A GENTLEMAN'S GUIDE

TO

SMITHS ELECTRONIC TACHOMETERS

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A gentleman's guide to Smiths electronic tachometers

Introduction

Smiths Motor Accessories produced a variety of tachometers, not to mention a wide range of other automotive instruments, over the years. Many English and European cars were fitted with these devices and electronic tachometers were also sold as accessory instruments. In some cases, the original equipment instruments were branded “Jaeger” but were otherwise the same.
There are three broad classes of tachometer (and speedometer) – mechanical, electrical and electronic.

Mechanical, cable-driven tachometers were of three types:

Type	Identification	Approximate usage period:
Governor	X.nnnnnn	Supplied from 1920 to late 1940s
Chronometric	RC nnnn	Supplied from 1930 to 1970s
Magnetic	RN nnnn RSM nnnn	Supplied from 1940s to mid/late 1980s RSM mainly/only used for motorcycles

The above tachometers had the same internals as the comparable speedometer, without the odometer bits, and were driven by a cable connected to the camshaft or distributor, as in the Spitfire, Vitesse etc. The chronometric type was mostly found on motorcycles although chronometric instruments were frequently fitted to “competition” cars due to their excellent accuracy. ***(Some faultfinding information for cable-driven instruments is provided in appendix B to this document.)***

Two classes of electrical tachometer are found:

Type	Identification	Approximate usage period:
Voltmeter	RV nnnn (early Xnnnnn & Znnnnn)	Supplied from ???? to late 1950s
Electromag	RE nnnn	Supplied from 1930 to 1970s

RV electrical tachometers are often found on earlier Jaguar cars. These use a generator mounted on the engine, usually attached to the camshaft, and the indicator is a voltmeter that measures the voltage produced by the generator and is calibrated in rpm rather than Volts. These used the same style meter movement as used in the Smiths electronic tachometers until the early 1970s.

Electromag instruments were a hybrid electro-mechanical instrument only ever fitted to commercial vehicles, primarily Leyland, and comprised a multi-phase generator as a sensor and an electric servo-motor driving a magnetic movement to indicate speed.

With the advent of transistors and, later on, integrated circuits these were utilised to eliminate expensive transmitters and drive cables. These electronic instruments could be readily fitted to any car, either as original equipment or as an accessory after a vehicle had been purchased. Various types were manufactured. The RVI and RVC types detect pulses generated by the ignition system or, for the RVP type, a pulse generator fitted to the diesel engine.

Electronic impulse tachometers:

Type	Identification	Approximate usage period:
Current sense	RVI nnnn	Supplied from mid 1960s to early 1970s Two distinct types of RVI were produced but external wiring is similar for each.
Contact (voltage) sense	RVC nnnn	Supplied from early 1970s
Pulse generator	RVP nnnn	Used for commercial diesel vehicles and worked with an external generator similar to the RV device. Not often seen. Usually 24V.

The remainder of this document will deal only with RVI and RVC electronic tachometers.

Identifying a tachometer:

Mark Olson of Accutach uses a scheme for categorising the different Smiths tachometers and I am not about to re-invent the wheel so have used his system within this document. Mark's document can be found at https://accutach.com/smiths-tachs and it is well worth looking at. To summarise, tachometers are classed as three "generations", to which I will add two further classes, generation 0 and generation 4. These generations are:

> **Generation 0** (**RV**) - an electrical tachometer which required a generator producing a voltage proportional to r.p.m Circuitry comprised a full-wave (bridge) rectifier and a wire-wound calibration resistor. The movement in these instruments is essentially the same as that used in generation 1 to 3 instruments.
>
> **Generation 1** (**RVI**) – the first electronic Smiths instrument which used two transistor in a monostable multivibrator configuration. These instruments used an inductive pickup to sense ignition current. The transformer primary connection was by way of a loop of wire in series with the ignition coil attached to the rear of the case.
>
> **Generation 2** (**RVI**) – also used inductive coupling to the ignition system but used a single transistor in a blocking oscillator circuit. The transformer primary winding was inside the case and connected to the car via two bullet connectors – one male, one female – mounted on the rear of the case.
>
> **Generation 3** (**RVC**) – sensed voltage spikes at the coil to trigger the instrument. An integrated circuit is used to drive the meter. Connection to the coil was by either a single bullet connector on the rear of the case or to a multi-pin bullet connector on connecting wires from the case.
>
> **Generation 4** (**RVC**) – A new meter movement but a similar circuit to, and using the same integrated circuit and voltage sensing as per "gen-3" above. Meter mounting screws in a "Y" pattern rather than the previous rectangular pattern. Connection to the ignition coil is by way of a single male bullet connector protruding from the back of the case.

The RVI and RVC Smiths electronic tachometers

In the "good old days", automotive ignition systems used a set of points to switch a few amps of coil current to produce a spark. The first Smiths electronic tachometers sensed these current pulses which were displayed as rpm on the tachometer dial.

These "RVI" tachometers sensed these current pulses using a current transformer to transfer these pulses to the tachometer circuitry without any direct connection to the ignition circuit. This kept voltage spikes present on the "low tension" side of the coil, possibly several hundred volts, from damaging the relatively fragile and expensive (at the time) transistors inside the instrument. These instruments are identified by the letters "RVI", followed by numbers printed on the dial. These identification characters are sometimes printed on the edge of the dial and may be hidden in normal use by the instrument bezel.

As noted earlier, there are two quite different versions of the RVI tachometer. These can be differentiated as follows.

The "early" gen-1 type instrument has a pulse lead looped through a small nylon block with a metal bracket outside the case, this type using two transistors in a monostable multivibrator circuit.

The "later" gen-2 type instrument has two bullet type connectors protruding from the rear of the case and a single transistor blocking oscillator monostable circuit inside.

