D4DD ENGINE DTC(COUNTY)

DTC TROUBLE SHOOTING

DTC TROUBLESHOOTING PROCEDURES

BASIC TROUBLESHOOTING EFE2F9FE

BASIC TROUBLESHOOTING GUIDE

1	Bring Vehicle to Workshop

2	Analyze Customer's Complaint.
• Ask the customer about the conditions and environment relative to the issue (Use CUSTOMER PROBLEM ANALYSIS SHEET).	

3	Verify Symptom, and then Check DTC and Freeze Frame Data
• Connect scan tool to Diagnostic Link Connector (DLC). • Record the DTC and freeze frame data. ***NOTE*** *To erase DTC and freeze frame data, refer to Step 4.*	

	Confirm the Inspection Procedure for the System or Part
Using the SYMPTOM TROUBLESHOOTING GUIDE CHART, choose the correct inspection procedure for the system or part to be checked.	

4	Erase the DTC and Freeze Frame Data
(WARNING) NEVER erase DTC and freeze frme data before completing Step 2 MIL/DTC in "CUSTOMER PROBLEM ANALYSIS SHEET".	

5	Inspect Vehicle Visually
• Go to Step 10, if you recognize the problem.	

6	Recreate (Simulate) Symptoms the DTC
• Try to recreate or simulate the symptoms and conditions of the malfunction as described by customer. • If DTC(s) is/are displayed, simulate the condition according to troubleshooting procedure for the DTC.	

7	Confirm Symptoms of Problem
• If DTC(s) is/are not displayed, go to Step 8. • If DTC(s) is/are displayed, go to Step 10.	

8	Recreate (Simulate) Symptom
• Try to recreate or simulate the condition of the malfunction as described by the customer.	

9	Check the DTC
• If DTC(s) does(do) not occur, refer to BASIC INSPECTION in INTERMITTENT PROBLEM PROCEDURE. • If DTC(s) occur(s), go to Step 10.	

10	Perform troubleshooting procedure for DTC

11	Adjust or repair the vehicle

12	Confirmation test

13	END

CUSTOMER PROBLEM ANALYSIS SHEET

1. VEHICLE INFORMATION

(I) VIN:
(II) Production Date:
(III) Odometer Reading: (km)

2. SYMPTOMS

☐ Unable to start	☐ Engine does not turn over ☐ Incomplete combustion ☐ Initial combustion does not occur
☐ Difficult to start	☐ Engine turns over slowly ☐ Other_____
☐ Poor idle	☐ Rough idle ☐ Incorrect idle ☐ Unstable idle(High: _____ rpm, Low: _____rpm) ☐ Other _____
☐ Engine stall	☐ Soon after starting ☐ After acceleration pedal depressed ☐ After acceleration pedal released ☐ During A/C ON ☐ Shifting from N to D-range ☐ Other _____
☐ Others	☐ Poor driving (Surge) ☐ Knocking ☐ Poor fuel economy ☐ Back fire ☐ After fire ☐ Other _____

3. ENVIRONMENT

Problem frequency	☐ Constant ☐ Sometimes (_____) ☐ Once only ☐ Other _____
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Other _____
Outdoor temperature	Approx. _____ °C/°F
Place	☐ Highway ☐ Suburbs ☐ Inner City ☐ Uphill ☐ Downhill ☐ Rough road ☐ Other _____
Engine temperature	☐ Cold ☐ Warming up ☐ After warming up ☐ Any temperature
Engine operation	☐ Starting ☐ Just after starting (____ min) ☐ Idle ☐ Racing ☐ Driving ☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ A/C switch ON/OFF ☐ Other _____

4. MIL/DTC

MIL (Malfunction Indicator Lamp)	☐ Remains ON ☐ Sometimes lights up ☐ Does not light
DTC	☐ Normal ☐ DTC (_____) ☐ Freeze Frame Data

BASIC INSPECTION PROCEDURE

MEASURING CONDITION OF ELECTRONIC PARTS' RESISTANCE

The measured resistance at high temperature after vehicle running may be high or low. So all resistance must be measured at ambient temperature (20℃, 68°F), unless there is any notice.

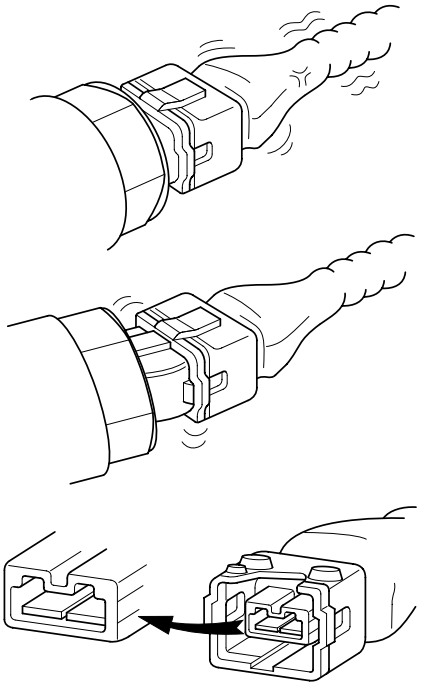
NOTE

The measured resistance in except for ambient temperature (20℃, 68°F) is reference value.

INTERMITTENT PROBLEM INSPECTION PROCEDURE

Sometimes the most difficult case in troubleshooting is when a problem symptom occurs but does not occur again during testing. An example would be if a problem appears only when the vehicle is cold but has not appeared when warm. In this case, technician should thoroughly make out a "CUSTOMER PROBLEM ANALYSIS SHEET" and recreate (simulate) the environment and condition which occurred when the vehicle was having the issue.

1. Clear Diagnostic Trouble Code (DTC).
2. Inspect connector connection, and check terminal for poor connections, loose wires, bent, broken or corroded pins, and then verify that the connectors are always securely fastened.



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3. Slightly shake the connector and wiring harness vertically and horizontally.
4. Repair or replace the component that has a problem.
5. Verify that the problem has disappeared with the road test.

● SIMULATING VIBRATION

a. Sensors and Actuators
: Slightly vibrate sensors, actuators or relays with finger.

WARNING

Strong vibration may break sensors, actuators or relays

b. Connectors and Harness
: Lightly shake the connector and wiring harness vertically and then horizontally.

● SIMULATING HEAT

a. Heat components suspected of causing the malfunction with a hair dryer or other heat sourre.

WARNING

- **DO NOT heat components to the point where they may be damaged.**

- **DO NOT heat the ECM directly.**

● SIMULATING WATER SPRINKLING

a. Sprinkle water onto vehicle to simulate a rainy day or a high humidity condition.

⊗ WARNING

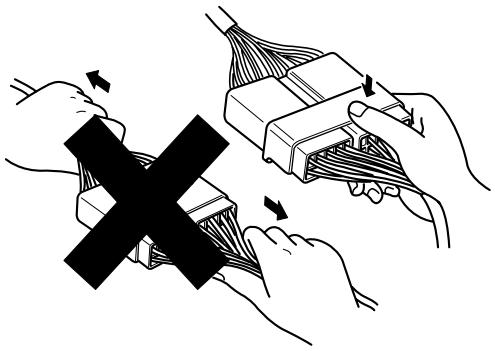
DO NOT sprinkle water directly into the engine compartment or electronic components.

● SIMULATING ELECTRICAL LOAD

a. Turn on all electrical systems to simulate excessive electrical loads (Radios, fans, lights, etc.).

