DENSO

Diesel Injection Pump

SERVICE MANUAL

MITSUBISHI PAJERO 4M41 ENGINE COMMON RAIL SYSTEM (CRS)

March, 2007

DENSO CORPORATION

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Table of Contents

Operation Section

1.	PRO	DDUCT APPLICATION INFORMATION	
	1.1	Applicable Vehicle	1-1
	1.2	System Component Part Numbers	1-1
2	SUF	PPLY PUMP	
	2.1	Outline	1_2
	2.2	Suction Control Valve (SCV)	
	2.3	Fuel Temperature Sensor	
	2.5	Tuel Temperature Sensor	1-0
3.	RAI	L	
	3.1	Outline	1-6
	3.2	Rail Pressure Sensor (Pc Sensor).	1-6
	3.3	Pressure limiter	1-7
4.	INJE	ECTOR (G2 TYPE)	
	4.1	Outline	1-8
	4.2	Characteristics	1-8
	4.3	Construction	1-9
	4.4	QR Codes	1-10
	○ DF	TRATION OF CONTROL OVETEM COMPONENTS	
5.	OPE	ERATION OF CONTROL SYSTEM COMPONENTS	
5.	5.1	Engine Control System Diagram	1-11
5.			
5.	5.1	Engine Control System Diagram	1-12
5.	5.1 5.2	Engine Control System Diagram	1-12 1-18
5.	5.1 5.2 5.3	Engine Control System Diagram Engine ECU (Electronic Control Unit) Cylinder Recognition Sensor (TDC)	1-12 1-18 1-19
5.	5.15.25.35.4	Engine Control System Diagram Engine ECU (Electronic Control Unit) Cylinder Recognition Sensor (TDC) Boost Pressure Sensor	1-12 1-18 1-19
	5.1 5.2 5.3 5.4 5.5 5.6	Engine Control System Diagram Engine ECU (Electronic Control Unit) Cylinder Recognition Sensor (TDC) Boost Pressure Sensor Mass Airflow Meter	1-12 1-18 1-19
	5.1 5.2 5.3 5.4 5.5 5.6	Engine Control System Diagram Engine ECU (Electronic Control Unit) Cylinder Recognition Sensor (TDC) Boost Pressure Sensor Mass Airflow Meter Electronic Control Throttle	1-12 1-18 1-19 1-20
	5.1 5.2 5.3 5.4 5.5 5.6	Engine Control System Diagram Engine ECU (Electronic Control Unit) Cylinder Recognition Sensor (TDC) Boost Pressure Sensor Mass Airflow Meter Electronic Control Throttle	1-12 1-18 1-19 1-20 1-21
	5.1 5.2 5.3 5.4 5.5 5.6 FUE	Engine Control System Diagram Engine ECU (Electronic Control Unit) Cylinder Recognition Sensor (TDC) Boost Pressure Sensor Mass Airflow Meter Electronic Control Throttle EL INJECTION CONTROL Outline	1-12
6.	5.1 5.2 5.3 5.4 5.5 5.6 FUE 6.1 6.2 6.3	Engine Control System Diagram Engine ECU (Electronic Control Unit) Cylinder Recognition Sensor (TDC) Boost Pressure Sensor Mass Airflow Meter Electronic Control Throttle EL INJECTION CONTROL Outline Fuel Injection Quantity Control	1-12
6.	5.1 5.2 5.3 5.4 5.5 5.6 FUE 6.1 6.2 6.3	Engine Control System Diagram Engine ECU (Electronic Control Unit) Cylinder Recognition Sensor (TDC) Boost Pressure Sensor Mass Airflow Meter Electronic Control Throttle EL INJECTION CONTROL Outline Fuel Injection Quantity Control Other Controls	1-12 1-18 1-20 1-21 1-22 1-22
6.	5.1 5.2 5.3 5.4 5.5 5.6 FUE 6.1 6.2 6.3	Engine Control System Diagram Engine ECU (Electronic Control Unit) Cylinder Recognition Sensor (TDC) Boost Pressure Sensor Mass Airflow Meter Electronic Control Throttle EL INJECTION CONTROL Outline Fuel Injection Quantity Control Other Controls	1-12
 7. 	5.1 5.2 5.3 5.4 5.5 5.6 FUE 6.1 6.2 6.3 OTH 7.1 7.2	Engine Control System Diagram Engine ECU (Electronic Control Unit) Cylinder Recognition Sensor (TDC) Boost Pressure Sensor Mass Airflow Meter Electronic Control Throttle EL INJECTION CONTROL Outline Fuel Injection Quantity Control Other Controls HER SYSTEMS Outline	1-12
 7. 	5.1 5.2 5.3 5.4 5.5 5.6 FUE 6.1 6.2 6.3 OTH 7.1 7.2	Engine Control System Diagram Engine ECU (Electronic Control Unit) Cylinder Recognition Sensor (TDC) Boost Pressure Sensor Mass Airflow Meter Electronic Control Throttle EL INJECTION CONTROL Outline Fuel Injection Quantity Control Other Controls HER SYSTEMS Outline Diesel Particulate Filter (DPF) System	1-12 1-18 1-20 1-21 1-22 1-24 1-26 1-26

1. PRODUCT APPLICATION INFORMATION

1.1 Applicable Vehicle

Vehicle Manufac-	Vehicle Name	Engine Model	Specification	Destination	Line Off Period
ture					
MITSUBISHI	PAJERO	4M41	4WD (MT/AT)	Europe, Australia	Sep, 2006

1.2 System Component Part Numbers

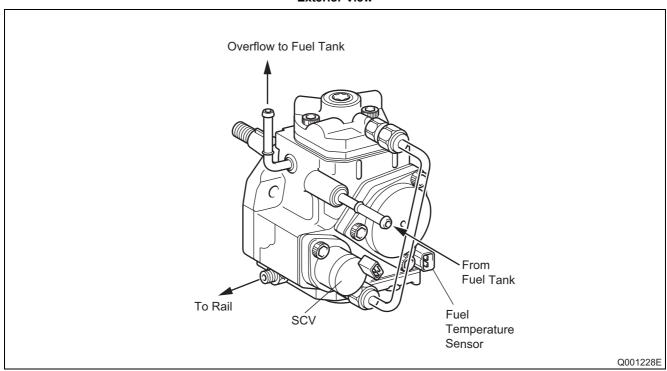
Parts Name	DENSO P/N	Manufacturer P/N	Remarks
Supply pump	SM294000-034#	1460A003	
Injector	SM095000-576#	1465A054	
Rail	SM095440-064#	1465A034	
Engine ECU	275800-468#	1860A699	Manual transmission vehi- cles only
Engine ECO	275800-469#	1860A702	Automatic transmission vehicles only
Boost pressure sensor	079800-779#	1865A035	
Electronic control throttle	197920-002#	1450A033	
Fuel temperature sensor	179730-002#	MR547077	
Mass air flow meter	197400-227#	1525A016	
Exhaust gas temperature sensor 1	265600-145#	1587A013	
Exhaust gas temperature sensor 2	265600-146#	1587A014	
Exhaust gas temperature sensor 3	265600-147#	1587A015	
Differential pressure sensor	104990-136#	1865A087	
Absolute pressure sensor	104990-135#	0865A086	Automatic transmission
Temperature sensor for differential pressure sensor learning	170400-602#	1865A095	vehicles only
Electric-Vacuum Regulating Valve (E-VRV) for Variable Geometry Turbo (VGT)	139700-035#	MR258166	

2. SUPPLY PUMP

2.1 Outline

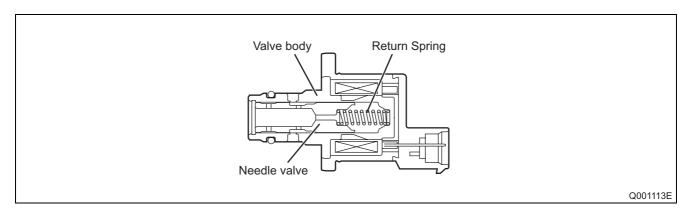
- The supply pump consists primarily of the pump body (eccentric cam, ring cam, and plungers), SCV (Suction Control Valve), fuel temperature sensor, and feed pump.
- The two plungers are positioned vertically on the outer ring cam for compactness.
- The engine drives the supply pump at a ratio of 1:1. The supply pump has a built-in feed pump (trochoid type), and draws the fuel from the fuel tank, sending it to the plunger chamber.
- The internal camshaft drives the two plungers, and they pressurize the fuel sent to the plunger chamber and send it to
 the rail. The quantity of fuel supplied to the rail is controlled by the SCV, using signals from the engine ECU. The SCV
 is a normally open type (the intake valve opened during de-energization).
- The HP3 supply pump is equipped with a compact SCV.
- For information on basic HP3 supply pump operation (suction from the fuel tank, fuel delivery to the rail, etc.), refer to the publication entitled, "General Edition Manual: Common Rail System (Doc ID: 00400076E)."

Exterior View



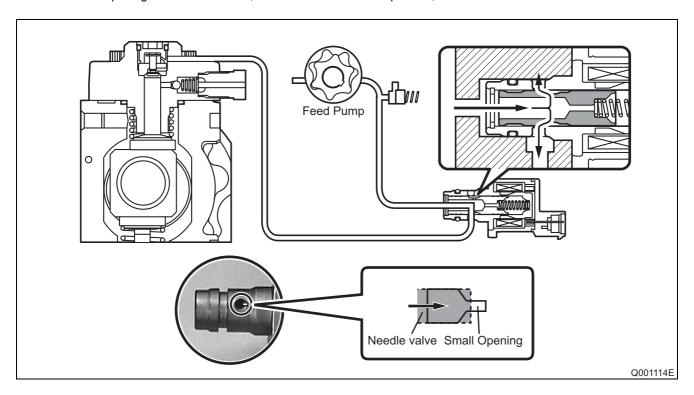
2.2 Suction Control Valve (SCV)

- A linear solenoid type valve has been adopted. The ECU controls the duty ratio (the duration in which current is applied to the SCV), in order to control the quantity of fuel that is supplied to the high-pressure plunger.
- Because only the quantity of fuel that is required for achieving the target rail pressure is drawn in, the actuating load of the supply pump decreases.
- When current flows to the SCV, variable electromotive force is created in accordance with the duty ratio, moving the
 cylinder (integrated with the armature) to the left side, and changing the opening of the fuel passage to regulate the fuel
 quantity.
- With the SCV OFF, the return spring contracts, completely opening the fuel passage and supplying fuel to the plungers. (Full quantity intake and full quantity discharge = normally open)
- When the SCV is ON, the force of the return spring moves the cylinder to the left, closing the fuel passage (normally open).
- By turning the SCV ON/OFF, fuel is supplied in an amount corresponding to the actuation duty ratio, and fuel is discharged by the plungers.



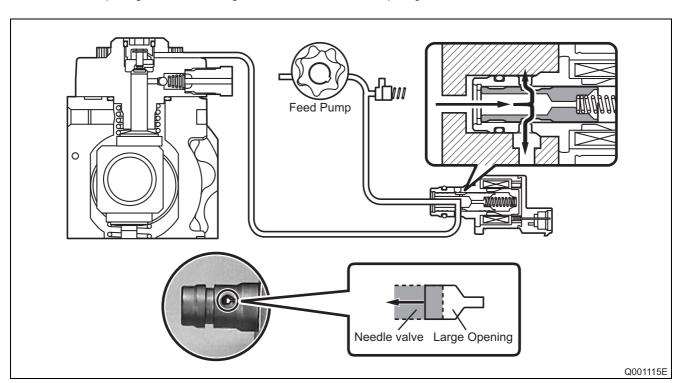
(1) SCV opening small (duty ON time long - refer to the "relationship between actuation signal and current" diagram.)

