

# ENGLISH GLOSSARY

**ACEA** Association des Constructeurs European d'Automobiles represents most of the Western European automobile and heavy-duty truck market. The organization uses different engines for testing than those used by API and SAE, and the requirements necessary to meet the ACEA standards are different yet generally correspond with most API ratings.

**Acetic acid** Some RTV silicone sealers use the fumes from this acid. Use caution as this type can be drawn through the engine through the PCV system and cause damage to oxygen sensors.

**Acid materials** Have pH numbers from 1 through 6.

**Additive package** Balanced additives.

**Adjustable wrench** A wrench that has a movable jaw to allow it to fit many sizes of fasteners.

**Aerated** Air mixed with the oil.

**AFV** Alternative-fuel vehicle.

**Agitation** Keeps fresh cleaning solution moving past the soil to help loosen it.

**AGST** Aboveground storage tank, used to store used oil.

**AIR** Air injection reaction emission control system; also called secondary air injection.

**Air compressor** A piece of shop equipment that uses an electric motor to power an air compressor, which is stored in a pressure tank for use in the shop.

**Air drill** A drill driven by the elastic pressure of condensed air; a pneumatic drill.

**Air ratchet** An air-operated hand tool that rotates a socket.

**Air-blow gun** A handheld nozzle attached to a compressed air hose to apply air pressure to a component or device.

**Air-fuel ratio** The ratio of air to fuel in an intake charge as measured by weight.

**AKI** Antiknock index. The octane rating posted on a gas pump, which is the average of the RON and MON octane ratings.

**Alternator** Turned by the engine through an accessory drive belt. The magnetic field of the rotor generates a current in the windings of the stator by electromagnetic induction.

**Ampere-hour rating** An older type of battery rating.

**Amplitude** The difference between the highest and lowest level of a waveform.

**Anhydrous ethanol** Ethanol that has no water content.

**Annealing** Heat-treating process that takes out the brittle hardening of the casting to reduce the chance of cracking from the temperature changes.

**ANSI** American National Standards Institute, an organization that publishes safety standards for safety glasses and other personal protective equipment.

**Antidrainback valve** Prevents oil from draining out of the filter when the engine is shut off.

**API** American Petroleum Institute.

**Aqueous-based solutions** Most aqueous-based chemicals are silicate based and are mixed with water.

**Armor** Protects the fiber facing around the combustion chamber.

**Asbestosis** A health condition where asbestos causes scar tissue to form in the lungs causing shortness of breath.

**ASTM** American Society for Testing Materials.

**Asymmetrical** The amount of lift of a camshaft is often different for the intake and exhaust valves. If the specifications vary, the camshaft is called asymmetrical.

**Aviation tin snips** Cutters designed to cut sheet metal.

**B20** A blend of 20% biodiesel with 80% petroleum diesel.

**Babbitt** Babbitt is the oldest automotive bearing material. Isaac Babbitt (1799–1862) first formulated this material in 1839. An excellent bearing material, it was originally made from a combination of lead, tin, and antimony.

**Back flushing** The use of a special gun that mixes air with water. Low-pressure air is used so that it will not damage the cooling system.

**Back pressure** The exhaust system's resistance to flow. Measured in pounds per square inch (PSI).

**Balancing bosses** Balancing pad.

**Bank** Each group of four inline cylinders.

**Bar** When air is pumped into the cylinder, the combustion chamber receives an increase of air pressure known as boost and is measured in pounds per square inch (PSI), atmospheres (ATM), or bar.

**Barrel** A part of a micrometer, which has 40 threads per inch.

**Base timing** The timing of the spark before the computer advances the timing.

**BCI** Battery Council International.

**Beam-type torque wrench** A type of wrench that displays the torque being applied to a fastener by the position of a deflective pointer and a scale, indicating the amount of torque.

**Bearing crown** The wall thickness of most bearings is largest in the center.

**Bearing splitter** A two-part steel device used between a bearing and a gear or other component, which is used to remove the bearing using a hydraulic press.

**Bedplate** A structural member that attaches to the bottom of the block and supports the crankshaft.

**Bench grinder** An electric motor with a grinding stone and/or wire brush attached at both ends of the armature and mounted on a bench.

**Bench vise** A holding device attached to a workbench; has two jaws to hold the workpiece firmly in place.

**Bin number** A United States federal rating of emissions. The lower the Bin number, the cleaner the exhaust emission.

**Biodiesel** A renewable fuel manufactured from vegetable oils, animal fats, or recycled restaurant grease.

**Biomass** Nonedible farm products, such as corn stalks, cereal straws, and plant wastes from industrial processes, such as sawdust and paper pulp used in making ethanol.

**Bleed hole** Controls the oil flow through the bearing.

**Block** The foundation of any engine. All other parts are either directly or indirectly attached to the block of an engine.

**Block deck** The cylinder head is fastened to the top surface of the block.

**Blowby gases** Combustion gases that leak past the piston rings into the crankcase during the compression and combustion strokes of the engine.

**Bolt** A fastener consisting of a threaded pin or rod with a head at one end, designed to be inserted through holes in assembled parts and secured by a mated nut that is tightened by applying torque.

**Boost** An increase in air pressure above atmospheric. Measured in pounds per square inch.

**Bore** The inside diameter of the cylinder in an engine.

**Boundary lubrication** When the oil film is thick enough to keep the surfaces from seizing, but can allow some contact to occur.

**Box-end wrench** A wrench with a closed loop (a socket) that fits over a nut or bolt head.

**Boxer** A type of engine design that is flat and has opposing cylinders. Called a boxer because the pistons on one side resemble a boxer during engine operation. Also called a pancake engine.

**Braided fabric seals** Used as rear crankshaft oil seals.

**Breaker bar** A long-handled socket drive tool.

**Bronze guide liners** See *thin-walled bronze alloy sleeve bushing*.

**BTU** British thermal unit. A measure of heat energy. One BTU of heat will raise the temperature of one pound of water one Fahrenheit degree.

**Bucket** Opens overhead camshaft valve trains.

**Bump cap** A hat that is plastic and hard to protect the head from bumps.

**Bypass** Allows a small part of the coolant to circulate within the engine during warm-up. It is a small passage that leads from the engine side of the thermostat to the inlet side of the water pump. It allows some coolant to bypass the thermostat even when the thermostat is open.

**Bypass valve** Allows intake air to flow directly into the intake manifold, bypassing the supercharger.

**CAA** Clean Air Act. Federal legislation passed in 1970 that established national air quality standards.

**Calendar year (CY)** A calendar year is from January 1 through December 31 each year.

**Calibration codes** Codes used on many powertrain control modules.

**California Air Resources Board (CARB)** A state of California agency that regulates the air quality standards for the state.

**Cam chucking** The movement of the camshaft lengthwise in the engine during operation.

**Cam follower** Opens overhead camshaft valve trains with a ratio similar to that of a rocker arm.

**Cam ground** Once a certain temperature is reached, the piston will have expanded enough across the piston pin area to become round.

