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## **2012 Fiat 500 Abarth: POWERTRAIN**

### **160 Horsepower (117 horsepower/liter) with new 1.4-liter MultiAir<sup>®</sup> turbo engine**

- New 2012 Fiat 500 Abarth is first to debut the new 1.4-liter MultiAir<sup>®</sup> Turbo engine
- Turbocharged, twin intercooled and MultiAir-equipped 1.4-liter engine delivers 160 horsepower (119 kW) and 170 lb.-ft. (230 N•m) of torque
- Addition of a turbocharger coupled with state-of-the-art MultiAir technology delivers 730 percent increase in torque, 589 percent increase in power over base 1.4-liter engine
- Heavy-duty five-speed manual transmission with Torque Transfer Control (TTC) system

November 15, 2011, Auburn Hills, Mich. - Taking a page from Karl Abarth's extensive experience to increase the power and durability of the original Cinquecento's engine for racing use, the new 2012 Fiat 500 Abarth debuts a turbocharged variant of the proven 1.4-liter MultiAir<sup>®</sup> engine for increased horsepower, torque and performance.

"With the addition of a turbocharger to the 1.4-liter engine, advanced intake technology including FIAT's exclusive MultiAir system, a heavy-duty five-speed manual transmission and a host of other internal refinements to the powertrain, the 2012 Fiat 500 Abarth transforms the Fiat 500 into a high-performance precision driving machine that every enthusiast will appreciate," said Mike Vincent, Platform Manager for the 1.4-liter MultiAir Turbo engine.

Behind the unique Rosso (red) Abarth engine cover and Abarth-designed front fascia with twin "nostrils," lies the heart of the 2012 Fiat 500 Abarth – the all-new 1.4-liter MultiAir Turbo engine backed with a stronger, manual five-speed transmission, equal-length half shafts, 3.35 final-drive ratio and a Torque Transfer Control (TTC) system that delivers power to the pavement.

#### **High-performance engine design with high output**

Selected as the "Best International Engine in 2010," by a panel of 72 journalists from 36 countries, the new 1.4-liter MultiAir Turbo engine in the Fiat 500 Abarth is designed to meet the rigorous demands of performance driving throughout its 6,500 rpm range.

Structurally, the 1.4-liter MultiAir Turbo engine starts with a cast-iron block and an aluminum bedplate. Bore is 72 mm (2.83 inches) and stroke is 84 mm (3.31 inches) for a total displacement of 1368 cu. cm (83.5 cu. in.).

At the bottom end, a forged-steel crankshaft with select-fit main bearings is supported across five main journals. The crankshaft has been designed with optimized counterweights to reduce overall mass for high engine rpm operation. Durability is ensured with the use of lightweight forged-steel connecting rods that have been designed with a unique cross section to minimize the longitudinal and lateral bending of the rod.

Lightweight cast-aluminum pistons with hard-anodizing contribute to the overall strength of the reciprocating assembly and the engine's high rpm capability. Full-floating piston pins are used for added strength. Piston cooling jets, located at the bottom of each cylinder, contribute to fuel economy by squirting oil on the bottom of the pistons to help maintain piston temperatures and reduce the possibility of hot spots along the cylinder walls or at the top of the piston that could lead to detonation.

Compression ratio of the Fiat 500 Abarth's 1.4-liter MultiAir Turbo engine is 9.8:1. For optimum fuel economy and performance, fuel with a 91 octane rating is preferred and regular 87 octane is acceptable.

This high-performance 1.4-liter engine also is fitted with a structural aluminum oil pan. Crankcase capacity is 4.0 quarts with a dry filter. Synthetic 5W-40 engine oil is recommended, due to higher overall temperatures with the turbocharger. And to maintain a lower ownership cost for the Fiat 500 Abarth, oil change intervals are set at 8,000 miles.

### **Innovative MultiAir<sup>®</sup> cylinder head**

The valve train for the high-performance 1.4-liter MultiAir Turbo engine features FIAT's exclusive MultiAir fuel delivery technology. Unlike engines that rely on direct action from fixed lobes on the camshaft to control intake valve opening and closing, MultiAir is an electro-hydraulic system that can control intake air, cylinder by cylinder and stroke by stroke depending on the demands from the standard electronic throttle control (ETC) system.

