

# Installation manual

## E32/E34

Engine Oil Pressure & Temperature  
Differential Temperature  
Transmission Temperature  
Interface



Rev 1.1      30 January 2011

## DISCLAIMER

You are solely responsible for determining the suitability of this product. The board has been tested and verified operational before it was shipped. The manufacturer cannot be held liable for any damages resulting from the use or installation of this board or the wiring thereof or the use of this manual.

Suitability, installation, proper fusing, wire diameters are all up to the installer. The current draw for this circuit board does not exceed 1 amp at 12 volt under normal conditions.

The correct fuse size also depends on the wiring size used.

Please keep in mind that you are about to work on wiring that may not have been disturbed for more than 10 years.

It is advisable to obtain the correct electrical diagrams for your car.

Installation and/or use of the circuit board constitutes acceptance of the disclaimer.

# **BEFORE DOING ANY WORK ON YOUR CAR, PLEASE DISCONNECT THE GROUND WIRE FROM THE CAR BATTERY**

**do note security codes for such items as radios  
before disconnecting the ground wire**

**Pin 5 of the DB9 connector MUST be connected via a suitable fused wire. If no such fuse is present then you MUST add a 1 amp fuse.**

**Pin 1 of the DB9 connector MUST be connected to the car frame or other suitable grounding point close to the Instrument Cluster.**

**Without pin 1 properly connected the interface Will Not Function!!**

## **Recommended Sensors:**

**VDO 323-057, Temperature Sender 300F/150C**

**VDO 360-004, Oil Pressure Sender 150psi / 10 bar, 10-180 Ohms**

These sensors are available in a variety of mounting threads, the above part numbers are for 1/8-27 NPT threads which are standard threads available in the USA.

One highly recommend place to buy from is [WWW.EGAUGES.COM](http://WWW.EGAUGES.COM) who have over the years provided me with very good service and a quality product.

The circuit board is designed to measure the engine oil and temperature and to display the measured values in the 16 character display line in the instrument cluster.

It does this by injecting the data stream onto the DAC and LAC wires. This is done in such manner that the already existing modules such as the CCM and LKM, the Radio and telephone, and the OBC are given priority.

If for example you choose to display information from the OBC, such as mile per gallon, time etc, then the OBC info will override the data send from the interface. To view the engine info again, you must push the right hand push button that signals to the OBC to stop sending the info.

In case of messages such as “Fasted Seatbelts”, “- - -ASC- - -“, that are only time limited visible, the engine info will automatically resume when the messages expire.

You may, in some rare cases see the message “Check Control”. This means that for some reason the data transmission from the CCM and/or LKM is disturb, interrupted, etc. This may indicate that the wiring to the cluster is faulty or that one of the connected modules has a problem. It is easiest to disconnect the DB9 connector to see if the problems persist.

As it is near impossible to cover all the different possibilities of placement of the senders and this board, this document will only provide global guidelines. Most pictures taken in this document of an actual install were taken from a 1990 BMW 750 iL.

As the E34 series uses the same protocol as the E32, most if not all of the installation instructions pertaining to the actual board will be the same. Please bear in mind that not all of the E34 series cars have the display in the center of the cluster.



**MUST HAVE THIS DISPLAY LINE**

The board is connected via a standard male DB9 connector and requires 9 signals to function properly:

