

# Welcome to the Automotive Engineering



# Activity Starter Package

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## 1. About us as a College

We are The Bournemouth & Poole College

We are the largest provider of Further Education (FE) and Apprenticeships in the area. Our core focus is on developing the work skills of our students, so that when they leave us, they are ready to start or to progress within their chosen career.

### Our mission

Through inspiring teaching and learning, we develop our students' work skills, life skills and knowledge, and so help to build a thriving local economy and community.

### Our values

- A passion for learning and success
- Supportive and caring
- Respectful and considerate
- A champion for equality through learning
- Ambitious and tenacious

## 2. Meet the Team

The Automotive and Marine Engineering department covers a wide range of FT, PT and apprentice studies to help you progress and achieve your aspirations. We have a wide variety of personal experience and knowledge. We have excellent facilities to provide both excellent theory and practical sessions.

<b>Peter Leech</b>	<b>Learning Manager</b>
<b>Kevin Chappell</b>	<b>Lead Tutor</b>
<b>Michael Marshall</b>	<b>Marine/Engineering/Automotive Engineering Lecturer</b>
<b>Owen Davies</b>	<b>Marine/Engineering/Automotive Engineering Lecturer</b>
<b>Dan Lovett</b>	<b>Marine/Engineering/Automotive Engineering Lecturer</b>
<b>David Wheeler</b>	<b>Automotive Engineering Lecturer</b>
<b>Steve Smith</b>	<b>Automotive Engineering Lecturer</b>
<b>Lee James</b>	<b>Automotive Engineering Lecturer</b>
<b>Richard Broden-Cowell</b>	<b>Marine Lecturer</b>
<b>Brian McKeown</b>	<b>Marine Lecturer</b>
<b>Steve Lunn</b>	<b>Boatbuilding Lecturer</b>

### 3. Useful Contacts

Automotive office	01202205668	
Wellbeing	01202 205242	
Safeguarding	07714851103 07774974781	North Road Campus & Fulcrum Landsdown Campus & APP's
Student finance	01202205660	
Work Placement Officer	01202205197	
Curriculum Admin	01202205622	
Careers advise	01202205312	

## 4. Course information

The Level 2 Motor Vehicle course is a 1 year full time course which comprises of a Level 2 Subsidiary Diploma in Motor Vehicle Maintenance and Repair.

The course is dedicated to giving the learner the ability to carry out maintenance and repair on the main Vehicle components and systems.

This course is designed to enable the student to be able to remove and refit components and have a good understanding of the vehicle systems and how they work.

Please click on the link below to find out more information relating to your potential course.

## IMI Level 2 Subsidiary Diploma in Light Motor Vehicle (Maintenance & Repair)

### 5. Course preparation material.

Please find below a number of short video links to provide you with an insight into the fundamentals of automotive engineering. These will enable you to develop & build on your underpinning knowledge relating to the subject prior to starting your course.

#### Automotive fundamentals



- How an engine works: [https://youtu.be/DKF5dKo\\_r\\_Y](https://youtu.be/DKF5dKo_r_Y)
- Basic Health & Safety: <https://youtu.be/LGXfWdAZ0N4>
- How to calculate the capacity of an engine: <https://youtu.be/75-j35irRGY>
- Engine cooling systems: [https://youtu.be/y5p31F\\_dVJU](https://youtu.be/y5p31F_dVJU)
- Engine lubrication systems: <https://youtu.be/mmmcj53TNic>
- Difference between SI & CI engines: <https://youtu.be/qMG31yfx-DQ>
- Suspension systems: <https://youtu.be/AVsBgoU88MU>
- Steering systems: <https://youtu.be/em1O8mz7sF0>
- Health & Safety signs: [https://youtu.be/\\_muliGYcLOo](https://youtu.be/_muliGYcLOo)

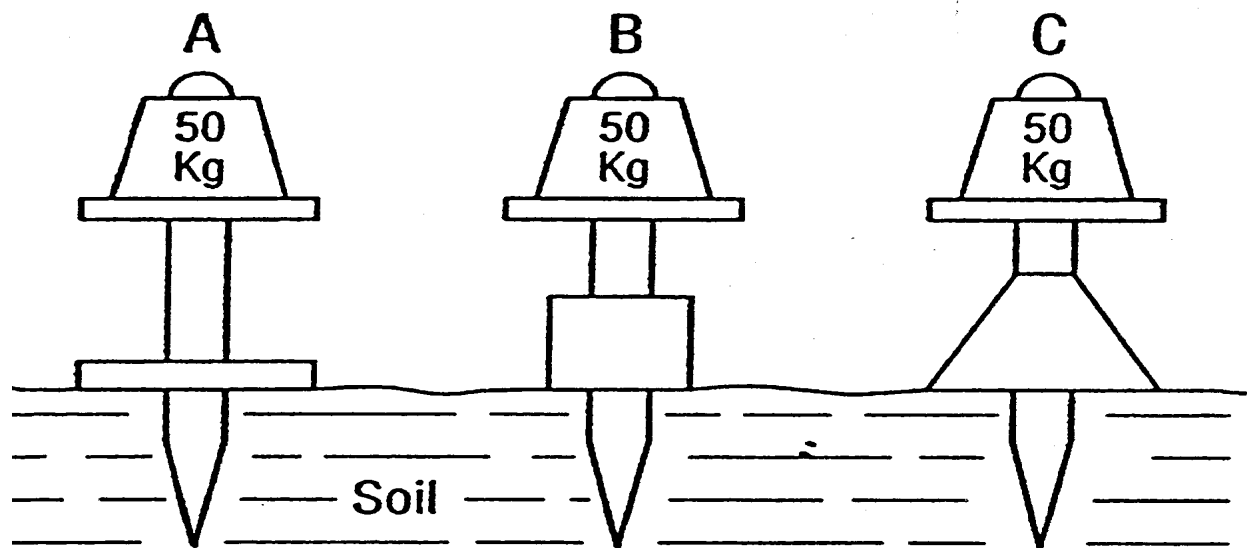
## 6. Learner activities

Please challenge yourself by completing the following activities, which will no doubt put you in good stead for what you can expect on your course.

Aptitude test

### Mechanical

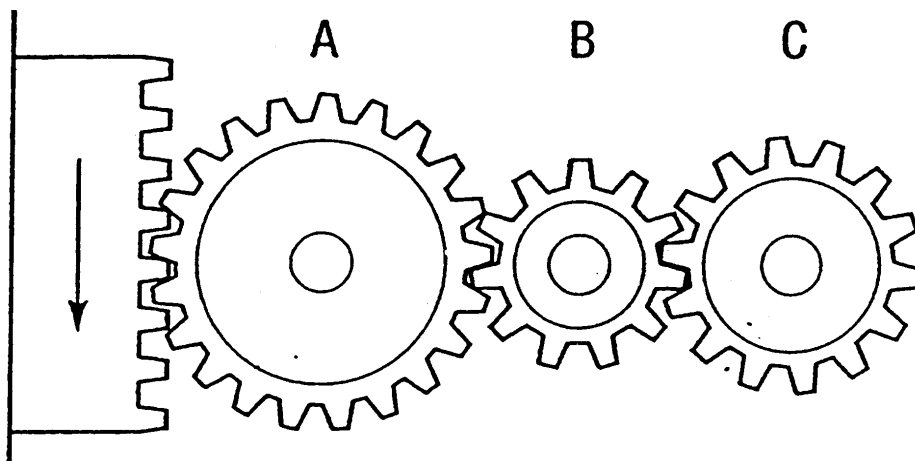
#### Question No' 1



Which stake is most likely to sink into the soil?

Answer \_\_\_\_\_

**Question No'2**



Which gear will turn clockwise?

Answer \_\_\_\_\_

**Numerical**

This test is made up of a series of number problems for which quick and accurate calculations are required. Which number should replace the question mark in each of the following problems.

**Question No' 1**

$15 + 7 = ?$

A = 23  
B = 22  
C = 8  
D = 12  
E = 27

Answer \_\_\_\_\_

**Question No' 2**

$45 - 21 = ?$

A = 24  
B = 26  
C = 34  
D = 23  
E = 29

Answer \_\_\_\_\_

### Question No'3

$17 = ? + 5$

$A = 11$

$B = 12$

$C = 9$

$D = 13$

$E = 14$

Answer \_\_\_\_\_

### Question No' 4

$? \div 4 = 12$

$A = 60$

$B = 44$

$C = 48$

$D = 16$

$E = 36$

Answer \_\_\_\_\_

### Question No' 5

$87 = ? + 39$

$A = 26$

$B = 48$

$C = 42$

$D = 58$

$E = 32$

Answer \_\_\_\_\_

## English Test

This test is based on questions involving words, choose the correct answer from the five possible alternatives

### Question No'1

Modest is the opposite of ? A = Arrogant

B = Chaste

C = Decent

D = Bully

E = Villain

Answer \_\_\_\_\_



**Question No' 2**

Legacy means the same as ? A = Permit  
B = Bequest  
C = Warrant  
D = Sanction  
E = Genius

**Answer** \_\_\_\_\_

**Question No'3**

Hate means the same as ? A = Assist  
B = Loathe  
C = Help  
D = Favour  
E = Sustain

**Answer** \_\_\_\_\_

**Question No'4**

Smooth is to rough as offend is to ? A = Take  
B = Ask  
C = Annoy  
D = Please  
E = Give

**Answer** \_\_\_\_\_

**Question No'5**

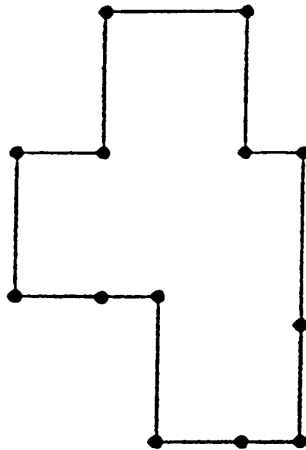
Short means the opposite of ? A= Wide  
B = Small  
C = Long  
D = Broad  
E = Far

**Answer** \_\_\_\_\_

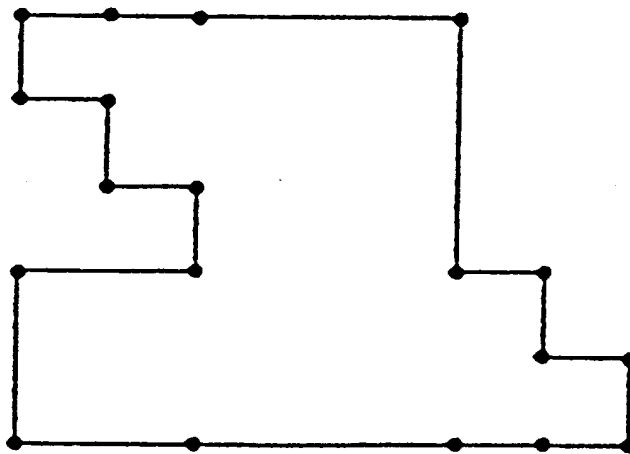
## Spatial Test

In the following diagrams you must indicate how each of the drawings could be cut into two pieces, by one straight line, so that the pieces could be put together again to make a complete square. **You will need only one straight line between two marked points for each drawing.** When you have found where it should go, draw it in.