•When the opening of the SCV is small, the fuel suction area is kept small, which decreases the transferable fuel volume.



(2) SCV opening large (duty ON time short - refer to the "relationship between actuation signal and current" diagram.)

•When the opening of the SCV is large, the fuel suction area is kept large, which increases the transferable fuel volume.

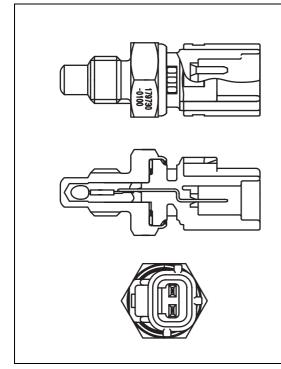


2.3 Fuel Temperature Sensor

• Detects the fuel temperature and sends a corresponding signal to the engine ECU. Based on this information, the engine ECU calculates the injection volume correction that is appropriate for the fuel temperature.

110

120



<	Reference: Temperature-resistance Characteristics				
Ì	TEMPERATURE (°C)	RESISTANCE(kΩ)			
	- 30	(25.40)			
	- 20	15.40 ^{+ 1.29} _{- 1.20}			
	- 10	(9.16)			
	0	(5.74)			
	10	(3.70)			
	20	2.45 ^{+ 0.14} _{- 0.13}			
	30	(1.66)			
	40	(1.15)			
	50	(0.811)			
	60	(0.584)			
	70	(0.428)			
	80	0.318 ± 0.008			
	90	(0.240)			
	100	(0.1836)			

0.1417 ± 0.0018

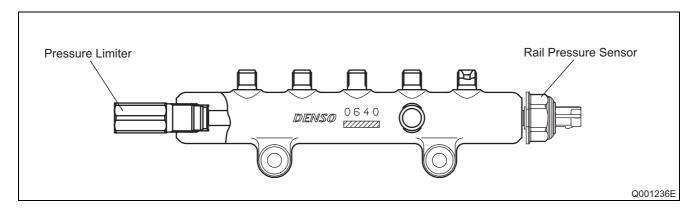
(0.1108)

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3. RAIL

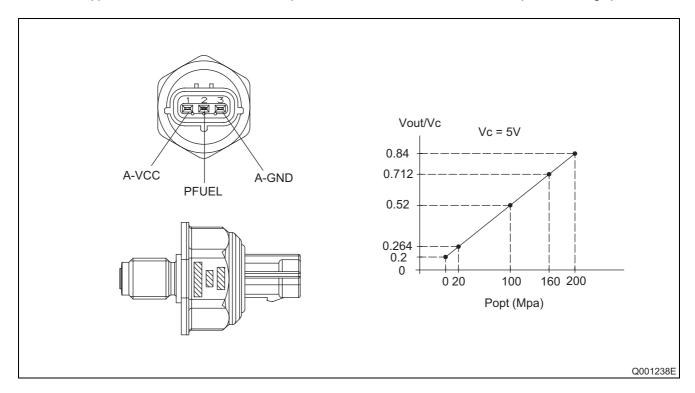
3.1 Outline

- Stores pressurized fuel (25 to 180 MPa) that has been delivered from the supply pump and distributes the fuel to each cylinder injector. A rail pressure sensor and a pressure limiter valve are adopted in the rail.
- The rail pressure sensor (Pc sensor) detects fuel pressure in the rail and sends a signal to the engine ECU, and the pressure limiter controls the excess pressure. This ensures optimum combustion and reduces combustion noise.



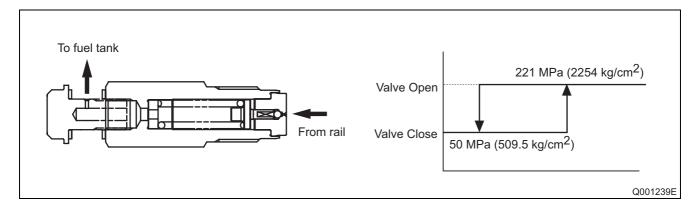
3.2 Rail Pressure Sensor (Pc Sensor)

• The pressure sensor detects the fuel pressure of the rail, and sends a signal to the engine ECU. The sensor is made from a semiconductor that uses the Piezo resistive effect to detect changes in electrical resistance based on the pressure applied to the elemental silicon. In comparison to the old model, this sensor is compatible with high pressure.



3.3 Pressure limiter

• The pressure limiter releases pressure when the internal pressure of the rail becomes abnormally high. The pressure limiter opens when internal pressure reaches 221MPa (2254 kg/cm2) and closes when rail pressure reaches a given set pressure. Fuel released from the pressure limiter is returned to the fuel tank.



4. INJECTOR (G2 TYPE)

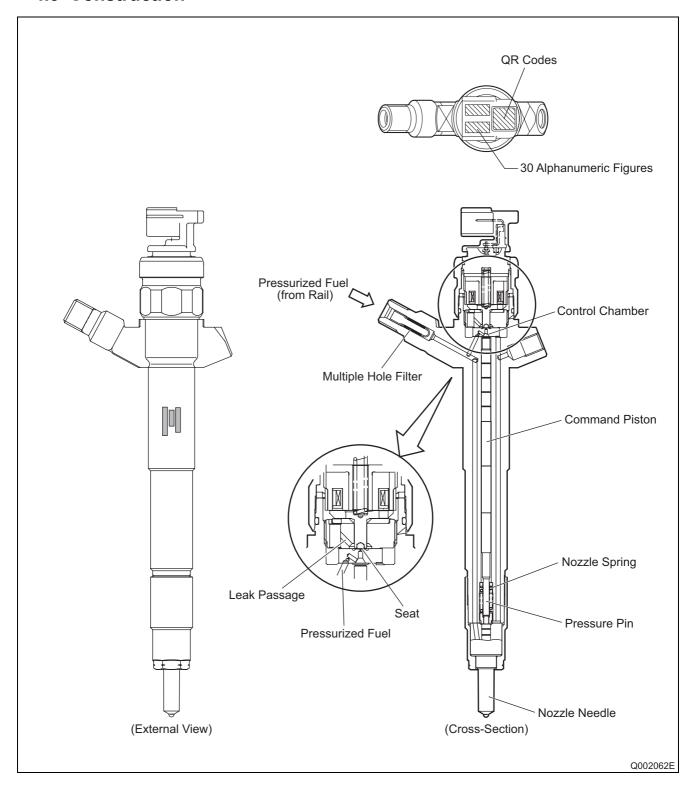
4.1 Outline

- The injectors inject the high-pressure fuel from the rail into the combustion chambers at the optimum injection timing, rate, and spray condition, in accordance with commands received from the ECU.
- For information on both basic injector operation and handling injectors with QR codes, refer to the publication entitled, "General Edition Manual: Common Rail System (Doc ID: 00400076E)."

4.2 Characteristics

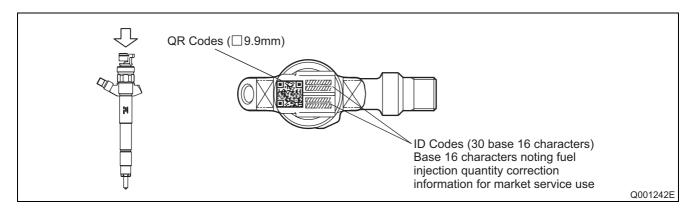
- A compact, energy-saving solenoid-control type TWV (Two-Way Valve) injector has been adopted.
- QR codes displaying various injector characteristics and the ID codes showing these in numeric form (30 alphanumeric figures) are engraved on the injector head. The common rail system optimizes injection volume control using this information. When an injector is newly installed in a vehicle, it is necessary to enter the ID codes in the engine ECU using the MITSUBISHI diagnosis tool (MUT III).

4.3 Construction

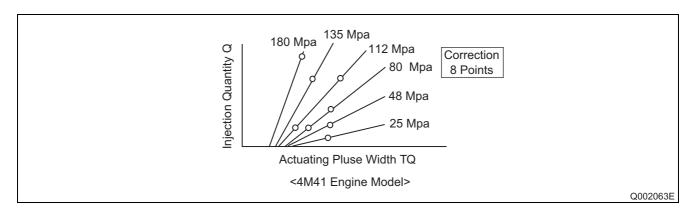


4.4 QR Codes

• Conventionally the whole injector Assy was replaced during injector replacement, but QR (Quick Response) codes have been adopted to improve injector quantity precision.

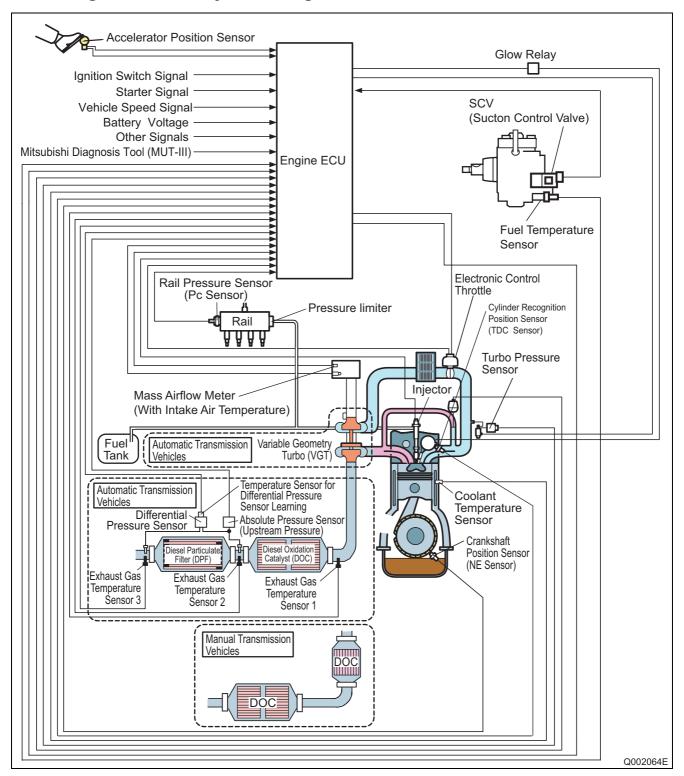


QR codes have resulted in a substantial increase in the number of fuel injection quantity correction points, greatly improving precision. The characteristics of the engine cylinders have been further unified, contributing to improvements in combustion efficiency, reductions in exhaust gas emissions and so on.



