

## GLOSSARY OF TERMS

**Acceleration mark(s)** - Mark(s) made on the road surface when sufficient power is applied to the drive wheels of a vehicle to make at least one wheel lose traction (spin).

**Age sag** - A condition created when a bulb filament sags due to its age and the pull of gravity.

**Air bag damage** - Damage or injury caused by the deployment of an air bag (e.g., windshield damage, marks on the vehicle occupant).

**Air resistance** - The force opposing movement of a vehicle through the air surrounding it. (Typically distances are too short for air resistance to have any effect in collision work.)

**Algebra** - A generalization of arithmetic in which letters representing numbers are combined according to the rules of math.

**Angular departure** - An angular departure occurs following maximum engagement and possible rotation of the vehicles that have been involved in an impact. The angle at which each vehicle or unit departs is measured counterclockwise from the X axis when the left-hand coordinate measuring system is used.

**Angular impact** - An angular impact occurs when two vehicles collide whose directions of travel at the moment of impact are not parallel to each other.

**Anti-lock brake system** - A service brake system that in order to prevent lock-up automatically controls (minimizes) the degree of rotational slip of one or more road wheels of the vehicle during braking.

**Aperture** (f/stop) - The adjustable opening that allows more light or less light into a camera.

**Approach angle** - The angle of approach of each vehicle with respect to the horizontal X axis. (Vehicle 1 is usually drawn headed toward zero degrees.)

**Arc tangent** - The reciprocal of the tangent. Commonly expressed as  $\tan^{-1}$ .

**Area of impact** (AOI) - The area of initial contact between a vehicle and an object on the highway or another vehicle.

**ASA** (American Standards Association) - Denotes film speed, e.g., 100 ASA/ISO. 400 ASA/ISO. See ISO.

**Aspect ratio** - The height of a tire sidewall in relation to the cross sectional width of the tire, expressed as a number indicating percent.

**Average acceleration** - Average acceleration is found by dividing the change in velocity of an object by the time required to gain that velocity, using compatible units.

**Axis** - A straight line about which a body or a geometric figure rotates or may be imagined to rotate. Also, a linear component of a coordinate system (X axis, Y axis).

**Axle** - The part that connects two wheels on opposite sides of a vehicle at either the front or rear of the vehicle.

**Base** (bulb) - The portion of the bulb which contains the mounting or connections. It may also have manufacturer information or trade numbers.

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**Bead** (tire) - That part of the tire made of steel wires, wrapped or reinforced by ply cords, that is shaped to fit the rim.

**Bead seat** (tire) - That part of the wheel rim onto which the bead of the tire is mounted to form an airtight seal or retentive fit.

**Bead separation** (tire) - Bead separation is a breakdown of the bond between components in the bead area of the tire.

**Belted bias** (tire) - A bias ply tire that has fabric belts that run around the circumference of the tire.

**Bias ply** (tire) - A tire with plies that run on a bias (at an angle) to each other.

**Biomechanics** - the study of the relationship between occupant movement & collision forces.

**Blowout** - A sudden loss of tire air pressure due to cuts, bruises, damages or defects.

**Botts dots** - Raised pavement markers used to delineate separate lanes, shoulders or center dividers. Usually made of metal or hard plastic.

**Brake** - Any mechanism used to retard, stop or hold a vehicle in place.

**Brake fade** - A condition arising when repeated application of the brakes causes a loss of frictional capability due to heating, which results in the impairment of braking efficiency.

**Braking efficiency** - The percent of braking that each wheel has in a dynamic braking situation. This percent is dependant on the amount of weight that is shifted to or from each wheel and/or on the mechanical condition of the brakes.

**Burnout** (bulb) - A condition created within a light bulb when the filament separates and current can no longer flow through it.

**Calculate** - The process of adding, subtracting, multiplying or dividing, following the rules of math.

**Cartesian grid** (left-hand) - A two dimensional X - Y grid that is read counterclockwise from zero degrees, with zero located at three o'clock, to determine angular orientation.

**Center of gravity** - (see Center of mass)

**Center of mass** - A point located within an object such that if the object were suspended from that point, it would exactly balance when rotated to any position.

