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## Mini FAQ Part 1

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The Mini FAQ is a list of frequently asked questions (plus answers) about maintenance and mechanical work on Minis and Mini Coopers. The answers are mostly derived from the archives of the Mini-List mailing list and are the work of contributors to the list, edited for presentation in the FAQ.

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## General

### 5 Speed gearboxes for Minis

Several companies sell 5 speed gearboxes for Minis (at a price), for road or race use. A 6 speed racing gearbox is also available from Special Tuning agents.

No Mini-compatible A-series engine has ever been fitted with a 5 speed gearbox at the factory.

### Adding central locking/keyless entry/electric windows

Mini Mania part numbers [MSSK2001](#) and [MSSK2002](#) are a pair of kits that enable any Mark 3-on Mini (with wind-up windows) to be fitted with central locking, keyless entry and/or electric windows. These kits are specifically designed for the Mini - other kits are available but many are generic and will not fit Mini doors well.

### Converting to/from Left Hand Drive

To convert from Right Hand Drive to Left Hand Drive or vice-versa, you need:

- The appropriate RHD or LHD steering rack (remember to use the correct steering arms for the rack - Mark 1 or Mark 2-on, depending on the spec. of the supplied rack).
- Appropriate RHD/LHD throttle pedal.
- New brake/clutch lines (these can be easily made with a brake pipe kit if shipping is a problem), to match the new location of the master cylinder.

Follow the procedures in a manual for changing a steering rack, bleeding the hydraulic system, dismantling/reassembling the pedal box, etc - with these parts it is a "bolt on" conversion. On a Mk1/2 Mini, it may be advisable to install a locking door handle on the driver's side, to avoid having to get in through the passenger's side when the car is locked. It may also be desirable to swap over the location of the windscreen wiper arms to their alternate mounting holes (on a Mark 1, these need to be drilled, on later cars, there are rubber bungs in these holes).

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### How can I find out more about my Mini/obtain a Heritage Certificate?

British Motor Heritage holds the build records for many of the BMC/BL/Rover-affiliated marques: Austin, Morris. MG, Wolseley, Riley, Triumph, etc. For a free (approximately 25 pounds) they can trace the

production record of your Mini and issue a Heritage Certificate listing the car's original specification (including paint color, bodywork, options), delivery destination and production dates.

To obtain a Heritage Certificate, you need the chassis number of your car and/or the engine number. (Note that a Heritage Certificate does not mean you own the actual car, just that you have the details of a particular car that was built).

Send the details, along with your credit card number and expiry date to:

The Archivist  
British Motor Heritage  
Range Road  
Cotswold Business Park  
Whitney, Oxon OX8 5YB  
England

Fax: +44-1993-707222 (Outside UK), 0-1993-707222 (Inside UK)  
Phone +44-1993-707200

British Motor Heritage also manufactures or sells many parts for old Minis, including body panels unique to the Mark 1 and Clubman that were no longer officially available. As BMH is a subsidiary of Rover, these panels are the closest anyone can get to genuine and many are made on the original presses.

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### **How to tell if a mechanical part is worn**

If you are not used to spotting mechanical wear (a common problem of novice DIY mechanics), most metal parts that are worn can be told by:

- Scuffing marks on the surface of a part as if it had been sanded.
- Any "ledges" worn into a part such as a shaft that runs in a bearing, that you can see or feel with your fingernail.
- Cracks, chips or pitting in a metal surface.
- Shafts, bars, beams, pushrods, etc can be checked for straightness by rolling them along a flat surface. If they tend to rotate in a circle, they are bent.
- Bearing races with grooves worn into them, that are either visible or can be felt with a fingernail.
- Signs of melting or burning.
- Surfaces that are meant to be flat can be checked by placing a straight edge (e.g. metal ruler) on them or placing them on a known flat surface - if a feeler gauge can fit under the straight edge at any point it is warped.

### **Importing a Mini into the USA**

Here are the basic facts about importing a Mini into the USA. To find more details, consult the [Mini Mania](#) web site.

