

16. Diagnostics for Engine Starting Failure

A: PROCEDURE

1. Check of the fuel amount
↓
2. Inspection of starter motor circuit. <Ref. to EN(H6DO)(diag)-66, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
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3. Inspection of ECM power supply and ground line. <Ref. to EN(H6DO)(diag)-70, 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(H6DO)(diag)-72, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
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5. Inspection of fuel pump circuit. <Ref. to EN(H6DO)(diag)-75, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
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6. Inspection of fuel injector circuit. <Ref. to EN(H6DO)(diag)-76, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

Diagnostics for Engine Starting Failure

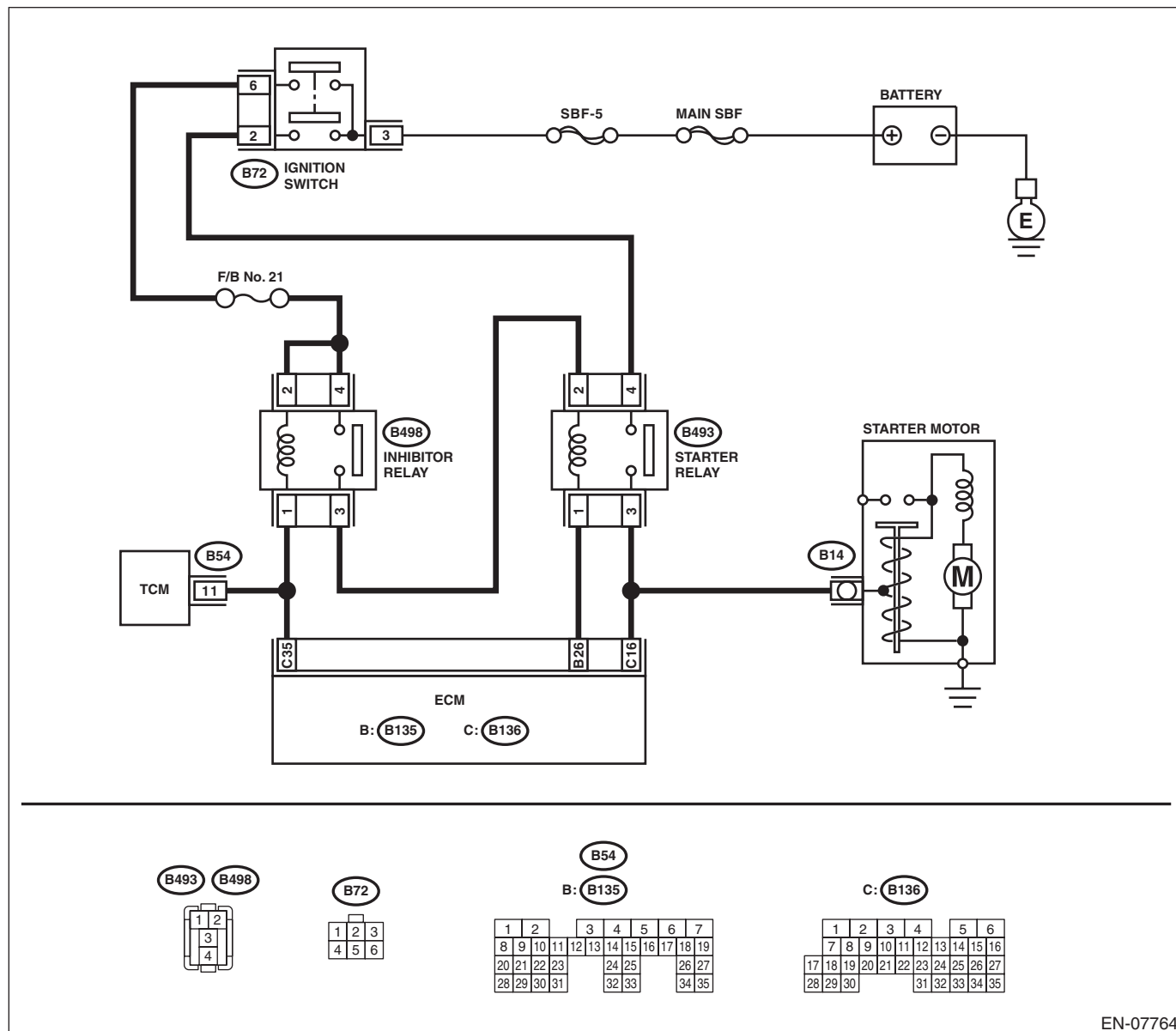
ENGINE (DIAGNOSTICS)

B: STARTER MOTOR CIRCUIT

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-54, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-43, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



EN-07764

Step	Check	Yes	No
1	CHECK BATTERY. Check the battery voltage.	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.

