

MY MGB TOOLS AND SPARES

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This paper addresses the tools and spares you should have in you car whilst on the road and in your workshop. Additionally some troubleshooting advice is provided based on the solutions found after many hours of chasing intermittent faults.

Accordingly I list below what I think are the essential instruments, tools and equipment for both roadside and workshop use. Note that many of the specialist instruments are available on ebay at ridiculously cheap prices.

ON THE ROAD



Figure 1 Roadside Repairs and Warning Triangle

Make your road trips safer and more pleasant by carrying appropriate tools and spares with you. My first recommendation is that you should join a motoring club such as RACQ or NRMA. Membership should include roadside assistance when in extreme instances, they provide a towing (or flattop) relocation service to either your home or to a nominated repairer.

Whether it is a puncture or mechanical fault, you should attempt to leave the road and find a safe place away from passing traffic. Changing a wheel on the offside (driver's side) puts you in serious danger of being hit by a passing vehicle. Regardless, you should have a warning triangle set up some 30 metres behind your car see Figure 1.

CAUTION – Do NOT work under the car unless you have axle stands available – AND use them!

Safety Equipment

Safety equipment for roadside work should be considered including:-

- High visibility (yellow or orange) jacket.
- Thin cotton disposable ones so that after the wheel change or repair, they can be discarded before getting back into your pristine car!
- Fire Extinguisher.
- First Aid Kit.

Punctures

Modern radial ply tyres, unlike the probably original crossply tyres are very resistant to punctures except that they have less strength in the sidewalls and although you won't be driving on rock strewn roads, sidewall punctures can happen I had a sidewall pierced by a nail in the first week of ownership of a Subaru WRX – the replacement tyre cost \$350!

Jacking up the car. Please do not even attempt to use the original side lift jack that came with the new car as shown in Figure 2, it is highly likely that the tube welded to the underside of the sill has rusted away or has been crushed by somebody using a lift jack. Worse still is that with a nearside (passenger side) puncture the car will be at the extreme side of the road camber and probably not on the bitumen, and the flimsy jack may likely bend due to the lift angle. Additionally it is common in summer for the bitumen on rural roads to be so soft that all you will achieve is driving the jack base into the road surface! Sure – keep it nice and shiny in the boot for display at *Concours de Elegance* events.

Instead, buy a good scissor jack as shown in Figure 3 and carry a piece of 5 ply wood as a support when the ground is likely to be soft. With most scissor jacks, there is a notch at the lift point and this should be positioned under the sill lip so that lifting is on both the inner and outer sill as shown in the insert in Figure 3. Also position it at a distance of 300mm (one ft) away from the guard location to ensure the inner sill is in contact.

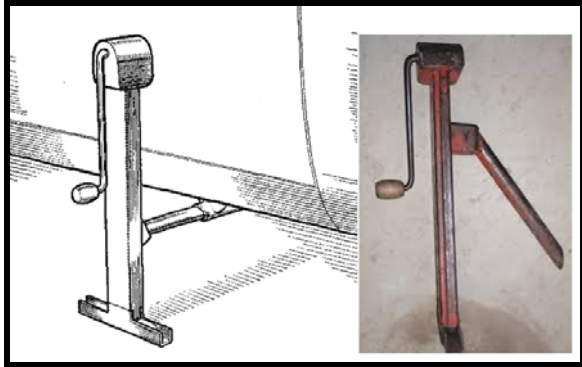


Figure 2 Factory Jack

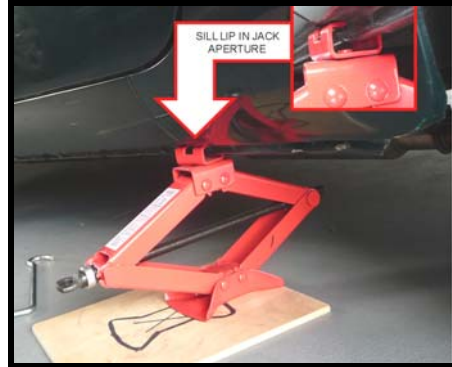


Figure 3 Scissor Jack

Finally, chock the front and rear wheels with chocks as shown in Figure 4. You should keep two chocks as part of your touring equipment.



Figure 4 Wheel Chock

Puncture Repair

If you cannot move the car to a safe place and remove the punctured wheel and replace it with the spare or effect a repair by plugging (tubeless tyres only), I would recommend that you use an aerosol tyre sealant so that you spend minimal time on the roadside and subject to the associated dangers, its cheaper to replace a tyre than your body!

