

# Car Basics ebook v1.0

[www.carbasics.co.uk](http://www.carbasics.co.uk)

**Everything you should know about**

**“ your car “**

**but were too embarrassed to ask !!!**

## Introduction

### **ASK YOURSELF THESE QUESTIONS ;**

- There are millions of cars on the road, but are we all mechanics ?
- Do we really know as much as we should about our cars ?
- Do we understand anything that the mechanic or recovery man just said ?



### **TRUE ;**

Most owners don't know as much about basic car care as they should.

So when things go wrong, they are left in the hands of so called experts. Don't let them baffle you with big words and parts you've never heard of.

**Empower yourself and get simple and basic car knowledge here**

We have put together simple non-technical car articles on everyday stuff.

This ebook has been written to be easy to understand and not crammed with jargon and big words.

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## HOW TO USE and SHARE THIS EBOOK

In order to get the best experience from using this ebook and associated information, it is best read using the latest version of Acrobat Reader.

Any version above version 7 will enable all of the embedded links to be used.

Make sure you have the latest version of Acrobat Reader by visiting ;  
[www.adobe.com/uk/products/reader](http://www.adobe.com/uk/products/reader)

We have bought together all the current articles and tips pages on our website and put them into one single ebook full of useful information for the car owner.

Some pages are better viewed online, with better images and VIDEO CLIPS. Therefore we have embedded links into this ebook that will take you directly to the CarBasics website if you need to.

We will endeavour to keep this ebook as up-to-date as possible.  
Visit [www.carbasics.co.uk/ebook.htm](http://www.carbasics.co.uk/ebook.htm) to check for the latest version.

### SHARING THIS EBOOK

A lot of work went into compiling this ebook for you. Its content is original and can only be found on our website at [www.carbasics.co.uk](http://www.carbasics.co.uk).

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## 2.1 What is an MOT ?

Online version - [www.carbasics.co.uk/what\\_is\\_an\\_mot.htm](http://www.carbasics.co.uk/what_is_an_mot.htm)

Car MOT testing is carried out by an approved garage to see whether a vehicle is roadworthy and safe to use on UK roads.

A vehicle MOT certificate is a receipt of the vehicle test and confirms that at the time of test it met the minimum acceptable environmental and road safety standards required by law.

MOT tests are only carried out and issued by approved garages, see below how to recognise an approved garage.

You cannot drive a vehicle on the road in the UK without a valid MOT.

When you purchase a vehicle that is more than 3 years old, you will need the most recent MOT certificate. You must ensure that it is current and that the MOT has not expired. You cannot use a vehicle on UK roads unless it has a valid and current MOT certificate.



Above are examples of the old style certificate (left) and the new style A4 size (right)

### What does MOT stand for ?

It stands for Ministry of Transport, this is the government department responsible for the transport network.

### How often does a vehicle need to be MOT tested ?

Every vehicle in the UK must be tested each year. This is to ensure that it is roadworthy and complies with the relevant standards. Cars do not need to have an MOT until they are three years old.

### How to recognise an approved MOT garage (MOT testing station)

There are about 19,000 approved garages in the UK. An approved garage will display the blue 'three triangles' logo shown here below ;



The garage should also have on display ;

- VT9a - fees and appeals poster
- VT26 - list of nominated testers
- VT9 - authorisation of examiner

### What does the garage check during car MOT testing ?

**Vehicle identification number** - a vehicle identification number must be permanently displayed and legible on a vehicle first used on or after 1 August 1980

**Registration plate** - condition, security, legibility and format of letters/numbers

**Lights** - condition, operation, security and correct colour. The headlamps will also be checked to see if the aim is correct

**Steering and suspension** - correct condition and operation

**Wipers and washers** - operate to give the driver a clear view of the road

**Windscreen** - condition and driver's view of the road

**Horn** - correct operation and type

**Seatbelts** - all seatbelts installed are checked for type, condition, operation and security. All compulsory seatbelts must be in place

**Seats** - front seats secure. Front and rear backseats can be secured in the upright position

**Fuel system** - no leaks, fuel cap fastens correctly and seals securely. The fuel cap will need to be opened. Make sure the key is available

**Exhaust emissions** - vehicle meets the requirement for exhaust emission. These vary on the age and fuel type of the vehicle

**Exhaust system** - complete, secure, without serious leaks and silences effectively

**Vehicle structure** - free from excessive corrosion or damage in specific areas. No sharp edges

**Doors** - open and close. Latch securely in closed position. Front doors should open from inside and outside the vehicle. Rear doors may need to be opened to gain access to testable items

**Mirrors** - presence, condition and security

**Wheels and tyres** - condition, security, tyre size and type, and tread depth. Spare tyres are not tested

**Brakes** - condition, operation and performance (efficiency test). Suitable vehicles will be tested on a roller brake tester. Vehicles such as those with permanent 4-wheel drive will be tested either on a suitable road using a properly calibrated and maintained decelerometer or, if one is installed at the test station, a plate brake tester

### **How long does an MOT test certificate last ?**

**Your vehicles MOT will last for one year. The certificate that the garage issues will have the date when the vehicle needs to be tested again.**

**NOTE - just because your vehicles MOT is not yet due does not mean that your vehicle is safe to drive on the road. Responsible owners/drivers will ensure that their vehicle is safe for use at all times and will not just drive the vehicle and have repair work done at every MOT. If you have a few months left before your MOT test is due and you know that work needs doing to the vehicle, don't wait, get the work done as soon as possible - it could save your life or someone elses.**

## 2.2 What is an HPI check

Online version - [www.carbasics.co.uk/what\\_is\\_a\\_hpi\\_check.htm](http://www.carbasics.co.uk/what_is_a_hpi_check.htm)

Basically HPI checks are 'Peace of Mind' when buying a car.

It will check the history of the car you want to buy to ensure it has not been stolen, cloned, ringed, clocked, written off or has no outstanding finance on it.

### What are the risks if I don't get a HPI check ?

#### The car could have been written off or stolen.

Almost half a million cars every year are reported by insurers to be too badly damaged to be repaired safely. However, some of these cars find their way back onto the roads. The HPIcheck website states that on average 4 in 100 cars that they check have been written off by insurers.

Some 375,000 vehicles are stolen in the UK every year. HPIcheck identifies nearly 30 stolen vehicles every day. Many are sold as 'bargains' to unsuspecting buyers. If you buy a stolen car and the police trace it to you, you may be able to prove you purchased it legitimately but it will still have to be returned to its rightful owner and you will have lost your money.

#### It could have outstanding finance against it.

Over 7 million vehicles are purchased in the UK using some form of finance. Outstanding loans against vehicles is the biggest risk when buying a car. HPIcheck website states that 24 out of 100 cars they check still had a finance agreement in place against the car.

If the loan remains unpaid when you purchase the vehicle, you will not acquire title to it (you will not own it), nor will you be protected by the 'Sale of Goods Act (1979)'. The finance agreement will state that ownership of the vehicle remains with the finance company until the loan is paid.

#### Is it clocked or cloned ?

Clocking is when the mileage on a vehicle has been altered so it appears that the vehicles has done less miles than it really has. HPI checks will identify if there are any discrepancies with the mileage history.

Cloning (or ringing) is when a genuine car has its identity copied onto stolen vehicle. Meaning that there will be 2 or more cars on the road with the same identity. You could end up purchasing a stolen car, and when the police eventually find it they will take the car in order to find the criminals and return it to its original owners.

A HPI check will check against all these things and will ensure that you do not loose money or end up driving you and your family around in an unsafe vehicle.

### **What do I need to perform a HPI check ?**

You will need the registration of the vehicle as well as the VIN (Vehicle Identification Number) or Chassis number. The full HPI check costs about £40, so you will need a method of payment.

### **MORE HPI INFO**

A HPI Check should also include the HPI Guarantee which provides up to £10,000 reimbursement of financial losses should you suffer arising from inaccurate or incomplete information provided by HPI as part of the HPI Check.

I have had HPI checks done or provided to me for almost every car I have ever purchased. I have paid for them myself when buying from private sellers, and when I have purchased a car from a garage I have either asked for a copy of their HPI report or asked them to pay for one before I parted when my hard earned cash.

You have to ask yourself what type of garage would not already have a HPI check for a vehicle or would not be willing supply one for a prospective customer.

HPI checks are very easy to obtain nowadays, you can telephone hpicheck and buy your report over the phone or even simpler you can perform the check online in the comfort of your own home.

Many companies check car history, however I understand that they all get their information from the same source which is hpicheck.com.

HPI have been checking the history of used cars since 1938.

They were the first to introduce this invaluable service and their many years of experience in the industry have made 'getting an HPI Check' a common phrase.

If you want a vehicle history check carried out by the real experts, always look for the official HPI logo. They have access to more car data than anyone else and their thorough investigations have helped hundreds of thousands of people avoid purchasing cars that have been stolen, clocked, written-off, or that have unpaid finance against them, saving them from unnecessary costs and heartache.

For current HPIcheck prices and more info on hpicheck.com, please visit [www.carbasics.co.uk/HPI-page.htm](http://www.carbasics.co.uk/HPI-page.htm)

## **2.3 What is a 'Q' plate**

Online version - [www.carbasics.co.uk/what\\_is\\_a\\_q\\_plate.htm](http://www.carbasics.co.uk/what_is_a_q_plate.htm)

**We are referring to registration numbers on cars that begin with a 'Q'.**

**The 'Q' shows that the vehicle was either not originally registered in the UK and proof of age was unavailable at registration, or that it has been built using a significant proportion of used parts.**

**If a vehicle has to be rebuilt, say after an accident and many new or used parts have been used that it calls the identity of the vehicle into question, the vehicle needs to be registered on a 'Q' Plate. This is done through the DVLA. It does not mean that there is anything wrong with the vehicle, just that its original identity cannot be clarified from the parts it is made from (i.e. from different vehicles)**

**Kit cars usually have a Q registration and this is perfectly normal, but on other vehicles, it suggests that their full history may be difficult to trace.**

**"Q" numbers are non-transferable, meaning that they must remain with the car. You cannot transfer them to another vehicle, and you cannot purchase another number plate for the 'Q' plated vehicle.**

**Before you purchase a vehicle with a 'Q' plate, it is very important that you obtain a HPI check to ensure that it is not stolen or ringed and registered correctly with the DVLA.**

**There is more information on the DVLA website at ;  
[www.dvla.gov.uk/vehicles/regrebil.htm](http://www.dvla.gov.uk/vehicles/regrebil.htm)**

## 2.4 What is T-Cut

Online version - [http://www.carbasics.co.uk/what\\_is\\_t-cut.htm](http://www.carbasics.co.uk/what_is_t-cut.htm)

### What is it

T-Cut is a lightly abrasive liquid used to restore car paintwork back to its original condition. If your car is more than a few years old then it will more than likely benefit from a little TLC from its owner. It is also ideal for removing small paintwork scratches.

### What does it do

It basically smoothes down the surface of your paintwork, cutting through all the road dirt and grime to return it to its original condition. It will also remove tar-spots, stubborn stains, small paintwork scratches and scuffs.

### Why use it

Once you have treated your car, there will be noticeable differences. Your paintwork will appear brighter and the colour will be more vivid.

It will be smoother to the touch, will trap less dirt and therefore keep the car looking cleaner for longer. In turn, this will also make the car easier to clean in the future.

It removes tar-spots and small paintwork scratches, and you can now get it in colours to match your cars paint as well as t-cut for metallic paint. The coloured t-cut can be used to cover-up poorly resprayed vehicles.

If you have to do this work over a period of time and it rains in between, you will notice a difference with the areas that you have treated and the ones you have not. The treated areas will disperse water more readily, because the surface is smoother and the water cannot grip as easily.

So if the dirty rainwater runs off the bodywork more easily, then it will not dry off and leave dirt deposits on it.

I can honestly say that a t-cut (better if t-cut and then waxed) car will remain cleaner for a lot longer.

There are other makes of abrasive liquid available for removing scratches such as Meguiars Scratch X. If you want details of this and other car cleaning and treatments then click the following links ;

<http://www.carbasics.co.uk/meguiars.htm>

[http://www.carbasics.co.uk/car\\_care.htm](http://www.carbasics.co.uk/car_care.htm)

## 2.5 What are Lexus lights

Online version - [www.carbasics.co.uk/what\\_are\\_lexus\\_lights.htm](http://www.carbasics.co.uk/what_are_lexus_lights.htm)

Well the question should actually be what are Lexus style lights, and there-in lies the answer.