Diagnostics for Engine Starting Failure

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No	
3	CHECK DTC.	Is DTC displayed? <Ref. to EN(H6DO)(diag)-42, OPERATION, Read Diagnostic Trouble Code (DTC).>	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-78, 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, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
4	CHECK INPUT SIGNAL FOR STARTER MOTOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter motor. 3) Place the select lever in "P" range or "N" range. 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)-9, Starter.>	Go to step 5.
5	CHECK INPUT SIGNAL FOR STARTER MOTOR. 1) Place the select lever in "P" range or "N" range. 2) Turn the ignition switch to START. 3) Measure the voltage between starter relay connector and chassis ground. Connector & terminal (B493) No. 3 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Repair the open circuit of the harness between starter relay connector and starter motor.	Go to step 6.
6	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 7.	Repair the power supply circuit.
7	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 8.	Replace the ignition switch. <Ref. to SL-60, REPLACEMENT, Ignition Key Lock.>

Diagnostics for Engine Starting Failure

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
8 CHECK INPUT VOLTAGE OF STARTER RELAY. 1) Remove the starter relay. 2) Connect the connector to ignition switch. 3) Turn the ignition switch to START. 4) Measure the voltage between starter relay connector and chassis ground. Connector & terminal (B493) No. 4 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 9.	Repair the open circuit of harness between starter relay connector and ignition switch connector.
9 CHECK STARTER RELAY. 1) Connect the battery to starter relay terminals No. 1 and No. 2. 2) Measure the resistance between starter relay terminals. Terminals No. 3 — No. 4:	Is the resistance less than 1 Ω ?	Go to step 10.	Replace the starter relay.
10 CHECK HARNESS BETWEEN ECM AND STARTER RELAY CONNECTOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance of harness between ECM and starter relay connector. Connector & terminal (B135) No. 26 — (B493) No. 1: (B136) No. 16 — (B493) No. 3:	Is the resistance less than 1 Ω ?	Go to step 11.	Repair the open circuit of harness between ECM and starter relay connector.
11 CHECK INPUT VOLTAGE OF STARTER RELAY. 1) Connect the connector to ECM. 2) Place the select lever in "P" range or "N" range. 3) Turn the ignition switch to START. 4) Measure the voltage between starter relay connector and chassis ground. Connector & terminal (B493) No. 2 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 12.	Go to step 13.
12 CHECK HARNESS BETWEEN ECM AND INHIBITOR RELAY CONNECTOR. 1) Turn the ignition switch to OFF. 2) Disconnect the inhibitor relay connector. 3) Measure the resistance of harness between ECM and inhibitor relay connector. Connector & terminal (B136) No. 35 — (B498) No. 1:	Is the resistance less than 1 Ω ?	Check the ECM power supply and ground line. <Ref. to EN(H6DO)(diag)-70, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>	Repair the open circuit of harness between ECM and inhibitor relay connector.
13 CHECK INPUT VOLTAGE OF INHIBITOR RELAY. 1) Turn the ignition switch to OFF. 2) Disconnect the inhibitor relay connector. 3) Turn the ignition switch to START. 4) Measure the voltage between inhibitor relay connector and chassis ground. Connector & terminal (B498) No. 2 (+) — Chassis ground (-): (B498) No. 4 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 14.	Check the following item and repair if necessary. • Blown-out of fuse (F/B No. 21) • Open or ground short circuit of harness between ignition switch connector and inhibitor relay connector

Diagnostics for Engine Starting Failure

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
14 CHECK INHIBITOR RELAY. 1) Connect the battery to inhibitor relay terminals No. 1 and No. 2. 2) Measure the resistance between inhibitor relay terminals. <i>Terminals</i> <i>No. 3 — No. 4:</i>	Is the resistance less than 1 Ω ?	Go to step 15.	Replace the inhibitor relay.
15 CHECK HARNESS BETWEEN INHIBITOR RELAY CONNECTOR AND STARTER RELAY CONNECTOR. 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between inhibitor relay connector and starter relay connector. <i>Connector & terminal</i> <i>(B498) No. 3 — (B493) No. 2:</i>	Is the resistance less than 1 Ω ?	Repair the open circuit of harness between TCM and inhibitor relay connector.	Repair the open circuit of harness between inhibitor relay connector and starter relay connector.