**Centrifugal force** - A pseudo force produced by the inertia of an object in motion that resists a change in the direction of that motion. Also referred to as an inertial force, it is outward acceleration tangential to the point of the arc occupied at any given moment by the object traveling in the arc.

**Centripetal acceleration** - An acceleration toward the center of a circle. It must be present whenever an object proceeds along a circular path.

**Centripetal force** - Actually a force component, it is provided by part of the friction between the tires and the road surface and holds the vehicle in its arc of travel (see

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centripetal acceleration).

**Chartrand ruler** - A device using the perimeter measurement system that aids the investigator in obtaining accurate crush and/or profile measurements of a damaged vehicle.

**Chop** - A broad, shallow gouge (as might be made by a metal part striking obliquely into the pavement) that starts as a sharp, defined mark and then slopes upward to a shallow, jagged end. Direction of motion is from the deeper end to the shallow end.

**Chord** - A straight line connecting two points on an arc.

**Coefficient of dynamic friction** - The ratio of the friction force to the normal force existing between two bodies, one of which is sliding across a surface of the other. It is expressed by the relationship:  $f = F/W$  where  $f$  = Coefficient of friction  $F$  = Friction Force  $W$  = Weight (Force)

**Coefficient of restitution** - The degree to which a material is capable of restoring itself to its original shape after being deformed. Values range from 0.0, totally inelastic, to 1.0, totally elastic.

**Cold shock** - A condition that occurs when force is applied to a cold (not hot incandescent) bulb or filament, resulting in a sharp break in the filament and/or loose piece of undeformed filament within the bulb envelope.

**Collinear collision** - A collision between two objects where the direction of travel of an object is parallel to that of the other.

**Collision** - The coming together of two objects that results in an abrupt change in motion of at least one of the objects.

**Collision (elastic)** - A central collision of two bodies in which no permanent deformation takes place and both momentum and kinetic energy are conserved (coefficient of restitution approaching 1.0).

**Collision forces** - Those forces that relate to the energy, momentum or AV of the collision.

**Collision (inelastic)** - A collision between two bodies in which there is permanent deformation. Momentum is conserved, kinetic energy is not. Some of the  $Ke$  is changed into heat, sound, scraping and bending (coefficient of restitution close to 0.0).

**Collision scrubs** - Marks left by wheels momentarily deviated from their path by the collision forces. These marks indicate the movement of the tires on the road during maximum engagement of the vehicle with some other object.

**COLM** - Conservation of linear momentum, meaning that momentum coming into a collision is equal to momentum leaving the collision. Momentum is conserved. COLM requirements - Values are needed for  $W_i$ ,  $W_g$ ,  $V^{\wedge}$   $V^{\wedge}$  the approach angle of both vehicles and the departure angle of both vehicles.

**Complex reaction time** (includes perception reaction time) - Reaction time determined in cases where there are multiple stimuli, each with its own response. In these multiple choice situations, where the stimulus may be simple but the number of choices is great, the reaction time increases with the number of choices. Complex reaction time is also known as disjunctive reaction time.

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**Contact damage** - Damage to any part of a motor vehicle by direct contact with some object not part of the vehicle.

**Contact damage (glass)** - A spider web fracture caused by direct contact at a given location on laminated safety glass (tempered glass will shatter).

**Cord separation (tire)** - occurs when tire cords part from adjacent rubber compounds.

**Cords (tire)** - Strands forming the plies in a tire.

**Cosine** - A trigonometric function that for an acute angle in a right triangle is the ratio of the length of the leg adjacent to the angle to the length of the hypotenuse.

**Crash sequence** - The events taking place during the period of time in a collision from the point of initial contact to the point of separation of the vehicles or to the point where the vehicles cease to apply a force on one another.

**Critical speed** - The maximum speed at which a vehicle can maintain travel along an arc of given radius.

**Critical speed scuff** - A tire mark left by a rotating wheel that is slipping sideways parallel to its axle.

**Crown (roadway)** - The amount by which the center of a roadway is made higher than the edge, usually for drainage purposes. It is measured as the slope from the edge perpendicular to the center line and is generally expressed as a percent (+%).

**Crush distance** - The amount of permanent deformation which a vehicle or object sustains as a result of impact. The crush distance is measured at right angles from the original body line to a point in the damage area.