- The Mini must be at least 25 years old. The only way round this is legally dubious: the car must

be dismantled and shipped as separate lots, then reassembled on arrival. The car must be registered using the identity of an older car, and the owner must hope that no authorities know what a newer Mini looks like. This has been done successfully. Anyone importing a complete, newer Mini risks severe penalties: six-figure fines, imprisonment and/or crushing of the car.

- The details of arranging shipping are best left to car shipping specialists.
- It is common for Minis to look good in photographs but be terminally rusty, particularly those in the UK where rust is severe by the standards of much of the USA - take care.

### Is my car a Mini Cooper?

See the [Mini Cooper Identification Guide](#).

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### Is my car a Mk1, Mk2, Mk3, ... ?

The table below shows which "Mark" your car is. It does not include Australian or continental European variations (Innocenti, Authi) which often had features of later cars. Vans had external hinges and sliding windows throughout production (except Australian production), Elfs/Hornets had a separate Mark sequence, and Clubmans are all Mk3 or Mk4.

<b>Mark 1 (1959-67)</b>	Small rounded, taillights, sliding windows, external door hinges.
<b>Mark 2 (1967-69)</b>	Square taillights, sliding windows, external door hinges.
<b>Mark 3 (1970-77)</b>	Square taillights, wind-up windows, internal door hinges.
<b>Mark 4 (1977-85)</b>	Large square taillights with reversing lights, wind-up windows, single bolt top subframe mounts.
<b>Mark 5 (1985-)</b>	As for Mark 4 but with 12 inch wheels and disc brakes.

From Mark 5 on, there is some debate about the era of each "Mark". It is better to refer to cars after this by Model Year. E.g. the 1997 MY (Model Year) Mini has twin point fuel injection and this refers to cars built to the same spec after 1997.

### MG Metro alloy wheels - can I use them?

No - they will bolt on to Mini hubs but the offset is not correct for the Mini, the wheels being offset too far inwards towards the center of the car.

### Rod change gear shift removal

To disconnect the rod change gear shift from the back of the gearbox:

1. Put the car in first or third gear.
2. Drift out the roll pin in the sleeve that connects the gear change rod to the gearbox, using a 5mm drift or 5mm by 4cm bolt.
3. Unbolt the upper rod from the back of the gearbox. This may necessitate removal of the exhaust

mounting clamp.

#### Socket size needed for (xyz) bolt?

Bolt	Socket Size
Crankshaft pulley	1 5/16 in
Steering wheel	1 5/16 in

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#### Stripped thread on gearbox drain plug hole/spark plug hole

These can be repaired using Helicoil threaded inserts. The stripped thread is first drilled out, then a special thread is cut that accepts the helicoil insert which is then inserted. It forms a new thread for the drain plug or spark plug. This job can be done by most engineering workshops or good mechanics and should be around 30 minutes labor plus a few (your currency units) for the insert. Tell them what you want helicoiled and they will understand you.

The gearbox casing is made of soft aluminum alloy - the drain plug does not need to be as tight as most people think, hence the risk of stripping the thread.

#### Turbocharging your Mini

If you need to ask how to turbocharge your Mini, you probably don't need to know. Having said that, everyone has to start somewhere. You will know if you are capable of this project if you are confident you can solve the problems described below.

The MG Metro Turbo provides the donor engine and ancillaries for the conversion. This engine is a 1275cc A-plus series engine, with a low compression ratio and relatively small, sodium-cooled valves to withstand the high combustion temperatures. The turbocharger unit is the Garrett T-3, and a boost modulator is used to reduce mid-range torque, prolonging the life of the gearbox.

The engine develops a claimed 93bhp and more is available by increasing the turbo pressure. To learn more of the details about this engine consult the Haynes Metro manual and *Tuning British Leyland's A-Series Engine* by David Vizard.

