Bongo Temperature Gauge

Author - Ben Bruce.

Bongo Models.

These instructions are specifically for the Mazda and Ford variants of the SGL3/5 fitted with the WL-T diesel engine from 1995 to 2001. It is probable that later models have the same instrumentation but whether this is true or not can't be confirmed to date. It has been confirmed that the V6 2.5 litre petrol engine has the same instrumentation for the same years to 2001 but there is no information available at present for later models.

Modifying The Gauge.

Any temperature gauge readings quoted in these instructions are percentage of full scale ranging from **0**% to **100**%. The cold mark **"C"** is the **0**% position and the hot mark **"H"** is the **100**% position.

The Mazda temperature gauge hides the normal running temperature range and only moves if the running temperature is too low or too high. In a normally healthy cooling system; the Mazda gauge should increase deflection up to approximately the **40**% position which is the start of normal running temperature. The gauge will always stay in this position The purpose of the modification was to make the gauge show the normal running temp fluctuations only. It is possible to calibrate the gauge to show what ever range you want but this would mean changing other values on the board and alterations to the PCB tracks.

This is a simple procedure which eliminates the dead zone and causes the gauge to react over a smaller temperature range. The intention was to make it as simple as possible without adding components to the gauge itself. If you are competent in using a fine soldering iron the rest is easy. The only thing you need to do is remove the temperature and fuel gauge cluster and solder a short circuit link across the Zener diode and then replace the pair of instruments. All further work is simply adding a resistor on to the PCB side of the main instrument panel. All you need to do is add one resistor across the PCB terminal screws (**T- U**) and the ground terminal (**E**). The resistor values chosen are from the standard range available from any electronic stockists such as Maplin. Extended resistor ranges are usually only available through electronic wholesalers such as RS Componants.

The intention is to scale the gauge to read from 75° Celsius to 120° Celsius, this enables the gauge to be more active over the normal running temperature range. You should be aware that the gauge will not start to move until the coolant temperature reaches about 75° C, this simply means the coolant temperature has not reached it's normal operating temperature.

Normal running temperatures show between the vertical position (50 %) and to the right (65 %) which correspond to an approximate coolant temperature of 88° to 98° C which reflects the thermostat opening and various low level throttle positions. A long steep uphill climb may cause the gauge to go to the 80 % position.

The single resistor added to the PCB side of the instrument cluster has a value of 100 Ohms, but be aware that this was calibrated with a perfect cooling system with the thermostat opening at the manufacturers design temperature of 82° Celsius. If your cooling system normally runs hotter than this then the gauge deflection will be higher, particularly if you have a heavy foot or a lazy thermostat. If you are not happy with the gauge reading higher, then you can increase the resistor to 110 Ohms which will decrease the needle deflection by about 15% for the same temperature. For mechanical strength, the thermal rating of resistors should be 2 Watts. 110 Ohm resistors do not fall within the standard range and you can achieve this resistance value using two 220 Ohm 1 Watt resistors in parallel.

Disclaimer.