**Cam-in-block** Pushrod engines have the cam located in the block.

**Cam-in-block design** An engine where the crankshaft is located in the block rather than in the cylinder head.

**Camshaft** A shaft with lobes that open valves when being rotated through a chain, belt, or gear from the crankshaft.

- Camshaft bearings** The camshaft is supported in the block by these bearings.
- Camshaft duration** The number of degrees of crankshaft rotation for which the valve is lifted off the seat.
- Camshaft overlap** The number of degrees of crankshaft rotation between the exhaust and intake strokes for which both valves are off their seats.
- Cap screw** A bolt that is threaded into a casting.
- Capillary action** The movement of a liquid through tiny openings or small tubes.
- Case hardening** Involves heating the crankshaft and adding carbon to the journals where it causes the outer surface to become harder than the rest of the crankshaft.
- Casting number** An identification code cast into an engine block or other large cast part of a vehicle.
- Catalyst** An element that starts a chemical reaction without becoming a part of, or being consumed in, the process.
- Catalytic converter** An emission control device located in the exhaust system that changes HC and CO into harmless H<sub>2</sub>O and CO<sub>2</sub>. In a three-way catalyst, NO<sub>x</sub> is also divided into harmless separate nitrogen (N<sub>2</sub>) and oxygen (O<sub>2</sub>).
- Catalytic cracking** Breaking hydrocarbon chains using heat in the presence of a catalyst.
- Caustic material** Chemical cleaners or strong soaps.
- Cavitation** A process of creating a cavity or void area. Cavitation is usually used in the automotive field to describe what happens in the cooling system when water boils, creating a bubble in the system, and then cools below 212°F, which causes the bubble to collapse. When this event occurs, water rushes back into the void left by the bubble. The force of this moving water can cause noise as well as damage to cooling system parts such as water pumps.
- Cellulose ethanol** Ethanol produced from biomass feedstock such as agricultural and industrial plant wastes.
- Cellulosic biomass** Composed of cellulose and lignin, with smaller amounts of proteins, lipids (fats, waxes, and oils), and ash.
- Centrifugal pump** A rotodynamic pump that uses a rotating impeller to increase the velocity of a fluid.
- Cerium** An element that can store oxygen.
- Cetane rating** A diesel fuel rating that indicates how easily the fuel can be ignited.
- CFR** Code of Federal Regulations.
- Cheater bar** A pipe or other object used to lengthen the handle of a ratchet or breaker bar.
- Check valve** Contains a spring-type metallic disc or reed that closes the air line under exhaust backpressure.
- Chisel** A sharpened tool used with a hammer to separate two pieces of an assembly.
- Christmas tree clips** Plastic clips used to hold interior panels in place. The end that goes into a hole in the steel door panel is tapered and looks like a Christmas tree.
- Clamping force** The amount of force exerted on a gasket.
- Clicker-type torque wrench** A type of wrench that is first set to the specified torque and then it “clicks” when the set torque value has been reached.
- Close end** An end of a wrench that grips all sides of the fastener.
- Cloud point** The low-temperature point at which the waxes present in most diesel fuel tend to form wax crystals that clog the fuel filter.
- CNG** Compressed natural gas.
- Coil-by-plug** See *coil-on-plug*.
- Coil-near-plug** See *coil-on-plug*.
- Coil-on-plug (COP)** Uses one ignition for each spark plug.
- Coil-over-plug** See *coil-on-plug*.
- Cold chisel** A type of chisel used to remove rivets or to break off fasteners.
- Cold-cranking amperes (CCA)** The cold cranking performance rating.
- Combination wrench** A type of wrench that has an open end at one end and a closed end at the other end of the wrench.
- Combustion** The rapid burning of the air–fuel mixture in the engine cylinders, creating heat and pressure.
- Combustion chamber** The space left within the cylinder when the piston is at the top of its combustion chamber.
- Compacted graphite iron (CGI)** A type of iron that is used for bedplates and many diesel engine blocks. It has higher strength, stiffness, and toughness than gray iron. The enhanced strength has been shown to permit reduced weight while still reducing noise vibration and harshness.
- Composite camshaft** A lightweight tubular shaft with hardened steel lobes press-fitted over the shaft.
- Compression ratio (CR)** The ratio of the volume in the engine cylinder with the piston at bottom dead center (BDC) to the volume at top dead center (TDC).
- Compression rings** Designed to form a seal between the moving piston and the cylinder wall.
- Compression test** A test that can be used to test the condition of valves and piston rings.
- Compressor bypass valve** This type of relief valve routes the pressurized air to the inlet side of the turbocharger for reuse and is quiet during operation.

**Concentric** Centered.

**Conformability** The ability of bearing materials to creep or flow slightly to match shaft variations.

**Connecting rod** A rod that transmits motion or power from one moving part to another, especially the rod connecting the crankshaft of a motor vehicle to a piston.

**Connecting rod bearing journal** See *crank throw*.

**Coolant recovery system** When the system cools, the pressure in the cooling system is reduced and a partial vacuum forms. This pulls the coolant from the plastic container back into the cooling system, keeping the system full.

**Cooling fins** Fins that are exposed to airflow, which removes heat from the radiator and carries it away.

**Copper-lead alloy** Alloy is a stronger and more expensive bearing material than babbitt. It is used for intermediate- and high-speed applications. Tin, in small quantities, is often alloyed with the copper-lead bearings.

**Core plugs** A subset of the plugs on a car engine cylinder block or cylinder head. The traditional plug is a thin, domed disc of metal which fits into a machined hole in the casting and is secured by striking or pressing the center to expand the disc.

**Core tubes** Made from 0.0045- to 0.012-inch (0.1- to 0.3-millimeter) sheet brass or aluminum, using the thinnest possible materials for each application. The metal is rolled into round tubes and the joints are sealed with a locking seam.

**Cork-rubber gaskets** Gaskets that use synthetic rubber as a binder for the cork.

**Corrosion resistance** The bearings' ability to resist attack from the acids in the oil.

**Cotter key** A metal loop used to retain castle nuts by being installed through a hole. Size is measured by diameter and length (for example, 1/8" × 1 1/2"). Also called a cotter pin. Named for the Old English verb meaning "to close or fasten."

**Counterweights** Used to balance the crankshaft.

**Country of origin** The first number of the vehicle identification number (VIN), which identifies where the vehicle was assembled.

**Cracking** A refinery process in which hydrocarbons with high boiling points are broken into hydrocarbons with low boiling points.

**Crank throw** The journals of the off-center bearings of the crankshaft.

**Cranking amperes (CA)** A battery rating tested at 32°F (0°C).

**Cranking vacuum test** Measuring the amount of manifold vacuum during cranking is a quick and easy test to determine if the piston rings and valves are properly sealing.

**Crankpin** See *crank throw*.

**Crankshaft** A shaft that turns or is turned by a crank.

**Crankshaft end play** Thrust bearing clearance.

**Creeper** A small platform mounted on short casters designed for a service technician to lie down and maneuver under a vehicle.

**Crest** The outside diameter of a bolt measured across the threads.

**Cross flow head design** By placing the intake and the exhaust valves on the opposite sides of the combustion chamber, an easy path from the intake port through the combustion chamber to the exhaust port is provided.

**Crowfoot socket** A type of socket that slips onto the side of the bolt or nut. Used where direct access from the top is restricted.

**Crush** Occurs when the bearing cap is tightened, the ends of the two bearing shells touch and are forced together.

**CTL** Coal-to-liquid.

**Cycle** A complete series of events that continually repeat.

**Cylinder** The chamber in which a piston of a reciprocating engine moves.

**Cylinder head cover gasket** A gasket that is used between the valve cover and the cylinder head.

**Cylinder leakage test** Fills the cylinder with compressed air, and the gauge indicates the percentage of leakage.

**Dampening** Reducing the vibration to an acceptable level.

**dB** An abbreviation for decibel, a measure of relative noise level.

**Dead-blow hammer** A type of hammer that has lead shot (small pellets) inside a steel housing, which is then covered with a plastic covering. Used to apply a blunt force to an object.