**Ground**, (pin 1) this is very important!! **THIS PIN MUST BE PROPERLY GROUNDED FOR THE INTERFACE TO OPERATE**

**Select**, (pin 2), this pin needs to be grounded to advance to the next value to display.

**DAC**, (pin 3) this is the data line that provides info to the cluster

**LAC**, (pin 4) this is the handshake line that controls the timing of the data signals

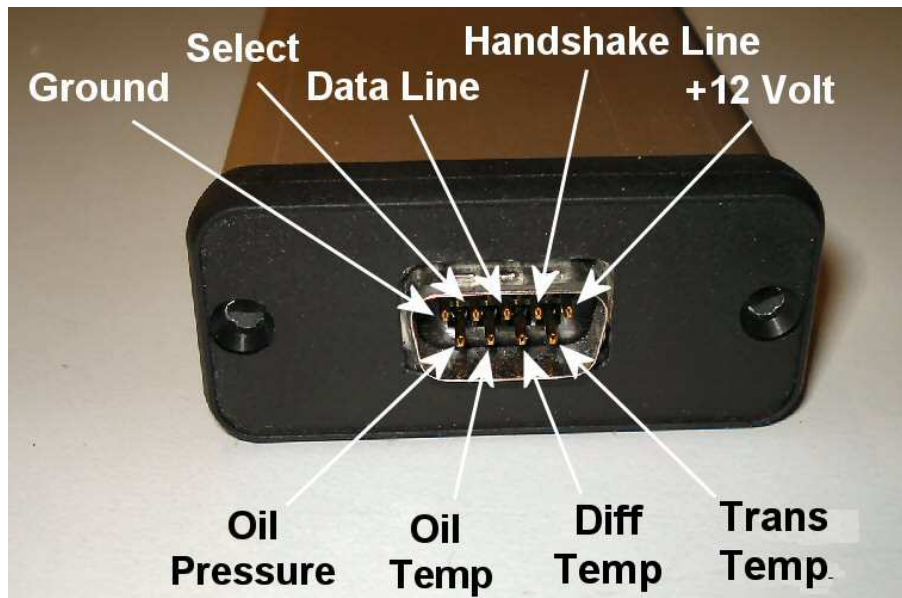
**+12 volt**, (pin 5) preferably from the accessory position of the ignition switch. This must be a FUSED wire or you must add a 1 Amp fuse.

**Oil Press**, (pin 6) this is where the pressure sensor is connected.

**Oil Temp**, (pin 7) this is where the engine oil temperature sensor is connected.

**Diff Temp**, (pin 8) this is where the Differential temperature sensor is connected.

**Trans Temp**, (pin 9) this is where the transmission temperature sensor is connected.



The Select input pin must be momentary grounded to advance to the next message to be displayed. This pin is currently set up for dual pulses. This means that to advance you must ground the Select pin twice in quick succession. This is done to allow for degraded contacts in the left or right stalk switch.

It is very important to properly ground the circuit board. The sensors used rely on the car frame for the return signal to the board. This means that each sensor has a single wire going to the board and the car frame forms the return line for the signal. You will have to verify that the sensors are properly grounded. Not all engine parts, such as remote oil filters are properly grounded. Improperly grounded sensors will cause incorrect readings.

**WARNING:**

UNDER NO CIRCUMSTANCES SHOULD YOU RUN A SEPARATE GROUND WIRE FROM SENSORS ALL THE WAY TO THE CIRCUIT BOARD FROM A GROUNDED SENSOR (generally one-wire sensors). IF THE ENGINE GROUND WIRE EVER BECOMES DISCONNECTED ALL CURRENTS WILL FLOW THROUGH YOUR ADDED GROUND WIRE. THIS CAN CAUSE YOUR ADDITIONAL WIRE TO BECOME A FIRE HAZARD

The board has 5 LED's to indicate various functions.

**Handshake Line Active:** This Led indicates the Handshake line is pulled low (active state). The triggering of this LED starts a timing chain for the proper insertion of the data to be sent to the cluster.

