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PONTIAC REVEALS SOLSTICE GXP PERFORMANCE VARIANT AT 2006 LA AUTO SHOW

LOS ANGELES – From its 2002 auto show introduction to an early-order program that sold 1,000 cars in 41 minutes, the Pontiac Solstice has always invoked a passionate response from customers. Now, Pontiac is taking the vehicle's combination of sensuous styling and driving exhilaration to a new level with the announcement of the turbocharged 2007 Solstice GXP.

“Creating a GXP performance edition of the Solstice is a natural extension of the capabilities of this car,” said John Larson, Pontiac general manager. “On its own, the base Solstice offers all of the qualities one would expect from a classic roadster – style, crisp handling, and spirited performance. The Solstice GXP takes that pure roadster DNA and pushes it to a new level, with a 47 percent boost in horsepower and other enhancements for a more thrilling driving experience.”

The heart of the Solstice GXP is the Ecotec 2.0-liter turbo engine, GM's first direct injection offering in North America . It produces 260 horsepower (194 kw) and 260 lb.-ft. of torque (353 Nm),* making it GM's highest specific output engine ever, at 2.1 horsepower per cubic inch of displacement (130 hp / 97 kw per liter), and the most powerful production engine in the Ecotec family.

A dual-scroll turbocharger with a lightweight turbine provides nearly instant power, and an air-to-air intercooling system boosts the turbo's performance by reducing inlet temperatures. Dual cam phasing complements the turbocharging system by optimizing valve timing at lower rpm for best turbo response and quick access to engine torque.

Direct injection technology helps the Ecotec engine produce more power while maintaining the lower fuel consumption of a small displacement port-injected engine.

With direct injection, fuel is delivered directly to the combustion chamber to create a more complete burn of the air/fuel mixture. Less fuel is required to produce the equivalent horsepower, especially at normal cruising speeds, of a conventional port-injection combustion system.

The GXP's high-performance Ecotec turbo engine is connected to a standard five-speed manual gearbox, or an optional five-speed automotive transmission. Either transmission can propel the car from zero-to 60 mph in under 5.5 seconds.

As with other members of GXP family, the Solstice GXP provides a number of standard features not available on the base model, including:

- Unique front and rear fascias
- High polish, dual-outlet exhaust
- StabiliTrak vehicle stability enhancement system
- 3.73 rear axle ratio
- Interior refinements including unique GXP gauge cluster and Cobalt Red seat stitching

The GXP also comes standard with a number of features available as options on the base model, including:

- Sport suspension system
- Four-wheel disc brakes with anti-lock
- Limited-slip rear differential
- Power window/locks/mirrors and remote keyless entry
- Leather-wrapped steering wheel with accessory controls and cruise control
- Driver information center
- 18-inch polished aluminum wheels

Additional options include a rear deck spoiler, leather seating, sport metallic pedals, chrome wheels, enhanced audio options, including XM Satellite Radio, and OnStar.

The 2007 Solstice GXP will be available in fall 2006. Pricing has not yet been established.

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2007 PONTIAC SOLSTICE GXP SPECIFICATIONS

Overview

Models:	Pontiac Solstice GXP
Body style / driveline:	2-passenger, 2-door roadster ; front-engine, rear-wheel drive performance model
Construction:	welded galvanized steel enclosed central tunnel and hydroformed tube
EPA vehicle class:	two seater
Manufacturing location:	Wilmington , Delaware
Key competitors:	Honda S2000, BMW Z4, Porsche Boxster, Nissan 350Z

Engine

	2.0L SIDI Turbo Ecotec
Type:	2.0L DOHC I-4
Displacement (cu in / cc):	122 / 1998
Bore & stroke (in / mm):	3.39 x 3.39 / 86 x 86
Block material:	cast aluminum
Cylinder head material:	cast aluminum
Valvetrain:	dual continuous variable valve timing, overhead camshafts, 4 valves per cylinder – intake and exhaust
Ignition system:	individual coil on plug
Fuel delivery:	direct injection with a variable high pressure rail and electronic throttle control
Compression ratio:	9.2:1
Horsepower (hp / kw @ rpm):	260 / 194 @ 5300 (<i>SAE certification pending</i>)*
Torque (lb-ft / Nm @ rpm):	260 / 353 @ 2000–5300 (<i>SAE certification pending</i>)*
Recommended fuel:	premium recommended but not required
Max engine speed (fuel cut-off):	6300 rpm
Emissions controls:	close-coupled catalytic converters; Quick-Sync 58x ignition system; returnless fuel rail; wide range O ₂

	sensor
Estimated fuel economy	
(mpg city / hwy / combined):	20 / 27 / 23 est.

