MerkMeter™ Installation Instructions: XR4Ti

Please read through these instructions completely once before proceeding. Although they may appear lengthy, we have just tried to be thorough and not assume any previous experience on the part of the installer. Installation is actually very simple and should easily take less than an hour. If more detailed information is required, please refer to our web site at www.bitsprings.com/af_main.htm or contact us via email at afhelp@bitsprings.com.

CAUTION: Although the MerkMeter has not been shown in practice to be sensitive to damage caused by static discharge, it does have a semiconductor component. As such, care should be taken to handle the MerkMeter outside its protective anti-static bag as little as possible. Under no circumstances should it be handled while an electrical source is connected.

Tools Required:

Philips screwdrivers
7mm nut driver or socket
Pliers
19mm open-end wrench (for late model cars w/ cruise control)

Step One: Remove Instrument Cluster

Note: The step order outlined here may be slightly different than that described elsewhere, but is the easiest procedure we have found in removing many XR4Ti instrument clusters. **TIP:** Before removing the instrument cluster check for any malfunctioning light bulbs. Now would be a good time to replace them.

1) Remove screw from upper steering column shroud and remove shroud.
2) Remove three screws from the bottom of the lower steering column shroud and remove the shroud. Note: one screw is near the steering wheel and two are at the hood release latch.
3) Remove four screws retaining instrument cluster bezel. Carefully pull bezel free and remove the panel illumination control and intermittent wiper control rheostats. **TIP:** Carefully push these controls out the front of the bezel and disconnect them from their wiring harness by gently pulling on the connector.
4) Remove four screws holding instrument cluster to dash and pull cluster towards the steering wheel. Do this gently and only far enough to allow your hand to reach behind the left side of the cluster.
5) Remove the turbo boost gauge vacuum line by pulling it free of the nipple on the back of the instrument cluster. **TIP:** If this hose is old, it may be necessary to twist it a bit to pull it free. The OE hose frequently develops a leak near the connection with the nipple, so now would be a good time to replace this hose if it is old.
6) Disconnect the cluster wire harness by gently pulling on the connector.
7) Locate the speedometer cable connector where it is attached to the back of the instrument cluster. While pressing on the "button" on the side of the white plastic cable latch, gently pull the cable free of the cluster. The cable should come free easily without much required force. **TIP**: In later model cars equipped with cruise control there is little or no slack in the two-piece speedometer cable. It will be necessary to disconnect the cable inside the firewall (near the fuse box) using a 19mm wrench. Only pull the cluster far enough to disconnect the cable as described above.
8) Remove cluster from dash.

Step Two: Configure MerkMeter™

Dot / Bar Mode

The MerkMeter can be configured to display in either *Dot Mode* (one light at a time displayed) or *Bar Mode* (current reading and all lights below are on). The MerkMeter is shipped with *Dot Mode* as the default and is the recommended mode.

To set the MerkMeter to operate in *Bar Mode*, install the shorting jumper on J1 *(See Fig 1)* across BOTH pins.

Instantaneous / Dampened Mode

How quickly the MerkMeter display responds to changes in the output of the oxygen sensor can also be set. In *Instantaneous Mode* the MerkMeter will display the voltage changes in the oxygen sensor immediately. While in

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Dampened Mode, the MerkMeter will not be as quick to change in response to changes in the oxygen sensor output. The MerkMeter is shipped with *Instantaneous Mode* as the default and is the recommended mode.
To set the MerkMeter to operate in *Dampened Mode*, install the shorting jumper on J2 *(See Fig 1)* across BOTH pins.

