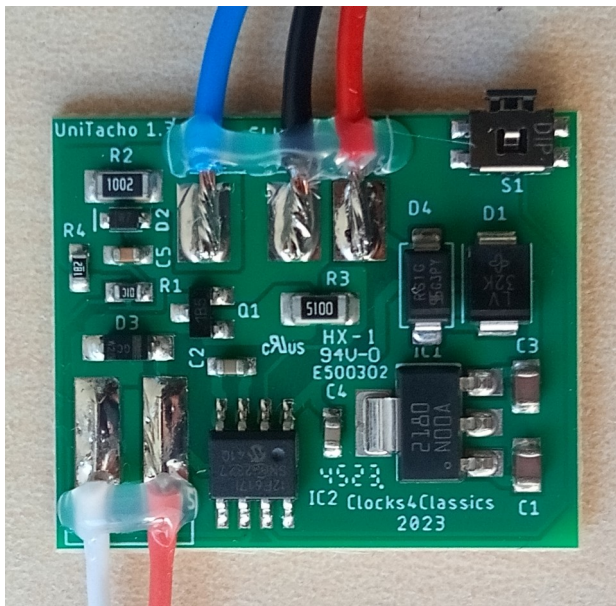


Clocks4Classics UniTacho

Tachometer Repair Kit Fitting Instructions

UniTacho:



- Small size – 25mm x 30mm
- Supports a wide range of Ignition Systems
- Works with Digital ECU signals
- Suitable for positive and negative earth cars, no extra parts needed
- Can be fitted without soldering
- No need to remove dial or needle
- On board, push button calibration - no computer or phone required
- Suitable for 4, 6 and 8 cylinder cars
- Replaces Tacho-generators

Please Note: These instructions are specific to the UniTacho repair kit product as shown in the photo above. If you have purchased one of our other tacho repair kit products please see the installation instructions for that product.

Clocks4Classics UniTacho

Tachometer Repair Kit Fitting Instructions

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1. General Information

These instructions cover the fitting of the Clocks4Classics UniTacho Tachometer repair kit. This kit is designed to repair a wide range of tachometers with moving coil movements. It replaces the existing tachometer electronics and can be used on 4, 6 or 8 cylinder engines. It can be configured for use on positive or negative earth vehicles and is suitable for use with contact breakers or electronic ignition. The UniTacho is also compatible with digital tacho signals from an ECU. The UniTacho has a built-in four point calibration mode and does not require the use of a computer or phone.

Kit Contents

- UniTacho Circuit board pre wired for connection to the vehicle and tacho movement coil
- 2 x no-solder wire connectors

Anti Static Precautions

As with any electronic parts, the circuit board can be damaged by static electricity. To avoid damage to the circuit board it is important to take the following precautions when handling the circuit board:

- Keep the circuit board in its anti-static packaging until you are ready to fit it.
- Before you open the anti-static packaging, discharge yourself by touching some grounded metalwork such as a water pipe or radiator pipe.
- Handle the circuit board by the edges and avoid touching the components on the board.
- Avoid contact with materials such as synthetic fibres or wool which generate static electricity.

2. Fitting the Repair Kit

The UniTacho kit can be used to repair a wide range of moving coil tachometers. The exact method of disassembly and fitting will vary depending on the type of tacho being repaired – a Smiths RV type tacho is used as an example in these instructions.

2.1 Remove Tacho Movement from Case

Start by removing the bezel and glass. On Smiths / Jaeger tachos the bezel can usually be removed by twisting. Other tachos may have tabs which need to be bent back or rolled on bezels – these need to be removed by using a small sharp screwdriver to work around the circumference of the bezel carefully straightening the rolled over part of the bezel until it can be removed.

Once the bezel and glass have been removed undo any securing screws from the rear of the tacho and lift the movement from its case



Note: Sometimes twist on bezels can corrode in place and may be difficult to remove. In this case apply penetrating oil to the joint between the bezel and case. After leaving the penetrating oil to soak in use a small screwdriver to gently ease the edge of the bezel away from the case (do not use excessive force – just enough to break the bond).