CONNECTOR INSPECTION PROCEDURE

1. Handling of Connector
   a. Never pull on the wiring harness when disconnecting connectors.



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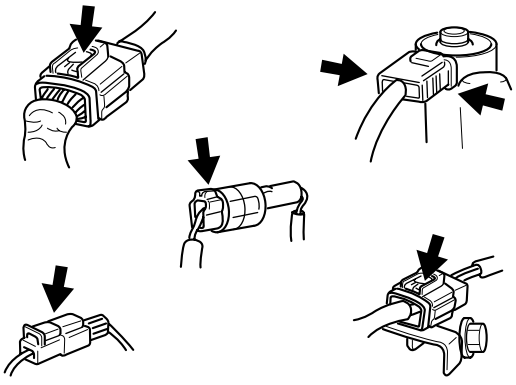
   b. When removing the connector with a lock, press or pull locking lever.



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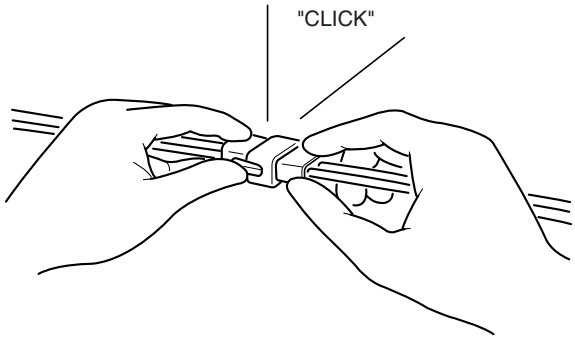
   c. Listen for a click when locking connectors. This sound indicates that they are securely locked.



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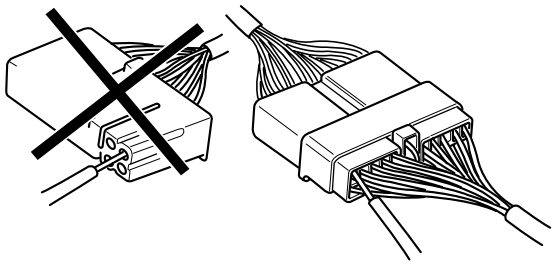
   d. When a tester is used to check for continuity, or to measure voltage, always insert tester probe from wire harness side.



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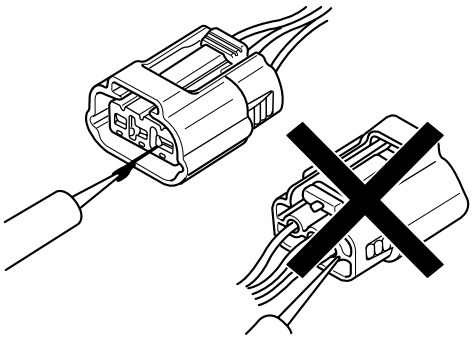
   e. Check waterproof connector terminals from the connector side. Waterproof connectors cannot be accessed from harness side.



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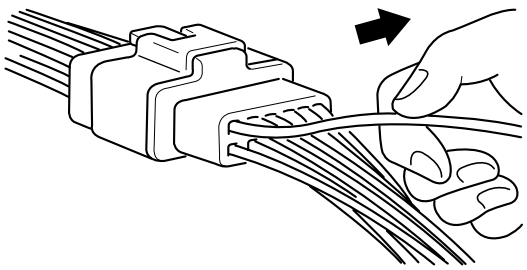
NOTE

- *Use a fine wire to prevent damage to the terminal.*
- *Do not damage the terminal when inserting the tester lead.*

2. Checking Point for Connector
   a. While the connector is connected:
      Hold the connector, check connecting condition and locking efficiency.
   b. When the connector is disconnected:
      Check missed terminal, crimped terminal or broken core wire by slightly pulling the wire harness. Visually check for rust, contamination, deformation and bend.
   c. Check terminal tightening condition:
      Insert a spare male terminal into a female terminal, and then check terminal tightening conditions.
   d. Pull lightly on individual wires to ensure that each wire is secured in the terminal.



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3. Repair Method of Connector Terminal
   a. Clean the contact points using air gun and/or shop rag.

NOTE

Never use sand paper when polishing the contact points, otherwise the contact point may be damaged.

   b. In case of abnormal contact pressure, replace the female terminal.

WIRE HARNESS INSPECTION PROCEDURE

1. Before removing the wire harness, check the wire harness position and crimping in order to restore it correctly.
2. Check whether the wire harness is twisted, pulled or loosened.
3. Check whether the temperature of the wire harness is abnormally high.
4. Check whether the wire harness is rotating, moving or vibrating against the sharp edge of a part.
5. Check the connection between the wire harness and any installed part.
6. If the covering of wire harness is damaged; secure, repair or replace the harness.

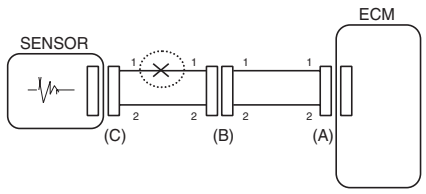
ELECTRICAL CIRCUIT INSPECTION PROCEDURE

● CHECK OPEN CIRCUIT

1. Procedures for Open Circuit
   - Continuity Check
   - Voltage Check

   If an open circuit occurs (as seen in [FIG. 1]), it can be found by performing Step 2 (Continuity Check Method) or Step 3 (Voltage Check Method) as shown below.

FIG 1



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2. Continuity Check Method

NOTE

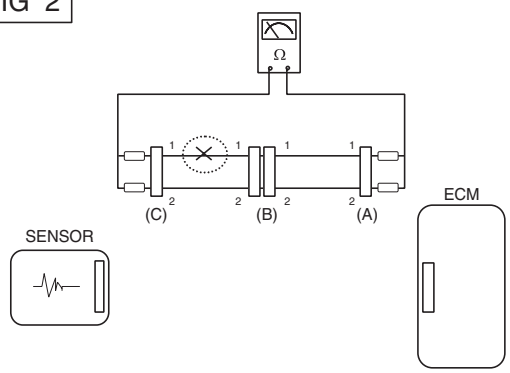
When measuring for resistance, lightly shake the wire harness above and below or from side to side.

Specification (Resistance)
1Ω or less → Normal Circuit
1MΩ or Higher → Open Circuit

a. Disconnect connectors (A), (C) and measure resistance between connector (A) and (C) as shown in [FIG. 2].

In [FIG.2.] the measured resistance of line 1 and 2 is higher than 1Ω MΩ and below 1 Ω respectively. Specifically the open circuit is line 1 (Line 2 is normal). To find exact break point, check sub line of line 1 as described in next step.

FIG 2



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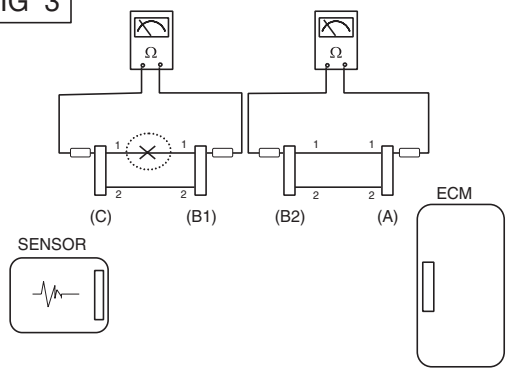
b. Disconnect connector (B), and measure for resistance between connector (C) and (B1) and between (B2) and (A) as shown in [FIG. 3].

In this case the measured resistance between connector (C) and (B1) is higher than 1MΩ and the open circuit is between terminal 1 of connector (C) and terminal 1 of connector (B1).