There is no real difference in the external wiring between the gen-1 and gen-2 type tachometers, both of which are marked "**RVI**". The pulse leads are placed in series with the

coil, either in the coil supply lead from the ignition supply to the coil or between the coil and the distributor.
Later, electronic ignition systems came in to play where the current supply to the ignition system was much lower than could be sensed by the RVI type tachometer. An "RVC" type tachometer will normally work with these systems. A single pulse lead is present and connects to the distributor side of the coil or the tachometer output present on some systems. No other changes need be made to the wiring.

RVI tachometer:

NOTE: This type of tachometer will not work with most electronic ignition systems without some modification. Electronic points replacement devices are no problem but full electronic ignition systems are a major pain. Try and obtain a suitable RVC type if fitting an electronic ignition system. If an early RVC instrument can be obtained, one using the same style of movement, then the pointer and dial from the original instrument can be fitted to the replacement unit.

There are a number of options available to allow RVI tachometers to work with later ignition systems. Possibly the easiest I have seen are the TM-02-I-Drive model at http://www.technoversions.com/TachMatchHome.html and the Smiths RVI buffer device at https://www.spiyda.com/magento/index.php/vehicle-electronics/tachometer-electronics/smiths-rvi-buffer.html .I have not tried either device. Other options mainly involve modification to the internals of the instrument.

RVI OEM tachometer:

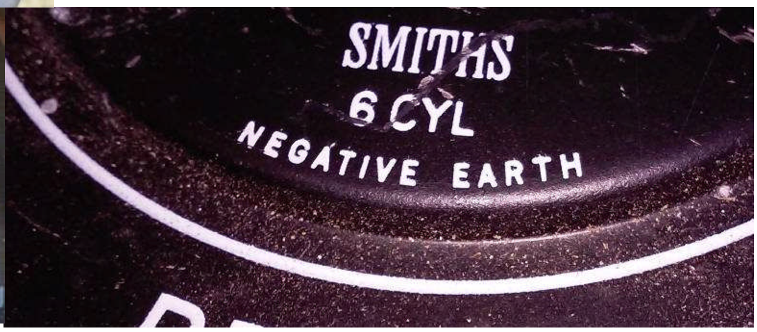
As noted above, there are two versions of the RVI type tachometer. The rear of the early type looks like this:

CAUTION:

If the connections on the back of the tachometer look like those in the left-hand picture, be very careful. This is the early type of tachometer and was produced in both positive and negative earth versions. With any luck, it will be marked on the dial as below.

Note the quality pulse lead wiring here! There is nothing special about the pulse lead wire, so replace with a new length of wire or use bullet connectors rather than risk later problems with faulty joints.

Use 16 AWG/1.5 mm or 18 AWG/1.0 mm wire for this job.

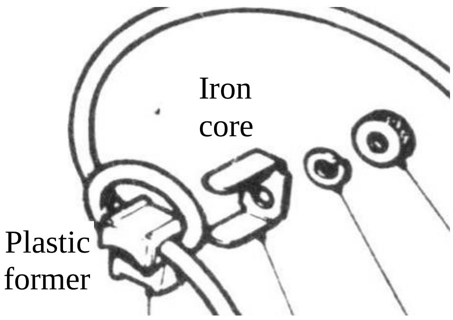


A FURTHER WORD OF WARNING:

Some positive earth instruments may have been internally converted to negative earth. If you are buying a second-hand tachometer, marked "positive earth", check with the seller as to the electrical polarity of the vehicle it came from!

Any tachometer that relies on the case for one of its supply connections will be toast if connected to a vehicle of opposite polarity. Refer to "Checking an electronic tachometer" below to determine this. Also note the polarity on the dial of the instrument and if it does not agree with what you have determined then get it checked out.

The early impulse pickup assembly is shown in detail below.

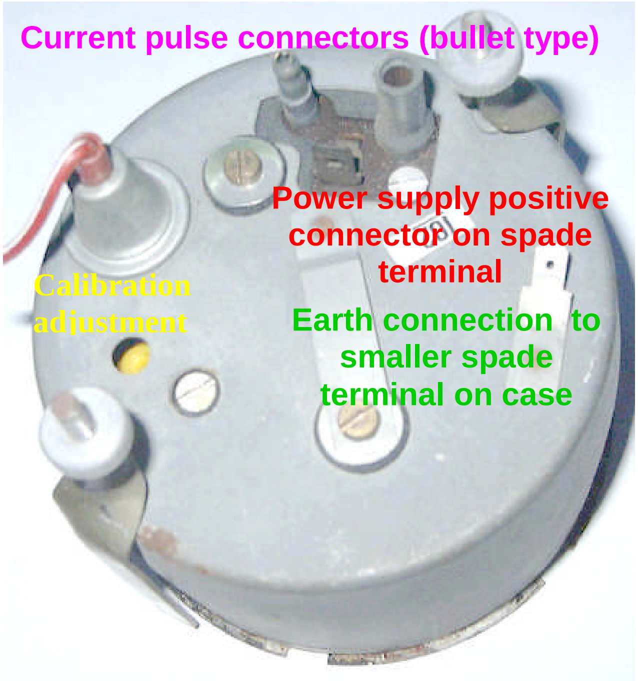


Early type RVI pulse lead assembly

A most important piece of the pulse lead assembly of the early RVI tachometer is the "Iron core". Without it, the tachometer will not work! One could easily be made if required. This "little bit of tin" completes the magnetic circuit that allows the tachometer to sense pulses. If you have to make a new one, the best material to use is "soft-iron" from an old power or audio transformer but any mild steel will do.

The plastic former shown in the diagram holds the pulse lead in place and prevents the wire chafing against the case and shorting out. A replacement could be fabricated from a piece of polyethylene (from an old plastic chopping board for example).