There was a new car launched in 1999, the Lexus IS200 and it had some very eye-catching rear lights ;



Little did Lexus know what a large aftermarket trend they would cause, the birth of the Lexus lights, or Lexus style lights

Now available for many popular cars as direct replacements to your original lights, and now other manufacturers are putting lexus style lights onto their new cars too.

Typically these rear lights have a clear outer cover, red inner lenses with a chrome inner surround.

### How difficult are they to fit ?

This is one of the easiest styling modifications you can do yourself. Most of the rear light kits that are available today are direct replacements to your original lights. This means that the new lights will fit in exactly the same position, using the same screws or bolts. They will plug directly into your existing wiring loom without any wiring modifications and there will be no need for bodywork modifications.

They normally come with full fitting instructions, to show you how to remove your old lights and fit the new rear lexus lights.

With good quality lexus style light conversions, everything is normally included including the light bulbs. If new bulbs are not including it is probably because you should use the bulbs out of your original lights.

### **How much are they ?**

Sold in pairs, they cost anything from £30 to £200 dependant on your model of car and the style of Lexus lights that you prefer.

### **What should I look for when I buy ?**

There are plenty of cheap imports around now, ebay is full of them. I would suggest buying your lexus rear lights from a reputable company with a good aftersales service, so that if you are not totally happy or there is a problem with your purchase then you can get it sorted out easily. In the uk, all online retailers have to comply with the 'distance selling directive' which gives the consumer the right to return the goods within a certain period of time for any reason. Check out the websites terms and conditions.

I would suggest buying online as prices are usually more competitive than shops. Online you will get more choice too, as the shops can't hold everything on the shelf.

Advantages of buying online are choice, but as mentioned above you need to get them from a larger more reputable e-shop so that they will be prepared to correct any error or dissatisfaction on your part. The supplier should understand that it can be more difficult for a customer to attain an exact idea of how something will look or fit when purchased online, hence the 'distance selling directive'.

Our online version of this article has more photos and examples of Lexus style lights that are available for purchase, click here [www.carbasics.co.uk/what\\_are\\_lexus\\_lights.htm](http://www.carbasics.co.uk/what_are_lexus_lights.htm)

As I explained about buying from reputable online shops and the 'Distance Selling Directive, Edworthys are one of the companies that adhere to this standard and they clearly state on their website that if you are not 100% happy with your purchase you can return it with no obligation under their 14 day money back guarantee.

They are one of the largest online car styling and performance shops. They sell a wide range of car styling products from rear lexus lights to spoilers and bodykits. They also sell performance parts such as induction kits and air filters.

They are also one of the few car accessory shops to offer finance on their product range, and this can be a major help when budgeting to style your car.

Their range of products is available to view online by clicking the link below ;

[www.carbasics.co.uk/edworthys.htm](http://www.carbasics.co.uk/edworthys.htm)

## **2.6 What is an Alternator**

Online version - [http://www.carbasics.co.uk/what\\_is\\_an\\_alternator.htm](http://www.carbasics.co.uk/what_is_an_alternator.htm)

**"Oh it's probably your alternator mate, it's probably knackered."**

**Well that's great news, I don't even know what an Alternator is, let alone know how to check it or replace it.**

Well hopefully we can shed a little light onto this matter with the article below.

### **Simply put ;**

An alternator is a generator. It generates an electrical current.

When does it do this ? - It will generate an electrical current when the engine is running.

Here are a couple of photos ;



### **What does it do with the electrical current ?**

It sends it back into the battery, it recharges it.

### **Why do I need an alternator ?**

Because if the battery was not recharged, there would be no power to run the car. If you took a fully charged battery and put it onto your car, the car would start and continue to draw power out of the battery (i.e. for the spark plugs in a petrol engine). Eventually the battery will run flat (no power) and the engine will stop.

### **Think of it like a full circle ;**

Battery starts the engine - Engine turns the alternator - Alternator recharges the battery.

### **Where is my Alternator ?**

On every car I have owned, the alternator has been on the left side at the front of the engine bay when looking from the front of the car.



### **Without getting too technical here is a little more info.**

The alternator is bolted to the side of the engine and is driven (turned) by the engine via a belt. The belt turns a shaft inside the alternator when the engine is running and the output (voltage) is sent to the battery via wires.

Alternators are relatively easy to change and many places sell brand new replacements as well as reconditioned or refurbished items. A reconditioned alternator has had all the internal wear parts such as brushes replaced with new ones. They will have been tested and will come with a guarantee.

I have also fitted second hand (used) alternators to a number of my cars. These have been sourced from scrap yards or vehicle dismantlers. They normally come with a receipt and can be changed within a short period of time if they turn out not to be working. I have always asked the supplier to test the alternator before I have paid for it. When buying parts it is always very important to keep the receipts incase a problem occurs.

Receipts are always worth keeping as they show a history of your car which prospective buyers like to see when they are thinking of buying your vehicle.

## 2.7 What is an air filter

Online version - [http://www.carbasics.co.uk/what\\_is\\_an\\_air\\_filter.htm](http://www.carbasics.co.uk/what_is_an_air_filter.htm)

All vehicles have an air filter because your car needs a mix of air and fuel to run.

Normal air is full of dirt and dust and if this were to enter your engine unfiltered then it would get damaged over time.

You can run an engine without an air filter, but damage will definitely occur in time and it cannot be repaired cheaply.

Your car's original air filter will be either round or panel (flat rectangle) type.



Typically, modern cars with fuel injection use a panel air filter, and those running on a carburettor have a round filter.

These filters normally have a paper core that is folded many 100's of times to give a larger surface area. The core is surrounded by a flexible rubber type outer frame that holds the core in place and forms an airtight seal inside the airbox or filter housing. The reason that the core is folded many times is so that there is a larger surface area for the air to be filtered through. Standard paper filters are very good for filtering out the dirt and dust from the air that the engine is sucking in. They are also cheap and easy to replace.



Whatever the shape, it will sit in the engine bay inside an 'air-box' or filter housing as shown above.

This is normally made of plastic and protects the incoming air from the heat of the engine. It will also have pipework connected to it so as it draws in cool air from the front of the car. Cool air is denser than warm and is better for fuel efficiency and performance.

#### **NOTES**

Regularly changing your air filter will help it to run more fuel efficiently and keep its performance up. It also helps lengthen the life of the engine. Replacement air filters (same as originally fitted) are readily available from most motor-factors and car shops. They are inexpensive and very easy to change. Paper airfilters cannot be cleaned unlike many aftermarket performance filters.

If you want to gain more power from your engine, you should be considering changing your original panel air filter for an performance induction kit. These kits replace your airbox with a cone shaped filter.

To find out more about performance induction kits read the article in this ebook called - [What is an induction kit.](#)

## 2.8 What is an Induction Kit

Online version - [http://www.carbasics.co.uk/what\\_is\\_an\\_induction%20kit.htm](http://www.carbasics.co.uk/what_is_an_induction%20kit.htm)

Whether your car is a basic model or a performance version it will probably have either a round or panel type filter sat inside an airbox in the engine bay.



Photo of standard airbox

Inside the airbox will be an inexpensive paper type air filter



Photo of standard airfilter element

This airbox and airfilter setup are, at best, adequate for providing clean air into the engine. However, as the car ages, things get dirty and full of dust and become less efficient.

The idea behind an induction kit is to replace the restrictive airbox and airfilter with something that will allow more cool air into the engine and also do it with less effort. This will then result in more power from the engine.

### **So what actually is an Induction Kit then ?**

An induction kit normally consists of a cone shaped filter (cone filter) and the necessary pipework and brackets to fit it to your specific vehicle model.



The photo above shows a typical (K&N) induction kit with the cone on the right attached to the existing pipework.

As mentioned above, the kit replaces the manufacturers airbox and filter, it will sit in the engine bay in place of them and provide the engine will more clean air for less effort from the engine.

### **Is fitting an induction kit difficult ?**

The short answer is no, fitting an induction kit is not a very technical or difficult thing to do. Most kits available from the most popular induction kit manufacturers are 'car specific'. K&N, piper, green filters and Jetex (there are more) are amongst the most well known induction kit manufacturers.

If you look online at some performance car parts shops, do a search on induction kits specific for your car, example "honda civic induction kit". You will then see a list of all the kits that are made specifically for that vehicle. It is best (and easiest) to buy a kit that has been designed to fit your specific car. It will come with everything you need to fit it, as well as detailed instructions showing how to fit it.

The only difficulties that may occur are when your specific car is not listed and you have to buy a universal induction kit. These are designed to fit onto many different cars but will need to be modified or have brackets made and fitted by the customer.

So induction kits are pretty straight forward to fit, and the cars computer (ECU) will adjust itself automatically and revise its fuel/air settings to get the best performance and efficiency. Compare it to just changing your dirty old panel filter for a clean new one. The ECU will automatically adjust itself to the new conditions. So nothing at all for you to do or worry about other than fit the kit and drive the car.

### **Advantages of induction kits ;**

- **Small gain in engine performance for a relatively small outlay, and then if you change your exhaust and other components for a performance items, you will get even better power gains.**
- **Good quality induction kits will last for a lifetime, because unlike standard paper filters, the can be cleaned/washed and re-oiled, so will never need to be replaced.**
- **Noise (some think it is a bad think). Because your new induction kit is sitting in the engine bay and not in a box (airbox) like your old panel filter, you will here air being sucked into the engine though the cone filter. This is called the 'induction roar' and it will vary from manufacturer to manufacturer**

### **Disadvantages of induction kits ;**

- **You have thrown away the airbox that protected the original filter from heat and supplied it with cool air and now you have a cone filter sitting in your engine bay unprotected. If you have purchased an expensive and reputable induction kit it will probably come with extra pipework that you can fit in order to push cold air from outside of the car onto the new filter. If this cold air feed is not in place, your cone filter will be sucking in plenty of air but it will be warm air. Warm air into your engine is bad for performance and economy because it is less dense, meaning**
- **Noise, induction roar - some people don't think of this as a problem and actually prefer the sportier noise.**

### **Notes**

**I have had induction kits fitted to most of my petrol cars, Nova SR and a Renault 5 GT Turbo. Never had one fitted to the Vauxhall Calibra 4x4, just never got around to it. What I would say is make sure that you can buy the best induction kit that you can afford. There are many cheap (normally foam) performance induction kits available, all claiming to give you great power increases and not costing alot to buy. You still need to be protecting the inside of your engine from airbourne particles and debris, otherwise we could just take off our airfilters and have no airflow restrictions whatsoever.**

**Continued .....**

**Notes continued .....**

**Buy the best you can afford and avoid the cheap crap. Stick with reputable brands that you may have heard of or a mate already has fitted.**

**And finally, don't expect massive and stomach churning power gains. An induction kit will not rock your world, it won't make you a better lover and it WILL NOT turn your car into a drag racer. IT IS however, an important part of what should be looked at as a 'performance package'. Changing the airbox for the induction kit and leaving everything else standard, will give you a small increase in performance - thats good. But then when you start changing other parts such as exhausts, spark plugs ECU chips etc. then you notice a much greater increase in performance and improvement from the induction kit.**

**If you want to see what induction kits are available for your car, click on the link below ;**

**[http://www.carbasics.co.uk/induction\\_kits.htm](http://www.carbasics.co.uk/induction_kits.htm)**

## 2.9 What is an air mass meter

Online version - [http://www.carbasics.co.uk/what\\_is\\_an\\_air\\_mass\\_meter.htm](http://www.carbasics.co.uk/what_is_an_air_mass_meter.htm)

Air mass meters are also commonly referred to as air flow meters. They measure the mass of the air flowing into the engine. The air mass information is necessary to calculate and deliver the right amount of fuel to the engine.

### What do they look like ?

Usually situated directly after the airbox so that filtered air is measured.

Simply put, they are a plastic tube that air passes through. There will be sensors inside that are in the air stream. There will be a plug with electrical wires attached to it. These send the air mass meter information to the cars computer (ECU).



Here is a Bosch air mass meter, typically fitted to Audi, Seat & VW diesel engines.



Here is a Pierburg air mass meter, typically fitted to Audi, Seat & VW diesel engines.



Here is an internal photo of the type of air mass meter fitted to the Ford Probe.

Other related articles

[3.12 How to change an air mass meter](#)

**What can go wrong with the air mass meter ?**

Well, if you imagine that everytime your car is driven the vane or electrical wire inside is having air passed over it. Although this air has been filtered via the panel filter within the airbox, there will still be minute particles of dust and pollen etc. that will build up over time and reduce the air mass meters efficiency.