2.2 Identify and Cut Tacho Coil Wires

Identify the two wires which connect to the tacho movement coil which will be located just behind the dial. Cut these two wires where they connect to the existing circuit board leaving as much length as possible connected to the movement coil. The photo shows the red and black tacho coil wires on a Smiths RV tacho movement.



2.3 Determine Polarity Of Tacho Coil Wires

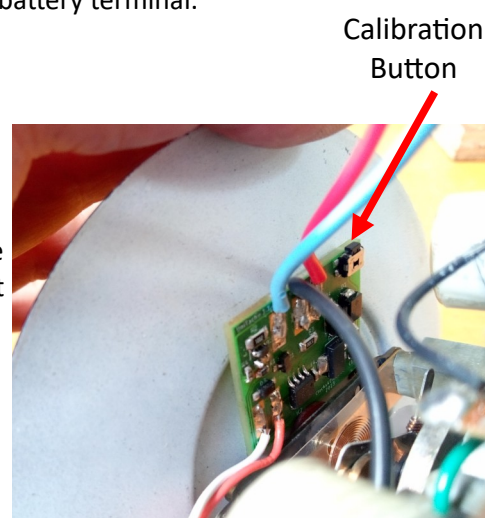
Before fitting the UniTacho Circuit board It is important to identify the polarity (positive or negative) of each of the tacho coil wires. Sometimes these wires are coloured Red and Black but DO NOT rely on these wire colours to identify the polarity as they are often incorrect.

A simple way to check the polarity of each of the tacho coil wires is to use a 1.5V battery (AA cell). Touch the wires briefly against the battery terminals and see if the tacho needle moves. If it does not move, reverse the connections to the battery and try again. Note which way around the wires need to be connected to make the needle move.

With the wires connected so that the needle moves, the polarity of the wires will match the polarity of the battery terminals i.e. the Positive Tacho coil wire will be the one connected to the Positive battery terminal and the Negative Tacho Coil wire will be the one connected to the Negative battery terminal.

2.4 Select a Mounting position for the UniTacho Circuit Board

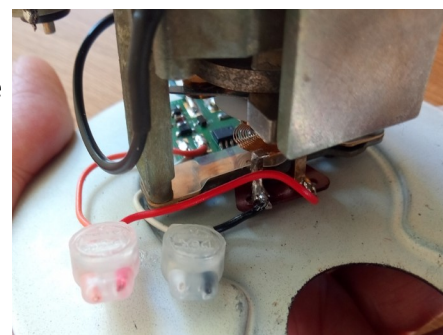
The UniTacho board can be mounted in any convenient place within the tacho and can be secured with an adhesive pad or hot melt glue. When choosing a location consider the routing of the wiring and make sure that the wires will not interfere with the movement of the mechanism. Also note that you will need to be able to access the calibration button at the top right hand corner of the board (arrowed). In the photo the UniTacho board has been mounted at the back of the tacho dial. Other possible locations are attached to the side of the movement or on the inside of the tacho case.



2.5 Connect Tacho Coil Wires

Using the supplied connectors, join the **Positive** tacho coil wire to the **Orange** wire from the circuit board and the **Negative** tacho coil wire to the **White** wire from the circuit board. **Do not rely on the tacho coil wire colours** as they may be incorrect – test the polarity as described in section 2.3 .

Tuck wires neatly to one side. Make sure that none of the wires are in the way of the moving parts and that the needle can move freely. It is a good idea to secure the wires and connectors with some superglue as these wires may pull on the moving coil and alter the calibration if they are disturbed.



Note: the connections are made with the supplied Insulation Displacement (IDT) connectors. Do not strip the wires when using these connectors. Insert each wire fully into connector hole so that it reaches the top of the connector. Squeeze button with pliers and make sure **that all of the button** is completely flush with the connector body to get a good connection.

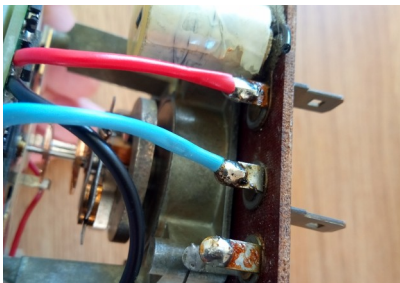
2.6 Connect /Route Vehicle Wires – Method 1

The easiest way to handle the vehicle wires is to route them through a hole in the rear of the case. Often there is an existing hole which can be used for this. Make sure that the edges of the hole are de burred and protect the wiring from chaffing with a suitable grommet or sleeving.