Note that if you have wire wheels you will have tubes and sealants cannot provide a repair.

Regardless, the following equipment is needed as appropriate.

- Tubeless type plugs and replacement shraeder valve cores, see Figure 5.
- Aerosol tyre sealant – see Figure 6.
- A 12v accessory socket powered 12v air compressor with incorporated light. See “Electrical Systems” paper which details the fitment of 12v accessory sockets.

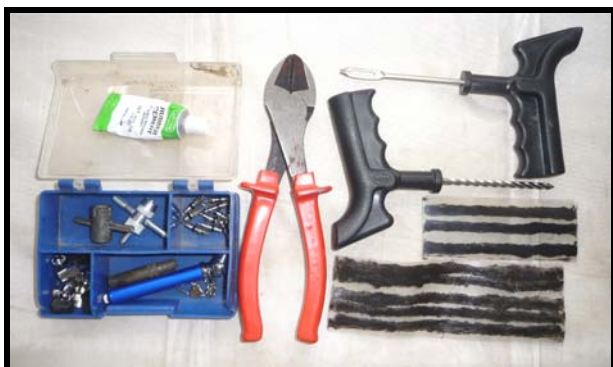


Figure 5 Tubeless Plug Repair Kit



Figure 6 Aerosol Sealant

Lighting

Work lighting should comprise of the following:-

- Lighting – a torch or preferably a 12v accessory socket powered one as shown in Figure 7 below. See “MGB Notes” which details the fitment of 12v accessory sockets.

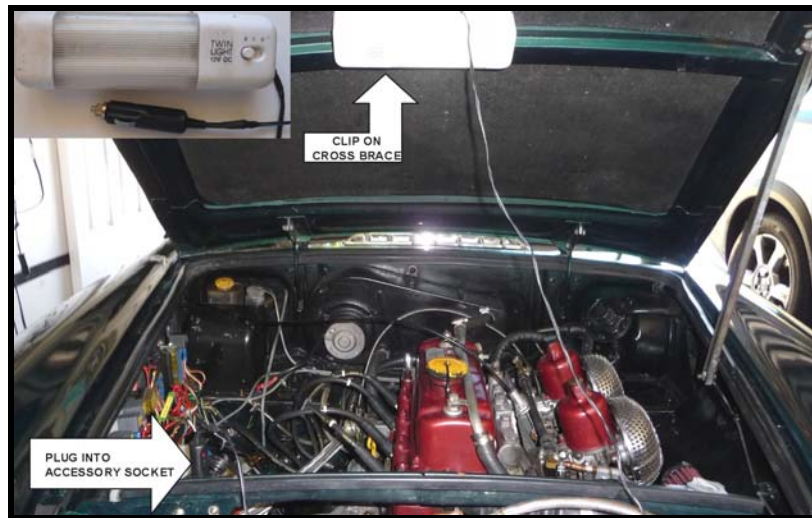


Figure 7 12v light

Jump Starting

There is always a problem in jump starting the MGB because the battery is under a panel* behind the seats, its even more difficult if the hood is up!

*Details of the twin 12v battery set up is provided in the “MGB Notes”.

To address this problem I have installed a box in the boot housing positive and negative terminals connected to the battery as shown in Figure 8. Obviously a set of jumper leads is required. Figure 8 also shows a 12v accessory socket suitable for either lighting or air compressor power.

An additional feature is a portable high current emergency battery as shown in Figure 9 to connect to the boot located jump start terminals on your or others’ cars; this is capable of starting a 6 cylinder diesel engine!



Figure 8 Jump Start & Accessory Socket



Figure 9 Emergency Battery

Maintenance Charging

To maintain battery charge and condition I have installed a wall mounted maintenance charger which plugs into the dashboard accessory socket as described in the “MGB Notes”. See Figures 10 and 11 below.



Figure 10 Maintenance Charger



Figure 11 Dashboard Charging Socket

Tools

The following should be part of your roadside tools.

- Various spanners*, flat blade and Philips screwdrivers, pliers, hammer, multigrips, sharp knife.
- * Note that the original MGB used inch AF (across flats) nuts and bolts.
- A 12v accessory socket powered 12v air compressor with incorporated light. See “MGB Notes which details the fitment of 12v accessory sockets.
- Multimeter.
- Sewing machine “three in one” oil for carburettor dashpots and moving parts lubrication.