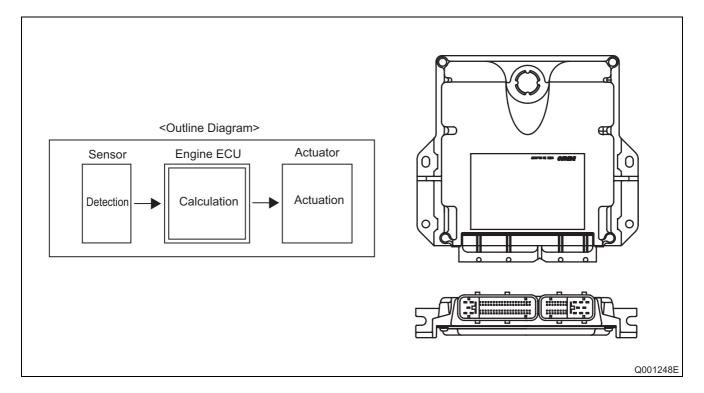
5. OPERATION OF CONTROL SYSTEM COMPONENTS

5.1 Engine Control System Diagram

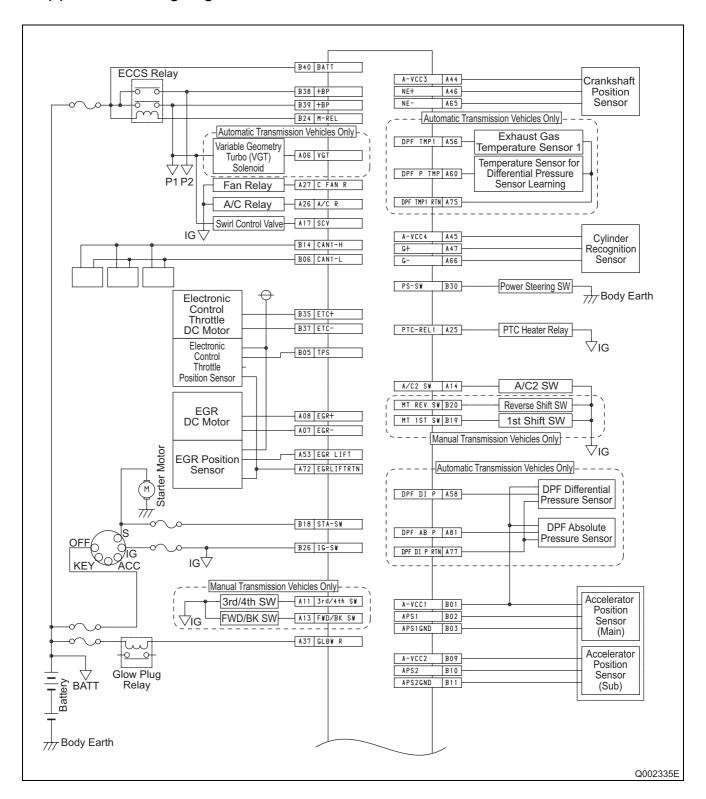


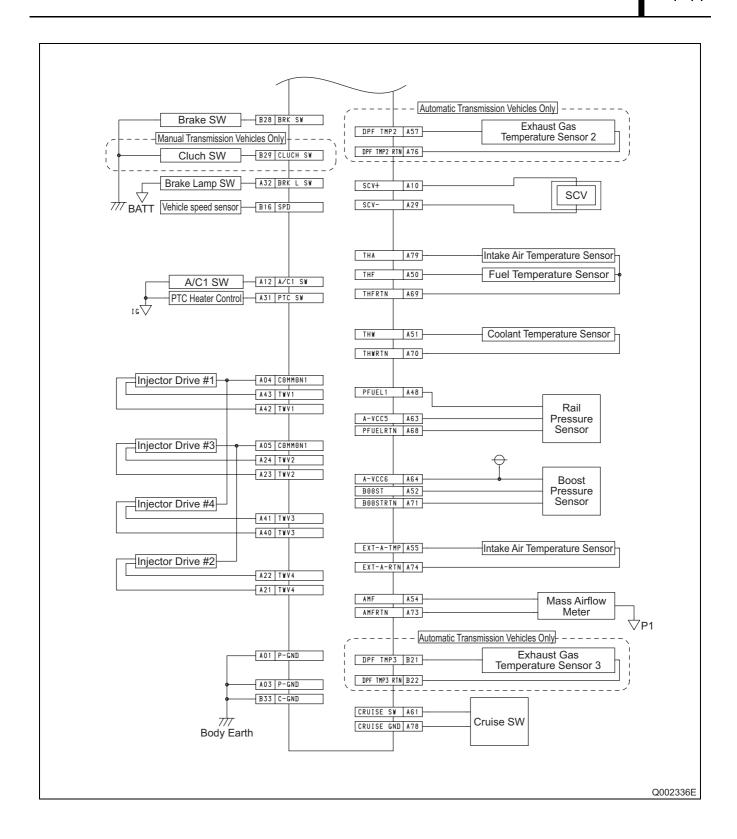
5.2 Engine ECU (Electronic Control Unit)

• This is the command center that controls the fuel injection system and the engine operation in general.

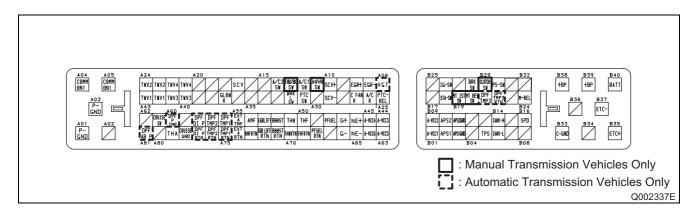


(1) External wiring diagram





(2) Connector diagram



Terminal connections

No.	Pin Symbol	Signal Name
A01	P-GND	Power Ground
A02		
A03	P-GND	Power Ground
A04	COMMON1	INJ#1/#4 BATT.
A05	COMMON1	INJ#2/#3 BATT.
A06	VGT (Automatic Transmission Vehicles Only)	Variable Geometry Turbo (VGT) Solenoid
A07	EGR-	EGR DC-Motor (-)
A08	EGR+	EGR DC-Motor (+)
A09		
A10	SCV+	SCV (+)
A11	3rd/4th SW (Manual Transmission Vehicles Only)	3rd/4th Shift SW
A12	A/C1 SW	A/C1 SW
A13	FWD/BK SW (Manual Transmission Vehicles Only)	FWD/BK Shift SW
A14	A/C2 SW	A/C2 SW
A15		
A16		
A17	SCV	Swirl Control Valve
A18		
A19		
A20		
A21	TWV4	Injector Drive #2
A22	TWV4	,
A23	TWV2	Injector Drive #3
A24	TWV2	,
A25	PTC-REL	PTC Heater Relay
A26	A/C R	A/C Relay
A27	C FAN R	Fan Relay
A28		

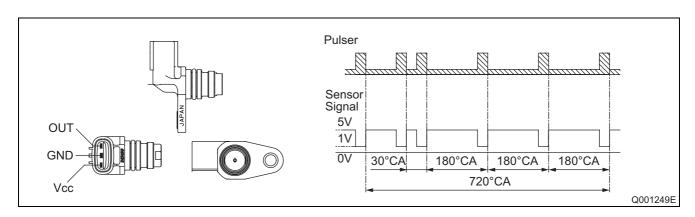
No.	Pin Symbol	Signal Name
A29	SCV-	SCV (-)
A30		
A31	PTC SW	PTC Heater Control
A32	BRK L SW	Brake Lamp SW
A33		
A34		
A35		
A36		
A37	GLOW R	Glow Plug Relay
A38		
A39		
A40	TWV3	Injector Drive #4
A41	TWV3	Injector Drive #4
A42	TWV1	Injector Drive #1
A43	TWV1	injector Drive #1
A44	A-VCC3	Crankshaft Position Sensor BATT.
A45	A-VCC4	Cylinder Recognition Sensor BATT.
A46	NE+	Crankshaft Position Sensor
A47	G+	Cylinder Recognition Sensor
A48	PFUEL	Rail Pressure Sensor
A49		
A50	THF	Fuel Temperature Sensor
A51	THW	Coolant Temperature Sensor
A52	BOOST	Boost Pressure Sensor
A53	EGR LIFT	EGR Position Sensor
A54	AMF	Mass Airflow Meter
A55	EXT-A-TMP	Intake Air Temperature Sensor (W/ Mass Airflow Meter)
A56	DPF TMP1 (Automatic Transmission Vehicles Only)	Exhaust Gas Temperature Sensor 1
A57	DPF TMP2 (Automatic Transmission Vehicles Only)	Exhaust Gas Temperature Sensor 2
A58	DPF DI P (Automatic Transmission Vehicles Only)	DPF Differential Pressure Sensor
A59		
A60	DPF P TMP (Automatic Transmission Vehicles Only)	Temperature Sensor for Differential Pressure Sensor Learning
A61	CRUISE SW	Cruise Control SW (W/O IG)
A62		
A63	A-VCC5	Rail Pressure Sensor Source
A64	A-VCC6	Sensor Source (5 V)
A65	NE-	Crankshaft Position Sensor GND
A66	G-	Cylinder Recognition Sensor GND

No.	Pin Symbol	Signal Name	
A67			
A68	PFUELRTN	Rail Pressure Sensor Earth	
A69	THERTN	Sensor Earth (Intake Air Temperature Sensor, Fuel Temperature Sensor)	
A70	THWRTN	Coolant Temperature Sensor Earth	
A71	BOOSTRTN	Boost Pressure Sensor Earth	
A72	EGR LIFT RTN	Sensor Earth (EGR Position Sensor, Throttle Position Sensor)	
A73	AMFRTN	Mass Airflow Meter Earth	
A74	EXT-A-RTN	Intake Air Temperature Sensor Earth (W/ Mass Airflow Meter)	
A75	DPF TMP1 RTN (Automatic Transmission Vehicles Only)	Exhaust Gas Temperature Sensor 1 Return	
A76	DPF TMP2 RTN (Automatic Transmission Vehicles Only)	Exhaust Gas Temperature Sensor 2 Return	
A77	DPF DI P RTN (Automatic Transmission Vehicles Only)	DPF differential pressure sensor Return	
A78	CRUISE GND	Cruise Control SW GND	
A79	THA	Intake Air Temperature Sensor	
A80			
A81	DPF AB P (Automatic Transmission Vehicles	DPF Absolute Pressure Sensor	
	Only)		
B01	A-VCC1	Accelerator Position Sensor (Main) Source	
B02	APS1	Accelerator Position Sensor (Main)	
B03	APS1GND	Accelerator Position Sensor (Main) Earth	
B04			
B05	TPS	Electronic Control Throttle Position Sensor	
B06	CAN1-L	CAN Lo (W/O Resistor)	
B07			
B08			
B09	A-VCC2	Accelerator Position Sensor (Sub) Source	
B10	APS2	Accelerator Position Sensor (Sub)	
B11	APS2GND	Accelerator Position Sensor (Sub) Earth	
B12			
B13			
B14	CAN1-H	CAN Hi (W/O Resistor)	
B15			
B16	SPD	Vehicle speed sensor	
B17			
B18	STA-SW	Start Signal	
B19	MT 1st SW (Manual Transmission Vehicles Only)	1st Shift SW	
B20	MT REV SW (Manual Transmission Vehicles Only)	Reverse Shift SW	

No.	Pin Symbol	Signal Name	
B21	DPF TMP3 (Automatic Transmission Vehicles	Exhaust Gas Temperature Sensor 3	
	Only)		
B22	DPF TMP3 RTN (Automatic Transmission Vehi-	Exhaust Gas Temperature Sensor 3 Return	
	cles Only)		
B23			
B24	M-REL	Control Relay (W/ Diode)	
B25			
B26	IG-SW	Ignition SW	
B27			
B28	BRK SW	Brake SW (Large Current)	
B29	CLUTCH SW (Manual Transmission Vehicles	Clutch SW	
	Only)		
B30	PS-SW	Power Steering SW	
B31			
B32			
B33	C-GND	Signal Ground	
B34			
B35	ETC+	Electronic Control Throttle Motor (+)	
B36			
B37	ETC-	Electronic Control Throttle Motor (-)	
B38	+BP	Battery	
B39	+BP	Battery	
B40	BATT	Battery (Backup W/ Monitor)	

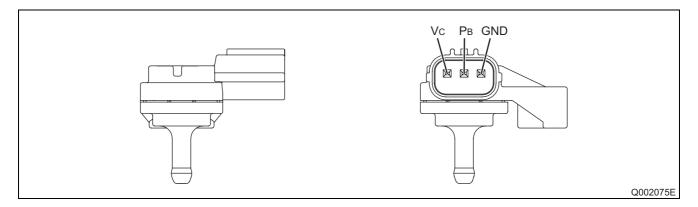
5.3 Cylinder Recognition Sensor (TDC)

• Outputs a cylinder identification signal. The sensor outputs 5 pulses for every two revolutions (720°CA) of the engine.



