

THE NEW ZEALAND CAR CONSTRUCTION MANUAL

TERMS & DEFINITIONS

1st Amendment
NOVEMBER
2010

Tony Johnson
Low Volume Vehicle Technical Association (Inc.)

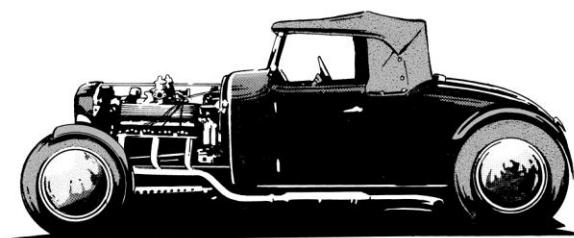
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Author: Tony Johnson

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The New Zealand Car Construction Manual was written by Tony Johnson of Auckland New Zealand, for the NZHRA, who originally commissioned the development of the Manual in 2002. Tony has continued to take responsibility for the on-going amendments to the Manual for NZHRA, and for LVVTA since LVVTA took ownership of the Manual in October 2010.

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NZHRA, and its key personnel, have, and continue to since the inception of LVV certification, form the back-bone of the LVV certification system in New Zealand. LVVTA is very appreciative of NZHRA's on-going commitment and integrity.



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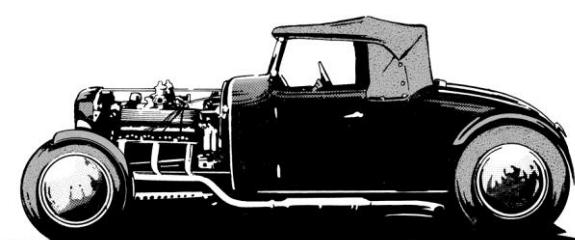
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Terms and Definitions

<u>A-arm</u>	means the top and bottom control arms in an independent suspension system, also known as wishbone arms.
<u>Ackerman-angle</u>	means a steering geometry principle that ensures that the inside front wheel prescribes a tighter radius than the outside front wheel in any turning situation, in order to prevent scrubbing of the tyres.
<u>Aftermarket</u>	means a manufacturer or supplier, other than a high volume motor vehicle manufacturer, who produces components or systems on a production-run basis for the mass-market.
<u>Annealed</u>	means a process used to render steel less brittle than in its original as-manufactured state, by allowing the material to cool very gradually from a high heat.
<u>A-Pillar</u>	means the forward-most pillars that support the windscreen and the front of the roof, and from which the front doors are usually hinged.
<u>Aramid-ply</u>	is the generic name for what we know as 'Kevlar'.
<u>A-zone</u>	<p>means the area within a passenger compartment that is inside an arc swung in a forward direction from the h-point using either an LVVTA body frame, or an LVVTA H-point template with the seat in its mid-point position if adjustable, from the seatback in a normal driving position to the seat base, of</p> <ul style="list-style-type: none"> ▪ where web-clamp retractor lap and diagonal or four-point harness seatbelts are fitted, a 700 mm (28") radius; or ▪ where seatbelts of types other than stated above are fitted, a 900 mm (37") radius; and ▪ 160 mm (6 ½") on either side of the longitudinal centerline of each seating position.
<u>Baffling</u>	means, in the context of this manual, a barrier to prevent splashing and surging of fuel in a fuel tank, during braking, accelerating, and cornering.
<u>Ball flare</u>	means a type of brake pipe end-flare that has a circular shape, rather than the more commonly used 'double-flare', that is shaped like an inverted cone.
<u>Beaming</u>	means, in relation to a chassis or floor-pan, bending loads of a type that could result in sagging on the horizontal plane throughout the length of the chassis or the floor-pan.