Actual opening of the valves is achieved by hydraulic fluid running through a narrow passage that is controlled by a dual-action solenoid (one for each cylinder). When the solenoid is closed, under highway speeds or full acceleration, intake valves are fully opened much like a traditional engine for maximum power. At lower speeds, the solenoid opens, allowing oil to bypass the passage, decoupling the valves. This allows for infinite control of the valves and the amount of fresh air into the cylinders, reducing wasted energy that is common with fixed intake camshaft lobes.

Spent exhaust gases are released through traditional lobes on the camshaft and exit through a cast stainless steel exhaust manifold.

Ignition is through a single output, coil-on-plug system. Spark plugs are dual precious metal for durability. Fuel delivery is sequential, multi-port, electronic, with injectors located to direct the fuel spray at the intake valves in a wide spray pattern that increases fuel atomization and enhances complete combustion for a smooth driving experience.

MultiAir technology on normally-aspirated 1.4-liter engines provides a 15 percent increase in low engine rpm torque, and a 7.5 percent improvement in fuel efficiency.

### **Turbo and twin intercoolers provide 160 horsepower**

Compared with the Fiat 500's natural-aspirated 1.4-liter MultiAir engine, the boost to 160 horsepower on the new 2012 Fiat 500 Abarth is largely due to its single turbocharger that operates off engine exhaust and utilizes energy that would normally be wasted through the tailpipe.

The turbocharger spins up to 230,000 rpm to convert exhaust heat and pressure to a rotational force that drives a compressor. The compressor draws cool air and pumps it into the intake manifold at increased pressure (maximum 18 psi / 1.24 bar) that results in a greater amount of air in the cylinder and hence more power.

The 1.4-liter MultiAir Turbo's induction system includes two intercoolers located behind the driver- and passenger-side air inlets of the Abarth-styled front fascia. The intercoolers are designed to remove heat in the air charge that the turbocharger generates while compressing incoming air (higher air density for more power). Reducing heat provides a cooler, denser air charge that helps increase the potential for more power. A cooler air charge also reduces the potential for engine knock.

### **High-performance engine system components**

The new 2012 Fiat 500 Abarth features several engine system component upgrades needed for high-performance driving.

On the intake side, the 1.4-liter MultiAir Turbo features an Abarth-designed fresh-air intake system with high-flow air filter, redesigned air box for improved air flow and smooth-flowing plumbing for maximum power and low induction noise.

An Abarth-designed concentric "double tip" dual-exhaust system delivers a high-performance look with menacing Abarth-tuned sound and minimal exhaust gas restriction for maximum power.

An Abarth-tuned powertrain control module (PCM) integrates all of the MultiAir Turbo's engine control functions. The PCM provides specific engine calibrations to maximize horsepower and torque in "Sport" mode, and syncs with the LED-illuminated shift light for additional driver notification at the redline.

An upgraded electrical system includes a high-output 140-amp alternator and 500 amp cold-cranking maintenance-free battery for increased vehicle system charging.

#### **High-performance transmission and driveline**

Developed by Fiat Powertrain Technologies (FPT) for high-output applications, the Fiat 500 Abarth is equipped with the heavy-duty C510 five-speed manual transmission. Proven on the European 500 Abarth models, this transmission features a 3.35 final-drive ratio for quick acceleration and faster top speed, while maintaining fuel efficiency.

Designed to handle the increased torque loads, the Fiat 500 Abarth's C510 transmission includes an intermediate shaft with equal-length half shafts to mitigate torque steer. Compared with the Fiat 500, the 500 Abarth features 23 percent larger half shafts (28.1 mm diameter vs. 22.8 mm diameter in the Fiat 500) for increased strength and to reduce torsional stress in the driveline during performance driving on the road or track. To handle the increased power and torque of the new 1.4-liter MultiAir Turbo engine, larger constant velocity (CV) joints with 53 percent greater torsional strength (2600 N•m vs. 1700 N•m in the Fiat 500) deliver added durability and refinement.

#### **Maximum track handling with Torque Transfer Control (TTC) system**

Helping the driver to utilize the power of the new 1.4-liter MultiAir Turbo engine is an Abarth-tuned Torque Transfer Control (TTC) system. TTC is designed to control and transfer the engine's torque to the drive wheels for world-class performance and improved at-the-limit handling.

The TTC system is a differential locking system that uses the mechanical differential as a reactive element in the transmission to control torque via the brake system and electronic stability program (ESP) sensors. Utilizing ESP enables the 500 Abarth to transfer torque from a front wheel that slips, to one that grips.

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