Step Three: Install MerkMeter™ In Instrument Cluster

1) Remove panel insert from the back of the instrument cluster. Simply squeeze the tab to unlock and slide out the insert blank. *(See Fig 2)*
2) Remove the protective paper from the two self-adhesive pads on the MerkMeter.
3) Carefully slide the MerkMeter into the slot in the back of the instrument cluster with the adhesive pads facing up**. (The side with the electronic components will be on the bottom.)** When properly installed, the three red LEDs will be on the left when viewed from the front. Be careful not to allow the adhesive pads to stick to the cluster yet.
4) Continue to slide the MerkMeter into the slot until the display socket of the MerkMeter is securely pressed into the opening and is flush with the front of the panel.
5) Carefully and firmly press upward on the back of the MerkMeter to allow the adhesive pads to stick to the two small plastic tabs at the top of the slot while ensuring the MerkMeter remains in the proper position. NOTE: The meter may also be secured using the large white wire tie. The wire tie should be routed through the hole on the MerkMeter and the eyelet on the tie then secured to the hole just above the mounting slot with a suitable screw (not included). It is easiest to place the tie through the MerkMeter hole first and only tighten it slightly. Then the screw should be inserted through the eyelet and threaded into the hole a couple turns. If you keep as much slack as possible in the tie, you can rotate the MerkMeter and insert it into the mounting slot. When the meter is in position, the tie can be slowly cinched down as the slack is carefully worked out of the tie. The screw should then be threaded the rest of the way into the hole. Do not over-tighten the tie or the screw.
6) Remove the nuts from the two electrical supply studs on the back of the cluster indicated in *Fig 2* as "**Power**" and "**Ground**" using a 7millimeter nutdriver.
7) Attach the **RED** wire to the stud indicated in *Fig 2* as "**Power**" and secure it with one of the nuts.
8) Place the **BLACK** wire on the stud indicated in *Fig2* as "**Ground**". Also place the tab adaptor used to secure the BLACK ground extension wire onto the same stud. Attach wire and tab with the remaining nut.
9) Attach the spade connector on the BLACK ground extension wire to the chassis grounding screw on the dash support bracket directly behind the instrument cluster. Loosen the screw a few turns, slide the spade connector under the screw, and retighten the screw. NOTE: This extra ground wire is needed since the instrument cluster ground Ford provided via the stock wiring harness is inadequate.
10) Check again that all wire connections are correct. Ensure that the ring connectors are not in contact with any other nearby studs.
11) Remove the sound-deadening panel from beneath the glove box.
12) The male connector end of the oxygen sensor signal wire should be carefully routed from the cluster, through the dash opening, and down and under the center console to the passenger side foot well area. (It may also be possible to route the wire down and through directly behind the radio.) A length of coat hanger wire may assist in fishing the wire through.
13) Attach the female connector on the extension signal wire to the GREEN wire on the MerkMeter. Attach the grounding wire to the tab adaptor installed on the cluster ground stud. The instrument cluster should be temporarily placed in its mounting hole or on the dash.

Step Four: Connect Signal Wire to Oxygen Sensor Signal At Computer

Note 1: The EEC-IV computer receives the input from the oxygen sensor via **Pin 29** on the computer wiring harness. The oxygen sensor signal wire should be DARK GREEN with a dashed PURPLE stripe but might vary. Verify the proper wire by tracing it to **Pin 29** on the connector. **DO NOT RELY ON THE WIRE COLOR ONLY**. Connecting the MerkMeter to the incorrect wire will cause it to malfunction. **A wrong connection may damage the MerkMeter, the computer, and/or some other part of the vehicle**.

Note 2: The splice connector supplied with the MerkMeter is an Insulation Displacement Connector (IDC). This means the connector will pierce the wire's insulation to make an electrical connection. If the connector is subsequently removed, the wire's conductive core may be exposed and subject to short circuits and corrosion if it is not properly reinsulated. Alternative splicing techniques exist and the installer is free to use the technique of their choice. In addition, the installer may choose to

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tap into the oxygen sensor signal wire at any point of their choosing. The wire is easily accessible near the actual sensor itself, but his will necessitate running a signal wire through the firewall. The signal wire provided with the MerkMeter will probably not be long enough to accomplish this alternate connection.