Diagnostics for Engine Starting Failure

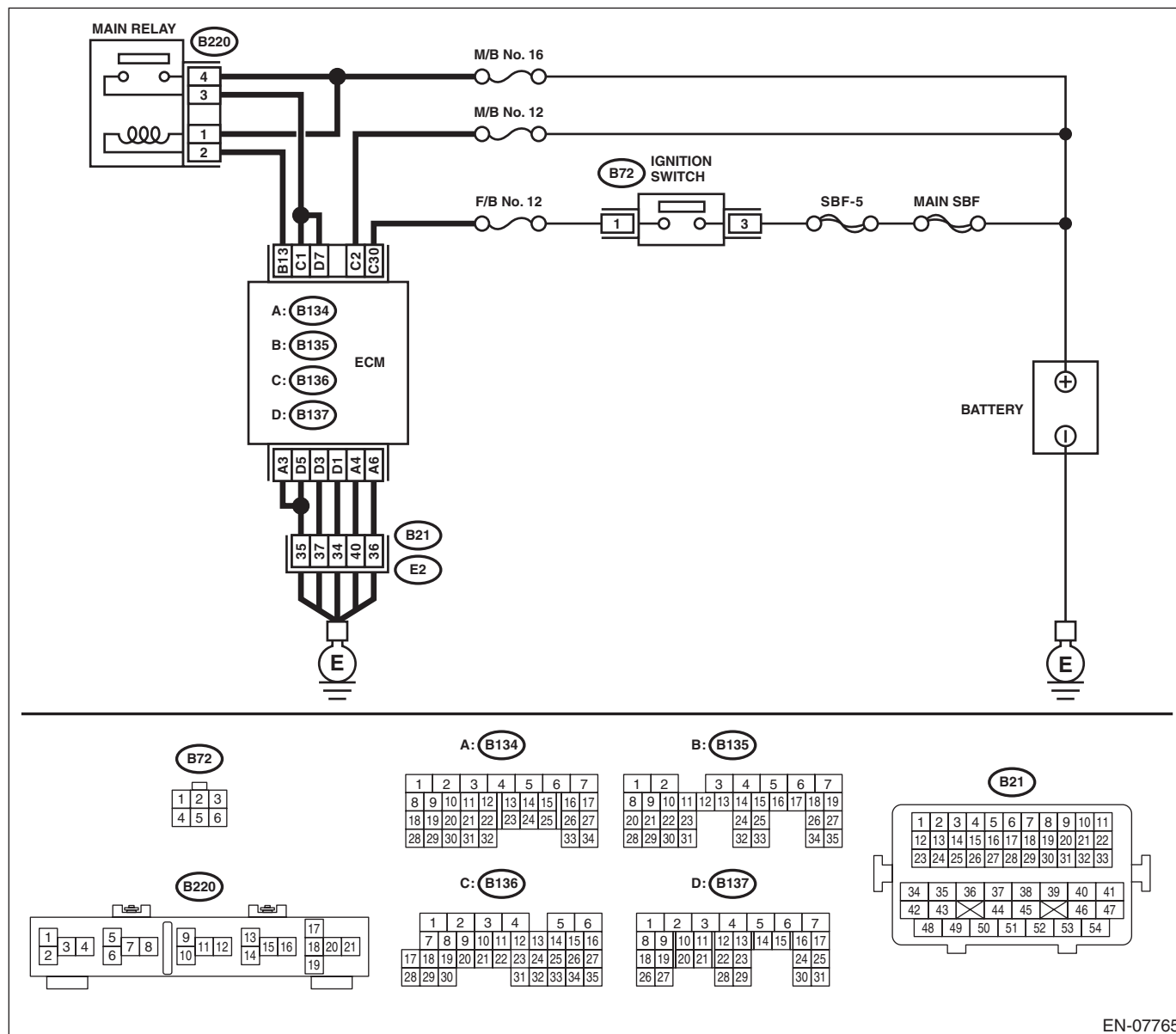
ENGINE (DIAGNOSTICS)