Eventually it will stop working and this usually results in a significant affect on your cars power and its fuel economy.

It is not a part that will last forever, and although there are people that state that you can clean the internal parts, it is probably better in the long run if you just get it changed when it finally does stop working.

There was an intermittent fault on my VW Sharan (turbo diesel) whereby on occasion after a long run or having a lot of people in it, the power would disappear and the turbo was virtually non-responsive. After a while or if I switched the ignition off, the problem would go away but it kept doing this for about 6 months. I had a search around on the internet and looked in many online forums and found that the most likely cause was the air mass meter was on its way out. I had the option of giving a clean to see if this would get rid of the problem, but because of the miles this car has done I decided that this would be a waste of time and would get round to replacing it at some point or to get it changed when it finally gave up for good (whichever situation would come first).

With my VW Sharan when the air mass meter did not give any signal out to the ECU, the car would switch itself into 'limp mode'. This 'limp mode' was the cause of the lose of power and it was the ECU (cars computer) running in a mode that would minimise any damage to the engine.

Well the air mass meter (airflow meter) finally died for good in July 2006, having covered 108,000 miles. When we changed it (see section [3.12 How to change an air mass meter](#)) we noticed that it was the original meter as it had a date stamp on it. Not too bad then seeing as it has done all those miles, many of them with lead boots on.

It was a simple 15 minute job and we explain it in detail with photos in the article. Changing the air mass meter is an easy job which did not require any specialist tools. We explained where we got the air mass meter from, how much it cost, how we fitted it and how the car felt afterwards - well worth a read.

### **A little more technical stuff if you want it ....**

There are two common types of air mass meter. They are the vane meter and the hot wire. Both types use additional sensors to accurately determine the engine's air mass flow rate.

#### **Vane meter sensor**

A vane sits in the intake air stream on a spring-loaded arm. The vane moves in proportion to the airflow, and a voltage is generated based on the distance the vane is moved. The vane type air mass meter measures air volume and not mass. It relies on information from other sensors to help accurately calculate air mass.

#### **Hot wire sensor**

A wire which is heated by an electrical current sits in the intake air stream. The electrical resistance of the wire changes with its temperature and thus changes the amount of electrical current being passed through it. Air passes the wire and cools it, decreasing its resistance thus allowing more electrical current to pass. As more current flows, the wire's temperature increases until the resistance reaches equilibrium again. The amount of current required to maintain the wire's electrical resistance is directly proportional to the mass of air flowing past the wire.

Typically the air mass meter outputs a 0 - 5.0 volt signal, proportional to the air mass flow rate. They also normally have a temperature sensor incorporated into their housings to measure the intake air temperature (IAT sensor).

If an Air Mass Meter is used in conjunction with an exhaust gas oxygen sensor (EGO), the engine's air/fuel ratio can be controlled very accurately. The air mass meter provides air flow information to the engine's ECU, and the EGO sensor provides information to make minor corrections.

## **2.10 What is an intercooler ?**

Online version - [http://www.carbasics.co.uk/what\\_is\\_an\\_intercooler.htm](http://www.carbasics.co.uk/what_is_an_intercooler.htm)

Basically it is a radiator found on turbo-charged and super-charged cars. Intercoolers are fitted to both petrol and diesel cars.

It's purpose is to reduce the temperature of the air going into the engine.

Intercoolers are also referred to as charge coolers.



Here is a typical performance intercooler

### **Why does my car need an intercooler ?**

Turbochargers and superchargers compress the air being fed to the engine. When air is compressed it heats up and this makes it less dense, meaning that for a set volume there will be less air available for the engine and hence less power. Your intercooler will cool this compressed air and therefore the engine will have more power.

This is why intercoolers are not found on non-turbo or non-supercharged vehicles. These vehicles are using cool external air, filtered and sent straight into the engine. The air has nothing done to it, it is not compressed and therefore not heated up.

### **Where are intercoolers mounted ?**

They are normally mounted at the front of the car behind the front bumper or grille so that they are in the path of cool air. However, the Subaru Impreza has its intercooler mounted underneath the bonnet and relies on a bonnet scoop to force air over it when moving.

### **How does an intercooler work ?**

It works in exactly the same way as your car's water radiator. The heated air is fed through the intercooler and it passes over vanes which are cooled by the external air passing over the vanes. So your intercooler system is external air (passes over vanes) cooling down internal air (passes through vanes), an air-to-air heat exchanger where the hot and cold air never actually touch. Compare this with your water radiator in your engine's cooling system which is a water-to-air heat exchanger. The hot water passes through vanes inside the radiator and the vanes help to remove heat from the water as the cool external air passes over the outside of the vanes.



Here is a photo showing the internal vanes of an intercooler

**Will an uprated intercooler give me more power ?**

Yes it will, however most road cars are restricted by space as to the size of intercooler that can be fitted. Vehicles running large amounts of turbo boost often have different bumpers fitted, allowing more air into the engine bay and often giving more room for a bigger uprated intercooler right at the front of the car.



Here is an example of a performance intercooler install

Here are some examples of intercoolers, see if they have one for your car ;

<http://www.carbasics.co.uk/intercoolers.htm>

### 3.1 How to jump start a car

Online version - [with video\) http://www.carbasics.co.uk/how to jump\\_start.htm](http://www.carbasics.co.uk/how_to_jump_start.htm)



If your car wont start because the battery has gone flat, then you may be able get it going again by jump-starting it.

#### What you need ;

A set of car jump leads, also referred to as booster cables  
A friends car that is working.

Using jump leads is pretty simple and safe if you follow these instructions ;

#### STEPS

1. Position both cars close together so the jump leads will reach both batteries.
2. Then connect the car battery booster cables in this order ;
  - a. Connect (+) positive red cable to the (+) positive terminal on the dead battery.
  - b. Connect the other end of the (+) positive red cable to (+) positive terminal on the working car.
  - c. Connect (-) negative black cable to (-) negative terminal on the working car.
  - d. Connect the other end of the (-) negative cable to the (-) negative terminal on the dead battery.
3. You are now ready to start the working car's engine. Turn off all electrical equipment on the working car (heater, lights, radio, etc.) so that all the battery power is getting used to jump start the dead battery. Let the working car run for a minute or so before you try to start the dead one. Revving the engine in the working car will produce more current and help with jumping the dead battery.
4. Now try and start the dead battery engine by turning the ignition. If it sounds like it is going to start but will not quite go, then rev the working car for a little longer before trying the dead battery again.
5. When the dead battery has started and is running, remove the jump leads. Do this in reverse order ;
  - a. Disconnect (-) negative black cable from the terminal on dead battery.
  - b. Disconnect (-) negative black cable from the (-) negative terminal on the working car.
  - c. Disconnect (+) positive red cable from the (+) positive terminal on the working car.
  - d. Disconnect (+) positive red cable from the (+) positive terminal on the dead battery.

### **TIPS**

**You must let the car that had the flat (dead) battery run for quite a while. If you turn the ignition off quite soon after starting it then it may not start again because there will not be enough charge in the battery. It might be worth taking the car for a drive, or driving the car home and connecting the battery to a battery charger overnight.**

**Ensure that when you are connecting and removing the jump leads, they do not touch each other and do not come into contact with any moving parts on either engine. Most quality jump leads have the clamps coated with plastic so there is less chance of the metal parts touching parts of the car or engine. This is something to consider when buying your jump leads.**

**If the battery terminals on either car are dirty and corroded, then they will need to be cleaned up so that the clamps on the jump leads will get a good clean connection.**

**If the flat battery will not start the car after following this procedure, then the battery could be damaged and faulty inside. It is suggested that you try replacing the dead battery with a borrowed one before you spend money on a new one. Alternatively, get an auto-electrician/mechanic to check the vehicle over for you.**

### **NOTES**

**Car battery booster cables are always a useful thing to have on your car, whether to help you out of trouble and get you on your way, or to give someone else a helping hand. They are relatively inexpensive, and buying a set to keep in the back of your car is well worthwhile when compared to the inconvenience of having a flat battery. They can be purchased from any local motor-factors, or bought online from most car accessory websites.**

**As well as jump leads, there are a couple of other useful items that perhaps you should stick onto your Christmas or birthday wish list ;**

### **1. Car battery chargers.**

Keep this at home and if you ever suffer a flat battery on your car you can bring it into the house and recharge it overnight. The battery charger plugs into your house electric supply and has a black and red clamp for fitting onto the (+) (red) and (-)(black) of your battery. Car battery chargers normally take 12-24 hours to recharge your car, they will recharge slowly and normally let you know when the battery is full.



### **2. Battery booster packs.**

Keep one of these on charge in your garage, and whenever you suffer a flat battery this will get you started. Inside it is a large battery and it also has (+) and (-) clamps. Keep it plugged in when it is not in use and then it will always be fully charged. Just attach it to your dead battery and it should provide enough power to start your car. Just remember to keep the car running until your engine has recharged the car's battery.



For a large range of car jump leads (booster cables), battery chargers, booster packs and battery testers visit -

<http://www.carbasics.co.uk/equipment.htm>

### 3.2 How to replace a blown fuse

Online version - [http://www.carbasics.co.uk/how\\_to\\_replace\\_a\\_blown\\_fuse.htm](http://www.carbasics.co.uk/how_to_replace_a_blown_fuse.htm)

This section is best viewed online as the video will explain things a lot more easily than words, click the link above.

Changing the fuse on a car electrical system is pretty easy.

You may need to check or change your fuses if something electrical on your car is not working, for example ;

windscreen wipers have stopped working,  
electric windows have stopped working.

etc.

Before you even think about taking the car to the garage or stripping bits off your vehicle, find out where your fuse box is and check the fuses. Your [Haynes workshop manual](#) should tell you where the fuse box is located.

Your problem might only need to have a fuse replaced to fix it. Fuses cost very little and are available from all motor factors (like Halfords).

#### **NOTE**

If the same fuse continues to blow, either immediately or after a while, then this will require further investigation. The fuse is probably continually blowing because of an electrical fault elsewhere on the car and this will need to be checked out by an expert.

### 3.3 - How to jack up a car safely

Online version - [http://www.carbasics.co.uk/how\\_to\\_jack\\_up\\_a\\_car\\_safely.htm](http://www.carbasics.co.uk/how_to_jack_up_a_car_safely.htm)



**Sounds silly to some, but many people are scared to do this and some people have been really hurt by not jacking up their car properly and taking the necessary precautions.**

**Think about it, do you want a car to fall on you, or do you want to damage your car when it drops to the floor without a wheel on ?**

**NO, didn't think so.**

**So don't do stupid things like this guy ;**



larger image at [http://www.carbasics.co.uk/how\\_to\\_jack\\_up\\_a\\_car\\_safely.htm](http://www.carbasics.co.uk/how_to_jack_up_a_car_safely.htm)

**So follow the advice on this page and you should be safe.**

#### **When will I need to jack up a car ?**

- to change a wheel,
  - to change brake pads,
  - to check your exhaust,
- etc..etc..

### What will I need ?

You will need a 'jack' to lift the car and 'axle stands' for safety, and if you are taking the wheel off you will also need a 'wheel brace'. Most cars come with a car jack and wheel brace like this ;



If your car did not come with a jack and wheel brace then you need to buy some. Most motor factors sell them, and you can get good deals online.

There are different types available ;



Trolley jack



Bottle jack



Scissor jack



[Extendable wheel nut brace](#)

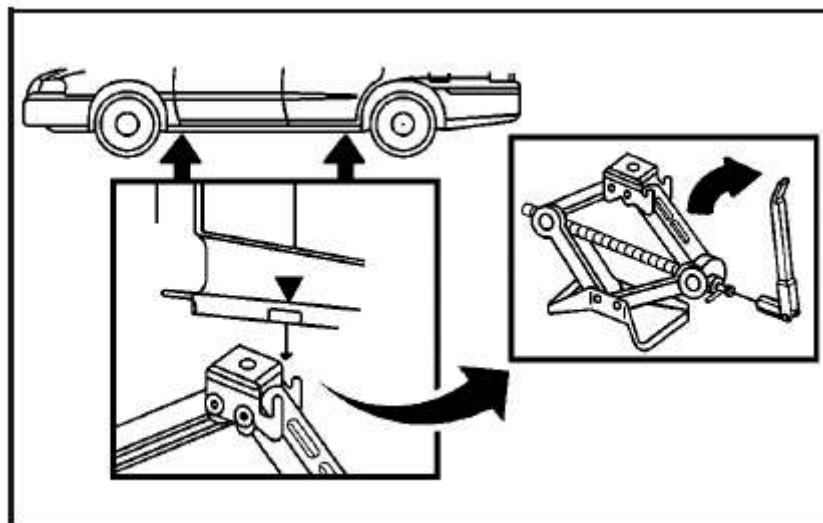


[Axle stands](#)

You can view more info on the above equipment by clicking the link below ;

<http://www.carbasics.co.uk/equipment.htm>

If you are using the jack that came with the car, it should be designed to fix securely onto specific points under the car, typically here ;



There will be a cut out or indentation behind the front wheel and in front of the back wheel that will accept the head of the jack. When the head of the jack is located at the correct points, it should not move about whilst you are operating it and raising/lowering the car.

