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TACHO SIGNAL CONVERTER

This module is used to convert the frequency or type of tacho signal, to allow the accurate use of a tachometer designed or calibrated for a different number of cylinders, or designed to be used with a different signal type.

The module can accept square wave (hall effect) inputs, including from the ignition primary circuit (coil negative), as well as inductive inputs (AC sine wave voltage). The input can be filtered to ignore multiple ignition events on the same cycle (multi-fire filter), sometimes required when using an ignition coil signal as the input.
The module produces 3 types of outputs:

1. A selectable 5v or 12v hall effect output, with a fixed 50% duty cycle, suitable for use with modern tachometers or other sensitive computers not designed to be connected directly to the noisy high voltage/variable duty cycle ignition primary circuit (coil negative).
2. A 12v hall effect output which includes a voltage spike, to simulate the voltage spike on the primary circuit of an actual ignition coil. This is useful for older model tachometers that rely on this voltage spike to operate.
3. An AC coupled output to simulate the AC voltage produced by an inductive type sensor, which is commonly used on older Diesel engine tachometers.

MAIN CONNECTIONS	
RED	**Switched Ignition +12v**
BLACK	**Earth**
INPUT SIGNALS Only one of these should be connected at a time, the other should be insulated and left unconnected	
BROWN	**DC Square Wave / Hall Effect Input** Either from the ignition coil negative, or a 5v or 12v square wave signal from an ECU or ignition module. The input is only measured on the “rising-edge”. This means variations in duty cycle (or dwell angle when connected to the coil) will not affect the output.
BROWN + WHITE	**AC Sine Wave / Inductive Input** Signal from an inductive type sensor. Inductive sensors are typically 2 wires, either wire can be used and the other should be connected to earth.
OUTPUT SIGNALS One or all of these can be used as required for your application	
GREEN	**DC Square Wave / Hall Effect Output** 5v or 12v square wave signal with a 50% duty cycle. Voltage can be selected via switch (see Configuration over page).
GREEN + WHITE	**AC Sine Wave / Inductive Output** AC coupled output to drive tachometers that are designed to be connected to inductive type sensors (typically older diesel models).
GREEN + ORANGE	**DC Square Wave High Voltage Output** A DC square wave that includes an inductive discharge voltage spike on the rising edge, the same as an ignition coil. For use with older tachometers that were connected to the ignition coil negative and used the voltage spike as a signal.

Setup will require removal of the 2 Phillips screws to open the plastic cover. Inside you will find:

- A group of 4x DIP switches, which are the main frequency (speed adjustment) selection.
- A blue trim pot, used for a finer final frequency adjustment.
- A group of 3x DIP switches used for configuration (Test Output, Multi-fire filter, 12/5v selection).
- An ‘Input’ LED that will illuminate when a valid signal is being received by the module.

FREQUENCY SELECTION

Set the 4 DIP switches located on the PCB.
The switches are numbered, and are turned on when pushed towards the side labelled "ON".

Mode	Switch 1	Switch 2	Switch 3	Switch 4	Ratio (in:out)	Output Pulse Length (% of Input Pulse)	Effective Change to Tachometer
0000	OFF	OFF	OFF	OFF	1:1	100	None
0001	OFF	OFF	OFF	ON	1:8	12.5	x 8
0010	OFF	OFF	ON	OFF	1:6	16.66	x 6
0011	OFF	OFF	ON	ON	1:4	25	x 4
0100	OFF	ON	OFF	OFF	1:3	33.33	x 3
0101	OFF	ON	OFF	ON	1:2	50	x 2
0110	OFF	ON	ON	OFF	4:7	57.14	x 1.75
0111	OFF	ON	ON	ON	3:5	60	x 1.66
1000	ON	OFF	OFF	OFF	2:3	66.66	x 1.5
1001	ON	OFF	OFF	ON	3:4	75	x 1.33
1010	ON	OFF	ON	OFF	4:5	80	x 1.25
1011	ON	OFF	ON	ON	4:3	133.33	x 0.75
1100	ON	ON	OFF	OFF	3:2	150	x 0.66
1101	ON	ON	OFF	ON	2:1	200	x 0.5
1110	ON	ON	ON	OFF	3:1	300	x 0.33
1111	ON	ON	ON	ON	4:1	400	x 0.25

To find the correct setting, take the actual RPM the engine is running at and divide it by the RPM displayed on the tachometer. For example, if the engine is actually at 1000rpm but the tachometer displays 1500rpm:
1000 / 1500 = 0.66
Select the closest setting, using the "Effective Change to Tachometer" from the table above (in example: 1100).

FREQUENCY TRIM

The blue trim pot provides a further +/- 10% adjustment of the frequency selected by the DIP switches. Using a small Phillips screw driver, turn it anti-clockwise to reduce the RPM or clockwise to increase the RPM shown on the tachometer. A green LED will illuminate when no extra trim is being applied (ie. the frequency is exactly as selected by the DIP switches). Other LEDs will illuminate to confirm + or – trim is being applied.

When the DIP switches are all off (mode 0000), the trim pot can be used to manually select an output frequency of approx. 0.1x to 8x the input frequency, however the larger range means adjustment is not as fine or accurate.

CONFIGURATION

The group of 3 DIP switches provide testing and configuration options:

Switch	Function	OFF	ON
1	**Pull-up Voltage Selection** of Hall Effect output (Green wire) only. The AC and HV outputs (Green + White or Green + Orange) are not changed in any way.	The green wire will output a **5v** square wave signal	The green wire will output a **12v** square wave signal
2	**Multi-fire Filter Enable** Some modern vehicles fire each ignition coil multiple times per cylinder at low RPM. This normally prevents using an ignition coil as a reliable input signal.	All input pulses will be used to calculate RPM. Use this for most vehicles.	Input pulses faster than 2.5mS (400 hertz) will be skipped
3	**Output Test Enable.** Used to generate a 50 hertz output for troubleshooting. The input LED will flash to indicate the test output is on.	Normal operation	Test output is being generated

TROUBLESHOOTING

Find out if the problem relates to the input signal (into module) or output signal (to tacho):

1. Use the yellow input LED to confirm you have a valid input signal (it will light up solid when you do).
2. Use the Output Test to confirm the output is driving the tachometer (INPUT LED will flash while active).

AFTERMARKET IGNITION SYSTEMS

1. This module should not be connected directly to the coil when using a CDI (capacitive discharge ignition) system - doing so may damage the module, and it will no longer recognize any input.
2. **MSD** ignition provides a **grey wire** tacho signal which should be used - do not connect directly to the coil.
3. **ICE** ignition provides a green wire tacho signal, but it may not be compatible with this module.
   If possible, find a different source for engine speed (eg. Injectors). Do not connect directly to the coil.

OLDER MODEL HIGH VOLTAGE TACHOS

A lot of older model tachometers are driven by the voltage spike produced by the coil being switched off.
The **Green + Orange - DC Square Wave High Voltage Output** is provided for these applications.

In some cases, the output from this module may not be strong enough to drive the tacho – the input impedance of the tacho is too high for the signal it can produce. Creating a module with enough inductance to drive the tacho would mean it is as big and heavy as a real ignition coil – so not practical.

The problem can usually be fixed with basic modification to the tachometer itself.
Follow where the input signal wire runs into the tacho. The first component it goes through is usually a series resistor of large value (eg. 33k ohm or more). Replacing this resistor with a smaller value (eg. 1k ohm) should resolve the problem. In most cases it will also be safe to short the resistor out completely (eg. make it 0 ohm).