The basic modifications required to fit this engine to a Mini are broadly outlined below:

- Bodysell. The bulkhead must have a hole cut in it and a box welded into it, to accommodate the turbo unit which occupies much space behind the engine. Some specialists also recommend reinforcing the front subframe. Extra engine steady bars and heat proofing for the bulkhead are needed.
- Exhaust. A custom exhaust system must be fabricated to interface with the turbo. Specialists such as Avonbar can help with this too.
- Fuel. A high-pressure (Metro Turbo) fuel pump, fuel regulator and fuel return line to the tank must be installed, requiring modification to the fuel tank. (Fuel injected Minis already have a return line built into the tank, plus an integral fuel pump which may be able to supply adequate pressure).

- Electrical. The Metro ancillaries must be interfaced with the Mini wiring loom.
- Brakes. Vented 4-pot brakes are the order of the day - these can be robbed from the same Metro as the engine.
- Cooling. An improved radiator is required.

The details of the fuel and electrical requirements are found in the Haynes Metro manual.

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### **What are the dimensions of a Mini?**

See [Body Dimensions](#).

### **What does MOWOG mean?**

This mysterious inscription is found on many Mini parts.

MOWOG stands for Morris Wolseley Garages, a company set up to supply parts to BMC (the original name of British Leyland, later Austin-Rover/Rover/etc).

### **Why are Minis notorious for overheating?**

Overheating can be caused by many problems: blocked radiator, incorrect ignition timing, lean mixture, blown head gasket, fitting a more powerful engine, water leaks, and/or rusted water pump.

Most of these are caused by old age and lack of maintenance. A well sorted Mini in standard trim should not overheat (except in rare circumstances, such as a Cooper S forced to idle in traffic for a long time on a hot day). If any mechanic tells you "they all overheat" they do not have good enough diagnostic abilities to be allowed to work on your car.

If your Mini does overheat, there is something wrong - have it fixed.

## **Body**

## Checking for rust (pre-purchase)

Anyone who has ever owned a Mini knows that they rust. If you are looking to buy a Mini check out the [rust](#) page for the most common rust points. If possible take someone familiar with Minis with you to inspect the car as well.

## Chrome side trim installation

New "plastichrome" side trim is purchased in rolls.

- Purchase only good quality replacement trim, which is easier to install.
- Heat the trim with a heater, dryer or hot water until it becomes slightly pliable - do not overheat or the trim will lose its elasticity and be more prone to detach from the body.
- Ensure the trim is installed so that the natural curve of the trim (the way it was rolled up) follows the sharp bends on the inside of the front/rear wheel arches, not following the contours of the wheel arches themselves.
- Depending on the year of your car, the trim is held on by self tapping screws or pop rivets. Replace these with new stainless steel items to prevent rust.
- Work slowly and patiently.

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## Door does not shut properly (fouls on body shell)

Grasp the door and shake it up and down. If it shows signs of movement, the door hinges are worn. If not, the car is likely to be distorted as a result of crash damage, particularly if the door catches on the rear edge of the A-panel when it is opened or closed.

## Is it safe to drill holes in the rear parcel shelf to install speakers?

Yes.

## Mark 1/2 (external hinge) doors are sagging

Grasp the door and shake it up and down. If the hinges are loose, new pins and bushes can be fitted. Tap the old ones out using a drift and fit a new set - widely available from any Mini specialist.

If the hinges do not flex but the door moves up and down, the door skin and/or A-panels may be rusty or the hinge mounting holes enlarged.

## Mark 1/2 door glass - fitting

- The rear half of the door glass sits on the inside of the track, and has the draught excluder fitted to it.
- The draught excluders are cut flat on the bottom, and tapered on the top and are different for the left-hand and right-hand doors.

## Mark 1/2 window channel removal



The window channels are held in place by screws, hidden beneath the channel cover. Run a screwdriver along the channel to find the screw-heads.

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### **Riley Elf/Wolseley Hornet - which panels are the same/different?**

The different panels on the Elf/Hornet shell are: body sides, front panel, rear panel, bonnet, boot lid, boot floor. The Mini saloon wings are compatible.

