

These instructions apply to the installation of all Western Diesel TurboGauges. Western Diesel TurboGauges are accurate and responsive, and when installed properly, will provide the diesel truck owner with accurate tools to assist them in managing their power-train, and to help them protect their truck's engine when increasing power.

The first section will cover installation instructions common to all diesel trucks, such as, recommended routing of the wires, and installing the gauge mount. The steps which apply to each specific type of truck, such as where to install the gauge sending units, will follow.

*****DO NOT INSTALL "A" PILLAR GAUGES IN ANY TRUCK EQUIPPED WITH SIDE AIR BAG CURTAINS.*****

Western Diesel urges all truck owners to wear eye protection while using power tools.

Recommended Supplies:

Listed are tools that we found helpful, you may find other tools more beneficial, necessary for your specific application.

Screwdriver	5/32" drill bit	12' 16-14 AWG braided RED wire
Wire cutters	7/16" drill bit	12' 16-14 AWG braided BLACK wire
Wire strippers	3/8" drill bit	At least one dozen 16-14 AWG butt connectors
Wire crimpers	Exacto knife (or similar)	At least one dozen 16-14 AWG disconnect terminals or spade connectors. (one dozen male and one dozen female)
Dozen zip-ties	Sandpaper (Fine)	
Drill	10' 16-14 AWG braided wire (a color other than red or black is recommended)	

Pillar Mount Installation

The Western Diesel Pillar Mount installs *OVER* the existing factory "A" Pillar trim-piece.

It will be necessary to remove the factory "A" Pillar trim-piece from the truck, so that you can attach the Western Diesel Pillar Mount to it.

If your truck is equipped with factory hand-straps, you will have to permanently remove them from the drivers' side "A" Pillar in order to mount the gauges. Western Diesel's passenger side "A" Pillar Mount's, are designed to accommodate the factory hand-straps.

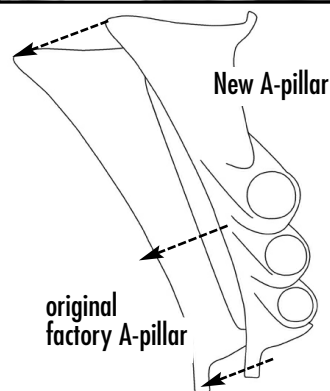
Remove the rubber moulding from around the drivers' side door insulation. It is only necessary to remove the rubber moulding from the area nearest the "A" pillar.

Remove the "A" Pillar trim-piece by starting at the top, and gently pulling back, and to the right. When you find the top spring-clip, use a flat-blade screw driver to press in on the clip, to get it to release. Use the same procedure with the remaining spring-clips. Once the trim piece is free of the all spring-clips, tip the top toward the steering wheel, and lift straight up. You may have to use a little force here, but *be careful not to apply so much pressure that you break the trim-piece*.

Once the factory trim-piece is out of the truck, place the new Western Diesel Pillar Mount over the factory piece, and inspect for any necessary trimming. The gauges are "press fit" into the mount, so the fit should be snug, but the gauges should recess completely in the holes. Carefully increase the hole size with fine grit sandpaper, to ensure a snug fit. Removing too much material will cause the gauges to fit poorly.

Now is the time to paint your new Western Diesel Pillar Mount to match your truck's interior, if you so desire. Matching interior trim paint can often be purchased in spray cans from the Parts Department of your truck's manufacturer, and at automotive paint supply stores.

When the paint is completely dry, it's time to get out your drill, and drill bits. A second pair of hands is helpful at this time. Place the new Western Diesel Pillar Mount over the factory "A" Pillar trim-piece again. Holding them firmly together, drill a small pilot hole, then a larger 5/32" hole near each of the four corners of the Pillar Mount and the trim-piece. If you are careful, you can get the holes close enough to the left edge so that when you're finished, the rubber door trim will hide the pushpins that hold the trim-pieces together. For a tighter, more permanent fit, you may want to use pop-rivets, rather than the included pushpins.



Next, you will drill from the side of the factory trim piece that faced, or was against the pillar. As before, drill a small pilot hole, then a larger 3/8" hole through the factory trim piece, directly behind the mounting hole where each gauge will reside in the Western Diesel Pillar Mount. This is for routing the wires from the back of the gauges.

BEFORE YOU DRILL, make certain you DO NOT drill through the new Western Diesel Pillar Mount, but ONLY through the factory trim piece. Set the mount aside when finished.