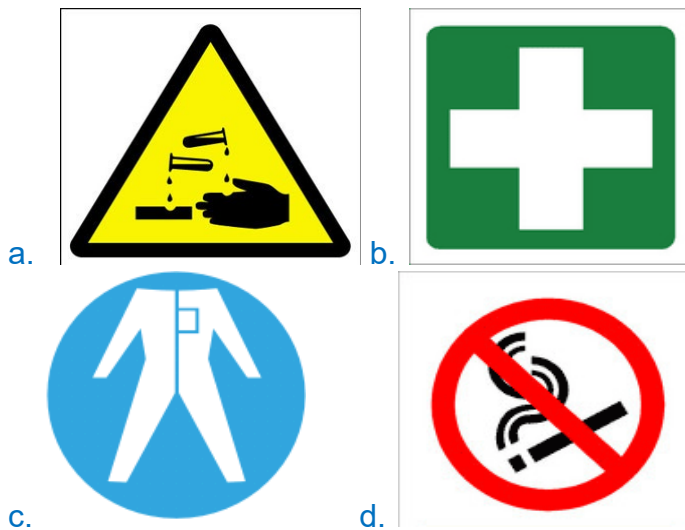
### Question No' 1



### Question No' 2



What do the following safety signs mean?



Automotive abbreviations.

Abbreviations are often used in the automotive industry. See how many you can identify. Feel free to use the internet to help you in your research. You will become very familiar with these during your course.

<b>MOT</b>	<b>NSF</b>	<b>N/A</b>	<b>TDC</b>	<b>EFI</b>
<b>DOHC</b>	<b>OHV</b>	<b>Insp</b>	<b>BDC</b>	<b>NM</b>
<b>MPG</b>	<b>RPM</b>	<b>VVT</b>	<b>GTI</b>	<b>TDI</b>

### 7. A little about yourself.

Please take the opportunity to write a little about yourself. This information will be invaluable to you when it comes to your interview.

Things to consider:

- Why have you chosen this course
- What are your hobbies & interests
- Have you had any previous experience with mechanics
- Where would you love to work
- Where do you see yourself in 5 years time
- What is your favourite car
- What do you feel you need help with during the course

## 8. Glossary of Terminology

### **Anti-lock Braking System (ABS)**

Braking systems which sense wheel rotation and automatically "pump" the brakes for the driver in emergency braking conditions. The pumping and the prevention of wheel lockup allow the driver to retain steering capabilities during the braking emergency. Any Fool purchasing a vehicle with such a system would be well advised to insist on the dealership demonstrating the proper use and maintenance of it. Most of these systems work when the driver applies heavy, constant braking pressure, and do not work properly if the driver "pumps" the brakes as he may have been previously taught.

### **Air-conditioning/AC**

Introduced during the 1970's in USA, as standard on many cars since 1990, globally. Causes quick cooling of cabin by way of chilled air flow.

### **Air Brakes**

Usually found on heavy-duty trucks, using compressed air to operate.

### **Air Injection**

A method for reducing exhaust emissions. The injection of fresh air into the engine exhaust ports, combined with the high heat present in the exhaust manifold, causes the burning up of leftover fuel vapors.

### **Aerodynamic**

The wind resistance of a vehicle's design elements. Aerodynamic vehicles claim to offer increased performance and reduced wind noise while moving. See Coefficient of Drag.

### **Alloy Wheels**

Any non-steel road wheel. Mostly aluminum, but technically a mixture of two or more metals.

### **Alternative Fuels**

May be alcohol-based, such as ethanol or methanol; compressed natural gas; or combinations of gasoline and alcohol.

### **All-Season Tyres**

Tyres designed to provide good traction in winter snow and slush without wearing too quickly on dry roads.

### **Anti-Roll Bar**

A suspension component. A steel rod or tube that connects the left and right suspension members to resist roll or swaying of the vehicle. Improves handling.

### **A-pillar**

Vertical roof support between the windshield and front edge of the front side window.

**Aspect Ratio**

The ratio between the width and sidewall (or height) of the tyre. Tyres with lower aspect ratios, usually found on sports models, provide superior handling but a harsher ride.

**Auto Mall**

Several Dealership operations located on one site.

**Automatic Locking Retractor**

Standard on 1995 and later models, this device is built into the shoulder belt retractor and keeps the belt cinched tightly, which is essential for properly securing a child-safety seat.

**Automatic Transmission**

A system that varies the power and torque to a drivetrain without the use of a foot-operated clutch.

**Alternator**

A device that converts mechanical energy into electrical energy for the purpose of charging the car battery.

**ATF**

Automatic Transmission Fluid. A liquid used within an automatic transmission to transfer the movement of the torque converter to the driveshaft.

**ATC**

Automatically controls a vehicle's heating and cooling systems, maintaining a temperature preset by the occupant.

**B-pillar**

Vertical metal roof support between front and rear side windows on the side of the vehicle.

**Back Pressure**

The pressure produced by restrictions in an exhaust system. Back pressure affects the rate at which exhaust gases are extracted from the cylinders.

**Ball Joint**

A dynamic joint of ball-and-socket configuration used in the steering and suspension systems.

**Base-Coat**

A coat of paint acting as the base for other layers to be applied.

**Beltline**

A horizontal line, usually imaginary but sometimes indicated by a feature in the body design, just below the window openings on a car or truck body.

**Bench Seats**

Full-length seat that runs along the rear width of the car cabin so that more than two passengers can sit there.

**Benzene**

An air pollutant produced via the combustion engine and the fossil fuels it burns.

**Booster Seat**

This child-safety seat is designed for children who are too large for a baby seat, but not big enough to sit safely in the vehicle's seats.

**Body Style**

The type of exterior shell or shape to a vehicle (sedan, coupe, hatchback, etc.).

**Booster Seat**

This child-safety seat is designed for children who are too large for a baby seat, but not big enough to sit safely in the vehicle's seats.

**Bore**

Diameter of an individual engine cylinder. Relates to that of the piston stroke length, both being given in millimeters, eg- 77.0/85.5mm

**Blowby**

Gases created during combustion that leak past the piston rings and are removed from the crankcase via the PCV system.

**Brake Booster**

Device or system that helps reduce the force the driver must exert against the brake pedal. May be hydraulic or electric.

**Brake Caliper**

A hydraulic (liquid-pressured) piston assembly that holds disc-brake pads.

**Brake Pad**

Used in a disc system, it is a replaceable piece of backing plate and additional friction lining. The Disc, a thick, round metal plate located behind each wheel, against which a set of brake pads are applied by a caliper during braking.

**Brake Pull**

Occurs when the vehicle pulls suddenly to the left or right as the brake pedal is depressed. It indicates the brakes may be out of adjustment.

**Brake Rotor**

Shiny metal disk that brake pads squeeze to stop the vehicle; hence the name disc brakes.

**Brake Shoe**

A curved, replaceable piece of friction material used on drum brakes. The wheel cylinder pushes the brake shoes against the brake drum.

**Bucket Seats**

Individual driver or passenger seats, that enclose a person by means of depth curvature and side lips. Usually found in customised and sporting cars.

**Bumper**

a length of metal with spring or rubber backing that sits rear-most on a car, and fronts the radiator.

**Box car**

a small car made from light wood and metal, with no mechanical content other than a steering mechanism plus 2 axels.

**Boxer Engine**

The cylinders are opposite (180 degrees apart) from each other. Also called flat engines, these are relatively flat compared to In-line or V engines.

**C-pillar**

The vertical metal roof support between the side edge of the rear windshield (also called the backlight) and the rear edge of the rear window.

**Cabin**

The interior people-space within a car. For a truck its called a Cab. The 'Greenhouse' is a term used in automotive circles to describe all of the windows enclosing the passenger compartment.

**Cabriolet**

A two-door small open car with a hand- retractable roof, being either a rag (cloth) top or hard top. Seating 4 usually, it appeared first in the 1920's but faded-out a decade later, and returning to fashion by the 1960's.

**Cam**

An irregularly shaped disc or projection whose rotation creates a rocking motion in an adjacent part.

**Camber**

Inward or outward tilt of the wheels tyres. This adjustment affects how the vehicle holds the road and handles cornering.

**Camshaft**

A metal shaft supporting the cams that cause the open/close operation of the intake and exhaust valves. The camshaft turns at 1/2 the speed of the crankshaft and is connected to it either via gears, a timing chain or a timing belt.

### **Carbon Brakes**

Introduced by the Brabham Team in 1978, these offer improved performance and superior durability to the steel brakes they superceded. Carbon disc brakes operate at their best when heated to extremely high temperatures, up to 1000° centigrade. Therefore, they are not suitable for road going cars as there performance when cold is very poor.

### **Carbon Fibre**

This is an ultra-light, but extremely strong material that has been used to manufacturer vehicle parts for road an racing cars. It was introduced to the World of Formula 1 racing in the 1970's in the form of large but light wings. McLaren were the first team to use it to produce the whole monocoque of a Formula 1 car in 1981.

### **Carburetor**

Device that mixes air with fuel, delivering the mixture into the engine's combustion chambers. Only found on older vehicles. By the mid-1980s, new emissions standards led to the use of fuel-injection systems, which do not require frequent adjustment.

### **CATS**

Computer Aided Traction System, in which a machine automatically adjusts the road holding ability of a car while it covers slippery or uneven ground. A standard high-tech add-on for expensive sports-cars an luxury saloons, introduced in the 1990's.

### **Catalytic Converter**

A component of the exhaust system that creates a heat- producing chemical reaction to convert potentially harmful combustion byproducts into carbon dioxide and water.

### **Capitalized Cost**

In a lease transaction, the price at which a financial institution buys a vehicle from a dealer. Equivalent to the cash purchase price if the consumer were buying the vehicle outright, it includes taxes and any other additional charges. Also called Capital Cost.

### **Captive Finance Company**

A car insurance institution owned by a car manufacturer. Examples include Chrysler Credit, Ford Motor Credit and General-Motors-AutoCredit.

### **Center-Locking Differential**

On all-wheel drive vehicles, a third differential in addition to those for the front and rear axles. This third differential allows the front and rear wheels to turn at different speeds as needed for cornering on dry pavement. On slippery surfaces, it locks all four wheels together, either automatically or manually depending on the system, for greater traction.