FIG 3



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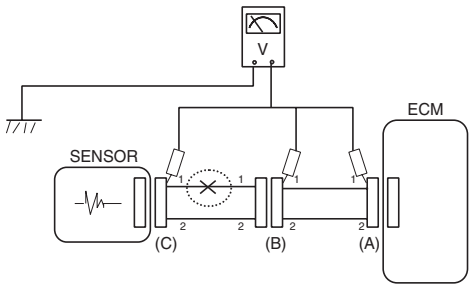
3. Voltage Check Method
   a. With each connector still connected, measure the voltage between the chassis ground and terminal 1 of each connectors (A), (B) and (C) as shown in [FIG. 4].

   The measured voltage of each connector is 5V, 5V and 0V respectively. So the open circuit is between connector (C) and (B).

FIG 4



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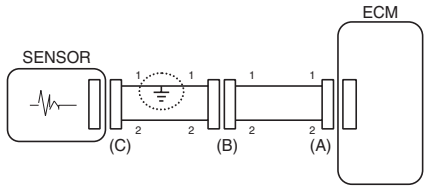
● CHECK SHORT CIRCUIT

1. Test Method for Short to Ground Circuit
   • Continuity Check with Chassis Ground

If short to ground circuit occurs as shown in [FIG. 5], the broken point can be found by performing below Step 2 (Continuity Check Method with Chassis Ground) as shown below.

FIG 5



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2. Continuity Check Method (with Chassis Ground)

NOTE

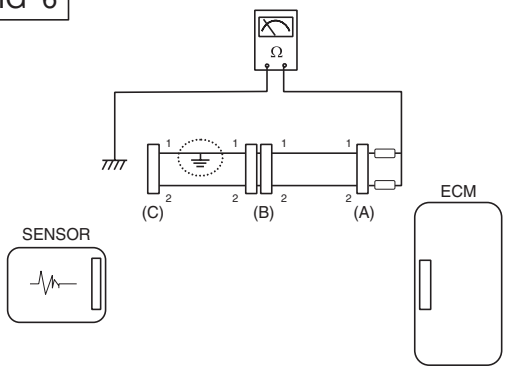
Lightly shake the wire harness above and below, or from side to side when measuring the resistance.

Specification (Resistance)
1Ω or less → Short to Ground Circuit
1MΩ or Higher → Normal Circuit

a. Disconnect connectors (A), (C) and measure for resistance between connector (A) and Chassis Ground as shown in [FIG. 6].

The measured resistance of line 1 and 2 in this example is below 1 Ω and higher than 1MΩ respectively. Specifically the short to ground circuit is line 1 (Line 2 is normal). To find exact broken point, check the sub line of line 1 as described in the folowing step.

FIG 6



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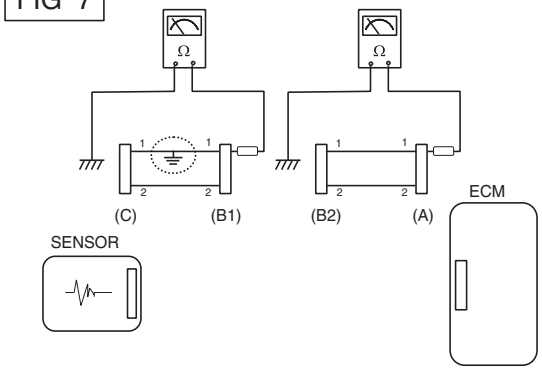
b. Disconnect connector (B), and measure the resistance between connector (A) and chassis ground, and between (B1) and chassis ground as shown in [FIG. 7].

The measured resistance between connector (B1) and chassis ground is 1Ω or less. The short to ground circuit is between terminal 1 of connector (C) and terminal 1 of connector (B1).

FIG 7



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ECM(TICS) PROBLEM INSPECTION PROCEDURE

1. Test ECM(TICS) connector: Disconnect the ECM(TICS) connector and visually check the ground terminals on ECM(TICS) side and harness side for bent pins or poor contact pressure. If the problem is found, repair it.

2. If problem is not found step 1, the ECM(TICS) could be faulty. If so, replace the ECM(TICS) with a new one, and then check the vehicle again. If the vehicle operates normally then the problem was likely with the ECM(TICS).

3. Re-test the original ECM(TICS): Install the original ECM(TICS)(may be broken) into a known-good vehicle and check the vehicle. If the problem occurs again, replace the original ECM(TICS) with a new one. If problem does not occur, this is intermittent problem (Refer to Intermittent Problem Procedure in Basic Inspection Procedure.)

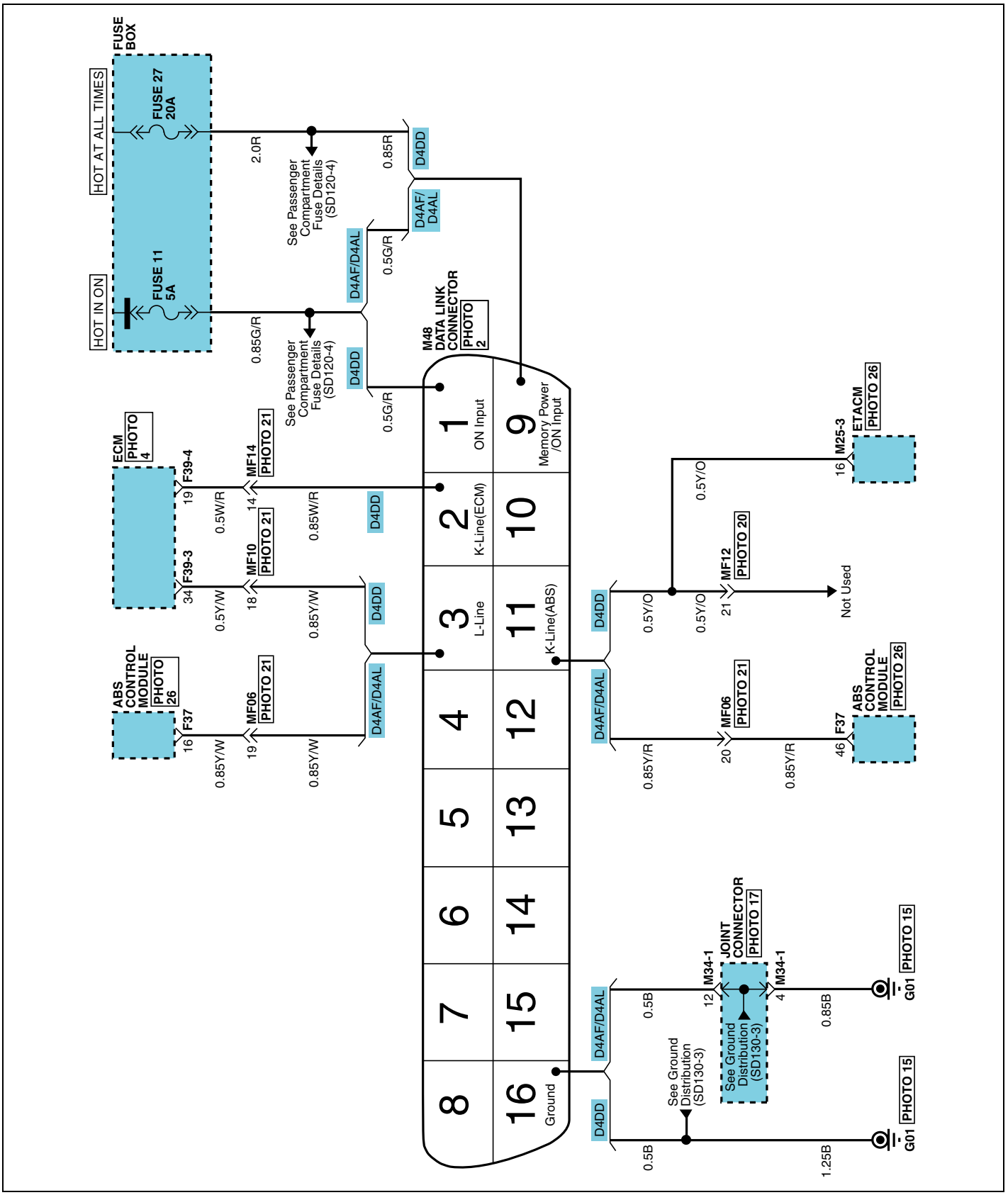
ABBREVIATION

ABS: Anti-lock brake system
APS: Accelerator pedal sensor
A/C: Air conditioning
B: Battery
BATT: Battery
Comp: Compressor
DTC : Diagnostic trouble code
ECTS: Engine coolant temperature sensor
ECU: Electronic control unit
ETCM: Electronic time control module
EUI: Electronic unit injection
IATS : Intake air temperature sensor
IG: Ignition