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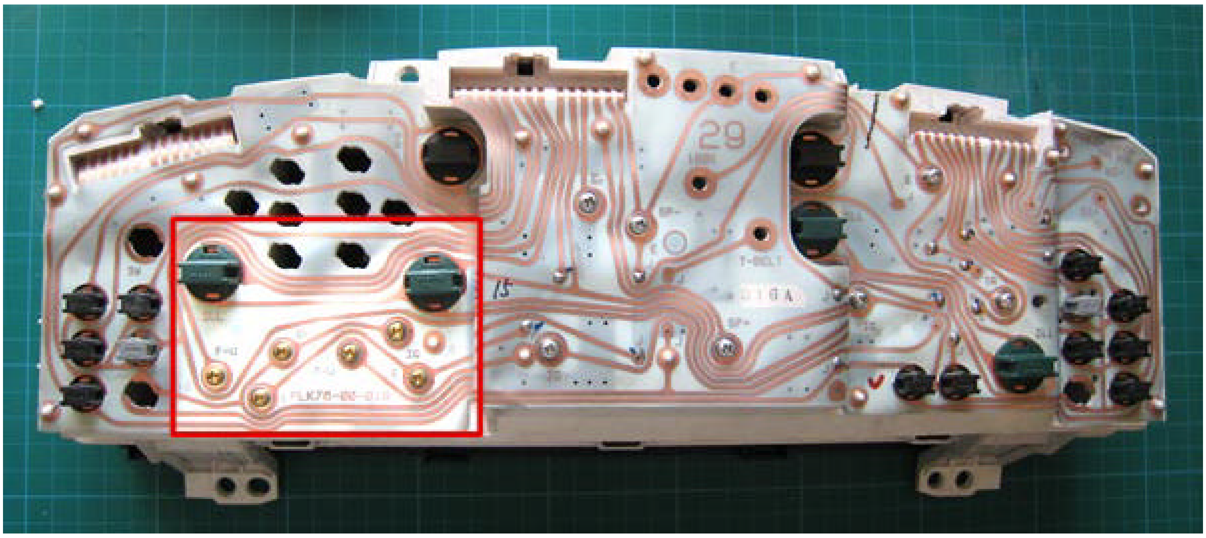
DISMANTLE

Undo the four screws holding the instrument cover and remove it. You may need to remove some switches on the rear of the panel to enable you to twist the cover so that the instrument panel is exposed. Lowering the steering wheel and removing the top half of the steering wheel nacelle will help.

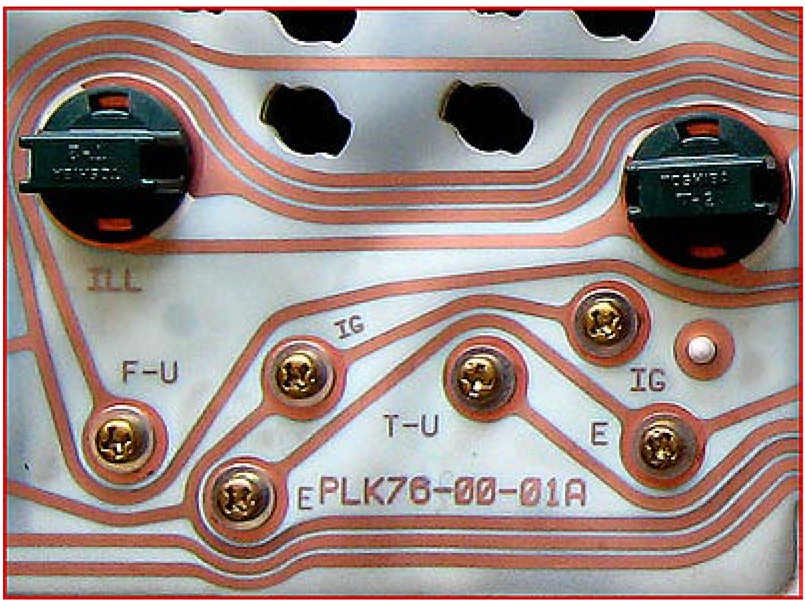
Remove the four screws holding the main instrument cluster. Pull the cluster toward you and remove the two or three PCB plugs by pressing down on the securing latches. It is now possible to remove the main instrument panel by extracting the top part first and then the lower part. Take the panel to your work bench.

Remove the clear plastic instrument cover and the black plastic cover below this by unclipping the eight clips on each section. You may prefer to remove both sections in one piece using the lower clips only.

The photograph shows the PCB on the rear of the instrument panel with the section we are interested in highlighted within a red box.



The next photograph is an enlarged view of the highlighted section shown above. This is the combined fuel gauge and temperature gauge cluster which must be dismantled as one unit.



Descriptions of the six fixing screws.

T -U Temperature Unit.
The thermister temperature sensor

F - U Fuel Unit.
The fuel tank level sensor.