<u>Bevel box</u>	means a type of steering box that is used to effect a dramatic change in direction, such as those used in forward-control vehicles like vans and trucks, also known as a right-angle drive box.
<u>Big-block</u>	is a term used for a family of V8 engines, as produced by most major North American motor vehicle manufacturers (in particular Ford, General Motors, and Chrysler) which in comparison to 'small-block' engines, are very large in external dimensions, and heavy.
<u>Blue-dot</u>	means a small accessory cosmetic lens incorporated as part of a stop-lamp lens, that causes a purple-coloured hue to be emitted when the stop lamp is illuminated.
<u>Boss</u>	means a section of steel material designed to absorb a high level of load, used to reinforce the area of the component in which it is incorporated.
<u>Boxed</u>	means to add a capping plate to convert a c-section or channel-section chassis rail or cross-member to a fully enclosed section like an RHS.
<u>B-Pillar</u>	means the center body pillar, used in most vehicles to connect the sill to the roof, and to latch the front doors, and in the case of most four-door vehicles, also to hinge the rear doors. A B-pillar is also known simply as the 'post', or the 'B-post'. On a true 'sports coupe' body style, these pillars terminate at the bottom of the window line, leaving an uninterrupted glass area along the sides of the vehicle.
<u>Brake-fade</u>	means the reduction of braking performance resulting from overheating of friction surfaces, due to prolonged or excessive use.
<u>Brinelling</u>	means the premature wear of a drive-shaft universal bearing due to a lack of rotary movement.
<u>Build approval</u>	means the process specified in 'Chapter 4 – Build Approval Process'.
<u>Bump-steer</u>	means the change in steering geometry of the steered wheels that can occur if one or more steering geometry principles are not correctly designed into the vehicle's steering system, as the steered suspension of the vehicle moves throughout its range of extension and compression.
<u>Bump-stop</u>	means a compression spring, usually of rubber, that prevents contact, or reduces the severity of contact, between the vehicle structure and a suspension component, when the vehicle's suspension system encounters a bump that causes the suspension to fully compress.
<u>B-Zone</u>	means the remaining area within a passenger compartment surrounding the A-Zone, but does not include the C-Zone.

<u>Camber</u>	means the angle between the plane of a wheel and the vertical axis of a vehicle, when viewed in end elevation.
<u>Cant rail</u>	means the interior roof structure sections in a vehicle with a fixed roof, which span the length of a vehicle directly above the side windows.
<u>Capped</u>	means to add a capping plate to convert a c-section or channel-section chassis rail or cross-member to a fully enclosed section like a RHS.
<u>Cardan-shaft</u>	means a parking-brake system that uses the drive-shaft for braking, rather than the wheels.
<u>Caster</u>	means the angle between the steering axis and the vertical axis of a vehicle, when viewed in side elevation.
<u>Centre-lock</u>	means a type of wheel attachment system, that relies on a single central method of location, such as a splined hub, rather than conventional multiple wheel nuts or bolts.
<u>Chamfered</u>	means the application of a radius, to give a smooth rounded shape to an edge or a corner.
<u>Chassis</u>	means the supporting frame or platform of a motor vehicle to which the major mechanical components and body attach.
<u>Chassis inspection</u>	means an inspection made by an LVV Certifier, of a vehicle at an early stage of its construction, ideally when the chassis is tacked together but not fully welded.
<u>Chrome-moly</u>	means a special high grade of steel that has been alloyed with small amounts of Chromium and Molybdenum, often used in top-level race car chassis and components.
<u>Circlip</u>	means a type of fastener consisting of a sprung ring with open ends which can be snapped into place within a machined groove on a cylinder or other part to allow rotation, but to prevent lateral movement. Circlips, otherwise known as 'snap-rings', are often used to secure pinned connections, and can be used internally or externally.
<u>Clevis joint</u>	means a yoke, with a hole formed or attached at one end of a rod.
<u>C-notch</u>	means a chassis modification where a 'C' is notched out of the rear chassis rails to increase axle housing clearance during suspension compression, usually carried out in conjunction with significant suspension lowering.
<u>Cornering lamp</u>	means a lamp designed to emit light at the front of a vehicle to supplement a vehicle's headlamps, by illuminating the road ahead in the direction of the turn.