MIL: Malfunction indicator lamp(Check engine lamp)
NTC: Negative Temperature Coefficient
PTO: Power take-off
NC: Normal close
NO: Normal open
RPM: Revolution per minute
Sw: Switch
Sig: Signal

SCHEMATIC CIRCUIT EEFF964A

DATA LINK DETAILS (1)



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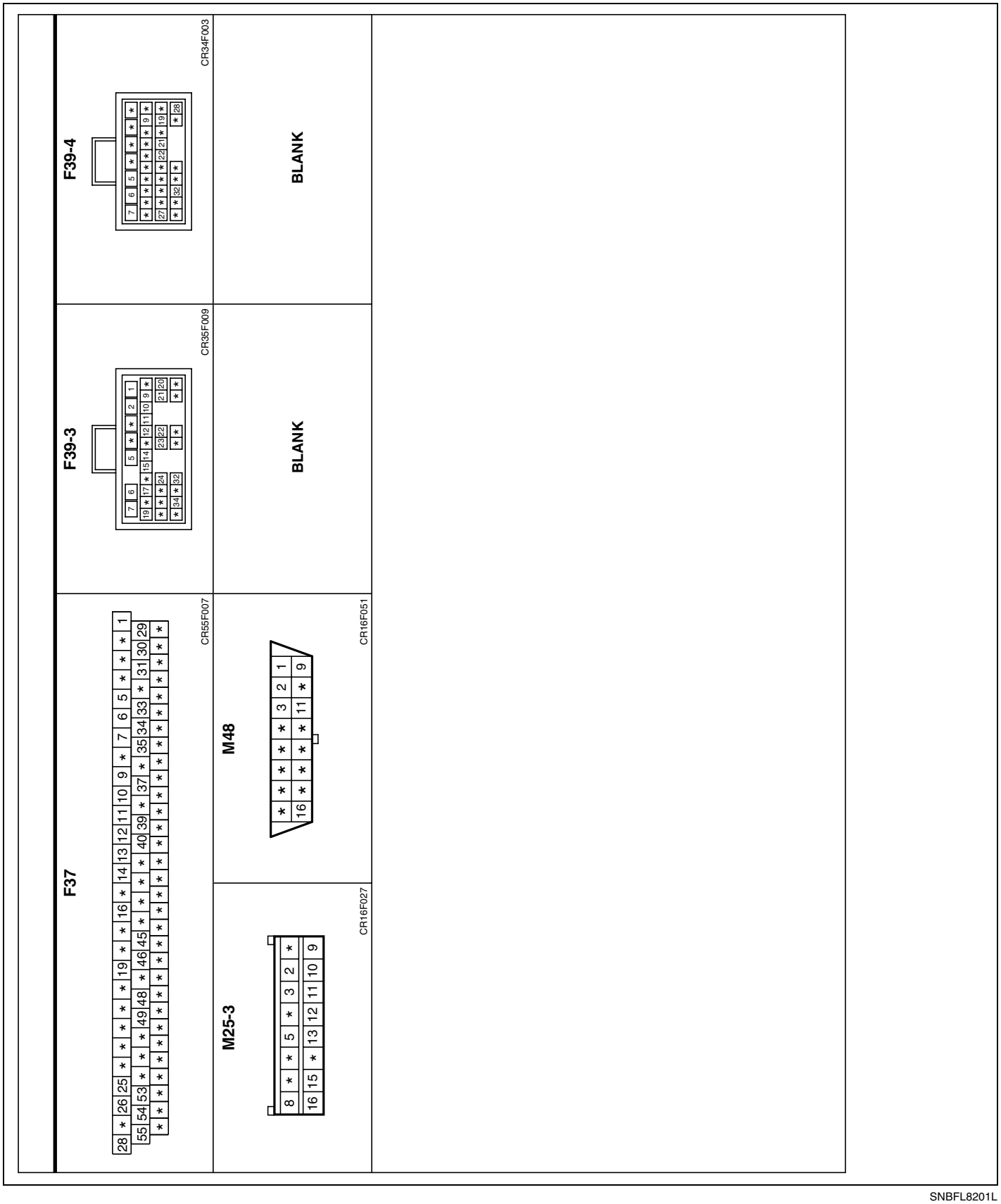
DATA LINK DETAILS (2)



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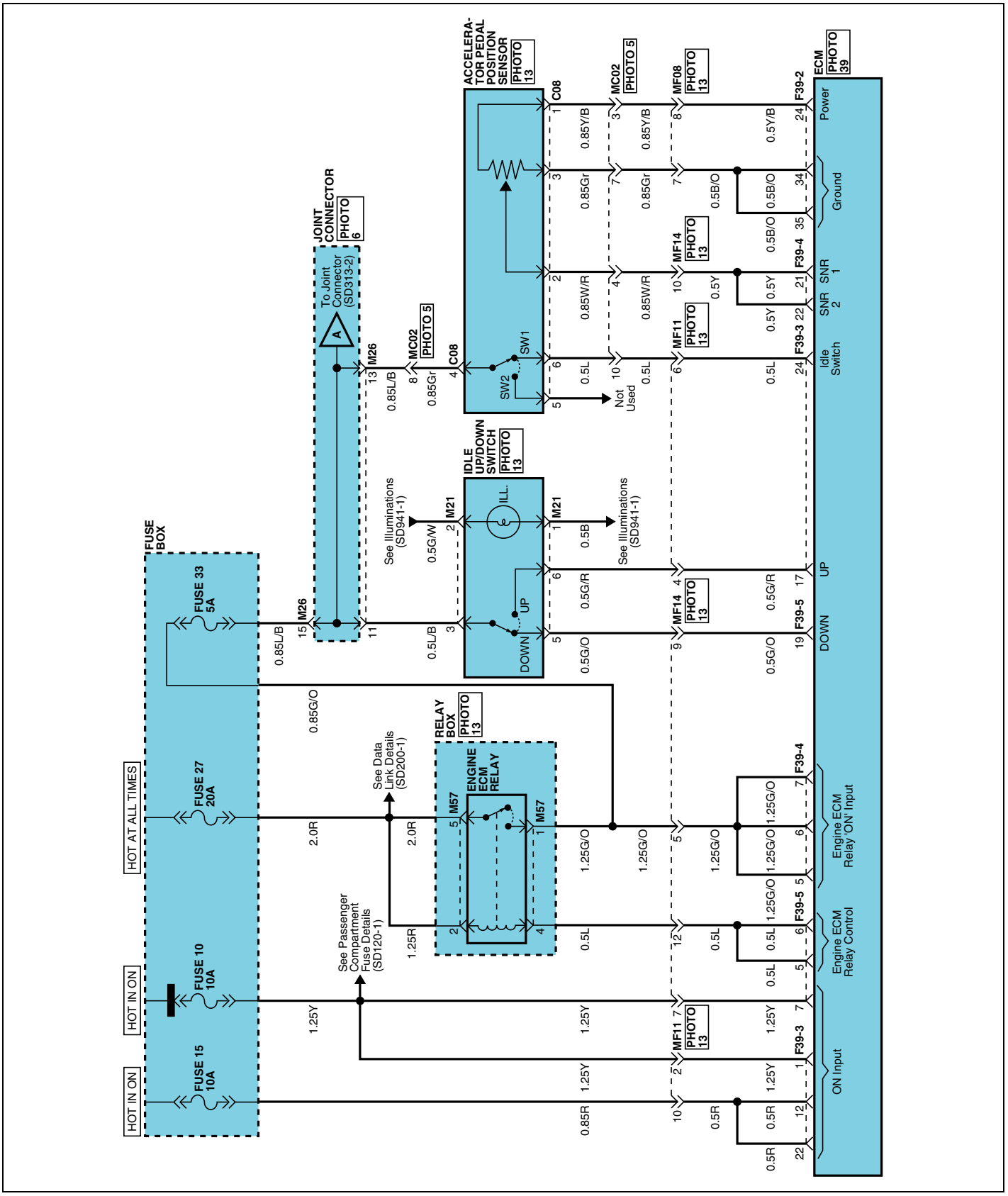
MFI CONTROL SYSTEM (D4DD) (1)