1) Remove the sound-deadening panel from beneath the glove box. This is attached with some clips to the bottom of the glove box and two bendable tabs on the firewall.
2) Carefully pull the computer down and free of its retaining bracket under the glove box.
3) Locate the oxygen sensor wire at **Pin 29** on the wiring harness connector by using *Fig 3a and Fig 3b* for reference. It may be necessary to pull back some of the wire bundle insulation for a better view of the connector and wires. **If you find it necessary to disconnect the computer from the wiring harness, DISCONNECT THE NEGATIVE BATTERY CABLE under the hood first.** Use caution in doing this. Sparks near an automotive battery can ignite explosive gases generated by the battery with potentially catastrophic results to you and/or your car.
4) After verifying that you have found the correct wire for the oxygen sensor signal, splice into that wire. A tap splice has been provided for this purpose with the proper connector for the signal wire that feeds the MerkMeter. *Fig 4* illustrates how the splice connector should be oriented on the wire. Carefully close the two halves of the connector shell and SLOWLY squeeze them together with the pliers until the connector locks closed. **CAUTION: Care should be taken that the wire is properly placed before the connector is squeezed closed. It is possible (though unlikely) that misalignment could result in a broken oxygen sensor wire.**
5) Insert the MerkMeter extension signal wire securely into the socket on the tap splice.

Step Five: Test MerkMeter™ Installation

1) Reconnect the turbo boost gauge vacuum line, harness connector, and the speedometer cable to the instrument cluster. **TIP:** You should feel a distinct click when the speedometer cable is properly reinserted.
2) If it was necessary to disconnect the computer from the wiring harness, reconnect it now. Also reconnect the battery negative cable. Note the above cautions in working around the battery.
3) Turn the ignition key to the "II" position. All warning lamps on the instrument cluster should light. If the MerkMeter is properly connected, the leftmost LED ("Lean") should illuminate. If the rightmost LED ("Rich") lights (or all LEDs if the MerkMeter is configured in *Bar Mode*) , then check that the signal wiring is properly connected from the meter to the computer. If no LEDs light, check that the power and ground wires are properly connected and the wiring harness is properly seated in the cluster.
4) Once the MerkMeter passes the test above, start the car and run it two minutes above 2000 rpm. If the car is cold, you should see the lights on the MerkMeter gradually light from left to right. If the car is warmed to normal operating temperature, you will soon see the lights in the display start to illuminate in an oscillating pattern from left to right and back again. If the display changes in either of these ways, it is properly installed.

Step Six: Finish Installation

Once the MerkMeter has been successfully tested, all removed components may be reinstalled.

1) Reinstall the computer in its bracket.
2) Use the provided wire ties where needed to secure the extension oxygen sensor signal wire under the dash.
3) Reinstall the sound-deadening panel under the glove box.
4) Reinstall the instrument cluster into the dash securing with the four screws. **TIP:** As you push the cluster back into the dash, be careful the speedometer cable does not kink. It may be necessary to pull the cable gently back through the firewall from the engine compartment.
5) Reinstall and reconnect wiper and light dimmer rheostats in the cluster bezel.
6) Reinstall cluster bezel using the original four screws.
7) Replace lower steering column shroud with three screws.
8) Reinstall the top steering column shroud with one screw.

Congratulations! Installation is complete.

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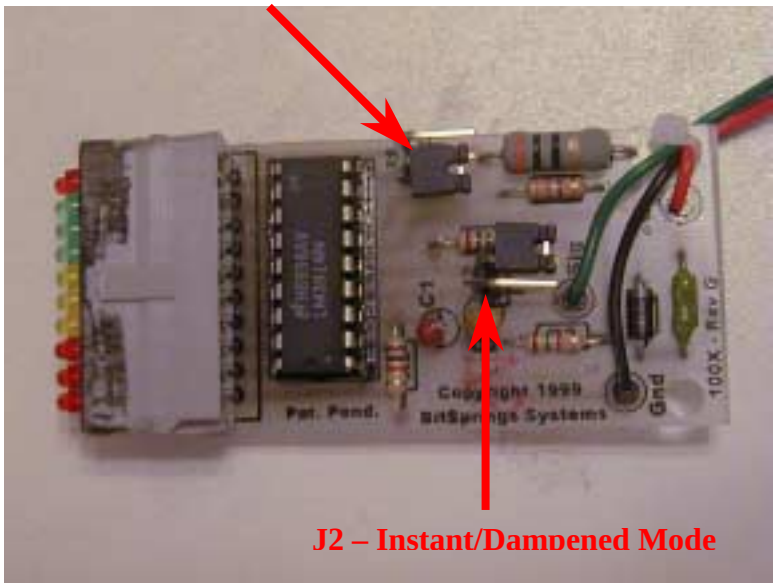

