

Diagnostics for Engine Starting Failure

ENGINE (DIAGNOSTICS)

17. Diagnostics for Engine Starting Failure

A: PROCEDURE

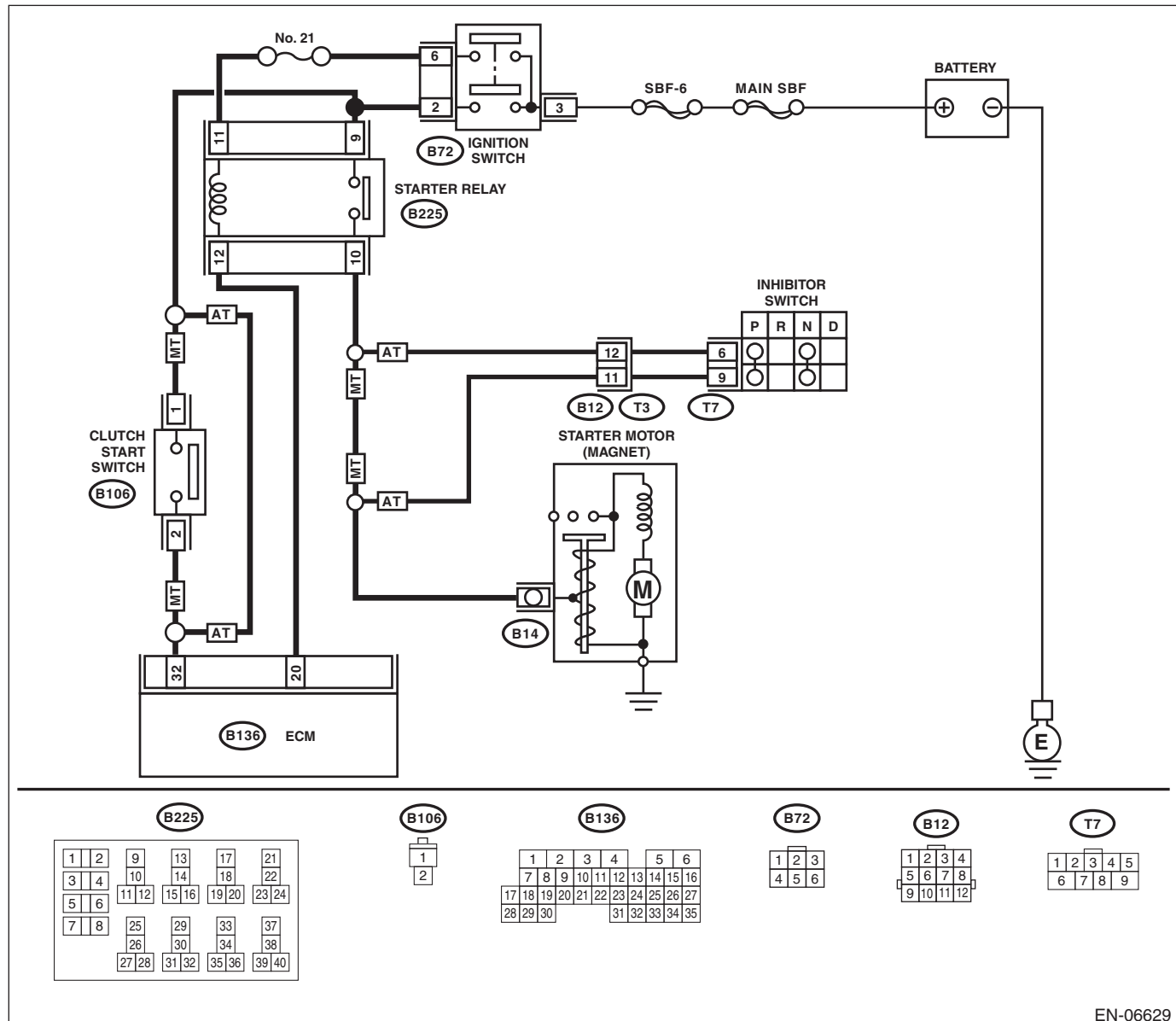
1. Check of the fuel amount
↓
2. Inspection of starter motor circuit. <Ref. to EN(H4SO)(diag)-67, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
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3. Inspection of ECM power supply and ground line. <Ref. to EN(H4SO)(diag)-71, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>
↓
4. Inspection of ignition control system. <Ref. to EN(H4SO)(diag)-73, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel pump circuit. <Ref. to EN(H4SO)(diag)-76, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
6. Inspection of fuel injector circuit. <Ref. to EN(H4SO)(diag)-78, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

B: STARTER MOTOR CIRCUIT

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO)(diag)-51, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-41, Inspection Mode.>.