### How do I do it safely then ?

For the purpose of this exercise we assume you are changing a car wheel.

If you are performing something else under your car, just stick to the stuff relevant to chocking the wheels, raising the car and securing it.

**Step 1. MOST IMPORTANT** - find a flat and solid surface to jack up your car. Don't jack up any car when it is not on level ground or has an uneven surface.

This is just asking for trouble and you could end up in hospital or worse.

**Step 2.** Make sure that the handbrake is fully on and the car is in gear.

**Step 3.** Secure the wheel on the opposite corner to the one you are removing, example if you are changing the wheel on the front passenger side (nearside), then you should secure the rear drivers side (offside) wheel. The wheel should be 'chocked' so as to prevent the car from rolling when we lift it with the jack.

I have chocked wheels with house bricks or pieces of wood in the past, but the most secure and safe method I found was proper 'wheel chocks' (see below).

They were very inexpensive to buy and are far safer than using anything else and the can potentially be a life saver so why cut corners ;

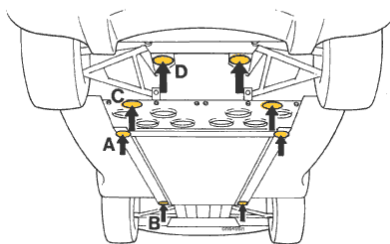


Rubber wheel chocks, only about £5

**Step 4.** Put the jack into its jacking position and take the weight of the car slightly. **DO NOT LIFT THE WHEEL OFF THE FLOOR.** If you are using the manufacturers jack then it will be easy to locate the correct jacking position. If you are using a trolley, bottle or scissor jack you will need to find a strong and secure place under the car to position it.



Example of secure position for jacking when using trolley jack



Here are a couple more examples of jacking points, your owners manual or [Haynes manual](#) may help you identify safe jacking points also.

**Step 5.** The reason for not lifting the wheel fully off the floor is so that we can loosen the wheel nuts slightly and with it on the ground the wheel won't spin around. If you were to jack up the car fully and then try and loosen the wheel nuts, the wheel will most likely just keep turning around.

So with the weight of the car on the jack, take your wheel bolt spanner (or wheel brace/spider as shown below) and loosen off all the bolts very slightly.



**Step 6.** Now raise the car slowly with the jack until the tyre is off the floor.

**Step 7.** At this point you can now fully remove all of the wheel bolts and put the safely to one side. Now you can remove the wheel by just lifting it off the car, mind your back as large wheels/tyres can be heavy. Place the removed wheel under the car as a back-up to the jack.

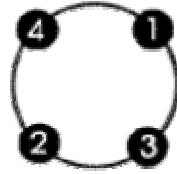
**NOTE** - if the wheel is stiff and does not want to come off, put one hand on the top (6 o'clock) and one at the bottom (12 o'clock) and try to rock it loose. It should not require too much force/effort to get the wheel loose but take care not to rock the car off its jack.

**Step 8.** Now you can fit your replacement wheel, making sure that the bolt holes on the wheel are lined up with the holes on the car wheel hub.

Line up the holes and refit the bolts you removed earlier.

With the car jacked up, tighten each bolt as much as you can until the wheel starts to turn. Now to ensure that the wheel goes on straight, make sure that when you tighten the bolts, they are tightened up as follows ;

**4 stud (bolt) wheels**



4 Bolts

**5 stud (bolt) wheels**



**Step 9.** Lower the car to the floor with the jack and remove it. Now perform the final tightening of the wheel bolts using the same sequence as shown above.

**Step 10.** Remove all tools and equipment to you have used and store them away safely.

**FINISHED**

If you changed a wheel because of a flat tyre/puncture then go and get it repaired or replaced straight away.

**Recommendations :**

If you don't have any axle stands to use when working under your car, you will need to put something else under the car to either protect you or to stop the car from hitting the ground if the jack fails.

**Continued ...**

### **Recommendations continued**

What I normally do if I have to take a wheel off is to put it under the car when I have removed it. I usually place it in its side under the lowest part of the car or under the side sills, so that if the car does fall (say with you under it), the wheel will at least offer some protection from you getting totally crushed.

**ALSO,**

Get yourself a good wheel brace, don't rely on the spanner supplied with the vehicle. I have managed to snap a few of these as they are not very well made.

Trolley jacks are easy to use ,



No bending down near the car to lift it.

If you are considering purchasing any of the equipment (jacks, axle stands, wheel chocks etc.) or need more info, click the link below ;

<http://www.carbasics.co.uk/equipment.htm>

### 3.4 - How to change your air filter

Online version - (with video) [http://www.carbasics.co.uk/how\\_to\\_change\\_air\\_filter.htm](http://www.carbasics.co.uk/how_to_change_air_filter.htm)

For the purposes of this article we assume you have a panel air filter fitted to your car as this type covers most vehicle applications.

**Changing an air filter regularly can have a significant impact on engine life and performance. It's quick, easy and will save you money.**

Changing a panel air filter is a 5 - 10 minute job and no special tools are needed.



This is a photo of a typical engine bay showing what the airbox looks like.

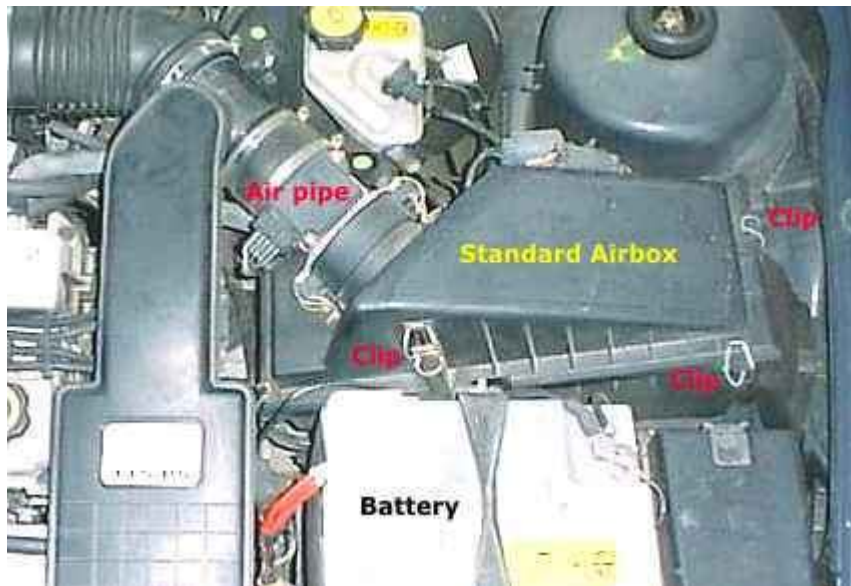
Inside the airbox is your panel air filter, it will look like this ;



If you have a Haynes manual for your vehicle, then you can refer to that for more specific photos of your engine bay.

However, the above photo shows the typical layout for most cars with the airbox situated on either the left or the right.

The top of the airbox is usually held in place with clips or screws ;



This photo shows the clips that hold the top of the airbox in place.

You should just have to undo the clips around the lid to get to the airbox, revealing the air filter beneath. It is then just a case of removing the old one, replacing it with the new one and then clipping the lid back down.

If the lid will not lift up far enough to reveal the airfilter, then the 'air pipe' shown in the photo above will need to be loosened.

As you can see, along the 'air pipe' are a number of clamps (jubilee clips). These are flat metal rings that clamp the pipe all the way around.

If you loosen off one of these by unscrewing it with a screw-driver then the pipes should pull apart allowing you to take off the airbox lid.

Refitting of all these parts is just a reversal of what you have done so far, i.e. put the new filter in, refit the air pipe, screw the jubilee clip back on and then clip the airbox lid in place.

### TIPS

1. When you fit the replacement air filter in place, make sure that it sits neatly inside the airbox. Check that the lid has clamped down fully all the way around and that no part of the new filter is trapped in between the box and the lid.
2. If you have to loosen off the 'air pipe' using the jubilee clips, then be careful when tightening them back up. Because the pipe that you are clamping up is probably made of plastic, any overtightening of the clip may cause damage to the pipe.

**So save yourself some serious money by performing your own car air filter change.**  
Online version has video - [http://www.carbasics.co.uk/how\\_to\\_change\\_air\\_filter.htm](http://www.carbasics.co.uk/how_to_change_air_filter.htm)

### **3.5 - How to check your engine oil**

Online version - [http://www.carbasics.co.uk/how\\_to\\_check\\_engine\\_oil.htm](http://www.carbasics.co.uk/how_to_check_engine_oil.htm) (with video)

Think of the oil in your engine like the blood in your veins.

It is essential and without it your body and your engine will die.

Regularly checking your oil level will help maintain the engine and make it last longer. It is quite literally a 30 second job that can save you a lot of hassle.

#### **So how do I check my engine oil level ?**

1. Ensure that your engine is warm and has not been running for a while. This will mean that all the oil has settled to the bottom of the engine and that you are getting a true reading.
2. Locate the oil dip stick. This will be under the bonnet, in the engine bay and usually at the front of the engine.



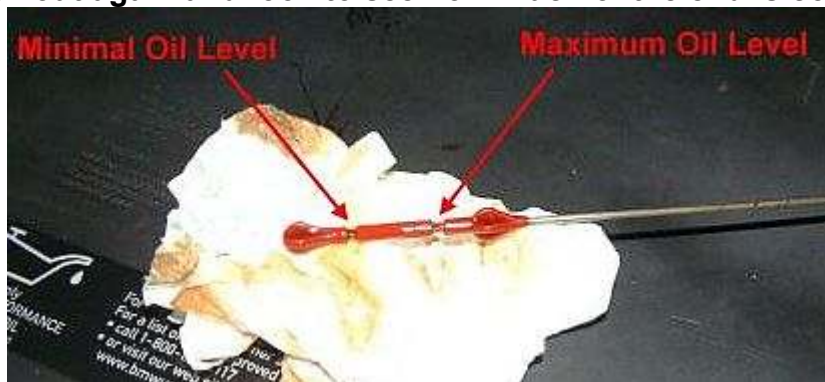
You can see in the photo above that the dipstick handle on this car is yellow and is circular. Not all dipstick handles are like this, however there is an effort on more modern cars to ensure that stuff that needs regular checking is coloured yellow. However, on older vehicles the dipstick handle could be any colour or shape. I've had Red, Green, Black and some have been circular, hooked or just sleeved.

3. Ensure that you have a clean rag to hand and then pull the dipstick handle in an upwards direction. You will notice that underneath the handle is a long strip of metal with markings on the end. These markings show the maximum and minimum levels for the oil.



4. Give the dipstick a wipe and remove all the oil and then slide it back into the tube from where it was removed. This will clean the dipstick so that you get a correct oil level reading. Ensure that the dipstick is pushed all the way down or you will get a false reading.

5. Pull dipstick out again and look to see how much of the end is covered with oil.



Ideally, the oil should have reached up to the maximum mark on the dipstick. However anywhere in between the maximum and minimum levels is OK.

It typically takes 1 litre of oil to take the oil level from minimum to maximum, however this value can be different for each car so it is a good idea too check the exact figure in your Haynes Manual if you have one.

6. If the oil level is OK then put the dipstick back in making sure it is pushed all the way down. Now you can feel happy that your engine has plenty of life-blood.

### **My oil level is LOW, what do I do ?**

If you are concerned that your engine oil is low (perhaps you are going on a long journey) or it has fallen below that minimum level on the dipstick then you need to 'top-up' your engine oil.