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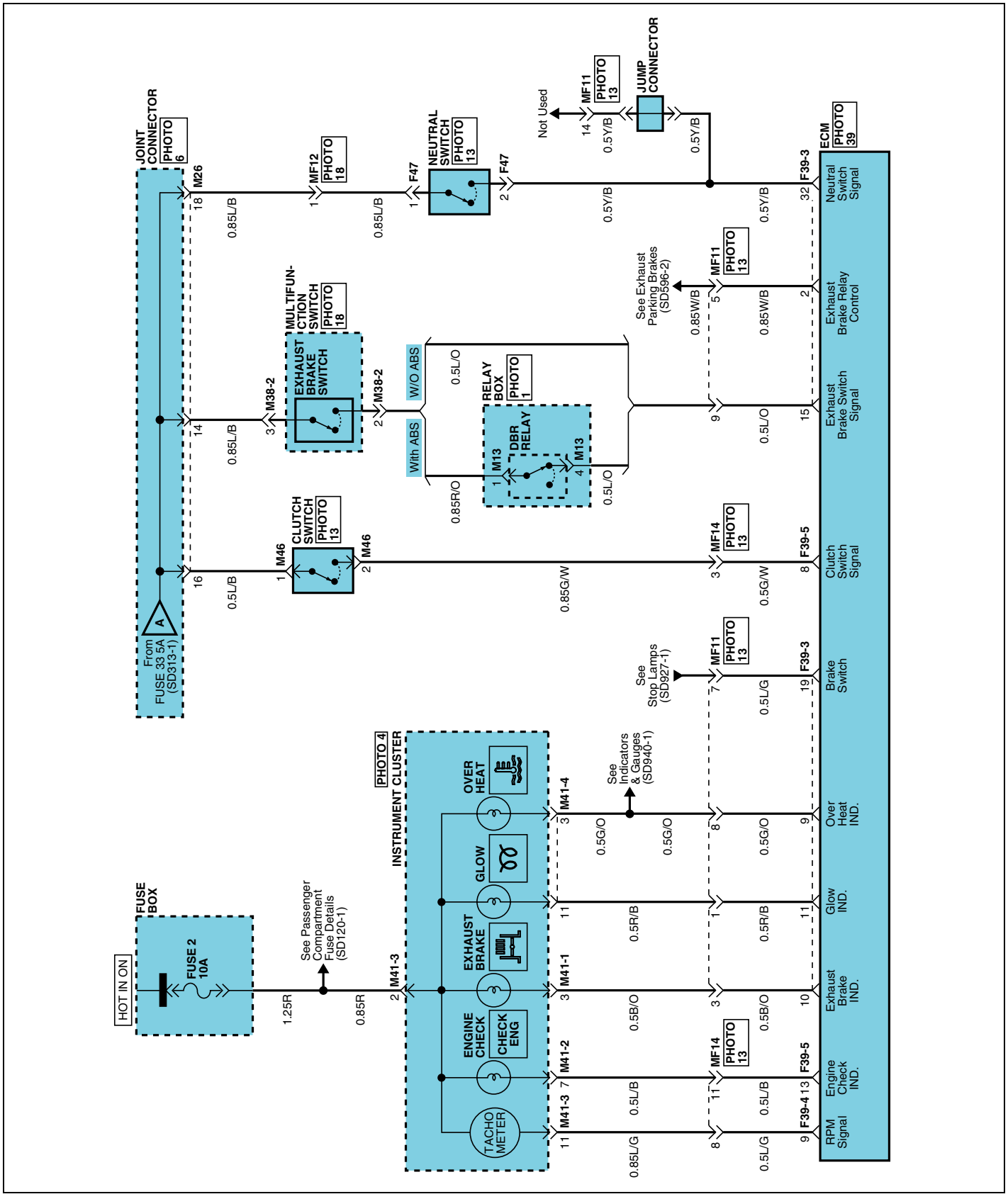
MFI CONTROL SYSTEM (D4DD) (2)



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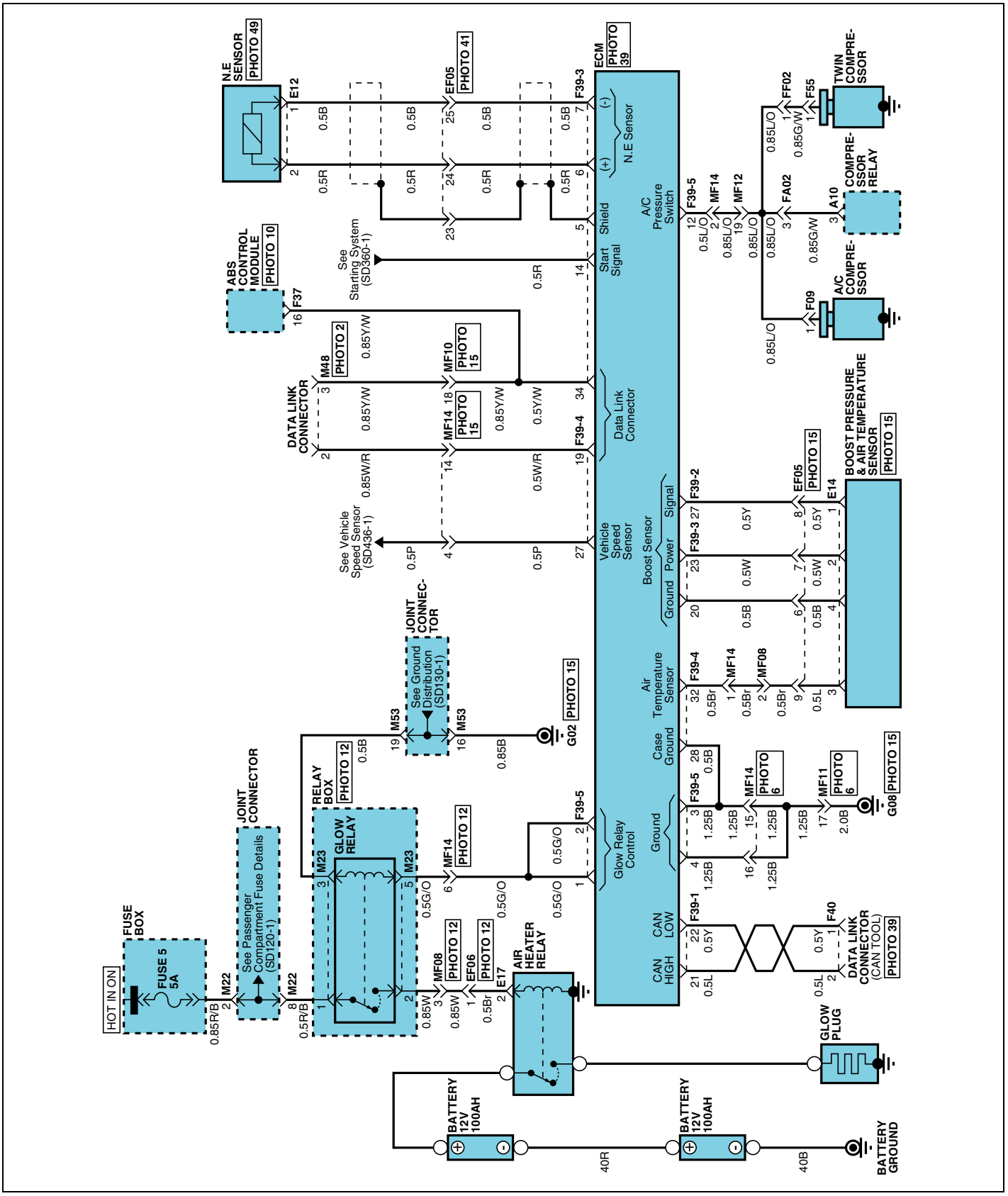
MFI CONTROL SYSTEM (D4DD) (3)