<u>Cotter pin</u>	means a bolt, wedge, key, or pin, inserted through a slot, in order to hold two or more components together.
<u>C-Pillar</u>	means the rear-most pillars on a sedan body-style of vehicle, that support the rear window and the rear of the roof, and to which the rear doors usually latch.
<u>Crush-tube</u>	means a section of non-compressible material that is positioned within a cavity, through which a fastener passes, to prevent collapsing of the material surrounding the cavity, and consequential loosening of the fastener.
<u>Custom</u>	means a service provided, or a component or system manufactured, by an individual or a company who is not a high-volume motor vehicle manufacturer.
<u>C-Zone</u>	<p>means the area within a passenger compartment that is:</p> <ul style="list-style-type: none"> ▪ below the horizontal plane measured at the lowest point of the front seat cushion; and ▪ behind, and following a plane extending upward, parallel to the back of the backrest on the rearmost seat; and ▪ provided that no front centre seating position exists, the width of the dashboard and centre console surface area, which may not exceed 140 mm (5 $\frac{3}{4}$ ") on either side of the longitudinal centerline of the vehicle; and ▪ the area forward of the steering wheel or control, defined as a forward horizontal projection of an area 400 mm (16") across, circumscribing the upper-most end of the steering column, provided that no fittings, controls, or surfaces are positioned closer than 100 mm (4") from the dashboard surface to the steering wheel; and ▪ any part of the dashboard and instrument panel between the edge of the area specified and the nearest inner pillar or sidewall area; and ▪ any window glass or window glass framing; and ▪ roof bows and related components within a hood frame of a convertible vehicle; and ▪ any area which is unable to be contacted by a 165 mm (6 $\frac{3}{4}$ ") diameter head-sphere; and ▪ any other areas which could not reasonably be expected to be contacted by an occupant in the event of a front, rear, or side impact, or roll over.
<u>Daytime-running lamp</u>	means a lamp designed to emit a low-intensity light forward of a vehicle, to make it more easily seen in the daytime.

<u>Dead perch</u>	means a fixed spring mount, rather than a shackle mount, used on the passenger side of a transverse leaf spring used to suspend a beam axle at the front of a vehicle, designed to prevent lateral movement of the axle.
<u>Doubler plates</u>	means a pair of plates that clamp together on either side of a part of a vehicle structure, commonly used as a seat anchorage or a seatbelt anchorage system.
<u>Double shear</u>	means an attachment method that supports a component on both sides, rather than the cantilever effect applied by a single-shear attachment system.
<u>Drag-link</u>	means the link in a steering system that connects the steering box pitman arm or drop arm to the stub axle steering arm.
<u>Dropping</u>	means the traditional hot rodding method of 'stretching' an old I-beam axle, to lower a vehicle's ride height.
<u>Eccentric</u>	means, in the context of this manual, a bush that incorporates an attachment hole that is offset from the central axis of the bush.
<u>Elastomeric</u>	means a type of material made with such properties so as to be able to return to its natural shape, when a deforming force is removed.
<u>Electrolysis</u>	means a chemical reaction that occurs to metals during an electroplating process.
<u>Engine hood</u>	means a hinged body panel that gives access to the engine compartment of a vehicle, also known as a bonnet.
<u>ERW</u>	is an abbreviation for electric resistance welded, which is a common type of steel tubing material.
<u>Fabric damper</u>	means a device incorporated as part of a steering system on some vehicles, positioned between the steering box and the steering column, designed to isolate road shocks from being transferred to the steering wheel.
<u>Fascia</u>	means a panel or molding immediately below the windscreen on a vehicle's interior, usually facilitating the mounting of instruments, air vents and accessories.
<u>Fiddle-brakes</u>	means a mechanical device that allows the individual operation of left side and right side brakes, used to achieve very tight cornering in off-road vehicle competition activities.