The following photograph shows the connections to the later RVI tachometer. A Triumph 2000 instrument (naturally) from an earlier Mk II PI. Later Mk IIs used the RVC type tachometer.



Later RVI tachometers have the whole pulse coil assembly inside the case with connections brought out to bullet connectors as shown.
This later type appears to have been produced in negative earth versions only for OEM instruments but see note below.

Note the yellow object inside the case and labelled "Calibration adjustment". This is a potentiometer that may be used to fine-tune the calibration. This adjustment, requiring only a small blade screwdriver, is often covered with a piece of adhesive paper or in some cases, a rubber plug. When finally fitting the tachometer to the vehicle, place a piece of adhesive tape over this hole to keep dust out.

Note:
It is not known for sure but it is possible that some positive earth instruments of this type exist. Two different circuit boards have been found inside this tachometer. One could only ever be used on negative earth vehicles, the other could be fitted to cars of either polarity though this would be as a "factory option" rather than a user option.

One instrument fitted with the alternate board is the RVI 1050/06A (right) which was fitted to Rover 2200, some Morgan vehicles and possibly supplied in some BMC cars. It may have been fitted to early production, positive earth, models. This is a 3¼ inch diameter instrument with a spun-on bezel but no polarity marked on the dial (for this particular negative earth instrument).

RVI accessory tachometer

There were two styles of this tachometer – an 80mm metal-cased unit and a “pod-style” instrument in a plastic case. Internally the pod-style instrument uses the later blocking oscillator circuit.

The 80mm RVI accessory instrument shown at left is the early type gen-1 tachometer.

The three terminals at the bottom of the case are the power supply connections and early models had provision for both -6 Volt and -12 Volt supplies. The middle terminal is the positive connection. These tachometers could be fitted to positive or negative earth vehicles as the electronics inside were isolated from the metal case.

Pulse leads are white and, when new, are marked with short red and black sleeves near the end of the wires. The red marked wire should connect (for a negative earthed vehicle) to the ignition supply.

The plastic-cased RVI 5000 series variant shown at right used the later blocking oscillator circuit. Isolation of the internals from the vehicle chassis allowed these to be fitted to both positive and negative earth vehicles. These were also fitted to Volvo 132GT vehicles as standard equipment as models RVI 5411/xx and RVI 5413/xx instruments.

RVC tachometer:

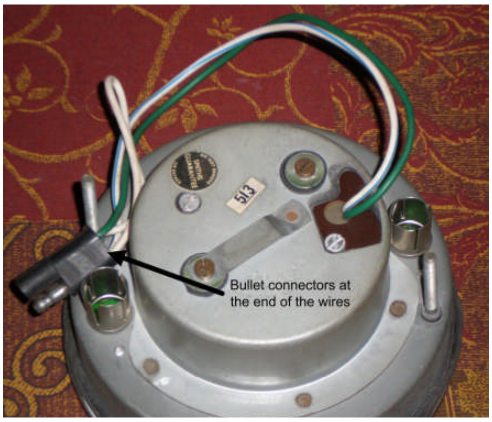
RVC OEM tachometer:

Where the RVI tachometer senses current in the ignition circuit, the RVC type senses voltage pulses at the coil. The RVC tachometer will work with most ignition systems. They connect to the coil on the points side and require no further modification of the cars wiring beyond providing power and light to the unit.

The early model RVC tachometer, with meter mounting holes in a rectangular pattern, is known to have been fitted to MG and Jaguar vehicles between 1970 1972. The “MGB-style” (left) looks almost identical to the later RVI model except that the dial is marked “RVCxxxx” and the female pulse lead bullet connector is replaced with a rubber plug.

Jaguar vehicles used this same model tachometer with the pulse and supply leads brought out to a 4-pin connector with a white wire looped between two of the pins (below right).

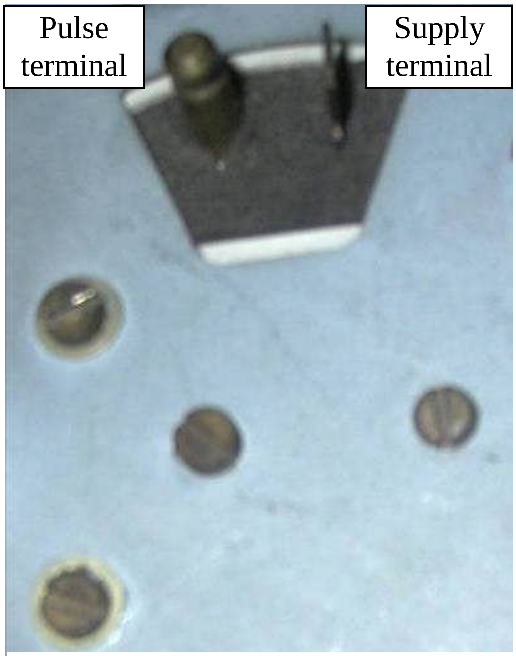
Rubber plug here in lieu of female bullet connector on the RVI tachometer.



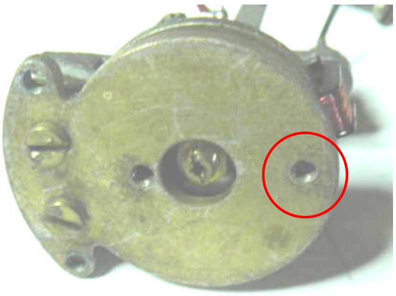
Jaguar tachometer photo courtesy of Mark Olson, Accutech.

Connections in a late model RVC OEM device consist of a blade connector for power supply, the negative connection is to the case and the pulse lead is a single "bullet" type connector as shown at right. Note the different mounting screw layout compared with that earlier photographs.