2.7 Connect Vehicle Wires – Method 2

A neater way of connecting the vehicle wire is to connect them to the existing tacho connectors. Before doing this you **must first remove any existing electrical connections to the connectors** as these would interfere with the operation of the UniTacho Board. Often this will just mean cutting the wires to these connectors but on some tachos this will involve cutting PCB tracks on the old circuit board where these connect to the wiring connectors. The photos below show how this has been done with a Smiths RV tacho. The existing wiring has been removed from back of the two spade connectors and the red and blue wires have been soldered in their place. Since only two spade connectors are available, the black negative supply wire has been connected to the body of the movement using a ring connector which fits under one of the screws which secures the original circuit board. When the tacho is installed in the vehicle the negative supply connection will be made via the case of the tacho.

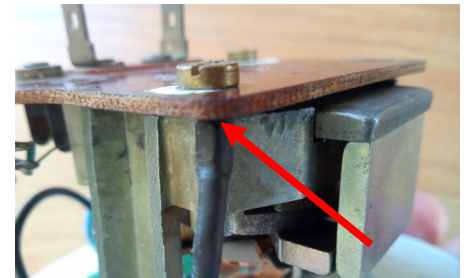
IMPORTANT: If you use the body of the movement as one of the supply connections, you must observe the earth polarity of the vehicle. If the vehicle is negative earth connect the black wire to the body. If the vehicle is positive earth connect the red wire to the body. Never connect the blue wire to the movement body or tacho case.



Old wiring removed from back of spade connectors and red and blue UniTacho wires soldered in their place



Ring connector added to black UniTacho wire



Ring connector fixed between old circuit board and movement body

3. Calibrating the Tachometer

Before fitting the tacho back into its case it needs to be calibrated. The calibration is straightforward and is best understood by watching the UniTacho Calibration video. To access this video go to www.clocks4classics.com/instructions and click on the link for “UniTacho Tachometer Repair Kit Video Guides “

Note: If you have a Volvo P1800 Tacho please download the Volvo P1800 dial template. To access this template go to www.clocks4classics.com/instructions and click on the link for “UniTacho Tachometer Repair Kit Instructions“ . Instructions on the use of this template are included in the template file.

2. Securing the Coil Wires for Calibration

The wires to the tacho coil should be secured so that they cannot move as any movement of these wires can place a strain on the coil movement and will make the calibration inaccurate. It is recommended that you secure the wire close to the coil (e.g. to the back of the dial) using hot melt glue or similar before starting the calibration process.

3.1 Setting up for Calibration

(1) Connect the red (+) and black (-) wires to a suitable 12-volt supply such as a car battery. Do not connect the blue wire. Do not use a battery charger or phone charger as a power supply as these will not work and may cause damage.

(2) Identify the calibration button. This is a small tactile button located at the top left corner of the circuit board (see section 2.4).

3.2 Calibrating the RPM Scale

- (1) Hold down the calibration button for at least 5 seconds and then release it. After a short delay the tachometer needle will start to move very slowly. Note that it may be up to 30 sec before the movement begins.
- (2) You can slow the needle movement by quickly pressing and releasing the calibration button. This can be used to slow the needle down as it approaches each calibration point (see next steps).
- (3) When the needle reaches 500 RPM hold the calibration button down to stop the needle exactly on the 500 RPM Mark. After 5 seconds the needle will jump forward by a small amount to show that the first RPM calibration point has been recorded.
- (4) Release the calibration button and the needle will start to move again.
- (5) Repeat step (3) for the 1500 RPM mark, the 3000 Rpm mark and the 5000 RPM mark.

3.3 Setting the Number of Cylinders

Once the RPM scale has been calibrated release the button. The needle will return to zero and then repeatedly move round the scale stopping at 1500, 3000 and 5000 RPM and then back to zero. These three points represent the three possible cylinder choices. By stopping the needle at one of these points and holding the button down you can select the correct number of cylinders for your car:

- If your vehicle has 4 cylinders hold down the button at 1500 RPM
- If your vehicle has 6 cylinders hold down the button at 3000 RPM
- If your vehicle has 8 cylinders hold down the button at 5000 RPM

When you have chosen the required number of cylinders the needle will jump forward again to confirm the selection and will then return to zero for you to set the signal type (see next section).