5.4 Boost Pressure Sensor

This is a type of semi-conductor pressure sensor. It utilizes the characteristics of the electrical resistance changes that
occur when the pressure applied to a silicon crystal changes. Because a single sensor is used to measure both boost
pressure and atmospheric pressure, a VSV is used to alternate between atmospheric and turbo pressure measurement.

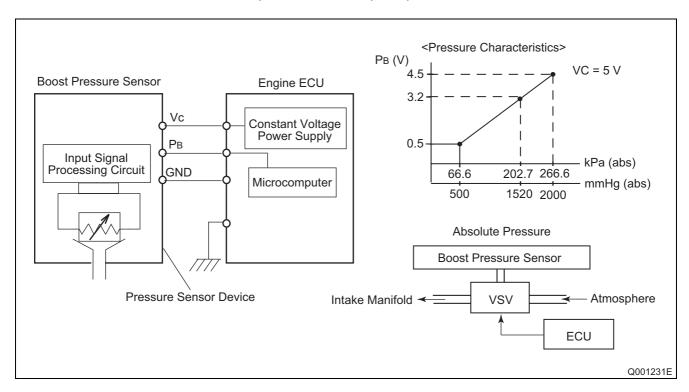


(1) Atmospheric pressure measurement conditions

- •The VSV turns ON for 150msec to detect the atmospheric pressure when one of the conditions below is present:
- •Engine speed = 0rpm
- •Starter is ON
- •Idle is stable

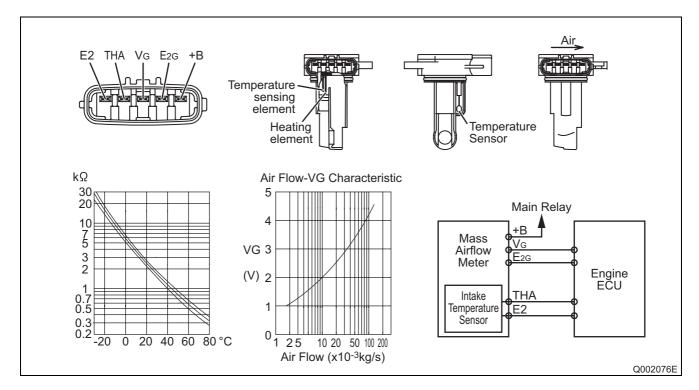
(2) Turbo pressure measurement conditions

•The VSV turns OFF to detect the turbo pressure if the atmospheric pressure measurement conditions are absent.



5.5 Mass Airflow Meter

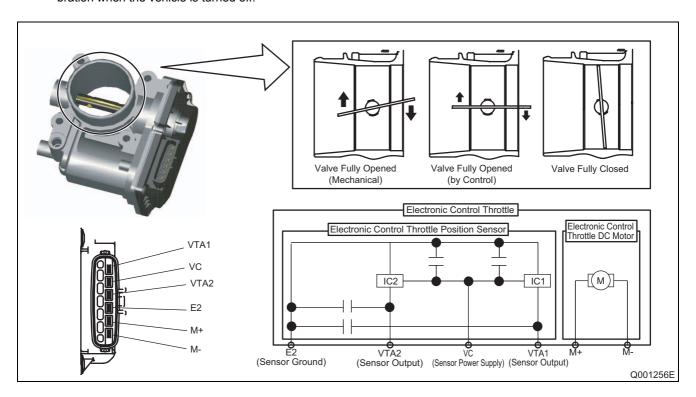
- This air flow meter, which is a plug-in type, allows a portion of the intake air to flow through the detection area. By directly
 measuring the mass and the flow rate of the intake air, the detection precision has been improved and the intake air
 resistance has been reduced.
- This mass air flow meter has a built-in intake air temperature sensor.



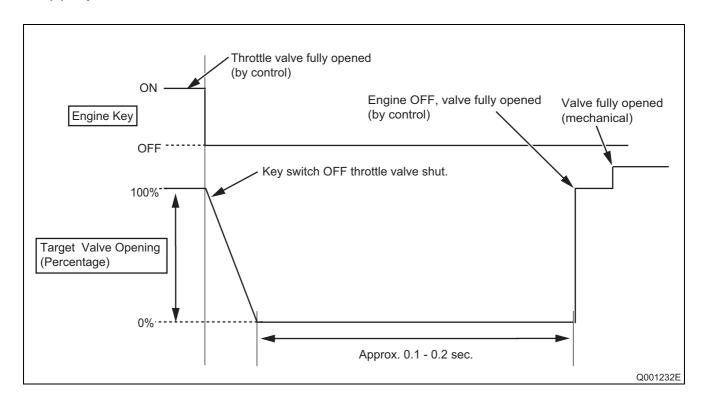
5.6 Electronic Control Throttle

(1) Outline

•The suctioning of air is stopped through interlocking the intake throttle with the key switch in order to reduce engine vibration when the vehicle is turned off.



(2) Operation



6. FUEL INJECTION CONTROL

6.1 Outline

The following explains the types of control used in the PAJERO system. For details on each type of control, refer to the
publication entitled, "General Edition Manual: Common Rail System (Doc ID: 00400076E)."

(1) Fuel injection rate control function

•Pilot injection control injects a small amount of fuel before the main injection.

(2) Fuel injection quantity control function

•The fuel injection quantity control function replaces the conventional governor function. It controls the fuel injection to an optimal injection quantity based on the engine speed and accelerator position signals.

(3) Fuel injection timing control function

•The fuel injection timing control function replaces the conventional timer function. It controls the injection to an optimal timing based on the engine speed and the injection quantity.

(4) Fuel injection pressure control function (rail pressure control function)

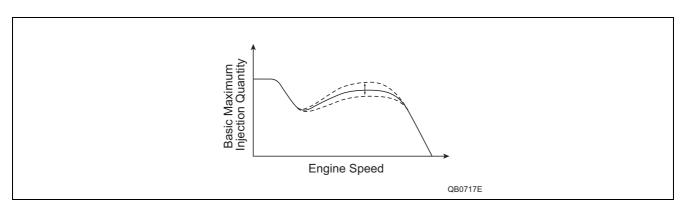
•The fuel injection pressure control function (rail pressure control function) controls the discharge volume of the pump by measuring the fuel pressure at the rail pressure sensor and feeding it back to the ECU. It effects pressure feedback control so that the discharge volume matches the optimal (command) value set in accordance with the engine speed and the injection quantity.

6.2 Fuel Injection Quantity Control

 The following explains controls unique to the PAJERO. For other types of basic fuel injection quantity control, refer to the publication entitled, "General Edition Manual: Common Rail System (Doc ID: 00400076E)."

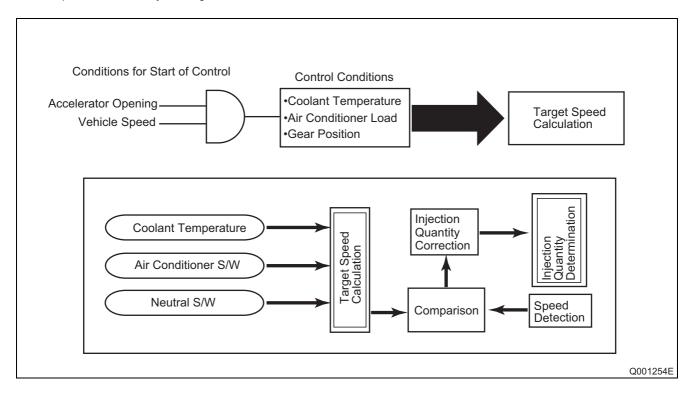
(1) Maximum injection quantity

•The basic maximum injection quantity is determined by the engine speed, the added corrections for intake air pressure, and gear position.

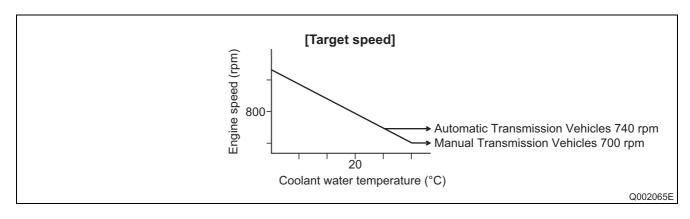


(2) Idle speed control (ISC) system

•This system controls the idle speed by regulating the injection quantity in order to match the actual speed to the target speed calculated by the engine ECU.



•The target speed varies, depending on the ON/OFF state of the air conditioner and the coolant temperature.



6.3 Other Controls

• The following explains microinjection quantity learning control.

(1) Microinjection quantity learning control

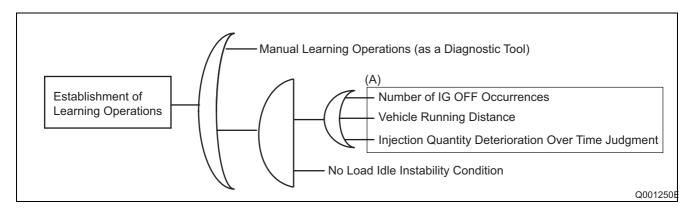
Outline

•Quantity learning control is used in every vehicle engine (injector) to preserve the accuracy of quantity (specifically, pilot injection quantity.)

This type of control is first performed when shipped from the factory (L/O), and later is automatically performed every time the vehicle runs a set distance (for details, see item "A".) Because of quantity learning control, the accuracy of each injector can be preserved not only initially, but also as deterioration in injection occurs over time. As a result of this learning, correction values are recorded in the ECU. During normal driving operations, this correction value is used to make modifications to injection commands, resulting in accurate microinjection.

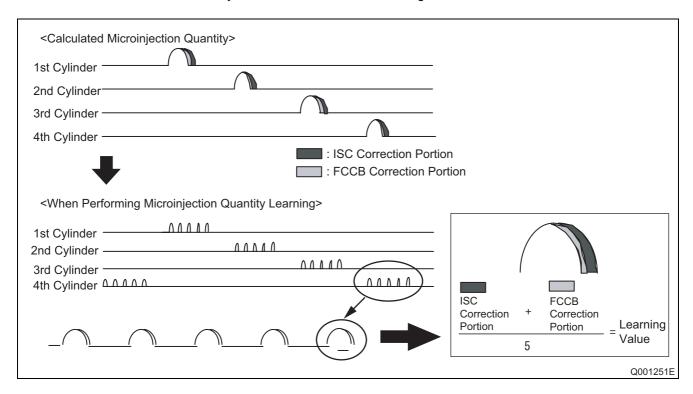
Learning operations

•For every two no load, idle instability conditions established (See chart "A" below) quantity learning takes place. In addition, it is also possible to perform quantity learning control manually as a diagnostic tool.