<u>Final inspection</u>	means the last inspection that takes place when a vehicle undergoing LVV certification is able to be driven, after which, rectifications aside, the vehicle is able to be issued with an LVV certification plate, and go through the entry compliance and registration process.
<u>Fish-plate</u>	means a plate that is positioned on one side of the chassis rail to reinforce the point at which two or more chassis sections join. A fish-plate can be positioned on either the outside or the inside of the chassis rail.
<u>Frost plug</u>	means a plug that is pressed into an engine block or cylinder head to contain the coolant in the engine's water jackets.
<u>Funny car</u>	means a type of drag racing vehicle, based on a one-piece replica fibre-glass or carbon fiber automotive body, mounted over a purpose-built front-engined chassis.
<u>'G'</u>	is an abbreviation for G-force, which is a unit of force equal to the force exerted by gravity, used to indicate the force to which a body is subjected, when accelerated or decelerated.
<u>Gross vehicle mass</u>	means the maximum legal weight at which a vehicle can be operated, including the vehicle's tare, and its payload.
<u>Grub-screw</u>	means a screw with a bearing point on one end, used to hold something in place when tightened against a mated surface.
<u>GVM</u>	is an abbreviation for gross vehicle mass.
<u>Header</u>	means a special exhaust manifold designed for maximum efficiency and to reduce exhaust back pressure, thereby increasing engine power.
<u>Heim joint</u>	means an eye-end joint, or ball and socket joint, incorporating a spherical bearing, also known as a 'rose' joint.
<u>Hip-bar</u>	means a section of roll-bar or roll-cage that extends forward from approximately the mid point of the main hoop, running longitudinally past the front seat at about hip level, to the mid-point or base of the A-pillar area.
<u>H-frame</u>	means a frame which provides a method of identifying the h-point, for the purpose of serving as a reference point for establishing various critical safety-related measurements, including the permitted areas for upper and lower seatbelt anchorages.
<u>Hooke's-type joint</u>	means a simple type of universal joint in which the shaft ends are connected by yokes disposed at right angles, and transmit torque by way of a cruciform bearing mounting.

<u>H-point</u>	means a reference point, which indicates the hip position of an occupant in a normal seated position.
<u>I-beam</u>	means a rigid transverse axle, cast or forged in an I-beam section, upon which the wheels are mounted.
<u>IFS</u>	is an abbreviation for independent front suspension.
<u>Independent suspension</u>	means a type of suspension that enables a wheel on one side of an axle to absorb changes in a road surface without affecting the other wheel on the same axle.
<u>IRS</u>	is an abbreviation for independent rear suspension.
<u>Jamb-nut</u>	means a nut usually used to lock an internally threaded section in a specified position against another externally threaded section.
<u>Keeper spring</u>	means a secondary spring, commonly used as a method of tensioning the primary spring in an adjustable platform suspension system.
<u>Kevlar</u>	is a brand name for a particularly light but very strong aramid-fibre, manufactured by the DuPont Company.
<u>Kg</u>	is an abbreviation for a kilogram.
<u>Kinetic energy</u>	means the energy possessed by a body or an object because of its motion.
<u>King-pin</u>	means a predominantly vertical shaft from which a steered wheel assembly pivots.
<u>Kph</u>	is an abbreviation for kilometres per hour.
<u>'L'</u>	is an abbreviation for a type of stainless steel, that denotes a low carbon content, which means that it is a material that can be successfully welded.
<u>Ladder chassis</u>	means a chassis in which parallel side members are joined at intervals by transverse beams, giving the appearance of a ladder.
<u>lb</u>	is an abbreviation for the imperial measurement of pounds.
<u>L-class</u>	is a New Zealand Transport Agency classification, which means, in very simple terms, a two or three-wheeled motor vehicle.