WIRING DIAGRAM:



EN-06629

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Step	Check	Yes	No
1 CHECK BATTERY. Check the battery voltage.	Is the voltage 12 V or more?	Go to step 2.	Charge or replace the battery.
2 CHECK OPERATION OF STARTER MOTOR.	Does the starter motor operate?	Go to step 3.	Go to step 4.
3 CHECK DTC.	Is DTC displayed? <Ref. to EN(H4SO)(diag)-40, OPERATION, Read Diagnostic Trouble Code (DTC).>	Check the appropriate DTC using the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO)(diag)-82, List of Diagnostic Trouble Code (DTC).>	The circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, there may be a temporary connector contact failure.
4 CHECK INPUT SIGNAL FOR STARTER MOTOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter motor. 3) On AT models, set the select lever to the "P" range or "N" range, and on MT models, depress the clutch pedal. 4) Turn the ignition switch to START. 5) Measure the voltage between the starter motor connector and the engine ground. Connector & terminal (B14) No. 1 (+) — Engine ground (-):	Is the voltage 10 V or more?	Check the starter motor. <Ref. to SC(H4SO)-6, Starter.>	Go to step 5.
5 CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition switch. 3) Measure the voltage between ignition switch connector and chassis ground. Connector & terminal (B72) No. 3 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 6.	Check the following item and repair if necessary. • Blown out of fuse • Open or ground short circuit of harness between ignition switch connector and battery
6 CHECK IGNITION SWITCH. Measure the resistance between ignition switch terminals after turning the ignition switch to START position. Terminals No. 3 — No. 2: No. 3 — No. 6:	Is the resistance less than 1 Ω ?	Go to step 7.	Replace the ignition switch. <Ref. to SL-36, REPLACEMENT, Ignition Key Lock.>
7 CHECK INPUT VOLTAGE OF STARTER RELAY. 1) Remove the starter relay. 2) Connect the connector to ignition switch. 3) Measure the voltage between starter relay connector and chassis ground after turning the ignition switch to START position. Connector & terminal (B225) No. 9 (+) — Chassis ground (-): (B225) No. 11 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 8.	Repair open circuit or short circuit to ground in harness between starter relay connector and ignition switch connector.

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Step	Check	Yes	No
8 CHECK STARTER RELAY. 1) Connect the battery to starter relay terminals No. 11 and No. 12. 2) Measure the resistance between starter relay terminals. Terminals No. 9 — No. 10:	Is the resistance less than 1 Ω ?	Go to step 9.	Replace the starter relay.
9 CHECK HARNESS BETWEEN ECM AND STARTER RELAY. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the ECM. 3) Measure the resistance of harness between ECM and starter relay connector. Connector & terminal (B136) No. 20 — (B225) No. 12:	Is the resistance less than 1 Ω ?	Go to step 10.	Repair the open circuit of harness between ECM and starter relay connector.
10 CHECK TRANSMISSION TYPE.	Is the transmission type AT?	Go to step 11.	Go to step 15.
11 CHECK ECM INPUT VOLTAGE. 1) Turn the ignition switch to START. 2) Measure the input voltage between ECM connector and chassis ground. Connector & terminal (B136) No. 32 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 12.	Repair the open circuit in harness between ECM and ignition switch connector.
12 CHECK HARNESS BETWEEN STARTER RELAY AND INHIBITOR SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from inhibitor switch. 3) Measure the resistance of harness between starter relay connector and inhibitor relay connector. Connector & terminal (B225) No. 10 — (T7) No. 6:	Is the resistance less than 1 Ω ?	Go to step 13.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between starter relay connector and inhibitor switch connector • Poor contact of coupling connector
13 CHECK HARNESS BETWEEN INHIBITOR SWITCH AND STARTER MOTOR. Measure the resistance of harness between the inhibitor switch connector and starter motor. Connector & terminal (T7) No. 9 — (B14) No. 1:	Is the resistance less than 1 Ω ?	Go to step 14.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between inhibitor switch connector and starter motor • Poor contact of coupling connector
14 CHECK INHIBITOR SWITCH. 1) Place the select lever in other than "P" range and "N" range. 2) Measure the resistance between inhibitor switch terminals. Terminals No. 6 — No. 9:	Is the resistance 1 M Ω or more?	Check the ECM power supply and ground line. <Ref. to EN(H4SO)(diag)-71, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>	Replace the inhibitor switch. <Ref. to 4AT-46, Inhibitor Switch.>

