

MOTORCYCLE ENGINEERING PERFORMANCE

Comprehensive Technical Guide to 2010 Harley-Davidson Touring Models: Engineering, Performance Upgrades, and S&S Integration

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The 2010 model year represents a pivotal era in the evolution of Harley-Davidson's Grand American Touring lineup. Coming off the heels of the massive 2009 chassis redesign, the 2010 models solidified a new standard for stability, weight capacity, and heat management. This technical analysis explores the foundational engineering of the 2010 Touring platform, evaluates specific model variants like the FLHTK Electra Glide Ultra Limited, and delves into high-performance aftermarket integration through S&S Cycle power packages. For owners, technicians, and enthusiasts, understanding the mechanical nuances of this specific year is essential for maintaining and optimizing the quintessential American long-haul motorcycle.

The Engineering Foundation: The 2009-2010 Chassis Redesign

To understand the 2010 Touring models, one must first analyze the **single-spar, rigid backbone frame** introduced just one year prior. Before 2009, the Harley-Davidson Touring frame was a multi-piece assembly that often suffered from lateral flex under heavy loads or high-speed cornering—a phenomenon colloquially known as the "bagger wobble."

Structural Rigidity and Manufacturing

The 2010 chassis utilized a robotic-welded frame consisting of a single-spar backbone. This design reduced the number of individual components and welds, significantly increasing torsional stiffness. The **stout swingarm** was also redesigned using a deep-draw process, providing the necessary strength to handle the increased torque of modern Twin Cam engines and the heavy gross vehicle weight ratings (GVWR) required for two-up touring. This structural shift allowed for a 2-into-1-into-2 exhaust system routing that better shielded the rider and passenger from engine heat, a frequent complaint in earlier iterations.

Suspension and Geometry

The 2010 models featured a 17-inch front wheel (up from 16 inches on many previous models) and an 18-inch wheel on the Street Glide and Road Glide Custom. The front suspension utilized 41.3mm telescopic forks, while the rear featured air-adjustable shocks. This combination provided a sophisticated balance between plush ride quality and predictable handling. The rake remained at

26 degrees, but the trail was optimized to 6.7 inches, ensuring that despite the bike's 800+ lb curb weight, low-speed maneuvers remained manageable while high-speed stability was ironclad.

The 2010 Model Lineup: Technical Distinctions

The 2010 catalog saw the introduction of new trim levels and the refinement of existing legends. Each model shared the same core drivetrain but differed in aerodynamics, ergonomics, and standard features.

2010 Electra Glide Ultra Limited (FLHTK)

Positioned as the new flagship, the **FLHTK Ultra Limited** was designed to bridge the gap between the standard Ultra Classic and the CVO (Custom Vehicle Operations) models. The most significant technical upgrade was the inclusion of the **Twin Cam 103(TM) engine** as standard equipment, whereas other models retained the Twin Cam 96(TM). This provided a roughly 10% increase in peak torque, reaching 102 ft-lb at 3500 RPM.

- Standard Features: Brembo® triple-disc brakes with ABS, heated handgrips, Tour-Pak® luggage carrier, and a higher-output charging system.
- Target Demographic: Cross-continental travelers requiring maximum load capacity and integrated luxury.

2010 Road Glide Custom (FLTRX)

The 2010 Road Glide Custom featured a distinctive **frame-mounted shark-nose fairing**. Unlike the fork-mounted "batwing" fairing of the Electra Glide, the Road Glide fairing does not move with the handlebars, reducing the effect of crosswinds on the steering. In 2010, the Custom trim lowered the rear suspension and removed the front fender lamp for a more aggressive, "slammed" aesthetic, making it a favorite for custom builders.

2010 Electra Glide Classic (FLHTC)

The FLHTC served as the mid-range touring option, offering the essential long-haul components—hard saddlebags, Tour-Pak, and fairing—without the high-end electronics or the larger 103 engine found in the Ultra Limited. It utilized the 1584cc Twin Cam 96 engine mated to the **6-Speed Cruise Drive® transmission**.

Technical Specifications Comparison

The following table illustrates the core mechanical differences between the primary 2010 Touring models. All models utilize the Electronic Sequential Port Fuel Injection (ESPFI) system.

Feature / Specification	FLHTK Ultra Limited	FLTRX Road Glide Custom	FLHTC Electra Glide Classic
Engine Displacement	1690cc (103 ci)	1584cc (96 ci)	1584cc (96 ci)
Peak Torque	102 ft-lb @ 3500 RPM	92.6 ft-lb @ 3500 RPM	92.6 ft-lb @ 3500 RPM
Compression Ratio	9.7:1	9.2:1	9.2:1
Weight (As Shipped)	889 lbs	772 lbs	827 lbs
Fuel Capacity	6.0 gal	6.0 gal	6.0 gal
Oil Capacity	4.0 qts	4.0 qts	4.0 qts

High-Performance Integration: S&S Cycle Power Packages

For owners of 2010 models seeking to exceed the factory performance envelopes, **S&S Cycle** offers comprehensive engine kits. The 2010 year is particularly well-suited for these upgrades due to the robust nature of the 2009+ frame, which can handle significantly higher power outputs without chassis flex.