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

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-54, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-43, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



EN-07765

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. 1 and No. 2. 4) Measure the resistance between main relay terminals. Terminals No. 3 — No. 4:	Is the resistance less than 1 Ω?	Go to step 2.	Replace the main relay. <Ref. to FU(H6DO)-53, Main Relay.>

Diagnostics for Engine Starting Failure

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
2 CHECK GROUND CIRCUIT FOR ECM. 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM connector and chassis ground. Connector & terminal <i>(B134) No. 3 — Chassis ground:</i> <i>(B134) No. 4 — Chassis ground:</i> <i>(B134) No. 6 — Chassis ground:</i> <i>(B137) No. 1 — Chassis ground:</i> <i>(B137) No. 3 — Chassis ground:</i> <i>(B137) No. 5 — Chassis ground:</i>	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 of harness between ECM connector and engine ground terminal. • 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 <i>(B136) No. 2 (+) — Chassis ground (-):</i> <i>(B136) No. 30 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 4.	Repair the open or ground short circuit of harness of power supply circuit.
4 CHECK INPUT VOLTAGE OF MAIN RELAY. Measure the voltage between main relay connector and chassis ground. Connector & terminal <i>(B220) No. 1 (+) — Chassis ground (-):</i> <i>(B220) No. 4 (+) — Chassis ground (-):</i>	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 and chassis ground. Connector & terminal <i>(B135) No. 13 (+) — Chassis ground (-):</i>	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 OFF. 2) Connect the connector to ECM. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground. Connector & terminal <i>(B136) No. 1 (+) — Chassis ground (-):</i> <i>(B137) No. 7 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Check ignition control system. <Ref. to EN(H6DO)(diag)-72, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and fuel injector connector • Poor contact of main relay connector • Poor contact of ECM connector

Diagnostics for Engine Starting Failure

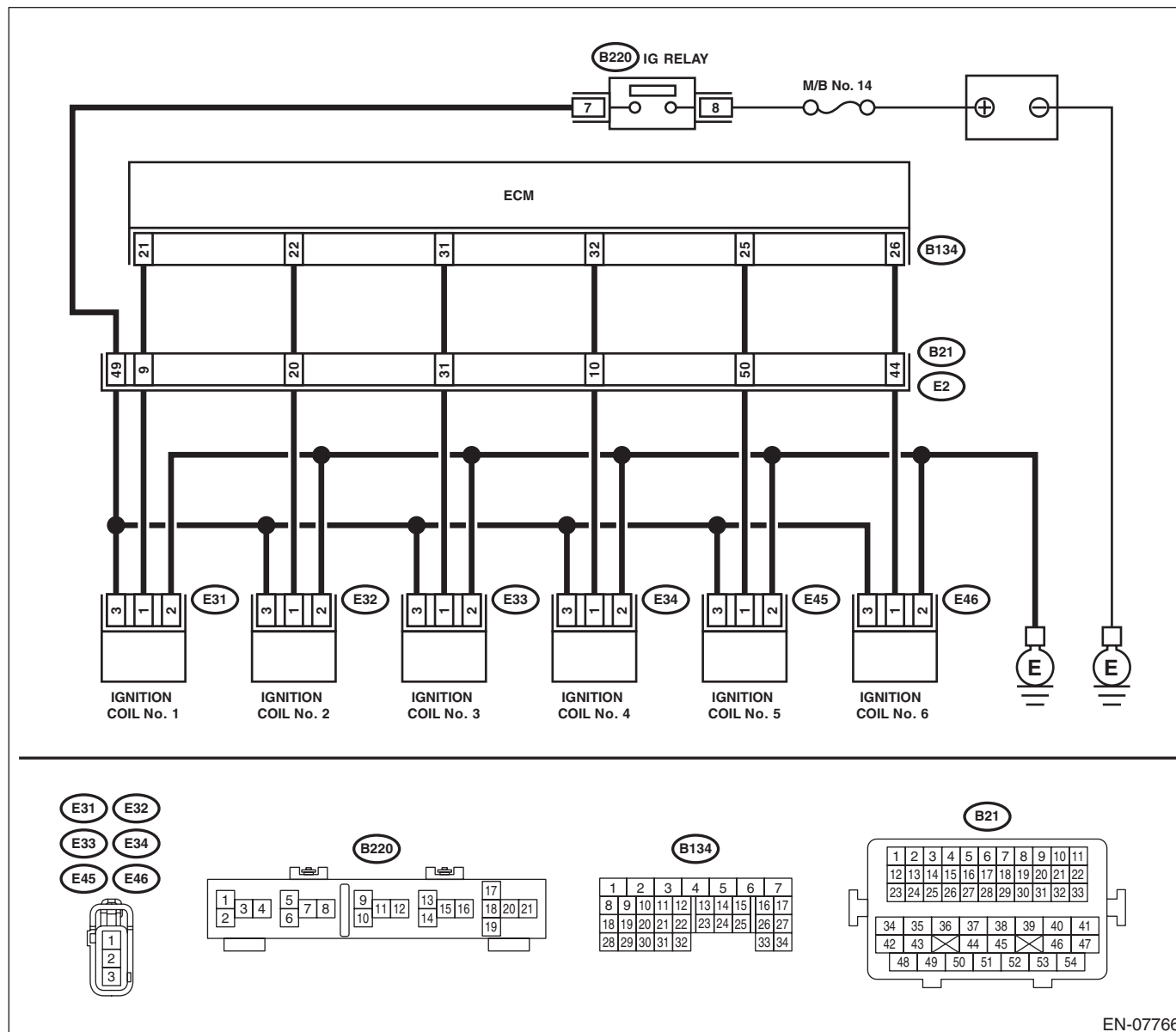
ENGINE (DIAGNOSTICS)