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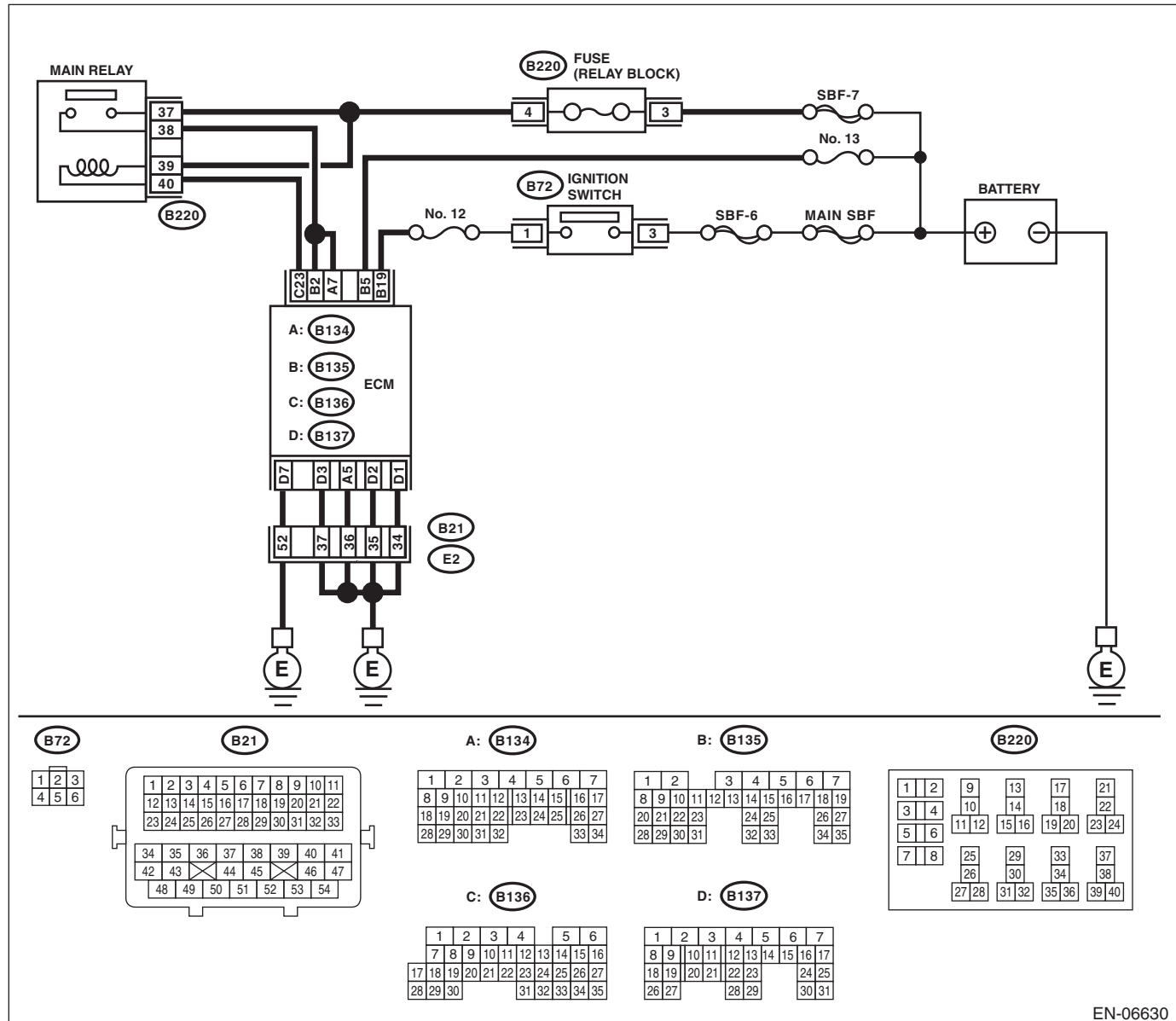
Step	Check	Yes	No
15 CHECK HARNESS BETWEEN IGNITION SWITCH AND CLUTCH START SWITCH. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from clutch start switch. 3) Turn the ignition switch to START. 4) Measure the voltage between the clutch start switch connector and chassis ground. Connector & terminal (B106) No. 1 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 16.	Repair the open circuit in harness between ignition switch connector and clutch start switch connector.
16 CHECK CLUTCH START SWITCH. Measure the resistance between clutch start switch terminals while depressing the clutch pedal. Terminals No. 1 — No. 2:	Is the resistance less than 1 Ω ?	Go to step 17.	Replace the clutch start switch. <Ref. to CL-26, Clutch Switch.>
17 CHECK HARNESS BETWEEN ECM AND CLUTCH START SWITCH. Measure the resistance of harness between ECM and clutch start switch connector. Connector & terminal (B136) No. 32 — (B106) No. 2:	Is the resistance less than 1 Ω ?	Go to step 18.	Repair the open circuit of harness between ECM and clutch start switch connector.
18 CHECK HARNESS BETWEEN STARTER RELAY AND STARTER MOTOR. Measure the resistance of harness between starter relay connector and starter motor. Connector & terminal (B225) No. 10 — (B14) No. 1:	Is the resistance less than 1 Ω ?	Check the ECM power supply and ground line. <Ref. to EN(H4SO)(diag)-71, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>	Repair the open circuit of the harness between starter relay connector and starter motor.