Before you re-insert the gauges into the mount, you will attach the necessary wires to the backs of the gauges. You will need a clean, well-lit area and a few tools and supplies: Wire cutters, wire strippers, wire crimpers; butt-connectors, spade connectors, and about 12' (twelve feet) each of two different colors (preferably red and black) of braided copper wire (16-14 AWG gauge).

We recommend using one color of wire, preferably red, for the positive, or hot connections, and another color, preferably black, for the negative, or ground connections. Keep in mind that you are wiring a parallel circuit for the hot wires, and a separate parallel circuit for the ground wires, so that all electrical points in each circuit are the same. The only exception will be the "B" spade on the back of the Trans Temp gauge. It will have to be attached separately, and will be the only connection in it's own circuit.

***We are proceeding on the presumption that you have a basic knowledge of electrical wiring. If you are not familiar with how to strip, twist, and crimp wires, PLEASE SEEK ASSISTANCE.*

Make the following connections on the backs of the gauges:

Our suggestion is to begin at the top-most gauge in the mount, or the Pyro (EGT) gauge. Cut an 18" length of each color wire, and using butt-connectors, extend the length of each of the wires coming from the gauge. If both gauge bulb wires are black, then polarity doesn't matter. Extend one of the bulb wires with a black wire, and the other with a red wire.

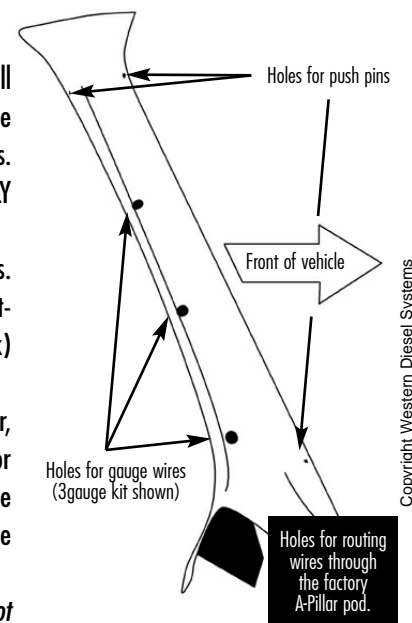
Next, with a 15" piece of each color wire, follow the same procedure for the next lower gauge in the Mount. We shall assume this is the Boost Pressure gauge. If the wires from the two bulbs are not already crimped together, then join the red wires together in one end of a butt-connector, and the two black wires together in a separate butt connector, so that you extend only one wire of each color.

The Trans Temp gauge is last. Crimp a female spade connector onto a 12" piece of black wire. Slip the female spade connector with the black wire over the male ground spade connector on the back of the Trans Temp gauge. The male ground spade is the lower-most on the back of the gauge. It has a ground symbol stamped to the lower right of the spade connector. Next, crimp another 12" piece of black wire to the black wire coming from the gauge bulb to extend it.

Now, crimp a female spade connector onto a 4' length of red wire. This is the only connection which will not be tied to the others on the fuse panel. Slip the spade connector with the 4' length of red wire over the male "B" spade connector on the back of the Trans Temp gauge.

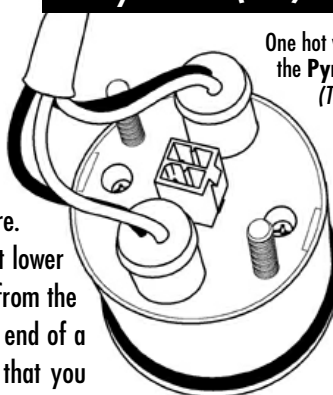
What you should now have is about 18" each of red and black wires on the back of the Pyro (EGT) gauge; about 15" each of red and black wires on the back of the Boost Pressure gauge; two 12" pieces of black wire on the back of the Trans Temp gauge; one 12" piece of red wire, and about a 4' length of red wire on the back of the Trans Temp gauge (4 red and 4 black, total). NOTE: You will want some slack on the back of the gauge wires in the future if you need to pull a gauge up and out of the Mount to change a gauge bulb.