### **Where/How can I get matching paint for my old Mini?**

British Motor Heritage can supply the paint mixing instructions for any classic Mini color, and can usually tell you the color that your car was originally painted. See [How can I find out more about my Mini/obtain a Heritage Certificate?](#) for contact details. Any paint shop can follow these instructions in the same way they mix paint for any paint job.

If your car is not on record (e.g. South African, Australian or other non-UK production), the paint code may be on the car somewhere (particularly in the case of Australian cars), local paint shops may have directories containing the original name of the shade and its' mixing instructions, or local Mini clubs may be able to help. Failing that, any paint shop can custom-mix paint to match a non-light-affected area of the car such as underneath the trim.

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## **Brakes**

### **All you need to know about brake upgrades**

(Almost) all you need to know about upgrading to disc brakes is available [here](#). Technical specs for each brake setup are available via the [Technical](#) page.

### **Brake bleeding advice**

- If the master cylinder has been serviced or replaced, bleed it before bleeding the rest of the system.
- Buy a pressure-bleeding kit such as the Ezi-Bleed. These kits use the air pressure from a spare tire to pressurize the master cylinder, forcing fluid out through the bleeders when they are opened. No more need for the open bleeder - stomp pedal - close bleeder - repeat cycle.
- Never reuse any brake fluid - it will be contaminated with dirt, water, and air bubbles.
- Always use proper brake wrenches/spanners to prevent rounding the brake bleeders. These have 5 corners rather than 3.
- Protect paintwork around the master cylinder as brake fluid will dissolve it. Use a funnel to prevent spillage of fluid around the master cylinder.
- Pour in new fluid slowly. If the fluid has been shaken or dropped, leave it to stand overnight

- before using it, to ensure no air bubbles remain.
- When finished with the brake fluid, replace the cap.
- Never store used brake fluid, or anything else, in brake fluid bottles, or store brake fluid in other bottles.
- Any hoses which appear/feel soft, or have rubber chunks missing must be replaced.
- Never let the master's reservoir run out of fluid while bleeding or it may have to be bled separately.
- Wheel cylinders and calipers must be assembled and drums must be installed before bleeding or the pistons will be forced out of the cylinders.

### **Brake system won't bleed**

If the brake system won't bleed (e.g. no fluid forced out when brake pedal pressed), bleed the master cylinder separately before bleeding the rest of the system.

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### **Disc brake calipers won't bleed**

If the calipers have been removed from the car and replaced, they may have been refitted to the wrong side of the car. Fit the calipers so that the bleed nipple is at the top, otherwise an air pocket will form inside the caliper.

### **Vibration felt through brake pedal**

If vibration is felt through the brake pedal, undo the front drive flange nuts and rotate the brake disc through 90 degrees. This can improve disc run-out (side to side wobble) repeat on the side in question up to 3 times (90-180-270 degrees) to try to reduce the run out.

The problem may be caused by brake drums wearing to an oval shape in drum-brake equipped cars.

### **Silicone versus standard brake fluid**

Standard brake fluid:

- Absorbs water from the atmosphere, causing slave cylinders to rust and seize up.
- Used by almost everyone.
- Cheap and readily available.
- Strips paint when spilled during changes.

Silicone brake fluid:

- Does not absorb water, therefore the brake system does not rust, greatly prolonging its' life and reducing the frequency of brake fluid changes.
- More expensive and harder to find.
- If your car is in for work, the mechanic might top the master cylinder up with standard fluid. The two types are compatible but not designed to be mixed.
- Boils at a lower temperature. However, there is no documentation of brake failure being caused

by this on road going cars. It meets strict DOT performance standards.

- Low maintenance (a car can be left standing for extended periods without rust and cylinder seizure occurring) and lack of damage to paint work make this the fluid of choice for low-usage and concours cars.

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## Clutch

### Clutch does not fully disengage

1. Check clutch flexible hydraulic line for bulging when the clutch pedal is pressed, and for signs of cracking or leaks. If any of these are found, replace the clutch line and bleed the clutch hydraulic system.
2. Check the clevis pin (connects the slave cylinder piston to the clutch arm) is not excessively worn.
3. Check the clutch adjustments are correct.
4. Check the master cylinder fluid level, clutch pedal and surrounding area, and slave cylinder for leaks. If the fluid requires topping up the system is leaking.
5. Bleed the clutch hydraulic system. This eliminates any trapped air from the system.