C: CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM)

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO)(diag)-51, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-41, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



EN-06630

Diagnostics for Engine Starting Failure

ENGINE (DIAGNOSTICS)

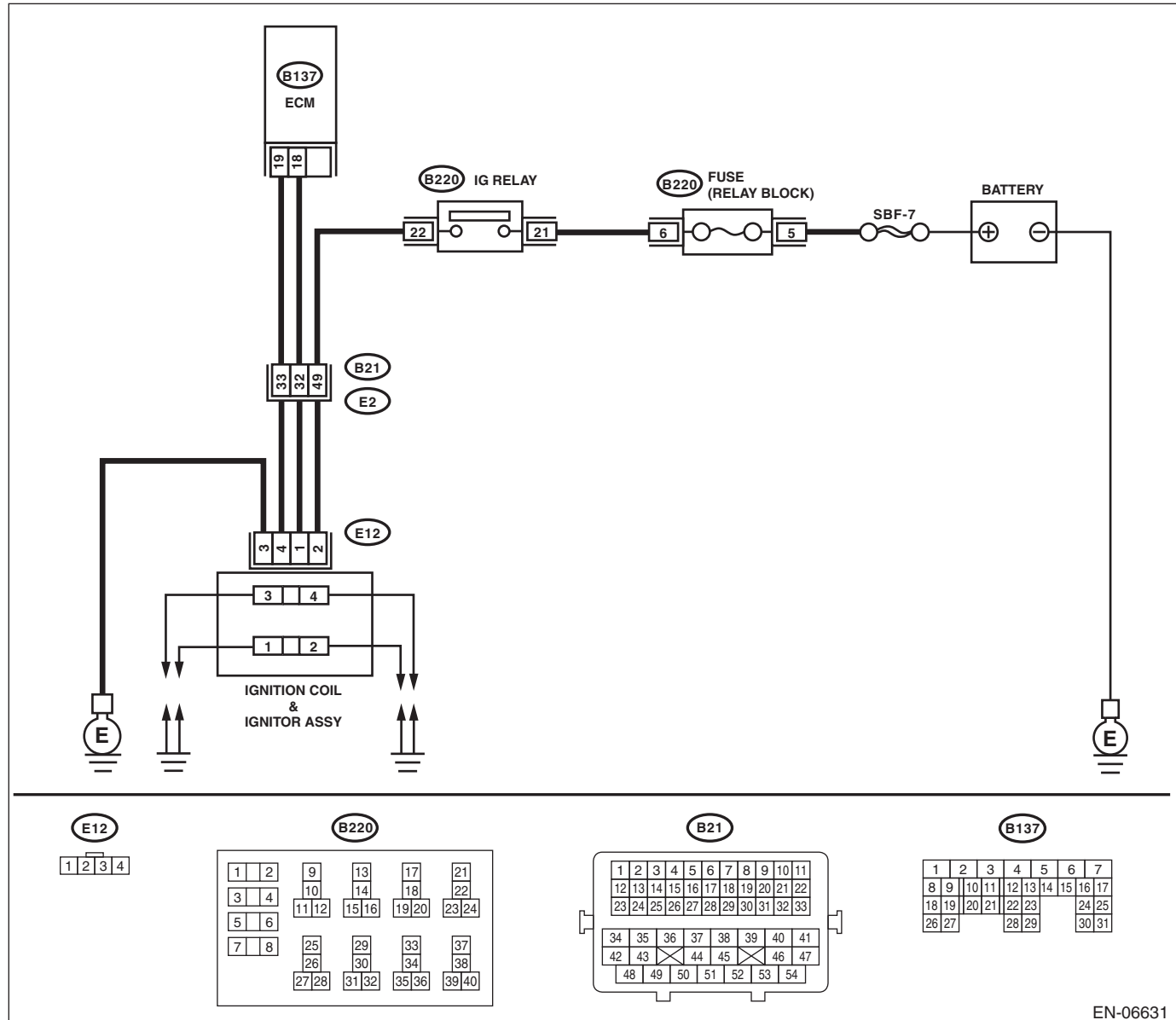
Step		Check	Yes	No
1	CHECK MAIN RELAY. 1) Turn the ignition switch to OFF. 2) Remove the main relay. 3) Connect the battery to main relay terminals No. 39 and No. 40. 4) Measure the resistance between main relay terminals. Terminals No. 37 — No. 38:	Is the resistance less than 1 Ω?	Go to step 2.	Replace the main relay.
2	CHECK GROUND CIRCUIT FOR ECM. 1) Disconnect the connectors from the ECM. 2) Measure the resistance of harness between ECM and chassis ground. Connector & terminal (B134) No. 5 — Chassis ground: (B137) No. 1 — Chassis ground: (B137) No. 2 — Chassis ground: (B137) No. 3 — Chassis ground: (B137) No. 7 — Chassis ground:	Is the resistance less than 5 Ω?	Go to step 3.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and engine ground • Poor contact of coupling connector
3	CHECK INPUT VOLTAGE OF ECM. 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. Connector & terminal (B135) No. 5 (+) — Chassis ground (-): (B135) No. 19 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 4.	Repair the open or ground short circuit of power supply circuit.
4	CHECK INPUT VOLTAGE OF MAIN RELAY. Measure the voltage between main relay connector and chassis ground. Connector & terminal (B220) No. 37 (+) — Chassis ground (-): (B220) No. 39 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 5.	Repair the open or ground short circuit of harness of power supply circuit.
5	CHECK INPUT VOLTAGE OF ECM. 1) Turn the ignition switch to OFF. 2) Install the main relay. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground. Connector & terminal (B136) No. 23 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 6.	Repair the open circuit of harness between ECM connector and main relay connector.
6	CHECK INPUT VOLTAGE OF ECM. 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. Connector & terminal (B134) No. 7 (+) — Chassis ground (-): (B135) No. 2 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Check ignition control system. <Ref. to EN(H4SO)(diag)-73, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair the open circuit of harness between ECM connector and main relay connector.

