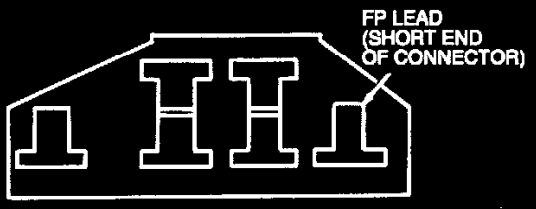
Fuel Pressure: Testing and Inspection

Test Step	Result ▶	Action to Take
FDS1 SYSTEM INTEGRITY CHECK		
• Visually inspect the complete fuel delivery system, including fuel tank lines, reservoir, filter, pumps, injectors, pressure regulator, battery, electrical lines and connectors for leakage, looseness, cracks, pinching, kinking, corrosion, grounding, abrasion, or other damage caused by accident, collision, assembly or usage. • Verify vehicle has followed maintenance scheduling. • Run self-test to verify pass code. If fuel related DTCs are present, repair them first. • Verify IFS switch set. • Verify that the battery is fully charged. • Check for sufficient fuel in the fuel tank. • For Type 2 fuel delivery system, repeat diagnostic procedures for both tanks. • **Is system free of any evidence of leakage, damage, or any other cause for concern?**	Yes ▶ No ▶	GO to FDS2. SERVICE or REPLACE as required. VERIFY a symptom no longer exists.

Test Step	Result ▶	Action to Take
FDS2 FUEL PRESSURE TEST		
WARNING: BEFORE SERVICING OR REPLACING ANY COMPONENTS IN THE FUEL SYSTEM, REDUCE THE POSSIBILITY OF INJURY OR FIRE, AS OUTLINED UNDER "WARNING, CAUTION AND NOTES." • NOTE: Grounding the FP lead at the DLC will allow the pump to run continuously with the ignition switch on. For specifics of this DLC connector, refer to Electrical and Vacuum Troubleshooting.  A9465-C • Key off. • Before releasing fuel system pressure at the Schrader fitting, observe the Warning Instructions to avoid fuel spillage and injury. • Install the fuel pressure tester. • Ground the fuel pump lead of the Data Link Connector with a jumper at the FP lead. For information specific to the DLC connector, refer to Electrical and Vacuum Troubleshooting. • Key on, engine off, to operate the fuel pump(s). • Verify that the observed fuel pressure is within specified limits for the engine being checked. Specification: Fuel System Pressure (Key On, Engine Off) Refer to "Fuel Pressure Specification Table." • On Type 2 system, perform test for both pumps. • **Is fuel pressure within specification?**	Yes ▶ No ▶	GO to FDS3. **If low:** GO to FDS10. **If high:** GO to FDS11.

Test Step	Result ▶	Action to Take
FDS3 CHECK FUEL PRESSURE LEAKDOWN		
• Observe the "Warning and Caution" to avoid fuel spillage and injury. • Connect the Fuel Pressure Test Kit at the fuel pressure test point. • Connect a jumper to the FP lead of the DLC. • Key on, engine off. • Ground the test lead using the jumper wire to run the fuel pump. • Run the fuel pump for 30 seconds minimum. Remove the test lead ground and note fuel pressure on the gauge. • Verify whether the fuel pressure remains within the specified 5 psi for 1 minute after the test lead is ungrounded. • On dual tank system, perform test for both tanks. • **Does fuel pressure remain within 5 psi for 1 minute after the test lead is ungrounded?**	Yes ▶ No ▶	GO to FDS5. GO to FDS4.
FDS4 CHECK PRESSURE REGULATOR DIAPHRAGM CONDITION		
• Key off. • Connect Fuel Pressure Test Kit at Schrader fitting on rail. Observe Warning Instructions to avoid fuel spillage and injury. • Start engine and run for 10 seconds. • Stop engine and wait 10 seconds. • Start engine and run for 10 seconds. • Stop engine and remove vacuum hose from pressure regulator. • Examine vacuum port in the pressure regulator for evidence of fuel leakage through the diaphragm. • **Is vacuum port free of any fuel?**	Yes ▶ No ▶	GO to FDS14. REPLACE pressure regulator and RERUN test FDS2.
FDS5 CHECK FUEL PRESSURE WITH ENGINE LOAD		
• Fuel pressure test kit installed. • Disconnect vacuum hose at the fuel pressure regulator and plug it. • Observe fuel pressure while driving vehicle with heavy accelerations. • On Type 2 (Dual Tank System) perform test for both tanks. • **Does fuel pressure reading remain within ± 3 psi during the test?**	Yes ▶ No ▶	UNPLUG vacuum hose and connect it to fuel pressure regulator. GO to FDS6. GO to FDS8.

