

## **SPEEDOMETER CALIBRATION PROCEDURE**

Calibration and modification of the Nissan Z32 series speedometer for 300kph range requires change of componentry and adjustment using a signal source.

Australian Design Rules (ADR's) 18/00 at 18.5.1.1. states, Unless otherwise 'approved' every vehicle shall be fitted with a speedometer which shall:

18.5.1.1.1 indicate vehicle speed only in kilometres per hour, and

18.5.1.1.2 indicate the actual vehicle speed, for speeds above 40 km/h, to an accuracy of +/- 10 percent.

The accuracy of the speedometer is subject to several variants, including tyre/wheel combinations, dial scale accuracy, parallax error, tolerance of components fitted (both in terms of temperature and value), and final calibration.

This procedure is intended to provide a means of conversion which will provide an accuracy within the scope of ADR 18/00.

### **Equipment required:**

12 Volt DC regulated power supply with current limiting

Digital Signal generator

Soldering Iron

Desoldering Equipment

Flux remover

Small phillips head screwdriver

### **Terminal Connections**

The rear of the speedometer printed circuit board features four screw terminals, labelled as follows: (clockwise from 12 o'clock position)

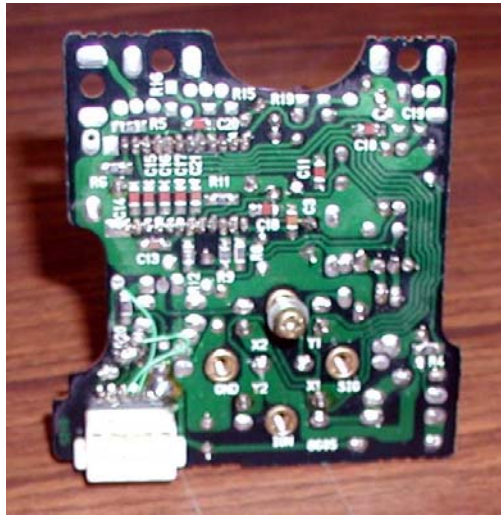
2P

SIG

IGN

GND

The screws that hold the speedometer to the instrument frame should be used as connecting points to relevant terminals by partial insertion into the terminals.



*Figure 1 – Terminal Connectors*

For all testing, the following connections should be made:

2P – no connection

SIG – to signal generator output

IGN – to 12 volt current limited power supply

GND – to power supply ground AND signal generator ground

#### **Initial Test**

Speedometer should be connected to power and signal source, using flyleads connected to the rear terminals. Take care that terminals cannot short circuit.

A 5 volt square wave at a frequency of 171Hz should be applied between the input signal terminal and ground.

Observe that speedometer needle deflection should indicate 60kph +/- 1 kph

Adjust frequency of signal generator until needle deflection indicates 60kph and record frequency.

Adjust frequency of signal generator to 288Hz. Speedometer should indicate 100kph +/- 1kph

Adjust frequency of signal generator until needle deflection of speedometer indicates 100kph exactly and record frequency.

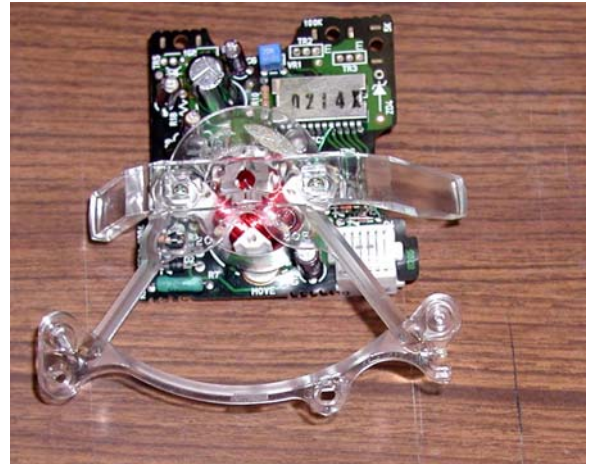
Adjust frequency of signal generator to 508Hz. Speedometer should indicate 180kph +/- 4kph

Adjust frequency of signal generator until needle deflection of speedometer indicates 180kph exactly and record frequency.