D: IGNITION CONTROL SYSTEM

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO)(diag)-51, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-41, Inspection Mode.>.

WIRING DIAGRAM:



EN-06631

Diagnostics for Engine Starting Failure

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK IGNITION SYSTEM FOR SPARKS. 1) Remove the plug cord cap from each spark plug. 2) Install a new spark plug on plug cord cap. CAUTION: Do not remove the spark plug from engine. 3) Contact the spark plug thread portion to engine. 4) While opening the throttle valve fully, crank the engine to check that spark occurs at each cylinder.	Does spark occur at each cylinder?	Check fuel pump system. <Ref. to EN(H4SO)(diag)-76, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step 2.
2 CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL AND IGNITOR ASSEMBLY. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the ignition coil and ignitor assembly. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between ignition coil and ignitor assembly connector and engine ground. Connector & terminal (E12) No. 2 (+) — Engine ground (-):	Is the voltage 10 V or more?	Go to step 3.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ignition coil and ignitor assembly and IG relay connector • Poor contact of coupling connector • Blown out of fuse
3 CHECK HARNESS BETWEEN IGNITION COIL AND IGNITOR ASSEMBLY, AND ECM. 1) Turn the ignition switch to OFF. 2) Measure the resistance between the ignition coil and ignitor assembly connector, and engine ground. Connector & terminal (E12) No. 3 — Engine ground:	Is the resistance less than 5 Ω?	Go to step 4.	Repair the open circuit in harness between ignitor assembly connector and engine ground.
4 CHECK IGNITION COIL AND IGNITOR ASSEMBLY. 1) Remove the spark plug cords. 2) Measure the resistance between spark plug cord contact portions to check secondary coil. Terminals No. 1 — No. 2: No. 3 — No. 4:	Is the resistance between 10 and 15 kΩ?	Go to step 5.	Replace the ignition coil and ignitor assembly. <Ref. to IG(H4SO)-6, Ignition Coil and Ignitor Assembly.>
5 CHECK INPUT SIGNAL FOR IGNITION COIL AND IGNITOR ASSEMBLY. 1) Connect the connector to the Ignition coil and ignitor assembly. 2) Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignition coil and ignitor assembly connector and engine ground. Connector & terminal (E12) No. 1 (+) — Engine ground (-): (E12) No. 4 (+) — Engine ground (-):	Does the voltage vary 10 V or more?	Go to step 6.	Replace the ignition coil and ignitor assembly. <Ref. to IG(H4SO)-6, Ignition Coil and Ignitor Assembly.>

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Step	Check	Yes	No
6 CHECK HARNESS BETWEEN ECM AND IGNITION COIL AND IGNITOR ASSEMBLY CONNECTOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the ECM. 3) Disconnect the connector from the ignition coil and ignitor assembly. 4) Measure the resistance of harness between ECM and ignition coil and ignitor assembly connector. Connector & terminal (B137) No. 18 — (E12) No. 1: (B137) No. 19 — (E12) No. 4:	Is the resistance less than 1 Ω ?	Go to step 7.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM and ignition coil and ignitor assembly connector • Poor contact of coupling connector
7 CHECK HARNESS BETWEEN ECM AND IGNITION COIL AND IGNITOR ASSEMBLY CONNECTOR. Measure the resistance of harness between ECM and engine ground. Connector & terminal: (B137) No. 18 — Engine ground: (B137) No. 19 — Engine ground:	Is the resistance 1 M Ω or more?	Repair poor contact of the ECM connector.	Repair the ground short circuit of harness between ECM and ignition coil and ignitor assembly connector.