**Curb weight** - The weight of a motor vehicle with standard equipment; with maximum capacity of engine fuel, oil and coolant; and with the additional weight of air conditioning and an optional engine, if so equipped.

**Debris** - Any accumulation of broken or detached matter resulting from a collision on having been otherwise deposited. Dislodged cargo is considered debris.

**Decimal number(s)** - A number/numbers appearing to the right of the decimal point and constituting a percentage of a whole number one (1), e.g., 0.52.

**Deformation** - The alteration of form or shape (e.g., as a result of collision).

**Delayed perception** - A phrase in which is implicit the fact that the point of actual perception does not necessarily coincide with the point of possible perception but may follow it. Delayed perception time does not include reaction time.

**Delta V (AV)** - The change of speed or velocity from initial contact through maximum engagement that correlates with ride-down time or distance.

**Denominator** - The number on the bottom of a fraction.

**Departure angle** - The angle to the horizontal X axis at which a vehicle departs after separation from the object or vehicle with which it has collided.

**Depth of damage** - The depth measurement of a damage area. Usually taken every (6) inches along a given line and used for crush evaluation.

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**Depth of field** - The range of distance in focus from lens setting (f/stop) of a camera.

**Distance** - A measure of the separation of one point from another. Generally expressed in feet (meters) in accident work.

**Drag factor** - A number representing the acceleration or deceleration of a vehicle or other body as a decimal fraction of the acceleration of gravity:

$$f = a/g$$

where  $f$  = Drag factor

$a$  = Acceleration in fps/s or fps<sup>2</sup> (m/s/s or m/s<sup>2</sup>)

$g$  = Acceleration due to gravity; 32.2fps/s or 32.2 fps<sup>1</sup>  
(9.81 m/s/s or 9.81 m/s<sup>2</sup>)

**Drip evidence** - Liquid that has drained from a ruptured container as the vehicle continued moving.

**Dx** - A modern camera's ability to read the film's ASA off the film canister via a bar code. The camera automatically adjusts to the film's ASA rating.

**Dynamics** - The physical behavior of an object in motion.

**Dynamic friction** - The forces exerted between surfaces in contact with each other while one or both of the surfaces are in motion.

**Eccentric** - Directed some distance away from the center of mass of another object.

**Eccentric force** - A collision force which is not directed through the center of gravity of a vehicle and thus causes rotation of one or both vehicles.

**Electronic level** - An electronic device (level) that can compute any grade, pitch or angle or give a bubble display.

**Energy** - The capacity to do work (Work = Force x Distance).

**Energy (kinetic)** - Energy associated with motion. Generally expressed in foot pounds.

**Energy (potential)** - The energy that an object possesses due to its position or the position of one or more of its parts.

**Envelope** - Used in the context of lamp examinations, an envelope is the sealed glass container which keeps oxygen from reaching the the bulb's incandescent filament.

**Equilibrium** - State of a body wherein no net force is acting on it. A body in equilibrium will do one of two things: It will not move at all or it will move at constant velocity.

**Etched glass** - A condition describing a light bulb on which the glass envelope has been etched (melted) due to contact with a hot or incandescent filament.

**Exponent** - A superscript number indicating the times that a quantity is multiplied by itself. (e.g., S<sup>2</sup>).

**Factor** - Any of the numbers or symbols in mathematics that when multiplied together form a product.

**Fiber optic** - A plastic or glass fiber that carries light from a light source to the end of a fiber, thus providing light.

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**Filament** - A thin, threadlike or spring-like conductor (usually of tungsten) spanning two or more posts inside a light bulb and becoming incandescent when electrical current passes through it.

**Filter** - A supplemental lens cover that filters out certain colors or atmospheric condition.

**First contact** - That point in the collision event where a vehicle makes initial contact with another vehicle or object.

**Flash or light unit** - A device usually coupled to the camera in order to place additional illumination on the subject.

**Flat tire** - A pneumatic tire devoid of air pressure.

**Flip** - An airborne movement of a vehicle from a place where the vehicle is suddenly rotated off the ground by a force from an object at a height below the vehicle's center of mass. A flip is usually sideways. If it is endwise, it is spoken of as a vault.