Operational outline

•Learning control sends ISC (target speed correction quantity) and FCCB (cylinder-to-cylinder correction quantity) feed-back based on engine speed to apply injection control. The correction quantity is added to each cylinder based on ISC and FCCB correction information. The corrected injection quantity is then calculated. Through the use of quantity learning control, injection is divided into 5 injections. In this state, the value for ISC and FCCB corrected injection quantity that has been divided into five injections is calculated as the "learning value".



7. OTHER SYSTEMS

7.1 Outline

• The following explains the Diesel Particulate Filter (DPF) System installed in PAJEROs equipped with an automatic transmission.

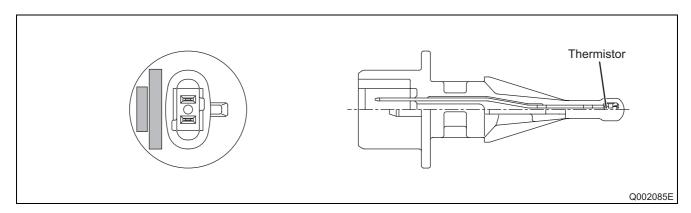
7.2 Diesel Particulate Filter (DPF) System

Outline

 For details on basic DTP construction and operation, refer to the publication entitled, "General Edition Manual: Common Rail System (Doc ID: 00400076E)." The following explains the newly added temperature sensor, used for differential pressure sensor learning.

Temperature Sensor for Differential Pressure Sensor Learning

• The temperature sensor for differential pressure sensor learning is attached to the differential pressure sensor. The temperature sensor detects differential pressure sensor temperature in order to make temperature corrections.



8. DIAGNOSTIC TROUBLE CODES (DTC)

8.1 About the Codes Shown in the Table

The "SAE" diagnostic trouble code indicates the code that is output through the use of the STT (MUT-III). (SAE: Society
of Automotive Engineers)

8.2 Diagnostic Trouble Code Details

DTC	Diagnostic Item	Light	Remarks
Number		ON	
(SAE)			
P0016	Crankshaft position sensor-Cylinder recognition sensor phase gap malfunction	Yes	
P0047	Turbo PWM output - low	Yes	Automatic transmission
P0048	Turbo PWM output - high	Yes	vehicles only
P0072	Intake manifold temperature sensor - low	Yes	
P0073	Intake manifold temperature sensor - high	Yes	
P0088	Rail high pressure abnormality	Yes	
P0089	SCV stuck diagnosis	Yes	
P0093	Fuel leak	Yes	
P0102	Mass Airflow Meter - low	Yes	
P0103	Mass Airflow Meter - high	Yes	
P0106	Boost pressure sensor characteristic abnormality	Yes	
P0107	Boost pressure sensor - low	Yes	
P0108	Boost pressure sensor - high	Yes	
P0112	Intake air temperature sensor - low	Yes	
P0113	Intake air temperature sensor - high	Yes	
P0117	Coolant temperature sensor - low	Yes	
P0118	Coolant temperature sensor - high	Yes	
P0122	Electronic control throttle - low	Yes	
P0123	Electronic control throttle - high	Yes	
P0182	Fuel temperature sensor - low	Yes	
P0183	Fuel temperature sensor - high	Yes	
P0191	Rail pressure sensor characteristic abnormality	Yes	
P0192	Rail pressure sensor (time) low	Yes	
P0193	Rail pressure sensor (time) high	Yes	
P0201	TWV 1 (No.1 cylinder) actuation system open circuit	Yes	
P0202	TWV 4 (No.2 cylinder) actuation system open circui	Yes	
P0203	TWV 2 (No.3 cylinder) actuation system open circuit	Yes	
P0204	TWV 3 (No.4 cylinder) actuation system open circuit	Yes	

DTC	Diagnostic Item	Light	Remarks
Number		ON	
(SAE)			
P0219	Engine overrun abnormality	No	
P0234	High boost abnormality diagnosis	Yes	Manual transmission vehi- cles only
P0301	Injector function (non - injection) 1	Yes	
P0302	Injector function (non - injection) 2	Yes	
P0303	Injector function (non - injection) 3	Yes	
P0304	Injector function (non - injection) 4	Yes	
P0335	No crankshaft position sensor pulse input	Yes	
P0336	Abnormal crankshaft position sensor pulse number	Yes	
P0340	No cylinder recognition sensor pulse input	Yes	
P0341	Cylinder recognition sensor pulse number abnormality	Yes	
P0403	EGR DC motor abnormality	Yes	
P0405	EGR lift sensor - low	Yes	
P0406	EGR lift sensor - high	Yes	
P0420	Diesel Oxidation Catalyst (DOC) temperature increase failure during regeneration	Yes	
P0427	Exhaust gas temperature sensor 2 - low	Yes	Automatic transmission
P0428	Exhaust gas temperature sensor 2 - high	Yes	vehicles only
P0472	Diesel Particulate Filter (DPF) absolute pressure sensor - low	Yes	
P0473	DPF absolute pressure sensor - high	Yes	
P0502	Vehicle speed abnormality - low	Yes	
P0513	Immobilizer authenticating error	Yes	
P0545	Exhaust gas temperature sensor 1 - low	Yes	Automatic transmission
P0546	Exhaust gas temperature sensor 1 - high	Yes	vehicles only
P0551	Power Steering Switch ON malfuncion	Yes	
P0603	EEPROM abnormality	Yes	
P0604	RAM abnormality	Yes	
P0605	Engine ECU flash-ROM abnormality	Yes	
P0606	Engine ECU CPU abnormality (main IC abnormality)	Yes	
P0607	Engine ECU abnormality (monitoring IC abnormality)	Yes	
P0628	SCV actuation system abnormality	Yes	
P0629	SCV +B short	Yes	
P0630	Vehicle Identification Number (VIN) not registered in Engine ECU	Yes	
P0638	Electronic control throttle stuck	Yes	
P0642	Sensor - voltage 1 low	Yes	
P0643	Sensor - voltage 1 high	Yes	
P0652	Sensor - voltage 2 low	Yes	
P0653	Sensor - voltage 2 high	Yes	
P1203	Low charge	Yes	
P1204	Over charge	Yes	