NOTE: When removing these instruments from the case, do not lose the mounting screws, particularly the one on the "tail" of the Y. This screw secures the meter to the plastic base and screws into the circled hole in the picture to the right. Too long a screw here will foul the armature coil when the movement is re-fitted to the case. The original screw will often have only a few threads formed on it rather than being threaded over the full length.

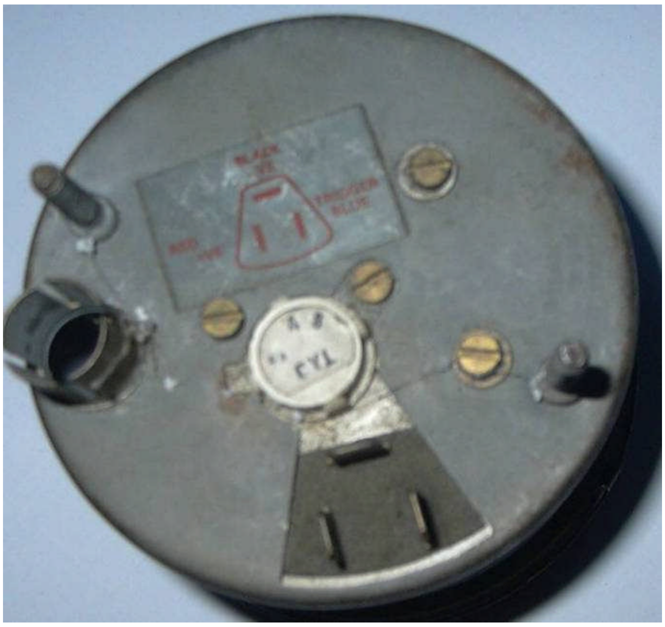


"Y" pattern mounting screw layout. The centre screw does not need to be removed to release the internals from the case.



RVC Accessory tachometer:

Pictures below show the rear of the "accessory" type RVC tachometer. As with the older RVI version, the case is isolated from the electronics inside.



Note the white selector switch above the terminals. This selector switch is only found on later instruments, early RVC tachometers used a potentiometer accessed through a hole in the rear of the case.
The lower picture is a close-up of the label setting out the connections for all these instruments.

The picture at left shows the RVC range's answer to the RVI 5000 series instruments. This is a small indicator designed to be mounted on a dashboard with sticky pads fitted to the base. Four wires (2 for meter, 2 for lighting) lead from the underside of the tachometer through a hole in the mounting panel, behind this indicator. All the electronics are housed in a rectangular metal case which is intended to be hidden below the mounting point. Power and pulse connections are made at the electronics unit and are the same as those shown above.

Checking an electronic tachometer

The following tables set out a few quick checks that can be made, prior to connecting, to determine if a tachometer has a chance of working. These are listed below for each type I have available to test.

The only tool required is a multimeter that can measure both resistance (Ohms) and current draw in milliamps. Generally a digital meter has the red lead positive on resistance ranges, where it is negative on an analogue multimeter. To make life easier, tests have been carried out using each type of meter and the results set out in separate tables for each multimeter type. Where resistance values are given, these will help determine the polarity of the tachometer.

The "supply" terminal is the one that connects to the car's ignition controlled supply, the other lead to case earth. For accessory-type tachometers, which have isolated terminals for positive and negative, the "supply" terminal for these measurements is the positive terminal of the tachometer.

THE RESISTANCE READINGS ASSUME A NEGATIVE EARTH TACHOMETER BUT IF THE READINGS ARE "BACK-TO-FRONT" THEN, EITHER THE POLARITY OF THE MULTIMETER LEADS IS NOT WHAT YOU THOUGHT OR THE TACHOMETER IS POSITIVE EARTH. CHECK POLARITY OF METER LEADS FIRST.

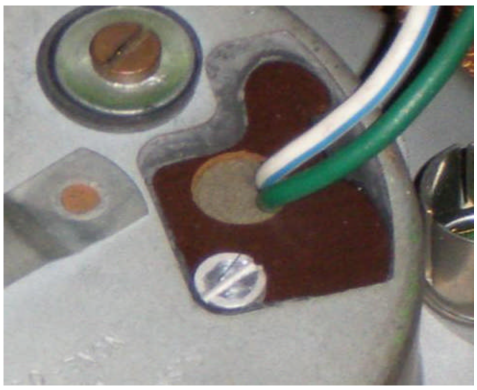
Perform the resistance check first, using the nearest range on your meter to that given in the table. Avoid using the higher resistance ranges on multimeters.

Note: *The measured resistance may "wander" when the meter leads are first connected to the instrument. Allow reading to settle down to a steady value before checking against values provided.*

If resistance checks are satisfactory proceed to check the current drawn by the tachometer. In any event a substantially different resistance or current reading, lower or higher, than the range provided in the table implies a fault in the tachometer.

Note: *The values in the tables below apply only to instruments fitted with their original Smiths circuit boards. If the internals have been altered or replaced quite different readings are likely to be noted.*

If testing Jaguar tachometers, make sure you identify the correct type, which is printed on the dial but may not be legible. The left-hand tachometer in the picture is a Jaguar gen-2 RVI tachometer (two white leads from inside case), the one on the right a gen-3 RVC (single white/blue lead from inside case). Use tests below appropriate for type.