### **How often should I check my engine oil ?**

**There is no straight forward answer, it depends on how often you use your car and how many miles you travel.**

**If you use your car every day to travel a long distance to work, you should be checking your engine oil level more often that your gran who only uses her car a few times per week.**

### **3.6 - How to top up your engine oil**

Online version - [http://www.carbasics.co.uk/how\\_to\\_top\\_up\\_oil.htm](http://www.carbasics.co.uk/how_to_top_up_oil.htm)

Dependant on how low your oil level is will depend on how much oil you need.  
New engine oil is available from all motor-stores in a number of sizes.

If you are just topping up then you will probably only need a small bottle.

You will need to check in your owners manual or Haynes manual to see what type of oil you require.



Have a look under your bonnet in the engine bay, and on top of the engine will be a cap with wording or pictures relating to oil on top of it.

The cap should unscrew anti-clockwise and allow you to pour your new oil into the engine.

**MAKE SURE YOUR ENGINE IS COOL  
before you touch any part of it !!**

#### **How do I know how much to much in ?**

Most bottles or containers of oil you buy from the store will tell you how much they hold, but more importantly will probably have a see-through section on the back of them with markings to show how much oil is in there. A bit like the fill windows on modern kettles.

So if your engine oil level is at the minimum mark and your car manual states that it is 1 litre between the min and max marks on your dipstick (see how to check your oil level) then you will need to pour the new oil into the engine until the contents of the bottle has gone down by 1 litre.

**Then you need to leave the car for a short while whilst all the oil drains down and then come back and do the checks described in the how to check your oil level article.**

**You should find that when you recheck the oil level it should now be back up to the maximum level.**

### 3.7 - How to change and air mass meter

Online version - [http://www.carbasics.co.uk/how\\_to\\_change\\_air\\_mass\\_meter.htm](http://www.carbasics.co.uk/how_to_change_air_mass_meter.htm)

If you are unsure of what an air mass meter (air flow meter) is or where to locate it then we suggest that you read our other article what is an air mass meter.

#### What can go wrong with the air mass meter ?

Well, if you imagine that everytime your car is driven the vane or electrical wire inside is having air passed over it. Although this air has been filtered via the panel filter within the airbox, there will still be minute particles of dust and pollen etc. that will build up over time and reduce the air mass meters efficiency.

Eventually it will stop working and this usually results in a significant affect on your cars power and its fuel economy.

It is not a part that will last forever, and although there are people that state that you can clean the internal parts, it is probably better in the long run if you just get it changed when it finally does stop working.

There was an intermittent fault on my VW Sharan (turbo diesel) whereby on occasion after a long run or having a lot of people in it, the power would disappear and the turbo was virtually non-responsive. After a while or if I switched the ignition off, the problem would go away but it kept doing this for about 6 months. I had a search around on the internet and looked in many online forums and found that the most likely cause was the air mass meter was on its way out. I had the option of giving a clean to see if this would get rid of the problem, but because of the miles this car has done I decided that this would be a waste of time and would get round to replacing it at some point or to get it changed when it finally gave up for good (whichever situation would come first).

With my VW Sharan when the air mass meter did not give any signal out to the ECU, the car would switch itself into 'limp mode'. This 'limp mode' was the cause of the lose of power and it was the ECU (cars computer) running in a mode that would minimise any damage to the engine.

**For the purpose of this step-by-step article, the information below will be related to changing the air flow (air mass) meter on a VW Sharan 1.9tdi 1997. The procedure for most other cars will be very similar and just as simple.**



These are typically the 2 types of air flow meter fitted to the VW sharan. On the left is the Bosch MAF sensor and on the right is the Pierburg MAF sensor.

### What do I need ?

Don't worry, you should not need any expert mechanical tools costing a small fortune. For changing the VW Sharan air mass meter all we need was an 8mm allen key and a pair of pliers, ooh and about 15-30 minutes of spare time.

### How long did it take ?

From start to finish the job took about 15 minutes.

### Here are the steps for changing your air mass meter ;

On the VW Sharan, the air mass meter is situated on the left of the engine bay behind the airbox. It is bolted onto the airbox at one end with 2 x 8mm allen bolts and clamped at the other end onto a plastic air pipe with a clamping ring.



- 1. Unplug the wiring from the meter by squeezing the clips wings inwards and pulling up. Do not pull it by the wires.**
- 2. We will start off by removing the plastic pipe at the back of the air mass meter. When you push the the 2 clamping ring wings towards each other, the diameter of the clamp increases allowing you to push the pipe off the end of the meter. With your right hand take your pliers and put them over clamping ring wings, push the pliers together and as the ring opens, separate the pipe from the meter with your left hand.**

You can leave the clamping ring in place around the loosened pipe.



**3.** The next thing to do is to unclip the top off the airbox and turn it over. This will be easy now you have removed that plastic pipe, and none of the other pipes on the airbox will need to be removed. Turning over the airbox lid at this point will make it easier to remove the 2 x 8mm allen bolts holding the meter.

There are 2 clips holding the airbox lid in place, one at the front and one at the back. Locate one of the clips, put your hand down there and feel the bottom of the clip. If you pull the bottom of the clip upwards, it will release the top of the clip. Push the top of the released clip away from the airbox lid and repeat with the other clip.



**4.** Now you should have easier access to both of the bolts holding the air mass meter. Undo the 2 x 8mm allen bolts using your 8mm allen key. Once removed make sure you put them in a safe place. The meter should now separate from the airbox, make sure that you retrieve the large 'o' ring from the outside of that end and fit it to the new air mass meter.



**5. Fitting the new air mass meter is a direct reversal of what you have just done ;**

- a. fit the old 'o' ring onto the new air mass meter**
- b. bolt the meter back onto the lid of the airbox**
- c. clip the airbox lid back on to the airbox, making sure that the panel filter is seated correctly**
- d. Connect the plastic pipe back onto the other end of the air mass meter, making sure that the clamping ring is securely in place**
- e. reconnect the wiring plug onto the top of the meter**

**FINISHED.**

It has been suggested that the battery power should be disconnected for at least 30 minutes so that the ECU (cars computer) will reset. This will ensure that all the old ECU settings are wiped and it will then start up again using the new air mass meter readings. This could be done at the start and remain disconnected during the new install to save time, or it could be disconnected for 30 minutes after you have finished.

### **Where did you get your air mass meter from ?**

Ours was purchased from 'German Swedish and French' car parts. They had the item we needed on the shelf so I drove round to fetch it. This was a Pierburg air mass meter, a brand new original part - identical to the one we took off. The cost was about £75.

We were informed that if it had been a bosch item, then there would have been a £25 surcharge on top that would be refunded until we bought the old faulty one back. The reason for this is that the Bosch items are reconditioned, the internal parts are changed for new ones and these are fitted into the reconditioned bodies.

Whichever your version is, they are readily available from local motor-factors as well as from online retailers. In fact with the online retailers you can usually get them cheaper than what we paid for ours. But we needed ours quickly and could not wait the few days for it to be delivered.

**Please note that there are cheaper MAF sensors available but these will most likely be pattern copies and not the original Bosch or Pierburg versions. You will have to do your own research (online) as to how reliable the copies are compared to the Bosch or Pierburg items.**

### **TIPS**

**When we changed the air mass meter it did not fix the problem immediately, it eventually started to work but I was not too impressed with the fuel consumption. It was suggested to us that what we should have done was to disconnect the power from the battery for about 30 minutes to reset the ECU after we had fitted the new meter.**

**After the 30 minutes, we reconnected the cars battery. The ECU then has no memory of what all the previous settings and readings were from the meters and sensors and is allowed to start from fresh and draw in all the correct relevant information.**

**This did the trick. All the power had returned, the throttle response was more crisp and precise and we believe that we now had a little more power than before the air mass meter failed for good. We also noticed that the fuel consumption went back up to slightly better than it was before. We were getting about 35-40mpg around town, much better than when it was running in 'limp mode', but now we are getting 40-45 mpg around town and even better at steady speeds on the motorway.**

### 3.8 - How to test your alternator

Online version - [http://www.carbasics.co.uk/How\\_to\\_test\\_your\\_alternator.htm](http://www.carbasics.co.uk/How_to_test_your_alternator.htm)

Alternators, if you don't know what one is then take a look at our article [what is an alternator](#).

The alternator on your car will not last forever, and when it does go, it can leave you stranded somewhere with a flat battery - and no-one needs that.

Perhaps you currently have car problems (battery keeps going flat) and you think it may be that the alternator is to blame !!

Whatever your current situation, testing your alternator is a quick and simple job and something you should do to keep your car tip-top and reliable.

You don't need to take your alternator apart to test it and you don't need any expensive tools.

What you will need (buy one, they are cheap or borrow one) is a volt meter or multimeter.

They are very simple to use, here is a photo of one (cost about £10) ;



**Here is what you do :**

Make sure all the accessories on your car are turned off (lights, radio etc.) and then rev up the cars engine to a fast idle (say 2000-2500 rpm). Set the Voltmeter to the DC scale and measure the voltage across the battery terminals - red lead of the voltmeter on the positive terminal, black on the negative. You will need someone to rev the engine whilst you connect the meter to the battery.

With the engine at a fast idle, the voltage on the meter should read around 14 volts (13.5 to 14.4). The alternator needs to generate a larger voltage than the battery's rated voltage to overcome the internal resistance of the battery. The current needed to recharge the battery would not flow at all if the alternator output voltage was the same. The larger the difference between the alternator output and the battery voltage, then the quicker the battery will charge.

So as you can imagine, if your car is quite old and the alternator and the battery are too, problems can occur with the battery getting enough charge and making the car more difficult to start and less reliable.

If the reading on the volt meter is less than 12 volts then you may have a failed alternator.

**One more check :**

Next, turn on the heater, the rear window de-mister, the radio, the headlights and anything else that draws power from the battery.

Now rev up the engine again and look at the the voltmeter.

It should still be reading around 14 volts. If it reads lower than 13 volts the chances are that the alternator is faulty and will need to be replaced before it catches you out.

**What to do if the alternator has failed**

Replacing an alternator is not a difficult job, however it varies from car to car as to how difficult the alternator is to access and remove the belt. If you purchase a Haynes Manual (cost about £13), then it will show you with instructions and photos how to undertake this change on your specific car in the easiest way and it will tell you what tools you need.

Doing the job yourself will save you money.

Even if you have to buy a Haynes Manual, volt meter and some spanners, it will still probably cost you less than having a garage do the work.

The alternator is bolted to the side of the engine and is driven (turned) by the engine via a belt. The belt turns a shaft inside the alternator when the engine is running and the output (voltage) is sent to the battery via wires.

Many places sell brand new replacement alternators as well as reconditioned or refurbished items. A reconditioned alternator has had all the internal wear parts such as brushes replaced with new ones. They will have been tested and will come with a guarantee, so don't worry about using one of these, they are good as new and cheaper.

I have also fitted second hand (used) alternators to a number of my cars. These have been sourced from scrap yards or vehicle dismantlers. They normally come with a receipt and can be changed within a short period of time if they turn out not to be working. I have always asked the supplier to test the alternator before I have paid for it. When buying parts it is always very important to keep the receipts in case a problem occurs.

Receipts are always worth keeping as they show a history of your car which prospective buyers like to see when they are thinking of buying your vehicle.

**TIPS**

If your garage ever tells you that you need a new alternator, ask them ;

- a) have they performed a load test on it
- b) what were the voltage readings
- c) was the alternator belt worn or slipping
- d) was there excessive noise from the alternator

These simple questions will let your mechanic know that you know a bit more about your cars electrical system than just how to turn the lights on. This should mean that you get given the best service and are treated better by the garage and not feel like you have been ripped off when work is done to your car.

## 4 – Car terms and acronyms

Online version - [http://www.carbasics.co.uk/car\\_terminology.htm](http://www.carbasics.co.uk/car_terminology.htm)

**We have created a list of common terms and abbreviations that not everyone knows.**

**They are not very technical and hopefully they will be of some use to you.  
So next time the garage mechanic tries to baffle you with rubbish  
or you are looking at car adverts, you should have a little better understanding  
and a little less chance of being miss-led.**

**Check out the online version for regular updates ;**  
[http://www.carbasics.co.uk/car\\_terminology.htm](http://www.carbasics.co.uk/car_terminology.htm)

**ABS** - Anti-lock Braking System. Uses sensors at each wheel to sense when the wheels are about to lock, and releases the brakes to prevent locking. This process occurs many times per second, and allows the driver to maintain steering control under hard braking.

**AC** - Air cooling, the cooling of the cabin area of the vehicle with a cool air stream. Not to be confused with Air Conditioning (air-con) or Climate Control.