3.4 Setting the Signal Type

Once the number of cylinders has been set release the button and the needle will return to zero and wait at three points: 500 Rpm, 1500 Rpm and 3000 Rpm. These three points represent three different signal types and you should select the appropriate type depending on the type of ignition system you have and whether your vehicle is positive or negative earth as shown in the table below. If you are unsure whether your vehicle is positive or negative earth then please see note 1 below. If you select the wrong signal type for your vehicle the tacho will not operate, however, no damage will occur and you can simply re-calibrate with the correct setting.

Positive / Negative Earth (see note 1)	Ignition System Type	Stop Needle at:
Negative Earth	Digital tacho signal from ECU – Rising edge (see note 2).	500 Rpm
Negative Earth	EDIS Distributor-less Ignition System (see Note 3)	500 Rpm
Negative Earth	Digital Tacho Signal – Falling Edge (See note 2).	3000 Rpm
Negative Earth	Contact Breakers (“points”).	1500 Rpm
Negative Earth	Electronic Ignition e.g. Accuspark, Powerspark etc.	1500 Rpm
Negative Earth	HEI / High Energy Electronic Ignition.	1500 Rpm
Positive Earth	Electronic Ignition e.g. Accuspark, Powerspark etc.	1500 Rpm
Positive Earth	Contact Breakers (“points”).	3000 Rpm

Once you have made your selection the needle will jump forward. Release the button and the needle will return to zero. You should then disconnect the battery or power supply and the calibration is complete.

The calibration is now stored in the circuit board memory but if you need to change the calibration you can re-calibrate the unit at any time by repeating the steps above.

Notes:

1. If you are unsure whether your vehicle is positive or negative earth then look at the battery connections. One terminal will be connected to the vehicle body or chassis – if this is the negative terminal your vehicle is negative earth. If the positive terminal is connected to the body or chassis then the vehicle is positive earth.
2. The UniTacho board will accept a 5 – 12V digital signal from an engine management ECU or ignition box. Two different types of digital signal are catered for: Rising Edge and Falling Edge. A Rising Edge signal is one which switches high when the ignition spark occurs and a Falling Edge signal is one which switches low when the spark occurs. If you are unsure which type of signal you have on your vehicle then try both settings and use the one which produces the smoothest needle movement.
3. The UniTacho will accept a signal from an EDIS distributor-less ignition system. The signal should be taken from Pin 2 of the EDIS ECU (“IDM” signal)
4. The UniTacho board is not compatible with Capacitive Discharge Ignition (CDI) systems, however, many CDI systems have a digital tacho output signal. This can be connected to the UniTacho as shown in Figure 4 of the vehicle installation instructions. When using this connection set the Signal type to one of the two digital tacho signal options depending on the output from your CDI unit.

4. Fitting the Tachometer into its Case

Once the UniTacho board has been calibrated securely mount the UniTacho board in your chosen location and then re-install the tachometer into its case and replace the glass and bezel.

5. Installing the Tachometer in the vehicle

Please refer to the UniTacho Tacho Repair Kit Vehicle installation Instructions. To access these instructions go to www.clocks4classics.com/instructions and click on the link for “UniTacho Tachometer Repair Kit Instructions” .