**Decking the block** A procedure where the block deck must be resurfaced in a surfacing machine that can control the amount of metal removed when it is necessary to match the size of the combustion chambers.

**Deflector valve stem seal** See *umbrella valve stem seal*.

**Detonation** A violent explosion in the combustion chamber created by uncontrolled burning of the air-fuel mixture; often causes a loud, audible knock. Also known as spark knock or ping.

**DEX-COOL** Extended life coolant.

**DI** Distillation index. A rating of the volatility of a fuel and how well it evaporates in cold temperatures.

**Diagonal pliers** Pliers designed to cut wire and to remove cotter keys. Also called side cuts or dike pliers.

**Die** A hardened steel round cutter with teeth on the inside of the center hole.

**Die grinder** A handheld air-operated tool used with a grinding stone or a wire brush.

**Diesel oxidation catalyst** Consists of a flow-through honeycomb-style substrate structure that is washcoated with a layer of catalyst materials, similar to those used in a gasoline engine catalytic converter.

**Diesohol** Standard #2 diesel fuel combined with up to 15% ethanol.

**Differential pressure sensor** Designed to remove diesel particulate matter or soot from the exhaust gas of a diesel engine.

**Digital EGR** The digital EGR valve consists of three solenoids controlled by the PCM.

**Direct injection** Fuel is injected directly into the cylinder.

**Dish** Pistons used in other engines may be provided with a depression.

**Displacement** The total volume displaced or swept by the cylinders in an internal combustion engine.

**Distillation** The process of purification through evaporation and then condensation of the desired liquid.

**Distillation curve** A graph that plots the temperatures at which the various fractions of a fuel evaporate.

**Distributor ignition (DI)** The term specified by the Society of Automotive Engineers (SAE) for an ignition system that uses a distributor.

**Double-cut file** A file that has two rows of teeth that cut at an opposite angle.

**Double-knock** The noise that is created when the piston stops at top dead center and occurs again as it starts to move downward, creating a double-knock sound, which is also described as a rattling sound.

**DPFE** This sensor measures the pressure differential between two sides of a metered orifice positioned just below the EGR valve's exhaust side.

**Drive size** The size in fractions of an inch of the square drive for sockets.

**Dry cylinder sleeve** Cast-iron dry sleeves are used in aluminum blocks to provide a hard surface for the rings.

**Dry sump** The oil pan is shallow and the oil is pumped into a remote reservoir. In this reservoir, the oil is cooled and any trapped air is allowed to escape before being pumped back to the engine.

**Dual overhead camshaft (DOHC)** An engine design with two camshafts above each line of cylinders—one for the exhaust valves and one for the intake valves.

**Ductile iron** Very flexible material that can be twisted without breaking; also used as a piston ring material in some automotive engines.

**Dump valve** Features an adjustable spring design that keeps the valve closed until a sudden release of the throttle.

**Dynamic compression test** A compression test done with the engine running rather than during engine cranking as is done in a regular compression test.

**E10** A fuel blend of 10% ethanol and 90% gasoline.

**E85** A fuel blend of 85% ethanol and 15% gasoline.

**Easy out** A tool used to extract a broken bolt.

**E-diesel** Standard #2 diesel fuel combined with up to 15% ethanol. Also known as diesohol.

**EGR** Exhaust gas recirculation. An emission control device to reduce NO<sub>x</sub> (oxides of nitrogen).

**Elastic valve** Type of poppet valve. The elastic valve is able to conform to valve seat shape. This allows it to seal easily, but it runs hot and the flexing to conform may cause it to break.

**Elastomer** Another term for rubber.

**Electromagnetic interference** Causes problems to computer signals.

**Electronic control unit** Module for the EIS.

**Electronic ignition (EI)** The term specified by the SAE for an ignition system that does not use a distributor.

**Electronic ignition module (or igniter)** Opens and closes the primary ignition circuit by opening or closing the ground return path of the circuit.

**Electronic ignition system** The system consists of a pulse generator unit in the distributor (pickup coil and reluctor).

**Electroplating** A process of putting an overplating layer onto the bearing.

**Embedability** The property that allows the bearing to fully embed the particle. The bearing material gradually works across the particle, completely covering it.

**Embittered coolant** Coolant that has been made bitter to deter animals.

**Engine stand** A floor-mounted frame usually equipped with casters on which an engine can be attached and rotated.

**EPA** Environmental Protection Agency.

**Ethanol (grain alcohol)** An octane enhancer added, at a rate of up to 10%, to gasoline will increase the octane rating of the fuel by 2.5 to 3.0. Ethanol is a fuel oxygenate.

**Ethyl alcohol** See *ethanol*.

**Ethyl tertiary butyl ether (ETBE)** An octane enhancer for gasoline. It is also a fuel oxygenate that is manufactured by reacting isobutylene with ethanol. The resulting ether is high octane and low volatility. ETBE can be added to gasoline up to a level of approximately 13%.

**Ethylene glycol-based antifreeze** Antifreeze.

**EVP** A linear potentiometer on the top of the EGR valve stem indicates valve position for the computer.

**EVRV** The computer pulses the solenoid to control the vacuum that regulates the operation of the EGR valve.

**Exhaust gas recirculation (EGR)** The process of passing a small, measured amount of exhaust gas back into the engine to reduce combustion temperatures and formation of NO<sub>x</sub> (oxides of nitrogen).

**Exhaust valve** A valve through which burned gases from a cylinder escape into the exhaust manifold.

**Exhaust valve cam phaser (EVCP)** Spline phaser system.

**Extension** A socket wrench tool used between a ratchet or breaker bar and a socket.

**External combustion engine** Engine combustion occurring outside the power chamber.

**Eye wash station** A water fountain designed to rinse the eyes with a large volume of water.

**Eyebrows** Recesses machined or cast into the tops of the pistons for valve clearance.

**Fatigue life** The length of time before fatigue will cause failure.

**Feeler gauge** A set of precision thickness steel blades used to measure a gap. Also called a thickness gauge.

**FFV** Flex-fuel vehicle. Flex-fuel vehicles are capable of running on straight gasoline or gasoline/ethanol blends.

**Fiber reinforced matrix (FRM)** A ceramic material similar to that used to construct the insulators of spark plugs. The lightweight material has excellent wear resistance and good heat transfer properties, making it ideal for use as a cylinder material.

**File** A metal smoothing tool.

**Finger follower** See *cam follower*.

**Fire blanket** A fireproof wool blanket used to cover a person who is on fire and smother the fire.

**Fire deck** The cylinder head surface that mates with the top deck of the block.

**Fire ring** See *armor*.

**Firing order** The order that the spark is distributed to the correct spark plug at the right time.

**Fischer-Tropsch** A refining process that converts coal, natural gas, or other petroleum products into synthetic motor fuels.

**Fitting wrench** A wrench that is used to remove the fitting holding a brake line or other line.

**Flare-nut wrench** A type of wrench used to remove brake lines.

**Flash point** The temperature at which the vapors on the surface of the fuel will ignite if exposed to an open flame.

**Flat-link type** See *silent chain type*.

**Flat-tip screwdriver** A screwdriver used to remove and insert screws that have a single slot.

**Flat-top piston** A type of piston found in low-cost, low-performance engines.

**Flex fuel** An automobile that can typically use different sources of fuel, either mixed in the same tank or with separate tanks and fuel systems for each fuel.