Next you will re-insert each gauge back in it's respective hole being careful not to scratch the painted surfaces. Push the red and black wire from each gauge, through the respective 3/8" hole in factory pod. Crimp the 12", 15", and 18" pieces of red wire together in one end of a butt connector. Do NOT include the 4' length of red wire. In the other end of that same butt connector, crimp the remaining length of red wire. If you started with 12' of wire, you will have about 4' left to attach here. Repeat the procedure with the black wires. There should now be two 4' lengths of red wire, and about an 8' length of black wire to run to the fuse panel.



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Pyrometer (EGT)

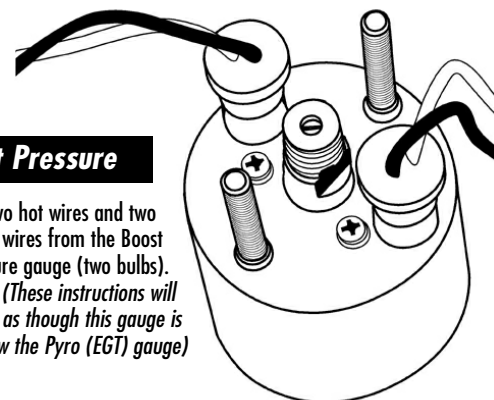


One hot wire and one ground wire from the Pyro (EGT) gauge (for the bulb). (These instructions will proceed as though this gauge is the top-most in the Mount)

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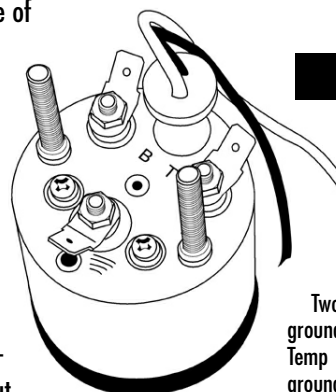
Boost Pressure

Two hot wires and two ground wires from the Boost Pressure gauge (two bulbs). (These instructions will proceed as though this gauge is below the Pyro (EGT) gauge)



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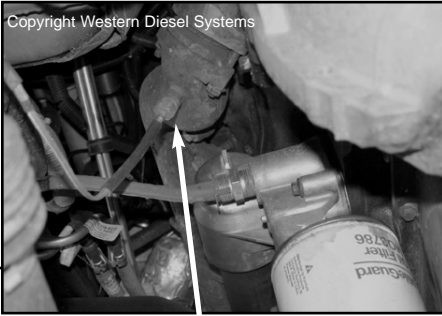
Transmission Temp



Two hot wires and two ground wires from the Trans Temp gauge (one hot and one ground for the bulb; one hot and one ground for the gauge).

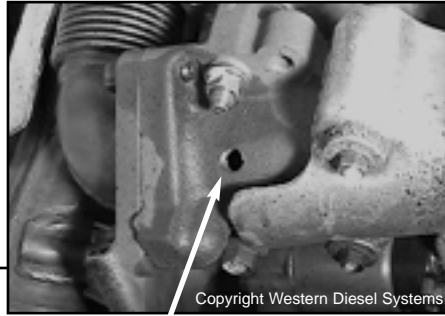
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Installation of the Exhaust Temperature Sending Unit



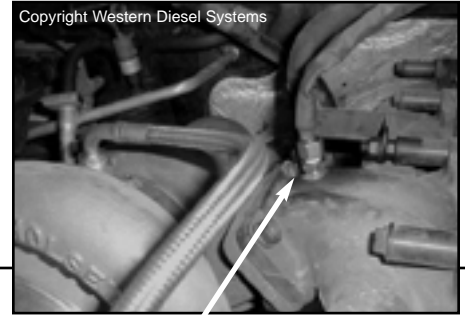
Powerstroke

The drilling location for the sending unit in the Ford Powerstroke is best accessed from beneath the engine on the driver's side of the truck, behind the front wheel. You will be lying on your back, and drilling up into the exhaust manifold, so we advise you to PLEASE wear eye protection. (Photo taken looking toward front of the truck)



Duramax

Access to the exhaust manifold on the Duramax is through the passenger side wheel-well. The plastic wheel-well liner is quickly removed by first removing the plastic snaps around it's perimeter. There are also two plastic "ratchet fasteners" that attach a wiring loom to the inside of the wheel-well liner, and another ratchet fastener holds the plastic wheel-well to the airbox frame. Use a hair dryer to soften the plastic ratchet fasteners, then push/pull them out. You will need to re-use the ratchet fasteners, so be careful not to damage them.