Diagnostics for Engine Starting Failure

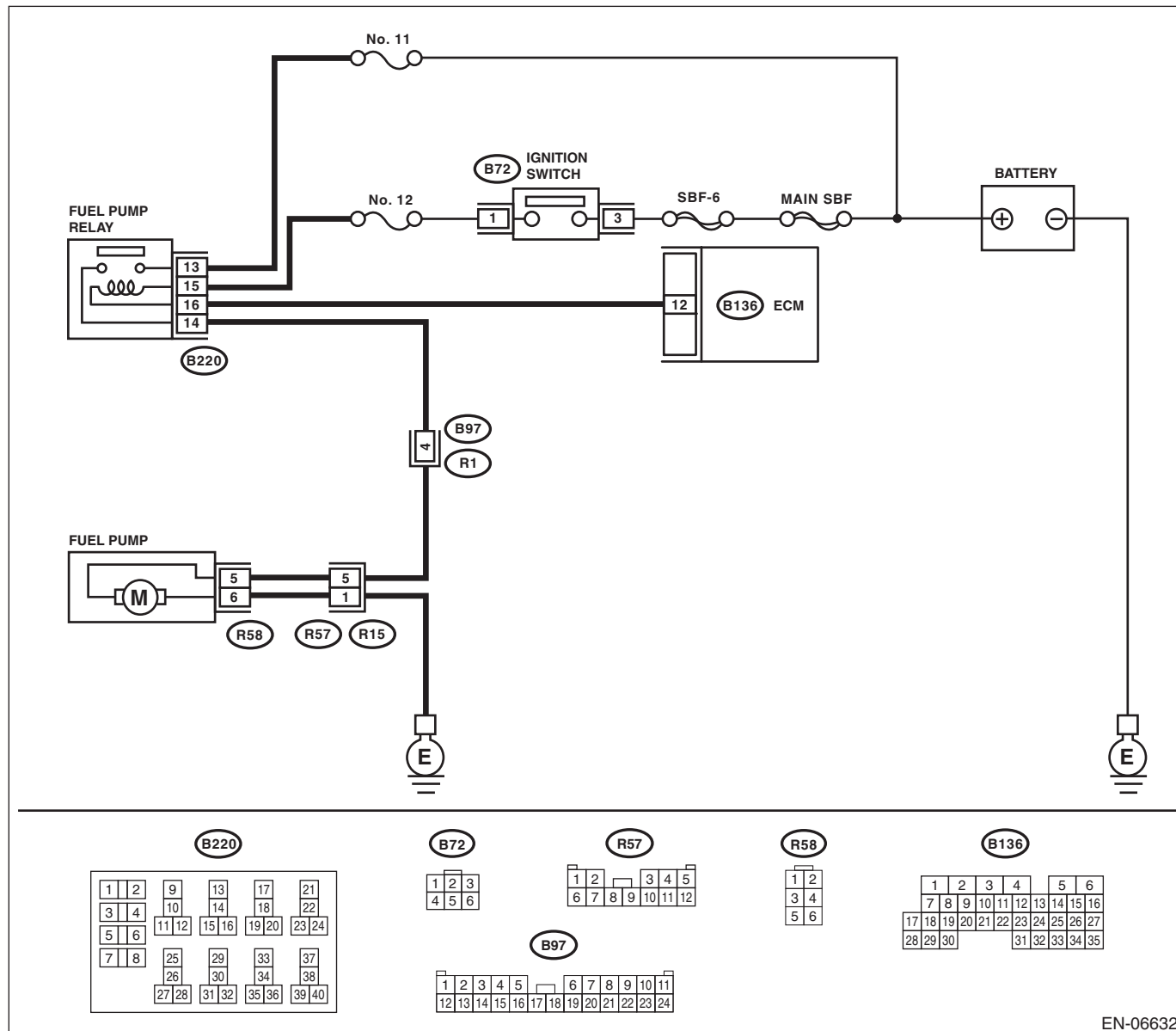
ENGINE (DIAGNOSTICS)

E: FUEL PUMP CIRCUIT

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO)(diag)-51, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-41, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



EN-06632

Step	Check	Yes	No
1 CHECK OPERATING SOUND OF FUEL PUMP. Make sure that the fuel pump operates for two seconds when turning the ignition switch to ON. NOTE: Fuel pump operation can be executed using the Subaru Select Monitor. For the procedures, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4SO)(diag)-52, Compulsory Valve Operation Check Mode.>	Does the fuel pump emit operating sound?	Check the fuel injector circuit. <Ref. to EN(H4SO)(diag)-78, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step 2.