Spares

I would recommend the following spares be carried:-

- Fuses – all sizes used and either flat blade or glass depending on the type of fuse box fitted.
- Full set of bulbs.
- Plug leads, preferably a full set but at least one being long enough for all locations.
- HT lead and rotor arm.
- Set of spark plugs.
- Radiator cap.
- Spare radiator and heater hoses, pre fitted with jubilee clips. See Figure 12.
- Spare fuel hose and filter.
- Fan belt. See Figure 12

If you are happy to repair or change fuel hoses, then you will need hose clamps to clamp off the fuel hose at the tank. See Figure 13.



Figure 12 Spare Hoses



Figure 13 Hose Clamps

If you are happy to effect wiring repairs by the roadside, the following will be required,

- Assorted wire and insulating tape.
- Crimping Tool and spade connectors, See Figure 14.
- 12V Soldering Iron See Figure 15.



Figure 14 Crimping Tool



Figure 15 12v Soldering Iron

Finally, to keep your MGB pristine, make sure that you protect the paintwork whilst leaning into the engine bay with this magnetic guard protector.



Guard Protector

IN THE WORKSHOP

Working on your MG can be either a pleasure or a pain. After many years (my early ones) as a marine engineer and my later hobby of building and racing cars, I have found that having the appropriate tools and equipment can make the task easier and rewarding.

Likewise, having the right tools available saves so much time from having to either visit a friend to borrow tools or your local tool merchant which is invariably shut – because you're working on the weekend! And please, have spare batteries available for all electrical instruments!

CAUTION

1. Do not use mains powered electrical equipment unless your house has an earth leakage circuit breaker. If not, use a portable protected power supply (ELCB) as shown in Figure 16.

Note that electrical equipment with two pin plugs as shown in Figure 17 are generally double insulated but without an earth pin, will NOT be protected by either the portable protected power supply or by a household earth leakage circuit breaker (ELCB).



Figure 16 Portable ELCB



Figure 17 Two pin plug

2. Be careful when using fluorescent lighting in the workshop because moving parts such as the engine fan may appear to be still. This is because fluorescent lights on ac electric systems produce light flickering at a frequency of 100 Hertz (Hz, cycles per second) when connected to a 50Hz electrical supply. Essentially, the power is turning on and off 100 times a second with the voltage varying from +240 volts to -240 volts 50 times or cycles a second. (50Hz 240v power supplies as in Australia, NZ or the UK)
3. Do not work underneath the vehicle unless it is supported by incompressible stands in appropriate places as described later in this paper.

Bodywork, Frame Repairs & Minor Steel / Aluminium Fabrication

Whilst I don't necessarily advocate major crash or rust repairs, having a welder and brazing equipment can be useful in your workshop. Accordingly I recommend the following:-

- Small gasless **MIG** welder using 0.9mm flux cored steel welding wire as shown in Figure 21.
- Dent puller as shown in Figure 22.
- Aluminium composite brazing rods and butane torch for fabricating small brackets etc from aluminium or zinc plated steel as shown in Figure 23.

Please don't try to use a "stick" welder on your MG you will just burn through body panels!

Remember to disconnect both positive and negative terminals on the battery before MIG welding!



Figure 21 MIG Welder



Figure 22 Dent Puller



Figure 23 Aluminium "Brazing"

Compressed Air Supply

A small pressurised air supply is useful in blowing out debris from fuel lines, floats and carburettor assemblies. In lieu of an air compressor, use WD40 to clean out carburettor bowls, jets etc.

Safety and Personal protective Equipment

- Fire extinguisher, minimum 4.5kg Dry Powder, anything smaller is a waste of time and money in the workshop see Figure 24.
- Safety glasses.
- Mechanic's gloves.
- Welding visor, gloves, wire brush and chipping hammer.
- Safety glasses see Figure 25.
- Breathing protection see Figure 25.
- Box of Nitrile rubber gloves see Figure 26.



Figure 24 Workshop Fire Extinguishers



Figure 25 Personal Protective Equipment



Figure 26 Nitrile Gloves

Instruments

- Digital or Vernier Calipers as shown in Figures 27 and 28.



