DID YOU KNOW…

...that the 3.5-liter, 100 percent fuel-grade ethanol-powered engines of IndyCar Series cars produce more than 650 horsepower, nearly four times that of the average street car?

…that each of the eight pistons in an IndyCar Series engine travels nearly 1 mile up and down in the cylinder every minute?

…that each of the eight pistons in an IndyCar Series engine is subjected to a maximum acceleration of 70,000 times the force of gravity?

...that the fuel mileage of an IndyCar Series car is less than 2 miles per gallon? A car burns approximately 1.3 gallons of fuel per lap at the Indianapolis Motor Speedway.

...that an IndyCar Series car accelerates from 0 to 100 mph in less than three seconds, more than nine seconds quicker than it takes a production Porsche 911 Turbo street car to reach the same speed?

...that a 1,565-pound IndyCar Series cars generates 5,000 pounds of downforce at 220 mph, enough to allow the car to run upside down if that speed is maintained?

...the tread depth of an IndyCar Series tire is 3/32nds of an inch – slightly thicker than a credit card?

...a front tire for the IndyCar Series weighs approximately 18 pounds - slightly less than the average weight of a 1-year-old child?

…at speed, the tread area of the racing tires approaches the temperature of boiling water (212 degrees Fahrenheit)? At those levels, the tread area actually becomes tar-like in consistency to help the tires and car adhere to the track.

…at any given moment on the racetrack, the total area of all four tires that is in contact with the track surface is equal to about 1 square foot? That means that an area not much bigger than a sheet of notebook paper is responsible for transferring all the technology and power generated by IndyCar Series cars into speeds exceeding 220 mph.

…at speeds of 220 mph, the front tires of an IndyCar Series car rotate at a rate of 43 times per second. That means, over the course of a single lap at Indianapolis Motor Speedway, the front tire will experience approximately 1,955 revolutions, and the rear tires will experience 1,800 revolutions. Considering a normal fuel stint is 30 laps or more at Indy, each tire could experience more than 60,000 revolutions before it is changed for a fresh set.

...that the draft (or the “hole” in the air) created by an IndyCar Series car extends 25 feet behind the car?

...that while traveling approximately 220 mph, IndyCar Series cars travel slightly more than the length of a football field every second?

... that, on an oval, IndyCar Series drivers endure G-forces equal to nearly four times the weight of gravity while going through turns? The space shuttle leaves the launching pad at Cape Canaveral with approximately the same force.

Sources: Indy Racing League Media Relations, Indy Racing League Technical Department, IndyCar Series race teams, Firestone, Honda.

RACING FLAG COLORS AND MEANINGS

Checkered Flag:	Signifies the end of the practice session, qualification attempt or race. The race leader is declared the winner.
Green Flag:	Signals the start of the practice session, qualification attempt or race and all restarts after a caution or red-flag period.
Yellow Flag:	The "caution flag," signals hazardous conditions on the track, and cars must slow immediately, maintain position and yield to track safety vehicles until the green flag is displayed. During a qualification session, a qualification attempt is halted.
White Flag:	Displayed when the leader starts the final lap of the race. During qualifications, signals that driver has started final lap of qualification attempt.
Royal Blue Flag with Diagonal Yellow Stripe:	The "passing flag," signals slower cars to yield to faster traffic.
Red Flag:	Signals that the race stops immediately, regardless of position of cars on the track.
Black Flag:	Directs a driver to proceed to the pits on the next lap and to consult with race officials.
Black Flag with White Cross:	Officials have ceased scoring the car until further notice.
Alternating Red and Yellow Striping:	Signals that oil, water or some other substance has made track surface slippery.

GLOSSARY OF INDIANAPOLIS 500 TERMS

Accelerometer – Device in driver's earpiece that measures force a driver's head experiences in an impact.

Adhesion – The maintenance of contact between two touching objects. Adhesion refers to a static condition, whereas traction (also known as "grip") refers to a moving condition.

Aerodynamics – As applied to racing, the study of the interaction between air and the resistance and pressures created by the passage of a moving car through the air.

