16.Diagnostics for Engine Starting Failure

A: PROCEDURE

1. Check for fuel amount.
↓
2. Inspection of starter motor circuit. <Ref. to EN(H4SO)(diag)-56, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
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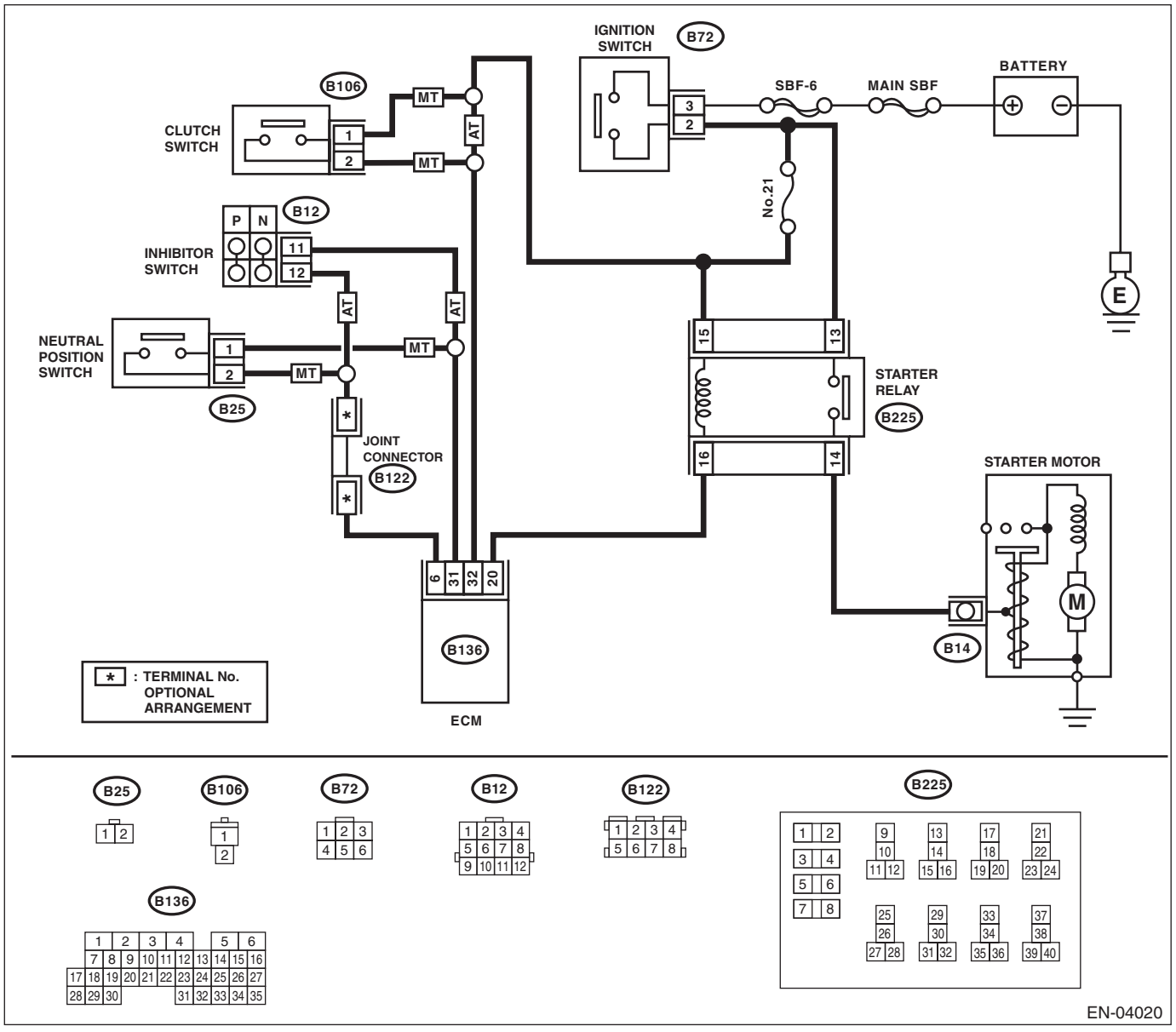
3. Inspection of ECM power supply and ground line. <Ref. to EN(H4SO)(diag)-60, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>
↓
4. Inspection of ignition control system. <Ref. to EN(H4SO)(diag)-62, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel pump circuit. <Ref. to EN(H4SO)(diag)-65, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
6. Inspection of fuel indicator circuit. <Ref. to EN(H4SO)(diag)-68, 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)-43, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-34, Inspection Mode.>.