Cummins

Remove the turbo from the exhaust manifold. To prevent drill shavings from entering the manifold, stuff a small shop towel or rag about 4" into the rear exhaust manifold passage (pic) through the turbocharger mounting flange. Drill through the exhaust manifold, into the rear manifold passage, and follow the drilling and tapping instructions below. Next, remove the shop towel or rag, and use a shop-vacuum to remove any small drill shavings that may remain in the exhaust manifold. Replace the turbo on the exhaust manifold.

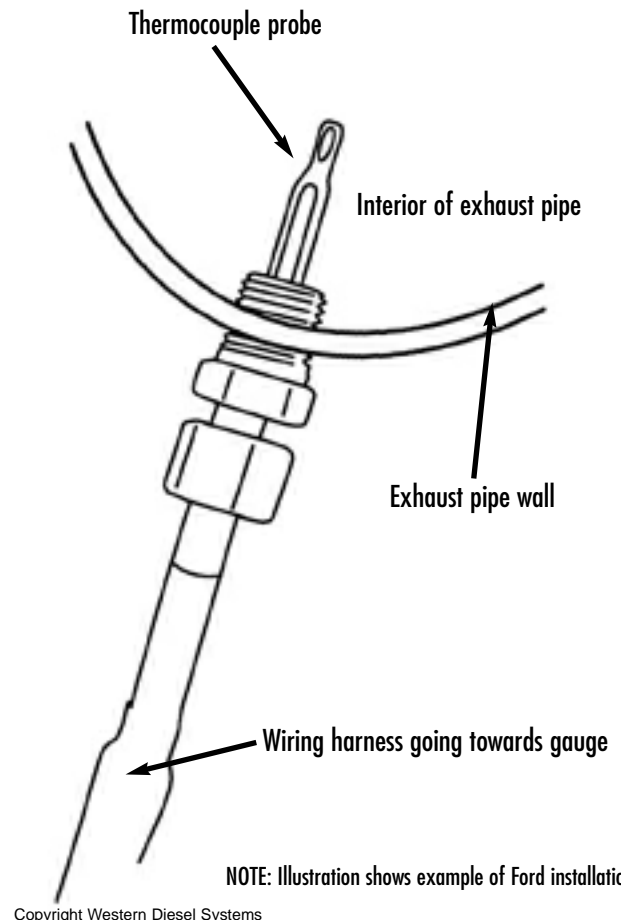
Next, follow the drilling and tapping instructions below.

We will begin with the installation of the Pyrometer, or Exhaust Gas Temperature (EGT) sending units. The Western Diesel Pyrometer thermocouple, or probe, is designed of a hybrid Inconel alloy, and is highly responsive and accurate. The threads are designed to fit a 1/4" NPT (National Pipe Thread) standard pipe tap. Correct drill bit size will be 7/16" for the 1/4"NPT and 21/64" for the 1/8"NPT. This should be confirmed by the information provided with the tap. We recommend you begin with a smaller drill bit then work your way up to the final size. Remember to keep the drill motor perpendicular to the exhaust manifold when drilling.

When the hole is finished, place a small mechanic's magnet up through the hole to attract any small metal fragments. Continue to re-insert the magnet through the hole, and rotate it around until you can remove it with no more drill fragments attached to it. NOTE: Any small shavings left behind will simply blow past the turbo at startup.

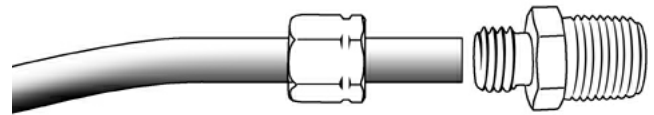
Next, tap the hole, remember to check the thread depth periodically by removing the tap, and threading the probe into the tapped hole. After you have the base-fitting tightened into the manifold, push the probe into the manifold and tighten the ferrule nut.

The heat-resistant wires of the sending unit should be kept away from direct contact with engine components, and away from any moving parts. We recommend Zip-ties as you thread it toward the driver's side of the truck, and up toward the steering column boot, where it can pass through the firewall in a number of places.

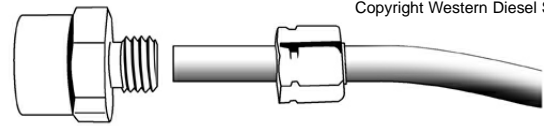


Installation of the Boost Pressure gauge

The idea of the Boost Pressure gauge is to measure the pressure between the compressor outlet of the turbo, and the intake manifold. Each make of truck requires very different methods to acquire this reading. Read the instructions below very carefully before beginning this step. The boost tube must maintain integrity from the sending barb to the gauge. There must not be any kinks, bends, or holes in the tube, as it is measuring air pressure.