Air box – Opening in the engine cowling, immediately above and behind the driver's head, which allows large volumes of air to enter the engine, providing the needed oxygen for fuel to ignite within the engine.

Apron – The paved (and usually flat) portion of a racetrack that separates the racing surface from the infield.

Attenuator – A safety device made of carbon fiber and honeycombed aluminum mounted on the rear of the gearbox. Enhances driver protection by absorbing much of the force of a rear impact.

Banking – The degree at which a track slopes from the apron up to the outside retaining wall. At Indianapolis, the banking in the turns is relatively flat, at 9 degrees, 12 minutes, compared to other tracks. Texas Motor Speedway, for instance, features 24-degree banking in the turns.

Bite – Adhesion of a tire to the track surface.

Blister – Bubbles on the surface of a tire created by overheating of the tread compound.

Bubble – The slowest car in the field of 33 is "on the bubble" during qualifying and will be removed from the field if a subsequent qualifier is faster.

Buckeye – External opening to the fuel cell. The fuel hose connects securely to the buckeye during refueling.

Bump – When the slowest car in the qualified field of 33 is removed, or "bumped," from the field by a faster car during qualifying.

Camber – Degree to which right-side tires lean in toward the car (from the top of the tire) and the left-side tires lean out. A useful tool to gain grip in corners by maximizing the amount of tire-to-track contact.

Camshaft – A rotating shaft in the engine that opens and closes the engine's intake and exhaust valves.

Carb Day – The final on-track practice before Race Day each year during the Indianapolis 500, taking place on Friday of Race Week, two days before the race. The Miller Lite Carb Day schedule includes the Freedom 100 Indy Pro Series race and the Indy 500 Pit Stop Challenge. The term "Carb Day" was originated because in the past, this was the final day teams could make adjustments of their carburetors and other engine systems based on track performance. All IndyCar Series engines are fuel-injected today; carburetors have not been used since 1963.

Chassis – The central body of the car, including the driver's compartment. Also referred to as the "tub."

Chute – At Indianapolis, the "short chutes" are 1/8-mile straightaways located between the corners. The "south short chute" is located between Turns 1 and 2, and the "north short chute" is located between Turns 3 and 4.

Compound – Tire compound refers to the chemical makeup of the rubber used in the Firestone Firehawks tires, which generally differ from track to track. The level of grip (or adhesion), durability and sidewall strength required varies from track to track, depending on factors such as the track surface, banking, length of race and angle of corners.

Contact patch – The portion of the tire that makes contact with the racing surface. Various chassis and tire adjustments can be made to maximize the contact patch.

Crankshaft – The rotating shaft within the engine that is turned by the up-and-down motion of the pistons. The crankshaft transfers power to the flywheel, and in turn to the transmission. The crankshaft is housed within the crankcase, which is part of the engine block.

Diaper – A blanket made from ballistic and absorbent material that surrounds part of the engine and serves as a containment device during accidents and engine malfunctions.

Dirty air – Turbulent air, created by another car or group of cars, which negatively affects the handling characteristics of a following race car.

Disc – In brakes, the rotor, the part which revolves and against which brake linings are pressed during braking.

Displacement – In an engine, the total volume of air-fuel mixture an engine theoretically is capable of drawing into all cylinders during one operating cycle.

Downforce – Creation of force through aerodynamics, which keeps the car stuck to the track. High-speed movement of air underneath the car creates a vacuum, while the wings on the car force it to stay on the ground, acting in a manner opposite to the wings on a jet airplane.

Drafting – See "Tow."

Drag – Aerodynamic forces that impede the free flow of air over or beneath a race car. Drag can be increased or decreased by teams based on a number of adjustments, primarily front and rear wings.

Dyno – Short for "dynamometer," a static machine used to measure an engine's horsepower output.

Engine block – An aluminum casting from the manufacturer that contains the crankshaft, connecting rods and pistons.