The 100/110 Power Package Mechanics

The S&S 110-inch Big Bore Kit is a "bolt-in" solution for the 2010 Twin Cam engines. Historically, increasing displacement to 110 cubic inches required machining the engine crankcases to accept larger cylinder spigots. However, S&S engineered specialized cylinders with high-strength liners that allow for a 4-inch bore without case modification.

- **Technical Componentry:** The kit typically includes 4-inch bore cylinders, forged pistons (usually around 10.5:1 compression), S&S 585 cams, and high-performance valve springs.
- **The Cam Chest Kit:** A critical sub-component of the S&S upgrade is the cam chest kit, which replaces the stock oil pump and cam plate. The S&S high-flow oil pump provides a 40% increase in pressure and a 60% increase in return (scavenge) flow, which is vital for cooling the larger 110-inch pistons.

Volumetric Efficiency and Tuning

Increasing displacement and cam lift requires a corresponding increase in airflow and fuel delivery. To extract the full potential of an S&S 110 kit on a 2010 FLHTK, technicians must address the **Volumetric Efficiency (VE)** tables in the ECM. This usually involves using a tool like the Vance & Hines FuelPak or Dynojet Power Vision to recalibrate the ESPFI for the new mechanical parameters. Failure to tune correctly results in lean conditions, excessive cylinder head temperatures (CHT), and potential piston galling.

Exhaust Dynamics: The Pro Pipe System

A frequent modification for 2010 Touring models is the installation of the **Pro Pipe** or similar 2-into-1 exhaust systems. From a fluid dynamics perspective, 2-into-1 systems are superior for torque production in the low-to-mid RPM range, which is where touring motorcycles spend 90% of their operational life.

Scavenging and Backpressure

The Pro Pipe utilizes a collector that merges the exhaust pulses from the front and rear cylinders. As a pulse from the front cylinder passes the collector, it creates a low-pressure area (vacuum) behind it, which helps "pull" or scavenge the exhaust gases out of the rear cylinder. This improves

the intake stroke's efficiency by ensuring the combustion chamber is clear of residual spent gases. This is particularly effective when paired with the S&S 585 cams, which feature increased overlap periods.

Identifying Your Machine: Harley-Davidson VIN Decoding

Properly identifying a 2010 model is critical for ordering parts and ensuring compatibility with performance kits. Harley-Davidson uses a 17-digit **Vehicle Identification Number (VIN)** located on the right side of the frame downtube.

VIN Breakdown for 2010 Models

1. Digits 1-3 (WMI): 1HD = Manufactured in the USA.
2. Digit 4 (Weight Class): 1 = Heavyweight (Touring/Dyna/Softail).
3. Digits 5-6 (Model Designation): KB = FLHTK Ultra Limited; KG = FLTRX Road Glide Custom; FF = FLHTC Electra Glide Classic.
4. Digit 7 (Engine Type): M = Twin Cam 103 (FLHTK); 4 = Twin Cam 96.
5. Digit 8 (Introduction Date): 1 = Regular Release; 2 = Mid-year Release.
6. Digit 9 (Check Digit): Used to verify VIN authenticity.
7. Digit 10 (Model Year): A = 2010. (Note: B=2011, C=2012).
8. Digit 11 (Plant): Y = York, PA; J = Milwaukee, WI.
9. Digits 12-17 (Sequential Number): The unique production number.

Maintenance Protocols and Field Reliability

While the 2010 models are renowned for their longevity, certain technical maintenance items are unique to this generation. Following the **2010 Harley-Davidson Owner's Manual** for Touring models is mandatory for ensuring operational safety.

Drive Belt and Compensator Maintenance

The 2010 models utilize a carbon-fiber reinforced final drive belt. Unlike chains, these require no lubrication but must be checked for tension and debris every 5,000 miles. A significant failure point in the 2010 drivetrain was the **crankshaft compensator**. The 2010 OEM compensator often suffered from insufficient lubrication, leading to "starter kickback" and clunking sounds during startup. Modern technicians often replace this with the SE (Screamin' Eagle) Compensator or an aftermarket version from Baker Drivetrain to ensure long-term durability.

Braking and ABS Fluid Flushes

For models equipped with the Brembo ABS system, the hydraulic fluid (DOT 4) must be flushed every two years regardless of mileage. Moisture absorption in DOT 4 fluid can lead to corrosion inside the ABS actuator valves, a repair that costs significantly more than a standard fluid service. During service, technicians should also inspect the isolated drive system (IDS) rubber dampers in the rear wheel hub, which absorb driveline shock and improve smoothness.

The Broader Impact of the 2010 Platform

The 2010 Harley-Davidson Touring models represent a masterclass in iterative engineering. By refining the radical chassis changes of 2009 and introducing the 103-cubic-inch engine to the mainstream via the Ultra Limited, Harley-Davidson set the stage for the Project RUSHMORE updates that would follow years later. These motorcycles remain highly sought after in the used market precisely because they offer the "modern" frame architecture without the electronic complexity of later Infotainment-heavy models.

Integrating high-performance solutions like S&S Cycle's Big Bore kits and Pro Pipe exhaust systems transforms these machines from capable tourers into high-output performance baggers. Whether maintaining a stock FLHTC for cross-country travel or building a high-compression FLTRX for aggressive riding, the technical foundation laid in 2010 provides a robust, reliable, and highly modular platform for the American v-twin enthusiast. Through meticulous maintenance and strategic performance upgrades, the 2010 Touring series continues to define the standard for the Grand American Touring experience.