<u>LED and LED array</u>	is an abbreviation for a light emitting diode, which is a relatively new type of automotive light source, now becoming a common alternative to lights that are illuminated by a conventional light bulb.
<u>Line-lock</u>	is a device based on an electronic solenoid that controls a valve, which is in line with the front brakes. Normally, the valve is open and allows fluid to pass through to the front brakes, however, while the front brakes are applied and the solenoid is activated, the valve closes to trap the fluid in the front brakes keeping them applied until the control is released.
<u>Linish</u>	means the process of using grinding or belt sanding techniques to improve the flatness or smoothness of a surface.
<u>Locked diff</u>	means a differential that drives both left and right side axles simultaneously without the usual mechanical slippage designed into production motor vehicles to provide smooth and comfortable cornering.
<u>Locost</u>	is the brand name for a popular sports car design based on the Lotus 7, intended as an entry-level do-it-yourself sports car for the home-builder.
<u>Loctite</u>	is a unique bonding resin that hardens in the absence of air, that is commonly used to prevent fasteners from vibrating loose.
<u>Longitudinal</u>	means in the fore-aft direction, running on or parallel to the centre-line of the vehicle.
<u>Low Volume Vehicle</u>	the legal definition is currently under review, but is intended to mean a vehicle that is built or modified in small numbers, and includes individual home-built or modified vehicles.
<u>Low Volume Vehicle Technical Association</u>	is an incorporated society established to represent the interests of vehicle modifiers and builders in New Zealand. The LVVTA owns and administers the Low Volume Vehicle Code, and is made up of 10 member associations, one of which is NZHRA.
<u>LVV certification plate</u>	means an aluminium plate, approximately 110 mm x 80 mm in size, that is manufactured for the LVV Certifier by LVVTA, and is engraved with all of the modification or construction details unique to the vehicle in question, which is attached to the vehicle structure, and confirms the vehicle's legality to Police, entry certifiers, and warrant of fitness inspectors.
<u>LVV Certifier</u>	means a person appointed by the New Zealand Transport Agency to inspect and approve modified and scratch-built vehicles, under the Low Volume Vehicle Code.

<u>LVVTA</u>	is an abbreviation for the Low Volume Vehicle Technical Association Incorporated, and is the owner of this NZ Car Construction Manual.
<u>'mm'</u>	is an abbreviation for the metric measurement of millimetres.
<u>'m'</u>	is an abbreviation for the metric measurement of metres.
<u>MacPherson-strut</u>	means a telescopic independently sprung suspension member incorporating a shock absorber, which is fixed at its upper end to the body shell or chassis, and has the lower end located by linkages which control transverse and fore and aft movement.
<u>Metallurgist</u>	means a person who studies the physical and chemical behaviour of metals, in particular the composition and mixture of their elements.
<u>MIG</u>	is an abbreviation for metal inert gas, which is a continuous welding system that uses an electrical arc, and incorporates a gas to protect the weld.
<u>Modified production</u>	the legal definition is currently under review, but is intended to mean a vehicle that, although modified, still maintains a sufficient percentage of body or chassis from one primary mass-produced vehicle, that it can still be considered to be that vehicle.
<u>'Moon' tank</u>	means a fuel tank manufactured by the Moon Equipment company of Southern California, which in the context of this manual, is of a style that is traditionally used in hot rods, mounted ahead of the vehicle's grille and above the front axle.
<u>Monocoque</u>	means the same as unitary construction.
<u>Mph</u>	is an abbreviation for miles per hour.
<u>N</u>	is an abbreviation for the metric measurement of a newton.
<u>NDT</u>	is an abbreviation for non-destructive testing.
<u>Necking</u>	means the narrowing of the beam section that occurs in an I-beam axle if the dropping process is carried out without the correct amount of heat being applied.
<u>Neutral axis</u>	means, in the context of this manual, to be drilled through the sides (on a horizontal plane), rather than from top to bottom.
<u>Newton</u>	is the amount of force required to accelerate a 1 kilogram mass by 1 metre per second per second.