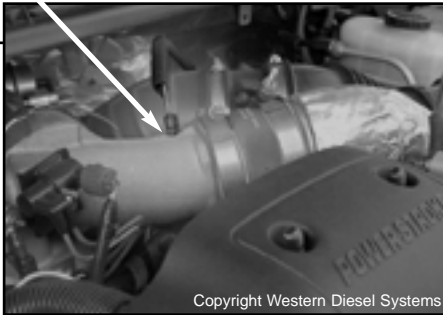


Connects to sender location



Connects to back of Boost Gauge

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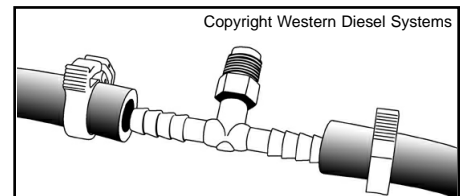
Powerstroke

You will have to drill and tap the aluminum intake air-horn to accept the brass 1/8" NPT barb supplied with the kit. Remember that aluminum is not magnetic, so the method you used to remove drill shavings from the exhaust manifold won't work here.

Loosen the hose clamp, and remove the connector hose that runs from the upper air intake, to the intake manifold. Push the air intake tube aside so that you can stuff a clean shop rag into the intake of the turbocharger air horn, deeper than the location that you intend to drill. Keeping the drill motor vertical will probably mean that you will want to be on top of the engine to drill in the air horn, and tap for the 1/8" NPT threads. Drill and tap.

When the brass barb is screwed snugly into the intake air-horn, remove the clean shop rag slowly from the intake of the turbocharger air horn, taking care not to drop any drill shavings. Use a shop-vac to suction out any remaining drill shavings, and re-attach the air intake connector hose. Attach the boost tube fitting onto the brass barb in the intake air horn. There is a diamond shaped knockout plug in the firewall above the steering column where the boost tube will pass through the firewall, so you can begin routing it that direction. You will have to zip-tie it to other wire bundles near the firewall, keeping it away from moving parts, and heat generating surfaces.

In '94-'97 Ford Powerstroke trucks, you will NOT drill and tap, but rather use a supplied "T" fitting. Find the 1/4" ID (Inside Diameter) rubber pressure line leading from the passenger side of the turbocharger, to the MAP sensor, located on the passenger side firewall of the truck. Splice the pressure line, and install the "T" fitting. Tighten the supplied plastic hose clamps, and install the boost tube fitting, and follow the routing steps described above.

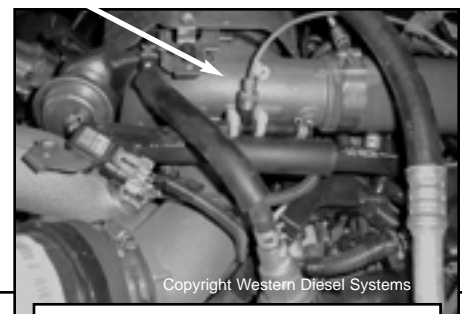


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Use supplied "T" fitting for
94-97 Powerstrokes and
all **Duramax** applications

Duramax

In GM Duramax trucks, you will utilize a supplied "T" fitting and hardware. Splice into the 1/4" ID (Inside Diameter) rubber pressure line that is part of the Duramax turbo waste-gate actuator. Insert the "T" fitting, and tighten the supplied plastic hose clamps. Install the boost tube fitting, and begin routing the tube toward the driver's side of the truck, where it will pass through the firewall in the steering column boot. You will have to zip-tie it to other wire bundles near the firewall, keeping it away from moving parts, and heat generating surfaces.



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Cummins

The easiest way to install a boost tube on a Dodge 24V Cummins engine, is to first acquire the necessary reducer fittings. Next, locate the 3/4" NPT pipe plug in the intake manifold located on the side of the engine, between the fuel filter, and the firewall. The 3/4" NPT plug has a 1/2" square in the center of it, and can be removed easily with a 1/2" drive ratchet, and an extension. Replace the 3/4" NPT plug with the

reducer fittings. Now, the 1/8" NPT fittings that came with the Western Diesel boost gauge kit will fit, and allow the tubing to be run from the intake manifold, to the boost gauge. Install the boost tube fitting, and begin routing the tube toward the driver's side of the truck, where it will pass through the firewall in the steering column boot. You will have to zip-tie it to other wire bundles near the firewall, keeping it away from heat and moving parts.