Ethanol – Clear, liquid fuel produced from crops such as corn, grain sorghum, wheat, sugar and other agricultural feedstocks. Cars in the Indianapolis 500 use 100 percent fuel-grade ethanol.

Fuel cell – The single, rupture-proof, 22-gallon cell that carries the ethanol powering the IRL IndyCar Series car. The fuel cell is located directly behind the driver.

Fuel injection -- A system replacing conventional carburetion that delivers fuel under pressure into the combustion chamber of the engine or airflow before entering the chamber.

Grip – How well the tires maintain traction through contact with the racing surface.

Groove/line – Term for the fastest or most efficient way around the racetrack. Often most drivers will use the same groove around the racetrack, and that portion of the track will consequently appear darker in color than the rest of the track due to the buildup of tire rubber.

Handling – A race car's on-track performance, determined by factors such as tire and suspension setup, and other aerodynamic issues.

Happy Hour – The final hour of each practice day during which many drivers attempt to post their fastest lap of the day, taking advantage of cooler conditions.

Horsepower – The power of an engine measured in terms of a unit of power equal to 550 foot-pounds per second. The 3.5-liter IndyCar Series engines have an estimated 670 horsepower.

Line – See "Groove."

Loose – The rear of the car is unstable due to a lack of rear-tire grip caused by too much front downforce or not enough rear downforce. Also known as "oversteer."

Marbles – Excess rubber buildup above the groove on the track, the result of normal tire wear throughout the race.

Neutral – Term used to describe the handling of the car when it is neither loose nor pushing (tight).

Nomex – Trade name of DuPont, a fire-resistant fabric used in the manufacturing of protective clothing.

Pit stall – The working area along pit lane assigned to each team during the race, in which the team changes tires, adds fuel and makes adjustments to the car. Each team is allocated a pit stall 13 feet wide and 47 feet long at the Indianapolis Motor Speedway.

Pole position – The driver who is the fastest qualifier in pole qualifying sits on the "pole," or first starting position of the race, which is on the inside of the front row. The term originates from horse racing. The horse that started on the inside was closest to the pole located inside the inner guardrail, and thus was on the "pole position."

Probe – Nozzle which is attached to fuel hose and connects securely to the buckeye during refueling.

Pushing – The car does not want to turn in the corners due to a lack of tire grip. This can be caused by a lack of downforce on the front of the car or too much downforce on the rear of the car. Also known as "understeer" and "tight."

Refresher test – Veterans without recent race experience sometimes are required by race officials to complete the final two speed phases of the Rookie Orientation Program – a "refresher test" – before they are allowed to participate in the Indianapolis 500.

Rev limiter – Electronic/computer device in the engine controls that causes a controlled engine misfire if engine revolutions per minute (rpm) exceed the limit set by IndyCar Series rules. The legal rpm (or "rev") limit is 10,300 rpm. The rev limiter is used primarily to control speeds, thereby increasing safety and controlling costs.

Ride height – The distance from the bottom of the chassis to the ground when a car is at speed. IndyCar Series rules stipulate that the ride height of the sides of a car should be 2 inches off the ground for all tracks.

Rookie – An Indianapolis 500 rookie is a driver who never has competed in the race. Therefore it is possible for a driver with prior IndyCar Series or other high-speed open-wheel experience to still be classified as an Indianapolis 500 rookie if that driver never has competed in "The Greatest Spectacle in Racing."

ROP – Abbreviation for Rookie Orientation Program, the four-phase speed test that all Indianapolis 500 rookies must pass before they are permitted to participate in the event.

RPM – Abbreviation for revolutions per minute.

SAFER Barrier – The Steel and Foam Energy Reduction (SAFER) Barrier, an energy-absorbing barrier system attached to the outside retaining walls in each of the four turns of the Indianapolis Motor Speedway. The energy-absorbing barrier, installed in May 2002, was constructed in 20-foot modules. Each module consisted of four rectangular steel tubes, welded together, to form a unified element. The modules are connected with four internal steel splices. Bundles of 2-inch-thick sheets of extruded, closed-cell polystyrene are placed between the concrete wall and the steel tubing modules every 10 feet. Six or seven sheets of polystyrene are used in each bundle, depending on the location on the module. The original SAFER Barrier was removed in August 2004 to repave the track, and an updated SAFER design was installed in spring 2005 with five rectangular steel tubes in each module.