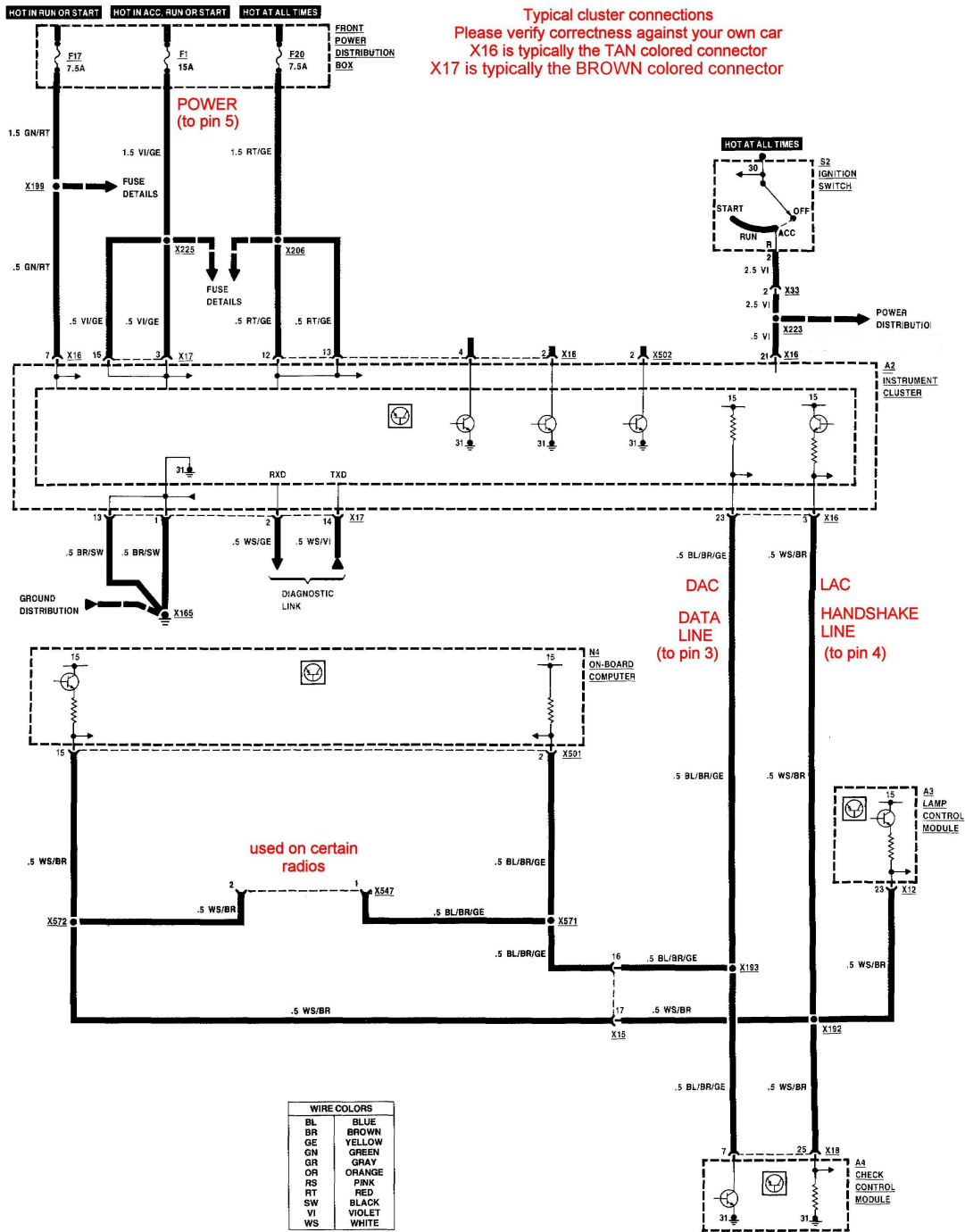
**Date Line Active:** This LED indicates data is present on the data line. This data can come not only from this board but also from the CCM and LKM modules, the radio and the telephone when installed and the OBC unit.

**5 Volt Power:** Indicates the board is powered up.



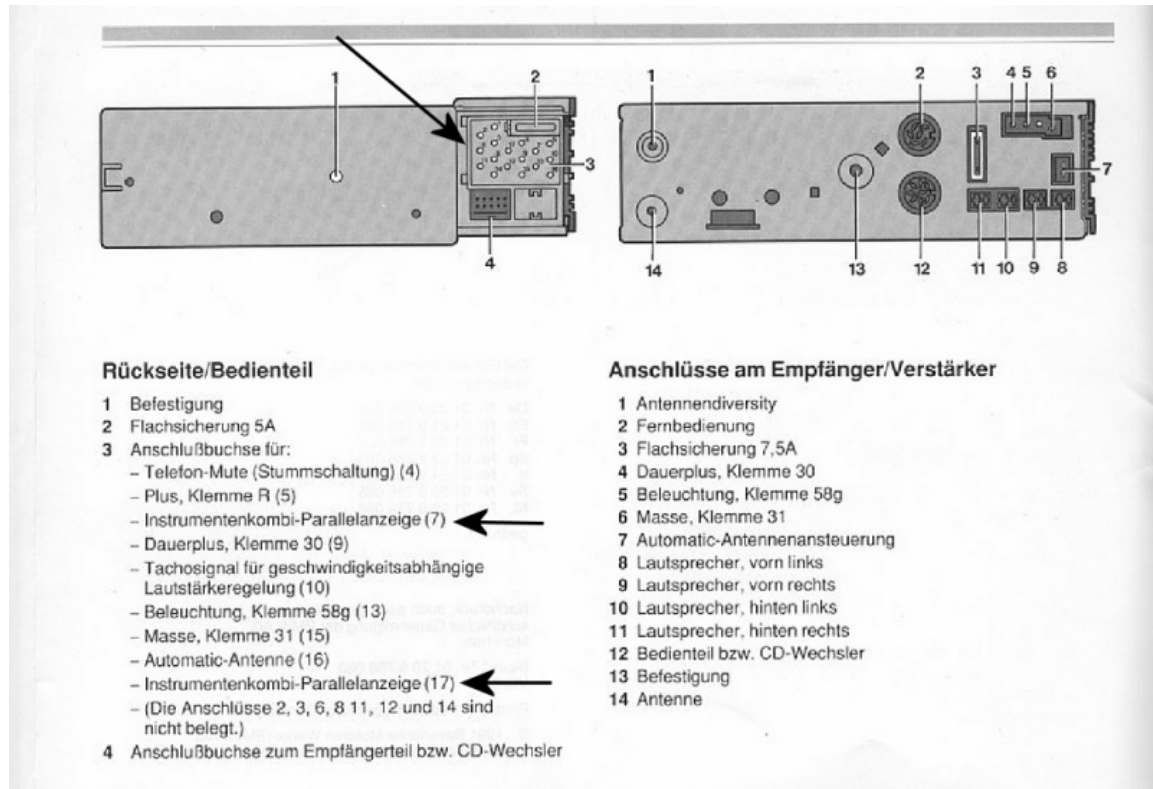
**Reference LED 1 & 2:** These 2 LEDs indicate various stages in the software. On start-up the LEDs will flash alternatively for up to 10 seconds whilst the board initializes then the LED's will indicated internal program activities.