WIRING DIAGRAM:



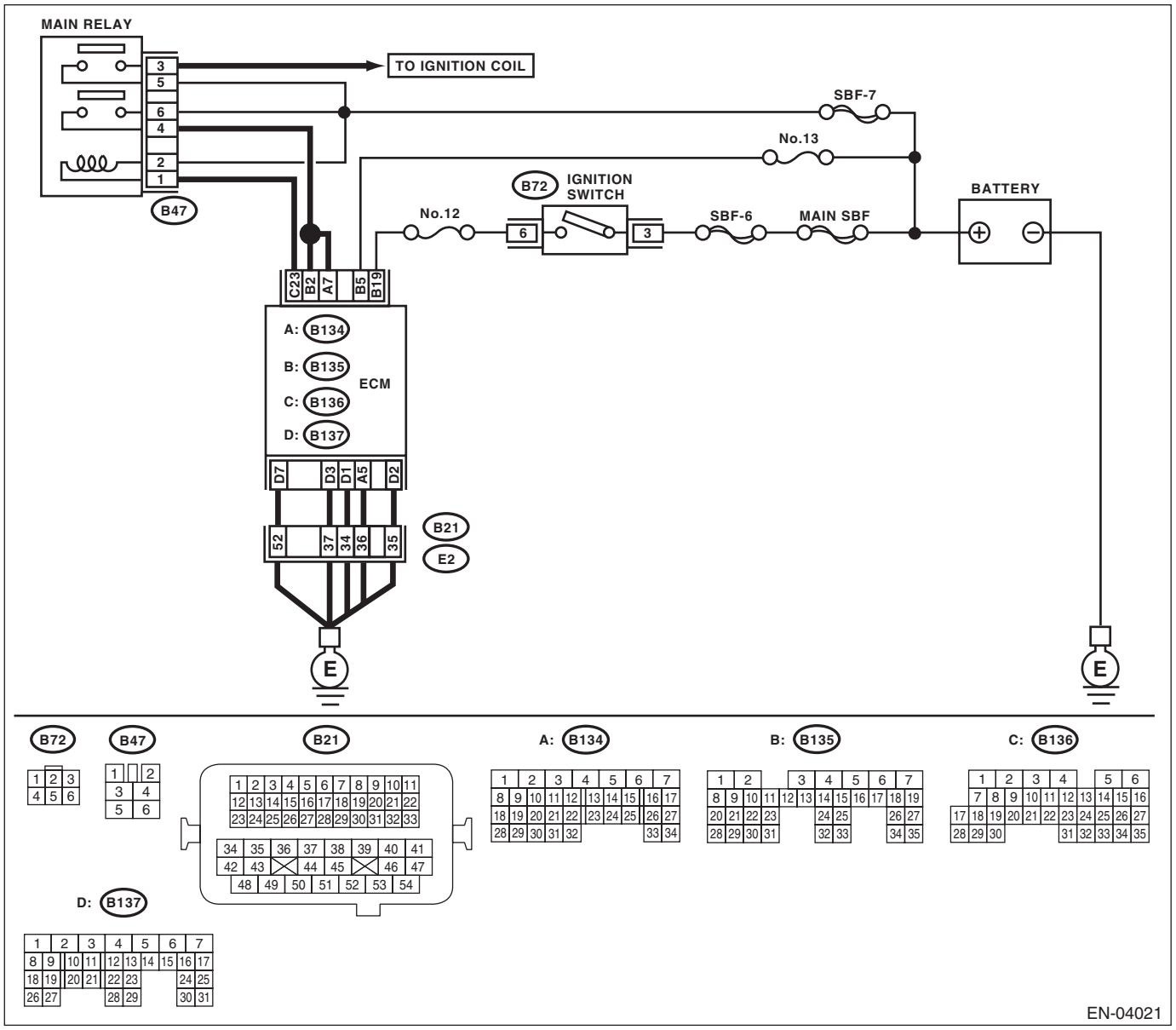
	Step	Check	Yes	No
1	**CHECK BATTERY.** Check the battery voltage.	Is the voltage more than 12 V?	Go to step **2**.	Charge or replace the battery.