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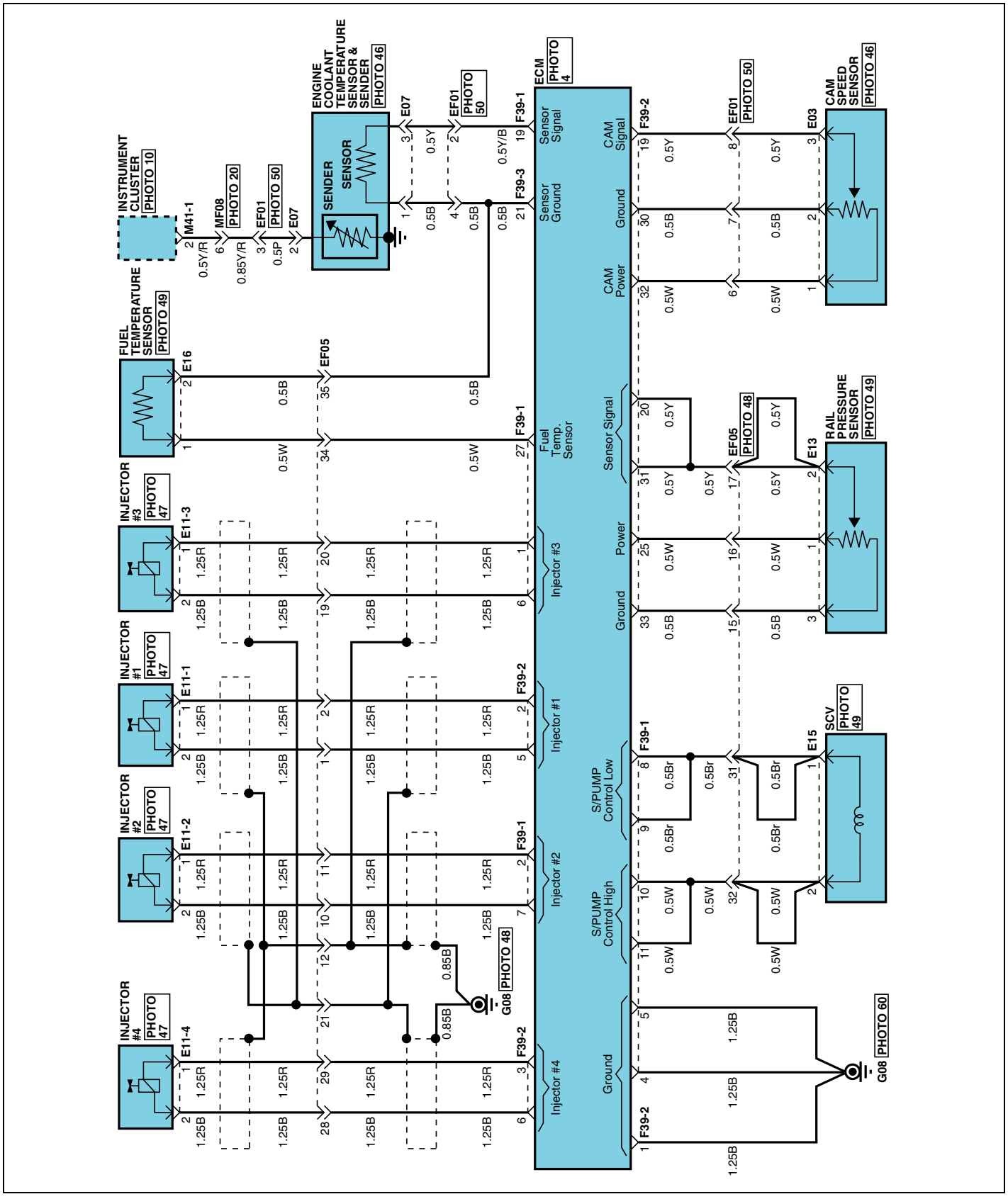
MFI CONTROL SYSTEM (D4DD) (4)



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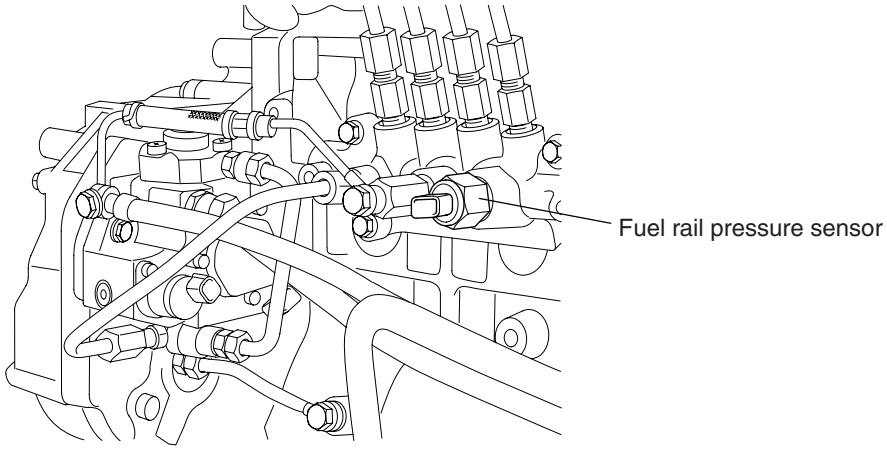
DTC LIST ED87EA08