**Focus** - Adjustment of a camera lens so that the light rays converge into a single clear image.

**Foot-pound (lb-ft)** - A unit of work. One foot-pound is equal to the work done by an applied force of one pound when it moves an object weighing one pound through a distance of one foot.

**Force** - A physical vector quantity constituting a push or a pull at a given point of application. The unit of force in the English system is the foot-pound (lb-ft); in the metric system the unit is the kilogram-meter (kg-m). Force may also be defined as energy exerted or brought to bear on an object. Force has direction as well as magnitude.

**Force line** - The direction of the resultant force which produces damage to the subject vehicle (see PDOF).

**Fraction** - A number containing both a numerator and a denominator.

**Free-fall** - A condition wherein a body falling through air encounters only air resistance. The body will accelerate until terminal velocity is attained (see terminal velocity).

**Friction** - The force resisting the motion of an object across the surface of another object that occurs when the two objects come into contact with one another.

**Fused glass** - A condition describing the adhesion of glass particles to portions of a bulb or filament that occurs when the glass envelope breaks and the particles melt upon contact with incandescent filaments or other parts.

**G force** - The effective force, expressed as a multiple and/or decimal fraction of the force of gravity, owing to the acceleration of a body.

**Geometry** - A branch of mathematics dealing with the measurement, properties, and the relationships of points, lines, angles, surfaces and solids.

**Gouge** - A small depression where a chunk of paving has been dug out with measurable depth and size (as might be done by a vehicle's undercarriage). Usually observed in asphalt/concrete pavements and caused by a downward thrust of the vehicles - usually at

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maximum engagement.

**Grade gauge** - A manual device used to measure slopes, e.g., the grade of a road.

**Grade [m]** - The percent of rise or fall of a roadway (along the center line) over a distance of 100 feet (meters) and calculated by the formula  $m = "s(r)$ .

**Gravitational constant** - A constant pertaining to the acceleration caused by gravi which on the surface of the earth is 32.2 feet per second per second (9.81 meters rf second per second).

**Gravity** - A force which tends to hold objects in contact with the earth's surface (s acceleration or rate of acceleration).

**Gross vehicle weight rating (GvWR)** - The value specified by the manufacturer as the safe maximum loaded weight of a single vehicle.

**Ground forces** - These include forces supplied by gravity, grade, superelevation friction. They are typically lower than collision forces.

**Head-on** - A collision wherein two objects (vehicles) contact one another from general opposite directions with their centers of mass in line or nearly in line. Little or no rotation results.

**Height of damage** - Measurement of the height of the damage area on a vehicle from the road surface (used to check correlation to damage on a suspect vehicle).

**Hot shock** - A condition occurring when a bulb filament is hot as force is applied to the area surrounding the bulb or filament, resulting in deformation of the filament.

**Hydroplaning** - Occurs when tires rolling on a wet road surface reach a speed at which they lose contact with the road surface and move along on a thin film of water. A hydroplaning vehicle does not respond to steering input.

**Hypotenuse** - The longest side of a right triangle.

**Impact** - Impact is the meeting and the action of two bodies in a collision that changes the velocity of one or both bodies.

**Imprint** - A shaped mark left on a surface by a same-shaped object belonging to the striking vehicle.

**Impulse** - The change in momentum of each colliding vehicle that takes place during the time frame from first contact through maximum engagement and results in the redirection of the vehicle (see PDOF).

**Incandescent** - Intensely hot to the point of producing light. Range for this to occur is generally accepted as 3,200 to 4,000 degrees Fahrenheit (1744 to 2188 degree Celsius) for tungsten filaments.

**Indeterminate filament** - A filament condition that does not allow the investigator to st< with certainty whether or not a filament was incandescent.

**Index print** - A permanent proof sheet of all photos on a roll (usually in miniature).

**Induced damage** - Damage caused by forces exerted on some location on the object vehicle other than where this damage appears.

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**Induced damage (glass)** - A parallel fracture pattern in laminated safety glass caused by force applied elsewhere on the vehicle.