## Typical electric diagram:



On newer model E32 and E34 cars the radio can send information to the cluster display. If you have a car with this feature it will be very easy to find the necessary wires to connect the circuit board. Both the DAC line (Blue/Brown/Yellow) and the LAC line (White/Brown) as well as a switched +12 volt wire (Violet) will be available at the back of the radio.

According to available BMW electrical drawings pin 17 is the LAC signal, pin 7 is the DAC signal on some of the radios.



On older model cars without this radio feature finding the necessary wiring is slightly more involved. The easiest place to find the DAC and LAC wires is on X16 on the back of the instrument cluster. To do this you will have to remove the screws that hold the cluster in place and pull the cluster forward enough to access connector X16. This is explained in addendum 1. Generally removal of the steering wheel is not necessary or recommended.

X16	DB9
Pin 3	Pin 4
Pin 23	Pin 3

Connector X17, pins 3 and 15, can provide a suitable switched and fused 12 supply.

X17	DB9
Pin 3	Pin 5

Pin 21 on X16 has been used to provide the switched +12 volt supply for the board, **BUT YOU MUST ADD AN 1 Amp FUSE if you use this pin to power your interface.**



**DISCONNECT THE BATTERY BEFORE  
REMOVING THE STEERING WHEEL OR  
INSTRUMENT CLUSTER. NOT DISCONNECTING  
THE BATTERY CAN CAUSE THE AIRBAG  
WARNING LIGHT TO BECOME ACTIVATED.**

Typical display examples, these may vary from your model:

Engine Oil temperature and pressure:



When the temperature goes below 50 degrees F, the display will show “---“

When the temperature goes above 300 degrees F, the display will show “999”

Transmission temperature:



Differential temperature:



### **Addendum 1: Accessing X16 and X17 on the back of the instrument cluster**

Remove the two small screws holding the cluster in place.



Pull the cluster slowly towards the steering wheel.

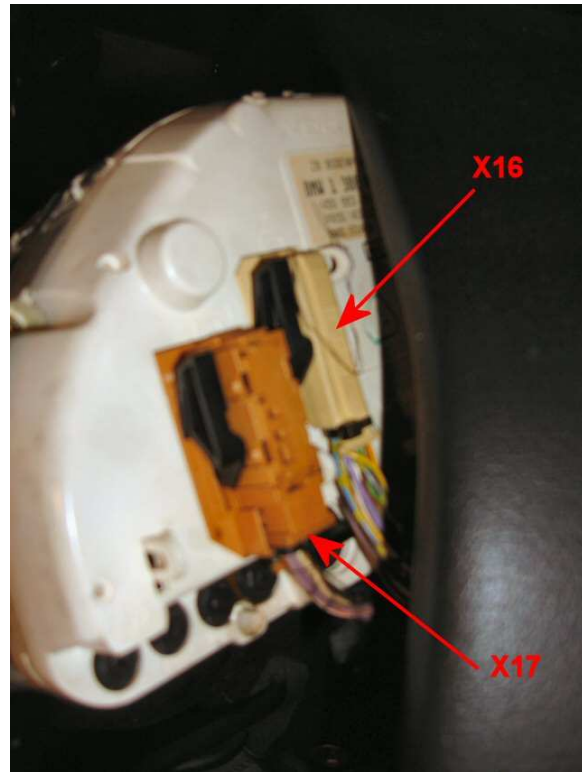


Now turn the cluster so it partially fits into the steering wheel.



