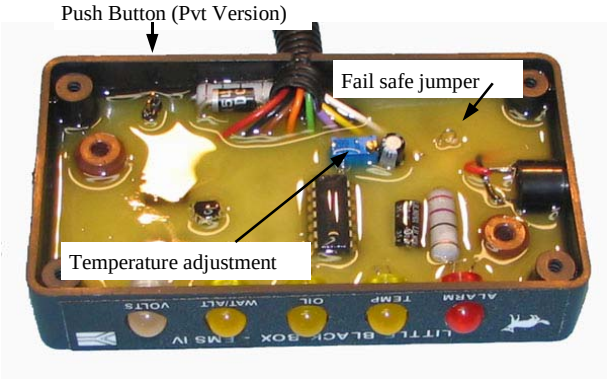


Volts Wat /Alt Oil Temp Alarm

Power on routine (POR)

When the ignition is turned on the EMS will do a self test, this is indicated by flashing each of the yellow LED's and then the red LED with a single beep. The unit will then wait for 10 seconds or until the vehicle starts before monitoring any alarm conditions, **Note:** – The EMS stores the last alarm condition and the **Private** version indicates this with **3 flashes of the relevant condition (yellow) LED** prior to the POR, (see Alarm Memory Pg 3 for more info) .

Indicators

The Little Black Box EMS has various indicators to provide warnings of several engine functions as described below.

Alarm (Red)

The Alarm LED will flash on/off in response to any alarm condition. The Buzzer will sound with the alarm LED.

Temp (Yellow) Indicates that the temperature has exceed the set point.

Oil (Yellow) Indicates that the Oil pressure is low.

Wat/Alt (Yellow) - Indicates low coolant level – LED on
or Alternator (fan belt) – LED flash

Volts (Visual indication only)

The LED displays the voltage of the battery / charging system.

Green:-	> 11.8 V	± 0.2V
Orange:-	10.5 - 11.8 V	± 0.2 V
Red:-	< 10.5 V	± 0.2 V

Alarms

The alarm sequence is as follows: (except Alternator)

The relevant **yellow condition LED** will be illuminated
Beep & flash Red LED at 1 second intervals for 5 seconds
Beep & flash Red LED at .5 second intervals for 5 seconds
Beep & flash Red LED at .25 second intervals for 5 seconds
Continuous Beep for 2 minutes, to quiet see **Beeper silence** below.

Engine Temperature.

The EMS will alarm if the engine temperature exceeds the set point.

Engine Oil Pressure.

The EMS will alarm whenever the vehicle's oil light is illuminated.

Water level (Optional connection)

The EMS will alarm if the coolant level falls below the safe limit. This alarm has a **3 second delay** to allow for movement of the coolant.

Alternator Alarm (includes broken Fan Belt)

The EMS monitors the Ignition Light, if this comes on the unit will beep and blink the **Alarm** (Red) and **Wat/Alt** (Yellow) LED's 5 times, this will be repeated at 40 second intervals.

Voltage Indicator.

The EMS provides a visual indication of the Battery and/or Alternator voltage. The LED will be green for normal operation.

Speed Alert.

Optional connection -requires an electronic speedometer or inline pulse generator. Drive to the speed required, press the rear push button -a double beep followed by a long beep should be heard - the EMS has now stored the speed. Whenever the selected speed is exceeded the EMS will alert via a fast 4 beep alarm and will repeat at 3 second intervals if speed is exceeded.

Re-set the speed setting at any time as described above or disable the alert by pressing and holding the push button until 2 long beeps are heard.

Functions

The primary function of the EMS is to provide an alarm in the event of any monitored conditions arising. Once alerted the alarm sound can become an irritant, this can be switched off - see **Beeper Silence** below.

Alarm Memory

The last Alarm that is recorded in **continuous beep mode** is stored in the EMS memory and displayed at POR time – to clear the memory press the push button while the alarm is being displayed - **LED flashes 3 times** – memory clear will be indicated by flashing of the yellow Oil LED.

Beeper Silence

In the event of an Alarm (excluding Alternator) wait until the EMS reaches the **continuous Beep mode** – at this time press the push button located at the back of the EMS body – the Beeper will be disabled until such time as the alarm clears or the EMS is switched off and on again.

Installation Instructions.

1. Temperature sensing.

The EMS can connect to a conventional temperature gauge or monitor cylinder head temperature using the Little Black Box EMS adapter and sensor , this sensor will provide a "fail safe" circuit.
Computer controlled, or Bi-Metal voltage regulated gauges cannot be connected - use the EMS temperature adapter & sensor.

2. Power source.

The EMS requires a 12 volt (Negative Earth) supply connected to the Ignition switch and preferably fused.

3. Location in the vehicle.

Mount on the dashboard such that the alarm buzzer is unobstructed. Secure the unit with double sided tape, cable ties or screws (3.5 x 16mm self tapers). Do not place the EMS in direct sunlight.

4. Connecting the EMS.

Black - Connect to a good ground source.

Red - Connect to the 12 volt source. (Ignition on)

Yellow - Connect to the vehicles temperature gauge sender unit wire or directly to the optional EMS temperature sensor.

Brown - Connect to water level float switch. Note the other wire of the float switch must be connected to ground.
Note:- Connect Brown to ground if **not** fitting a float switch.

Orange - Connect to vehicle's existing oil pressure **switch**.
Note:- Switch must provide ground signal when engine is off.