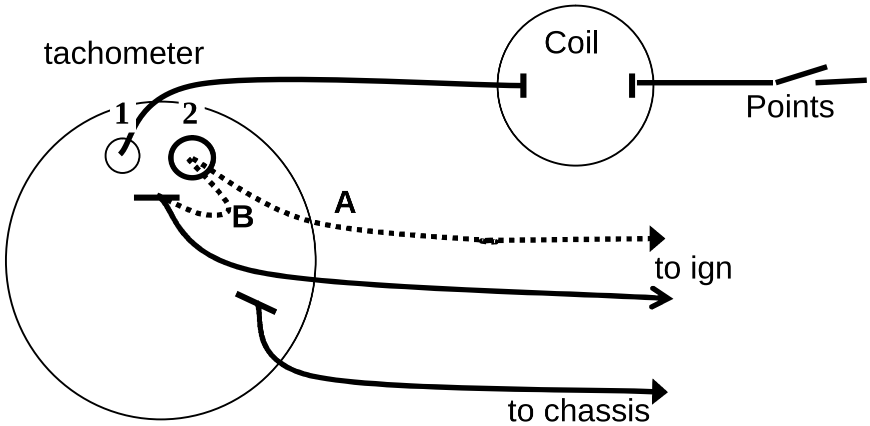
TEST METHODS – DIGITAL MULTIMETER (Red lead positive)	**TACHOMETER IDENTIFICATION**
RVI gen-1 monostable type with external pulse coupling. Positive and negative earth OEM versions available. One instrument tested using meter's **0-2000Ω** range. Measured resistance should be in the range 600Ω to 700Ω with the red meter lead to supply terminal. Measured resistance should be in the range 300Ω to 400Ω with the black meter lead to supply terminal. Tachometer draws about 50mA to 60mA from power supply with no input pulse. No current indicates an open circuit inside the tachometer. A significantly different current indicates tachometer needs service.	
RVI gen-2 blocking oscillator type with internal coupling. Two instruments tested using meter's **0-2000Ω** range Measured resistance should be infinite (no reading) with the red meter lead to supply terminal. Measured resistance should be in the range 150Ω to 300Ω with the black meter lead to supply terminal. Tachometer draws no indicated current from power supply with no input If a current is measured with no pulse input, transistor is leaky/shorted. This test does not detect open circuit transistor, resistor or open winding in the pulse transformer..	
RVC gen-3 early type with rectangular pattern mounting screws. No instruments available to test	
RVC gen-4 later type with "Y" pattern mounting screws. Negative earth OEM instrument only. Five instruments tested using meter's **0-20kΩ** range Measured resistance should be in the range 6000Ω to 7000Ω with the red meter lead to supply terminal. Measured resistance should be in the range 4500Ω to 5000Ω with the black meter lead to supply terminal. Current draw with no pulse lead connected is about 30mA.	

TEST METHODS – MOVING COIL MULTIMETER (Red lead negative)	**TACHOMETER IDENTIFICATION**
RVI monostable type with external pulse coupling. Positive and negative earth OEM versions available. One instrument tested using meter's **Rx100Ω** range. Measured resistance should be in the range 600Ω to 700Ω with the red meter lead to supply terminal. Measured resistance should be in the range 900Ω to 1200Ω with the black meter lead to supply terminal. Tachometer draws about 50mA to 60mA from power supply with no input pulse. No current indicates an open circuit inside the tachometer. A significantly different current indicates tachometer needs service.	
RVI blocking oscillator type with internal coupling. Two instruments tested using meter's **Rx100Ω** range Measured resistance should be in the range 150Ω to 300Ω with the red meter lead to supply terminal. Measured resistance with the black meter lead to supply terminal should be infinite (no reading). Tachometer draws no indicated current from power supply with no input If a current is measured, with no pulse input, transistor is leaky/shorted. This test does not detect open circuit transistor, resistor or open winding in the pulse transformer..	
RVC early type with rectangular pattern mounting screws. No instruments available to test	
RVC later type with "Y" pattern mounting screws. Negative earth OEM instrument only. Five instruments tested using meter's **Rx100Ω** range Measured resistance should be in the range 3000Ω to 5500Ω with the red meter lead to supply terminal. Measured resistance should be in the range 4500Ω to 5500Ω with the black meter lead to supply terminal. Current draw with no pulse lead connected is about 30mA.	

Fitting a tachometer to the car – and getting it working!

Assuming the polarity is correct for the target vehicle, then the 12 Volts can be connected to the instrument. Next the impulse leads need to be connected. These too are polarity sensitive but getting them wrong will not do any harm.

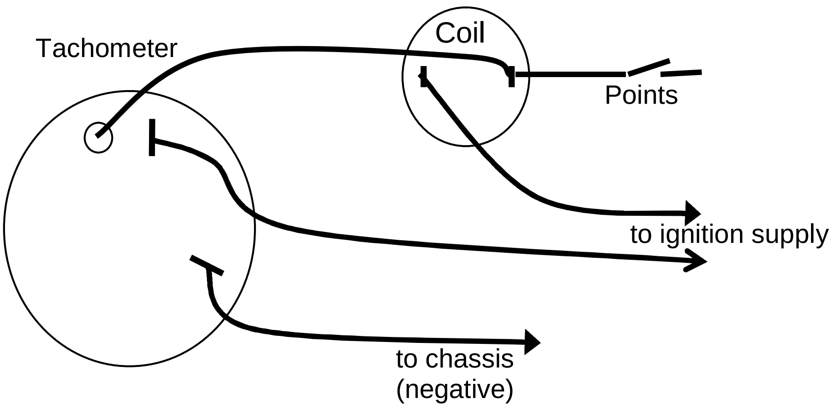
The diagram below shows how to connect the later RVI instrument. Illustrations in Appendix A show the earlier type.
While it is possible to place a jumper as shown at "B", the connection "A" may assist to reduce noise in the car's sound system.



This should have the tachometer displaying rpm. If not, check first for smoke (supply polarity wrong) then for 12 volts between the case and the spade terminal. If this is OK then swap leads at terminals 1 and 2. If the tachometer is still not working then it needs repair.

Check for correct voltage, start the engine and the tachometer should read. If not, reverse the connections of the white pulse leads only and re-try. If it still doesn't read and the supply voltage is present and correct, you have a dead tachometer.

