

# 2007 Explorer Sport Trac Chassis

## ALL-NEW SPORT TRAC CHASSIS DELIVERS BALANCED RIDE CONTROL AND ROAD ISOLATION

- All-new, tube-through-tube frame is 444 percent stiffer than previous model
- All-new independent front and rear suspensions deliver exemplary ride and handling
- Confident handling augmented by four-wheel disc brakes with standard ABS, Electronic Brake Distribution, Advance Trac® with Roll Stability Control
- Available 17-inch or 18-inch wheels are both firsts for Sport Trac

The 2007 Ford Explorer Sport Trac offers an all-new chassis that delivers impressive durability and capability inspired by the Ford F-150, paired with the class-leading ride and handling of the 2006 Ford Explorer.

The key to Sport Trac's new, refined driving character and increased capability is its all-new frame. The new, tube-through-tube design provides a 444 percent increase in stiffness over the previous model. The all-new front suspension features short- and long-arm geometry and monotube shocks for additional ride control and comfort. For the first time, Sport Trac is offered with an independent rear suspension (IRS), designed to deliver the capability of a pickup truck and the ride comfort of passenger car.

"You wouldn't even want to bring in a comparison to a compact pickup in terms of ride and handling," says Raj Nair, SUV and Body-on-Frame vehicles executive director. "The highest praise I can give the Sport Trac team is that they achieved the same driving experience as the new Explorer. Like Explorer, the new Sport Trac is just as comfortable on the freeway as it is driving down a washboard road, with the ideal balance of road isolation and ride control."

To maximize manufacturing efficiency, the new Sport Trac shares much of its hardware with the new 2006 Explorer. However, the engineering team tuned the component systems to fit the unique requirements of the Sport Trac, according to John Davis, Sport Trac vehicle engineering manager:

"Conceptually, the fundamental architecture is the same as the 2006 Explorer. However, we added almost 17 inches in wheelbase to the frame as well as minor modifications such as the spare tire carrier, a unique driveshaft carrier, and a unique, integrated tow bar.

"Although the chassis hardware is identical, it is tuned differently. We really created a new product, and needed to tune the chassis as a system. For example, we use a unique steering ratio to accommodate the longer wheelbase, and stiffer dampers, coil springs, and roll bars to accommodate the change in weight distribution."

### **All-new, tube-through-tube frame is 444 percent stiffer**

The driving dynamics of any vehicle are founded upon the strength of its frame. Fortunately, the 2007 Sport Trac offers an all-new frame that is shared with the 2006 Explorer. This frame is 444 percent stiffer torsionally than the previous Sport Trac assembly, even though the wheelbase increased 4.3 inches.

Extensive computer-aided engineering (CAE) modeling enabled engineers to add strength where it was needed. For example, the new frame rails feature taller and wider sections than before. In crucial areas, the sections are also thicker for additional strength where it's needed, without added extra weight where it's not.

Possibly the most significant change was moving from traditional flat joints – with the cross beams attached to the top of the frame rails – to box joints. The Sport Trac adopts the F-150's tube-through-tube frame design, where the cross beams pass through the frame rails, creating an inherently stronger joint. These joints are then completely welded around the perimeter.

“Lift the body off the Sport Trac, and you will see the little brother of the F-150 frame,” says Nair.

The stiffer frame also helps eliminate squeaks and rattles in the cabin, improving long-term customer satisfaction.

“One of the easiest ways to detect frame flex is noise in the cabin,” says Davis. “As the frame moves, it causes body panels and trim pieces to squeak and rattle as they shift position. Thanks in large part to the new frame, the 2007 Sport Trac is remarkably quiet, even on our toughest off-road washboard tests and four-post shaker tests.”

Like the 2006 Explorer, the new Sport Trac features a factory tow hitch integrated into the last crossmember of the frame. This contributes to the stability of the frame, and cuts down on the added weight of a secondary, bolt-on aftermarket receiver. A Class II receiver is standard, while a Class III/IV trailer tow package is available. The tow receiver is modified from that of the new Explorer, as the Sport Trac bar dips down, under the fascia of the rear step bumper.

### **New suspension attachment points and post-hole piercing improve isolation, build quality**

In addition, the new Sport Trac features all-new body and suspension mounts. These brackets also benefited from extensive CAE modeling, adding strength without adding unnecessary weight.

Many of the body and suspension attachment points are manufactured with a post-piercing technique. Instead of pre-drilling the holes before assembly, with post-piercing the brackets are mounted to the frame and then the holes are pierced.