### Modification

Disconnect speedometer from power and signal source.

Use a suitable container to hold components during disassembly and reassembly.

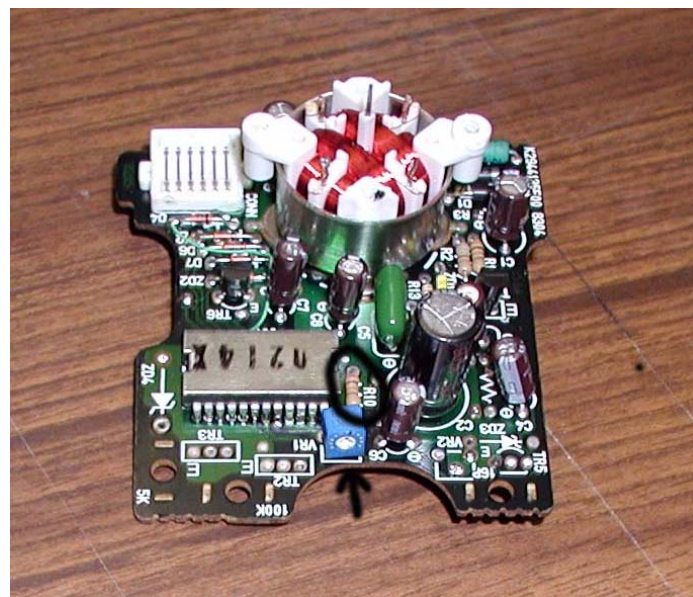


*Figure 2 & 3 – Disassembly Stage One*

Remove needle stop, and note fully counter clockwise position (mark).

Remove speedometer needle, dial, dial support frame from meter assembly.

**DO NOT USE EXCESSIVE FORCE WHEN REMOVING THE NEEDLE AS IRREPARABLE DAMAGE MAY BE CAUSED TO THE METER MOVEMENT.**



*Figure 4 – Component Side of PCB – Note R10 (circled) and VR1*

Locate resistor R10 on component side of PCB. Desolder and remove R10, then replace with an 18kilohm 1% tolerance 0.25 watt dissipation metal film resistor.

Locate and remove the following components (if fitted):

TR3  
ZD4  
TR5  
ZD3  
C2  
R18  
R10

Remove all traces of flux residue from rear of PCB using PCB flux remover and a toothbrush. Avoid excessive pressure on the PCB..

Visually inspect the PCB board and ensure that no solder dags are present, and that no short circuits are present .

Replace dial support frame, fit new dial and speedometer needle, aligning needle in full counter clockwise position to the same position as determined earlier (mark).

**DO NOT USE EXCESSIVE FORCE WHEN REPLACING THE NEEDLE AS IRREPARABLE DAMAGE MAY BE CAUSED TO THE METER MOVEMENT.**

### **Calibration and testing**

Connect power supply and signal generator to speedometer via rear screw terminals.

Locate potentiometer VR1 located at the top of the speedometer printed circuit board.

Apply a 5 volt square wave at a frequency of 171Hz between the input signal terminal and ground....adjust VR1 until meter needle indicated 60kph +/- 1 kph

Adjust frequency of signal generator to 288Hz. Speedometer should indicate 100kph +/- 1kph

Adjust frequency of signal generator to 508Hz. Speedometer should indicate 180kph +/- 4kph

Adjust frequency of signal generator to frequency recorded earlier for 60kph and adjust VR1 until needle deflection indicates 60kph.

Adjust frequency of signal generator to frequency recorded earlier for 100kph and adjust VR1 until needle deflection indicates 100kph.

Adjust frequency of signal generator to frequency recorded earlier for 180kph and adjust VR1 until needle deflection indicates 180kph.

Retest at lower frequencies and verify operation is within Australian Standards.

***Note: some degree of compromise may be required dependent on linearity of the speedometer as a consequence of component tolerances. The speedometer should display accurately at 60kph and 100kph.***