### Clutch pedal slow to release

Check the clutch hydraulics, particularly the rubber hose - it may have swollen internally.

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## Diagnostics

### Brake Shoes- rear - uneven wear and/or binding

Check that the rear handbrake cable pivots are not seized.

### Car interior smells of petrol

1. Ensure the breather pipe is connected to the fuel tank/s and is not blocked (they sometimes come loose).
2. Check the carburetor/s for signs of fuel leaks.
3. Check the fuel pipe joints for signs of fuel leaks.

### Clicking/clunking noise when turning sharply

If a regular clicking or clunking noise can be heard from the front of the car on one side, the CV joint on that side is worn to the point of needing replacement.

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## Engine oil smells of petrol

If using a mechanical fuel pump, the diaphragm is likely to have failed allowing petrol into the oil - drain oil and replace/recondition fuel pump.

## Exhaust - testing for leaks

While the car is idling, block the exhaust pipe off using your hand (suitably protected!) - if the engine continues to run the leak should be audible. If the engine falters or stalls, there is no exhaust leak.

## Ignition system

*(by Rocky Frisco)*

Rocky's Quick Ignition Test:

1. Remove the distributor cap with the wires all still hooked up and turn it over upside down.
2. Turn the ignition on and put the car out of gear with the emergency brake on hard.
3. Lay a coin (quarter, sixpence, general size) across the center post and one of the side contacts of the distributor cap.
4. Pop the points (if they're closed, lever them open with an insulated screwdriver blade; if they're open, short across the points with the screwdriver blade); as you break the circuit, there should be a good strong blue spark across the coin.

The coin acts as the rotor in this test. If there's no spark or it's weak, then you can start looking for the reason; if there's a good spark but the engine won't fire with the cap back in place, the rotor's probably bad.

## Removed distributor to work on it, now car won't start

Assuming the timing is correct and everything else checks out, the distributor may have been reinstalled with the spindle upside-down on the distributor drive, making the timing 180 degrees out of phase. To test this theory, the car should start if the middle two plug leads are reversed.

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## Shaking or vibration at certain speeds

Some Minis shake or vibrate at certain speeds. Usually this speed will be in the range of 50-55 MPH (80-90 kph) but may be higher. This usually happens to older cars. It causes greatly increased tire wear. To cure this problem, follow these directions:

1. Ensure that each wheel has its' balance weights still attached, and the tires are inflated to the correct pressures. Ensure the tires are in good condition and have no bulges. If the car has been stationary for more than a few months, the wheels could be out-of-round. These are the two most common causes of vibration. Tires can also look fine when inflated but show signs of serious structural failure when deflated.

2. Follow the instructions in the FAQ to check the ball joints, steering rack and wheel bearings are intact. Check the wheel rims for any obvious signs of damage or distortion.
3. Have the wheels balanced.
4. If the ball joints, steering rack, wheel bearings or wheel rims show signs of excessive wear or damage, replace them

### **Squeaking noise when going over bumps**

If a squeaking noise is heard from the front left or right of the car when the front of the car travels over a bump, the suspension trumpet knuckle joint is worn. If left long enough, the knuckle joint will wear through the plastic cup that it sits in, causing that corner of the car to drop in height. Damage to the upper suspension arm will result if the car is driven like this for an extended period of time.

### **Water temperature gauge reads low**

1. Take the wire connecting the gauge to the sender in the head and earth it onto the block (briefly).
2. If the gauge goes to full travel the sender is faulty. If not, the gauge is faulty or the wire that connects the gauge and sender is faulty.
3. Test the connecting wire between the gauge and sender for conductivity.
4. If the fuel gauge is also reading incorrectly, the likely cause is a faulty voltage regulator (post-1963 cars).
5. Check the car's fuses are intact.