D: IGNITION CONTROL SYSTEM

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-54, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-43, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



EN-07766

Step	Check	Yes	No
1	CHECK SPARK PLUG CONDITION. 1) Remove the spark plug. <Ref. to IG(H6DO)-4, REMOVAL, Spark Plug.> 2) Check the spark plug condition. <Ref. to IG(H6DO)-5, INSPECTION, Spark Plug.>	Go to step 2.	Replace the spark plug. <Ref. to IG(H6DO)-4, Spark Plug.>

Diagnostics for Engine Starting Failure

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
2 CHECK IGNITION SYSTEM FOR SPARKS. 1) Connect the spark plug to ignition coil. 2) Release the fuel pressure. <Ref. to FU(H6DO)-57, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.> 3) Contact the spark plug thread portion to engine. 4) While opening the throttle valve fully, start the engine to check if spark occurs at each cylinder.	Does spark occur at each cylinder?	Check fuel pump system. <Ref. to EN(H6DO)(diag)-75, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step 3.
3 CHECK IGNITION COIL POWER SUPPLY CIRCUIT. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition coil. 3) Turn the ignition switch to ON. 4) Measure the voltage between ignition coil connector and engine ground. Connector & terminal <i>(E31) No. 3 (+) — Engine ground (-):</i> <i>(E32) No. 3 (+) — Engine ground (-):</i> <i>(E33) No. 3 (+) — Engine ground (-):</i> <i>(E34) No. 3 (+) — Engine ground (-):</i> <i>(E45) No. 3 (+) — Engine ground (-):</i> <i>(E46) No. 3 (+) — Engine ground (-):</i>	Is the voltage 10 V or more?	Go to step 4.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit or short circuit to ground in harness of power supply circuit • Blown out of fuse (M/B No. 14) • Poor contact of coupling connector
4 CHECK HARNESS OF IGNITION COIL GROUND CIRCUIT. 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between ignition coil connector and engine ground. Connector & terminal <i>(E31) No. 2 — Engine ground:</i> <i>(E32) No. 2 — Engine ground:</i> <i>(E33) No. 2 — Engine ground:</i> <i>(E34) No. 2 — Engine ground:</i> <i>(E45) No. 2 — Engine ground:</i> <i>(E46) No. 2 — Engine ground</i>	Is the resistance less than 5 Ω ?	Go to step 5.	Repair the open circuit in harness between ignition coil connector and engine grounding terminal.
5 CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR. 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and ignition coil connector. Connector & terminal <i>(B134) No. 21 — (E31) No. 1:</i> <i>(B134) No. 22 — (E32) No. 1:</i> <i>(B134) No. 31 — (E33) No. 1:</i> <i>(B134) No. 32 — (E34) No. 1:</i> <i>(B134) No. 25 — (E45) No. 1:</i> <i>(B134) No. 26 — (E46) No. 1:</i>	Is the resistance less than 1 Ω ?	Go to step 6.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and the ignition coil connector • Poor contact of coupling connector
6 CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR. Measure the resistance of harness between ECM connector and chassis ground. Connector & terminal: <i>(B134) No. 21 — Chassis ground:</i> <i>(B134) No. 22 — Chassis ground:</i> <i>(B134) No. 31 — Chassis ground:</i> <i>(B134) No. 32 — Chassis ground:</i> <i>(B134) No. 25 — Chassis ground:</i> <i>(B134) No. 26 — Chassis ground:</i>	Is the resistance 1 M Ω or more?	Go to step 7.	Repair the ground short circuit of harness between ECM connector and ignition coil connector.