**Inert gas (bulb)** - A gas, generally argon or nitrogen, which fills the bulb envelope.

**Inertia** - A fundamental property of matter best described by the concept that any mass remains at rest or in uniform motion in the same straight line unless acted upon by some external force (Newton's first law).

**Infinity** (photograph) - A distance setting on a camera at which all objects beyond certain point appear in focus.

**In-line** - A collision mode wherein the force of an object is directed through the center mass of another object, resulting in little or no rotation of either object.

**Interior vehicle damage** - Damage to a vehicle interior, frequently caused by induced forces or occupant contact.

**ISO** (International Standards Organization) - see ASA.

**Kg-km/h** - The S.I. unit of measurement for momentum, the momentum being the weight of the vehicle in kilograms times its velocity in kilometers per hour.

**Kilogram-meter** (kg-m) - A unit of work. One kilogram-meter is equal to the work done by an applied force of one kilogram when it moves an object weighing one kilogram through a distance of one meter.

**Kinematics** - That branch of engineering or physics which studies the geometry of motion, or how things move, with little or no reference to the magnitude of the force that causes the motion (e.g., occupant movement within accident vehicles).

**Kinetic energy** - Energy possessed by a body in motion. It is expressed as:  $KE = \frac{1}{2} M (V^2)$

**Laser measuring device** - A device that measures distances and/or speeds through use of a laser light beam.

**Lateral (direction)** - The sideways direction of a vehicle. It is parallel to the vehicle's axis.

**Lb-mph** - The unit of measurement for momentum, the momentum being the weight of the vehicle in pounds times its speed in miles per hour.

**Lens** - That part of the camera that focuses the image onto the film.

**Lens (bulb)** - The portion of the bulb that shapes the light pattern.

**Light meter** - A camera feature that reads the available light and in an automatic camera adjusts the lens opening and/or shutter speed accordingly.

**Macro lens** - A lens used for extreme close-ups of subjects and/or objects.

**Magnitude** - The length of a vector line, as drawn on a diagram, representing the amount of momentum or speed a vehicle has as it enters or leaves a collision.

**Mass** - Vehicle weight in pounds (kilograms) divided by the constant for gravity, i.e.,

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(9.81). Mass is measured in slugs (joules).

**Maximum engagement** - The furthest penetration of one object (vehicle) into another object (vehicle). It may be described as the point of a collision at which the greatest contact area and/or depth of crush between the vehicles has been achieved. The same is true for a vehicle contact with an object other than a vehicle or a collision between two other objects.

**Melting temperature of glass** - Generally accepted as 2,500 degrees Fahrenheit (1355 degrees Celsius).

**Melting temperature of tungsten** - Generally accepted as above 6,000 degrees Fahrenheit (3298 degrees Celsius).

**Moment arm** - The distance from the center of mass of an object to the point of force application on that object. The longer the moment arm the greater the rotational force.

**Momentum** - A vector quantity, momentum is the product of the mass and velocity of a moving object, or  $M = \text{weight} \times \text{velocity}$  in mph (km/h). The units are expressed lb-mph (kg-km/h).

**Monopod** - An adjustable single-leg camera support.

**Negative number** - A number preceded by a minus sign where the sign is part of a number's value, not a subtraction sign.

**Numerator** - The number on the top of a fraction.

**Occupant kinematics** - The movement of occupants of a vehicle as a result of force being applied to the vehicle.

**Offset** - The measure of the distance between the centerlines of two vehicles at impact in any collision where the centerlines do not coincide.

**Orientation shot** - A photo taken to identify the address or location of an incident or pull-back shot to show the location of the damage area on a vehicle.

**Overall width (of a tire)** - The linear distance between the exteriors of the sidewalls of an inflated tire, including elevations due to labeling, decoration, or protective bar or ribs.

**Overall vehicle width (OAW)** - The dimension of the widest part of a vehicle, exclusive of signal lamps, marker lamps, outside rear-view mirrors, flexible fender extensions and mud flaps, determined with doors and windows closed and the wheels in a straight-ahead position.