### **C<sup>d</sup>A**



Aerodynamic efficiency (Cd) multiplied by frontal area (A). This will tell you how much effort is required to push the car through the air at a given speed.

### **CD changer**

a jukebox style enclosure containing 5 to 50 audio CDs, each being accessible via a built-in CD player, all remotely controlled from the car-hi-fi panel on the dashboard.

### **Central Locking System**

On a vehicle with power door locks, the system locks or unlocks all doors at one time.

### **CHMSL**

Center High-Mounted Stop Light - required brake light mounted higher than the taillights, at the top center or bottom center of the rear windshield, as for racing purposes by regulation.

### **Check valve**

A safety valve which allows fuel, air or a vacuum to flow in only one direction.

### **Chicane**

A sequence of tight corners. Often inserted on straights to slow cars into the following corner. A number of race tracks have been modified to reduce speeds.

### **Chassis**

This is the part of the car in which the driver sits and to which the engine and suspension are attached. In modern Formula 1 cars the chassis is a monocoque design manufactured from carbon fibre.

### **Christmas Tree**

The pole of lights that starts a drag race, named for its red and green lights. Most drag races use the pro or heads up start which has three lights in between the first (red) and last (green) stage.

### **Choptop**

The result of the process of lowering the top of a car, usually as part of a customized design.

### **Clearcoat**

The transparent top coat of paint on many newer vehicles; designed to create a long-lasting, lustrous appearance.

### **Climate-Control System**

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

### **Clutch**

This drivetrain component is found between the engine and the transmission. It acts as a coupling device which is used to engage and disengage the transmission from the engine

when shifting gears. It is necessary to do this joining and detaching because the engine is turning at a relatively high rate (thousands of revolutions per minute), and attempting to alter a gear ratio at this point could send various bits of transmission shrapnel careening about the occupant compartment.

### **Clutch Disk**

Presses against the transmission flywheel to transfer power from the engine to the transmission.

### **Club seat**

The rear seat in a coupe.

### **Coefficient of Drag (Cd)**

A measure of the aerodynamic resistance of the vehicle body. The smaller the number, the more wind-cheating the body design and the greater likelihood that passengers won't have to endure wind noises.

### **CO<sub>2</sub> emissions**

Carbon dioxide pollution expelled from the exhaust pipe, that since the 1990's must be at low enough levels to make the car meet world toxicity regulations. Figure given in grams per kilometer.

### **Coil**

A transformer used in the ignition system for stepping up 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 heavy-duty, spiraled metal component of the suspension system which forms a dynamic connection between the body of an automobile and its chassis.

### **Collision Coverage**

Optional insurance that pays for damage to your car caused by collision with another car or object.

### **Compression**

The stage prior to combustion during which the piston in a cylinder pushes down on the fuel vapor within to pressurize it.

### **Compression Ratio**

The ratio of the volume within an engine cylinder when the piston is at the bottom of its stroke, compared to the volume in the cylinder when the piston is at the top of its stroke. The

higher the ratio, the more compression during combustion and the more powerful the engine. Eg- 8:3:1

### **Comprehensive Coverage**

Optional insurance that pays for damage to your car caused by things other than collision. For example, if your car is stolen or vandalized.

### **Combustion Chamber**

Top section of the engine cylinder, where the air-fuel mixture is ignited by a spark plug. The explosion of the combustion pushes the piston down into the cylinder, producing the force that the transmission delivers to the drive wheels.

### **Constant-Velocity Joint (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.

### **Continental kit**

A spare tyre mounted on the bumper at the rear of the car, usually requiring a bumper extension.

### **Convertible**

A medium-large sized car seating upto 5 people and having possibly 4 doors. Largely occurring in America, as with a top that can be either lowered or removed. Originally, many popular American cars were of this design, but soon the protection of the closed in sedan gained dominance. Convertibles have always had a niche except for a brief period in the '70's and '80's when they disappeared due to safety concerns.

### **Corporate Average Fuel Economy (CAFE)**

The government tracks the average fuel economy of all the vehicles produced in a single model-year by each individual manufacturer. CAFE is that rating.

### **Coupe**

Generally, a two-door car with close-coupled passenger compartment.

### **Coupe de Ville**

A coupe with an enclosed, rear passenger section and an open driver's section.

### **Crankcase**

The area inside the engine block where the crankshaft, piston rods and other moving parts operate and receive continuous lubrication.

### **Crankshaft**

The main shaft of an engine through which the power produced during combustion is transferred to the transmission (and ultimately the wheels) as torque. Its rotation results from the reciprocating motion of the pistons.

### **Crash-Test**

Crash protection research programs run by government backed authorities. Cars are crashed head-on into a rigid barrier at 35 mph, and instrumented dummies measure crash forces endured by properly restrained occupants. Each tested vehicle is assigned a score indicating the likelihood of moderate, severe or fatal injury.

### **Cruise Control**

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

### **Cruiser skirts**

Optional accessory similar in function to fender skirts but are normally longer, fit on the outside of the body of the car, and are most often used in customization work.

### **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.

### **Cylinder**

One of a group of chambers in the engine within which the process of combustion takes place. The most common engine configurations utilize either four (4), six (6) or eight (8) cylinders.

### **Cylinder Block**

The main part of the engine to which other parts are attached.

### **Cylinder Head**

At the top of the engine block is the cylinder head which contains intake and exhaust valves. Air and fuel enter the cylinder head through the intake valves and spent leftovers are released after combustion through the exhaust valves

### **Damper**

A device which reduces vibration.

### **Daytime Running Lights (DRL)**

These lights come on whenever the vehicle is turned on; they make the vehicle more visible to other drivers. Mandatory in Canada and standard equipment on many vehicles sold in the United States.

### **Dashboard**

This may refer to the unit found between the front driver and passenger seat that contains the automatic transmission shifter, cupholders and a storage compartment. But it can also refer to the section of the instrument panel that includes the controls for the sound system

and climate-control system, particularly if the panel flows down the center of the vehicle and includes the automatic-transmission shifter. Called a Console in USA.

### **Dealer Invoice Price**

Also called dealer cost. The amount the dealer pays for a car or truck. Deducted from this price may be a dealer incentive, which is a set discount offered for a limited period of time, or a dealer holdback, which is a percentage of the vehicle's wholesale price.

### **Depreciation**

The decrease in a vehicle's market value over time. The amount of yearly depreciation is affected by vehicle condition; resale-marketplace supply and demand; and make and model reputation. Convertibles, high-performance cars, trucks and vans tend to depreciate less than other vehicles.

### **Decked**

the process of removing the body trim or contour lines from the hood or trunk of a car, usually as part of a customized design.

### **Diesel**

An internal combustion engine in which the air-fuel mixture is ignited by compression in the cylinder rather than by a spark. Diesel engines use diesel fuel rather than gasoline and tend to be more fuel-efficient and require less maintenance than gasoline engines, but it is more complicated to get them to run cleanly. Also used as a slang term: after turning off the ignition, the engine continues to run for a short period.

### **Differential**

A mechanical gearbox or fluid coupling that allows wheels to rotate at different speeds. Usually located on an axle, it allows 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. all-wheel drive vehicles also may have a third or center differential on the drive shaft that runs between the front and rear axles.

### **Diffuser**

A rear outlet for expelling engine noise.

### **Ding**

A small dent or scrape in the body of the vehicle.

### **Disc Brakes**

Shiny metal discs, called brake rotors, are attached to the wheel hub, rotating with the wheel. When the brake pedal is depressed, the brake calipers squeeze the discs to slow the vehicle. See Brake Caliper and Brake Rotor. Diameter given in millimeters.

### **Displacement**

The volume displaced by an engine's cylinders. Formerly measured in cubic inches, it is now more commonly expressed in liters.

### **Distributor**

Part of the ignition (electrical) system. Delivers electricity from the ignition coil to the distributor cap and the spark plug wires in the correct firing order. (The firing order is that sequence in which each cylinder begins its power stroke.) The spark plugs ignite the fuel and air mixture in each cylinder thousands of times a minute, producing the explosion that pushes the piston down in the cylinder to power the vehicle.

### **Dogleg**

Popular name applied to the angle created at the door opening by the wrap-around windshields found on many mid to late '50's models.

### **Downforce**

The air pressure applied to the surface of a car at high speed, by means of aerodynamic body details, thus improving its traction, as airflow tries to lift the car.

### **Downpipe**

The pipe that joins the entire exhaust system to the exhaust manifold.

### **Double Wishbone Suspension**

A type of independent suspension in which the upper and lower support pieces, or members, look somewhat like a wishbone.

### **Dragster**

A straight-line racing car where the engine is half exposed and the rear wheels are larger than the front wheels. Exotic booster fuels are usually added like nitro-gas.

### **Drafting**

A phenomena where two cars running nose to tail together can move faster than an individual vehicle.

### **Drive Axle**

Connects the transaxle to the front wheels on a front-wheel drive vehicle.

### **Drive Range (EV)**

The distance an electric vehicle can drive without re-charging its batteries.

### **Drum Brakes**

A braking system that uses a metal drum. Brake shoes press against the drum to slow or stop the car.

### **Drivetrain**

Vehicle components which act together to move the vehicle forward or backward. On a rear-drive vehicle, it is the combination of the engine, transmission, differential and drive shaft. On a front-drive vehicle, it consists of the engine, transaxle and drive axles.

## **Driveshaft**

A long metal cylinder located between the transmission and the rear axle, in front-engine rear-wheel drive vehicles. The shaft is connected to the components on each end with a universal joint, which allows for movement up and down without bending the shaft.

## **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.

## **Electronic Mufflers**

In an electronic muffler system, sensors and microphones in the exhaust system sense the pattern of exhaust pressure waves. This information is sent to an on-board computer that controls loudspeakers in the muffler. The computer operates the loudspeakers to generate sound waves that oppose and cancel the original exhaust sound waves produced by the engine.

## **Electronic Stabilization Program**

(ESP) increases vehicle control in situations near the vehicle's limits. It reduces the risk of skidding and helps to keep the vehicle on course. ESP recognizes the course desired and the car's reactions. Through brake application at individual wheels, it generates one-sided forces which help the car to move in the desired direction. The ESP program uses other driving aids and is permanently engaged.

## **Electronic Control Module (ECM)**

Electronic Control Module. The master computer responsible for interpreting electrical signals sent by engine sensors and for activating automated engine components and processes accordingly in order to produce optimum performance.

## **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.

## **Electronic Valve Timing (EVT)**

System in which a computer controls the timing of the opening and closing of cylinder valves.