Diagnostics for Engine Starting Failure

ENGINE (DIAGNOSTICS)

Step		Check	Yes	No
7	CHECK FOR POOR CONTACT. Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Replace the ignition coil. <Ref. to IG(H6DO)-7, Ignition Coil.>

E: FUEL PUMP CIRCUIT

CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-54, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-43, PROCEDURE, Inspection Mode.>.

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 detailed procedures, refer to "System Operation Check". <Ref. to EN(H6DO)(diag)-55, System Operation Check Mode.>	Does the fuel pump emit operating sound?	Check the fuel injector circuit. <Ref. to EN(H6DO)(diag)-76, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Display the DTC. <Ref. to EN(H6DO)(diag)-42, OPERATION, Read Diagnostic Trouble Code (DTC).>

Diagnostics for Engine Starting Failure

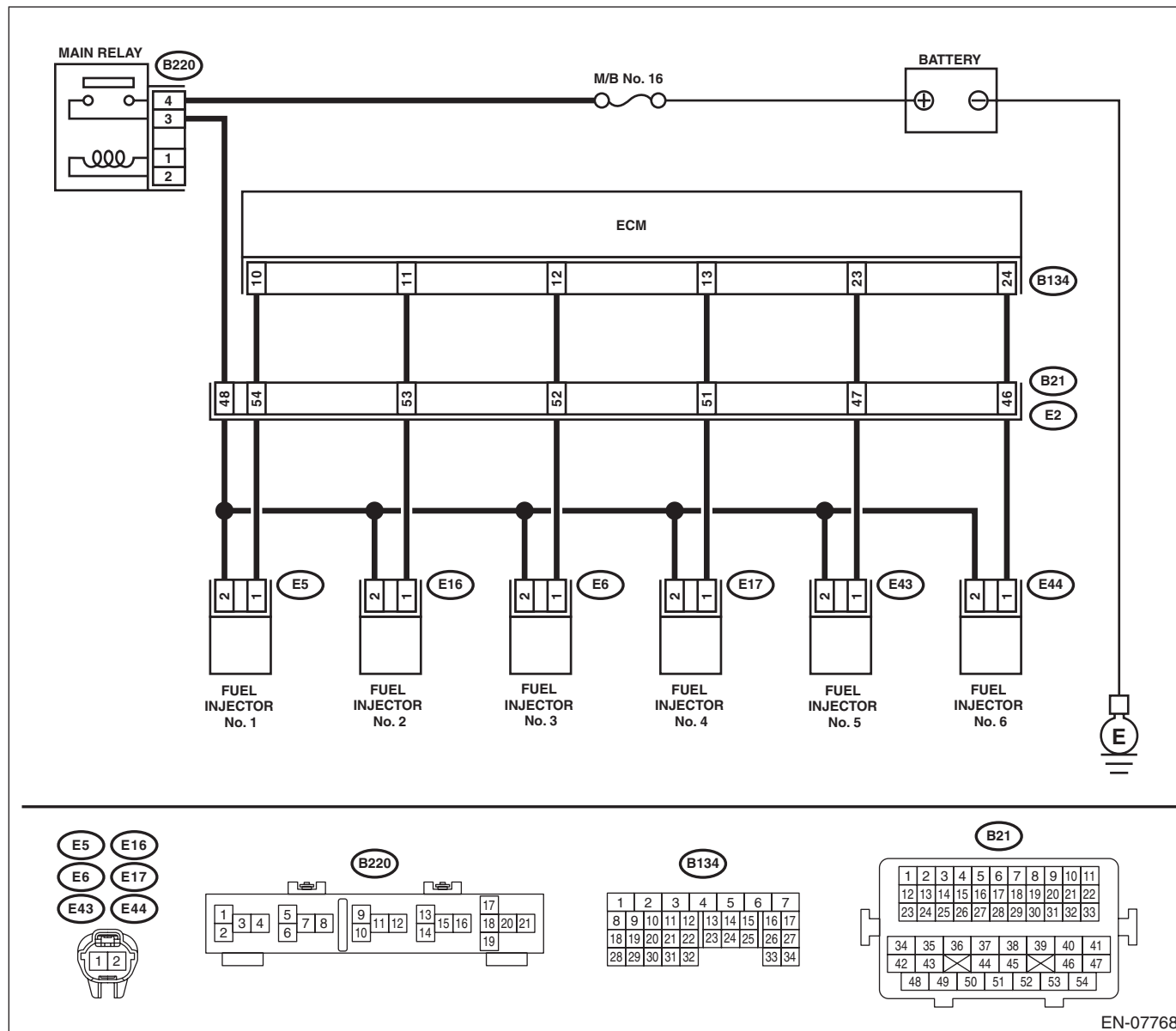
ENGINE (DIAGNOSTICS)