Test Step	Result ▶	Action to Take
FDS6 CHECK FUEL PRESSURE REGULATOR • Fuel pressure test kit installed. • Install vacuum gauge to intake manifold. • Start engine and observe both gauge readings. • Accelerate the engine speed to lower the vacuum gauge reading. • **Does fuel pressure gauge reading increase as the vacuum gauge reading decreases, and/or does fuel pressure gauge reading decrease as vacuum gauge reading increases?**	Yes ▶ No ▶	REMOVE vacuum gauge and fuel pressure test kit. CHECK for other possible causes. GO to FDS7.
FDS7 CHECK VACUUM SUPPLY • Key off. • Vacuum hose removed from the fuel pressure regulator and plugged. • Install a hand operated vacuum pump to the fuel pressure regulator. • Start engine. • Observe fuel pressure while applying vacuum. • **Does fuel pressure reading change as the vacuum changes?**	Yes ▶ No ▶	SERVICE vacuum system. REMOVE plug from vacuum hose and RECONNECT to fuel pressure regulator. VERIFY a symptom no longer exists. REPLACE fuel pressure regulator. VERIFY a symptom no longer exists.
FDS8 CHECK FUEL FILTER • Observe "Warning and Caution" to avoid fuel spillage and injury. • Key off. • Replace in-line fuel filter if not replaced recently (check maintenance log). • Operate fuel pump as in FDS2 and check fuel pressure. • **Is pressure within specification?**	Yes ▶ No ▶	GO to FDS3. GO to FDS15.
FDS9 CHECK VOLTAGE AT BOTH PUMP SPEEDS • Key off. • Connect DVOM between Inertia Fuel Shut-off (IFS) and chassis ground. • Start and run engine. • Read voltage at idle and at 3500 rpm. • **Is the voltage near 9 volts at idle and near 13 volts at 3500 rpm?**	Yes ▶ No ▶	CHECK fuel pump ground connection and service. If OK, REPLACE fuel pump. VERIFY a symptom no longer exists. CHECK CCRM/VCRM for proper operation. CHECK fuses of the fuel pump circuits high and low. RERUN FDS2.

	Test Step	Result ▶	Action to Take
FDS10	CHECK REGULATOR FOR LOW PRESSURE CAUSES		
	• Key off. • Remove return fuel line at fuel rail and connect short hose from rail to measured container of at least one quart capacity. • Operate fuel pump as in step FDS2. • Key on, engine off. • Record fuel pressure and note whether fuel is being returned to measured container. Unground FP lead after 10 seconds or if container is more than half full. • **Is fuel being returned while pressure is still low?**	Yes ▶ No ▶	REPLACE fuel pressure regulator and GO to FDS2. **For type 2:** CHECK both pumps. If both are low, CHECK voltage at both pumps before replacing pumps. **All others:** REPLACE fuel pump assembly. GO to FDS2. NOTE: When replacing fuel pump, clean out tank and replace fuel filter.
FDS11	CHECK REGULATOR FOR HIGH PRESSURE CAUSES		
	• Key off. • Remove return fuel line at fuel rail and connect short hose from rail to measured container of at least one quart capacity. • Operate fuel pump as in step FDS2. • Key on, engine off. • Record fuel pressure and note whether fuel is being returned to measured container. Unground FP lead after 10 seconds or if container is more than half full. • **Is fuel pressure within specification?**	Yes ▶ No ▶	**For type 2:** GO to FDS12. **All others:** GO to FDS13. REPLACE fuel pressure regulator and GO to FDS2.
FDS12	CHECK FUEL RETURN SYSTEM		
	• Observe the "Warning and Caution" to avoid fuel spillage and injury. • Check the fuel return system(s) for restriction due to blockage, kinking, or pinching. If only one tank is affected, pay special attention to the return line after branching to the affected tank. If both are affected, check return line before the branch. • **Were any signs of damage found in the fuel return system?**	Yes ▶ No ▶	REPLACE in-tank unit where air is entering. RECONNECT fuel return line. GO to FDS2 for verification. GO to FDS13.

Test Step	Result ▶	Action to Take
FDS13 CHECK FUEL RETURN SYSTEM • Key off. • Observe the "Warning and Caution" to avoid fuel spillage and injury. • Fuel return line disconnected at the fuel pressure regulator. • Check the fuel return system(s) for restriction due to blockage, kinking, or pinching. • Disconnect the fuel return line near the fuel tank. • Apply 3-5 psi regulated shop air to the return line at the pressure regulator side. • **Does air flow freely through the line?**	Yes ▶ No ▶	REPLACE fuel pump assembly. SERVICE the fuel return line. RECONNECT fuel line.
FDS14 CHECK FUEL INJECTOR LEAKAGE AND FLOW • Observe "Warning and Caution" to avoid fuel spillage and injury. • Check injectors for leakage and flow rate, using Rotunda Injector Tester 113-00001 and Rotunda Fuel Pump Check Valve-Pressure Regulator and Injector Leakage Tool 113-00010, SBDS Injector Flow Tester or equivalent. • **Does the system maintain fuel pressure and is flow rate for individual injectors within specification?**	Yes ▶ No ▶	CHECK fuel lines for leaks. If OK, REPLACE fuel pump. RECONNECT all components. REPLACE the damaged injectors as required. RERUN test.
FDS15 FUEL PUMP VOLTAGE CHECK • Key on. • Ground the fuel pump lead of the Data Link Connector (DLC) with a jumper at the FP lead. • Use VOM to check voltage to fuel pump. Check for approximately system voltage at the fuel pump connector, fuel pump relay, VRCM, or IRCM, whichever point is accessible and closest to the fuel pump. • **Is fuel pump voltage approximately system voltage (12 volts or better)?**	Yes ▶ No ▶	CHECK fuel pump ground connection for tightness on vehicle and at fuel pump external connection. If problem found, SERVICE. If no problem found, REPLACE fuel pump assembly. LOCATE cause of low voltage in fuel pump circuit (relay, module, wiring, connectors, fuse, ground connection, etc.) and SERVICE.