NO	DTC	DESCRIPTION	Page
1	P0088	COMMON RAIL PRESSURE EXCEEDS LIMIT	
2	P0093	FUEL SYSTEM LEAK DETECTED	
3	P0107	BAROMETRIC PRESSURE SENSOR -LOW VOLTAGE	
4	P0108	BAROMETRIC PRESSURE SENSOR -HIGH VOLTAGE	
5	P0112	INTAKE AIR TEMPERATURE SENSOR - LOW VOLTAGE	
6	P0113	INTAKE AIR TEMPERATURE SENSOR - HIGH VOLTAGE	
7	P0117	ENGINE COOLANT TEMPERATURE SENSOR-LOW VOLTAGE	
8	P0118	ENGINE COOLANT TEMPERATURE SENSOR-HIGH VOLTAGE	
9	P0120	PEDAL SENSOR NO.1 NOT OPEN	
10	P0121	PEDAL SENSOR NO.1 NOT CLOSE	
11	P0122	PEDAL SENSOR NO.1 SIGNAL LOW	
12	P0123	PEDAL SENSOR NO.1 SIGNAL HIGH	
13	P0182	FUEL TEMP. SENSOR LOW INPUT	
14	P0183	FUEL TEMP. SENSOR HIGH INPUT	
15	P0192	C/RAIL PRESSURE SENSOR SIGNAL LOW	
16	P0193	C/RAIL PRESSURE SENSOR SIGNAL HIGH	
17	P0194	C/RAIL PRESSURE SENSOR INTERMITTENT	
18	P0201	INJECTOR #1 COIL OPEN	
19	P0202	INJECTOR #2 COIL OPEN	
20	P0203	INJECTOR #3 COIL OPEN	
21	P0204	INJECTOR #4 COIL OPEN	
22	P0217	ENGINE COOLANT OVER TEMPERATURE	
23	P0219	ENGINE OVERSPEED CONDITION	
24	P0220	PEDAL SENSOR NO.2 NOT OPEN	
25	P0221	PEDAL SENSOR NO.2 NOT CLOSE	
26	P0222	PEDAL SENSOR NO.2 SIGNAL LOW	
27	P0223	PEDAL SENSOR NO.2 SIGNAL HIGH	
28	P0225	IDLE SWITCH STUCK CLOSED	
29	P0226	IDLE SWITCH STUCK OPENED	
30	P0236	BOOST PRESSURE SENSOR INVALID	
31	P0237	BOOST PRESSURE SENSOR SIGNAL LOW	
32	P0238	BOOST PRESSURE SENSOR SIGNAL HIGH	
33	P0301	CYLINDER 1 MISFIRE DETECTED	
34	P0302	CYLINDER 2 MISFIRE DETECTED	
35	P0303	CYLINDER 3 MISFIRE DETECTED	
36	P0304	CYLINDER 4 MISFIRE DETECTED	
37	P0335	CRANK SENSOR NO PULSE	

NO	DTC	DESCRIPTION	Page
38	P0340	CAM SENSOR NO PULSE	
39	P0385	CRANK & CAM SENSOR NO PULSE	
40	P0501	VEHICLE SPEED SENSOR(VSS) SIGNAL INVALID	
41	P0502	VEHICLE SPEED SENSOR(VSS) INPUT OPEN / SHORT	
42	P0503	VEHICLE SPEED SENSOR(VSS) FREQUENCY TOO HIGH	
43	P0562	SYSTEM VOLTAGE LOW	
44	P0563	SYSTEM VOLTAGE HIGH	
45	P0601	CHECK SUM ERROR - FLASH AREA	
46	P0602	QR CODE ERROR	
47	P0606	CPU FAULT; MAIN CPU FAULT	
48	P0607	CPU FAULT; WATCHDOG IC FAULT	
49	P0615	START SWITCH SHORT TO BATTERY	
50	P0627	FUEL PUMP CONTROL CIRCUIT - OPEN	
51	P0629	FUEL PUMP SHORT TO BATTERY	
52	P0704	CLUTCH SWITCH MALFUNCTION (M/T)	
53	P0850	PARK/NEUTRAL SWITCH MALFUNCTION	
54	P1091	FUEL SYSTEM #1 CYLINDER LEAK DETECT	
55	P1092	FUEL SYSTEM #2 CYLINDER LEAK DETECT	
56	P1093	FUEL SYSTEM #3 CYLINDER LEAK DETECT	
57	P1094	FUEL SYSTEM #4 CYLINDER LEAK DETECT	
58	P1120	PEDAL SENSOR SIGNAL INVALID	
59	P1190	SUPPLY PUMP CONTROL VALVE(SCV) STUCK	
60	P1217	SUPPLY PUMP PROTECTION	
61	P1218	SUPPLY PUMP EXCHANGE	
62	P1219	SUPPLY PUMP MULFUNCTION	
63	P1231	EXHAUST BRAKE SHORT TO GROUND	
64	P1232	EXHAUST BRAKE SHORT TO BATTERY	
65	P1383	GLOW RELAY SHORT TO POWER	
66	P1384	GLOW RELAY SHORT TO GROUND	
67	P1616	MAIN RELAY MALFUNTION	
68	P2146	INJECTION COMMON #1 OPEN CIRCUIT	
69	P2147	INJECTION COMMON #1 VOLTAGE - LOW	
70	P2148	INJECTION COMMON #1 VOLTAGE - HIGH	
71	P2149	INJECTION COMMON #2 OPEN CIRCUIT	
72	P2150	INJECTION COMMON #2 VOLTAGE - LOW	
73	P2151	INJECTION COMMON #2 VOLTAGE - HIGH	
74	P2293	FUEL PRESSURE REGULATOR 2 PERFORMANCE	
75	P2503	CHARGING SYSTEM VOLTAGE LOW	
76	P2504	CHARGING SYSTEM VOLTAGE HIGH	

DTC P0088 COMMON RAIL PRESSURE EXCEEDS LIMIT

COMPONENT LOCATION EBFB21BB



SUDFL8017L

DESCRIPTION E1C448DE

1. GENERAL DESCRIPTION
   The rail pressure sensor is installed on the common rail assembly and is composed of piezo-electricity. It is used to control rail pressure by governing fuel amount to equal pressure measured by the rail pressure sensor and pressure required by ECM.
   The common rail pressure regulator valve is controlled by ECM and is usually opened if fuel is not supplied. The ECM decides current value to be sent to pressure regulator valve according to engine revolution, fuel amount and rail pressure etc.

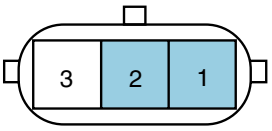
2. DTC DESCRIPTION
   If common rail pressure is continued above 2,000 bar or more, that is, the sensor is detected above 4.2V for 2,097.1 ms even though common rail pressure is abnormal, the ECM judges this as a fault and DTC is set. The possible causes may be overflow valve malfunction, poor rail pressure, faulty fuel rail pressure sensor.
   In case of fail safe, lack of engine power will occur since fuel pressure is limited to 450 bar and fuel amount is limited to below 60mm³/st.