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Step	Check	Yes	No
2 CHECK GROUND CIRCUIT OF FUEL PUMP. 1) Turn the ignition switch to OFF. 2) Remove the fuel pump access hole lid. 3) Disconnect the connector from fuel pump. 4) Measure the resistance of harness between fuel pump and chassis ground. Connector & terminal (R58) No. 6 — Chassis ground:	Is the resistance less than 5 Ω ?	Go to step 3.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between fuel pump connector and chassis grounding terminal • Poor contact of coupling connector
3 CHECK POWER SUPPLY TO FUEL PUMP. 1) Turn the ignition switch to ON. 2) Measure the voltage between fuel pump connector and chassis ground. Connector & terminal (R58) No. 5 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Replace the fuel pump. <Ref. to FU(H4SO)-56, Fuel Pump.>	Go to step 4.
4 CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR. 1) Turn the ignition switch to OFF. 2) Remove the fuel pump relay. 3) Measure the resistance of harness between fuel pump connector and fuel pump relay connector. Connector & terminal (R58) No. 5 — (B220) No. 14:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between fuel pump connector and fuel pump relay connector • Poor contact of coupling connector
5 CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR. Measure the resistance of harness between fuel pump connector and fuel pump relay connector. Connector & terminal (R58) No. 5 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 6.	Repair the short circuit to ground in harness between fuel pump connector and fuel pump relay connector.
6 CHECK FUEL PUMP RELAY. 1) Connect the battery to fuel pump relay terminals No. 15 and No. 16. 2) Measure the resistance between terminals of fuel pump relay. Terminals No. 13 — No. 14:	Is the resistance less than 1 Ω ?	Go to step 7.	Replace the fuel pump relay. <Ref. to FU(H4SO)-41, Fuel Pump Relay.>
7 CHECK HARNESS BETWEEN ECM AND FUEL PUMP RELAY CONNECTOR. 1) Disconnect the connectors from the ECM. 2) Measure the resistance of harness between ECM and fuel pump relay connector. Connector & terminal (B136) No. 12 — (B220) No. 16:	Is the resistance less than 1 Ω ?	Go to step 8.	Repair the open circuit of harness between ECM and fuel pump relay connector.
8 CHECK POWER SUPPLY OF FUEL PUMP RELAY. 1) Turn the ignition switch to ON. 2) Measure the voltage between fuel pump relay connector and chassis ground. Connector & terminal (B220) No. 13 (+) — Chassis ground (-): (B220) No. 15 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Repair poor contact of the ECM connector.	Repair the open or ground short circuit of power supply circuit.

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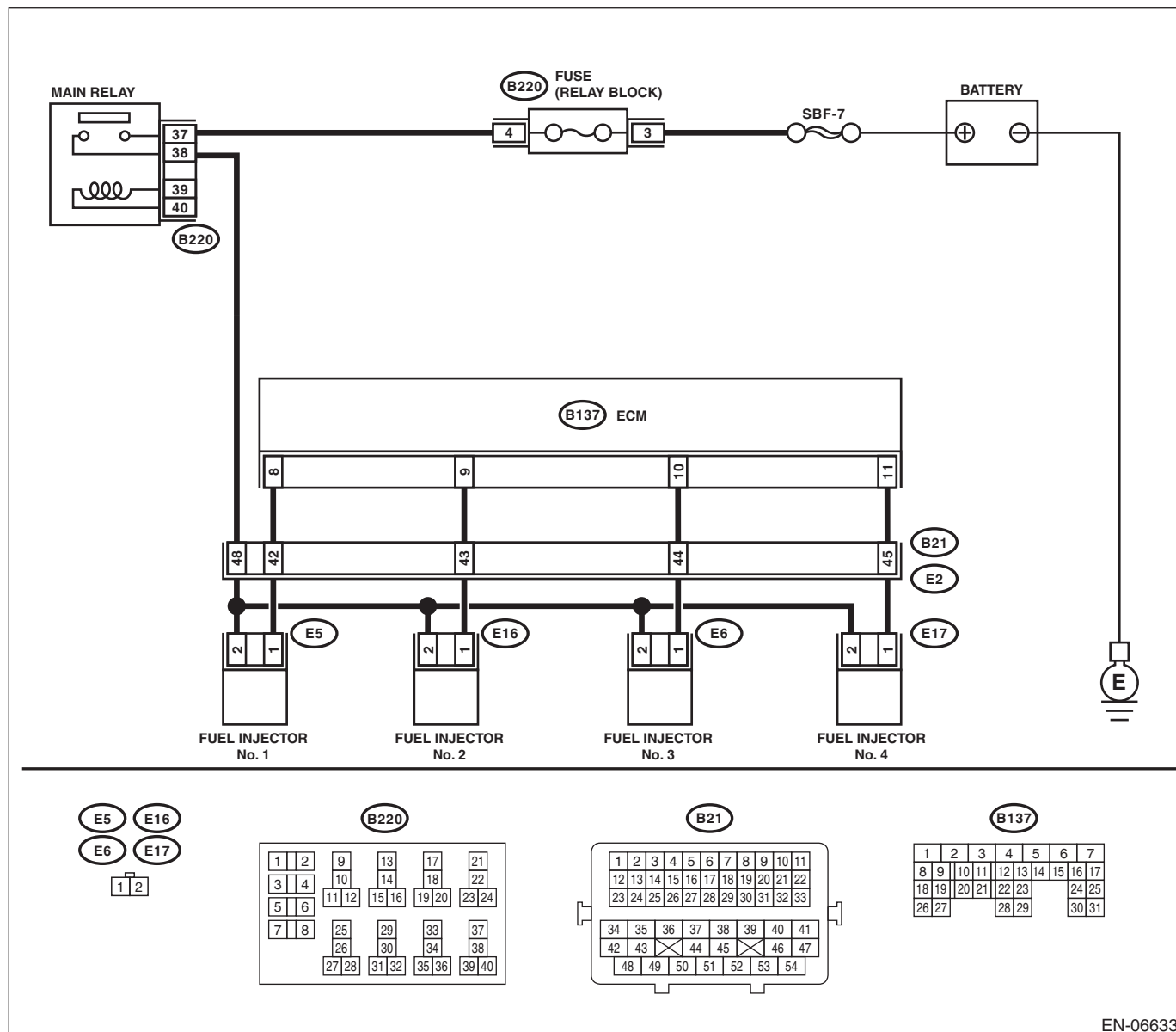
ENGINE (DIAGNOSTICS)