Figure 1

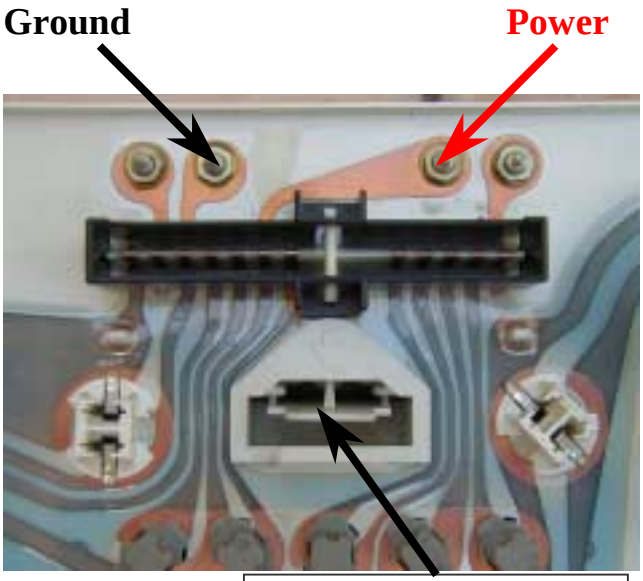

Figure 2

Squeeze and pull tab to remove

Splice Connector

Figure 4

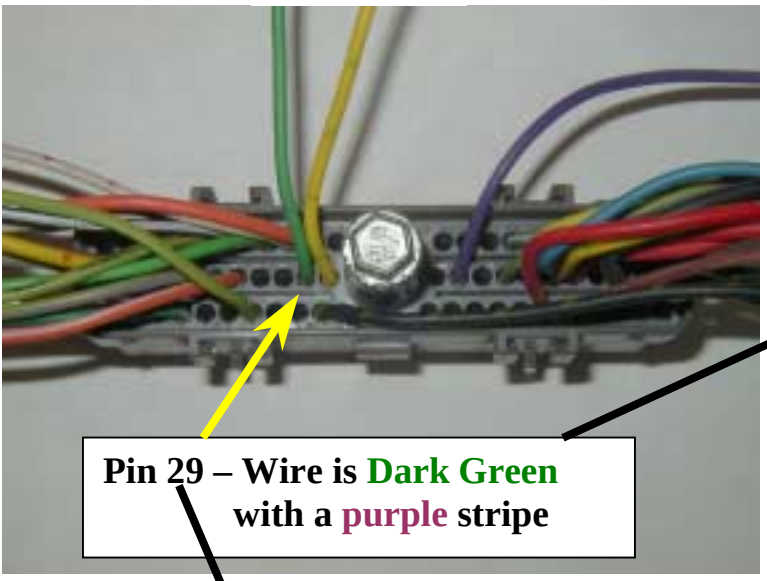

Figure 3a

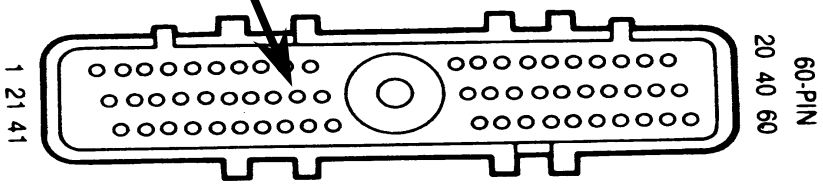

Figure 3b

Figure 5 – Meter Installed

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