**Floor jack** A hydraulic jack mounted on casters or steel wheels and used to lift a vehicle.

**Flying web** The flange between the splayed crankpin journals.

**Fogging oil** Coats metal parts to keep them from rusting.

**Forming stone** See *roughing stone*.

**Four-stroke cycle** An internal combustion engine design where four strokes of the piston (two crankshaft revolutions) are required to complete one cycle of events. The four strokes include intake, compression, power, and exhaust.

**Freeze plugs** See *core plugs*.

**Frequency** The number of times a waveform repeats in one second, measured in hertz (Hz), frequency band.

**Fretting** A condition that can destroy intake manifold gaskets and is caused by the unequal expansion and contraction of two different engine materials.

**Frost plugs** See *core plugs*.

**FTD** Fischer-Tropsch diesel process. See *Fischer-Tropsch*.

**Fuel compensation sensor** A sensor used in flex-fuel vehicles that provides information to the PCM on the ethanol content and temperature of the fuel as it is flowing through the fuel delivery system.

**Fuel composition sensor** Measures both the percentage of ethanol blend and the temperature of the fuel.

**Full round bearing** Sleeve-type bushing.

**Full-floating** A type of axle assembly where the weight of the vehicle is supported by the axle housing and not on the axle itself.

**Fully counterweighted** A crankshaft that has counterweights on both sides of each connecting rod journal.

**Fusible link** A type of fuse that will melt and open the protected circuit in the event of a short circuit, which could cause excessive current flow through the fusible link. Most fusible links are actually wires that are four gauge sizes smaller than the wire of the circuits being protected.

**Gallery** Longitudinal header. This is a long hole drilled from the front of the block to the back. Passages drilled through the block bulkheads allow the oil to go from the main oil gallery to the main and cam bearings.

- Gasoline** Refined petroleum product that is used primarily as a fuel in gasoline engines.
- GAWR** Gross axle weight rating. A rating of the load capacity of a vehicle and included on placards on the vehicle and in the owner's manual.
- Glow plug** A heating element that uses 12 volts from the battery and aids in the starting of a cold engine.
- Grade** The strength rating of a bolt.
- Grain alcohol** See *ethanol*.
- Grinder** Type of resurfacer that uses a large-diameter abrasive wheel.
- Grit size** The size of the abrasive particles in the grinding and honing stones controls the surface finish.
- Grooves** Piston ring grooves are located between the piston head and skirt.
- GTL** Gas-to-liquid. A refining process in which natural gas is converted into liquid fuel.
- Gudgeon pins** A British term for pins used to attach the piston to the connecting rod.
- Guttering** A result from poor seating that allows the high-temperature and high-pressure combustion gases to leak between the valve and seat.
- GVWR** Gross vehicle weight rating. The total weight of the vehicle including the maximum cargo.
- Hacksaw** A saw that uses a replaceable blade and is used to cut a variety of materials depending on the type of blade used.
- Half-shell bearing** The bearing is manufactured to very close tolerance so that it will fit correctly in each application.
- Hangers** Made of rubberized fabric with metal ends that hold the muffler and tailpipe in position so that they do not touch any metal part.
- Harmonic balancer** See *vibration damper*.
- Head gasket** Gasket that is used between the cylinder head and engine block.
- Heat dams** Most pistons have horizontal separation slots that act as heat dams.
- Heat of compression** Incoming air is compressed until its temperature reaches about 1,000°F.
- Helical insert** A steel insert used to repair damaged threads.
- Helicoil®** A brand name for a helical insert.
- Helmholtz resonator** A resonance tube named for the discoverer of the relationship between shape and value of frequency, Herman L. F. von Helmholtz (1821–1894) of the University of Hönizsberg in East Prussia.
- HEPA vacuum** High-efficiency particulate air filter vacuum, used to clean brake dust.
- High energy ignition (HEI)** Uses an air-cooled, epoxy-sealed E coil.
- High-pressure common rail** Newer diesel engines use a fuel delivery system referred to as a high-pressure common rail.
- HO<sub>2</sub>S** Heated oxygen sensor.
- Hybrid organic additive technology (HOAT)** Coolants can be green, orange, yellow, gold, pink, red, or blue.
- Hydraulic Electronic Unit Injection** The components that replace the traditional mechanical injection pump include a high-pressure oil pump and reservoir, pressure regulator for the oil, and passages in the cylinder head for flow of fuel to the injectors.
- Hydraulic lash adjusters (HLA)** Some newer engines have the hydraulic adjustment in the rocker arm called HLA.
- Hydraulic lifter** A valve lifter that, using simple valving and the engine's oil pressure, can adjust its length slightly, thereby maintaining zero clearance in the valve train. Hydraulic lifters reduce valve train noise and are maintenance-free.
- Hydraulic press** A piece of shop equipment usually mounted on the floor, which uses a hydraulic cylinder to remove and install pressed-on components, such as bearings.
- Hydrocracking** A refinery process that converts hydrocarbons with high boiling points into ones with low boiling points.
- Hydrodynamic lubrication** A wedge-shaped oil film is built up between the moving block and the surface. This wedging action depends on the force applied, how fast the speed between the objects, and the thickness of the oil.
- Hydroseal** A layer of water over the chemical to prevent evaporation of the chemical.
- Hypereutectic** Pistons that are commonly used in the aftermarket and as original equipment in many turbocharged and supercharged engines.
- Identification marks** For pushrod inline engines, they are normally placed on the camshaft side.
- Idle vacuum test** An engine in proper condition should idle with a steady vacuum between 17 and 21 inches Hg.
- Ignition coil** The coil creates a high-voltage spark by electromagnetic induction.
- ILSAC** International Lubricant Standardization and Approval Committee. Responsible for development of the ILSAC standard for motor oil performance.
- Impact wrench** An air-operated hand tool used to install and remove threaded fasteners.
- Impeller** The mechanism in a water pump that rotates to produce coolant flow.
- Incandescent light** A type of light that uses an incandescent rather than a fluorescent or LED light source.

**Inches of mercury** Unit of measure used to measure a vacuum.

**Indirect injection** Fuel is injected into a small prechamber, which is connected to the cylinder by a narrow opening.

**Inert** Chemically inactive.

**Inertia forces** A product of reciprocating action of the piston.

**Infrared pyrometer** Measures the inlet and the outlet temperatures.

**Injection pump** A diesel engine injection pump is used to increase the pressure of the diesel fuel from very low values from the lift pump to the extremely high pressures needed for injection.

**Inorganic additive technology (IAT)** Conventional coolant that has been used for over 50 years. The additives used to protect against rust and corrosion include phosphate and silicates.

**Intake centerline** The point that is often located between 100 degrees and 110 degrees.

**Intake lobe centerline method** This method determines the exact centerline of the intake lobe and compares it to the specifications supplied with the replacement camshaft.

**Integral seat** The seat is generally formed as part of the cast-iron head of automotive engines.

**Intercooler** Used on many turbocharged and some supercharged engines to reduce the temperature of air entering the engine for increased power.

**Interference fit** The modern method of retaining the piston pin in the connecting rod is to make the connecting rod hole slightly smaller than the piston pin. The pin is installed by heating the rod to expand the hole or by pressing the pin into the rod.

**Internal combustion engine** Engine combustion occurring within the power chamber.

**Jack stand** See *safety stand*.

**Jam nut** A second nut used to prevent the first nut from loosening.

**JASO** The Japanese Automobile Standards Organization oil standards. The JASO tests use small Japanese engines, and their ratings require more stringent valve train wear standards than other countries' oil ratings.