Setup – The aerodynamic and mechanical adjustments that can be made to a car to create the ideal balance between handling and speed.

Side pod – Bodywork on the side of the car covering the radiators and engine exhaust. Aids in engine cooling, car aerodynamics and driver protection in the event of a side impact.

Slick – n. A tread-less tire, used only on dry surfaces. Slicks provide maximum contact with the track surface, thereby enhancing grip. In wet conditions, treaded tires are used to dissipate the water build-up between the track and the tire surfaces in order to increase grip. adj. A track condition where a car's tires do not adhere to the surface. This could be for a variety of reasons, such as a lack of rubber on the surface (a "green track"), dirt on the track or high track temperatures.

Stagger – Right-front and/or right-rear tire is larger in diameter than left-side tires in order to improve turning ability on ovals.

Sticker tires – Slang term for new tires, derived from the manufacturer stickers placed on each new tire.

Superspeedway – A racetrack of 1.5 mile or more in length.

Suspension & Wheel Energy Management System (SWEMS) – Wheel-restraint system using multiple restraints attached at multiple points to a car's chassis and suspension designed to minimize the possibilities of wheel assemblies becoming detached during high-speed accidents. The restraints are made of FIA-approved Zylon. This material, with its high-tensile properties and its wound construction (opposed to woven), has a breaking strength of 5 tons. The Indy Racing League introduced SWEMS in May 1999.

Telemetry – A radio device that relays information such as engine, tire, steering and throttle performance to team engineers in the pits. The team can monitor both car and driver activity to ensure the car is performing properly. Also enhances driver safety by allowing the team to notice any developing mechanical problem the driver cannot foresee.

Tight – Also known as “understeer.” A handling condition characterized by a lack of grip in the front tires. As the driver steers through a turn, the front wheels want to continue straight ahead.

Tire compound – A formula based on rubber polymers, oils, carbon blacks and curatives used to create a tire. The varying lengths and banking of IndyCar Series tracks require different compounds.

Toe – Refers to the alignment of the front and rear tires. If tires point inward, the alignment is called “toe-in;” if outward, it is called “toe-out.” Correct toe settings are essential in order to maximize grip, and generally change from track to track.

Tow/drafting – As a car moves around the track at 220 mph, it literally splits the air, some of which goes over the car, and some of which goes beneath. This lack of air behind the car creates a vacuum, which a trailing car may use to be pulled, or “towed,” by the lead car.

Tub – See “Chassis.”

Victory Lane – The location of post-race celebration for the race winner. The Indianapolis 500 Victory Lane and post-race celebration was developed circa 1919 and took place at the south end of the main straightaway. It moved to its current location in 1971. Today, the circular Victory Podium is located in front of the Bombardier Learjet Pagoda and is used for both pre- and post-race festivities.

Wave off – The process by which a team forfeits a qualification attempt. A driver or team can “wave off” an attempt any time before the start of the fourth and final lap in the attempt. If the run is waved off before the car takes the green flag, it does not count as one of the three allowed attempts for that car. Once the green flag is waved to start the attempt, the run counts as one attempt, even if it’s waved off.

Weight jacker – A hydraulic cylinder the driver uses to adjust car handling from the car’s cockpit while racing. The cylinder compresses or extends springs, which transfers the car’s weight distribution from one side of the car to the other, thereby adjusting the car’s handling to the driver’s liking.

Wicker bill – A long, narrow, removable spoiler made of steel, aluminum or carbon fiber on the trailing edge of the front and rear wings which varies in height, creating downforce. Teams will use different sized wicker bills to create more or less downforce. The larger (higher) the wicker bill, the greater the downforce, and vice versa for smaller wicker bills.