You can now access X16 and X17 on the back of the cluster, please keep in mind that the position of X16 and X17 in the picture is for clusters with a white back, other colored clusters may have X16 in a different position!!

You can now disconnect X 16 and X17 and find the necessary wires.





## Addendum 2: Alternative method of connecting to the cluster display.

It is possible to fabricate a piggyback connector from cheaply available components.

For example,

Tyco dual row header, part number 929836-05-36,

[www.mouser.com](http://www.mouser.com) pn: 517-836-05-36

[www.digikey.com](http://www.digikey.com) pn: 929836-05-36-ND



For representation only,  
number of pins will vary.

can be soldered to

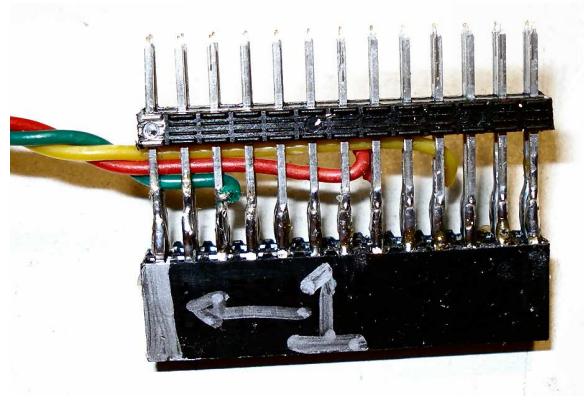
Tyco receptacle, part number 1-534206-3,

[www.mouser.com](http://www.mouser.com) pn: 571-15342063

[www.digikey.com](http://www.digikey.com) pn: A26462-ND



When soldered together they will form a piggyback connector. In the picture, the green wire is the LAC line, the yellow wire is the DAC line. Please note that pin 14 is next to pin 1.

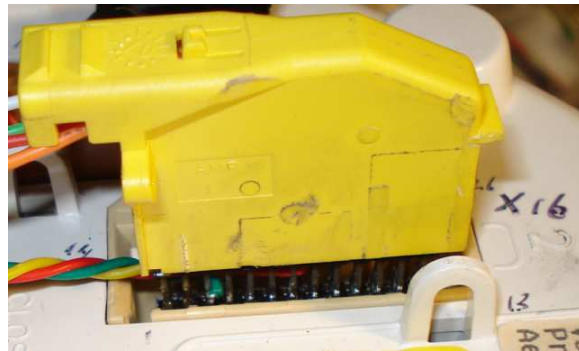


**If you use pin 21 to supply power you must add a 1 Amp fuse.**

Insert the home made piggyback connector in X16 on the back of the cluster. When placing the piggyback connector, ensure u have positioned the piggyback connector correctly as there is no connector housing to guide you. It is quite easy to place the connector one row off.



Next re-attach the original X16 connector on top of the piggyback connector.



**The Piggyback connector DOES NOT provide a proper ground, you must still properly ground pin 1 of the DB9 connector.**

**If you use pin 21 to supply power you must add a 1 Amp fuse.**

### Addendum 3: Feeding the wires to the cabin. 1990 BMW 750 iL

As suitable entry point for the sensor wires can be found behind the fuse box where already existing wires feed into the cabin.



Many commercial solutions exist to mount the sensors, which one you chose is up to you. Below are some pictures of a home made oil filter cap. Note the ground screw next to the center hole. This screw is provided to properly bond the oil filter cap to the car frame if the oil filter housing is not properly bonded.





#### **Addendum 4: Connecting sensors**

**It is important that the single wire sensors have a good connection to the car frame. A lot of problems in readings can be traced back to improper ground connections especially if the sensors are mounted to remote oil filters and other equipment not attached to the car.**

**Temperature sensor for the engine oil and coolant:**

**For example VDO 323-057, Temperature Sender 300F/150C**



**Pressure sensor for the engine oil:**

**For example VDO 360-004, Oil Pressure Sender 150psi / 10 bar, 10-180 Ohms**



**2 wire sensors need to have 1 wire connected to either the car frame or run back all the way to the interface, DO NOT DO BOTH!**

**The signal wire will be connected to pin 6.**

**If you run both wires back to the DB9 connector then it is acceptable to connect one wire to the signal input of the DB9 connector and one wire to the same ground point that Pin 1 of the DB9 connector is connected, to the car frame, close to the interface.**

**For example: VDO 360-043, Boost Pressure Sender 0-30 PSI, 10-180 Ohms, running 2 wires to the interface.**