**Air-Con** - Air conditioning

**Air Mass Meter** - Also referred to as an airflow meter. Will be located next to the airbox in the engine bay. It tells the cars computer (ECU) the amount of airflow that is being delivered to the engine so that the correct level of fuelling. [See article - what is an air mass meter](#) and [see article - how to change an air mass meter](#).

**Alternator** - A device that converts rotating mechanical energy into electrical energy. As you are driving along, the alternator is turned by a belt from the engine and sends an electrical charge back into the battery. If you did not have an alternator then your battery would go flat. [See article - what is an alternator](#).

**Anti-roll bar** - A metal bar mounted across the underside of car, it connects the two sides of the suspension, which counteracts the natural tendency for the car to lean when cornering.

**A-pillar** - The vertical roof support between the windscreen and front edge of the front side window.

**Airflow meter** - [see air mass meter](#)

**Aquaplaning** - A word to describe the cars tyres skating across the surface of water. When there is a build up of water on the road, the tyres will sit on the surface of the water and there will be no grip on the road. This is a dangerous occurrence due to loss of braking and steering and should be avoided by reducing your driving speed in bad weather.

**Aspect Ratio** - The ratio between the width and height of a tyre. Lower aspect ratios are usually found on sports models provide better handling and a firmer ride. e.g - written on the side of your tyres might be 185 x 65 x 15 (185 is the width, 65 is the height and 15 is the wheel diameter).

**ATF** - Automatic Transmission Fluid.

**Automatic transmission** - A gearbox that selects the correct gear automatically according to engine speed. These vehicles have no clutch pedal, only a brake and accelerator. In the UK, if you pass your test in an Automatic car, your license does not allow you to drive a manual gear driven vehicle.

**Back Pressure** - The pressure produced by restrictions in an exhaust system. Back pressure affects the rate at which the exhaust gases are extracted from the engine cylinders. This is an area where increases in engine performance can be achieved. Removing the back pressure from the engine by fitting a more free flowing exhaust will allow the engine to use its efforts to send power to the wheels instead of wasting it pushing exhaust gases out down a restrictive exhaust.

**BHP** - Brake Horse Power, see Horsepower.

**B-pillar** - The vertical metal roof support between front and rear side windows

**Bio Diesel** - It is an alternative to conventional diesel. It can be produced from vegetable oil, animal oil/fats, and waste cooking oil. These oils are converted Biodiesel using a process called transesterification. It costs less than normal diesel and does not require any modifications to your diesel engine. See our article on 'what is bio-diesel'.

**Booster Seat (booster cushion)** - A child-safety seat that is designed for children too large for a baby seat, but not big enough to sit safely in the vehicle's seats. If a booster seat is not used, then it is highly likely that the vehicles seat belts will not do their proper job and also potentially harm the child. In the UK, there are changes being implemented regarding children under a certain height. These children must be seated onto a booster cushion in order that the seat belts operate correctly and restrain the child in the correct places as they would if worn by an adult.

**Booster cables** - See also, [Jump Leads](#) and [Jump Start](#). Heavy duty electric cables fitted with clips to enable a car's battery to be connected to another battery for emergency jump starting. [See article - How to jump start your car](#).

**Brake caliper** - The part of a disc brake system, that houses the brake pads and the hydraulically operated pistons.

**Brake disc** - A rotating metal disc which is clamped between hydraulically operated brake pads in a disc brake system.

**Brake fade** - A temporary loss of braking efficiency due to overheating of the brake friction material. This is usually overcome by fitting high performance brake discs and pads. Performance pads will operate at higher temperatures,, and performance discs typically have grooves and are cross-drilled to remove gases and heat from the friction surfaces.

**Brake pad** - Part of the brake system which consists of friction material on a metal back-plate.

**Brake shoe** - Part of a drum brake system (found at the rear of the vehicle), that consists of friction material and a curved metal former.

**Breather** - A device that allows air into a system or allows, contaminated air out e.g. oil breather, or crank case breather.

**Bump stop** - Hard rubber piece used in many suspension systems to prevent moving parts from contacting the body during violent suspension movements. Also, lowered vehicles may choose to have bump-stops fitted around the shaft of the shock absorbers (shocks) so that the shocks do not bottom-out or get damaged when under load.

**Camber angle** - The angle at which the front wheels are set from the vertical (upright), when viewed from the front. Positive camber is the amount that the wheels are tilted out at the top.

**Cam follower** - A piece of metal used to transfer the rotary movement of the camshaft to the up-and-down movement required for valve operation.

**Camshaft** - A rotating metal shaft driven from the engine crankshaft with lobes or cams used to operate the engines inlet/exhaust valves.

**Carburettor (carb)** - A device that mixes air and fuel in the proportions required for burning by the engine under all conditions of engine running. Only found on older vehicles. Carbs have now been replaced by fuel injection and engine management systems,

**Catalytic converter** - Part of the exhaust system that creates a heat-producing chemical reaction to convert potentially harmful combustion by-products into carbon dioxide and water. All modern cars are now fitted with catalytic converters.

**Central Locking (CL)** - On a vehicle with powered door locks, the system locks or unlocks all doors at one time e.g. put your key in to open the drivers door and all the other doors will open at the same time. Remote Central Locking is a further enhancement, meaning that you press a button on your key fob instead of having to put your key in the door.

**Charge cooler** - [See intercooler](#).

**Choke** - Usually found on older vehicles, it is a pull type lever found around the steering column that is used to give extra fuelling on cold starting. Later vehicles moved from having a manual choke to having it controlled electronically.

**Climate Control** - The term for the heating, ventilation and air-conditioning system (HVAC). Most current vehicles have all three - heating, defrost, and AC.

**Clutch** - A friction device that is found between the gearbox and the engine. It acts as a coupling to be engaged or disengaged both parts smoothly during gear changes, without the need for either to stop moving.

**Coil** - A transformer used in the ignition system for increasing the voltage of the electric current conducted through the spark plugs. This high level of "electrical pressure" is what causes the current to jump the gap at the tip of each spark plug and create the actual spark that ignites the fuel inside the cylinder.

**Coil spring** - A spiral coil of spring steel used in many suspension systems.

**Combustion chamber** - Area in the cylinder head into which the fuel/air mixture is compressed by the piston and where the spark from the spark plug ignites the mixture.

**Compression ratio (CR)** - A term used to describe the amount by which the fuel/air mixture is compressed as a piston moves from the bottom to the top of its travel, and expressed as a number. The higher the ratio, the more compression during combustion and the more powerful the engine.

**Condenser (capacitor)** - A device in a contact breaker point distributor, which stores electrical energy and prevents excessive sparking at the contact breaker points.

**Connecting rod ('con-rod')** - Metal rod in the engine connecting a piston to the crankshaft.

**CV Joint** - see constant velocity joint.

**Constant velocity (CV) joint** - On front-wheel drive and all-wheel drive vehicles, a coupling that allows the front axle to turn at a constant speed at various angles when the vehicle turns. The CV joint is a shaft that transmits engine power from the transmission to the wheel.

**Contact breaker points** - A device in the distributor, which consists of two electrical points (or contacts), and a cam, which opens and closes them to operate the HT electrical circuit, which provides the spark at the spark plugs. Normally found on older vehicles.

**Crankcase** - The area of the cylinder block below the pistons, which houses the crankshaft.

**C-pillar** - The vertical metal roof support between the side edge of the rear screen and the rear edge of the rear window.

**Crankshaft** - A cranked shaft that is driven by the pistons and provides the engine output to the transmission.

**Crossflow cylinder head** - A cylinder head in which the inlet and exhaust valves and manifolds are on opposite sides.

**Cruise Control** - A device that, when set by the driver, will hold the car at the chosen speed.

**Crumple Zone** - Portions of a vehicle's structure designed to buckle and fold in an impact, absorbing crash force rather than transmitting it to vehicle occupants.

**Cubic capacity** - The total volume within the cylinders of an engine which is swept by the movement of the pistons.

**CVH** - A term applied by the Ford Motor Company to their overhead camshaft engines which incorporate a hemispherical combustion chamber. CVH means Compound Valve angle, Hemispherical combustion chamber.

**Cylinder** - Close fitting metal tube in which a piston slides. In the case of an engine, the cylinders may be bored directly into the cylinder block, or on some engines, cylinder liners are used which rest in the cylinder block and can be replaced when worn with matching pistons to avoid the requirement for reboring the cylinder block.

**Cylinder block** - The main engine casting which contains the cylinders, crankshaft and pistons.

**Cylinder head** - The casting at the top of the engine, which contains the valves and associated operating components.

**Dashpot** - An oil-filled cylinder and piston used as a damping device in SU and Zenith/Stromberg CD type carburettors.

**Diesel engine** - An engine that relies on the heat generated when compressing air to ignite the fuel, and which therefore doesn't need an ignition system. Diesel engines have much higher compression ratios than petrol engines, normally around 20:1. They do not require spark plugs to ignite the air/fuel mixture, only the compression from the engine cylinders.

**Differential** - A gearbox or fluid coupling that allows the wheels to rotate at different speeds. They are usually located on an axle, allowing the outside wheels to turn faster than the inside wheels during cornering. Four-wheel-drive and all-wheel drive vehicles have two differentials, one for the rear axle and one for the front.

**Disc brakes** - A brake assembly where a rotating disc is clamped between hydraulically operated friction pads.

**Distributor** - Part of the ignition (electrical) system, used to distribute the HT current from the ignition coil to the individual spark plugs via the HT leads.

**Distributor cap** - Plastic cap which fits on top of the distributor and contains electrodes, in which the rotor arm rotates to distribute the HT spark voltage to the correct spark plug.

**DOHC** - Abbreviation for Double Overhead Camshaft (see 'Twin-cam').

**Downpipe** - The pipe that joins the entire exhaust system to the exhaust manifold.

**Driveshaft** - Term usually used to describe the shaft (normally incorporating universal or constant velocity joints), that transmits drive from a differential to one wheel. More commonly found in front-wheel-drive cars.

**Drum brakes** - A brake assembly with friction linings on 'shoes' running inside a cylindrical drum attached to the wheel.  
**Dual circuit brakes** - A hydraulic braking system consisting of two separate fluid circuits, so that if one circuit becomes inoperative, braking power is still available from the other circuit.

**Dwell angle** - A measurement that corresponds to the number of degrees of distributor shaft rotation during which the contact breaker points are closed during the ignition cycle of one cylinder. The angle is altered by adjusting the contact breaker points gap.

**Earth strap** - A flexible electrical connection between the battery and a car earth point, or between the engine/gearbox and the car body to provide a return current path flow to the battery.

**EBD** - Electronic Brake Distribution is a component used with ABS and usually a brake assist mechanism, for small powerful cars, like the new Mini of 1998.

**ECU** - Electronic Control Unit.

**EFI** - Abbreviation for Electronic Fuel Injection.

**EGR** - Exhaust Gas Recirculation. Part of the emissions system that recirculates exhaust gases into the intake manifold, cooling the combustion chamber.

**Electronic ignition** - A system which uses an electronic unit as opposed to an older mechanical style distributor with points (contacts) to control the timing and firing of spark plugs.

**Engine management system** - Computerised control of the ignition and fuel systems, making driving more economical, quieter, and power-effective.

**EW** - Electric windows.

**Excess** - (car insurance) The amount you would have to pay in the event of an insurance claim. [See article - Car Insurance Tips](#)

**Exhaust Manifold** - A set of cast pipes that attach directly to the engine and connect to the exhaust system via the downpipe and remainder of the system. The exhaust gases exit the engine cylinders and are pushed out into the exhaust. The exhaust manifolds are made from cast metal materials because they need to withstand extreme temperatures of the expelled gases

**Expansion tank** - A container used in many cooling systems to collect the overflow from the car's cooling system as the coolant heats up and expands.

**Float chamber** - The part of a carburettor, which contains a float and needle valve for controlling the fuel level in the reservoir.

**Flywheel** - A heavy rotating metal disc attached to the crankshaft and used to smooth out the pulsing from the pistons. It can also be encircled by a ring gear designed to mesh with the gear in a starter motor. The starter motor, using power from the battery will turn the engine (via the flywheel) and to help initiate the ignition sequence (starting).

**Forced Induction** - When a gas is blown into the engine to increase speed, by a turbo or supercharger.

**Fuel injection** - Injectors are used on fuel injection engines to inject fuel directly or indirectly into the combustion chamber. Some fuel injection Systems use a single fuel injector, while some systems use one fuel injector for each cylinder of the engine. The fuel injection system has electronic control to time and meter the fuel flow.