The sketch below shows how all OEM RVC tachometers are connected.
The accessory tachometer is wired similarly – refer Appendix A.



You should now have a working tachometer fitted to the vehicle.

Should the engine not run and if you have replaced an RVI tachometer with an RVC type then check that the old tachometer pulse leads have been joined together. Failing to do this, or to run a new ignition supply lead to the coil, will leave the coil unpowered. In a car with a ballasted coil, there will be spark when cranking the engine but not otherwise!

If the tachometer is not working, recheck the voltage supply to the instrument paying particular attention to the earth connection. Do not rely on a terminal placed under a mounting nut. Use the spade connector on the case, or if not present, secure the connection under one of the meter mounting screws on the case, using a proper terminal rather than a loop of wire.

If the tachometer is an RVI type check the pulse leads are correctly connected in series with the coil. It may be that the tachometer will indicate with the pulse leads reversed but runs out of "puff" once the revs get up a bit. Try swapping the pulse leads (again) to see if it works/improves. (This should not be an issue if replacing an OEM unit with an equivalent replacement unit.)

Recheck the pulse connection. For an RVC type meter make sure the pulse is taken from the distributor side of the ignition coil.

In the case of a late model RVC tachometer reading zero with the engine running, firmly tap the tachometer glass a couple of times to free a stuck meter. These instruments are prone to the needle sticking at zero. It may be that it will also free up itself at higher revs.

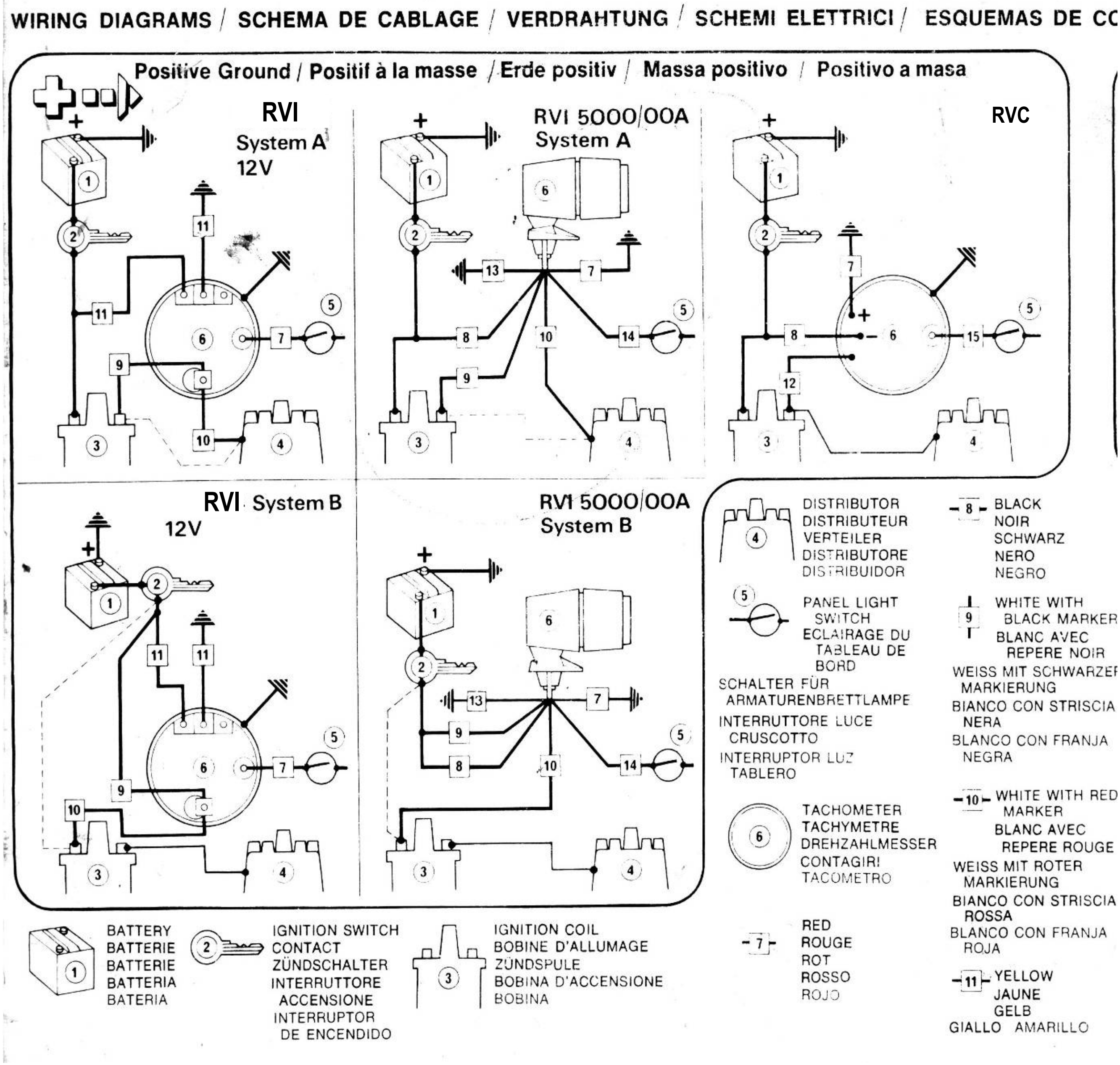
If everything seems to be correct but the tachometer is not reading correctly, most probably the needle wavers at higher revs, check the points gap, condenser and coil.

If possible re-check the current drawn by the tachometer. There should be some but it will only be a few tens of milliamps. If no current can be measured, the instrument needs servicing.

The tachometer may need servicing. If you are a dab hand with a meter and soldering iron and have some basic knowledge of electronic circuits, then almost all the data you need is available on the internet. Otherwise find someone with the necessary skills to check/repair it.