## **Engine**

The basic job of an engine is to take fuel and convert its energy to some usable mechanical form (burn gasoline to spin a shaft and, ultimately, the wheels). Usually made from alloy & block. Its Cubic Capacity number [cc] represents the interior fuel space within it. The higher cc# the greater power it generates. Most vehicles today are fitted with what is known as a 4-cycle internal combustion engine. The four cycles are: Intake, Compression, Power, Exhaust.

## **Engine Displacement**

The total of the volume used for combustion inside the cylinders of an engine. Measured in liters on newer models, or in cubic inches on older models.

### **Engine layout**

The position it sits within the chassis, the cylinder amount, their arrangement, the CC total, plus any extra add-ons.

### **Engine management system**

Computerized control of the ignition and fuel systems, making driving more economical, quieter, and power-effective. It can be made by the company using it, or be bought from another car manufacturer, or from a specialist electronics maker.

### **Engine noise pollution**

An environmental concern measured in SPL decibels, at various speeds, and when the engine is idling. Leaded emissions relate to 'toxic pollution'.

### **Engine cooler**

An air intake with behind it a large inducting fan, drawing air through a water cooled piping arrangement, thus preventing engine overheating, where the event is highly expected.

### **Environmental Protection Agency (EPA)**

The federal agency that regulates air quality and sets automotive fuel-economy and emissions standards.

### **Equity**

The value left in a used vehicle after subtracting the outstanding loan balance from its market value. For example, if £4,000 is still owed on a car worth £8,000 on the open market, then it has an equity of £4,000.

### **Escrow**

A process in which a neutral third party takes care of the transfer of ownership of the vehicle.

### **Evaporative Emissions**

Evaporated fuel from the carburetor or fuel system which mixes with the surrounding outside air.

### **Evaporator Core**

Part of the climate-control system that contains a liquid refrigerant which turns to gas to absorb heat from the air.

### **Excess Mileage**

Any mileage over the amount agreed upon within a car hire lease contract. Generally incurs a per-mileage charge at the end of the lease. Experts recommend a yearly mileage limit, or Mileage Cap, that exceeds normal driving needs.

### **Extra urban**

A government fuel consumption rating in mpg for when driving along motorways.



### **Exhaust Manifold**

A cast set of pipes or passages through which exhaust gases exit the engine cylinders on their way into the exhaust system.

### **Exhaust Valves**

Devices that open passageways from the cylinders for exhaust gases to exit but which also close them during compression and combustion to maintain cylinder pressure.

### **Exhaust Gas Recirculation (EGR)**

Part of the emissions system, it recirculates exhaust gases into the intake manifold, cooling the combustion chamber.

### **Factory standard**

The basic design and options that make up the packaging of an entry-level vehicle.

### **Fan Belt**

Transmits power from a crankshaft-driven pulley to an engine fan and other accessories.

### **Feed-through**

The accepted and safest method by which a driver turns a steering wheel.

### **Fender**

A body panel that lies below either side of the bonnet, between the front bumper and front-most door edge, encompassing the wheel space in-between, [2 off].

### **Fifth Wheel**

Provides a flexible connection between car and that which it tows, like a caravan.

### **FIA**

Federation Internationale De L'Automobile

### **Final Drive Ratio**

The reduction ratio of the transmission gear set furthest from the engine. In other words, the ratio of the number of rotations of the drive shaft for one rotation of a wheel. In general, a low final drive ratio results in better fuel efficiency, and higher final drive ratio results in better performance.

### **Firewall**

The metal panel that separates the engine compartment from the passenger compartment. It also often includes sound and heat insulation.

### **Forced Induction**

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

## **Formula Racing**

The most popular, sophisticated, and expensive of all the forms of auto racing is Formula 1 [F1]. It tends to be dominated by European drivers, who race through non-ovular circuits around the globe. The parallels to Indy Car racing have led to the defections of drivers like Nigel Mansell, who sought the greater spoils of victory in the US, even though the technical expertise and racing challenge are lower there. Formula 2, 3, and 4 are lesser versions of F1, in terms of finance, spectacle, and skillman-ship. Since 1970, F2 cars have tended to succeed in the Le Mans 24hr race. Of the 3 cars from left of the picture below, they represent F1, F2, & F3. Next is a rally car, then a vintage racer, and right-most is a touring-car racer.

## **Four-Wheel Drive (4WD)**

A transfer case distributes power to both axles in order to drive all four wheels. Sometimes called All-Wheel-Drive in USA.

## **Four-Wheel Steering**

Vehicle on which all four wheels turn when the driver turns the steering wheel. The rear wheels turn at a smaller angle than the front wheels. This system appeared on a few sports models in the 1980s but was never very popular in North America.

## **Fog lights**

Two special headlights designed for cutting through foggy conditions along the road ahead.

## **Firing Order**

The sequence in which spark plugs fire and combustion takes place in the engine cylinders.

## **Flywheel**

A large disc bolted to the rear end of the crankshaft. The flywheel is encircled by a ring gear whose teeth are designed to mesh with the pinion gear in the starter during the process of starting the engine.

## **Frame-off restoration**

A restoration method in which the car is completely disassembled with all parts cleaned or replaced as necessary, including the engine and all other mechanical components) so the restored car meets the exact factory specifications of the time as closely as possible.

## **Front Wheel Drive**

The front wheels are the ones that are being powered by the engine/transmission, and the rear wheels just follow along. Generally speaking, these cars are more fuel-efficient than their rear-wheel drive counterparts, and they operate more easily in snow, but they are more expensive to build and maintain.

## **Fuel**

A combustible, vaporous mixture of air and gasoline which is ignited within an engine to produce power. "Fuel" is a term often used in reference to the gasoline itself.

## **Fuel Cell**

The name for a volumous fuel tank used in formula racing cars, that sits behind the driver an is reinforced with Kevlar.

### **Fuel Injection System**

Injects fuel into the engine's cylinders with electronic control to time and meter the fuel flow.

### **Fuel System**

These systems are vast and countless, but today's basic systems divide into two fundamental groups: carburetor systems and fuel Injection systems. Carburetor systems work by allowing the vacuum created by the engine in the intake stroke to pull fuel and air into the engine. Fuel Injection systems are more common these days. Sensors and computer controls monitor various engine speeds, air flows and throttle positions, and then tell the system what to do. A fuel pump is used to transfer the gasoline from the fuel tank to the injector (which is kind of like a spray nozzle).

### **Fuel Injector**

Taking the place of carburetors in the 1980s, the fuel injector is an electrically controlled valve that delivers a precise amount of pressurized fuel into each combustion chamber.

### **GAP Insurance**

Stands for Guaranteed Auto Protection insurance. Extra insurance for lease customers to cover the difference in the actual value of the vehicle and whatever is owed on the lease. Important if the car is stolen or totaled early in the lease term. It also covers the difference in value between what may be paid by an insurance carrier and what is still owed to the leasing company, including future lease payments.

### **Gas-Charged Shocks**

Also called gas-filled shocks. They are shock absorbers filled with a low-pressure gas to smooth the vehicle's ride during up-and-down movement.

### **Gasket**

A thin, expanding material used to seal the gaps and imperfections between hard, adjoining surfaces.

### **Gear Ratio**

The ratio of teeth counts between meshing gears.

### **Gearbox**

A metallic enclosure containing several cogs, each one affecting the effort in which the car moves. Each cog/gear has a different mph ratio per 1000rpm. Overall control maybe manual via the gear stick, automatic, or semi via a hand paddle.

### **Go-Cart**

A small lightly powered single seat sporting car, driven by juveniles for leisure, or more seriously as a precursor to professional sport driving, as like F1 champion Ayrton Senna did while training before turning Pro.

**Grand Prix**

A type of car race popular in Europe. Also, a French term meaning great prize.

**Gray Market Vehicle**

Any car that is imported, but not through authorized retailers. May have insufficient emissions standards.

**Gridlock**

A traffic situation where most vehicles cannot move in any direction.

**Grille**

An opening in the front of the vehicle that allows air to reach the radiator.

**Gross Vehicle Weight Rating**

The kerb weight of the vehicle plus the maximum load it is designed to carry.

**Ground Clearance**

The distance between the ground and the lowest point of the vehicle chassis (usually the axle). A vehicle can drive over any object shorter than its minimum ground clearance.

**Gross Vehicle Weight Rating**

The actual weight of the vehicle plus the maximum load it is designed to carry.

**Hardtop**

A car designed to resemble a convertible in looks and feel but without a removable top. Hardtops do not have the fixed post between the side windows.

**Halogen bulb**

A special headlight form whose brightness power is greater than standard bulbs, though they cost more and last shorter.

**Hairpin**

A tight looping curve on a race track.

**Handling**

The ease of vehicle steering and maneuverability around turns, up hills, etc.

**Hatchback**

A passenger car with a full-height rear door that includes a rear window. Usually has a rear folding seat. Called a 'Compact' by leasing companies in USA.

**Head Room**

The distance from the top of an occupant's head to the headliner.

**Headliner**

The interior covering of the roof. Headliners often contain consoles with slots for garage-door openers and other devices, as well as dome lights and wiring for electrical and electronic components attached to the headliner. The covering usually includes a sound-absorbing material.

**Hip Room**

The allotted room between a passenger's hips and any other part of the vehicle.

**Horsepower (hp, bhp)**

Abbreviated as hp, as in 200-hp engine, or bhp (brake horsepower or net horsepower) to designate power produced by an engine. In general, the higher the horsepower, the higher the vehicle's top speed. One horsepower is the power needed to lift a 550-pound weight one foot in one second.

**Hot Rod**

A normal vehicle that has been altered to improve speed and overall appearance or look. When racing acts as a variation of a dragster by hiding the usual front engine chassis under a lightweight body that looks like a street car.

**Holdback**

Manufacturer refund to a dealer after a vehicle is sold. Usually a percentage of the recommended retail price.

**Hood ornament**

A chromeplated metal figurine that sits atop the radiator or at the middle-front of the bonnet.

**Hydraulic**

An integral car component operated by means of liquid under pressure, as used in the braking system. Word derived from Grecian origin.

**I-Beam Suspension**

A suspension beam under the car that supports the body in the shape of a capital I.

**Idle Speed**

The speed of the engine at minimum throttle and the engine in neutral.

**Ignition System**

The system responsible for generating and distributing the electrical spark needed to ignite fuel in the cylinders and for altering the frequency (timing) of that spark in relation to changes in engine speed.

**Inboard Air Jack**

A device added to some racing cars which raises their chassis after making a pitstop, so quicker action can be taken on their maintenance. It is powered by a compressed air canister.

### **Injectors**

Devices which receive fuel at low pressure and shoot it into the engine cylinders at predetermined intervals under higher pressure.

### **Intake Manifold**

A cast set of pipes or passages through which fuel or air is directed into the cylinders.