DTC DETECTING CONDITION ED0EC562

<table>
<tr><th>Item</th><th colspan="3">Detecting Condition</th><th>Possible Cause</th></tr>
<tr><td>DTC Strategy</td><td colspan="3">• Voltage monitoring</td><td rowspan="5">• Overflow valve malfunction
• Poor rail pressure
• Faulty fuel rail pressure sensor</td></tr>
<tr><td>Enable Conditions</td><td colspan="3">• Running</td></tr>
<tr><td>Threshold Value</td><td colspan="3">• When common rail pressure is continued above 2,000 bar or more, even though common rail pressure is abnormal</td></tr>
<tr><td>Diagnosis Time</td><td colspan="3">• 2,097.1ms or more</td></tr>
<tr><td rowspan="3">Fail Safe</td><td>Fuel Cut</td><td>No</td><td rowspan="3">• Fuel amount is limited to below 60mm³/st
• Fuel pressure is fixed to 450 bar.
• Lack of engine power</td></tr>
<tr><td>Fuel Limit</td><td>Yes</td></tr>
<tr><td>MIL</td><td>ON</td></tr>
</table>

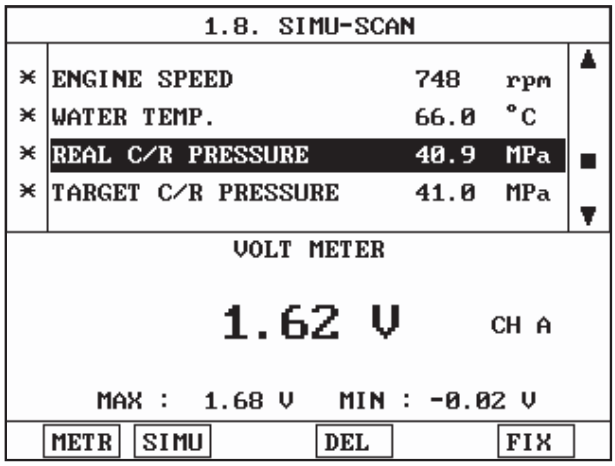
SPECIFICATION E7601390

Rail pressure sensor	Specification
Output voltage	Below 1.7V (At idle after engine warming-up)
Rail pressure	350~500 bar(Engine idling)



Sensor connector

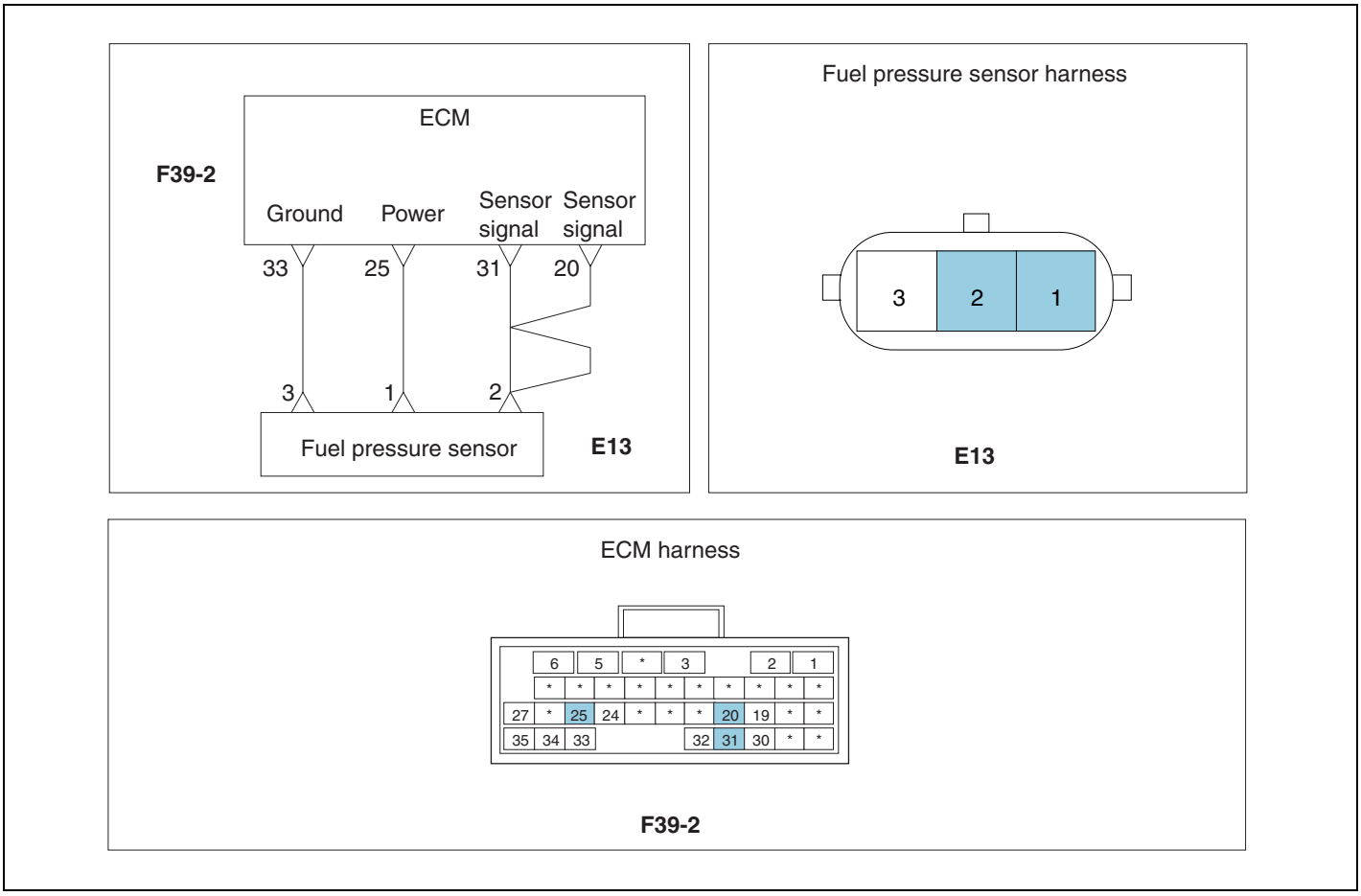
Terminal 1: Power
Terminal 2: Sensor signal
Terminal 3: Ground



Resistance	Specification
1, 2번	3 KΩ
1, 3번	13 KΩ
2, 3번	16.4 KΩ

SNBFL8001L

SCHEMATIC DIAGRAM E0F30ED7



SNBFL8002L

WAVEFORM E398C198

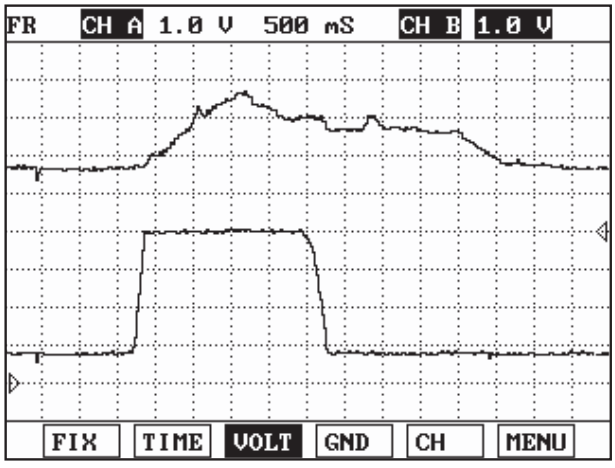
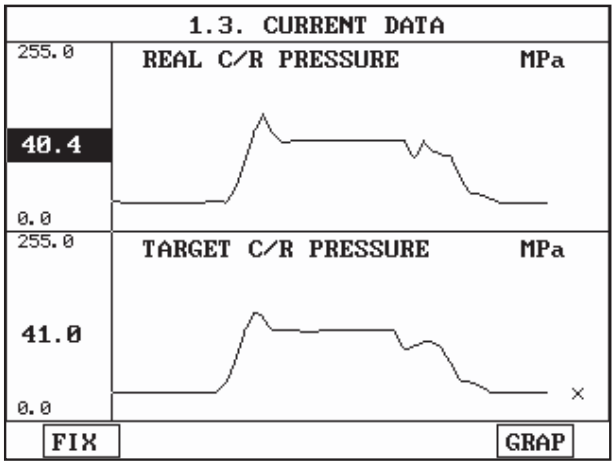


Fig. 1 Check with oscilloscope waveform



Reference Check with control information

Fig1) This is waveform checked together with accelerator pedal position sensor 1 and rail pressure sensor and it is confirmable that rail pressure sensor output is increased at sudden acceleration.

SUDFL8003L