DODGE: Step down adapters are necessary to match the factory port to our fitting. Below are the NAPA part numbers for these two fittings. (or use an equivalent)

#3220x6x4 1/4 to 3/8

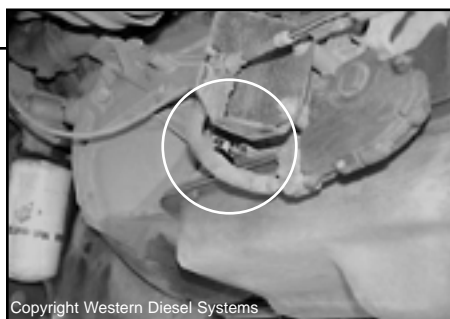
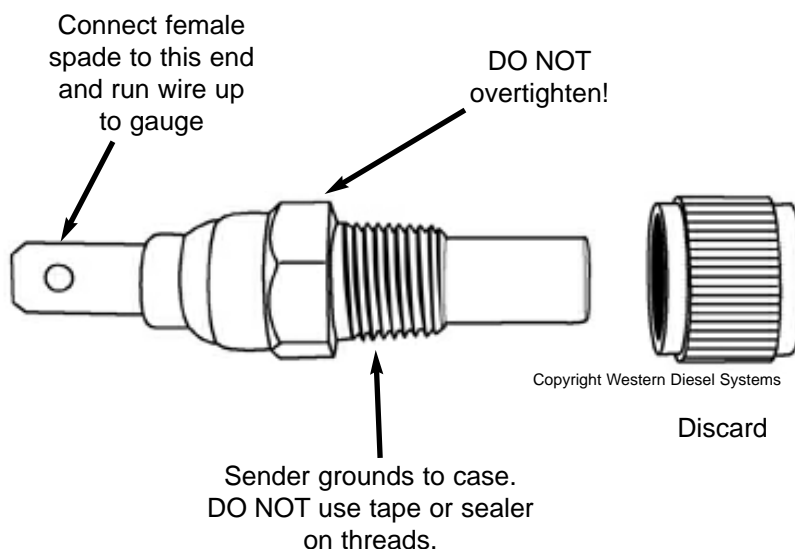
#C3109x12x6 3/8 to 3/4

Installation of the Trans Temp gauge

If you have a truck with a manual transmission you do not need to be concerned with this section.

The Trans Temp sending unit is designed for NPT 1/4" X 27 threads.

If your kit includes only the sending unit with no wire, you will have to acquire about ten feet of 16-14 AWG gauge wire to go from the Trans Temp sending unit, to the Trans Temp gauge. Preferably a color other than red or black. If only red or black is available then tape the ends to distinguish from light circuit wires. Crimp a female spade connector onto one end of the 10' piece of wire, because the Trans Temp sending unit has a male spade connector on it. You will join them together after the sending unit is installed.



Powerstroke

The Trans Temp sending location for the Ford Powerstroke trucks is on the driver's side of the transmission case, just above the pan flange, and just ahead of where the transmission wiring harness exits the transmission. Remove the existing transmission plug in this location. A small amount of Transmission fluid may run out of the pan when you remove the plug, but you can control it with your finger while you replace the plug with the Trans Temp sending unit. DO NOT OVERTIGHTEN.

Now, using the wire that you prepared earlier, slip the female spade connector, which is on the end of the wire, over the male spade connector, which is on the Trans Temp sending unit. Route the wire with the transmission wiring harness up the fire-wall, being careful to zip-tie it away from moving parts, and sources of heat. It will pass through the firewall with the Boost Pressure gauge tube, and the Pyrometer (EGT) gauge sending wire, at the diamond shaped knockout plug above the steering column.

Cummins (Duramax if applicable)

If you own a GM Duramax, or a Dodge 24V Cummins truck, you will have to drill and tap for this sender. A tranny pan is available from Western Diesel which is already equipped with a sender location.

If you choose to drill and tap. Drain fluid and remove transmission pan from the truck. You will need to replace the pan gasket and the transmission fluid filter.