**Julian date** The number of the day of the year. Also called JD.

**Keepers** See *valve locks*.

**Lands** Between the ring grooves.

**Lash** Valve clearance.

**LED** Light-emitting diode. A high-efficiency light source that uses very little electricity and produces very little heat.

**Left-hand rule** A method of determining the direction of magnetic lines of force around a conductor. The left-hand rule is used with the electron flow theory (– flowing to +).

**Lift pump** The diesel fuel is drawn from the fuel tank by a lift pump and delivers the fuel to the injection pump.

**Lifter preload** The distance between the pushrod seat inside the lifter and the snap-ring of the lifter when the lifter is resting on the base circle (or heel) of the cam and the valve is closed.

**Light-off** The catalytic converter does not work when cold and it must be heated to its light-off temperature of close to 500°F (260°C) before it starts working at 50% effectiveness.

**Linear EGR** Contains a solenoid to precisely regulate exhaust gas flow and a feedback potentiometer that signals the computer regarding the actual position of the valve.

**Load test** One of the most accurate tests to determine the condition of any battery.

**Lobe centers** Separation between the centerlines of the intake and exhaust lobes, measured in degrees.

**Lobe displacement angle (LDA)** See *lobe centers*.

**Lobe separation** See *lobe centers*.

**Lobe spread** See *lobe centers*.

**LOC** Light-off converter.

**Lock rings** Retain full-floating piston pins in automotive engines.

**Locking pliers** A hand tool that can be used to grasp an object and then be locked into position. Often called by a popular brand name Vise Grips®.

**LPG** Liquefied petroleum gas. Another term for propane.

**Lugging** Increasing the throttle opening without increasing engine speed (RPM).

**M85** Internal combustion engine fuel containing 85% methanol and 15% gasoline.

**Magnetic pulse** The pulse generator consists of a trigger wheel (reluctor) and a pickup coil.

**Major thrust surface** The side of an engine cylinder that receives the greatest thrust or force from the piston during the power stroke.

**Mechanical force** The pressure developed within the combustion chamber is applied to the head of a piston or to a turbine wheel.

**Mechanical power** The output of mechanical force.

**Mercury** A heavy metal.

**Methanol (wood alcohol)** Typically manufactured from natural gas. Methanol content, including co-solvents, in unleaded gasoline is limited by law to 5%.



**Metric bolts** Bolts manufactured and sized in the metric system of measurement.

**Microbe** A microorganism that is too small to be seen by the human eye.

**Micron** Unit of measure equal to 0.000039 inch.

**Milling** Type of resurfacer that uses metal-cutting tool bits fastened in a disk.

**Mini-converter** A small, quick heating oxidation converter.

**Miscible** Capable of mixing with other oils (brands and viscosities, for example) without causing any problems such as sludge.

**Model year (MY)** The year of a vehicle, which may be different from the calendar year when it is sold.

**Monoblock** The cylinder, water jacket, main bearing supports (saddles), and oil passages are all cast as one structure for strength and quietness.

**Morse type** See *silent chain type*.

**MSDS** Material Safety Data Sheets.

**MTBE** Methyl tertiary butyl ether. MTBE is an oxygenated fuel that is used as a gasoline additive to enhance its burning characteristics. It is being phased out due to groundwater contamination concerns.

**MTG** Methanol-to-gasoline. A refining process in which methanol is converted into liquid gasoline.

**MTHF** Methyltetrahydrofuron. A component of P-series nonpetroleum-based fuels.

**Multigroove adjustable pliers** A hand tool that is capable of grasping a wide range of object sizes; also called water pump pliers or by a popular brand name of Channel Locks®.

**Multilayered steel (MLS)** The many layers of thin steel reduce bore and overhead camshaft distortion with less clamping force loss than previous designs.

**Mutual induction** Generation of an electric current in both coil windings.

**Naturally aspirated** Refers to an internal combustion engine that is neither turbocharged nor supercharged.

**Necking** Weakens the stem and leads to breakage.

**Needle-nose pliers** A hand tool that is equipped with pointed jaws, which allow use in restricted areas or for small parts.

**Negative Backpressure** Some EGR valves react to this low pressure area by closing a small internal valve, which allows the EGR valve to be opened by vacuum.

**NGV** Natural gas vehicle.

**Nitriding** The crankshaft is heated to about 1,000°F (540°C) in a furnace filled with ammonia gas, and then allowed to cool. The process adds nitrogen (from the ammonia)

into the surface of the metal—forming hard nitrides in the surface of the crankshaft to a depth of about 0.007 inch (0.8 mm).

**Nonprincipal end** The end of the engine that is opposite the principal end and is generally referred to as the front of the engine, where the accessory belts are used.

**Normal operating temperature** When the cooling fan has cycled on and off at least once after the engine has been started. Some vehicle manufacturers specify that the cooling fan should cycle twice.

**Notch** An indentation on the piston head indicating the “front.”

**NO<sub>x</sub>** Oxides of nitrogen; when combined with HC and sunlight, form smog.

**Nut splitter** A hand tool designed to break a nut that is rusted onto a bolt or stud.

**Octane rating** The measurement of a gasoline’s ability to resist engine knock. The higher the octane rating, the less prone the gasoline is to cause engine knock (detonation).

**Offset aviation snip** A tin snip that has curved jaws allowing it to make curved cuts either left or right.

**Oil control ring** Allows oil to return through the ring and openings in the piston.

**Oil control valve (OCV)** Directs oil from the oil feed in the head to the appropriate camshaft position actuator oil passages.

**Oil galleries** An oil pump, which is driven by the engine, forces the oil through the oil filter and then into passages in the crankshaft and block.

**Opacity** The degree to which light is blocked.

**Open-circuit battery voltage test** A test that is conducted with an open circuit—with no current flowing and no load applied to the battery.

**Open end** The end of a wrench that is open to allow the wrench to be inserted onto a fastener from the side.

**Organic** A term used to describe anything that was alive at one time.

**Organic additive technology (OAT)** Antifreeze coolant that contains ethylene glycol, but does not contain silicates or phosphates. This type of coolant is usually orange in color and was first developed by Havoline (called DEX-COOL) and used in General Motors vehicles starting in 1996.

**OSC** Oxygen storage capacity.

**OSHA** Occupational Safety and Health Administration. OSHA is the main federal agency responsible for enforcement of workplace safety and health legislation.

**Overhead camshaft (OHC)** Either belt or chain driven from the crankshaft and located in the cylinder head(s).

**Overhead valve (OHV)** A type of piston engine that places the camshaft in the cylinder block (usually beside and slightly above the crankshaft in a straight engine or directly above the crankshaft in the V of a V engine) and uses pushrods or rods to actuate rocker arms above the cylinder head to actuate the valves.

**Overlay** Many of the copper-lead bearings have a third layer of metal. This third layer is usually of babbitt. Babbitt-overlaid bearings have high fatigue strength, good conformity, good embedability, and good corrosion resistance.

**Oxygenated fuels** Fuels such as ETBE or MTBE that contain extra oxygen molecules to promote cleaner burning. Oxygenated fuels are used as gasoline additives to reduce CO emissions.