### **Intake Valves**

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

### **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. See also Multi-Link Suspension, Live Axle.

### **Installation**

the engine location maybe front, rear, or mid. If its mid or further back the car is rear-wheel drive. Its orientation maybe traverse or longitudinal.

### **IHRA**

International Hot Rod Association

### **IMSA**

International Motor Sports Association, founded by John Bishop in 1969. Sanctions, organizes, markets and officiates professional auto racing events.

### **In-Line Engine**

Cylinders are arranged side by side in a row and in a single bank. 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 banks, each of which is angled away from the other in a 'V' pattern.

### **Imobiliser**

An electronic safety feature that prevents a car from being illegally driven away.

### **Indy 500**

The big race held in Indianapolis every year on Memorial Day weekend.

### **Inflatable Tubular Restraint**

This tube of woven material is stiffer and stays inflated longer than a traditional airbag cushion. The tube protects the occupant's head and torso in a side impact, in part by keeping them away from the point of intrusion. The uninflated tube is tucked into the edge of the roof headliner. The tube is attached at the base of the A-pillar in front of the occupant, and at the roofline behind the occupant. When it inflates, the tube angles across the window to keep the occupants head from hitting the window glass or metal side pillar. Because of the longer time the tubular restraint stays inflated, it is expected to also offer protection in a rollover.

### **Intercooler**

Device 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.

### **Interior Payload**

The amount of space or material that can be carried inside the vehicle.

### **J-gate**

A metal plate with a J shaped whole, in which the gear-stick must slip between during gear changes.

### **Jackknife**

The point at which the cab of an articulated lorry is overtaken by the trailer its pulling while still attached.

### **Journal**

The surface of a bearing against which a moving shaft turns.

### **Jump start**

To transfer electrical power from one car battery to another to enable the cars ignition system to startup, using jump leads.

### **Keyless Entry**

A system for locking and unlocking doors of a vehicle with a central locking system without using the key. Usually, the user controls the locks by pressing a button on a remote key-fob transmitter. Some vehicles have electronic combination locks on the doors near the handle.

### **Kilometers Per Hour (KPH)**

Multiply by 0.621 to convert to miles per hour.

### **Kit Car**

A vehicle that is designed for assembly by the private hobbyist.

### **Landau top**

A roof style characterized by a (usually small) rear section being covered by vinyl fabric or otherwise set apart.

### **Lap-and-Shoulder Belt**

A safety belt that secures the driver and/or passenger in the seat with a continuous web of material which fits across the lap and crosses the upper body. It keeps the occupant from jerking forward in the event of a crash. Also called three-way belt, three-point belt, or three-point safety harness.

### **Land yacht**

A large luxury car, especially the huge, chrome laden, finned monsters of the late '50's.

### **Leaf Spring**

Suspension spring made up of several thin, curved, hardened-steel or composite-material plates attached at the ends to the vehicle underbody. The curved shape of the plates allows them to flex and absorb bumps.

### **Lean or Rich Fuel Mixture**

The fuel mixture is lean when it has too much air, and rich when it has too much fuel. These terms can also be used to refer to adjustments the electronic control module makes to the fuel mixture in response to various driving conditions, particularly on engines with variable-valve technology.

### **Leg Room**

With the front seat adjusted all the way back, the distance from the accelerator pedal's heel point to the back of the front seat cushion.

### **Lien**

A legally documented claim against a vehicle by another party to which the vehicle has been offered as security for repayment of a loan or other debt. A lien against the title may make it impossible to sell the vehicle and transfer the title until the lien is cleared.

### **Lift Gate**

The rear opening on a hatchback. Called a tailgate in Europe, or hatch door.

### **Liftover**

The distance a person must lift an object off the ground to put it in a trunk, boot, or cargo bay.

### **Limited-Slip Differential**

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.

### **Litre**



Engine-displacement measurement, as in a 2.0-litre engine. The metric equivalent to the imperial measuring standard, which is largely favoured by American car makers. A Gallon is this other liquid volume standard, an contains 3.78541 litres.

### **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 tucks. Also called a rigid axle.

### **Leased car agreement**

A contract between leasor and lessee for a specified time period and at a specified payment. The title to the car remains in the name of the leasor as owner of the asset.

### **Loan to Value Ratio (LTV)**

Obtained by divided price or value into loan amount. A vehicle with a £10,000 price and an £8,000 loan would have a loan-to-value ratio of 80 percent.

### **Lock-to-lock**

The amount of turns the steering wheel must rotated for the wheels to be turned from rightmost to leftmost. Eg - for the Mini Cooper its 2.5.

### **Lowrider**

Generally, a car on which the chassis has been lowered; however, other customizations are often present. Some American cars have a hydraulic mechanism that does this action during driving.

### **M+S Rating**

A tyre rating which indicates a tyre designed to perform well in mud and snow.

### **MacPherson Strut**

A MacPherson strut is a unit that includes a damper or shock absorber cartridge inside a large, long metal spring. MacPherson struts are used over the front wheels of most front-drive cars. Replacement of MacPherson strut cartridges requires a spring compressor.

### **Manifold Absolute Pressure Sensor (MAP sensor)**

Detects engine load by measuring air pressure or vacuum in the intake manifold.

### **Manual Transmission**

A transmission that varies the power and torque through a foot pedal controlled clutch and a floor-mounted or steering-shaft-mounted gear selection lever.

### **Mass Airflow Sensor**

Device that measures the flow of air entering the throttle housing.

**Master Cylinder**

The primary component for pressurizing fluid in a hydraulic system. Used in the braking system, it supports a reservoir for holding brake fluid and is activated each time the driver depresses the brake pedal.

**Max power**

Two figure totals given in brake-horse-power by engine revs per minute. [bhp x rpm].

**Max torque**

The weight of force per foot, given in pounds, and the rpm level, eg 100 lb ft at 1000 rpm.

**Metallic paint**

A glittery sheen within the paintwork by customer request at an additional cost.

**Minivan**

A quite large car of saloon capacity but resembling a small van with windows.

**Miles Per Gallon / MPG**

Fuel economy measurement. Generally, a vehicle maker may offer mpg ratings for city driving, highway driving, and combined driving, so there is no definitive single measure overall.

**Muffler**

A chamber in the engine exhaust system used to suppress exhaust noise and smooth exhaust pulsations. Also referred to as a "silencer". Motorbike and moped owners sometimes remove these to beef-up their sound.

**MPV**

A multi-person vehicle, pioneered by Renault, like a windowed van with several seats. Similar to a mini-bus but with modcons and for private use.

**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.

**Multi-Port Fuel Injection**

An electronic fuel-injection method that uses individual injectors to spray fuel directly into each intake port, bypassing the intake manifold. Also called multi-point fuel injection.

**Muscle car**

A term used beginning in the mid-'50's to refer to cars which had very high horsepower and is still in use today. Occasionally called a 'pony car' in USA. The Aston-Martin Vanquish is a perfect example.

**NASCAR**

National Association of Stock Car Auto Racing; the governing body which sets the rules and regulations for stock car racing.

### **Nitro-methane**

A mixture of nitric acid and methane which is used to fuel Top Fuel Dragsters and Hotrods; is also called nitro or top fuel.

### **Nose**

A small frontal body section of a car which extends beyond the bonnet line, typically slanting downwards. The narrower version used on Formula cars is called a shark-nose. 'Nosed' refers to the process of raising a small peak in the center of the bonnet of a car, usually as part of a customized design.

### **Octane**

The hydrocarbon substance in gasoline that reduces engine knock or pinging, 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. High octane, which has a rating above 91, is useful only when recommended by the manufacturer.

### **Odometer**

Indicates the number of miles a vehicle has been driven, an is also called a Mileometer. It is illegal to tamper with the odometer reading. This illegal practice of rolling a vehicle's odometer back to indicate that it traveled fewer miles than it actually has, is done by 2nd-hand sellers. Odometer Rollover occurs when the vehicle's mileage exceeds the mechanical limits of the odometer - usually 99,999 miles. This must be certified by the seller, under law binding Mileage Acts.

### **Offroader**

A wheeled road vehicle whose design allows it to move across rugged terrain with greater ease than standard vehicles.

### **Overhead Cam (OHC)**

The camshaft is on top of the cylinder head on overhead-cam engines. Single overhead-cam (SOHC) engines have a single cam above the cylinder head. Dual overhead-cam (DOHC) engines have two cams above the cylinder head.

### **(OHV) engine**

An overhead-cam engine with overhead-valves, which means the intake and exhaust valves sit atop the cylinder head.

### **Oversteer**

Occurs when the rear tyres lose adhesion under cornering. In motor sports, this is also called loose. Oversteer can lead to a spin if the driver doesn't reduce acceleration. See also Understeer.

### **Overdrive**

A transmission gear with a ratio below 1:1, which improves fuel economy by reducing engine revolutions per minute at highway speeds. On a five-speed manual transmission, the fourth and fifth gears are overdrive. On a four-speed automatic transmission, the fourth gear is overdrive. When an overdrive gear set is engaged, the output shaft turns at a higher rate than the input shaft, reducing engine revolutions at cruising or highway speeds.

### **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 (ECM) along with other sensor input to determine automatic adjustment of the air/fuel mixture.

### **Optional Equipment**

Machines or features that can be added to a particular model which are not part of the standard package. These usually involve additional cost and can be ordered individually or as part of a package. A CD changer/jukebox is an example.

### **Pace Car**

Seen at racing meets, the pace car leads race cars into their pole positions at the beginning of races, or after a yellow flag or restart has been called.

### **Parts car**

A car that is suitable only for gleaning parts. Such cars are often, wrecked, incomplete and do not run. Such a car would normally have a condition number of #6.

### **Passive Restraint**

A device or structure that automatically helps restrain vehicle occupants in an impact. This includes airbags, belt pretensioners, padded knee bolsters, and shoulder belts that are motorized, or attached to the door.

### **Package Shelf**

The ledge between the rear seat and the backlight (or rear windshield). The name is misleading because it's a bad idea to put anything on the package shelf. However, it often contains the sound system's rear speakers and, on some vehicles, the CHMSL or center brake light. Sometimes also called the package tray. On European cars the package tray often contains a first-aid kit; on higher-end models it may contain storage compartments.

### **Phaeton**

A four-door open car (convertible). Most true phaetons had vanished by the late '30's, but as late as the '60's, a few models that roughly qualify for the term were briefly re-introduced by Lincoln. VW brought back the term in 2002 for their luxury saloon model.

### **Pick-up**

The type of light-duty truck with an open cargo bed behind a closed cab.

### **Pinion**

A type of gear that has small teeth that mesh with other, larger gears.