**Overall vehicle length (OAL)** - The bumper-to-bumper length of a vehicle.

**Overlap** - The amount or area of contact between two colliding objects.

**Panoramic view** - An extreme wide-angle view for special applications (e.g., to show an entire intersection).

**Parallax** - The displacement between the viewfinder view and the lens view on a camera.

**Parentheses** - Upright curved lines used in mathematics and science to group numbers and/or symbols together so that they will be treated as a unit. Where brackets or parentheses exist in an equation, the rules governing the order in which mathematical operations are to

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be performed must be followed.

**PDOF** (Principal Direction of Force) - The direction of the impulse of each vehicle on the other as determined from the vehicle's approach angle. The impulse of a vehicle is equal in magnitude and opposite in direction.

**Percentage** - A part of a whole expressed in hundredths.

**Perception-reaction distance** - The distance that a vehicle travels during the driver's perception-reaction time.

**Perception-reaction time** - The interval or time lapse between the instant a driver perceives a reason to avoid a hazard and the instant he initiates the action to avoid it. Typically 1.5 to 1.6 seconds (daylight).

**Perimeter measuring** - Measurements around the perimeter of a vehicle along a given line, usually taken at the height of the deepest penetration.

**Perspective grid** - A diagonally lined grid of known size to be placed in a photograph from which estimated measurements may be obtained.

**Photogrammetry** - The process of using an object of a known size depicted in a photograph to find the size or measurement of other objects in the photograph.

**Pitch axis** - The axis that extends from one side of a vehicle to the other side through a vehicle's center of mass. More commonly known as the lateral axis, perpendicular to the longitudinal axis.

**Pocket rod** - A surveyor's measuring tape that has large numerals and is removable from its case.

**Point of actual perception** - The point in the sequence of events at which an object is actually recognized as a potential hazard.

**Point of possible perception** - The point at which it would have been possible under conditions of weather, light, roadway, etc. existing at the time the incident occurred for a normal person to recognize an object as posing a hazard.

**Point of rest (POR) controlled** - That place to which a vehicle is driven, pulled, pushed or rolled by persons or by forces other than the collision forces.

**Point of rest (POR) uncontrolled** - That place where the vehicle comes to rest solely to the collision forces. (This is the POR used for determining V1 & V2 in COLM and vector analysis).

**Point of separation** - The point in the collision sequence where collision forces have been dissipated and the objects in contact have the opportunity to physically separate from and no longer influence each other.

**Porosity (tire)** - The volume of air loss through the pores in the compound of a tire.

**Post-accident damage** - Damage caused by (handling) extrication, wrecker operation and vehicle storage.

**Post-impact sequence** - The period of time in a collision sequence from the point of separation or point of maximum engagement of the vehicles, or from the point of maximum engagement of a vehicle with an object, to the occurrence of the last event which

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significantly influences the vehicles, object or vehicle occupants.

**Pre-crash sequence** - The period of time in the collision sequence from the significant event to initial contact.

**PSI** - Pounds per square inch. Usually measured with tires at ambient air temperature.

**Pull-back shot** - A photo taken at a greater distance to identify the location of an object prior to taking close-up shots of the object. Used also to show the location of damage area on a vehicle.

**Puncture** - Damage to a tire resulting from an object penetrating the tire.

**Radial (tire)** - A tire having casing plies with cords running at 90 degrees to the bead. The plies can be either steel or fabric.

**Radical sign** - A symbol indicating a square root function is to be performed on the term under it.

**Ratio** - A mathematical expression relating the value of two numbers to one another.

**Reaction (simple)** - Response to an expected situation. No choice among alternatives required. Average found to be .75 seconds.

**Rear-end collision** - A collision wherein the front of one moving vehicle strikes another vehicle from the rear, usually forcing it forward, often with rotation, which depends on the alignment of the centers of mass of the vehicles.

**Resultant force** - A single force which is due to the vector summation of two or more forces.

**Roll axis** - The axis extending from the rear to the front through the center of an object. Longitudinal axis.

**Rollover damage** - Usually damage to roof lines, hood lines and vehicle scratches and scrapes running angled or crosswise to the longitudinal axis of the vehicle.

**Roller-wheel measuring device** - A device that measures distances by means of a large or small roller wheel.

**Rolling friction** - The resistance to motion attendant to the rolling of one body across another (e.g., a vehicle rolling to a stop on a surface after impact - accepted is .02 - .05).