Figure 27 Vernier Calipers



Figure 28 Digital Calipers

- 150mm and 300mm steel rulers
- Air Velocity meter as shown in Figure 29 – see the paper on SU tuning.
This one has temperature readings so you can calculate the mass air flow through the 40mm (1 ½”) SU choke body.
- Multimeter – Figure 30
- Digital Contactless Temperature Gauge as shown in Figure 31. Useful for checking brake caliper temperatures to troubleshoot braking problems.



Figure 29 Air Velocity Meter



Figure 30 Multimeter



Figure 31 Digital Temperature Gauge

- Stroboscopic Timing light as shown in Figure 32
I have modified this one so that power can be picked up from a cigarette lighter / accessory socket in the engine bay.
- Static Timing Light as shown in Figure 33
- Endoscope as shown in Figure 34
For viewing internal parts such as cylinder bores and SU carburettor throats.



Figure 32 Stroboscope Timing Light



Figure 33 Static Timing Light



Figure 34 Endoscope showing carb butterfly open

Working, Lifting & Support Equipment

- Sturdy workbench.
- 100mm (4") engineer's vice.
- Hydraulic trolley jack – 1.5 tonne capacity.
- Four 1.0 tonne capacity axle stands.
- Bottle jack 1.0 tonne capacity – useful for supporting / raising components such as the front suspension spring pan or rear spring bracket whilst removing a damper.
- Two wheel chocks with abrasive surfaces as shown in Figure 35. The rubber section can be purchased at most "rubber" stores.



Figure 35 Wheel Chocks

Power Tools

- 3/8" 240v drill
- 3/8" cordless drill.
- Angle Grinder.
- Right angle drive attachment as shown in Figure 36.



Figure 36 Right Angle Drive

General Tools

- Full set of 1/4" to 7/8" Imperial (inch) sockets with 1/2" and 3/8" rods and adaptors.
- 7/16" and 9/16" long sockets.
- Full set of 1/4" to 7/8" Imperial (inch) open ended / ring spanners.
- 24mm AF open end spanner for oil cooler hose unions.
- Full set of 6mm to 24mm metric sockets with ratchet lever and extension rods
- 34mm (steel) socket for rear axle nuts.
- Full set of 6mm to 20mm metric open ended / ring spanners.
- 10" Shifting spanner.
- Assortment of flat blade and Philips screwdrivers.
- Ball Pein hammer as shown in Figure 37 – NOT a carpenter's hammer which can shatter!
- 1/4" and 1/2" flat steel chisels.
- Allen keys.
- Two 3" "C" clamps – for holding rear leaf springs during disassembly.
- Large and small hacksaws.
- Large and small multi-grips.
- Pliers, including one pair of point nose for brake shoe springs.
- Side cutters



Figure 37 Ball Pein Hammer

Specialist tools

- Dremel micro tool with extension shaft and accessories as shown in Figure 38, this is quite an expensive piece of equipment but if you're doing things like repairs, making small replacement parts or grinding and buffing your cylinder head, it will save money.
- Two coil spring compressors as shown in Figure 39.
- Oil Filter tool as shown in Figure 40 – saves your knuckles!



Figure 38 Dremel



Figure 39 Coil Spring Compressors



Figure 40 Oil Filter Tool

- 1/4" x 5/16" drum brake adjuster spanner as shown in Figure 41. From specialist MG Dealers
- Nut Splitter as shown in Figure 42
- Multi size drill / reamer as shown in Figure 43



Figure 41 Drum Brake Spanner



Figure 42 Nut Splitter



Figure 43 Multi Drill / Reamer

- Fuel Line Clamps as shown in Figure 44
- Hole Punches for making gaskets as shown in Figure 45
- Mini Files as shown in Figure 46



Figure 44 Fuel Hose Clamps

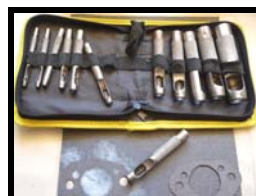


Figure 45 Hole Punches



Figure 46 Mini Files

- Clutch Alignment Tool as shown in Figure 47



Figure 47 Clutch Alignment Tool

- Metric taps and dies as shown in Figure 48.
Useful for threading new fabricated parts etc.



Figure 48 - Metric Taps and Dies

$\frac{1}{8}$ " & $\frac{3}{16}$ " BSP dies

- Inch taps and dies as shown in Figure 49.
These sizes are the baseline inch A/F sizes used in the original MGB.
From specialist MG and tool dealers



Figure 49 - $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ " and $\frac{3}{8}$ " UNF Taps and Dies

- Compression tester as shown in Figure 52.
- Combined internal and external model sprocket puller as shown in Figure 53
- Forever dropping things in the engine bay? These claw & Magnetic extension retrievers as shown in Figure 54 will help!