### **Pinion Gear**

The smaller of two meshing gears. A pinion gear is used in a starter motor to engage the flywheel ring gear and also rides along the surface of the steering rack (hence "rack and pinion" steering).

### **Pitstop**

This is the garage area at F1 races, where major mechanical work is done on the cars. The pitlane runs its length. At Indy racing [in USA] its called the 'gasoline alley'.

### **Piston**

A solid, cylindrically shaped part that alternately compresses fuel vapor within a cylinder (the compression stroke) and is thrust downward (the power stroke) by the force of the explosion that results when the vapor is ignited. Rocker arms connect the pistons to the crankshaft.

### **Piston Rings**

Metal rings seated in grooves on the outside of a piston that are used to ensure a proper seal between the piston and the cylinder wall. Typically, three (3) rings are used: two (2) ensure proper compression is produced and one (1) prevents oil from leaking into the cylinder.

### **Poke**

The degree of acceleration after exiting a sharp turn, as in 'pokey'.

### **Pole position**

The leading spot amongst an array of cars on the starting grid of a race.

### **Positive Crankcase Ventilation Valve**

An emission device that routes oil pan vapors to the intake manifold to be burned during combustion. Also known as the PCV valve.

### **Power Steering**

A steering system that uses a separate motor or engine power to reduce the effort necessary to turn the front wheels.

### **Power Steering Fluid**

Many power steering systems use hydraulic power. These systems use a power steering pump driven by a belt from the crankshaft. The pump moves fluid under pressure through hoses to the steering gear. The pressure is used in the steering gear to reduce steering effort. A reservoir for fluid is attached to the rear of the pump.

### **Power-to-Weight Ratio**

The maximum power output of the vehicle per unit mass. The higher the ratio, the more powerful the vehicle. In comparing several vehicles, this can be a better measurement than engine horsepower or torque because it considers the weight variable. In other words, a car that seems to have a powerful engine but is also heavy may have less get-up-and-go than a vehicle that has a similar or less powerful engine but also weighs less. Lotus are the best exponents of this. Given in a BHP per tonne value.

### **Powertrain**

The combination of engine and transmission.

### **Pretensioner**

A device that rapidly yanks in shoulder-belt slack when a crash sensor detects an impact. Some pretensioners are activated by a small explosive charge in the belt retractor; some contain their own inertial sensors. So far, pretensioners are still found on more expensive models, particularly those by European manufacturers. By pulling in belt slack within milliseconds of an impact, pretensioners help reduce chest and head injury by restricting occupant motion and preventing the occupant from hitting the belt.

### **Projector-Beam Headlights**

A headlight that uses a spherical reflector to tightly control the light beam. The bulb or light source directs the light inward, toward the reflector at the back of the headlight assembly, which then projects it forward from the vehicle. These lights are more powerful, accurate and expensive than standard sealed-beam and halogen headlights, and are generally found on sport and luxury models.

### **PRO**

Professional Racers Organization

### **Pro Start**

A method of starting a drag race that differs from most starts in that it only has one amber light between the initial staging and the final lights on the track-owners car.

### **Pro street**

A customized automobile designed for very high-performance and racing.

### **Project car**

An essentially complete, usually running car, that is capable of being restored. A project car usually has a condition number of #4 or #5.

### **Pro Rallies**

Road rallies which are very competitive and are run at high speeds on roads closed to the public. Often sponsored by the SCCA.

### **Pressure Plate**

Holds the clutch disc against the flywheel.

## **PSI**

Acronym for pounds per square inch. A pressure measurement used in tyre inflation and turbocharger boost.

## **Pushrod**

A metal rod that transmits the motion of the camshaft to the valve actuators to open and close the valves. Used on engines with overhead valves but without overhead camshafts.

## **Quarter Panel**

Sheet of metal panel that covers the front and rear quarters of the vehicle.

## **Quality control**

A department within a company that ensures its products meet the required standard, such as checking if a car has adequate weather-proofing.

## **Quickest Lap**

Counted officially by race organisers, this determines each cars position on the 'starting grid'. It is achieved by each competitor driving their cars their fastest around 1 circuit of the race-course, over 1 session.

## **R-134a**

The environmentally safe refrigerant now used in air-conditioning systems. It requires a slightly bulkier condenser unit than the older R-12 type. Vehicles equipped with R-12 systems can be converted to use R-134a. Since Freon is now banned, expensive and hard to obtain, the conversion may be a good idea when an R-12-based system needs recharging, particularly if technicians detect a leak.

## **Roadster**

An open car having a single seat for two or three passengers, with originally a rumble seat in the rear, an usually a folding roof.

## **Rack and Pinion Steering**

The steering wheel is connected to a pinion gear that meshes with a toothed bar, also called a rack or linear gear. As the pinion turns, the rack moves side to side, moving the steering linkage and causing the front wheels to turn left or right. The ends of the rack are linked to the steering wheel with tie rods.

## **RACMSA**

The RAC Motor Sports Association is recognized by the FIA as the governing body of motor sport in Great Britain.

## **Radiator**

The copper or aluminum device in front of the engine through which hot engine coolant is circulated and cooled. The liquid is then recirculates back through the engine block to cool it.

**Rag Top/Soft-top**

A convertible with a soft top, usually made from canvas or a polymer.

**Rally**

Competing teams, consisting of a driver and a navigator, are given route instructions, which they must follow exactly. Each team follows the course independently, trying to rack up points based on how well they meet a pre-determined schedule.

**Rear axel assembly**

The drive shaft turns (spins) a set of gears within the rear axle assembly known as the differential, or rear differential. The differential changes the direction of power from the driveshaft out to the rear wheels via the rear axle.

**Rear-Wheel Drive (RWD)**

The drivetrain in which power is applied through the rear wheels only.

**Recall**

A manufacturer calls in vehicles to repair defects, usually safety-related. Recalls may be voluntary, requested by the government, or mandated by NHTSA.

**Recirculating Ball**

A steering mechanism in which the steering shaft turns a worm gear causing a toothed metal block to move back and forth, turning the front wheels. Ball bearings reduce friction between the worm gear and the metal block.

**Redline**

The point on the engine tachometer that indicates the maximum RPM the engine can safely withstand.

**Release Fork**

Disengages the clutch disc from the flywheel by pressing on the pressure plate release springs.

**Retractable**

A car having a mechanically retractable hardtop such as the late '50's Ford Skyliner.

**Restrictor**

An electronic safety device preventing high-speeds above 160mph from being reached.

**Revolutions Per Minute (RPM)**



Describes at which speed the engine crankshaft is turning.

### **Rev counter**

Usually sits near the Speedometer. Shows the driver the rpm level while pressing the accelerator, thus indicating how much fuel may be unnecessarily being burned.

### **Rim**

The outer edge of a bare wheel. A hub-cap sometimes sits within this.

### **Rocker Panel**

The body panel that runs beneath a vehicle's doors.

### **Road test**

A neutral road vehicle examination done by transport depts., publishers, and consumer associations. It covers - design, engineering, performance, braking, handling, ride, comfort, safety, equipment, specifications, economy, market & finance.

### **Rotor**

The rotating part of a machine or mechanism. The brake disc itself is referred to as a "rotor," as is the center of a distributor or starter motor.

### **Rollcage**

A protective steel cage to prevent driver injury during a rollover.

### **Rollover**

The type of vehicle impact in which the car or truck rolls over on its side, onto its roof, or turns over completely. The biggest cause of injury in a rollover is ejection of the occupant or any part of the occupant. Rollover is a greater risk in any sport-utility vehicle - because of its high center of gravity - than in a minivan, pickup truck or passenger car. Rollover can occur immediately upon impact or in the seconds after an impact, which makes it more difficult to protect occupants with traditional airbags. Inflatable tubular restraints and similar designs that stay inflated longer than traditional airbags will be more effective in rollover situations.

### **Running Yellow**

This indicates that something may be wrong on the race track, but the cars are allowed to stay, running at a reduced speed. A quick check by the officials usually resolves the issue and the green light comes back on.

### **Rumble seat**

Fold-up seat in the rear of a car.

### **Running board**

A strip running between the fenders and below the doors of early autos used both as a step up into the car and to wipe the mud from one's feet.

### **Rush hour**

A time period between 8am>10am, where traffic peaks more so than at any time during the day, but excluding weekends.

### **Sat-nav**

An LCD showing the vehicle position within the local area, as pinpointed by a GPS satellite.

### **Scrub radius**

The distance from the point where the steering axis intersects the ground to the longitudinal line that runs through the center of the tyre's contact patch. Also called "steering offset."

### **Sedan**

A fixed-roof car with at least four doors or any fixed-roof two-door car with at least 33 cubic feet of rear interior volume. Called a Limousine outside America. Daimler only make this car type.

### **Sedanette**

A two-door sedan having a slanted back with the rear window and trunk along one unbroken curve. This name for the early streamlined design is most often used for Buick and Cadillac models, but similar designs of other makes are known by various names.

### **Sensor Algorithm**

An algorithm is a mathematical formula or series of formulas used by an on-board computer or processor to make decision. In an airbag system, a crash-sensor algorithm determines whether the change in velocity indicates an impact of great enough force to require airbag deployment, based on pre-programmed parameters. If the change in velocity is great enough, the processor sends a signal to the device that inflates the airbag.

### **Sequential Fuel Injection**

Similar to multi-port fuel injection, but the injectors spray fuel into the individual intake ports exactly at the beginning of each cylinder's intake cycle. The precise fuel control provides better engine performance.

### **Semi-trailing-arm suspension**

An independent rear-suspension system in which each wheel hub is located only by a large, roughly triangular arm that pivots at two points. Viewed from the top, the line formed by the two pivots is somewhere between parallel and perpendicular to the car's longitudinal axis.

### **Shift Interlock**

On a vehicle with automatic transmission, a safety device that prevents the driver from shifting out of park unless the brake pedal is depressed.

### **Shift gate**

The mechanism in a transmission linkage that controls the motion of the gearshift lever. The shift gate is usually an internal mechanism; however, in some transmissions: including Ferrari five-speeds and Mercedes-Benz automatics: the shift gate is an exposed guide around the shift lever.

### **Shock absorber**

A device that converts motion into heat, usually by forcing oil through small internal passages in a tubular housing. Used primarily to dampen suspension oscillations, shock absorbers respond to motion; their effects, therefore, are most obvious in transient maneuvers.

### **Short Block**

The lower portion of an engine below the cylinder head.

### **Side Airbag**

An inflatable cushion that fills the space between the door and the occupant to prevent head, torso and pelvis injuries when a vehicle is hit from the side. Side airbags may be stored in the door-trim panel or the outboard side of the seat; they may protect the hip and torso only or also protect the head. A new design, called an inflatable tubular restraint, is stored in the edge of the roof headliner and attached at the base of the A-pillar at the front end and above the doors along the roofline at the other. The device inflates into a somewhat stiff tube that prevents the occupant's head from hitting the side pillar or the window.