**Gasket** - Compressible material used between two surfaces to provide a leakproof joint.

**Gearbox** - A group of gears and shafts installed in a housing, positioned between the clutch and the differential, and used to keep the engine within its safe operating speed range as the speed of the car changes.

**Horsepower** - A measurement of power. Brake Horsepower (BHP) is a measure of the power required to stop a moving body.

**HPI check** - A HPI check is a check on the history of a vehicle. HPI checks should be purchased before buying a vehicle. It will tell you whether it has been stolen, written off, ringed, cloned, clocked etc. [See Article - What is a HPI check.](#)

**HT** - High Tension (meaning high voltage) used to describe the spark plug voltage in an ignition system.

**Idle Speed** - The speed of the engine at minimum throttle and the engine in neutral.

**Independent suspension** - A suspension system where movement of one wheel has no effect on the movement of the other, e.g. independent front suspension.

**Ignition coil** - An electrical coil, which forms part of the ignition system and which, generates the HT voltage.

**Ignition system** - The electrical system which provides the spark to ignite the air/fuel mixture in the engine. Normally the system consists of the battery, ignition coil, distributor, ignition switch, spark plugs and wiring.

**Ignition timing** - The time in the cylinder firing cycle at which the ignition spark (provided by the spark plug) occurs. The spark timing is normally a few degrees of crankshaft rotation before the piston reaches the top of its stroke, and is expressed as a number of degrees before top-dead-centre (BTDC).

**Independent Suspension** - A suspension design that lets each wheel move up and down independently of the others. A vehicle can have two-wheel or four-wheel independent suspension; sportier models have four-wheel independent suspension.

**Inlet Manifold** - A set of cast metal pipes through which fuel or air is directed into the engine cylinders.

**Inlet Valves** - Devices that open passageways within the engine for fuel vapor to enter the cylinders but which also close them to maintain cylinder pressure during compression and combustion.

**In-Line Engine** - Cylinders are arranged side by side in a single row. Most four-cylinder and some six-cylinder engines are in-line engines. In V-6, V-8 or V-12 engines, the cylinders are divided into two rows angled away from each other in a 'V' pattern (Hence the 'V' in V8, V12).

**Immobiliser** - An electronic security device that prevents a car from being stolen. It usually disables the ignition system so that the engine may not be started.

**Induction kit** - An upgrade to your manufacturer's air filter. Usually replacing the airbox and paper airfilter with a cone performance filter - [See article - What is an Induction Kit.](#)

**Intercooler** - A device much like a radiator that cools air as it leaves a turbocharger or supercharger before the air is blown into the engine air intake. Cooling makes the air denser and richer in oxygen, which lets the engine produce more power. [See article - What is an intercooler.](#)

**Jet** - A calibrated nozzle or orifice in a carburettor through which fuel is drawn for mixing with air.

**Jump leads** - See also, Booster Cables and [Jump Start](#). Heavy duty electric cables fitted with clips to enable a car's battery to be connected to another battery for emergency jump starting.

**Jump start** - To transfer electrical power from one car battery to another to enable the cars ignition system to startup, using jump leads. [See article - How to jump start your car.](#)

**Kerb weight** - The weight of a car, unladen but ready to be driven, i.e. with enough fuel, oil, etc, to travel an arbitrary distance.

**KPH** - Kilometers Per Hour, used as a measure of speed especially in Europe. Multiply by 0.621 to convert to miles per hour.

**Lag** - see turbo lag

**Leaf spring** - A spring commonly used on cars with a live axle, consisting of several thin, curved steel plates clamped together at the ends to the underside of the vehicle. Usually found on older cars such as the Ford Escort mk2.

**Limited slip differential (LSD)** - A device that helps prevent the drive wheels from skidding or losing traction by diverting power from the slipping wheel to the opposite wheel on the same axle. Often used on high-performance cars.

**Live axle** - A solid axle allowing movement of the wheel on one end to affect the opposite wheel. Found on older rear-drive cars and trucks. Also called a rigid axle.

**Lock-to-lock** - The amount of turns needed to move the steering wheel from one full lock position to the other. Full lock being the point at which you cannot turn the steering wheel any further.

**Loom** - A complete car wiring system or section of a wiring system consisting of all the wires of correct length, etc, to wire up the various circuits.

**LPG** - liquid petroleum gas. A natural hydrocarbon fuel made up of propane and butane, cheaper than petrol to run your car on.

**LT** - Abbreviation of Low Tension (meaning low voltage) used to describe battery voltage in the ignition system.

**Manifold** - A device used for ducting the air/fuel mixture to the engine (inlet manifold), or the exhaust gases from the engine (exhaust manifold).

**MAP Sensor** - Manifold Absolute Pressure Sensor. It detects engine load by measuring air pressure or vacuum in the inlet manifold.

**Mass Airflow Sensor** - Also known as an air-mass meter. A device that measures the flow of air entering the throttle housing.

**Master cylinder** - A cylinder containing a piston and hydraulic fluid, directly coupled to a foot pedal (e.g. brake or clutch master cylinder). Used for transmitting pressure to the brake or clutch operating mechanism.

MOT - Ministry of Transport annual test of vehicle road safety [see article - what is an MOT](#)

**MPG** - Miles Per Gallon. Fuel economy measurement. Generally, a vehicle maker may offer mpg ratings for city (urban) driving, motorway driving, and combined driving.

**MPH** - Miles Per Hours

**MPV** - Multi-person vehicle. e.g. Renault Espace, Ford Galaxy. VW Sharan (7 seater) Toyota Previa etc.

**Multi-Link Suspension** - Independent suspension controlled with several link arms that restrict undesired motion of the suspension for a smoother ride and more precise handling.

**Needle valve** - A component of the carburettor, which restricts the flow of fuel or fuel/air mixture according to the position of the valve in an orifice or jet.

**Negative earth** - Electrical system (almost universally adopted) in which the negative terminal of the car battery is connected to the car body. The polarity of all the electrical equipment is determined by this.

**Octane** - The hydrocarbon substance in fuel that reduces engine knock or pinking, which is a noise caused by premature ignition of fuel in the cylinder combustion chamber. The higher the octane number, the less chance of premature ignition. Typically, higher octane fuels will give improved engine power/performance. Petrol in the UK has a higher octane rating than that in the US.

**Octane rating** - A scale rating for grading petrol.

**OHC (overhead cam)** - Describes an engine in which the camshaft is situated above the cylinder head, and operates the valve gear directly. Single overhead-cam (SOHC) engines have a single cam above the cylinder head. Double overhead-cam (DOHC) engines have two cams above the cylinder head.

**OHV (overhead valve)** - Describes an engine, which has its valves in the cylinder head, but with the valve gear, operated by pushrods from a camshaft situated lower in the engine.

**Oil cooler** - Small radiator fitted in the oil circuit and positioned in a cooling airflow to cool the oil. Used mainly on high-performance engines.

**Oversteer** - A tendency for a car to turn more tightly into a corner than intended. Occurs when the rear tyres lose adhesion, and can lead to a spin if the driver doesn't reduce acceleration. See also Understeer.

**Oxygen Sensor** - An emissions related device which senses the presence of oxygen in the exhaust. The voltage it puts out is interpreted by the main computer (ECU) along with other sensor input to determine automatic adjustment of the air/fuel mixture.

**Piston** - A cylindrically shaped part which compresses fuel vapour within a cylinder (compression stroke) and is thrust downward by the force of the explosion that results when the vapour is ignited.

**Piston ring** - Hardened metal rings that fit in a groove around the outside of the piston to ensure a gas-tight seal between the piston and cylinder wall.

**Positive earth** - The opposite of negative earth.

**Power steering** - A steering system that uses hydraulic fluid pressure (provided by an engine-driven pump) to reduce the effort required to steer the car.

**Power-to-Weight Ratio** - The power output of a vehicle in comparison to its weight, usually described in number of bhp per ton. For example, if a car has a powerful engine but is also very heavy it may not be as fast as a lighter car with less power, there is less weight for the engine to move.

**Projector-Beam Headlights** - A headlight that uses a spherical reflector to control the light beam. The bulb directs the light inward, toward the reflector which then projects it forward. These lights are more powerful, accurate and expensive than standard sealed-beam and halogen headlights.

**Pressure Plate** - Holds the clutch disc against the flywheel.

**Propeller shaft (prop-shaft)** - The shaft, which transmits the drive from the gearbox to the rear axle in a front-engine rear-wheel-drive car (i.e. BMW)

**PSI** - Pounds per square inch. A measurement of air pressure, i.e. when inflating a tyre.

**Pushrod** - A rod that is moved up and down by the rotary motion of the camshaft and operates the rocker arms in an OHV engine.

**Quarter light** - A triangular window mounted in front or behind the main front or rear windows, usually in the front door, or behind the rear door.

**Radiator** - Cooling device through which the engine coolant is passed, situated in an airflow and consisting of a system of fine tubes and fins for rapid heat dissipation. Usually has a fan situated behind it that will start when the coolant reaches a certain temperature. This will pull more air across the fins of the radiator to aid cooling.

**Redline** - The point on the engine rev counter that indicates the maximum RPM the engine can safely withstand.

**Rev counter** - See Tachometer.

**Rolling Radius** - This is the radius of your wheels and tyres. If you change your wheels for bigger or smaller diameter items, it is important to try and keep the same rolling radius as the wheels originally fitted to the car. The reason is that if the rolling radius changes greatly, the gearing, 0-60 speed and top end speed can be affected.

**Rocker arm** - A lever that rocks on a central pivot, with one end moved up and down by the camshaft, and the other end operating an inlet or exhaust valve.

**Rotary engine** - See 'Wankel engine'.

**Rotor arm** - A rotating arm in the distributor, which distributes the HT spark voltage to the correct spark plug.

**RPM** - Revolutions per Minute. This shows the speed at which the engine is turning.

**Running on** - A tendency for an engine to keep on running after the ignition has been switched off. Often caused by a badly maintained engine or the use of an incorrect grade of fuel.

**Sat-nav** - Satellite Navigation. A System that shows you on a small screen where your car is and normally gives you directions to where you want to go.

**Sealed beam** - A sealed headlamp unit where the filament is an integral part and cannot be renewed separately.

**Semi-trailing arm** - A common form of independent rear suspension.

**Servo** - A device for increasing the normal effort applied to a control, i.e. servo assisted braking.

**Shock absorber** - A device for damping (smoothing) the up-and-down movement of the suspension when the car hits a bump in the road.

**SOHC** - Single Overhead Cam. An engine with a single cam generally has one intake and one exhaust valve per cylinder; the single cam opens and closes both valves. See also Overhead Cam and Double Overhead Cam.

**Spark plug** - A device with two electrodes insulated from each other by a ceramic material, which screws into an engine combustion chamber. When the HT voltage is applied to the plug terminal, a spark jumps across the electrodes and ignites the fuel/air mixture.

**Starter motor** - A powerful electric motor used to start the movement of engine so that combustion can begin. Activating the starter by turning the ignition key, causes the solenoid to thrust the pinion gear in the starter against the engine flywheel ring gear and begin turning it.

**Steering rack** - See Rack and pinion.

**Stroke** - The total distance travelled by a single piston in its cylinder.

**Stub axle** - A short axle that carries one wheel.

**Strut** - A single, self contained pivoting suspension unit that integrates a coil spring with a shock absorber. Struts are used on front wheel drive automobiles. A suspension element in which a reinforced shock absorber is used as one of the wheel's locating members, typically by solidly bolting the wheel hub to the bottom end of the strut.

**Strut brace** - An aftermarket item (commonly used in rallying) that fits inside the engine bay with each end bolted to the top of the left and right suspension tops or turrets. Its purpose is to increase the rigidity of the car by stiffening the front end suspension set-up.

**Subframe** - A small frame that is mounted on the car's body, and carries the suspension and/or the drivetrain assemblies.

**Sump** - The main reservoir for the engine oil, found at the bottom of the engine. Usually has a drain plug built into it for draining oil during and oil change or engine work.

**Supercharger** - Has the same function as a turbo but has no lag time because it runs off an engine-driven pump. The supercharger usually driven by a belt or gears from the crankshaft, drives a compressor which forces air into the engine, providing increased fuel/air mixture flow, and therefore increased engine performance and efficiency.

**Suppressor** - A device that is used to reduce or eliminate electrical interference caused by the ignition system or other electrical components. i.e. you would fit a suppressor onto your radio if you were getting radio interference when the car was turned on.