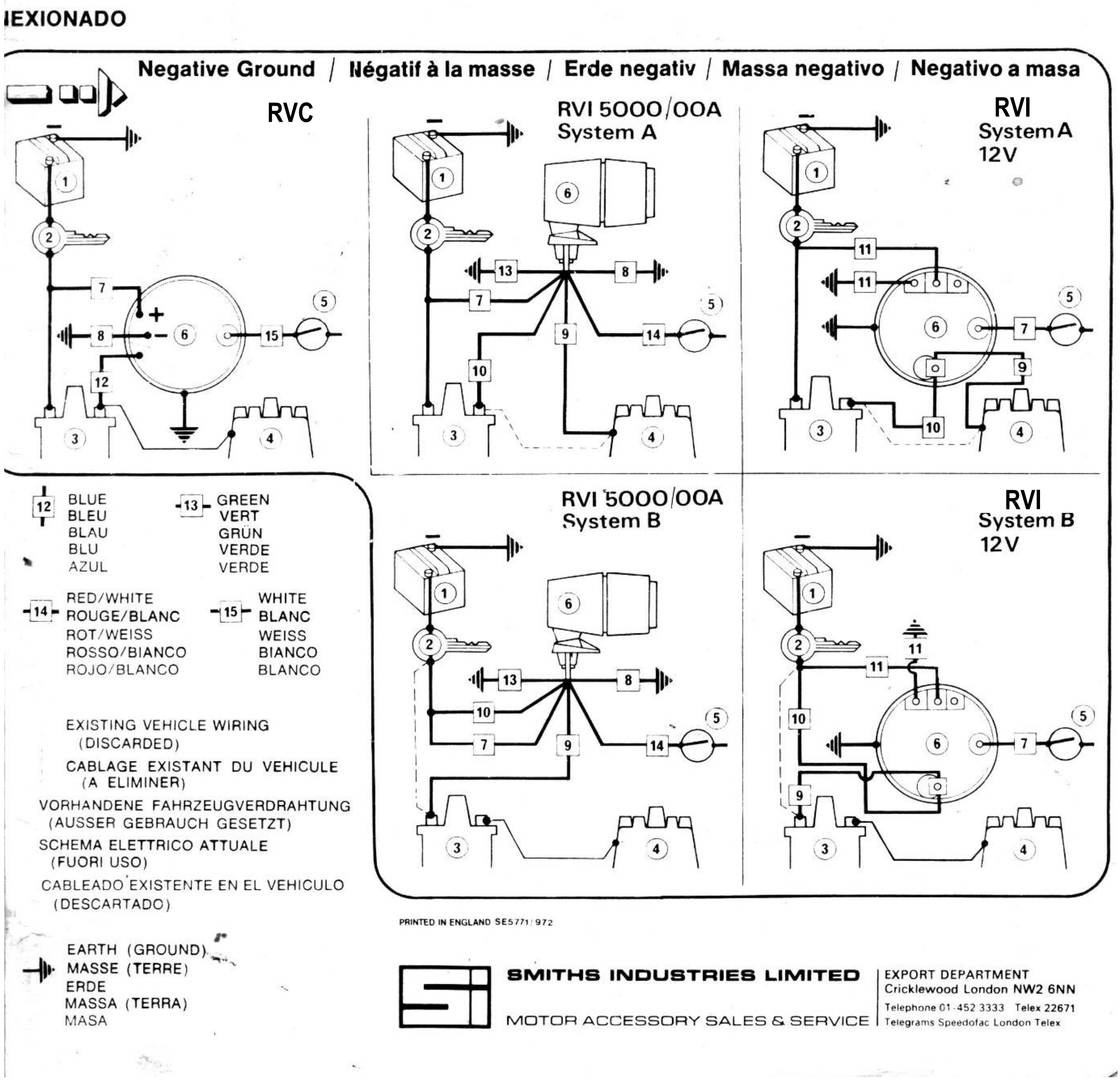
Appendix A – accessory tachometer wiring

Positive earth vehicle



Appendix A – accessory tachometer wiring continued

Negative earth vehicle



Appendix B – Possibly useful information ?

Mechanical tachometer woes

Mechanical tachometers are fairly reliable but will lose accuracy over time and will need re-calibrating. Internal wear can also cause them to lose accuracy and read erratically. Some special equipment is required to recalibrate these.
Some faults with these tachometers are external to the instrument or caused by external effects. The following table provides some troubleshooting tips for these tachometers.
Note that these "faults" also apply to any cable-driven instrument such as a speedometer.

SYMPTOM	PROBABLE CAUSE	TROUBLESHOOTING/SOLUTION
Instrument doesn't read	Drive/drive cable faulty.	Disconnect drive cable from instrument and remove inner drive cable. If broken or worn then replace. Replace drive cable and check the inner cable turns when engine cranked/run. If cable serviceable, refer to "Needle doesn't move…" below.
Needle doesn't move or pointer moves erratically	Internal wear and instrument needs repair. Inner drive cable may be too long.	Wear in the instrument. Speedcup (drag-cup) is pinched between thrust plate in rotor and top bearing in older instruments. This could be due to old age and/or a too long inner drive cable. There must be no end thrust applied to the instrument head by the drive cable. Check the length of the inner drive cable by undoing the cable nut at the rear of the instrument and check that the ferrule on the end of the outer cable butts up to the instrument body readily without applying any force to the instrument.
Needle wavers at low revs	Drive cable	The drive cable needs replacing. Also check instrument shaft is not binding or hard to turn else a new cable will only be a temporary fix.
Needle flicks to full scale or beyond	Severe internal wear or oil in instrument.	Replace or repair instrument.

Instrument drive cables comprise an inner wire core with closely wound layers of thin wire wound over this core. Each layer is wound in the opposite direction to the previous one. The end result is a cable with very little torsional movement (twist) when new. These wear over time and allow the cable to "wind-up" in use. This leads to erratic operation or "wavering" in the needle at lower indications.

