DTC	P0093/78	FUEL SYSTEM LEAK DETECTED – LARGE LEAK

HINT:

- If DTC P1229/78 is set, P0093/78 (fuel leaks in high–pressurized areas) may be set simultaneously. This may be due to the extremely high internal fuel pressure in the common rail opening the pressure limiter, and the ECM interpreting this as a fault and setting P0093/78.
- For more information on the common rail system, refer to the system description (see page 05–422).
- If P0093/78 is present, refer to the "Diagnostics Trouble Codes (DTCs) Table for Common Rail System" (see page 05–422).

CIRCUIT DESCRIPTION

Refer to the system description (see page 05–422).

DTC No.	DTC Detection Condition	Trouble Area
P0093/78	Fuel leaks in high–pressure areas (1 trip detection logic)	• Fuel line between supply pump and common rail • Fuel line between common rail and each injector • Supply pump • Common rail • Injectors • Pressure discharge valve • Open or short in EDU circuit (P0200/97 set simultaneously) • Open or short in injector circuit • EDU (P0200/97 set simultaneously) • ECM

HINT:

When DTC P0093/78 is set, check the internal fuel pressure of the common rail by entering the following menu items on the intelligent tester II: Powertrain / Engine / Data List / Fuel Press.

Reference:

Engine Speed	Fuel Pressure
Idling	Approximately 30,000 to 40,000 kPa
3,000 rpm (No engine load)	Approximately 50,000 to 80,000 kPa

MONITOR DESCRIPTION

P0093/78 (Fuel leaks in high–pressure areas):

This DTC indicates fuel leaks that exist in highly–pressurized areas in the common rail system. The ECM constantly monitors the internal fuel pressure of the common rail after the engine is started. The ECM sets this DTC if the drop in the internal fuel pressure is large when injecting the fuel.

In the common rail system, high–pressure fuel is always supplied to the high–pressure areas including the supply pump, common rail, injectors and piping. The ECM adjusts the suction control valve opening angle to obtain the target internal fuel pressure.

If this DTC is set, the ECM enters fail–safe mode. The fail–safe mode suspends both fuel injection and supply pump operation, and then stops the engine. Before stopping the engine, the ECM permits the vehicle to be driven for 1 minute. The fail–safe mode continues until the ignition switch is turned OFF.

MONITOR STRATEGY

Required sensors	Fuel pressure sensor
Frequency of operation	Continuous
Duration	1 second
MIL operation	1 driving cycle

TYPICAL ENABLING CONDITIONS

	Specification	Specification
Item	Minimum	Maximum
Engine speed	500 rpm	–
The monitor will not run if the fuel pressure sensor or suction control valve circuit is malfunctioning		

TYPICAL MALFUNCTION THRESHOLDS

Threshold
Drop of the internal fuel pressure is large when injecting fuel

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, and other data from the time the malfunction occurred.

When using intelligent tester II:

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0093/78)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the ignition switch ON and turn the intelligent tester II ON.
(c) Enter the following menus: Powertrain / Engine / DTC.
(d) Read the DTCs.

Result:

Display (DTC Output)	Proceed to
P0093/78	A
P0093/78 and P0200/97	B

B → **Go to RELEVANT DTC CHART (See page 05–477)**

A

2	CHECK FUEL LEAKAGE (IN HIGH–PRESSURE FUEL PARTS AND AREAS)

(a) Visually check the supply pump, each injector and fuel line located between the supply pump and common rail for fuel leaks or fuel pressure leaks. Also, perform the same on the fuel line between the common rail and the each injector (see page 11–46).

HINT:
There is a possibility that fuel leaks inside the components (supply pump, etc.) have occurred.

OK: No leakage

NG → **REPAIR OR REPLACE**

OK

3	READ DATA LIST (COMPENSATORY INJECTION VOLUME FOR EACH CYLINDER)

(a) Connect the intelligent tester II to the DLC3.
(b) Start the engine and turn the intelligent tester II ON.
(c) Enter the following menus: Powertrain / Engine / Data List / Injection Feedback Volume #1, #2, #3 and #4.
(d) Read the values.

OK: Compensatory injection volume is between –4.9 mm^3 and 4.9 mm^3

HINT:
- If the injector is malfunctioning, the compensatory injection volume remains at –5.0 mm^3 to 5.0 mm^3.
- The compensatory injection volume is usually between –3.0 mm^3 and 3.0 mm^3.

NG → **REPLACE INJECTOR ASSY (See page 11–52)**

OK

4	PERFORM ACTIVE TEST (FUEL LEAK TEST)

(a) Connect the intelligent tester II to the DLC3.
(b) Start the engine and turn the intelligent tester II ON.
(c) Enter the following menus: Powertrain / Engine / Active Test / Test the Fuel Leak.
(d) Check for fuel leaks in the high–pressure areas.

NEXT

CHECK IF DTC OUTPUT RECURS (DTC P0093/78)

HINT:
- After clearing the DTC, let the engine idle for 1 minute and then run it at 2,500 rpm for 30 seconds.
- At the same time, check the fuel pressure inside the common rail by selecting Powertrain / Engine and ECT / Data List / Fuel Press on the intelligent tester II.
- The internal fuel pressure of the common rail must be stable under each driving condition.

Reference:

Engine Speed	Fuel Pressure
Idling	Approximately 30,000 to 40,000 kPa
3,000 rpm (No engine load)	Approximately 50,000 to 80,000 kPa

When not using intelligent tester II:

1	CHECK DTC OUTPUT

(a) Turn the ignition switch ON.
(b) Read DTCs (See page 05–466).

Result:

Display (DTC output)	Proceed to
P0093/78 only	A
P0093/78 and P0200/97	B

B → **Go to RELEVANT DTC CHART (See page 05–477)**

A

2	CHECK FUEL LEAKAGE

(a) Visually check the supply pump, each injector and fuel line located between the supply pump and common rail for fuel leaks or fuel pressure leaks. Also, perform the same on the fuel line between the common rail and the each injector (see page 11–46).

HINT:
There is possibility that fuel leaks inside the components (supply pump, etc.) have occurred.

NG → **REPAIR OR REPLACE**

OK

REPLACE INJECTOR ASSY (See page 11–52)