Carefully inspect the relationship of the transmission pan to the transmission before drilling and tapping, to find a location where the Trans Temp sending unit will not interfere or contact with the internal parts of the transmission. When you're sure you have an acceptable location, drill and tap the transmission pan for a 1/4" X 27 NPT threads. In some cases the transmission pan wall may be too thin to tap effectively. In which case a boss may have to be welded onto the pan and then tapped for the sender. Another option is to order a Western Diesel larger capacity pan which is already equipped with the boss. In either case, remember that the pan is aluminum, so don't over-tighten the sending unit.

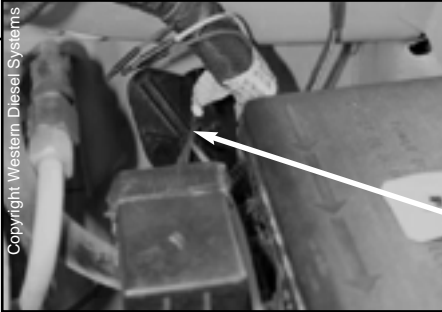
Replace the transmission fluid filter and the pan gasket, and reinstall the pan. Fill the pan with the proper amount of your preferred transmission fluid, refer to owner's manual. Check for leaks.

Now, using the wire that you prepared earlier, slip the female spade connector, over the male spade connector, which is on the Trans Temp sending unit. Route the wire with the transmission wiring harness up the firewall, being careful to zip-tie it away from moving parts, and sources of heat. It will pass through the firewall with the Boost Pressure gauge tube, and the Pyrometer (EGT) gauge sending wire.



Connecting the Gauges

Now that you have installed all the necessary sending units, it's time to make your final connections. First, you have to get the boost pressure tube, and the wires from the pyrometer and transmission sending units.



Powerstroke

On the Ford, there are several places to pass wires through the firewall. We recommend a diamond shaped knockout plug above the steering column. You can pry it out with a flat-blade screw driver, or drill a 3/8" hole in it's center to pass the tube and wires through. After you pry it out, push gently from the engine compartment into the cab through the hole, and dislodge a small piece of insulation

on the inside of the cab, which covers the hole. On Ford's with manual transmissions, the hydraulic clutch cylinder is located where the diamond shaped knockout plug is, so you will have to select another place to pass through the firewall. Such as the steering column boot.



Cummins/Duramax

For these trucks, the boot around the steering column seems to be the best place to get from the engine compartment into the cab. If you use an ice-pick, or a sharp screw driver, the rubber boot will re-seal around the boost tube and wires after they're passed through. A helper would be useful here, because you may have to hold the hole open slightly with a tool, while you feed the boost tube and wires through the hole in the steering column boot. It is crucial that the boost tube not become pinched or bound, so having another hand inside the cab to pull gently on the tube and wires as you feed them through, makes the task go much smoother.

Pull all the slack into the cab, leaving only what is necessary to reach each sending unit inside the engine compartment. We recommend zip-tying the tube and wires on both sides of the firewall, so that they don't get pulled either way. Aside from that, the remainder of the installation will take place inside the cab.

The boost tube and wires from the sending units will have to run up the "A" Pillar from where they passed through the firewall. The red and black wires from the gauges will have to run down the "A" Pillar to the fuse panel.

First, drop the two red and one black wires from the gauges down the "A" Pillar in the left front corner of the dash, so they come out beneath the dash. When this is done, use red or black wire as "fishing line" to pull the boost tube and wires from the sending units up to the top of the dash, where you will attach them to the gauges. NOTE: You can tape the tube and sending unit wires to the red and black wires with a wrap of electrical tape, then pull them carefully up the "A" pillar at the corner of the dash. Once above the dash, remove the tape, and lower the red and black wires back down in the corner.

Now you are ready to make the connections at the gauges.

Start with the Pyrometer (EGT) gauge. You may want to pull the gauge up and out of the Mount to have easier access to the back of the gauge. Push the brown Pyro wire through the hole you drilled earlier in the factory trim piece at the back of the gauge, and make the connection to the gauge. Now, press the gauge back into the Mount.

Next, push the boost tube through the hole behind the Boost Pressure gauge. You will definitely want the gauge out of the Mount to attach the boost tube to the back. Make sure there are no binds or kinks as you press the gauge back into the mount.



Duramax Wires, tube and thermocouple lines ready to be connected to gauges.



Cummins Wires, tube and thermocouple lines ready to be connected to gauges.

