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Cannondale Motorsports Technical Bulletin

BULLETIN : TB02-008
MODELS : All ATVs and Motorcycles
ISSUED : 7/10/02
SUBJECT : Spark plug fouling and the fuel tank return line

Our technical service reps have taken reports of engine stalling and spark plug fouling. Often, these calls were the result of the fuel return line not being connected to the fuel tank return fitting properly.

If the fuel tank return line is not reconnected properly following removal of the fuel tank or the line detaches because the quick connect fitting was not properly locked into the tank coupling body, the engine will start and run for several minutes. However, because the fuel regulator is not able to relieve building fuel pressure to the tank via the return fitting, the fuel pressure climbs resulting in the engine running extremely rich due to higher fuel pressure developed behind the return fitting. The higher fuel pressure will result in greater fuel injector flow resulting in spark plug fouling and eventual shut down.

In many cases, an ATV or motorcycle thought to have engine management system related fouling problem such as problem with the engine control unit (ECU) or related circuit was actually found to have the return fuel line disconnected from the tank or some other problem with adequate or restricted fuel flow.

Correct fuel supply and pressure are critical to engine performance. It is important to check the system for fuel leaks, check the fuel tank inlet and return fittings for proper connection to the tank, replace the fuel filter as specified, and make sure the fuel system is closed (e.g., air is not drawn into the system through the hose fittings). Check the fitting O-rings and make sure they are in good condition.

DETAIL : The fuel circuit of Cannondale ATVs and Motorcycles is responsible for providing adequate fuel at the correct fuel pressure in order for the engine to operate properly. The ECU controlled fuel pump draws fuel from the tank through an internal pickup tube exiting through the quick connect fitting mounted on the left side of the tank. A pickup screen attached to the end of the pickup tube inside the tank prevents larger particles from contaminating the hoses and pump, and injectors. Before the drawn fuel reaches the inlet fitting of the fuel pump, the fuel will pass through the external fuel filter. This filter is rated at 35 microns. It will remove any contaminants that could damage the pump or clog the injector tips. In order to maintain optimum fuel flow, it is recommended that this filter be replaced every 5 hours of operation. Once fuel has passed through the filter, it enters the inlet fitting of the fuel pump and exits through the outlet fitting into the fuel "rail" where the specified pressure is maintained. The fuel rail is the section of fuel hose connected between the fuel pump outlet and the fuel pressure regulator inlet. The fuel injectors are mounted in this "rail" and receive

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7/10/02

fuel at the specified system pressure 42 psi (3 bar). At the injectors the pressurized fuel in the rail will “spray” through the injector openings when the ECU triggers them to open. The amount of fuel that sprays through the injector when open is calibrated for the specified system pressure, the injector flow rate, and the time the injector remains open. If the fuel pressure in the rail is too low, not enough fuel will spray out of the injectors and if the fuel pressure is too high, too much fuel will spray out.

At the fuel pressure regulator end of the fuel rail, the fuel regulator opens and closes by spring pressure maintaining the specified fuel pressure inside the fuel rail at all times. A small barometric pressure hose attached to the regulator and airbox allows the regulator to compensate its set spring pressure for slight changes in atmosphere which would affect ECU fuel delivery calculations. As stated before the correct pressure in the “rail” section of fuel line between the outlet of the fuel pump and inlet of the regulator is maintained by the regulator. In order for the regulator to function normally, it must be able to relieve excess pressure in the rail by passing fuel back to the fuel tank. The outlet side of the regulator routes fuel back to the tank via the fuel tank return line. This line terminates at the right side of the tank.