IG Ignition.
+ 12 Volt supply from ACC.

E Earth.
Chassis or ground.

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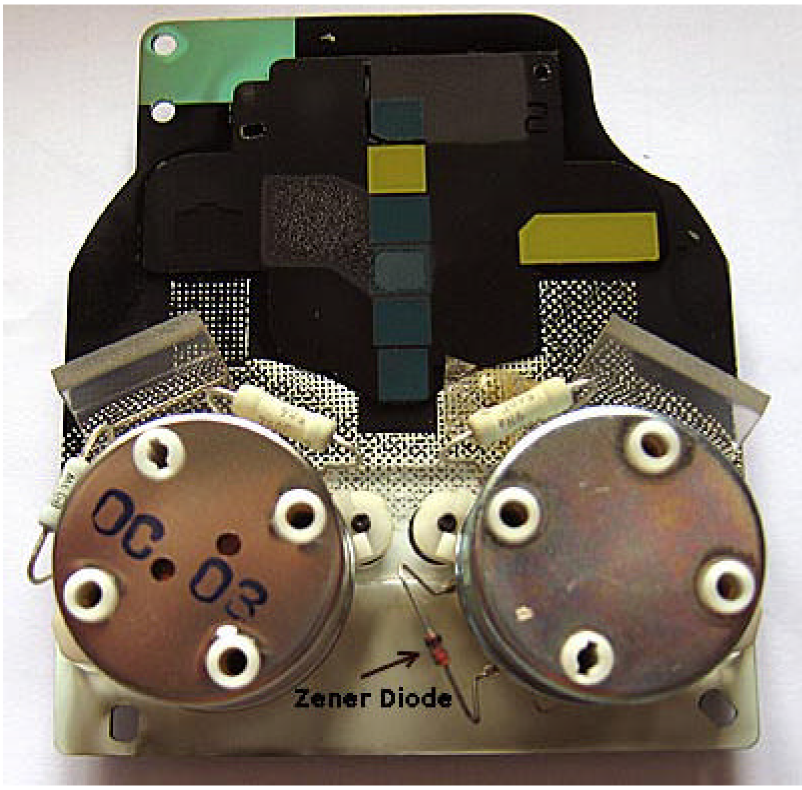
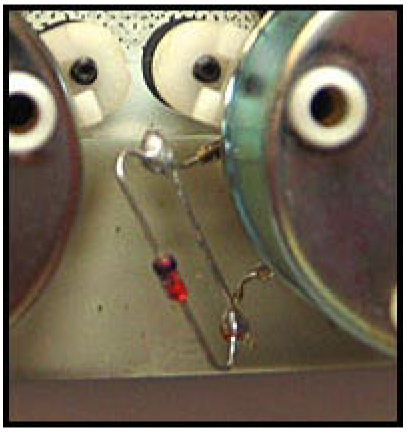
Carefully remove the six screws shown on the previous photograph to remove the fuel and temperature gauge cluster. A word of advise at this point would be appropriate. Loosen each screw first and take note of the tightness - or looseness - of the screws, they should not require excessive torque to remove them and when they are finally replaced you should ensure that you only apply the same torque when tightening them. The surface area of the large washer and PCB track is sufficient to conduct electricity and over tightening may cause damage to the meter coils. When you remove the screws, the meter cluster will fall onto the work bench, either hold your hand underneath the gauges to cushion the fall or protect the needles with a soft cloth or foam plastic. The gauges are relatively robust in this respect but be aware that a heavy fall could damage them.

This photograph shows the temperature gauge before modification. The Mumetal shields may fall off or they can be removed to aid necessary soldering. Make sure you replace them when reassembling the gauges as the gauge magnetic fields may react with each other giving false readings.

Before Modification.



After Modification.



You could cut out the diode altogether but shorting it out achieves the same effect and easily allows you to go back to the original by just removing the link.

