. The codes can only be cleared by a OBDII scan tool.

Crankshaft Position Sensor code P0336.

It is not unusual to get this code, however the sensor is usually okay. This fault tends to occur most often around 1100 RPM under extreme load. It may not mean there is actually a performance problem and it can be ignored if the engine runs and pulls smoothly. If engine runs very poorly or won't start, check to insure that connectors are plugged in correctly at the crank sensor and at the PMCR module. Check for broken wires in the PMCR and stock timing harness.

Camshaft Position Sensor code P0341

If engine runs very poorly or won't start, check to insure that connectors are plugged in correctly at the cam sensor and at the PMCR module. Check for broken wires in the PMCR and stock timing harness.

Crank/Cam codes, such as P0016 and/or P0341.

Check if there is an after market auto start system on the truck, such as a Python Alarm with Auto Start from Directed Electronics. If so, disconnect the wire that is connected to the Cam/Crank sensor, ECM pin 24, K44 18DB/GY = CMP SIGNAL.

PCM Processor code P0606

It is not unusual to get this code. This fault normally has no affect on the way the vehicle runs. It does not mean there is actually a problem and it can be ignored. We are working on a fix and will post a message on the web site when we have a fix.

AC clutch code P0647

When the PowerMax is turned on, the AC shuts off/quits working. Move the PMCR module ground from the battery terminal to inside the cab under the dash where there is a good ground. This happens often when a FASS or other auxiliary fuel pump is added.

Fuel Injector code P2146 or P2149

If a constant miss or extremely rough running, insure that the injector harness is plugged in at the PMCR and at the injector plugs. Check for a broken diode or broken wire in the harness going to the injectors.

Engine Misses under moderate load with PMCR

If on setting 5/5 or less, check lift pump fuel pressure at idle, should be 8-12 psi. Check fuel pressure at wide open throttle, if it goes below 5 psi engine can miss due to lack of fuel, not an electrical problem. If pressure is low the solution is to use an aftermarket lift pump like FASS or equivalent.

Engine Misses under hard load with PMCR

If on setting 6/6 or higher, even lower setting if stacking with other fueling boxes or bigger injectors, check lift pump pressure. If below 8 psi, install an aftermarket lift pump like FASS or equivalent. If lift pump pressure is okay, check rail pressure using a DRB scan tool or other tool designed to check high rail pressure. If rail pressure is below the requested rail, i.e. less than 23,000 psi then either the rail pump is out of capacity or the rail pressure relief valve is defective.

How to take the PMCR out of the system to get back to stock for testing.

If you have the By-Pass Connector shown in Figure 43, try it first. If you don't have one or the truck still won't run, disconnect the Cam, Crank, and MAP sensors and reconnect factory connectors. Also reconnect original turbo wastegate fittings or you may get P0234 Engine Over Boost code because the PMCR module is no longer clamping the boost signal going back to the OEM (factory) ECM.