Transmission

Type:	5-spd man (MM5)	5-speed automatic (MXO)
Gear ratios: (:1):		
First:	3.75	3.42
Second:	2.26	2.21
Third:	1.51	1.60
Fourth:	1.00	1.00
Fifth:	0.73	0.75
Reverse:	3.67	3.02
Final drive ratio:	3.73:1	3.73:1

Chassis/Suspension

Front:	independent short/long arm, with 33.3 mm stabilizer bar
Rear:	independent short/long arm, with 25.4 mm stabilizer bar
Steering type:	power rack-and-pinion
Steering ratio:	16.4:1
Steering wheel turns, lock-to-lock:	2.7
Turning circle, curb-to-curb (ft / m):	34.8/10.6

Brakes

Type:	std: four-wheel disc; ABS with dynamic rear
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	proportioning and Electronic Stability Control (ESC)
Rotor diameter x thickness (in / mm):	front: 11.7 x 1 / 297 x 25 ; vented
	rear: 10.9 x 0.5 / 277 x 13; solid
Swept area (sq in / sq cm):	front: 243 / 1570
	rear: 189 / 1221

Wheels/Tires

Wheel size and type:	std: 18-inch x 8-inch polished aluminum
Tires:	P245/45R18- Goodyear Eagle F1 GS2 96W all-season tires

Dimensions

Exterior

Wheelbase (in / mm):	95.1 / 2415
Overall length (in / mm):	157.2 / 3992
Overall width (in / mm):	71.3 / 1810
Overall height (in / mm):	50.1 / 1273
Track (in / mm):	front: 60.7 / 1543
	rear: 61.5 / 1561
Curb weight, base (lb / kg):	2948 / 1337 manual, 2988 / 1355 auto. estimated
Weight distribution (front / rear):	approx. 52 / 48

Interior

Seating capacity:	2
Headroom (in / mm):	38.4 / 975

Legroom (in / mm):	42.8 / 1086
Shoulder room (in / mm):	52.4 / 1332
Hip room (in / mm):	50.6 / 1284

Capacities

EPA interior volume (cu ft / L):	54 / 1529
Passenger volume (cu ft / L):	50 / 1416
Cargo volume (cu ft / L):	3.8 / 107.6 (top up)
Fuel tank (gal / L):	13.6 / 51.5
Engine oil (qt / L):	5 / 4.7
Cooling system (qt / L):	7.9 / 7.5

Note: Information shown is current at time of publication.

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NEW ECOTEC 2.0-LITER DIRECT INJECTION TURBO ENGINE

Advanced Combustion Technology Improves Power and Efficiency in the 2007 Pontiac Solstice GXP

PONTIAC, Mich. – General Motors introduces the Ecotec 2.0-liter Turbo engine in the 2007 Pontiac Solstice GXP, making it GM's first direct injection offering in North America. Gasoline direct injection technology helps the Ecotec engine produce more power while maintaining the lower fuel consumption of a small displacement port-injected engine. It produces 260 horsepower (194 kW) and 260 lb.-ft. of torque (353 Nm),* making it GM's highest specific output engine ever, at 2.1 horsepower per cubic inch of displacement (130 hp / 97 kW per liter), and the most powerful production engine in the Ecotec family.

Variable valve timing and an intercooled, twin-scroll turbocharging system are used to optimize the Ecotec 2.0-liter Turbo engine's performance. It was developed with the global resources of GM Powertrain in the United States and Europe, drawing on expertise from the naturally aspirated Ecotec 2.2-liter direct injection engine used in

some European applications and the 2.0-liter turbocharged engines already in production.

With direct injection, fuel is delivered directly to the combustion chamber to create a more complete burn of the air/fuel mixture. Less fuel is required to produce the equivalent horsepower, especially at normal cruising speeds, of a conventional port-injection combustion system.

“Direct injection technology works well with turbocharging and helps deliver a great balance of power and economy,” said Ed Groff, assistant chief engineer, Ecotec 2.0-liter Turbo engine. “The Ecotec 2.0-liter Turbo produces the power expected of a V-6, but in a smaller, more efficient package – and the driving response is simply terrific.”

A dual-scroll turbocharger with a lightweight turbine provides nearly instant power and an air-to-air intercooling system bolsters the turbo's performance by reducing inlet temperatures. Dual cam phasing complements the turbocharging system by optimizing valve timing at lower rpm for best turbo response and quick engine torque build-up time.

The Ecotec 2.0-liter Turbo uses a stronger, “Gen II” Ecotec engine block, which was developed with input from racing experience to support increased horsepower and torque. The cylinder block bulkheads – the areas where the main bearing caps are attached – and the bore walls are enlarged for strength. Other areas of the engine were enhanced to reinforce the structure and the water jacket is deeper for added cooling capacity and improved cylinder bore roundness. This architecture is shared with the 2.4-liter Ecotec engine that debuted in the Pontiac Solstice roadster.

