



10. CANbus

CANbus MULTIPLEXING

Why and how CAN came into use in the automotive industry.

CAN stands for Controlled Area Network.

It is a communication systems which relies on the generation of a digital signal form which is delivered through a pair of twisted wires, depending on the vehicle. These wires are twisted together in order to reduce interference from outside radio wave noise. You may have seen a similar arrangement of wires used on stereo speakers for example.

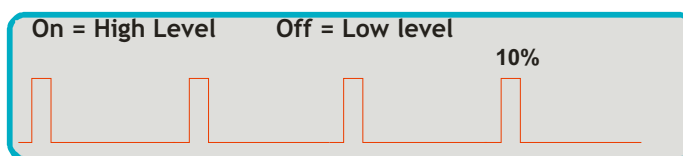
What is the major difference between a full CAN system and a Multiplexed system? Although both concepts are linked together, Multiplexed wiring mainly concentrates on the delivery of power and signals to the independent relays or microcontrollers which operate the various functions in the car. Technically known as FDM (frequency division modulations) for automotive. This results in a single microcontroller division unit (Central Processor Unit) transmitting different signal frequencies through a harness so the relevant actuators and motors are individually activated.

The difference is that CAN is a main data transport mechanism which delivers the data signals required in the order of priority decided by the importance of individual operations. (I.e. high CAN, low CAN).

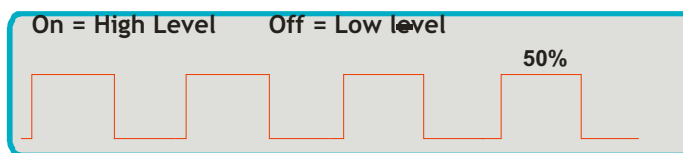
In the broad term of multiplexing, many of us have tested wires on a vehicle to find the wire function for the trailer connections. While doing this, we have found that the voltmeter is reading a small volt measure, and often only a single wire that supplies both the tail lamp and brake lamp functions. This is because the lighting wires operate with a system called PWM (pulse width modulation) or PBM (pulse band modulation). This directly means that using a hardware module, a series of 'pulses' in a on-off-on waveform can be sent down a wire. What determines the amount of light a bulb emits, relies on the size of gaps between the on-off pulse. (see diagram)

So, in the case of a combined tail/brake lamp wire, the on-off-on wave forms for each function will be different making the same bulb glow at 5W for a tail light and 21W for a brake light.

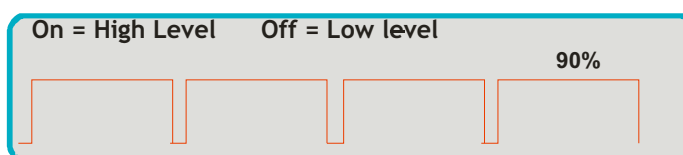
Examples 12volt circuit



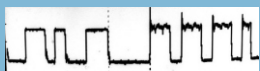
In the top diagram, we see that the waveform is on for just 10% and off for 90%. This means on a 12V system, a reading of 1.2v will be measured.



Likewise, in the second diagram the waveform is on for only 50% of the time. This would give a reading of 6v.



The third diagram is a follow on with a different cycle rate. On for 90% gives a voltage of 10.8v



Actual Recorded Signal

CANbus Microprocessors

Standard switch relays are operated by voltage and CANbus microcontrollers are controlled by data signals.