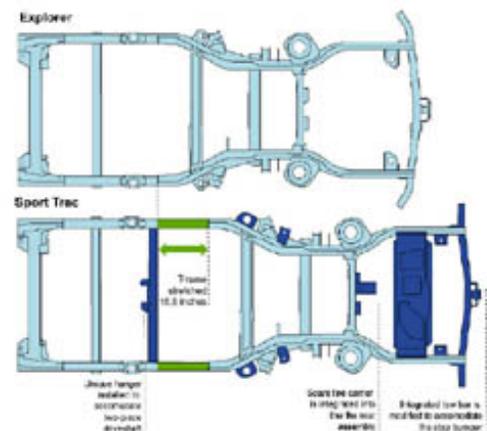
Before, the holes had to be made larger than necessary to compensate for manufacturing variances. These variances in the frame could add up to six millimeters in total. Mounting the bracket and then punching the hole removes much of that variance from the equation. Some tolerances have decreased as much as 50 percent, providing much better build quality, with consistent fit and finish and fewer long-term squeaks and rattles.

Such an improvement is evident in how the Sport Trac cargo box is mounted to the frame. Previously, the margin between the cab and bed was set by using plastic spacers sandwiched between the two surfaces. After the bed bolts were run through, the spacers were removed. Improvements for the 2007 program, such as the precision of post-hole piercing, enable mounting the box without any manufacturing aids.

New body mounts were also used to improve the overall noise, vibration, and harshness of the 2006 Explorer. The new, softer mounts feature butyl rubber for improved damping and tuning. The stiffer frame and softer body mounts help isolate road inputs before they can reach the passenger compartment.

“Before, the majority of our body mounts were natural rubber or urethane,” says David McCreadie, Sport Trac vehicle NVH supervisor. “Where appropriate, we’ve used new mounts made of butyl

This side-by-side comparison with the 2006 Explorer frame illustrates the 2007 Sport Trac's additional wheelbase, and unique driveshaft hanger, spare-tire carrier, and integrated tow bar.



rubber to help dampen impacts, rather than bounce on impact.”

According to McCreadie, this new butyl rubber allowed the NVH engineering team to help isolate road impacts transmitted into the cabin. This, in turn, allowed the chassis dynamics team to provide a firmer suspension tuning, for improved handling without sacrificing ride comfort or road isolation.

### **All-new, fully independent suspension takes advantage of frame improvements**

To capitalize on the stiffer frame and improved isolation from road impacts, engineers developed an all-new front and rear suspension for the 2007 Sport Trac. The suspension features a short-/long-arm, coil-over-shock design. The new, stamped-steel upper and lower control arms are both stronger and significantly lighter. As a result, engineers were able to accommodate the available 18-inch wheels without negatively increasing unsprung weight.

Both the front and rear suspension assemblies incorporate new monotube shocks, again to take advantage of the new road isolation and frame stiffness. Compared with traditional twin-tube shocks, monotube shocks enable much more tuning flexibility, delivering softer reaction to impacts – such as potholes and expansion joints – while providing exemplary body control over larger road undulations and under cornering.

Like most of its competitors, the previous Sport Trac featured a live rear axle, suspended on leaf springs. For 2007, the Sport Trac features the same independent rear suspension (IRS) assembly showcased on the Explorer.

This all-new suspension features a patent-pending trailing blade that features a stamped-steel arm with an integrated casting for the knuckle attachment and welded steel-tube control arms. The coil-over springs and stabilizer bar have slightly stiffer rates than those of the 2006 Explorer, to accommodate the change in weight distribution. Like the front suspension assembly, the IRS features significant weight savings for decreased unsprung mass.

IRS offers significantly better handling over both smooth and rough surfaces as each wheel reacts independently to bumps in the road, moving both up and rearward to absorb the bumps and reduce impact harshness. The IRS’s ability to soak up longitudinal forces, such as those imposed by potholes or sharp pavement bumps, translates directly into a more comfortable ride and reduced harshness. Maintaining lateral stiffness helps keep the rear of the vehicle from swaying side-to-side in bumps or maneuvers.

The trailing blade design, with a large bushing at the connection of the trailing blade and frame, helps further isolate rearward impacts.

“The bushing acts as a ‘soft spring,’” says Davis. “During an impact, the bushing absorbs more energy that would otherwise travel into the passenger compartment.”

In addition, the suspension’s ability to maintain optimum contact between the tires and pavement also helps communicate important feedback – handling “feel” – to the driver through the steering wheel.

In addition, IRS drastically reduces rear-end skate, which is the lateral movement that occurs when a vehicle with a solid rear axle travels over sharp bumps or washboard/corrugated road surfaces.