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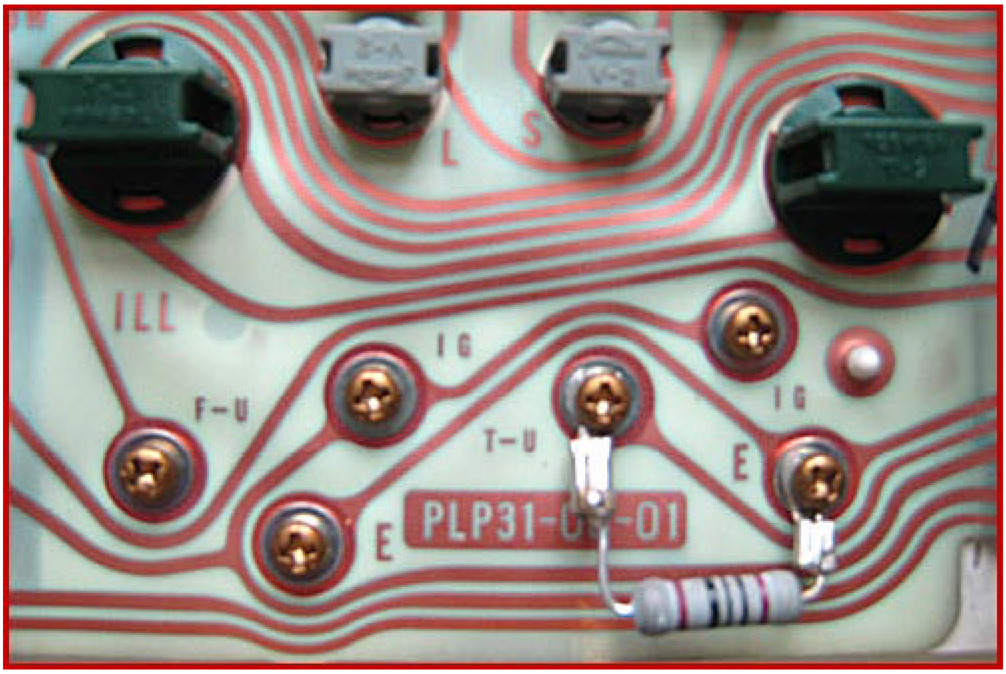
Below is the same red box area as shown on page 2 except a resister has been fitted across the terminal screws **T-U** (Temperature Sensor) and **E** (Ground). If you are prepared to accept that the temperature gauge does not start to rise from the cold position “**C**” until the water temperature has reached 75° C, then that is all you need to do. Reassemble the instrument covers and refit the instrument panel back into the dashboard.

Use spade terminals crimped on the resistor legs and ensure that the spades fit between the spring washer and plate washer of the terminal screw, in other words, make sure the plate washer mates to the PCB surface. I should stress once again not to overtighten the terminal screws. Finally, bend the spade terminals and resistor away from the PCB to ensure there is no contact with the PCB tracks, one or 2 millimeter is fine.



This is the scale in percentage of movement from the “**C**” cold mark to the “**H**” hot mark in Celcius.

“”**C**”	**20**%	**40**%	**50**%	**60**%	**80**%	“**H**”
75°	85°	90°	92°	95°	100°	120°

From cold, the needle rises linearly to 95° when the return thermostat opens and the temperature falls back to about 92° Heavy use of the accelerator on a long steep hill shows a maximum temperature of 105°. Your temperatures may be slightly different depending on the state of the radiator, thermostat, water pump and general cleanliness of the cooling system.

If the gauge rises to the “H” mark when driving normally, you may have a fault with some part of the cooling system. You should rectify this as soon as possible as damage may be caused by overheating the engine. Excess temperatures may be caused by air trapped in the cylinder head, damaged or lazy thermostat, radiator blocked with sludge, damaged coolant pump, incorrect belt tension, low coolant levels and poorly maintained coolant antifreeze and corrosion inhibitors.