### **Side-Impact**

safety regulations require that vehicles absorb a certain amount of force when hit from the side. To meet side-impact standards, automakers have stiffened side-impact beams, which resist intrusion into the passenger compartment, and added safety devices such as side airbags and extra padding, which are designed to push the occupant toward the interior of the vehicle and away from the point of intrusion.

### **Side mount**

A spare tyre mounted on the side of a car, normally on the fender just above and behind the front wheel.

### **Single Overhead Cam (SOHC)**

An engine with a single overhead cam generally has one intake and one exhaust valve per cylinder; the single cam opens and closes both valves. See also Overhead Cam and Dual Overhead Cam.

### **Skidpad**

A large area of smooth, flat pavement used for various handling tests. Road holding is measured by defining a large-diameter circle (Car and Driver uses 300 feet) on the skidpad and measuring the fastest speed at which the car can negotiate the circle without sliding off.

**Slicks**

A type racing tyre characteristically very wide with no tread.

**Slalom**

Several soft turns in a row at a race-track, like at Brands Hatch in the UK.

**Society of Automotive Engineers**

The professional association of transportation-industry engineers. The SAE sets most auto-industry standard for the testing, measuring, and designing of automobiles and their components.

**Solenoid**

The electromagnetic device positioned above the starter which thrusts the pinion gear against the engine flywheel when starting ("turning over") the engine.

**Space frame**

A particular kind of tube frame that consists exclusively of relatively short, small-diameter tubes. The tubes are welded together in a configuration that loads them primarily in tension and compression.

**Specific output**

The amount of BHP produced from 1 litre of fuel.

**Spark Plug**

Converts voltage into an arc that passes between its electrodes; the arc ignites the fuel-air mixture in the combustion chamber. The mixture explodes, creating power by pushing down the piston.

**Speedo**

An instrument dial above the steering wheel which informs the driver of the current speed, in MPH and/or KPH.

**Sport Utility Vehicle (SUV)**

Refers to a style of truck which has a square passenger cabin and hatchback, and may be equipped with two- or four-wheel drive.

**Sports Car**

A body type designation. Generally a small, powerful car seating only two people.

**Sprint Car**

Two types of sprint cars exist, the first is the open-wheel cars that feature a upright roll cage. The second is a similar car that has a large wing mounted to the top for stability.

**Spoiler**

An aerodynamic device that changes the direction of airflow in order to reduce lift or aerodynamic drag and/or improve engine cooling..

### **Spyder**

A very fast sports car with a removable roof and a top speed above 170mph.

### **Smart Airbag**

There are many designs, but each contains similar elements including a system of sensors and mathematical algorithms to detect the presence or absence of an occupant in the seat; to determine the size, weight and nature of any occupant (including whether it is a rear-facing infant and determine whether the occupant is an adult, a dog, a bag of groceries or a rear-facing infant seat); and to determine whether the occupant is too close to the airbag door for safe deployment. A smart system will use that information to decide whether to inflate the airbag in an impact. Later generations of smart airbags will adjust the rate of inflation based on force of impact and size of the occupant.

### **Slip angle**

The angular difference between the direction in which a tyre is rolling and the plane of its wheel. Slip angle is caused by deflections in the tyre's sidewall and tread during cornering. A linear relationship between slip angles and cornering forces indicates an easily controllable tyre.

### **Slushbox**

A slang for an automatic transmission.

### **Squat**

The opposite of dive, squat is the dipping of a car's rear end that occurs during hard acceleration. Squat is caused by a load transfer from the front to the rear suspension.

### **Straight-line tracking**

The ability of a car to resist road irregularities and run in a straight line without steering corrections.

### **Stator**

As opposed to the moving rotor, the stationary portion of a device. In an alternator, for example, the stator includes an intricate copper winding that picks up the current induced by the rotation of the rotor within a magnetic field.

### **Starter**

An electric motor used to initiate movement of internal engine parts so that combustion can begin. Activating the starter causes the solenoid to thrust the pinion gear in the starter against the engine flywheel ring gear and begin turning it.

### **Street rod**

A customized, usually modernized, most often classic, automobile designed for show and/or pleasure driving.

## **Starting Grid**

The first section or portion of a race track.

## **Station Wagon**

A two- or four-door passenger car with a cargo area that extends all the way to the rear bumper. A model variant derived from an extension of a popular saloon model. In Europe is termed an estate version.

## **Steering axis**

The line that intersects the upper and lower steering pivots on a steered wheel. On a car with a strut suspension, the steering axis is defined by the line through the strut mount on top and the ball joint on the bottom.

## **Steering feel**

The general relationship between forces at the steering wheel and handling. Ideally, the steering effort should increase smoothly as the wheel is rotated away from center. In addition, the steering effort should build as the cornering forces at the steered wheels increase. Finally, the friction built into the steering mechanism should be small in comparison with the handling-related steering forces.

## **Steering gain**

The relationship between yaw and the steering wheel's position and effort. All three should be proportional and should build up smoothly.

## **Steering Ratio**

The ratio of the different steering gears. Usually a lower gear means a faster response.

## **Steering Rack**

The device by which the movement of the steering wheel is transferred to the front wheels of an automobile.

## **Steering Rods**

The metal rods on each end of the steering rack that connect it to the front wheels via ball joints (tie rod ends).

## **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.

## **Stock Car Racing**

Started by NASCAR's founder, Bill France, in the 1940s. Initially meant track cars equipped with showroom parts. Today, few cars use stock parts. Most are built from custom parts, made especially for these race cars, that look like those in showrooms.

## **Stroke**

The up-and-down distance the piston travels within the cylinder. On a traditional internal combustion engine, the piston makes four strokes during the combustion cycle, only one of which is a power stroke. On the power stroke, the piston is near the top of the cylinder, and it has compressed the air and fuel mixture. The spark plug ignites the mixture, and the force of the explosion pushes the piston down into the cylinder, producing the force that turns the crankshaft. The piston returns to the top of the cylinder to expel the exhaust gases on the second, or exhaust, stroke. It slides down to the bottom of the cylinder during the intake stroke, when the valves open to let in air and fuel. The piston rises to the top of the cylinder on the compression stroke to begin the cycle anew. This process repeats hundreds or thousands of times a minute, resulting in the number of crankshaft revolutions per minute at which the crankshaft is rotating. Length measured in millimeters.

## **Subcompact**

The car size class one step up from the mini-car, like the Rover 45 an Austin Maestro.

## **Suicide doors**

Car doors that open from the front rather than the rear, by being hinged beneath the windscreen or rear window. Although most often thought of as applying to rear doors of four-door cars, several early models had suicide-style front doors. Some of the last suicide doors to appear on an American car were on the '1960's Lincolns. In 2002 Mazda introduced a car called the RX8 which brought back this obscure idea.

## **Supercharger**

Serves the same function as a turbocharger but avoids lag time because it runs off an engine-driven pump. Both turbochargers and superchargers are used to produce more power without increasing engine displacement, but neither are particularly fuel efficient and both can require costly maintenance as vehicles age. A standard piece of equipment of Hotrods and Top Fuel dragsters, this provides more power by blowing a combination of more air and vaporized fuel into the car's engine.

## **Suspension**

Springs, dampers, shock absorbers, hydraulics, wishbones, roll bars, struts, and links used to suspend the frame, body and engine above the wheels.

## **Sump**

The space in the engine block under the crankshaft into which the oil drains from its various applications.

## **Switch-gear**

The variety an quality of function controls the driver can utilize while driving.

## **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.

## **T-top; Targa top**

A hand removable plastic roof, as with TVR's Tuscan model, leaving a T shaped roof opening.

### **Tachometer**

The instrument gauge that shows engine speed, or revolutions per minute. On a vehicle with manual transmission, the driver can use the tachometer to tell when to upshift or downshift. Also called tach.

### **Tappet**

A pivoting actuator that opens and closes cylinder intake and exhaust valves.

### **Taxometer**

A machine which counts the travel-time of a taxi journey.

### **Throttle-Body Fuel Injection**

A form of electronic fuel injection in which the injectors are centrally located in a throttle-body housing that contains a valve to regulate air flow through the intake manifold. Less efficient and precise than multi-port or sequential fuel injection.

### **Timing Belt**

On overhead cam equipped engines, an external belt used to synchronize the operation of intake/exhaust valves with the compression/ignition process occurring in the cylinder head and engine block below.

### **Timing Valve**

A valve in a fuel injection pump which times the delivery of fuel.

### **Tie Rod End**

A type of ball joint which transfers the movements of the steering wheel to the wheels.

### **Toe-in**

A wheel-alignment term that indicates the leading edges of a pair of wheels angle slightly toward each other. 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.

### **Toe-out**

A wheel-alignment term that indicates the leading edges of a pair of wheels angle slightly away from each other.

### **Top-Fuel Dragsters**



The fastest of drag racing vehicles, these have a characteristically long body and use top fuel which accounts for the tremendous speeds these vehicles can attain.

### **Torque**

A measure of twisting force, given in foot-pounds (abbreviated as lb.-ft.) or Newton-meters (N-m). In the case of an automobile, it is the twisting or rotational force the engine exerts on the crankshaft. Vehicle specifications often include the maximum torque an engine produces at a specific number of revolutions. An engine that produces 200 lb.-ft. of torque at 3,000 revolutions per minute, or 200 lb.-ft.@ 3,000 rpm, accelerates better at low speeds than an engine that provides 200 lb.-ft.@5,000 rpm.

### **Torque Converter**

An enclosed device connected to the crankshaft that uses a turbine-based system and a thin fluid (ATF) to propel the movement of the automatic transmission mainshaft. As opposed to an automobile equipped with a manual transmission and clutch that must be engaged/disengaged, this "fluid" connection between the engine and the wheels is what enables a car to come to a full stop with its automatic transmission still in gear.

### **Torque Steer**

The tendency of the front wheels on a front-drive vehicle to pull to the side under hard acceleration.

### **Torque-to-weight**

The amount of torque derived power effort, in pounds per foot, over the tonnage of the vehicle.

### **Torsion Bar**

A simple, rugged type of suspension spring that twists as it is compressed or stretched.

### **Torsional Stiffness**

A vehicle body's resistance to twisting motions.

### **Towing Capacity**

The amount of weight a vehicle can tow behind it, eg a trailer carrying a speed-boat.

### **Track**

Vehicle width, measured from the center of one tyre's contact patch to the center of the opposite tyre's contact patch. 2 - a racing surface at race-course, like at Silverstone in the UK.