Highlights of the Ecotec 2.0-liter Turbo engine include:

- Steel crankshaft
- Forged connecting rods
- Cast aluminum oil-galley pistons
- Jet-spray piston cooling
- 9.2:1 compression ratio
- Aluminum cylinder head with sodium-filled exhaust valves
- High-pressure engine-driven fuel pump

- Variable pressure fuel rail
- Dual-scroll turbocharger

Components including the steel crankshaft, forged connecting rods and cast-aluminum pistons are high-strength items that enhance durability. Jet-spray oil cooling directed toward an oil-galley piston help reduce piston temperatures. The system delivers pressurized oil to continuously lubricate and cool the pistons, which reduces friction and noise and ensures durability for the engine's higher power levels. To enhance combustion, the piston tops feature a dish shape that deflects injected fuel toward the spark plugs.

To accommodate the direct injection system, the Ecotec 2.0-liter Turbo has a unique cylinder head and intake manifold. The cylinder head incorporates mounting locations for the fuel injectors – which are typically mounted in the intake ports or intake manifold on port injection engines. A high-pressure fuel pump delivers fuel to a variable-pressure fuel rail. Fuel enters the combustion chamber through precision multi-hole fuel injectors. The fuel pump, fuel rail pressure, fuel injection timing, and injection duration are controlled by the engine control module. In this way, fuel is metered and delivered in a finely atomized spray.

Apart from the mounting positions of the fuel injectors, the cylinder head has conventional port and combustion chamber designs, although both are optimized for direct injection and high boost pressures. The sodium-filled exhaust valves and stainless steel exhaust manifold are durable components designed to stand up to the high-performance capability of the engine.

The unique cylinder head, fuel system, pistons, intake manifold, and the dual-scroll turbocharger are the only major components that differentiate the 2.0-liter Turbo from other members of the Ecotec engine family. Mobil 1 synthetic engine oil is installed at the factory. Synthetic oil was selected for its friction-reducing capabilities and high-temperature performance.

How direct injection works

Gasoline direct injection differs from the fuel delivery process of a conventional engine by delivering fuel directly into the combustion chamber, where it is mixed with air drawn in to the chamber. The combustion process of conventional fuel injected

engines uses air and fuel that are mixed in the intake port or intake manifold prior to being introduced into the combustion chamber. Direct injection is a continuation of the evolutionary process of moving the fuel introduction point closer to the combustion location to improve control.

With the Ecotec 2.0-liter Turbo, fuel is introduced directly to the combustion chamber during the intake stroke. As the piston approaches top-dead center, the mixture is ignited by the spark plug, giving the name spark ignition direct injection (SIDI). The fuel injectors are located beneath the intake ports. SIDI allows the mixture to be “leaner” – less fuel, more air – at full power. SIDI also permits a slightly higher compression ratio than if the fuel were delivered with conventional fuel injection. The result is better fuel consumption at part and full throttle. The engine uses conventional spark plugs similar to other Ecotec engines.

A high-pressure, returnless fuel system is employed. It features a high-strength stainless steel fuel line that feeds a variable-pressure fuel rail. Direct injection requires higher fuel pressure than conventional fuel injected engines and an engine-driven high-pressure fuel pump is used to supply up to 2,250 psi (155 bar) of pressure. The system regulates lower fuel pressure at idle – approximately 752 psi (50 bar) and higher pressure at wide-open throttle. The cam-driven high-pressure pumps works in conjunction with a conventional fuel tank-mounted supply pump.

Direct injection’s precise fuel delivery enables more complete combustion to help reduce emissions, particularly on cold starts – the time when most engine emissions are typically created. Also, direct injection permits higher a compression ratio in the engine which is a positive influence on fuel economy. At certain power levels, the boosted SIDI engine can provide significant fuel economy benefits to the vehicle compared to a larger displacement naturally aspirated engine.

Turbocharging system

A unique, dual-scroll turbocharger is partnered with an air-to-air intercooling system to provide up to approximately 20 psi (1.38 bar) of power-enhancing boost. The dual-scroll turbocharger delivers nearly instant response, as dual exhaust passages from the engine to the turbine housing guide exhaust gas to the turbine. This reduces lag time, or spool-up, at low rpm.

“There is virtually no lag with this system,” said Groff. “Throttle response is immediate. The engine acts like a larger displacement engine.”

The turbocharger is matched to the engine’s displacement and performance objectives. It is supported by the air-to-air intercooling system, which uses fresh air drawn through a heat exchanger to reduce the temperature of the warmer compressed air forced through the intake system by the turbocharger. Inlet temperature is reduced by approximately 212 degrees (100 degrees C), enhancing performance because cooler air is denser and promotes optimal combustion.