**Pal nut** See *jam nut*.

**Palladium** An element that acts as a catalyst.

**Pancake** A pancake engine is an internal combustion engine that has the cylinders on a horizontal plane.

**Paper test** Hold a piece of paper or a “3 × 5” card (even a dollar bill works) within 1 inch (2.5 centimeters) of the tailpipe with the engine running at idle. The paper should blow out evenly without “puffing.” If the paper is drawn toward the tailpipe at times, the exhaust valves in one or more cylinders could be burned.

**Parallel flow system** Coolant flows into the block under pressure and then crosses the gasket to the head through main coolant passages beside each cylinder.

**PASS** A word used to help remember how to use a fire extinguisher: pull pin, aim, squeeze the lever, and sweep the nozzle from side to side.

**PCV** Positive crankcase ventilation.

**Penetrating oil** A thin oil that is designed to penetrate through rust and provide lubrication for the threads of a fastener.

**Petrodiesel** Another term for petroleum diesel, which is ordinary diesel fuel refined from crude oil.

**Petroleum** Another term for crude oil. The literal meaning of petroleum is “rock oil.”

**PFE** Pressure feedback EGR.

**pH** A measure of the acidity or alkalinity of a material. A pH of 7 is neutral, higher than 7 is alkaline, and lower than 7 is acidic.

**Piloting surfaces** Closely fit reamed holes on the connecting rod bolts.

**Ping** Secondary rapid burning of the last 3% to 5% of the air–fuel mixture in the combustion chamber causes a second flame front that collides with the first flame front causing a knock noise. Also called detonation or spark knock.

**Piston** Forms a movable bottom to the combustion chamber.

**Piston pin** Attaches the piston to the connecting rod.

**Piston ring** Seals the small space between the piston and cylinder wall, keeping the pressure above the piston.

**Piston ring compressor** Holds the rings in their grooves.

**Piston ring expanding tool** Piston ring removal tool.

**Piston stroke** A one-way piston movement between the top and bottom of the cylinder.

**Pitch** The pitch of a threaded fastener refers to the number of threads per inch.

**Plateau honing** Honing leaves a plateau surface that can support the oil film for the rings and piston skirt. This plateau surface is achieved by first using a coarse stone followed by a smooth stone to achieve the desired surface.

**Platinum** An element that acts as a catalyst.

**Plenum** A chamber, located between the throttle body and the runners of the intake manifold, used to distribute the intake charge more evenly and efficiently.

**Polarity** The polarity of an ignition coil is determined by the direction of rotation of the coil windings.

**Pop rivet** A type of fastener that uses a rivet gun to pull out the rivet until the end deforms, thereby creating a light clamping form.

**Pop tester** A device used for checking a diesel injector nozzle for proper spray pattern.

**Poppet valve** The valve is opened by means of a valve train that is operated by a cam.

**Pop-ups** Raised domes.

**Portable crane** A piece of shop equipment that is used to lift and move heavy pieces of equipment, such as an engine.

**Positive backpressure** At low engine speeds and light engine loads, the EGR system is not needed, and the backpressure in it is also low.

**Positive twist** Gives the same wall contact as the tapered ring.

**Pour point depressants** Coat the wax crystals in the oil so that they will not stick together. The oil will then be able to flow at lower temperatures.

**Power balance test** A test to determine if all cylinders are contributing power equally.

**PPE** Personal protective equipment, which can include gloves, safety glasses, and other items.

**PPO** Pure plant oil.

**Precision insert-type bearing shells** See *half-shell bearing*.

**Preconverter** See *mini-converter*.

**Pressure regulator** A regulating device that maintains a specified pressure in a system.

**Prevailing torque nut** A special design of nut fastener that is deformed slightly or has other properties that permit the nut to remain attached to the fastener without loosening.

**Primary ignition circuit** The ignition components that regulate the current in the coil primary winding by turning it on and off.

**Primary vibration** A strong low-frequency vibration when pistons move up and down in the cylinders.

**Principal end** The end of the engine that the flywheel is attached to.

**Propane** See *LPG*.

**Pump-up** Occasionally, engines are run at excessive speeds. This tends to throw the valve open, causing valve float. During valve float, clearance exists in the valve train. The hydraulic lifter will take up this clearance as it is designed to do. When this occurs, it will keep the valve from closing on the seat, called pump-up.

**Punch** A hand tool designed to be used with a hammer to drive out pins.

**Pushrod** The link rod connecting the brake pedal to the master cylinder piston.

**Putty knife** A scraper with a broad blade that helps to avoid scratching the surface as it is used to clean the parts.

**Pyrolytic** High-temperature oven.

**Quench area** See *squish area*.

**Ramp** A gradual rise in the cam contour.

**Ratchet** A handle used to rotate a socket, which is reversible and allows the socket to be rotated in one direction and then free movement in the opposite direction of rotation.

**RCRA** Resource Conservation and Recovery Act.

**Recesses** Cut in the piston top for valve clearance.

**Regeneration** A process of taking the kinetic energy of a moving vehicle and converting it to electrical energy and storing it in a battery.

**Reid vapor pressure (RVP)** A method of determining vapor pressure of gasoline and other petroleum products. Widely used in the petroleum industry as an indicator of the volatility of gasoline.

**Relief valve** Vents pressurized air from the connecting pipe between the outlet of the turbocharger and the throttle whenever the throttle is closed during boost, such as during shifts.

**Removers** Hand tools that are designed to remove broken studs, bolts, and other fasteners.

**Reserve capacity** The number of minutes for which the battery can produce 25 amperes and still have a

battery voltage of 1.75 volts per cell (10.5 volts for a 12-volt battery).

**Resonate** Audible vibrations.

**Restricted exhaust** If the exhaust system is restricted, the engine will be low on power, yet smooth.

**Reverse cooling** The coolant flows from the radiator to the cylinder head(s) before flowing to the engine block.

**Reverse twist** Seals the lower outer section of the ring and piston ring groove, thus improving oil control.

**RFG** Reformulated gasoline.

**Rhodium** An element that acts as a catalyst.

**Right-to-know laws** Laws that state that employees have a right to know when the materials they use at work are hazardous.

**Rigid valve** Type of poppet valve. The rigid valve is strong, holds its shape, and conducts heat readily. It also causes less valve recession. Unfortunately, it is more likely to leak and burn than other valve head types.

**Ring gap** Allows some leakage past the top compression ring. This leakage is useful in providing pressure on the second ring to develop a dynamic sealing force.

**Rocking couple** 90-degree V-6 engines use a split-crank journal to create an even-firing arrangement. As a result, these forces cause the engine to rock back and forth.

**Roots-type supercharger** Called a positive displacement design because all of the air that enters is forced through the unit.

**Rotary engine** An internal-combustion engine in which power is transmitted directly to rotating components.

**Roughing stone** Used to rapidly remove large amounts of seat metal. This would be necessary on a badly pitted seat or when installing new valve seat inserts.

**RTV** Room-temperature vulcanization.

**Running compression test** The running compression test can inform a technician of the relative compression of all the cylinders.

**Saddles** Bores.

**Safety stand** A metal device with an adjustable vertical support that is designed to support a vehicle after it has been raised off the ground. Also called a jack stand.

**Saturation** The point at which a coil's maximum magnetic field strength is reached.

**Score resistance** Prevents the bearing materials from seizing to the shaft during oil film breakdown.

**Scraper ring** Usually recommended for use at the second compression ring.

**Screwdriver** A hand tool designed to remove or insert screws.

**Scroll** A smoothly curved passage that changes the fluid flow direction with minimum loss in velocity.

**Scuff** The valve stem temporarily welds to the guide when the valve is closed. The weld breaks as the valve is forced to open.