6. Trouble Shooting Chart

Problem	Probable Cause	Action
Needle does not move when calibration button pressed	Button not held down for sufficient time or not released	Hold the button down for at least 5 sec and then release it.
	Not waiting for sufficient time for needle to move	The needle may not move for some time after the button is released – wait for at least 30 sec.
	Not correctly connected to power supply. Or wrong type of supply.	Make sure the red & black leads from the UniTacho board are connected to a suitable 12V power supply (Red to positive and black to negative). Use a car battery or regulated bench power supply. Do not use a battery charger or phone charger.
	Needle jammed	Check that the needle can move freely. Move wiring out of the way of moving parts and make sure that needle is not touching against the dial.
	Poor connection at tacho coil wire connectors	Check that the wires are pushed to the end of the connectors and that the connector “button” is fully pressed down around its whole circumference.
	Tachometer coil connections the wrong way round	Check that the connections to the orange and white wires are the correct way around as detailed in section 2. above. If necessary re-check the polarity of the tacho wires (see section 2.3) and re-make the connections.
	Tachometer coil wires not connected or coil broken.	Check that the wires to the tachometer coil are still soldered in place. If wires are connected OK use a multimeter to check the tacho coil itself (if the resistance is more than 500 Ohms the coil is probably broken). Check the coil by using an AA battery as shown in section 2.3
Tacho needle does not move smoothly during Calibration or takes too long to start moving.	Dirty Tachometer Bearings	Clean Tachometer Bearings – See APPENDIX A
Needle moves during calibration but does not move when tacho is installed in the vehicle.	Supply wires not correctly connected to vehicle.	Check that the red and black wires from the tacho have a good connection to the vehicle’s electrical system as shown in the vehicle installation instructions. Check that the red wire is at +12V and the black wire is at 0V when the vehicle’s ignition switch is on.
	Incorrect connection to vehicle ignition coil.	Check that the blue wire from the UniTacho board is connected to the correct terminal of the ignition coil as detailed in the vehicle installation instructions. If unsure swap the wire to the other coil terminal. WARNING be careful not to swap the connections to your electronic ignition module or damage may result – only swap the blue wire from the UniTacho.
Tacho needle moves in vehicle but reading is incorrect.	Not calibrated or calibrated incorrectly	Refer to the calibration instructions in section 3. Re-calibrate the tacho being sure to specify the correct number of cylinders and correct signal type. If unsure about the signal type try each of the other settings until the tacho reads correctly.

APPENDIX A – Cleaning the Tachometer Bearings

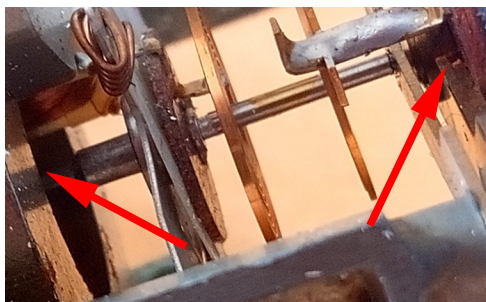
If the tachometer bearings are dirty this can cause the tachometer to behave incorrectly. The needle may not move smoothly at certain points and It may take a long time for the needle to start moving. This will make the tachometer inaccurate and can also cause a problem during calibration as it may be impossible to stop the needle at the desired point.

It is important to note that the forces involved in moving the needle are very small so the needle may appear to move freely when moved by hand even though the bearings need cleaning.

Cleaning the bearings with Spray Cleaner

The tachometer movement is very delicate so it is not advisable to disassemble it for cleaning. In most cases it is sufficient to spray the bearings with a suitable cleaner. It is important to use a cleaner which does not leave a residue – suitable cleaners are Brake Cleaner, Carb Cleaner or Non Residue Contact Cleaner. **Do not use** maintenance sprays such as WD40 as these will damage the movement. Make sure that you use a spray with a straw so that you can direct the spray accurately.

Before spraying the bearings protect the dial from the spray by placing some tissue around the base of the needle. Spray both the upper end lower at each end of the main shaft as shown in the photo below. After spraying, move the needle back and forth a few times to work the cleaner into the bearings. Leave the Tachometer for a few minutes to allow the cleaner to dry and then re-calibrate the tachometer. This method usually produces good results but in some cases it may be necessary to repeat the procedure two or three time to resolve the issue.



Cleaning the bearings with an Ultrasonic Cleaner

If you have an ultrasonic cleaner then this can be used to clean the movement. The ultrasonic cleaner should be filled with pure water as cleaning fluids may leave a residue. The circuit board should be removed before cleaning as water would damage the calibration button. You will also need to remove the needle and dial before cleaning. To remove the needle first protect the dial with thin cardboard and then use two teaspoons as levers to prize the needle from its shaft as shown in the photo below (in this picture a blob of Blu-Tack has been placed on the centre of the needle to prevent it from flying too far when it releases). Once the needle has been removed, undo the two securing screws and the dial can then be lifted away from the movement.