Run the car until it reaches stable operating temperature, then measure the temperature of the water with a thermometer. It should read 80-88 degrees Celsius and air from the heater should be hot. If not, the problem is with the engine, not the gauge. Ensure that a thermostat is fitted and that the car is not running excessively rich or with very retarded ignition.

If the car is overheating but the gauge reads low, the water pump impellers may be corroded to the point where the water pump is ineffective - check the water in the radiator for signs of movement. If none, this is the likely cause.

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### **Voltage regulator diagnostics**

The voltage across the voltage regulator terminals should read approximately 10V with occasional spikes. If the voltage is higher/lower, the water and fuel gauges will read higher/lower.

## **Electrical**

## Dynamo to alternator conversion

Minis up until the early 1970's (except some Cooper S) were fitted with dynamos. These do not generate a great deal of current to charge the battery, or run extra lamps and in-car entertainment, and are less efficient than alternators. The mechanical regulator is also one more thing to go wrong - it can be bypassed when installing an alternator as the alternator has one installed.

If you are considering fitting an alternator to a Mk1 Mini or Cooper, please think twice if the car is in original condition - any modification of this type will reduce the value of the car (keep the olds parts so the modification is reversible).

Parts required: Lucas alternator, alternator mounting bracket, cable ties.

The recommended alternator is Lucas type 16ACR which delivers 34 amps at 6,000 rpm. 18ACR, 20ACR and higher can be used but generate more current - the ability of the Mini wiring loom to withstand this is not guaranteed.

1. Check vehicle polarity. Most dynamo equipped-cars will be positive-earth (positive lead of battery connected to body shell). This must be reversed (negative lead of battery connected to earth). Some cars will already have been converted to negative earth; if the negative terminal of the battery is connected to the body shell, nothing need be changed and all radios/tachometers/etc may be retained.

A new earth strap may be required if the positive-earth strap does not reach the negative terminal after the battery has been flipped around. If you have any tachometers, radios, or other electronic gadgets in your car and it is positive earth, they will have to be removed, at least until they can be converted to negative earth, assuming this is possible.

1. Fit the alternator and bracket into the position occupied by the dynamo. Connect the thick wire to the terminal marked S or +. Connect the thin wire to the terminal marked IND or WL. Ensure the fan belt is tensioned correctly; replace if excessively worn.
2. Dynamo control box: remove the black wire from terminal E and. Remove the brown/green wire from terminal F and the brown/yellow or yellow wire from terminal D and connect them. Remove the wires from terminals AL, A and D and join them.
3. Insulate the ends of all wires/terminals that are now exposed and tie the wires off to convenient mounting points using cable ties.
4. Alternatively, the innards of the control box can be removed or bypassed and the appropriate wiring connections made inside the box, with the wiring loom wires still connected to the same terminals to give the original look.

Your Mini is now negative-earth instead of positive-earth.

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## Positive Earth (Ground) vs. Negative Earth

This refers to the terminal of the battery that is connected to the body of the car and makes up the earth of the electrical system. Most Mark 1 Minis and Minis with dynamos instead of alternators are positive

earth. There are no major reasons apart from convention for wiring cars either way. **Beware:** Connecting a battery the wrong way around can result in electrical fires and the destruction of the wiring loom, if done for more than a few seconds. I don't know of a good way to determine the "earth" of a particular Mini (except that an alternator-equipped Mini will always be negative earth), but have noticed that when the battery is connected the wrong way, the last battery terminal to be connected will draw a small spark.

To install a radio or other electrical accessory in a positive-earth Mini, or to change to an alternator, it must be converted to negative-earth. This is usually a simple matter of re-polarizing the dynamo and removing any positive-earth accessories (e.g. old radios).

#### Type of wire to use when re-wiring

Do not use solid-core mains cable as it is not designed to flex and will eventually work-harden and snap. Use wire bought from auto-electric shops. An alternative (much cheaper) source of correct Lucas color coded wiring are wiring looms from almost any British car, found in scrap yards.

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*Hamish Hubbard*  
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