**Seal driver** A hand tool used with a mallet or hammer to seat seals into a seal groove.

**Seal puller** A hand tool designed to remove seals.

**Sealed lead–acid battery (SLA)** Converts the released hydrogen and oxygen back into water instead of escaping as gasses.

**Seat duration** The number of degrees of crankshaft rotation that the valve is off the seat.

**Secondary ignition circuit** The components necessary to create and distribute the high voltage produced in the secondary windings of the coil.

**Secondary vibration** A weak high-frequency vibration caused by a slight difference in the inertia of the pistons at top dead center compared to bottom dead center.

**Self-induction** When current starts to flow into a coil, an opposing current is created in the windings of the coil.

**Self-tapping screw** A screw that has a tapered tip which allows the screw to form threads in the metal.

**Series flow system** Coolant flows around all the cylinders on each bank. All the coolant flows to the rear of the block, where large main coolant passages allow the coolant to flow across the gasket.

**Series-parallel flow system** Some engines use a combination of the series and parallel flow systems.

**Service information** Includes service manuals, owner's manuals, CD-ROM discs, Internet sites, or other sources where vehicle information is found.

**Siamese ports** Two cylinders share the same port because of the restricted space available.

**Side clearance** Space in the ring groove above the ring.

**Silent chain type** Camshaft chain drive that operates quietly but tends to stretch with use.

**Silicone coupling** A fan drive mounted between the drive pulley and the fan.

**Single-cut file** A file that has just one row of cutting teeth.

**Single overhead camshaft** A design in which one camshaft is placed within the cylinder head.

**Skirt** See *slipper skirt*.

**Sleeve bearing** Engine bearing.

**Sleeving** Cylinder blocks with deep gouges can be saved by boring the cylinder to a dimension that is greatly oversize to almost match the outside diameter of the cylinder sleeve. The

sleeve is pressed into the rebored block, then the center of the sleeve is bored to the diameter required by the piston.

**Slip-joint pliers** A hand tool that has two positions allowing the use of two different ranges of sizes.

**Slipper skirt** The cast-aluminum piston skirt has been reduced to a minimum by using an open-type slipper skirt.

**Slots** Act as heat dams.

**Small-hole gauge** A handheld measuring tool that is adjustable to fit inside small holes. A micrometer is then used to measure the gauge to determine the inside diameter of the hole. Also called a split-ball gauge.

**Smog pump** Pulls fresh air in through an external filter and pumps the air under slight pressure to each exhaust port through connecting hoses or a manifold.

**Snap ring** A spring steel clip that is used to retain an object in a bore by being inserted into a groove.

**Snap-ring pliers** A hand tool that is designed to install or remove snap rings.

**Socket** A tool that fits over the head of a bolt or nut and is rotated by a ratchet or breaker bar.

**Socket adapter** An adapter that allows the use of one size of driver (ratchet or breaker bar) to rotate another drive size of socket.

**Solid valve lifter** Assists in making sure that valve train clearance is not excessive.

**Soluble** Dissolved with a chemical or solvent.

**Solvent** Usually colorless liquids that are used to remove grease and oil.

**Spark knock** Secondary rapid burning of the last 3% to 5% of the air–fuel mixture in the combustion chamber. Causes a second flame front that collides with the first flame front causing a knock noise. Also called detonation or ping.

**Spark tester** Checks spark plugs.

**Specific gravity** Specific gravity is the ratio of the weight of a given volume of a liquid to the weight of an equal volume of water.

**Spindle** The part of a micrometer that moves and contacts the object being measured.

**Spiral bronze alloy bushing** Guide insert for guide repair.

**Spit hole** Bleeds some of the oil from the connecting rod journal.

**Splay angle** Angle between the crankpins on the crankshaft throws.

**Split-ball gauge** See *small-hole gauge*.

**Split-type (half-shell) bearing** See *full round bearing*.

**Spontaneous combustion** A condition that can cause some materials, such as oily rags, to catch fire without a source of ignition.

**Spread** Holds the bearing shell in the housing while the engine is being assembled.

**Spun bearing** Bearing shells that do not have enough crush may rotate with the shaft.

**Squish area** An area of the combustion chamber where the piston nearly contacts the cylinder.

**Steam slits** See *bleed hole*.

**Stellite** An alloy of nickel, chromium, and tungsten that is nonmagnetic.

**Stoichiometric** An air–fuel ratio of exactly 14.7:1. At this specific rate, all the gasoline is fully oxidized by all the available oxygen.

**Stone wheel** A grinding stone attached to a grinder used for cleaning, sharpening, or other similar operations.

**Stop drilling** A hole drilled at each end of a crack to keep it from extending further.

**Straight cut aviation snip** A tin snip that is designed with curved jaws that allow a straight cut through sheet metal.

**Straightedge** A precision ground metal measuring gauge that is used to check the flatness of engine components when used with a feeler gauge.

**Strip feeler gauge** Used to measure the piston-to-cylinder clearance.

**Stroke** The distance the piston travels down in the cylinder.

**Struts** A structural part of a suspension that includes the shock absorber.

**Stud** A short rod with threads on both ends.

**Stud removal tool** A hand tool used with a breaker bar or ratchet to remove what is left of a broken stud.

**Stud remover** A stud removal tool grips the part of the stud above the surface and uses a cam or wedge to grip the stud as it is being rotated by a ratchet or breaker bar.

**Supercharger** A gas compressor that forces more air into the combustion chamber of an internal combustion engine.

**Surface finish** Measured in microinches; the smaller the number, the smoother the surface. Where the surface finish of a machined block deck or cylinder head may range from 60 to 100 RA (roughness average), the typical specification for main and rod crankshaft journals is between 10 and 20 RA.

**Surface-to-volume ratio** An important design consideration for combustion chambers.

**Surge tank** A reservoir mounted at the highest point in the cooling system.

**SVO** Straight vegetable oil.

**Switchgrass** A feedstock for ethanol production that requires very little energy or fertilizer to cultivate.

**Symmetrical** The amount of lift of a camshaft is often different for the intake and exhaust valves. If the specifications are the same, the camshaft is called symmetrical.

**Syn-gas** Synthesis gas generated by a reaction between coal and steam. Syn-gas is made up of mostly hydrogen and carbon monoxide and is used to make methanol. Syn-gas is also known as town gas.

**Synthetic fuel** Fuels generated through synthetic processes such as Fischer-Tropsch.

**TAME** Tertiary-amyl methyl ether. TAME is an oxygenating fuel and is used as a gasoline additive similar to ETBE or MTBE.

**Tap** A metal cutting tool used to create threads in metal after a hole of the proper size has been drilled.

**Tap test** Involves tapping (not pounding) on the catalytic converter using a rubber mallet.

**Taper face ring** Contacts the cylinder wall at the lower edge of the piston ring.

**Tapered pilots** Locate themselves in the least-worn section of the guide.

**TDC** Top dead center.

**Technical service bulletin** When a problem has a correction, the vehicle manufacturer releases a technical service bulletin (TSB), which details the repair. Also called technical service bulletin information (TSBI).

**TEL** An additive that was added to gasoline in the early 1920s to reduce the tendency to knock.

**Tensile strength** The maximum stress used under tension (lengthwise force) without causing failure.

**Thermactor pump** See *smog pump*.

**Thermal shock** A sudden change in temperature. The shock will often cause radial cracks in the valve.

**Thermostatic spring** Operates a valve that allows the fan to freewheel when the radiator is cold. As the radiator warms to about 150°F (65°C), the air hitting the thermostatic spring will cause the spring to change its shape.