Figure 52 Compression Tester



Figure 53 Sprocket Puller

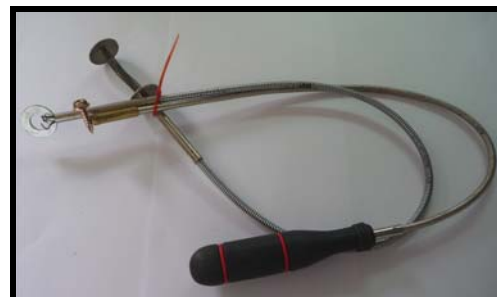


Figure 54 Bits Retrievers

- Grease gun & cartridges as shown in Figure 55. This handy cartridge trigger unit is just the job for the hard to reach grease nipples on the MGB.
- Small hacksaw
- “Easy Outs” for removing broken bolts as shown in Figure 56
- Brake Bleeding Kit as shown in Figure 57



Figure 55 Grease Gun



Figure 56 Easy Outs



Figure 57 Brake Bleeding Kit

- Pop Rivet Gun as shown in Figure 58.
- Spark plug wrench as shown in Figure 59
- Trim Removal tools as shown in Figure 60.



Figure 58 Pop Rivet Gun



Figure 59 Spark Plug Wrench



Figure 60 Trim Removal Tools

- Fire Resistant sheet as shown in Figure 61. Use to protect car and especially carpets and trim when welding or grinding. It is a commercial kitchen fire blanket now used instead of the dangerous asbestos ones previously. Also always have a fire extinguisher ready.



Figure 61 Fire Protection

- Tuning Kit as shown in Figure 62

This kit comprises:-

- Feeler Gauges for tappet and carburettor throttle stop adjustment.
- Point nose pliers. (useful also for drum brake return springs).
- Socket spanner for carburettor shaft adjustment.
- SU spanners for jet adjustment.
- Screwdriver for carburettor idle adjustment.
- Micro reamers and brushes.
- Assorted spanners of correct sizes for carburettor and distributor adjustment.



Figure 62 – Tuning Kit

Home made / assembled tools and instruments

- Engine Bay Tachometer as shown in Figure 63

Useful for reading engine speed whilst tuning and timing.

See the end of this paper for manufacturing details



Figure 63 Engine Bay Tachometer

- Plug Rack as shown in Figure 64

For holding spark plugs whilst examining burn characteristics and recording compression readings – home made



Figure 64 Plug Rack

- 240V soldering iron, solder, mini blow torch and heat shrink tubing as shown in Figure 65.



Figure 65 240V Soldering Kit

- Steel and Copper Tube cutting and bending. This homemade bender used two different sized window sash pulleys to act as mandrels so that the tubing is not squashed when bending. Figure 66 shows the two different size tubing, Figure 67 the bending mandrel and Figure 68 the tube cutter.



Figure 66 Tube and Connector Sizes



Figure 67 Tube Bending Mandrel



Figure 68 Tube Cutter

WORKSHOP NOTES

Notes on nuts, bolts etc

Removing and replacing components, especially chassis, suspension, gearbox and engine fasteners, should be carried out with care noting that in many cases connections are made using high tensile bolts and nuts.

This section of the paper serves to familiarise readers with identifying marks on such equipment.

Firstly it is important to note the difference between a bolt and a setscrew, shown in Figures A and B respectively. A set screw has the thread along the entire length and a bolt only as far as required. Compare the thread transition to the plain part between the two, the bolt has a clean radius machining whilst the setscrew has a sharp transition and is inherently weak at the point where the thread ends.

It is unusual for setscrews to be used on suspension components. If they are found, discard them and replace with correct bolts. Similarly you may find bolts and nuts without high tensile identifying marks, probably used in error by previous owners.

Considering the requirement for high tensile bolts and nuts, Figure C shows common bolt and nut markings with the number "5" indicating AS2465 Grade 5 and the number "8" for AS2465 Grade 8, both with high tensile attributes.