Number (SAE) P1272 Pressure limiter open valve abnormality Yes P1273 Supply pump single-side element abnormality Yes P1274 Supply pump protective fail flag Yes P1275 Supply pump protective fail flag Yes P1276 Supply pump replace fail flag Yes P1277 Supply pump replace fail flag Yes P1278 Turbo system (positive deviation) Yes P1279 Turbo system (negative deviation) Yes P1279 Turbo system (negative deviation) Yes P1279 Turbo system (negative deviation) Yes P1427 Exhaust gas temperature sensor 3 - low Yes P1428 Exhaust gas temperature sensor 3 - low Yes P1429 Differential pressure sensor temperature sensor low Yes P1475 Differential pressure sensor temperature sensor low Yes P1475 Differential pressure sensor temperature sensor high Yes P1479 DPF heat loss temperature abnormality Yes P1499 DPF heat loss temperature abnormality Yes P1499 DPF heat loss temperature abnormality Yes P1499 DPF heat loss temperature abnormality No P1654 Cruse control switch abnormality No P1655 OR data failure to write abnormality Yes P1626 OR data failure to write abnormality Yes P1627 OR data failure to write abnormality Yes P1628 Swirt control (VSS) output (VSV) open load/short to GND Yes P2010 Swirt control (VSS) output (VSV) short to BATT Yes P2121 Accelerator position sensor-1 low P2122 Accelerator position sensor-1 low P2123 Accelerator position sensor-1 ligh final Yes P2124 Accelerator position sensor-1 ligh final Yes P2125 Accelerator position sensor-2 low Yes Accelerator position sensor-2 low Yes Accelerator position sensor-1 duplicate malfunction low Accelerator position sensor-1 duplicate malfunction low Accelerator position sensor-1 duplicate malfunction low Accelerator position sensor-1 low Yes Accelerator position sensor-1 low Yes Accelerator position sensor-1 low Yes P2148 Common 1 system open circuit Yes P2149 Common 2 system sen	DTC	Diagnostic Item	Light	Remarks
P1272 Pressure limiter open valve abnormality Yes P1273 Supply pump single-side element abnormality Yes P1274 Supply pump protective fail flag P1275 Supply pump protective fail flag P1276 Supply pump replace fail flag P1277 Supply pump replace fail flag P1278 Turbo system (negative deviation) P1289 Turbo system (negative deviation) P1299 Turbo system (negative deviation) P1291 Exhaust gas temperature sensor 3 - low P1292 Exhaust gas temperature sensor 3 - low P1293 Exhaust gas temperature sensor 3 - low P1294 Differential pressure sensor temperature sensor low P1295 Differential pressure sensor temperature sensor high P1297 DOC regeneration time exceeded P1298 Regeneration timing abnormality P1299 DPF heat loss temperature abnormality P1299 P1290 DPF heat loss temperature abnormality P1291 Rake switch abnormality P1292 QR data abnormality P1293 QR data failure to write abnormality P1294 QR data failure to write abnormality P1295 Swirt control (VSS) output (VSV) open load/short to GND P294 Swirt control (VSS) output (VSV) open load/short to GND P295 Swirt control (VSS) output (VSV) open load/short to BND P296 Swirt control (VSS) output (VSV) open load/short to BND P297 Accelerator position sensor-1 low P298 Accelerator position sensor-1 low P299 Accelerator position sensor-1 high final P299 Accelerator position sensor-2 ligh final P299 Accelerator position sensor-1 chigh final P299 Accelerator position sensor-2 high final P299 Accelerator position sensor-2 high final P299 Accelerator position sensor-2 ligh final P299 Accelerator position sensor-1 high final P29	Number	g The state of the		
P1273 Supply pump single-side element abnormality Yes P1274 Supply pump protective fail flag Yes P1275 Supply pump replace fall flag Yes P1289 Turbo system (positive deviation) Yes P1299 Turbo system (negative deviation) Yes P1299 Turbo system (negative deviation) Yes P1427 Exhaust gas temperature sensor 3 - low Yes P1428 Exhaust gas temperature sensor 3 - high Yes P1427 Differential pressure sensor temperature sensor low Yes P1474 Differential pressure sensor temperature sensor high Yes P1475 Differential pressure sensor temperature sensor high Yes P1476 DoC regeneration time exceeded Yes P1487 DoC regeneration time exceeded Yes P1499 DPF heat loss temperature abnormality Yes P1499 DPF heat loss temperature abnormality Yes P1564 Cruise control switch abnormality Yes P1665 QR data abnormality Yes P1666 OR data failure to write abnormality Yes P1660 QR data failure to write abnormality Yes P1660 Swirl control (VSS) output (VSV) open load/short to GND Yes P2009 Swirl control (VSS) output (VSV) short to BATT Yes P2118 Electronic control throttle DC motor over current abnormality Yes P2122 Accelerator position sensor-1 low Yes P2123 Accelerator position sensor-1 high final Yes P2124 Accelerator position sensor-1 high final Yes P2125 Accelerator position sensor-2 high final Yes P2126 Accelerator position sensor-2 high final Yes P2127 Accelerator position sensor-2 high final Yes P2128 Accelerator position sensor-2 high final Yes P2129 Accelerator position sensor-2 high final Yes P2120 Accelerator position sensor-2 high final Yes P2121 Accelerator position sensor-2 high final Yes P2122 Accelerator position sensor-1 high Yes P2123 Accelerator position sensor-1 high final Yes P2124 Accelerator position sensor-1 duplicate malfunction high Yes P2125 Accelerator position sensor-1 duplicate malfunction high Yes P2146 Common 1 system open circuit Yes P2147 COM1 TWV actuation system +B short Yes P2148 Common 2 system open circuit Yes P2149 Common 2 system open circuit Yes P2240 Atmospheric pressure sensor high P2245 Different	(SAE)			
P1274 Supply pump protective fail flag Yes P1275 Supply pump protective fail flag Yes P1276 Supply pump replace fail flag Yes P1288 Turbo system (positive deviation) Yes P1299 Turbo system (positive deviation) Yes P1299 Turbo system (positive deviation) Yes P1428 Exhaust gas temperature sensor 3 - low Yes P1427 Exhaust gas temperature sensor 3 - low Yes P1428 Differential pressure sensor temperature sensor low Yes P1475 Differential pressure sensor temperature sensor high Yes P1497 DOC regeneration time exceeded Yes P1498 Regeneration timing abnormality Yes P1499 DPF heat loss temperature abnormality Yes P1590 DFF heat loss temperature abnormality Yes P1591 Brake switch abnormality No P1571 Brake switch abnormality Yes P1562 QR data abnormality Yes P1570 QR data failure to write abnormality Yes P1570 QR data failure to write abnormality Yes P1570 Swirl control (VSS) output (VSV) open load/short to GND Yes P1570 Swirl control (VSS) output (VSV) short to BATT Yes P1571 Electronic control throttle DC motor over current abnormality Yes P1572 Accelerator position sensor-1 high final Yes P1572 Accelerator position sensor-1 high No P1573 Accelerator position sensor-2 low Yes Accelerator position sensor-2 high final Yes Accelerator position sensor-1 duplicate malfunction high Yes Accelerator position sensor - high final Yes P15748 COM1 TWV actuation system +B short Yes Atmospheric pressure sensor - low Yes Automatic transmissio vehicles only	P1272	Pressure limiter open valve abnormality	Yes	
P1275 Supply pump replace fail flag P1298 Turbo system (positive deviation) P1299 Turbo system (negative deviation) P1297 Turbo system (negative deviation) P1297 Exhaust gas temperature sensor 3 - low P1298 Exhaust gas temperature sensor 3 - low P1428 Exhaust gas temperature sensor 3 - low P1429 Differential pressure sensor temperature sensor low P1470 Differential pressure sensor temperature sensor high P1471 Differential pressure sensor temperature sensor high P1472 Differential pressure sensor temperature sensor high P1473 DOC regeneration time exceeded P1498 Regeneration timing abnormality P1499 DPF heat loss temperature abnormality P1490 DPF heat loss temperature abnormality P1504 Cruise control switch abnormality P1505 QR data abnormality P1506 QR data failure to write abnormality P1625 QR data failure to write abnormality P1626 QR data failure to write abnormality P1627 QR data failure to write abnormality P1628 QR data failure to write abnormality P1629 Swirl control (VSS) output (VSV) open load/short to GND P1629 Swirl control (VSS) output (VSV) short to BATT P1509 Swirl control (VSS) output (VSV) short to BATT P1509 QR date failure to write abnormality P1509 Accelerator position sensor-1 low P1509 Accelerator position sensor-1 low P1509 Accelerator position sensor-1 low P1509 Accelerator position sensor-2 low P1509 Accelerator position sensor-2 low P1509 Accelerator position sensor-2 duplicate malfunction low P1509 Accelerator position sensor-3 duplicate malfunction low P1509 Accelerator position sensor-3 duplicate malfunction low P1509 Accelerator position sensor-3 duplicate	P1273	Supply pump single-side element abnormality	Yes	
P1298 Turbo system (positive deviation) P1299 Turbo system (negative deviation) P1427 Exhaust gas temperature sensor 3 - low P1428 Exhaust gas temperature sensor 3 - low P1428 Exhaust gas temperature sensor 3 - low P1429 Differential pressure sensor temperature sensor low P1430 Differential pressure sensor temperature sensor low P1431 Differential pressure sensor temperature sensor high P1432 DOC regeneration time exceeded P1438 Regeneration timing abnormality P1439 DPF heat loss temperature abnormality P1439 DPF heat loss temperature abnormality P1564 Cruise control switch abnormality P1571 Brake switch abnormality P1571 Brake switch abnormality P1582 QR data abnormality P1584 QR data failure to write abnormality P1585 QR data failure to write abnormality P1586 Swird control (VSS) output (VSV) open load/short to GND P1687 Swird control (VSS) output (VSV) short to BATT P188 Electronic control throttle DC motor over current abnormality P189 Electronic control throttle DC motor over current abnormality P189 Electronic control throttle DC motor over current abnormality P180 Accelerator position sensor-1 low P180 Accelerator position sensor-1 high final P180 Accelerator position sensor-2 low P180 Accelerator position sensor-2 high final P180 Accelerator position sensor-2 high final P180 Accelerator position sensor-2 high final P180 Accelerator position sensor - duplicate malfunction low Accelerator position sensor - duplicate malfunction low Accelerator position sensor - duplicate malfunction low P180 Accelerator position sensor - dupli	P1274	Supply pump protective fail flag	Yes	
P1299 Turbo system (negative deviation) P1427 Exhaust gas temperature sensor 3 - low P1428 Exhaust gas temperature sensor 3 - low P1429 Differential pressure sensor temperature sensor low P1430 Differential pressure sensor temperature sensor low P1431 Differential pressure sensor temperature sensor low P1432 DoC regeneration time exceeded P1439 P1439 DPF heat loss temperature abnormality P1439 P1439 PF heat loss temperature abnormality P1430 PF heat loss temperature abnormality P1431 Brake switch abnormality P1551 Brake switch abnormality P1625 QR data failure to write abnormality P1625 QR data failure to write abnormality P1626 QR data failure to write abnormality P1627 QR data failure to write abnormality P2010 Swirl control (VSS) output (VSV) open load/short to GND P2010 Swirl control (VSS) output (VSV) short to BATT P2118 Electronic control throttle DC motor over current abnormality P2122 Accelerator position sensor-1 low P2123 Accelerator position sensor-1 high final P2124 Accelerator position sensor-2 low P2125 Accelerator position sensor-2 low P2126 Accelerator position sensor-2 high final P2127 Accelerator position sensor-2 high final P2128 Accelerator position sensor-2 high final P2139 Accelerator position sensor-2 high final P2140 Common 1 system open circuit P2141 COM1 TWV actuation system ground short P2142 COM1 TWV actuation system pround short P2143 EGR feedback abnormality P2244 Atmospheric pressure sensor - low P2245 Differential pressure sensor low P2455 Differential pressure sensor low P465 Differential pressure sensor low P665 Automatic transmission P6767 Automatic transmission P6767 Differential pressure sensor low P6768 Differential pressure sensor low P6769 Differential pressure sensor low P6769 Differential pressure sen	P1275	Supply pump replace fail flag	Yes	
P1427 Exhaust gas temperature sensor 3 - low P1428 Exhaust gas temperature sensor 3 - high P1427 Differential pressure sensor temperature sensor low P1475 Differential pressure sensor temperature sensor high P1487 DOC regeneration time exceeded P1498 Regeneration time exceeded P1498 Regeneration timing abnormality P1499 DPF heat loss temperature abnormality P1590 DPF heat loss temperature abnormality P1591 Brake switch abnormality P1591 Brake switch abnormality P1625 QR data failure to write abnormality P1626 QR data failure to write abnormality P1629 Swirl control (VSS) output (VSV) open load/short to GND P2009 Swirl control (VSS) output (VSV) short to BATT P2118 Electronic control throttle DC motor over current abnormality P2122 Accelerator position sensor-1 low P2123 Accelerator position sensor-1 high final P2124 Accelerator position sensor-2 low P2125 Accelerator position sensor-2 low P2126 Accelerator position sensor-2 low P2127 Accelerator position sensor-2 low P2128 Accelerator position sensor-2 low P2129 Accelerator position sensor-2 low P2128 Accelerator position sensor-2 high final P2138 Accelerator position sensor-4 high final P2148 Common 1 system open circuit P2148 COM1 TWV actuation system ground short P2149 Common 2 system open circuit P2240 Atmospheric pressure sensor - low P2240 Atmospheric pressure sensor - low P2240 Differential pressure sensor - low P22410 Differential pressure sensor - low P224210 Differential pressure sensor - low P2243 Differential pressure sensor low P2445 Differential pressure sensor low P2455 Differential pressure sensor low P3455 Differential pressure sensor low P455 Veshicles only	P1298	Turbo system (positive deviation)	Yes	