F: FUEL INJECTOR CIRCUIT

CAUTION:

- Check or repair only faulty parts.
- After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-54, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-43, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



EN-07768

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 listen by attaching a screwdriver to the injector for this check.	Does the fuel pump emit operating sound? Check the fuel pressure. <Ref. to ME(H6DO)-31, INSPECTION, Fuel Pressure.>	Go to step 2.

Diagnostics for Engine Starting Failure

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
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 voltage between fuel injector connector and the engine ground. Connector & terminal #1 (E5) No. 2 (+) — Engine ground (-): #2 (E16) No. 2 (+) — Engine ground (-): #3 (E6) No. 2 (+) — Engine ground (-): #4 (E17) No. 2 (+) — Engine ground (-): #5 (E43) No. 2 (+) — Engine ground (-): #6 (E44) 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 main relay 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) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance of harness between ECM and fuel injector connector. Connector & terminal #1 (B134) No. 10 — (E5) No. 1: #2 (B134) No. 11 — (E16) No. 1: #3 (B134) No. 12 — (E6) No. 1: #4 (B134) No. 13 — (E17) No. 1: #5 (B134) No. 23 — (E43) No. 1: #6 (B134) No. 24 — (E44) No. 1:	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 in harness between ECM and fuel injector connector • Poor contact of coupling connector
4 CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR. Measure the resistance between ECM and chassis ground. Connector & terminal #1 (B134) No. 10 — Chassis ground: #2 (B134) No. 11 — Chassis ground: #3 (B134) No. 12 — Chassis ground: #4 (B134) No. 13 — Chassis ground: #5 (B134) No. 23 — Chassis ground: #6 (B134) No. 24 — Chassis ground:	Is the resistance 1 M Ω or more?	Go to step 5.	Repair the short circuit to ground in harness between ECM and fuel injector connector.
5 CHECK EACH FUEL INJECTOR. Measure the resistance between each fuel injector terminals. Terminals No. 1 — No. 2:	Is the resistance 5 — 20 Ω ?	Go to step 6.	Replace the faulty fuel injector. <Ref. to FU(H6DO)-42, Fuel Injector.>
6 CHECK FOR POOR CONTACT. Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Inspection using "General Diagnostic Table". <Ref. to EN(H6DO)(diag)-352, INSPECTION, General Diagnostic Table.>