Figure A – Bolt

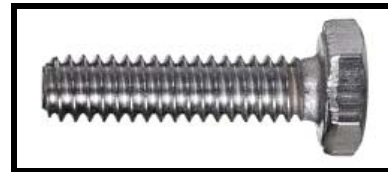


Figure B - Setscrew

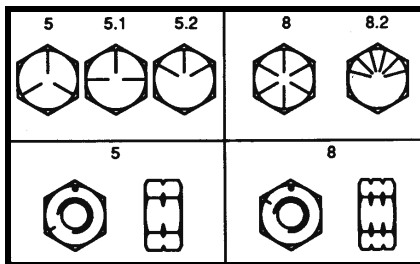


Figure C – Bolt & Nut Head Markings



Figure D – Typical Bolt Head Marking

- Bolts in shear such as in suspension components should be high tensile. Whilst it is not critical that the nuts in this application be high tensile –they only locate the bolt, but it is good practice to match high tensile bolts and nuts together.
- Bolts in tension such as cylinder head, crankshaft main bearings etc. They, and the nuts, should be high tensile.
- Note that nyloc nuts should only be used once after which they should be recycled into general use with spring washers or discarded. The nylon insert is degraded after the first use and may not effect proper resistance when worn.

Figures E and F below show the HT markings on Nyloc nuts.



Figure E - Nyloc nut AS2465 Grade 5



Figure F - Nyloc nut AS2465 Grade 8

The Bentley and Leyland Workshop Manuals manual provide various torque figures for all applications.

When installing new equipment or re-installing old, make sure that the torque settings specified in the manuals or those advised with aftermarket kits are adhered to.

The full range of available high tensile nuts and bolts together with illustrations can be found in the AJAX Fastener Handbook as shown below which can be purchased from their web site at <http://www.ajaxfast.com.au/>

WORKSHOP MATERIALS

A range of workshop materials is needed to support maintenance and repairs, note that I have specified stainless steel for fasteners and the like, it is not really that much more expensive than mild steel, however ordinary steel fasteners will suffice if painted.

- Workshop Manuals.
- Cheap functional digital camera that you don't mind being knocked about. It will be VERY useful to photograph parts when being dismantled – a reminder of how to reassemble them!
- Welding, brazing and soldering consumables.
- Stainless steel wire brushes.
- Gasket materials including fibre, rubber and cork.
- Pre cut gaskets for SU carburettors.
- Rubber grease.
- Rubber trim sections.
- Flex conduit.
- Neoprene and Buna-N "O" Rings and grommets.
- Copper, steel, stainless steel and fibre washers.
- Various return springs.
- Selection of brass and steel nuts, bolts, flat and spring washers.
- Split pins and circlips.
- Trim clips.
- Nyloc nuts, both high tensile and ordinary for suspension parts – see page 14 for information.
- Stainless steel and aluminium pop rivets.
- Stainless steel self tapping screws.
- Contact adhesive, araldite, superglue and epoxy fillers.
- Various grades of "wet and dry" emery paper.
- Various lubricants, additives and fluids as described in the "Fuels and Lubricants" paper.
- Muffler putty
- Exhaust manifold wrap
- Spare can of Butane for heat torch.
- Thread sealant and "gasket goo".
- WD40.
- Etch Prime spray paint, finish coat and clear coat for touching up minor scratches and dings.
- Auto electric wire – at least red, black, white, blue, green and yellow.
- Insulating tape.
- "Gaffer" tape.
- Spare hacksaw blades and drill bits.
- Zip ties.
- Aluminium and steel sheet, flat and angle sections, useful for fabrication small brackets etc.
- Lint free cleaning cloths.
- Aerosol degreaser.
- DYMO label machine.
- **Heavy duty** sewing kit with needles, thread, sheet vinyl and leather for repairing tonneau and hood.

WORKSHOP SPARES

In addition to the “Road” spares in the boot, the following are kept:-

- Spare batteries for instruments and power tools.
- Spare stainless steel “lift the dot” fasteners for the tonneau cover and hood.
- Stainless steel wire cable and swages suitable for replacing throttle and choke cables.
- Various ¼” and 3/16” fuel hose barbed elbows. See Figure 66 on page 13.
- Throttle and choke cables.
- Full set of new plug leads.
- Full set of near new spark plugs.
- New distributor cap.
- New rotor arm
- Two sets of new points.
- New condenser.
- New coil.
- Original (serviceable) starter motor.
- Oil Filter
- Square and oval clutch lever to bellhousing grommets
- SU petrol pump, used but serviceable.
- New SU HS4 left and right hand jets.
- New SU HS4 ram tubes.
- New fuel filter
- Relays of the type used in the car.
- Rear axle drop strap.
- 4 Drum brake slave cylinder seals.
- Original Coopers air filters
- Retain parts that you have replaced such as bushes and seals, they may be useful in an emergency.
- Keep all odds and ends of fasteners such as screws etc

OTHER EQUIPMENT

- MG Clock see Figure 70
- SatNav
- Dashcam
- Soft car cover as shown in Figure71.
- Full weatherproof cover.