<u>Nm</u>	is an abbreviation for the metric measurement of a newton metre.
<u>Newton metre</u>	is equal to a torque of 1 newton applied over a 1 metre long lever.
<u>New Zealand Hot Rod Association</u>	is the organisation that administers hot rodding within New Zealand, and is a founding member of the LVVTA.
<u>Nitrous oxide</u>	is a liquid chemical composition of one part of nitrogen and two parts of oxygen, which when introduced with the fuel mixture entering an internal combustion engine, converts to a gas and may increase the oxygen content in the combustion chamber producing a momentary increase in power output.
<u>Non-destructive testing</u>	means, generally, one of the many different types of crack-testing available.
<u>NOS</u>	means a nitrous oxide system.
<u>Nylock</u>	means a type of vibration-proof locking nut that incorporates a nylon section, which enables the nut to lock itself against the corresponding bolt.
<u>NZDRA</u>	is an abbreviation for the New Zealand Drag Racing Association Incorporated.
<u>NZHRA</u>	is an abbreviation for the New Zealand Hot Rod Association Incorporated.
<u>NZTA</u>	is an abbreviation for the New Zealand Transport Agency, a crown entity.
<u>OE</u>	is an abbreviation for original equipment, usually referring to equipment supplied by a high-volume vehicle manufacturer.
<u>OEM</u>	is an abbreviation for original equipment manufacturer, meaning a high-volume vehicle manufacturer.
<u>Oil-canning</u>	means the fatigue-induced cracking brought about by constant movement the two joined sections of material, usually as a result of poor attachment design.
<u>Osmosis</u>	means the diffusion of fluids through a semi-permeable membrane or porous partition, often found in the automotive world as moisture absorbed and trapped in fibre-glass, resulting in blistering or bubbling of the outward surface.

<u>Overlay</u>	means a thin layer of clear or colored plastic that is folded, formed or coated over glass.
<u>Panhard bar</u>	means a transverse rod pivoted at one end from the chassis or body structure to a beam axle or differential at the other end, in order to constrain the axle or differential's lateral movement.
<u>Passenger compartment</u>	means the part of a vehicle body that houses the passengers and driver.
<u>Passivating</u>	means, in the context of this manual, a corrosion-resistant coating, usually gold in colour.
<u>Payload</u>	means the maximum weight that a vehicle manufacturer certifies that a vehicle can carry.
<u>PBR</u>	means a manufacturer of braking system components, used in mass-produced vehicles throughout the world.
<u>Perimeter</u>	means the distance around the outside of an object.
<u>Photometric</u>	means the process of measuring the intensity of illumination from a particular light source, and comparing it with that produced by a standard source.
<u>Pitman arm</u>	means the levering arm in a steering system that connects the steering box output shaft to the drag-link, also known as a drop arm.
<u>Porosity</u>	means the density of a material, and its capacity to pass liquids through it.
<u>Preliminary inspection</u>	means the inspections, generally between one and four, that take place before the final inspection when a vehicle undergoing LVV certification is able to be driven.
<u>Pro-street</u>	means a particular style of hot rod or street machine vehicle that features typical drag racing vehicle attributes and characteristics in order to achieve a performance-oriented look, including large wheel tubs to accommodate extremely large rear tyres, low stance, and a powerful (sometimes supercharged) engine.
<u>Push-lock</u>	means a type of hose and fitting system that enables the hose to be easily pushed on, however because of the design of the male fitting, the hose grips against the male fitting such that its removal is very difficult.
<u>Push-pull drag-link</u>	means a linkage that runs longitudinally, connecting a steering box that is mounted near the firewall, forward to the steering arm.