**Suspension** - A general term used to describe the components which suspend the car body on its wheels.

**Swing axle** - A suspension arm, which is pivoted near the front-to-rear centreline of the car, and which, allows the wheel to swing vertically about that pivot point.

**Synchromesh** - A device in a gearbox, which synchronises the speed of one gear, shaft with another to produce smooth, noiseless engagement of the gears.

**Synthetic oil** - Engine lubricant not derived from raw petroleum. It has superior engine-protection properties but costs as much as five times more than petroleum oil.

**Tachometer** - Also known as a rev counter, indicates engine speed in revolutions per minute (rpm).

**Tappet** - A term often used to refer to the component which transmits the rotary camshaft movement to the up-and-down movement required for valve operation.

**TC** - Traction control

**Thermostat** - A device which is sensitive to changes in engine coolant temperature, and opens up an additional path for coolant to flow through the radiator (to increase the cooling) when the engine has warmed up.

**Tie-rod** - A rod which connects the steering arms to the steering gear.

**Timing belt** - On overhead cam equipped engines, a fabric or rubber belt engaged on sprocket wheels and driving the camshaft from the crankshaft. It synchronises the operation of intake/exhaust valves with the compression/ignition process occurring in the cylinder head and engine block.

**Timing chain** - Metal flexible link chain engaging on sprocket wheels and driving the camshaft from the crankshaft.

**Timing marks** - Marks normally found on the crankshaft pulley or the flywheel and used for setting the ignition firing point with respect to a particular piston.

**Toe-in/toe-out** - The amount by which the leading edge of the front wheels point inwards or outwards from the straight-ahead position. Front-drive cars are often aligned with slight toe-in to compensate for the effects of torque steer, or the tendency of the front wheels to pull to the side under hard acceleration.

**Top Dead Centre (TDC)** - The point at which a piston is at the top of its stroke.

**Torque** - The measure of turning force generated by a rotating component, given in foot-pounds (lb.-ft.). In vehicle terms it is the twisting force the engine exerts on the crankshaft. Vehicle specifications often include the maximum torque an engine produces at a specific RPM. An engine producing 200 lb.-ft. of torque at 3,000 RPM or 200 lb.-ft. @ 3,000 RPM accelerates better at low speeds than an engine that provides 200 lb.-ft. @ 5,000 RPM.

**Torque steer** - The tendency of the front wheels on a front-drive vehicle to pull to the side under hard acceleration. Normally compensated for with toe-in.

**Torsion bar** - A metal bar, which twists as it is compressed or stretched. Peugeots and Citroens typically have torsion bars as part of their rear suspension set-up.

**Traction Control** - A system that limits wheel spin under acceleration. It maintains each wheel's contact with the road surface. Traction-control systems generally use the anti-lock braking system to stop wheel spin and reduce power from one or more engine cylinders when an electronic sensor detects wheel spin.

**Trailing arm** - A form of independent suspension where the wheel is attached to a swinging arm, and is mounted to the rear of the arm pivot.

**Turbocharger** - A device which uses a turbine driven by the engine exhaust gases to drive a compressor which forces air into the engine, providing increased fuel/air mixture flow, and therefore increased engine efficiency. Commonly used on high-performance engines.

**Turbo lag** - The time taken for the turbocharger to kick in upon acceleration. The lag occurs because a turbocharger compressor is spun by exhaust gases in the exhaust manifold and it takes time for it to spin up to speed. Larger turbos have more turbo lag but give more more further up the rev range, whereas smaller turbos spin up faster but are less powerful. Many performance cars now incorporate 2 turbos, a smaller one for low down response and then a larger one that takes over as the engine speed increases.

**Twin-cam** - Abbreviation for twin overhead camshafts (see 'OHC'). Used on engines with a crossflow cylinder head, usually with one camshaft operating the inlet valves and the other operating the exhaust valves. Gives improved engine efficiency due to improved fuel/air mixture and exhaust gas flow in the combustion chambers.

**Understeer** - A tendency for a car to go straight on when turned into a corner. It happens when the front wheels have lost adhesion or the driver is turning the steering wheel too sharply for the vehicle's speed. In understeer, the front wheels do not follow the steering wheel angle, and the car refuses to turn and goes straight ahead.

**Universal joint** - A joint that can swivel in any direction whilst at the same time transmitting torque. This type of joint is commonly used in propeller shafts and some driveshafts, but is not suitable for some applications because the input and output shaft speeds are not the same at all positions of angular rotation. The type in common use is known as a Hardy Spicer, Hooke's or Cardan joint.

**Unsprung weight** - The part of the car, which is not supported by the springs.

**Vacuum advance** - System of ignition advance and retard used in some distributors where the vacuum in the engine inlet manifold is used to act on a diaphragm which alters the ignition timing as the vacuum changes due to the throttle position.

**VIN** - Vehicle Identification Number A number that is unique to each vehicle. This number is stamped onto the car so that it can be identified. Different manufacturers put VIN numbers in different places.

**Vented Discs** - A brake disc that has cooling passages between the friction surfaces. When looked at, the disc looks like it is made up of 2 sections sandwiched together with vanes in between. These vane pull in air to keep the friction surfaces cooler and therefore aid braking.

**Wankel engine** - A rotary engine which has a triangular shaped rotor which performs the function of the pistons in a conventional engine, and rotates in a housing shaped approximately like a broad-waisted figure of eight. Very few cars use this type of engine.

**Waste gate** - A device used to limit the boost developed in a turbocharger. A waste gate operates by allowing some of the engine's exhaust flow to bypass the turbocharger's turbine section under certain conditions. Normally controlled by the 'waste-gate actuator'.

**Wheel balancing** - Adding small weights to the rim of a wheel so that there are no out-of-balance forces when the wheel rotates.

**Wishbone** - An 'A'-shaped suspension component, pivoted at the base of the 'A' and carrying a wheel at the apex. Normally mounted close to the horizontal.

**VGC** - Very good condition

## 5 – Tips for cheap car insurance

Online version - <http://www.carbasics.co.uk/car-insurance-tips.htm>

### Here are a few bits of insurance terminology you should know before buying your car insurance

**NCB - No claims bonus**, you get one years no claims for every year that you do not claim off your motor insurance. Also referred to as a 'No Claims Discount', typically if you build up 5 years NCB this can reduce your insurance premium by 60-75% dependant on the insurance company.

Many insurers offer 'protected' no claims bonus, it will cost you a little extra but in the event of an accident your NCB will be protected. So it can be worth the extra as the savings from your NCB can far outweigh the cost of the extra on your premium.

**Excess** - This is the amount of money that you will pay in the event of a claim. Voluntary Excess allows you to top up this amount and the higher the voluntary excess the cheaper the insurance premium will be.

**Fully Comprehensive** - This is the highest level of insurance cover. It includes what is covered under TPFT (see below), but in the event of an accident which was your fault (even if no-one else was involved) the insurance company will pay to repair or replace your own car.

**TPO - Third Party only** - The insurance policy will only pay out to repair the other persons car in the event of an accident that was your fault. It will not pay out for repairing or replacing your vehicle. This policy does not cover you for fire or theft of the car. This is the cheapest type of insurance policy available.

**TPFT- Third Party, Fire and Theft** - This is the same as TPO above, but will cover your car for fire and theft.

### Here are some tips for helping keep your car insurance down

1. Shop around (read more about this below), those companies with the biggest and flashiest websites and adverts may not be the cheapest.

2. Drive a cheap car with a small engine. This is important especially if you are a young driver and perhaps it is your first car. It is tempting to buy a nippy motor and stretch yourself to afford the insurance, but it is better in the long run if you get yourself a car with a small engine and has a low insurance group. The insurance will be lower and you will be able to build up your no-claims bonus.

3. If you have recently passed your driving test, look into whether it's worth going through the [Pass Plus](#) training programme to qualify for car insurance discounts. Not all insurers give discounts for Pass Plus drivers, but the number that do is increasing all the time.

4. Consider using the internet to get quotes and buy your insurance online. Most companies offer a 10% discount for buying online instead of over the telephone.

5. Choose to pay a higher excess in the event of an insurance claim. This is the amount that you will agree to pay in the event of an accident i.e. an insurance policy with a £500 excess will be less than with a £100 excess, however if you have an accident that is your fault then you will have to pay the first £500 of the claim.

6. If your vehicle is not fitted with an [approved alarm or immobiliser](#), compare car insurance quotes with and without one fitted. It may be cost-effective to have one installed. [Approved alarms and immobilisers](#) that are recognised by the insurance industry are those that have been tested to 'Thatcham' standards and will be sold as 'Thatcham Approved', typically category 1 (alarms) and category 2 (immobilisers). Having one of these fitted will help reduce your insurance premium. In addition, there are [RAC Trackstar](#) and [Tracker](#) security devices that can be fitted to your vehicle. These will help get your vehicle recovered quickly in the event of theft and will help reduce your premium too.

7. Limiting the number of miles you drive each year will reduce your insurance premium. They will ask you how many miles to expect to cover annually. Tell the truth though and be as accurate as anyone can. Chances are that most people's mileage is to and from work, so if you live closer to work then this should be reflected on your estimate.

8. If you commute to work or you take the company van home, then you will only need insurance cover that is referred to as 'social, domestic and pleasure', instead of 'social, domestic and pleasure and to and from work'. This may help reduce your premium.

9. Having just you as the named driver on your policy will help keep costs down. The number of other people on it will increase its cost, especially if they are under 25.

10. Start building and protecting a 'no claims' bonus as soon as possible. In the long run, this will have a significant impact on your ability to get cheap car insurance.

11. Keep your car standard. Don't modify or customise it as it may add to your insurance. If you can't resist having that new [induction kit](#), then ask about whether it will be covered first and how much it will be. Be honest with the insurers, sometimes these small mods don't cost much extra (if at all). But if you don't tell them then your insurance will be invalidated. Make sure the car has not been modified before you buy it. If it has, then you will need to declare all these modifications and they could increase your premium.

12. Consider just having 'third party, fire and theft' cover if your car was very cheap. The alternative is 'fully comprehensive' cover and then you are covered for repairs to your own vehicle even if no-one else was involved. But hey, if it was that cheap then it may be cheaper to buy another car than lose your no-claims bonus. You could even consider just insuring the car 'third party only'.

13. Where you park your car will affect your insurance, it will be lower if you have it locked in a garage at night instead of leaving it out in the road. Even parking it on a driveway can reduce your premium.

### **More tips.**

The internet is a great place for getting insurance quotes and finding out what your insurance is going to cost you based on your circumstances. They will offer incentives (typically 10% discount) for buying online.

But hold on - to make sure that you are getting the best deal, sometimes it is important to speak with someone on the phone. They nearly always ask you what your best quote was. So with your quotes from the internet, get a copy of a car magazine (MaxPower, Fast car etc) and start dialing all the numbers you can. I recommend these types of magazines because the back pages of them are jam-packed full of insurance advertisements desperate for your business/money.

Your occupation may also help to reduce your premium. If you are a van driver or similar, where you do a lot of driving in a company vehicle, the insurers will take this into account and deem you have having more driving experience.

## **6 – Recommendations – books / DVDs**

Online version - [http://www.carbasics.co.uk/car\\_books\\_and\\_dvds.htm](http://www.carbasics.co.uk/car_books_and_dvds.htm)

**I strongly suggest that you purchase a Haynes Workshop Manual or something similar for your car. I have bought a Haynes Manual for every car I have ever owned and I am sure that this small outlay has saved me money every time.**

**These type of manuals will help you perform your own car diy repairs and save you money.**

**I am no mechanic but these car repair books have helped me to understand more about my cars. They have enabled me to perform simple car diy repair work, such as changing an alternator. The manuals will help you to fault find problems and tell you how to repair it in step-by-step stages.**

**If doing the repair yourself is a little bit beyond your capabilities or you do not have the tools, you are always in a better position when taking the car to the garage if you know what the fault is.**

**I am not suggesting that all garages are waiting to rip you off, but if you show that you know a little bit about the cars faults instead of nothing at all, you are less likely to get taken for a ride.**

**The range of Haynes workshop manuals is very extensive and they cover most cars. You can buy them from most large motor stores like Halfords but I would suggest you purchase haynes manuals online as you will not end up driving all the way to your local store to find out they do not have your cars manual in stock. You can get many car repair books online, not just Haynes manuals.**

**Our online version of this page has regular updates regarding useful books and DVDs, so it is well worth a visit.**

**These publications can save you a small fortune and are well worth the small outlay to buy them. Think of them as an investment ;**

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