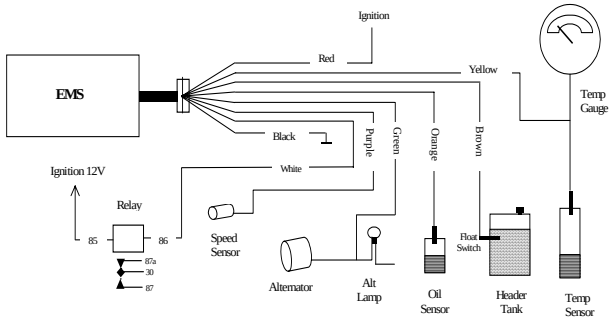
Green - Connect to the Ignition light Alternator side.
Note**:-** Connect Green to Ignition if **not** connecting Alternator alarm

White - The Commercial version of the EMS provides a ground signal on this wire after 30 seconds of continuous alarm for additional relay.

Purple - Connect to vehicles speedometer pulse generator.
Note:- This is an optional connection .

NB:- Solder or crimp connections should be used. Run all wiring in protective conduit and away from hot engine parts.

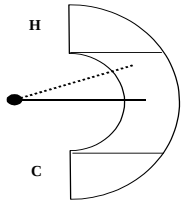
Basic Wiring Configuration



Adjusting the Temperature Alarm.

1. Using the vehicle's temperature sensor & gauge.

The alarm should be set to come on at a point approximately mid way between the normal operating temperature and the start of the hot zone on the vehicle's gauge. Setting the alarm at the mid way point alerts the driver that the vehicle is running hotter than normal before the temperature has reached a dangerous level.



Start by turning the EMS adjustment potentiometer 10-15 turns clockwise to set the temperature alarm to maximum.

Warm the engine above normal by blocking the radiator or slipping the fan belt to obtain the desired reading on the temperature gauge.

- or -

Attach the **EMS Gauge calibration tool** red probe to the temperature sender unit and attach the other probe (black) to a good earth source. Rotate the adjustment knob until the needle on the temperature gauge **stabilises** in the required "HOT" position.

Run the engine at a fast idle to ensure correct charging voltage.

Turn the EMS adjustment potentiometer anticlockwise until the alarm sounds. By alternatively turning slowly clockwise then anticlockwise establish the exact position where the alarm sounds.

Seal the potentiometer from vibration movement with a drop of paint.

2. Using the EMS Sensor.

Locate a suitable M8 threaded hole in the cylinder head and fit the Little Black Box EMS temperature adaptor and sensor.

Ensure that the cylinder head thread and mating surface are clear of paint and clean to maximise the thermal contact efficiency.

Start by turning the EMS adjustment potentiometer 10-15 turns clockwise to set the temperature alarm to maximum.

Run the engine at a fast idle to ensure correct charging voltage.

Use the **EMS Sensor calibration tool** to select the required setting **- recommended setting is 95 - 105 deg C.** (see calibration pg 6) (Alternatively warm the engine above normal by restricting the radiator airflow or slipping the fan belt.)

Turn the EMS adjustment potentiometer anticlockwise until the alarm sounds. By alternatively turning slowly clockwise then anticlockwise establish the exact position where the alarm sounds.

Note:- A **1/2** turn of the Potentiometer is equal to **± 5 deg C** with the EMS sensor installed.

Cut the "fail safe" jumper to activate the fail safe feature take care not to damage the EMS sealing compound.

Seal the potentiometer from vibration movement with a drop of paint.

Fail-Safe circuits

Fail safe circuits will alarm in the event that the sensor wire is detached

Temperature :- If the optional EMS cylinder head sensor is used and the "Fail Safe" jumper is cut. (see picture page 2)

Oil : -Requires installation of a "close on rising pressure" switch and a different software revision in the EMS.

Coolant level :- Circuit is "Fail Safe" as standard.

Alternator :- Circuit is "Fail Safe" as standard

Integrity Checks :-

The EMS alarm circuits are checked during the POR , it is however recommended that the alarm functions and temperature calibration be checked as part of the vehicles normal maintenance routine.

Specifications

Operating temperature - 5 deg C to 40 deg C
Operating Voltage 12.5 – 13.9 VDC

Temperature monitoring

Existing coolant temperature sensor – manufacture specifications.

EMS – Temperature alarm point set on installation.
Cylinder head Sensor operating range **40 - 120 deg C**

EMS Sensor Calibration

43 ohms - - - - - - 95 deg C ± 2%
39 ohms - - - - - - 100 deg C ± 2%
33 ohms - - - - - - 105 deg C ± 2%

Limited Warranty

This unit is warranted against defective parts and workmanship for 12 months from date of purchase. Warranty is limited to repair or replacement of components at the sole discretion of the manufacturer and excludes any damage caused by incorrect voltage, mechanical shock, water or fire damage and abuse or incorrect application, installation or temperature setting.

The seller does not represent that the product may not be compromised or circumvented; that the product will prevent any personal injury or property loss or that the product will in all cases provide adequate warning or protection.

Implied Warranties :-

Any implied warranties, including implied warranties of merchantability and fitness for a particular purpose shall be limited to the duration and terms of the express warranties set forth in this limited warranty.

www.littleblackbox.co.za

Little Black Box

EMS IV

D.I.Y. Installation Instructions

Rev 4
EMS IV DIY