<u>Rag coupling</u>	means the same as a fabric damper.
<u>Reaction rod</u>	means a control rod used to locate a suspension arm, and commonly used to resist brake loadings, also known as brake reaction rods or strut rods.
<u>Rectangular hollow section</u>	means a configuration of steel section commonly used in the manufacture of chassis, and other motor vehicle component fabrication.
<u>Retro-fitment</u>	means the fitting of a component or system that was not originally installed during the construction of the vehicle by the vehicle manufacturer.
<u>Retro-reflector</u>	means a reflective surface fitted to the rear of a motor vehicle, used to reflect light back to the light source, commonly known simply as a reflector.
<u>RHS</u>	is an abbreviation for rectangular hollow section, a common steel section used for chassis building.
<u>Riv-nut</u>	is a type of captured nut that can be attached to any part of a vehicle, using the same attachment principle as that of a rivet.
<u>Roll-bar</u>	means a transverse bar, or bars, positioned behind the front seating positions, which is attached and longitudinally braced to the main structure of the vehicle.
<u>Roll-cage</u>	means a roll-bar with additional members extending forward past the front seating positions to another roll-bar positioned around the top of the windscreen area.
<u>Roll-control</u>	means a device intended for drag racing, to enable the front brakes to be locked on, without the rear brakes being engaged, enabling the burnout process to occur without the engine fighting against rear brake pressure.
<u>Roll-over one-way check-valve</u>	means a safety-valve installed in the fuel tank breather line which operates in only one direction, which prevents fuel from coming out of the breather line in the event of a roll over.
<u>Rose-joint</u>	means the same as a 'heim' joint.
<u>SAE</u>	means the Society of Automotive Engineers.
<u>SAE 4130</u>	means a grade of steel that has a low alloy and low carbon content, that features excellent welding and machining properties, and can be readily heat-treated.

<u>Schedule-A</u>	means the driver and vehicle safety requirements contained in the MotorSport New Zealand rulebook.
<u>Scratch-built</u>	legal definition is currently under review, but is intended to mean a vehicle that is built from the ground up, and contains so little body, chassis, or componentry from any one particular mass-produced vehicle, that it cannot be considered a modified production vehicle.
<u>Semi-elliptic</u>	means a type of leaf spring, that is positioned longitudinally, usually supporting a beam axle or a differential, arranged as a compressed semi-circle, and mounted at points both forward and rearward of the axle or differential.
<u>Servo</u>	means a control system that converts a small mechanical motion into a corresponding motion that produces much greater power, in the case of a braking system, through the use of engine vacuum.
<u>SFI</u>	is an abbreviation for the Snell Foundation Incorporated.
<u>Shifter</u>	means a device provided for the operation of changing gears.
<u>Shimming</u>	means the installation of a thin washer to adjust or fill a gap between machined parts, especially gears.
<u>Sintering</u>	means a method for making objects from powder, by heating the material (below its melting point) until its particles adhere to each other. Sintered bronze in particular is frequently used as a material for bearings, since its porosity allows lubricants to flow through it.
<u>Small-block</u>	is a term used for a family of V8 engines, as produced by most major North American motor vehicle manufacturers (in particular Ford, General Motors, and Chrysler) which in comparison to 'big-block' engines, are very compact in external dimensions, and lightweight.
<u>Snell Foundation Incorporated</u>	is an organisation involved in the setting of safety standards in relation to motor-sport.
<u>Space-frame chassis</u>	means a chassis that is built to give the advantage of lightness and rigidity, by using predominantly straight small-diameter tube sections, arranged in a fully triangulated truss-like design, with some tube sections acting in compression and others acting in tension. The rigidity of the space-frame chassis relies on the configuration and the spacing of the tube sections acting in unison to contribute to the overall strength.
<u>Spindle</u>	means the machined section that the hub bearings run on, otherwise known as the 'pin' or 'axle'.