Dual cam phasing

The camshafts of the Ecotec 2.0-liter Turbo engine have phasers that support the continuously variable intake and exhaust valve timing. They also have cam position sensors, so that the engine control module can accurately control valve timing. The crankshaft and camshaft position sensors are digital. A new engine controller, specific to the engine, is used to sense and control the engine’s performance parameters.

Variable intake and exhaust timing works synergistically with both the gasoline direct injection and turbocharging systems. The variable engine timing enabled by cam phasing allows the combustion process to be optimized. Also, valve “overlap” at low rpm can be adjusted by the controller to increase the response of the turbocharger, providing a more immediate feeling of power.

Ecotec family traits

The Ecotec 2.0-liter Turbo is built on a global platform that was designed at the outset for a range of performance and combustion capabilities. The Gen II block supports the high-performance demands of the engine, but it is merely a strengthened version of the original Ecotec architecture. The oil pump, for example, is the same as used in all other Ecotec engines. It was originally designed to support high-performance applications of future engines.

“The 2.0-liter Turbo is the pinnacle of Ecotec performance to date, with additional growth planned. The groundwork for its capabilities was laid on the drawing table at the very beginning of the Ecotec’s development,” said Groff. “Prior work and a far-thinking engine design continue to help GM respond to market demands around the globe more quickly and with greater accuracy.”

This new Ecotec family member also has traits that have helped forge a reputation for durability and sophistication:

- Dual overhead camshafts (DOHC) and four valves per cylinder
- Twin counter-rotating balance shafts for operational smoothness
- Electronic throttle control
- Low-friction, roller-finger follower valvetrain with hydraulic lash adjusters
- Low-maintenance chain-drive for the camshafts
- 58X crankshaft positioning
- Direct-mount accessories, which reduce or eliminate traditional sources of noise and vibration
- Full-circle transmission mount to reduce noise and vibration
- GM Oil Life System, which can reduce the frequency for oil changes
- Innovative cast-in oil filter housing, which eliminates the need to crawl under the vehicle to perform oil changes and eliminates throwaway oil filter cans that retain used oil

As with other engines in the Ecotec family, the 2.0-liter Turbo engine also has premium features designed to ensure smooth and quiet operation, including a polymer coating and skirt design for the pistons that reduces noise during cold starts. An automatic hydraulic tensioner also is used to maintain optimal tension on the timing chain, which reduces noise and vibration.

General Motors Corp. (NYSE: GM), the world's largest automaker, has been the global industry sales leader since 1931. Founded in 1908, GM today employs about 325,000 people around the world. It has manufacturing operations in 32 countries and its vehicles are sold in 200 countries . In 2004, GM sold nearly 9 million cars and trucks globally, up 4 percent and the second-highest total in the company's history. GM's global headquarters are at the GM Renaissance Center in Detroit . More information on GM can be found at www.gm.com.

**SAE certification pending. A new voluntary power and torque certification procedure developed by the SAE Engine Test Code committee was approved March 31, 2005. This procedure (J2723) ensures fair, accurate ratings for horsepower and torque by allowing manufacturers to certify their engines through third-party witness testing. GM was the first auto manufacturer to begin using the procedure and expects to use it for all newly rated engines in the future.*

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Ecotec 2.0-liter Turbo Specifications

Assembly site:	Spring Hill, Tenn.
Application:	2007 Pontiac Solstice GXP
Type:	2.0-liter DOHC turbocharged I4
Displacement (cu in/ cc):	122 / 1998
Bore x stroke (in x mm):	3.38 x 3.38 / 86 x 86
Block material:	319 aluminum
Cylinder head material:	356 T6 aluminum
Intake manifold:	cast aluminum
Exhaust manifolds:	cast stainless steel
Compression ratio:	9.2:1
Valve configuration:	overhead cam; four valves per cylinder
Valve lifters:	hydraulic lash adjuster, roller finger follower
Firing order:	1-3-4-2
Fuel system:	Gasoline high-pressure, variable-rail pressure, spark ignition direct injection (SIDI)
Horsepower (hp / kW):	260 / 194 @ 5300 rpm (<i>SAE certification pending</i>)*
Torque (lb.-ft. / Nm):	260 / 353 @ 2000 – 5300 rpm (<i>SAE certification pending</i>)*
Fuel shut off:	6300 rpm
Crankshaft:	forged steel

Connecting rods:	forged steel
Additional features:	air-to-air intercooled dual scroll turbocharger system, variable valve timing, electronic throttle control, pressure-actuated piston cooling jets, extended-life spark plugs, extended-life coolant, GM oil level sensor, extended-life accessory drive belt, Nimonic sodium-filled exhaust valves