### **Traction Control**

A system for limiting wheel slip under acceleration, thus maintaining 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.

### **Traction**

The amount of friction between the tyre and the ground.

### **Trade-in Value**

The amount a dealership credits you for the used vehicle you provide as partial payment for another vehicle. The amount credited is often about 5 percent below the vehicle's wholesale market value.

### **Transfer Case**

On four-wheel drive vehicles, a gearbox that allows power to be delivered to front and rear wheels.

### **Transaxle**

A transmission and differential housed together in the same enclosure. This setup is most commonly found in today's front-wheel-drive-dominated car (not truck) market. The transmission and differential are married together because no drive shaft is required in front-wheel drive (front engine) vehicles.

### **Transmission**

The transmission is used to take the high-speed, low-torque power of the engine and convert it to a lower-speed, higher-torque output, which ultimately turns the drive wheels. Transmissions come in a wide variety of choices, but they basically divide into three categories: Manual, Automatic, and Manumatic. Lower gears allow fast acceleration, higher gears provide better gas mileage. Manual transmission uses a system of gears to create the high torque output required from the engine's high speed input. A clutch is used to disengage the transmission from the engine when shifting gears. Automatic transmissions do the shifting for the driver. No clutch is required. The shifting is accomplished by a hydraulic oil system. Manumatic transmissions are a hybrid of manual and automatic transmissions. In most cases they require no manually operated clutch, but they allow for the driver to shift gears manually when desired.

### **Tread-Wear Index**

A tyre rating consisting of a number followed by two letters, such as 300AB. The number indicates the useful life of the tyre, the first letter (A, B, or C, A for best, C for worst) indicates its traction in wet conditions, and the second letter (A, B, or C, A for best, C for worst) its resistance to heat buildup.

### **Tri-Link Suspension**

A fully independent rear suspension featuring a single fiberglass or composite leaf spring.

### **Trim Decor**

the embellishments added to the cars interior that give it identity an character, such as leather, wood, fabric, chrome etc.

### **Trim Level**

The level of options or features added to a model (as like with a GT version). An optional extra as selected by the customer, like an airbag, doesn't instigate a new trim level. Only the car maker selects the attributes to a car to make it a special variant of the basic version, which is the 'factory standard' version, an is the cheapest within the range.

### **True MPH**

The actual velocity a body moves at as opposed to the reading given by internal instrumentation. Used by speed cameras an police with timing guns in speed-traps.

### **Tune-up**

A regularly scheduled maintenance to check normal operation of the vehicle.

### **Turbine**

An integral piece of the turbocharger, this small fan drives the compressor. A rotor with vanes or blades which is driven by the movement of fluid or gases across its surface. The turbine wheel in a turbocharger spins as a result of exhaust gases. In a torque converter, a turbine is used to propel ATF within the unit.

### **Turbo Lag**

The time it takes the turbocharger to kick in after the driver accelerates; the lag results because a turbocharger compressor is spun by exhaust gases in the exhaust manifold.

### **Turbocharger**

Device that compresses and forces extra air into the intake manifold to produce extra power. Both turbochargers and superchargers are used to produce more power without increasing engine displacement, but neither are particularly fuel efficient and both can require costly maintenance as vehicles age. By forcing fuel through the engine, this system allows the car to gather more speed. Usually they're made by specialist component makers like Roots, X-Trac, Bosch, etc.

### **Turning circle**

The minimum distance a car needs to turn around in one step. A low figure is a prerequisite for a proper Taxi deign, an in the venues of big cities is a regulation.

### **Twist-Beam Axle**

A semi-independent rear axle often used on front-drive vehicles. The horizontal beam, which connects the two rear wheels, can twist to reduce the effect of one wheel's motion on the other. Less expensive and more compact than fully independent suspension.

### **Understeer**

Occurs 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 pushes ahead. In motor sports, this is called push. The driver can regain traction by reducing speed. Also may be called plow.

### **Unidirectional tyre**

Tire whose tread pattern is designed to get optimum traction only when the tyre is mounted to roll in one direction.

### **Unitized construction**

A type of body construction that doesn't require a separate frame to provide structural strength or support for the car's mechanical components. A unitized body can employ monocoque construction, or it can utilize strong structural elements as an integral part of its construction. Before 1980 cars were built almost exclusively from frames. In other words, underneath everything was a basic rectangular steel assembly. Everything else on the car attached to the frame in one way or another. Today, nearly every car and many trucks are built on the "unibody" concept, for reasons of weight and cost. Unibody construction uses the body assembly itself to create the infrastructure of the vehicle and is constructed in most cases by spot welding together hundreds of smaller metal assemblies. On a modern assembly line you may see automated spot welders sparking away on hunks of sheet metal, eventually forming a car body.

### **Universal joint**

A joint that transmits rotary motion between two shafts that aren't in a straight line. Depending on its design, a universal joint can accommodate a large angular variation between its inputs and outputs. The simplest kind of universal joint, called a "Hooke joint," causes the output shaft to speed up and slow down twice for every revolution of the input shaft. This speed fluctuation increases with the angular difference between the shafts.

### **Uninsured Motorist Coverage**

Insurance which pays for costs resulting from a hit-and-run or an accident with an uninsured motorist.

### **V6**

A vehicle with six cylinders. The cylinders are divided into two banks, each of which is angled away from the other at the top, forming a 'V'. Typically, this angle is 60 degrees on V-6 engines.

### **V8**

A vehicle with eight cylinders. The cylinders are divided into two banks, each of which is angled away from the other at the top, forming a 'V'. Typically, this angle is 90 degrees on V-8 engines

### **V12**

A vehicle with a dozen cylinders. The cylinders are divided into two banks, each of which is facing each other at the top, and slightly forms a 'V' shape. Typically this angle is 30 degrees on most V-12 engines. Occasionally two V6 engines can be combined to act as a V12.

### **Valve Train**

The valves and camshaft(s) within an engine, and any parts attached to the valves, such as rockers and pushrods, to move them up and down.

### **Valves**

Many overhead-cam engines, particularly multi-valve models, are described by the total number of intake and exhaust valves in the cylinder head. A 24-valve V-6 engine would have four valves per cylinder: two intake and two exhaust valves. A 16-valve V-8 engine has only the standard single exhaust and single intake valve for each of its eight cylinders.

### **Valve gear**

The valve number per cylinder and the cam number plus its position.

### **Valve float**

A high-rpm engine condition in which the valve lifters lose contact with the cam lobes because the valve springs are not strong enough to overcome the momentum of the various valvetrain components. The onset of valve float prevents higher-rpm operation. Extended periods of valve float will damage the valvetrain.

### **Valve lifter**

Also called a "valve follower": the cylindrically shaped component that presses against the lobe of a camshaft and moves up and down as the cam lobe rotates. Most valve lifters have an oil-lubricated hardened face that slides on the cam lobe. So-called "roller lifters," however, have a small roller in contact with the cam lobe: thereby reducing the friction between the cam lobe and the lifter.

### **Valvetrain**

The collection of parts that make the valves operate. The valvetrain includes the camshaft(s) and all related drive components, the various parts that convert the camshaft's rotary motion into reciprocating motion at the valves, and the valves and their associated parts.

### **Viscous coupling**

A particular kind of fluid coupling in which the input and output shafts mate with thin, alternately spaced discs in a cylindrical chamber. The chamber is filled with a viscous fluid that tends to cling to the discs, thereby resisting speed differences between the two shafts. Viscous couplings are used to limit the speed difference between the two outputs of a differential, or between the two axles of a car.

### **Van**

A box-shaped truck with a forward cab and a cargo area to the back bumper.

### **Variable-Assist Steering**

A power-steering system that varies the amount of assistance it provides according to driving conditions. It provides maximum assistance at low speeds for maneuvers such as turning into a parking space or turning a corner after leaving a stop light. It provides minimum assistance at cruising or highway speeds to provide greater vehicle stability.

### **Vehicle Identification Number (VIN)**

A seventeen-digit identification number, unique to each vehicle, which includes codes for the manufacturer, year, model, body, and engine specifications.

### **Vented Disc Brakes**

A brake disc that has cooling passages between the friction surfaces.

### **V-Type Engine**

In a V-6, V-8 or V-12 engine, the cylinders are divided into two banks, each of which is angled away from the other at the top, forming a 'V'. Typically, this angle is 60 degrees on V-6 engines and 90 degrees on V-8 engines. From the rear are identified by having twin exhaust pipes, and by ear have a deep rumble engine sound.

### **Waste gate**

A valve 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.

### **Water Pump**

The pump that circulates coolant through the engine block, cylinder head and radiator. It is driven by the engine crankshaft.

### **Weight distribution**

Measured in Kg, representing the balance, control and stability, with the centre of gravity acting as the fulcrum.

### **Wheel Size**

Determined by the diameter and width of the wheel on which the tyre is mounted. A 15-inch wheel has a diameter of 15 inches. A 15 X 7 wheel has a 15-inch diameter and a 7-inch width.

### **Wheelbase**

The distance between the center of the front wheels to the center of rear wheels.

### **Wheelstand**

A mainstay in drag races, this refers to when the front end of car lifts up during a race. It is also known as a wheelie.

### **Wheel hop**

An undesirable suspension characteristic in which a wheel (or several) moves up and down so violently that it actually leaves the ground. Wheel hop can be caused by many problems, including excessive unsprung weight, insufficient shock damping, or poor torsional axle control.

### **Wheelspin**

When a wheel continues turning after its lost traction during a sharp turn, or loses surface contact while over uneven ground.

### **Wheel well/arch**

The area of space between a wheel and the fender that shrouds it. The arch follows the profile of the wheel size.

### **Wing**

2 body panels that exist either rear side, beneath the trunk cover, partly enclosing the rear-wheel-space.

### **Winston Cup**

The high-point of NASCAR racing, a race that spans the entire season as drivers accumulate points at each of 31 events. The driver that accumulates the most points, not the most wins, becomes the eventual Winston Cup winner.

### **Woody**

Refers to a vehicle which has part of its side body-panels covered or replaced with decorative wood.

### **X series**

The name given to the famous chassis designs used by Jaguar since the 1960s, such as the XJ, XK and X-type.

### **X-ray detection**

This is used by law enforcement agencies when searching for illegal materials concealed within the door panels and bodywork of cars, such as Semtex and heroin.

### **Yaw**

The rotation about a vertical axis that passes through the car's center of gravity.

### **Yugo**

The only car company named after a country that no longer exists, ie Yugoslavia.

### **Zero-offset steering**

A steering system whose geometry has a scrub radius of zero. This configuration minimizes the steering effects produced during acceleration (with front drive) or braking on varying traction surfaces.

**Z-axis**

The plain of movement a road vehicle cant access.