**Rotation** - The movement about an axis or center of mass (see roll, pitch, yaw).

**Rub-offs** - A transfer of material from one vehicle or object to another vehicle (e.g., paint, tire marks, fabrics).

**Scalar quantity** - A quantity that has only magnitude (e.g., 30 mph), with no reference to direction.

**Scrape** - An abrasive scar on a surface material with some measurable width but little or no depth.

**Scratch** - An abrasive mark or material left on a surface, usually narrow in nature with little or no depth.

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- Scuff mark** - A mark left on a surface by a tire that is both rotating and side slipping.
- Seat belt D-ring** - A plastic or metal guide through which the seat belt passes.
- Seat belt retractor** - A device designed to store, release, retract or lock the seat webbing, in accordance with the situation.
- Secondary contact** - An additional contact with the same or another object or vehicle after disengagement from the first contact.
- Self-timer** - A camera feature that, once engaged, allows the camera to shoot independently of the operator.
- Sense** - In vector diagraming, the direction that the vehicle enters or leaves the coil (indicated by an arrowhead).
- Series of events** - The sequence of events leading up to and taking place during and after a collision. A collision is divided into three specific periods of time: pre-crash, at-crash and post-crash.
- Shallow approach-angle collision** - For two vehicles in motion, a collision in which the angle between the directions of travel of the vehicles with respect to each other is typically less than 15 degrees. For a vehicle and any stationary object, the angle formed by the path of the vehicle to the object is likewise typically less than 15 degrees.
- Shot sequence** - The order in which a scene is shot as it applies to direction (clock or counterclockwise).
- Shutter speed** - The setting for the shutter that determines how long the film in the camera will be exposed to the light.
- Sideswipe** - A collision wherein two objects contact one another at an extremely shallow angle. The general direction of their pre-collision paths changes at most only slightly after the collision.
- Sidewall** - The area on each side of a tire between the crown and the start of the bead area.
- Simple reaction time** - Reaction time involving a single stimulus and a single response. Determined through testing to be .75 seconds on average. Does not include perception time.
- Sine** - A trigonometric function that in a right triangle is the ratio of the length of the side opposite the acute angle to the length of the hypotenuse.
- Skid mark** - A mark left by a locked, nonrotating wheel sliding in contact with a surface.
- Skid patch** - The evident result (flat spot) on a tire of a wheel locked and sliding.
- Skid resistance** - The frictional force which resists the motion of a skidding wheel or tire. This force is dependent on the type and condition of the surface on which the skidding takes place.
- Slope** - The degree to which a surface is inclined to the horizontal (see grade).
- SLR camera** - A single lens reflex camera, in which the viewing and shooting image take

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place through the same lens. Eliminates parallax.

**Sonar measuring device** - A device that uses sound waves to measure distance.

**Speckling** - The evident result on a tire of a wheel under deceleration but not yet stopped.

**Speed** - The rate of movement without regard to direction. It is a scalar quantity.

**Speed loss** - The amount of speed or velocity lost as a result of a force acting on a body.

**Static friction** - The force exerted between two surfaces by reason of weight without motion.

**Stopping distance (total)** - The sum of the reaction distance and the distant vehicle travels to a stop.

**Striations** - Narrow, light, parallel stripes or streaks on the roadway or on vehicle usually resulting from abrasion when friction is created between two surfaces.

**Subscript** - A number appearing after and somewhat lower than the symbol to which it is attached. Used as an identifier only, it has no mathematical function.

**Substituting** - Replacing numbers or symbols in an equation by a value.

**Subtrahend** - The number being subtracted from another number.

**Superelevation** - The percent of rise or fall measured across the roadway at an angle from an edge to the center line of a straight road ( $e = \text{Rise/Run}$ ). On curves the percent change in elevation is measured across the entire roadway, from the inside edge of the curve to the outside edge. This change on curves is also known as banking or cross slope.

**Takeoff angle** (fall or vault) - The angle between the CM's direction of travel parallel to the surface at takeoff and the horizontal.