P1428 Exhaust gas temperature sensor 3 - high P1474 Differential pressure sensor temperature sensor low P1475 Differential pressure sensor temperature sensor high P1497 DOC regeneration time exceeded P1498 Regeneration timing abnormality P1499 DPF heat loss temperature annormality P1591 Brake switch abnormality P1591 Brake switch abnormality P1625 QR data failure to write abnormality P1626 QR data failure to write abnormality P1626 QR data failure to write abnormality P1627 QR data failure to write abnormality P1628 QR data failure to write abnormality P1629 Swirl control (VSS) output (VSV) open load/short to GND P2009 Swirl control (VSS) output (VSV) short to BATT P2118 Electronic control throttle DC motor over current abnormality P2122 Accelerator position sensor-1 low P2123 Accelerator position sensor-1 high final P2124 Accelerator position sensor-2 low P2125 Accelerator position sensor-2 low P2126 Accelerator position sensor-2 low P2127 Accelerator position sensor-2 high final P2128 Accelerator position sensor-2 high final P2138 Accelerator position sensor-2 duplicate malfunction high Accelerator position sensor - duplicate malfunction high Accelerator position sensor - duplicate malfunction low Accelerator position sensor characteristic abnormality P2146 Common 1 system open circuit P2147 COM1 TWV actuation system ground short P2148 COM1 TWV actuation system P8 short P2149 Common 2 system open circuit P2229 Atmospheric pressure sensor - low P2229 Atmospheric pressure sensor - low P2229 Atmospheric pressure sensor - low P2235 Differential pressure sensor low P2455 Differential pressure sensor low P3455 Differential pressure sensor low P465 Ves P2455 Differential pressure sensor low P465 Automatic transmissio vehicles only	P1299	Turbo system (negative deviation)	Yes	
P1474 Differential pressure sensor temperature sensor low P1475 Differential pressure sensor temperature sensor high P1476 Differential pressure sensor temperature sensor high P1487 DOC regeneration time exceeded P1488 Regeneration timing abnormality P1499 DPF heat loss temperature abnormality P1564 Cruise control switch abnormality P1571 Brake switch abnormality P1625 QR data abnormality P1626 QR data failure to write abnormality P1627 QR data failure to write abnormality P1628 QR data failure to write abnormality P1629 Swirl control (VSS) output (VSV) open load/short to GND P1629 Swirl control (VSS) output (VSV) short to BATT P148 Electronic control throttle DC motor over current abnormality P1640 QR dacelerator position sensor-1 low P1641 Electronic control throttle DC motor over current abnormality P1641 Accelerator position sensor-1 high final P1642 Accelerator position sensor-2 low P1643 Accelerator position sensor-2 low P1644 Accelerator position sensor-2 high final P1644 Accelerator position sensor-2 high final P1655 Accelerator position sensor-2 high final P1656 Common 1 system open circuit P1657 Accelerator position sensor characteristic abnormality P1658 Accelerator position sensor characteristic abnormality P1659 Accelerator position sensor characteristic abnormality P1659 Accelerator position sensor characteristic abnormality P1650 Common 1 system open circuit P1650 Common 2 syste	P1427	Exhaust gas temperature sensor 3 - low	Yes	
P1474 Differential pressure sensor temperature sensor low P1475 Differential pressure sensor temperature sensor high P1497 DOC regeneration time exceeded P1498 Regeneration timing abnormality P1499 DPF heat loss temperature abnormality P1594 Cruise control switch abnormality P1594 Cruise control switch abnormality P1595 QR data abnormality P1625 QR data abnormality P1626 QR data failure to write abnormality P1626 QR data failure to write abnormality P1627 QR data failure to write abnormality P1628 Swirl control (VSS) output (VSV) open load/short to GND P2010 Swirl control (VSS) output (VSV) short to BATT P2118 Electronic control throttle DC motor over current abnormality P2120 Accelerator position sensor-1 low P2121 Accelerator position sensor-1 high final P2122 Accelerator position sensor-1 high No P2127 Accelerator position sensor-2 low P2128 Accelerator position sensor-2 high final P2129 Accelerator position sensor-2 high final P2120 Accelerator position sensor-2 high final P2121 Accelerator position sensor-2 high final P2122 Accelerator position sensor-2 high final P2123 Accelerator position sensor-2 high final P2124 Accelerator position sensor-2 high final P2125 Accelerator position sensor-3 duplicate malfunction low P2138 Accelerator position sensor-4 duplicate malfunction low Accelerator position sensor characteristic abnormality P2148 Common 1 system open circuit P2149 Common 2 system open circuit P2149 Common 2 system open circuit P2240 Atmospheric pressure sensor - low P2241 EGR feedback abnormality P2242 Atmospheric pressure sensor - low P2243 EGR feedback abnormality P2445 Differential pressure sensor low P2445 Differential pressure sensor ligh P2455 Differential pressure sensor ligh P2455 Differential pressure sensor ligh P2455 Differential pressure sensor ligh	P1428	Exhaust gas temperature sensor 3 - high	Yes	
P1475 Differential pressure sensor temperature sensor high P1497 DOC regeneration time exceeded P1498 Regeneration timing abnormality P1499 DPF heat loss temperature abnormality P1594 Cruise control switch abnormality No P1571 Brake switch abnormality No P1626 QR data failure to write abnormality P2009 Swiri control (VSS) output (VSV) open load/short to GND P2010 Swiri control (VSS) output (VSV) short to BATT P2118 Electronic control throttle DC motor over current abnormality P2122 Accelerator position sensor-1 low P2123 Accelerator position sensor-1 high final P2124 Accelerator position sensor-1 high No P2127 Accelerator position sensor-2 low P2128 Accelerator position sensor-2 high final P2128 Accelerator position sensor-2 high final P2129 Accelerator position sensor-2 high final P2130 Accelerator position sensor-2 high final P2140 Accelerator position sensor-2 high final P2141 Accelerator position sensor-2 high final P2148 Accelerator position sensor-2 high final P2149 Common 1 system open circuit P2140 Common 1 system open circuit P2141 COM1 TWV actuation system ground short P2142 Atmospheric pressure sensor - low P2229 Atmospheric pressure sensor - low P2229 Atmospheric pressure sensor - low P2230 Differential pressure sensor - high P2445 Differential pressure sensor low P2455 Differential pressure sensor low P365 Automatic transmissio vehicles only	P1474	Differential pressure sensor temperature sensor low	Yes	
P1498 Regeneration timing abnormality Yes P1499 DPF heat loss temperature abnormality Yes P1564 Cruise control switch abnormality No P1571 Brake switch abnormality No P1625 QR data abnormality Yes P1626 QR data failure to write abnormality Yes P2009 Swirl control (VSS) output (VSV) open load/short to GND Yes P2010 Swirl control (VSS) output (VSV) short to BATT Yes P2118 Electronic control throttle DC motor over current abnormality Yes P2122 Accelerator position sensor-1 low Yes P2123 Accelerator position sensor-1 high final Yes P2124 Accelerator position sensor-2 low Yes P2127 Accelerator position sensor-2 high final Yes P2128 Accelerator position sensor - duplicate malfunction high Yes P2138 Accelerator position sensor characteristic abnormality Yes P2146 Common 1 system open circuit Yes P2147 COM1 TWV actuation system ground short Yes P2148 COM1 TWV actuation system poen circuit	P1475	Differential pressure sensor temperature sensor high	Yes	verlicles offly
P1499 DPF heat loss temperature abnormality P1564 Cruise control switch abnormality No P1571 Brake switch abnormality No P1625 QR data abnormality P1626 QR data failure to write abnormality P1627 QR data failure to write abnormality P1628 QR data failure to write abnormality P1629 Swirl control (VSS) output (VSV) open load/short to GND P2009 Swirl control (VSS) output (VSV) short to BATT P2010 Swirl control (VSS) output (VSV) short to BATT P2118 Electronic control throttle DC motor over current abnormality P2122 Accelerator position sensor-1 low P2123 Accelerator position sensor-1 high final P2124 Accelerator position sensor-1 high No P2127 Accelerator position sensor-2 low P2128 Accelerator position sensor-2 low P2128 Accelerator position sensor-2 high final P2138 Accelerator position sensor - duplicate malfunction high Accelerator position sensor - duplicate malfunction low Accelerator position sensor - duplicate malfunction low Accelerator position sensor characteristic abnormality P246 Common 1 system open circuit P247 COM1 TWV actuation system ground short P248 COM1 TWV actuation system pen circuit P249 Common 2 system open circuit P220 Atmospheric pressure sensor - low P2210 Atmospheric pressure sensor - high P2221 EGR feedback abnormality P245 Differential pressure sensor low P2450 Differential pressure sensor high P3450 Differential pressure sensor high	P1497	DOC regeneration time exceeded	Yes	
P1564 Cruise control switch abnormality P1571 Brake switch abnormality P1625 QR data abnormality P1626 QR data failure to write abnormality P2009 Swirl control (VSS) output (VSV) open load/short to GND P2010 Swirl control (VSS) output (VSV) short to BATT P2118 Electronic control throttle DC motor over current abnormality P212 Accelerator position sensor-1 low P212 Accelerator position sensor-1 high final P212 Accelerator position sensor-1 high final P212 Accelerator position sensor-2 low P212 Accelerator position sensor-2 high final P212 Accelerator position sensor-2 high final P212 Accelerator position sensor-2 high final P213 Accelerator position sensor-2 high final P214 Accelerator position sensor-2 high final P215 Accelerator position sensor - duplicate malfunction high Accelerator position sensor - duplicate malfunction low Accelerator position sensor characteristic abnormality P218 Accelerator position sensor characteristic abnormality P219 Common 1 system open circuit P214 COM1 TWV actuation system ground short P2148 COM1 TWV actuation system #B short P2149 Common 2 system open circuit P222 Atmospheric pressure sensor - low P222 Atmospheric pressure sensor - high P243 EGR feedback abnormality P245 Differential pressure sensor low P245 Differential pressure sensor high P345 Differential pressure sensor high P345 Differential pressure sensor high P345 Differential pressure sensor high	P1498	Regeneration timing abnormality	Yes	
P1571 Brake switch abnormality P1625 QR data abnormality P1626 QR data failure to write abnormality P1626 QR data failure to write abnormality Yes P2009 Swirl control (VSS) output (VSV) open load/short to GND Yes P2010 Swirl control (VSS) output (VSV) short to BATT Yes P2118 Electronic control throttle DC motor over current abnormality Yes P2122 Accelerator position sensor-1 low Yes P2123 Accelerator position sensor-1 high final Yes P2124 Accelerator position sensor-2 low Yes P2128 Accelerator position sensor-2 low Yes P2128 Accelerator position sensor-2 high final Yes P2138 Accelerator position sensor - duplicate malfunction high Accelerator position sensor - duplicate malfunction low Accelerator position sensor characteristic abnormality Yes P2146 Common 1 system open circuit Yes P2147 COM1 TWV actuation system ground short Yes P2148 COM1 TWV actuation system +B short Yes P2149 Common 2 system open circuit Yes P2228 Atmospheric pressure sensor - low Yes P2229 Atmospheric pressure sensor - high Yes P2441 EGR feedback abnormality Yes P2452 Differential pressure sensor low Yes P2455 Differential pressure sensor high Yes P2455 Differential pressure sensor high Yes P2465 Differential pressure sensor high Yes P2465 Differential pressure sensor high Yes P2465 Differential pressure sensor high	P1499	DPF heat loss temperature abnormality	Yes	
P1625 QR data abnormality P1626 QR data failure to write abnormality P2009 Swirl control (VSS) output (VSV) open load/short to GND P2010 Swirl control (VSS) output (VSV) short to BATT P2118 Electronic control throttle DC motor over current abnormality P2122 Accelerator position sensor-1 low P2123 Accelerator position sensor-1 high final P2124 Accelerator position sensor-1 high P2127 Accelerator position sensor-2 low P2128 Accelerator position sensor-2 low P2128 Accelerator position sensor-2 ligh final P2138 Accelerator position sensor-2 high final P2138 Accelerator position sensor - duplicate malfunction high Accelerator position sensor - duplicate malfunction low Accelerator position sensor characteristic abnormality P2146 Common 1 system open circuit P2147 COM1 TWV actuation system ground short P2148 COM1 TWV actuation system +B short P2149 Common 2 system open circuit P2228 Atmospheric pressure sensor - low P2229 Atmospheric pressure sensor - high P2431 EGR feedback abnormality P2454 Differential pressure sensor low P2455 Differential pressure sensor high P2455 Differential pressure sensor high P360 Accelerator position sensor low vehicles only	P1564	Cruise control switch abnormality	No	