The Sport Trac also features the innovative porthole-in-frame design, first introduced on the 2002 Explorer, where the IRS halfshafts pass through the frame rail. This lowers the IRS assembly even further, providing a lower center of gravity for improved handling. Lowering the IRS assembly also enabled the engineering team to incorporate storage bins under the floor of the cargo box.

### **Improved braking system contributes to increased payload capacity, increased towing capacity**

To match the increased capability, 2007 Sport Trac now features sizeable, four-wheel-disc brakes: 305- x 30-millimeter vented front discs, and 301- x 12-millimeter solid rear discs. The two-piston front calipers measure 51 millimeters for increased pad surface area. In addition, new caliper housings are stronger for less flex under full brake pressure. This provides increased braking effectiveness and improved heat.

As a result, the 2007 Sport Trac delivers an impressive 1,450 pounds of payload capacity and 6,800 pound towing capacity.

“It was essential that the new Sport Trac match the confident towing manners of the Explorer,” says Davis. “You want to make sure the tow vehicle is in control of the trailer, not the other way around. A significant amount of chassis testing was done to validate that the suspension, powertrain, and braking systems are confident and composed, even when pulling a trailer that weighs almost 3,000 pounds more than the truck.”

Contributing to the confident nature of the Sport Trac is the standard four-wheel, four-channel antilock braking system (ABS) with electronic brake force distribution (EBD). The ABS with EBD systems work in unison for dynamic brake-force proportioning, measuring braking force versus traction and allocating brake pressure to the wheels that have the best grip even before the ABS system kicks in. This helps reduce the braking distance. The confident braking system is paired with standard AdvanceTrac® with Roll Stability Control, creating a comprehensive active safety system to help prevent accidents from occurring.

### **New, drooping-flow steering system and available 18-inch wheels**

The front end also benefits from a new, low-friction rack-and-pinion steering system. The system features a “drooping flow” pump that reduces steering efforts at parking-lot speeds. However, as the speeds increase, the steering system automatically decreases assistance, for a firm, confident feel on the freeway. A unique 17.4:1 steering ratio is used on 2007 Sport Trac, to account for the 16.8-inch increase in wheelbase compared to the 2006 Explorer.

“The steering is really remarkable,” says Davis. “In fact, some prefer the steering feel of the new Sport Trac to that of the Explorer. It’s nice and light at low speeds, making the Sport Trac very easy to maneuver in and out of parking spaces. Yet, you don’t want light steering efforts at highway speeds, as that can cause drivers to input steering changes they didn’t really want.”

The steering system also benefits from improved mounting brackets and the revised front suspension. As a result, tactile vibration felt through the steering wheel has decreased by 35 percent.

Finally, the Sport Trac will be available with three wheel-and-tire packages:

- 16-inch wheels with P235/70R-16 all-season tires
- 17-inch wheels – a first for Sport Trac – with P245/65R-17 all-terrain tires
- 18-inch wheels – also a first for Sport Trac – with P235/65R-18 all-season tires

### **Profile on Raj Nair, SUV and Body-on-Frame Vehicles executive director**

Overseeing the product development of Ford body-on-frame vehicles, Raj Nair has seen firsthand the advantages the new Sport Trac offers over the competition:

“The new chassis architecture is really an elegant engineering solution. The tube-through-tube frame features impressive torsional and bending rigidity, enabling a level of driving dynamics, refinement and build quality that is normally associated with unibody passenger cars. Plus, the new frame features the improved load isolation of a full body-on-frame vehicle, delivering capability that’s

close to a full-size truck.

“Paired with the new, fully independent suspension, the frame delivers ride and handling that is a quantum leap beyond what the competition offers. It’s an ideal balance of ride control and road isolation. It’s really comfortable in any situation – on the freeway, on a twisting two-lane mountain road or on a washboard two-track.”

For Nair, the Sport Trac also represents an elegant solution for delivering unique, niche products:

“The new Explorer and Sport Trac program is an example of how Ford is going to be more flexible, creating different top hats to fit a common platform. We are able to address the niche market the Sport Trac occupies very efficiently by sharing platform costs with the Explorer. Yet, we tuned the Sport Trac as a unique system, delivering an uncompromised vehicle with a very distinct personality.”

### **About Ford Motor Company**

Ford Motor Company, a global automotive industry leader based in Dearborn , Mich. , manufactures and distributes automobiles in 200 markets across six continents. With more than 327,000 employees and 110 plants worldwide, the company’s core and affiliated automotive brands include Aston Martin, Ford, Jaguar, Land Rover, Lincoln , Mazda, Mercury and Volvo. Its automotive-related services include Ford Motor Credit Company and Hertz. For more information regarding Ford’s products, please visit [www.fordvehicles.com](http://www.fordvehicles.com).