F: FUEL INJECTOR CIRCUIT

CAUTION:

- Check or repair only faulty parts.
- After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H4SO)(diag)-51, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-41, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



EN-06633

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ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
1 CHECK OPERATION OF EACH FUEL INJECTOR. While cranking the engine, check each fuel injector emits operating sound. Use a sound scope or attach a screwdriver to the injector to listen to sounds for this check.	Does the fuel pump emit operating sound?	Check the fuel pressure. <Ref. to ME(H4SO)-28, INSPECTION, Fuel Pressure.>	Go to step 2.
2 CHECK POWER SUPPLY TO EACH FUEL INJECTOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between fuel injector terminal and engine ground. Connector & terminal <i>#1 (E5) No. 2 (+) — Engine ground (-):</i> <i>#2 (E16) No. 2 (+) — Engine ground (-):</i> <i>#3 (E6) No. 2 (+) — Engine ground (-):</i> <i>#4 (E17) No. 2 (+) — Engine ground (-):</i>	Is the voltage 10 V or more?	Go to step 3.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between main relay connector and fuel injector connector • Poor contact of main relay connector • Poor contact of coupling connector
3 CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR. 1) Disconnect the connectors from the ECM. 2) Measure the resistance of harness between ECM and fuel injector connector. Connector & terminal <i>#1 (B137) No. 8 — (E5) No. 1:</i> <i>#2 (B137) No. 9 — (E16) No. 1:</i> <i>#3 (B137) No. 10 — (E6) No. 1:</i> <i>#4 (B137) No. 11 — (E17) No. 1:</i>	Is the resistance less than 1 Ω?	Go to step 4.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and fuel injector connector • Poor contact of coupling connector
4 CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR. Measure the resistance of harness between ECM and fuel injector connector. Connector & terminal <i>#1 (B137) No. 8 — Chassis ground:</i> <i>#2 (B137) No. 9 — Chassis ground:</i> <i>#3 (B137) No. 10 — Chassis ground:</i> <i>#4 (B137) No. 11 — Chassis ground:</i>	Is the resistance 1 MΩ or more?	Go to step 5.	Repair the ground short circuit of harness between ECM and fuel injector connector.
5 CHECK EACH FUEL INJECTOR. 1) Turn the ignition switch to OFF. 2) Measure the resistance between each fuel injector terminals. Terminals <i>No. 1 — No. 2:</i>	Is the resistance between 5 — 20 Ω?	Go to step 6.	Replace the faulty fuel injector. <Ref. to FU(H4SO)-30, Fuel Injector.>
6 CHECK POOR CONTACT. Check for poor contact of the ECM connector.	Is there poor contact in ECM connector?	Repair poor contact of the ECM connector.	Inspection using “General Diagnostic Table” <Ref. to EN(H4SO)(diag)-304, INSPECTION, General Diagnostic Table.>