**Takeoff point** (flip, fall or vault) - The point at which a vehicle leaves the ground to flip, fall or vault.

**Takeoff speed** - The speed at which the vehicle leaves a surface and becomes airborne.

**T-bone** (90 degree) - A collision wherein the forces oppose one another at or near 90 degrees.

**Tangent** (to an arc) - A straight line that touches a curve at only one point no matter how far the line is extended.

**Tangent** (trigonometry) - A trigonometric function that for a right triangle is the length of the leg opposite the acute angle to the leg adjacent to that angle.

**Telephoto lens** - A lens used to enlarge far objects so they appear to be closer (high millimeter number, i.e., above 70 mm).

**Terminal velocity** - The maximum velocity attainable by a falling body, which may vary with the mass and configuration of the body.

**Theodolite** - A device that measures distances and computes angles of interest from magnetic north.

## GLOSSARY OF TERMS

**Tire age** - May be determined by the last three digits and symbol of the DOT number e.g., 376 A, in which 376 means the 37th week of a year ending in 6, while the triangle designates the decade of the 90's - thus 1996.

**Tire footprint** - That part of the tire which is in contact with the road.

**Total station** - A mapping instrument capable of measuring distances and angles and storing the collected data, from which a computer generated map can be produced.

**Track width** - Vehicle manufacturers define track width as the distance between the centers of corresponding wheels on opposite sides of the vehicle for evidence gathering purposes at the scene, however, accident investigators measure at a right angle from the outermost point of the track left by a wheel side to the outermost point left by the corresponding wheel on the other side. This distance will be somewhat greater than the track width listed by the manufacturer. The rear track width of a vehicle may be different from the front track width.

**Trajectory** - The curve through which a vehicle or body moves while in an airborne state.

**Transform** - To change in composition, state or structure (e.g., kinetic energy is transformed to thermal energy, heat, during braking).

**Tread** - The area composed of ribs and grooves that lies between the crowns of the tire.

**Treadwear indicator** - A small triangle, or the letters (TWI), or some other marking embossed in several places on the side of a tire. A wear bar is located in the tread next to each place an indicator appears.

**Trigonometry** - The area of mathematics concerned with determining of the size of the angles and the length of the sides of a triangle through use of side and angle relationships.

**Tripod** - An adjustable three-legged camera support.

**Truncating** - Shortening or rounding a value down.

**Tungsten oxide** - A white powder-like substance deposited on or around the posts and/or filaments of a bulb, indicating that a tungsten filament was incandescent or partially incandescent when it was oxidized or burned.

**Uniform acceleration** - Constant acceleration, meaning that the velocity change constant rate with each unit of time (one second).

**Unit** - A general label given to a standard measure for a quantifiable substance (e.g., foot, meter, pound, kilogram).

**Vanishing point** - The point at which the extended sides of a grid appear to converge.

**Vault** - The process of elevating an object away from its level horizontal path.

**Vector addition or subtraction** - Generally done by creating a vector diagram of geometric scaled figures.

**Vector diagram** - The scaled geometric representation of an accident based on or subtracting vectors.

**Vector quantity** - A quantity that has both magnitude and direction (e.g., the momentum of

## GLOSSARY OF TERMS

collision vehicles preceding or following impact).

**Velocity** - The rate of change of distance with respect to time. Velocity is a quantity.

**Wear patterns** - Indications of wear on tires due to improper balance, improper alignment or improper air pressure.

**Weight** - The heaviness of an object, generally expressed in pounds or kilograms (the mass of an object times the earth's gravitational rate).

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**Weight (collision vehicle)** - The actual weight of the vehicle in pounds including occupants, cargo, fuel and other fluids.

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**Weight shift** - A transfer of weight from one portion of a vehicle to another as the consequence of an acceleration, deceleration or turning.

**Wheelbase** - The straight-line level distance between the center of the front wheel and the center of the rear wheel on the same side of the vehicle, with the wheels straight-ahead.

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**Wide angle lens** - A lens used to capture a wide view even at close millimeter number, e.g., 28 - 35 mm).

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**Witness marks (seat belt)** - Discernable marks left on the seat belt or the seat-belt hardware as a result of the extreme forces of a collision.

**Work** - A quantity used to measure the physical effort expended by a force moving an object through a distance. Its unit is the Ib-ft (joule).

**Yaw** - Rotation of a body about its vertical axis.