Figure 70 MG Clock



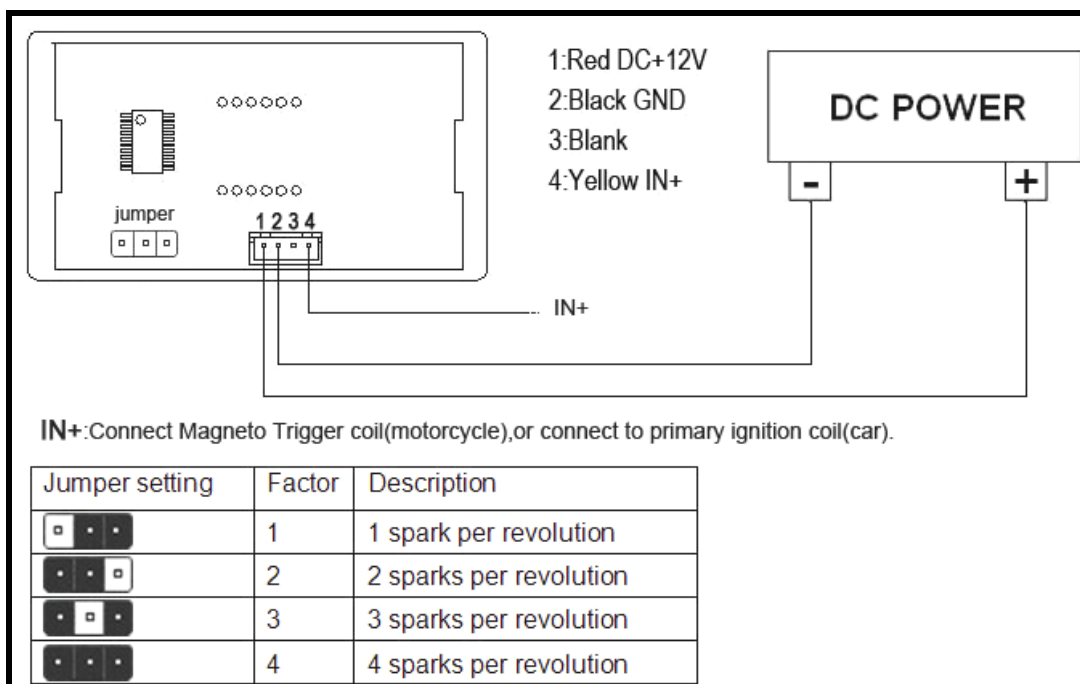
Figure 71 Soft Cover

SOURCING AND MANUFACTURE OF AN ENGINE BAY TACHOMETER

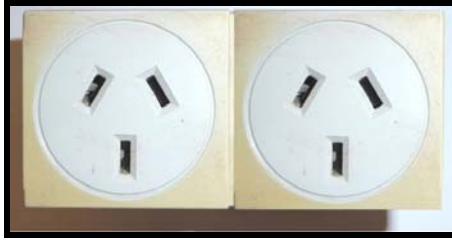


1. On ebay, source one of the many featured tachometers.

2. It will come with the following circuit diagram. +ve and -ve are common sense but the jumper needs to be set. Noting that a single cylinder four stroke engine has a power stroke every second revolution, a two cylinder has one power stroke every revolution and therefore a four cylinder engine produces two sparks for each revolution of the engine, set the jumper to "Factor 2"



3. Source a simple rectangular double adaptor



4. Disassemble the adaptor, remove the wires and tabs, mill out the front and interior so that the tachometer body fits neatly inside – this is where the Dremel is handy. Glue it in place.
5. Wire the tachometer with red, black and yellow wires terminating in alligator clips.
6. Assign the red to +ve12v, the black to -ve 12v and the white to the +ve post on the coil.
7. Fix an angle bracket to the rear and tidy up the wiring.