Miscellaneous

Smiths bezels incorporated a resilient material to hold the instrument glass. Over time, this loses its resilience and may "bleed" onto the glass and bezel. For 4" instruments, replace with 4mm diameter sponge rubber cord. For 2" instruments, 3mm sponge cord works well. Para Rubber do/did stock 4mm sponge cord. Rubbermark stock 3mm and 4mm sponge cord. Rubbermark's stock codes are:

73.16030N SPONGE CORD 3MM DIA (Neoprene)
73.16040E SPONGE CORD 4MM DIA (EPDM)

To remove the old (formerly) resilient material from chrome bezels:

1. scrape out with a piece of wood (toothpick e.g.) or plastic. If it's so hard a toothpick won't touch it then go to 2.
2. soak the bezel in methylated spirits overnight and remove the resulting gunge with a toothpick or stiff brush (an old toothbrush works just fine) as appropriate.
3. Repeat step 2 until clean.

Give the bezel a touch up with metal polish once cleaned.
Do not soak (black) painted bezels or the paint finish will be damaged.
Note that chrome-finish bezels are made from brass and painted bezels are steel. (It may be that older bezels are brass, newer are steel.)
Join rubber foam cord and if using contact adhesive a butt joint should be OK. If using cyano-acrylate (Super-glue) or similar rigid adhesive, use a lap joint.
Make sure all the rust and old rubber has been cleaned from the outer rim of the instrument case before refitting the bezel. A light smear of K-Y jelly (the best rubber lubricant known to man!) on the sponge cord prior to assembly helps too.

Getting an RVI instrument to work with electronic ignition systems.

RVI instruments sensed current pulses in the ignition coil circuit and are designed to work with coil current pulses of 3 – 4 Amps.

If a Transistor Assisted Ignition (TAI)/Transistor Assisted Contact (TAC) system is installed with an original specification coil then the RVI tachometer should continue to work. Products such as Pertronix "Ignitor I" and "HotSpark" kits fall into this category. If a higher performance coil is fitted, some of these TAI systems may not be able to handle the current and will fail sooner rather than later. The tachometer also may misbehave. This may be "fixed' by reducing the number of turns of the pulse lead in the pickup. Pertronix provide some information on this modification at http://support.pertronix.com/kb/faq.php?id=34 .
RVI tachometers may not work with systems that alter the dwell time of the ignition system as Lumenition ignition systems appear to do.

For those readers with an interest in the technical aspects of the operation of these instruments, the following is Smiths description of operation for the gen-1 instrument. It is assumed that the gen-2 instrument operates similarly sensing points opening rather than points closing.

> "The primary of the triggering transformer (T) is connected in series with the primary of the engine ignition coil, so that when the contact breaker in the engine distributor closes, the current flowing to feed the ignition coil passes through the primary of the transformer energising the core. When the contact breaker opens to provide a spark to the engine, the flux in the transformer core collapses and appears as a short duration voltage pulse across the secondary of the triggering transformer."

Any ignition system that does not permit the tachometer's triggering transformer to fully energise (saturate), or "de-energise" will adversely affect operation.

For Capacitor Discharge Ignition (CDI) systems, RVI tachometers are best replaced by an RVC type. CDI ignition systems run at several hundred volts which exceeds the rating of automotive electrical cable. Voltages of this magnitude behind the dash don't bear thinking about. Similar comments apply to RVC tachometer wiring and this would need to be considered for any CDI system without a dedicated tachometer output.

Changing a mechanical tachometer to an RVI electronic type:

Smiths did not make this easy! The dial fixing screws on the mechanical tachometers (and speedometers) are spaced 23mm apart and in line with the spindle. Not so for the electronic tachometer. The mounting points are usually 34mm apart and offset 2.5mm above the spindle.
(If the movement was from a RVI 5000 series instrument, dial mounting points are 24mm apart also with the 2.5mm offset.)
It would be a relatively straightforward exercise to make an adaptor plate to accommodate the dial from the mechanical unit.
BUT.
Not only is the dial mounting different, the spindle size is smaller causing the pointer from the mechanical unit to sit too close to the dial, possibly touching it and almost certainly fouling on the mounting screws.

I can't find any Smiths electronic tachometer using the same pointer as the Spitfire/Vitesse. Some MG and Hillman tachometers use the same style of pointer but they differ in colour. (Orange pointer/black hub/silver centre where white/white/black is required. Austin Healy comes close with white/black/silver.) As far as I can determine, all Vitesse, GT6 and Spitfire (up to MkIII) tachometers are mechanical (RNxxxx) types.

Spitfire/Vitesse
(Mechanical)

Austin Healy
(Electronic)

Hillman/Rootes
(Electronic)

Changing a mechanical tachometer to a later RVC electronic type.

Early RVC instruments used the same movement as the RVI so the above comments apply. The later RVC movement has spindle and dial mounting holes in-line but this is not much help. The spacing of the mounting holes of the later RVC meter is 29mm. They are also vertically aligned but this is not a problem as the instrument can be rotated 90 degrees in the dashboard in any case.

The bad news is that the spindle taper is significantly smaller than that of the earlier meter. Some form of adaptor would be mandatory here.

The most realistic option may be similar to that at:
http://ccts-inc.com/SPITFIRE/Tach%20Conv.htm .

To repair an existing electronic tachometer by replacing the electronics -
http://www.dummett.net/ime/website/ime/a2z/electronic_tacho_driver_using_LM2917N.html
Bear in mind that these meters were always intended to be driven by pulses, not a continuous current. There may be an issue with long-term reliability here.

Another option to replace the electronics of a Smiths electronic tachometer is found at:
http://www.dinoplex.org/tachoconversion/