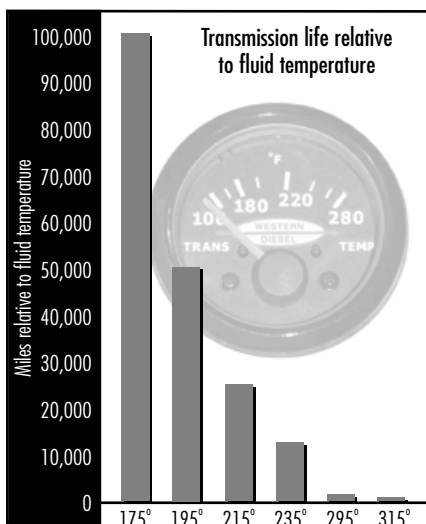
Finally, repeat the process for the Trans Temp gauge. You will want to leave yourself enough slack on the wire to get to the gauge, and cut off the remainder. Crimp a female spade connector onto this end of the wire. The correct terminal is marked "T". Join the spade connectors together.

Now, you're ready to wire-up the gauge lights. Remove the fuse panel cover. It is located under the steering column in the Ford's; on the left, or driver's end of the dash on the GM's. On the Dodge's, you'll find your power source in a large blue wire beneath the steering column.

On the Ford, look to the right of the steering column, and you will see a brown 6-wire connector. The top center wire in that connector is a light blue wire with a red tracer. This is the wire you want to tap for the gauge lights, because it is controlled by the dimmer switch. If your truck is a 2002, the connector may be grey instead of brown, and the wire may be yellow, but regardless of color, it is always the top center wire in that connector. Attach a T-Tap connector to that wire, and crimp a male spade connector to the red wire coming from the gauges. Insert the spade connector into the T-Tap. Crimp a loop connector onto the black wire coming from the gauges. Remove one of the chassis ground screws from under the dash, and add the black wire to the other loop connectors on the post. Re-insert the screw through the loop connectors, and tighten. For the "B" connection from the Trans Temp gauge, you will need to insert the other red wire in any fused, keyed 12V source. Do NOT attach it to where you connected the other red wire, or the Trans Temp gauge will only work when the trucks lights are turned on.

On the GM, find the fuse marked "ILLUM". This is the dash panel illumination lamp fuse, and it dims with the dimmer switch. Remove the stock fuse, and replace it with a fuse tap of equal value, with the tap circuit to the right. Attach the red wire from the gauges to the fuse tap. Crimp a loop connector onto the black wire coming from the gauges. Remove one of the chassis ground screws from under the dash, and add the black wire to the other loop connectors on the post. Re-insert the screw through the loop connectors, and tighten. For the "B" connection from the Trans Temp gauge, you will need to insert the other red wire in any fused, keyed 12V source. Do NOT attach it to where you connected the other red wire, or the Trans Temp gauge will only work when the trucks lights are turned on.

Now, your gauge installation is finished. Re-attach the Western Diesel Pillar Mount to the truck's "A" Pillar by reversing the removal procedure, and re-inserting the Mount under the spring clips. Be careful not to pinch the boost tube or wires, particularly in the corner of the dash where you will have to push the Mount down into the recess. Re-install your truck's rubber door trim, and you're ready for a road test. Enjoy your new gauges!



Temperature Recommendations

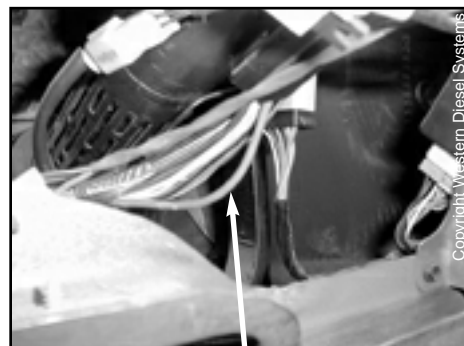
Pyro: Exhaust temperatures (EGT) will vary based on a number of factors. The more fuel, the higher the temperature.



This also means that it's manageable as well. In order to lower EGT, simply back out of the fuel. To keep from damaging the turbo in your vehicle, It is recommended that you keep the EGT below that of redline.



Ford Wires, tube and thermocouple lines ready to be connected to gauges.



Dodge Suggested power source. Large blue wire beneath steering column.



Dodge Completed installation.



Ford Completed installation.



Duramax Completed installation.