<u>Spool</u>	means a type of ring and pinion carrier assembly designed specifically for drag racing, that does away with side gears and spider gears, which when fitted, has the effect of a locked differential.
<u>Spud</u>	means, in relation to a suspension arm, a threaded heavy wall section of material used to accept a rod end, that is welded into a lighter wall section of tubing.
<u>Spring shackle</u>	means an attachment system designed to support the end of a spring, whilst permitting the spring to vary in length as it deflects upward and downward from suspension compression and extension.
<u>Steel bundy</u>	means not a statue of Mark Stokes, but a type of steel tubing material for the manufacture of brake fluid pipes.
<u>Stressed seat</u>	means a seat that has one or more seatbelt anchorages attached to the seat frame in such a way that any loading applied to the seatbelt anchorage would be transmitted through the seat structure to the seat anchorage.
<u>Stub axle</u>	means the outer part of the suspension assembly, to which the brake and wheel assemblies attach, also known as an upright.
<u>Surge tank</u>	means a small tank used to hold the fuel to prevent fuel from moving away from the fuel pump pickup during cornering, acceleration, and braking.
<u>Swaged fitting</u>	means a type of compression fitting used with metal tubing, that offers a high degree of long term reliability, consisting of a male half of the fitting which has a straight thread and an angled front face (usually 45° or 37°). A matching nut is placed on the tubing, and a flaring tool is used to flare the end of the tubing outward at the same angle. The nut is then tightened, compressing the flared portion of the tubing between the male fitting and the nut.
<u>TAC</u>	is an abbreviation for the Technical Advisory Committee.
<u>Tare</u>	means the unladen weight of a vehicle.
<u>Technical Advisory Committee</u>	means a committee, comprising scratch-built vehicle experts, appointed by, and operating under, the Low Volume Vehicle Technical Association. The TAC primarily consists of NZHRA club members, but includes some members of other vehicle enthusiast groups.
<u>Tie-rod</u>	means the steering track-rod or cross-rod, or any nominally transverse linkage that directly or indirectly actuates steered wheels.
<u>Tie-rod end</u>	means a mechanical joint in which a spherical end moves freely within a recessed socket, typically used on steering linkages.

<u>TIG</u>	is an abbreviation for tungsten inert gas, which is a type of arc welding.
<u>Toe-in</u>	means the setting of paired wheels on an axle so that the leading edge of each wheel is inclined slightly inwards.
<u>Toe-out</u>	means the setting of paired wheels on an axle so that the leading edge of each wheel is inclined slightly outwards.
<u>Torsional</u>	means, in the context of this manual, the rotational twisting loads applied throughout the length of a chassis during vehicle operation.
<u>Torque</u>	means a force that produces a twisting or rotating motion.
<u>Torque (engine)</u>	means the amount of twisting effort exerted at the crankshaft by an engine, expressed in foot-pounds of force. A foot-pound represents the force of one pound acting at a right angle to the rotating crankshaft, at a distance of one foot in length.
<u>Traction control</u>	means a system designed to prevent loss of traction, and therefore the loss of control of the vehicle, when excessive throttle or steering is applied by the driver.
<u>Transverse link</u>	means a suspension link or rod that, whilst allowing full suspension travel, locates the suspension in the east-west direction.
<u>Trunk-lid</u>	means a hinged lid or cover, designed to give access to the rear luggage compartment, also known as a boot.
<u>TSDA</u>	is an abbreviation for a transport service delivery agent, which is a people or company appointed by the New Zealand Transport Agency to provide entry and in-service (WoF and CoF) inspections.
<u>UHMC</u>	is an abbreviation for ultra-high modulus carbon.
<u>UNF</u>	is an abbreviation for unified screw thread 'fine'.
<u>Unitary- construction</u>	means a type of vehicle construction that incorporates the vehicle body and chassis frame in one unit, as opposed to having a separate and removable chassis.
<u>Unstressed seat</u>	means a seat that does not have any seatbelt anchorages attached to the seat frame.
<u>Vehicle identification number</u>	is a 17-digit numbering system used world-wide as a primary means of individually identifying motor vehicles.

<u>Vehicle Inspection Requirements Manual</u>	means the New Zealand Transport Agency's set of legal requirements that is used by a TSDA to assess vehicle compliance in a Warrant of Fitness inspection.
<u>VIN</u>	is an abbreviation for 'vehicle identification number'.
<u>VIRM</u>	is an abbreviation for the Vehicle Inspection Requirements Manual.
<u>VLT</u>	is an abbreviation for visible light transmittance.
<u>Watts linkage</u>	means a three-element linkage typically used to control rear axle transverse movement.
<u>Witness hole</u>	means a hole drilled into a suspension linkage, to enable an inspection to determine that sufficient thread engagement of a threaded joint has been achieved.