**Thick-film integration** This system uses a smaller control module attached to the distributor and uses an air-cooled epoxy E coil.

**Thickness gauge** See *feeler gauge*.

**Thimble** The part of a micrometer that is rotated to move the spindle.

**Thin-walled bronze alloy sleeve bushing** Guide insert for guide repair.

**Threaded insert** A type of thread repair where the original threads are replaced by an insert that contains the same size threads as the original on the inside of the insert.

**Throating** Removes metal from the port side of the seat, raising the lower edge of the seat.

**Throating angle** The second angle uses a 60-degree stone or cutter to remove material right below the valve seat to increase flow in or out of the combustion chamber.

**Thrust bearing** Supports thrust loads and maintains the front-to-rear position of the crankshaft in the block.

**Thrust plate** Controls the shaft end thrust.

**Tier** A level of environmental regulation created by the EPA. Tier 1 is gradually being phased out in favor of stricter Tier 2 regulations.

**Tin snips** A hand tool used to cut sheet metal, thin cardboard, or similar material.

**Topping angle** The third angle uses a 30-degree stone or cutter and is used to smooth the transition between the valve seat and the cylinder head, again to increase flow in or out of the combustion chamber.

**Torque angle** A tightening procedure that has a more constant clamping load from bolt to bolt.

**Torque-to-yield** See *torque angle*.

**Torque wrench** A wrench that registers the amount of applied torque.

**Total indicator runout (TIR)** When measuring and re-grinding camshafts the TIR should be less than 0.002 inch.

**Transistor** Electronic switch.

**Trouble light** A light used for close viewing of dark areas. Also called a work light.

**Tube-nut wrench** See *fitting wrench*.

**Tuftriding** A trade name that General Motors Corporation uses for the process of heating the crankshaft in a molten cyanide salt bath.

**Turbo lag** The delay between acceleration and turbo boost.

**Turbocharger** An exhaust-powered supercharger.

**TWC** Three-way catalytic converter, all three exhaust emissions (NO<sub>x</sub>, HC, and CO) are converted to carbon dioxide (CO<sub>2</sub>) and water (H<sub>2</sub>O).

**UCG** Underground coal gasification.

**UCO** Used cooking oil.

**ULSD** Ultra-low-sulfur diesel. Diesel fuel with a maximum sulfur content of 15 parts per million.

**Ultrasonic cleaning** Parts are placed in a tank of cleaning solution which is then vibrated at ultrasonic speeds to loosen all the soil from the parts.

**Umbrella valve stem seal** Holds tightly on the valve stem and moves up and down with the valve. Any oil that spills off the rocker arms is deflected out over the valve guide, much as water is deflected over an umbrella.

**UNC** Unified national coarse.

**UNF** Unified national fine.

**Universal joint** A joint in a steering or drive shaft that allows torque to be transmitted at an angle.

**Used oil** Any petroleum-based or synthetic oil that has been used.

**UST** Underground storage tank.

**Utility knife** A handheld knife that uses replaceable blades.

**Vacuum test** A test that includes testing the engine for cranking vacuum, idle vacuum, and vacuum at 2500 RPM.

**Valve duration** The number of degrees by which the crankshaft rotates when the valve is off the valve seat.

**Valve float** Occurs when clearance exists in the valve train.

**Valve guide** Supports the valve stem so that the valve face will remain perfectly centered.

**Valve guide knurling** A tool is rotated as it is driven into the guide. The tool displaces the metal to reduce the hole diameter of the guide.

**Valve keepers** Secure the spring retainer to the stem of the valve.

**Valve lash** Valve train clearance.

**Valve locks** A lock for engine valves.

**Valve pockets** See *eyebrows*.

**Valve relief** See *eyebrows*.

**Valve shrouding** The valve is kept close to the walls of the combustion chamber to help increase mixture turbulence.

**Valve spring** Holds the valve against the seat.

**Valve spring surge** The tendency of a valve spring to vibrate.

**Vapor lock** Vaporized fuel, usually in the fuel line, that prevents or retards the necessary fuel delivery to the cylinders.

**Variable fuel sensor** See *fuel compensation sensor*.

**Variable valve timing (VVT)** Uses electronically controlled, hydraulic gear-driven cam phaser that can alter the relationship of the camshaft from 15 degrees retard to 25 degrees advance (40 degrees overall) relative to the crankshaft.

**VECI** Vehicle emissions control information. This sticker is located under the hood on all vehicles and includes emission-related information that is important to the service technician.

**Vehicle identification number (VIN)** Alphanumeric number identifying vehicle type, assembly plant, powertrain, and so on.

**Vent valve** See *dump valve*.

**V-FFV** Virtual flexible-fuel vehicle. This fuel system design does not use a fuel compensation sensor and instead uses the vehicle's oxygen sensor to adjust for different fuel compositions.

- Vibration damper** A device connected to the crankshaft of an engine to reduce torsional vibration.
- Viscosity** Thickness of oil as its resistance to flow.
- Viscosity index** An index of the change in viscosity between the cold and hot extremes.
- Vise Grips®** A brand name for locking pliers.
- Volatility** A measurement of the tendency of a liquid to change to vapor. Volatility is measured using RVP, or Reid vapor pressure.
- Volumetric efficiency** The ratio between the amount of air–fuel mixture that actually enters the cylinder and the amount that could enter under ideal conditions expressed in percent.
- VTEC** Variable valve timing and lift electronic control. A valve train control system developed by Honda Motor Company to enhance engine output and efficiency over a wide RPM range.
- Wankel engine** See *rotary engine*.
- Washcoat** A porous aluminum material.
- Washers** Flat or shaped pieces of round metal with a hole in the center used between a nut and a part or casting.
- Wastegate** A bypass valve at the exhaust inlet to the turbine.
- Water pump pliers** See *multigroove adjustable pliers*.
- Water-fuel separator** Water is heavier than diesel fuel and sinks to the bottom of the separator.
- Welsh plugs** Core holes left in the external block wall are machined and sealed with this type of plug.
- Wet compression test** When oil is used to help seal around the piston rings.
- Wet cylinder sleeve** Coolant flows around this type of cylinder sleeve.
- Wet holes** Head bolts that extend through the top deck of the block and end in a coolant passage.
- Wet sump** A system where oil is held in the oil pan and the oil pump drains the oil from the bottom.
- WHMIS** Workplace Hazardous Materials Information Systems.
- Windage tray** Tray that is sometimes installed in engines to eliminate the oil churning problem.
- Wood alcohol** See *methanol*.
- Work hardened** Flexing starts fatigue, which shows up as fine cracks in the bearing surface.
- Work light** See *trouble light*.
- Wrench** Any of various hand or power tools, often having fixed or adjustable jaws, used for gripping, turning, or twisting objects such as nuts, bolts, or pipes.
- Wrist pin** See *piston pin*.
- WVO** Waste vegetable oil.
- WWFC** World Wide Fuel Charter. A fuel quality standard developed by vehicle and engine manufacturers in 2002.
- ZDDP** Commonly referred to as zinc dialkyl dithiophosphate. The use of ZDDP was intended to reduce sliding friction in an engine.
- Zinc dithiophosphate (ZDP)** Antiwear additive.
- Zygro** A method where cracks show up as bright lines when viewed with a black light.