P1626 QR data failure to write abnormality P2009 Swirl control (VSS) output (VSV) open load/short to GND P2010 Swirl control (VSS) output (VSV) short to BATT P2118 Electronic control throttle DC motor over current abnormality P2122 Accelerator position sensor-1 low P2123 Accelerator position sensor-1 high final P2124 Accelerator position sensor-1 high No P2127 Accelerator position sensor-2 low P2128 Accelerator position sensor-2 low P2128 Accelerator position sensor-2 high final P2138 Accelerator position sensor - duplicate malfunction high Accelerator position sensor - duplicate malfunction low Accelerator position sensor - duplicate malfunction low Accelerator position sensor characteristic abnormality P2146 Common 1 system open circuit P2147 COM1 TWV actuation system ground short P2148 COM1 TWV actuation system ground short P2149 Common 2 system open circuit P2149 Common 2 system open circuit P2228 Atmospheric pressure sensor - low P2229 Atmospheric pressure sensor - high P2451 Differential pressure sensor low P2452 Differential pressure sensor low P2453 Differential pressure sensor high Yes vehicles only	P1571	Brake switch abnormality	No	
P2009 Swirl control (VSS) output (VSV) open load/short to GND P2010 Swirl control (VSS) output (VSV) short to BATT P2118 Electronic control throttle DC motor over current abnormality P2121 Accelerator position sensor-1 low P2122 Accelerator position sensor-1 high final P2124 Accelerator position sensor-1 high No P2127 Accelerator position sensor-2 low P2128 Accelerator position sensor-2 low P2138 Accelerator position sensor-2 high final P2138 Accelerator position sensor - duplicate malfunction high Accelerator position sensor - duplicate malfunction low Accelerator position sensor characteristic abnormality P2146 Common 1 system open circuit P2147 COM1 TWV actuation system ground short P2148 COM1 TWV actuation system +B short P2149 Common 2 system open circuit P2228 Atmospheric pressure sensor - low P2229 Atmospheric pressure sensor low P24413 EGR feedback abnormality P245 Differential pressure sensor high P36 Ves P37 Accelerator position system sensor high P38 Accelerator position sensor sensor high P38 Accelerator position sensor sensor high P39 Automatic transmissio vehicles only	P1625	QR data abnormality	Yes	
P2010 Swirl control (VSS) output (VSV) short to BATT P2118 Electronic control throttle DC motor over current abnormality P2122 Accelerator position sensor-1 low P2123 Accelerator position sensor-1 high final P2124 Accelerator position sensor-1 high P2127 Accelerator position sensor-2 low P2128 Accelerator position sensor-2 low P2138 Accelerator position sensor - duplicate malfunction high Accelerator position sensor - duplicate malfunction low Accelerator position sensor - duplicate malfunction low Accelerator position sensor characteristic abnormality P2146 Common 1 system open circuit P2147 COM1 TWV actuation system ground short P2148 COM1 TWV actuation system +B short P2149 Common 2 system open circuit P2228 Atmospheric pressure sensor - low P2229 Atmospheric pressure sensor - high P2451 Differential pressure sensor low P2452 Differential pressure sensor high P3453 Differential pressure sensor high Yes P458 Ves P468 Automatic transmissio vehicles only	P1626	QR data failure to write abnormality	Yes	
P2118 Electronic control throttle DC motor over current abnormality P2122 Accelerator position sensor-1 low P2123 Accelerator position sensor-1 high final P2124 Accelerator position sensor-1 high No P2127 Accelerator position sensor-2 low P2128 Accelerator position sensor-2 low P2138 Accelerator position sensor-2 high final P2138 Accelerator position sensor - duplicate malfunction high Accelerator position sensor - duplicate malfunction low Accelerator position sensor - duplicate malfunction low Accelerator position sensor characteristic abnormality P2146 Common 1 system open circuit P2147 COM1 TWV actuation system ground short P2148 COM1 TWV actuation system +B short P2149 Common 2 system open circuit P2228 Atmospheric pressure sensor - low P2229 Atmospheric pressure sensor - high P2413 EGR feedback abnormality P2454 Differential pressure sensor low P2455 Differential pressure sensor high Yes P2456 Differential pressure sensor high Yes P2457 Differential pressure sensor high Yes P2458 Differential pressure sensor high Yes P2459 Differential pressure sensor high Yes P2450 Differential pressure sensor high Yes P2450 Differential pressure sensor high	P2009	Swirl control (VSS) output (VSV) open load/short to GND	Yes	
P2122 Accelerator position sensor-1 low P2123 Accelerator position sensor-1 high final P2124 Accelerator position sensor-1 high P2127 Accelerator position sensor-2 low P2128 Accelerator position sensor-2 low P2128 Accelerator position sensor-2 high final P2138 Accelerator position sensor - duplicate malfunction high Accelerator position sensor - duplicate malfunction low Accelerator position sensor characteristic abnormality P2146 Common 1 system open circuit P2147 COM1 TWV actuation system ground short P2148 COM1 TWV actuation system +B short P2149 Common 2 system open circuit P2228 Atmospheric pressure sensor - low P2229 Atmospheric pressure sensor - high P2413 EGR feedback abnormality P2454 Differential pressure sensor low P2455 Differential pressure sensor high P36 Yes P26 P26 P26 P27 Actomatic transmissio vehicles only	P2010	Swirl control (VSS) output (VSV) short to BATT	Yes	
P2123 Accelerator position sensor-1 high final P2124 Accelerator position sensor-1 high P2127 Accelerator position sensor-2 low P2128 Accelerator position sensor-2 high final P2138 Accelerator position sensor - duplicate malfunction high Accelerator position sensor - duplicate malfunction low Accelerator position sensor characteristic abnormality P2146 Common 1 system open circuit P2147 COM1 TWV actuation system ground short P2148 COM1 TWV actuation system +B short P2149 Common 2 system open circuit P2228 Atmospheric pressure sensor - low P2229 Atmospheric pressure sensor - high P2454 Differential pressure sensor low P2455 Differential pressure sensor high Yes P2455 Differential pressure sensor high Yes P268	P2118	Electronic control throttle DC motor over current abnormality	Yes	
P2124 Accelerator position sensor-1 high P2127 Accelerator position sensor-2 low P2128 Accelerator position sensor-2 high final P2138 Accelerator position sensor - duplicate malfunction high Accelerator position sensor - duplicate malfunction low Accelerator position sensor characteristic abnormality P2146 Common 1 system open circuit P2147 COM1 TWV actuation system ground short P2148 COM1 TWV actuation system +B short P2149 Common 2 system open circuit P2228 Atmospheric pressure sensor - low P2229 Atmospheric pressure sensor - high P2454 Differential pressure sensor low P2455 Differential pressure sensor high Yes No Yes Yes P48 P48 P48 P48 Automatic transmissio vehicles only	P2122	Accelerator position sensor-1 low	Yes	
P2127 Accelerator position sensor-2 low Yes P2128 Accelerator position sensor - duplicate malfunction high Yes P2138 Accelerator position sensor - duplicate malfunction low Yes Accelerator position sensor characteristic abnormality Yes P2146 Common 1 system open circuit Yes P2147 COM1 TWV actuation system ground short Yes P2148 COM1 TWV actuation system +B short Yes P2149 Common 2 system open circuit Yes P2228 Atmospheric pressure sensor - low Yes P2229 Atmospheric pressure sensor - high Yes P2413 EGR feedback abnormality Yes P2454 Differential pressure sensor low Yes P2455 Differential pressure sensor high Yes	P2123	Accelerator position sensor-1 high final	Yes	
P2128 Accelerator position sensor-2 high final P2138 Accelerator position sensor - duplicate malfunction high Accelerator position sensor - duplicate malfunction low Yes Accelerator position sensor characteristic abnormality Yes P2146 Common 1 system open circuit Yes P2147 COM1 TWV actuation system ground short Yes P2148 COM1 TWV actuation system +B short Yes P2149 Common 2 system open circuit Yes P2228 Atmospheric pressure sensor - low Yes P2229 Atmospheric pressure sensor - high Yes P2413 EGR feedback abnormality Yes P2454 Differential pressure sensor low Yes P2455 Differential pressure sensor high Yes Vehicles only	P2124	Accelerator position sensor-1 high	No	
P2138 Accelerator position sensor - duplicate malfunction high Accelerator position sensor - duplicate malfunction low Yes Accelerator position sensor characteristic abnormality Yes P2146 Common 1 system open circuit Yes P2147 COM1 TWV actuation system ground short Yes P2148 COM1 TWV actuation system +B short Yes P2149 Common 2 system open circuit Yes P2228 Atmospheric pressure sensor - low Yes P2229 Atmospheric pressure sensor - high Yes P2413 EGR feedback abnormality Yes P2454 Differential pressure sensor low Yes P2455 Differential pressure sensor high Yes Ves Ves Ves Automatic transmission vehicles only	P2127	Accelerator position sensor-2 low	Yes	
Accelerator position sensor - duplicate malfunction low Accelerator position sensor characteristic abnormality Yes P2146 Common 1 system open circuit Yes P2147 COM1 TWV actuation system ground short Yes P2148 COM1 TWV actuation system +B short Yes P2149 Common 2 system open circuit Yes P2228 Atmospheric pressure sensor - low Yes P2229 Atmospheric pressure sensor - high Yes P2413 EGR feedback abnormality Yes P2454 Differential pressure sensor low Yes Automatic transmissio Yes P2455 Differential pressure sensor high Yes Yes Yes Automatic transmissio	P2128	Accelerator position sensor-2 high final	Yes	
Accelerator position sensor characteristic abnormality P2146 Common 1 system open circuit P2147 COM1 TWV actuation system ground short P2148 COM1 TWV actuation system +B short P2149 Common 2 system open circuit P2228 Atmospheric pressure sensor - low P2229 Atmospheric pressure sensor - high P2413 EGR feedback abnormality P2454 Differential pressure sensor low P2455 Differential pressure sensor high Yes P2466 Common 1 system open circuit Yes Yes Yes Automatic transmission vehicles only	P2138	Accelerator positon sensor - duplicate malfunction high	Yes	
P2146 Common 1 system open circuit P2147 COM1 TWV actuation system ground short P2148 COM1 TWV actuation system +B short P2149 Common 2 system open circuit P2228 Atmospheric pressure sensor - low P2229 Atmospheric pressure sensor - high P2413 EGR feedback abnormality P2454 Differential pressure sensor low P2455 Differential pressure sensor high Yes Automatic transmissio vehicles only		Accelerator position sensor - duplicate malfunction low	Yes	
P2147 COM1 TWV actuation system ground short P2148 COM1 TWV actuation system +B short P2149 Common 2 system open circuit P2228 Atmospheric pressure sensor - low P2229 Atmospheric pressure sensor - high P2413 EGR feedback abnormality P2454 Differential pressure sensor low P2455 Differential pressure sensor high Yes Yes Automatic transmission vehicles only		Accelerator position sensor characteristic abnormality	Yes	
P2148 COM1 TWV actuation system +B short P2149 Common 2 system open circuit P2228 Atmospheric pressure sensor - low P2229 Atmospheric pressure sensor - high P2413 EGR feedback abnormality P2454 Differential pressure sensor low P2455 Differential pressure sensor high Yes Yes Automatic transmissio vehicles only	P2146	Common 1 system open circuit	Yes	
P2149 Common 2 system open circuit P2228 Atmospheric pressure sensor - low P2229 Atmospheric pressure sensor - high P2413 EGR feedback abnormality P2454 Differential pressure sensor low P2455 Differential pressure sensor high Yes Automatic transmission vehicles only	P2147	COM1 TWV actuation system ground short	Yes	
P2228 Atmospheric pressure sensor - low Yes P2229 Atmospheric pressure sensor - high Yes P2413 EGR feedback abnormality Yes P2454 Differential pressure sensor low Yes Automatic transmission vehicles only P2455 Differential pressure sensor high Yes Vehicles only	P2148	COM1 TWV actuation system +B short	Yes	
P2229 Atmospheric pressure sensor - high P2413 EGR feedback abnormality P2454 Differential pressure sensor low P2455 Differential pressure sensor high Yes Yes Automatic transmissio vehicles only	P2149	Common 2 system open circuit	Yes	
P2413 EGR feedback abnormality P2454 Differential pressure sensor low P2455 Differential pressure sensor high Yes Yes Automatic transmissio vehicles only	P2228	Atmospheric pressure sensor - low	Yes	
P2454 Differential pressure sensor low P2455 Differential pressure sensor high Yes Automatic transmission vehicles only	P2229	Atmospheric pressure sensor - high	Yes	
P2455 Differential pressure sensor high Yes vehicles only	P2413	EGR feedback abnormality	Yes	
The state of the s	P2454	Differential pressure sensor low	Yes	Automatic transmission
	P2455	Differential pressure sensor high	Yes	vehicles only
P252F Oil level abnormality No	P252F	Oil level abnormality	No	
UD073 CAN bus OFF error No	UD073	CAN bus OFF error	No	

DTC	Diagnostic Item	Light	Remarks
Number		ON	
(SAE)			
UD101	CAN time out flag (trans)	No	Automatic transmission vehicles only
UD102	CAN time out flag (ESP)	No	
UD109	CAN time out flag (ETACS)	No	
UD117	CAN time out flag (immobilizer)	No	

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