2	**CHECK OPERATION OF STARTER MOTOR.** NOTE: Check the security alarm is not sounding.	Does the starter motor operate?	Go to step **3**.	Go to step **4**.
3	**CHECK DTC.**	Is DTC displayed? <Ref. to EN(H4SO)(diag)-33, OPERATION, Read Diagnostic Trouble Code (DTC).>	Check the appropriate DTC using the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Repair the poor contact of ECM connector.
4	**CHECK INPUT SIGNAL FOR STARTER MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter motor. 3) Turn the ignition switch to START. 4) Measure the power supply voltage between starter motor connector terminal and engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (–):*** NOTE: For AT model, place the select lever in P or N range. For MT model, depress the clutch pedal.	Is the voltage more than 10 V?	Check the starter motor. <Ref. to SC(H4SO)-6, Starter.>	Go to step **5**.
5	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Disconnect the connector from ignition switch. 2) Measure the power supply voltage between ignition switch connector and chassis ground. ***Connector & terminal*** ***(B72) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **6**.	Repair the open circuit or ground short of harness between ignition switch and battery, and check fuse SBF No. 6 and MAIN SBF.
6	**CHECK IGNITION SWITCH.** 1) Disconnect the connector from ignition switch. 2) Measure the resistance between ignition switch terminals after turning the ignition switch to START position. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance less than 5 Ω?	Go to step **7**.	Replace the ignition switch.
7	**CHECK INPUT VOLTAGE OF STARTER RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter relay. 3) Connect the connector to ignition switch. 4) Measure the input voltage between starter relay connector and chassis ground after turning the ignition switch to START position. ***Connector & terminal*** ***(B225) No. 13 (+) — Chassis ground (–):*** ***(B225) No. 15 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **8**.	Repair open or ground short circuit of harness between starter relay and ignition switch.

	Step	Check	Yes	No
8	**CHECK STARTER RELAY.** 1) Connect the battery to starter relay terminals No. 15 and No. 16. 2) Measure the resistance between starter relay terminals. ***Terminals*** ***No. 13 — No. 14:***	Is the resistance less than 1 Ω?	Go to step **9**.	Replace the starter relay.
9	**CHECK HARNESS BETWEEN STARTER RELAY AND STARTER MOTOR.** 1) Disconnect the connector from starter motor. 2) Measure the resistance of harness between starter relay and starter motor. ***Connector & terminal*** ***(B225) No. 14 — (B14) No. 1:***	Is the resistance less than 1 Ω?	Go to step **10**.	Repair open or ground short circuit of harness between starter relay and starter motor.
10	**CHECK HARNESS BETWEEN STARTER RELAY AND ECM.** 1) Disconnect the connectors from ECM. 2) Measure the resistance of harness between starter relay and ECM. ***Connector & terminal*** ***(B225) No. 16 — (B136) No. 20:***	Is the resistance less than 1 Ω?	Go to step **11**.	Repair the open or ground short circuit of harness between starter relay and ECM.
11	**CHECK TRANSMISSION TYPE.**	Is the transmission type AT?	Go to step **12**.	Go to step **16**.
12	**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 more than 10 V?	Go to step **13**.	Repair the open or ground short circuit of harness between ECM and ignition switch.
13	**CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH.** 1) Turn the inhibitor switch to OFF. 2) Disconnect the connector from inhibitor switch. 3) Measure the resistance of harness connector between ECM and inhibitor switch. ***Connector & terminal*** ***(B136) No. 31 — (B12) No. 11:***	Is the resistance less than 1 Ω?	Go to step **14**.	Repair the open or ground short circuit of harness between ECM and inhibitor switch.
14	**CHECK INHIBITOR SWITCH AND ECM.** Measure the resistance of harness between inhibitor switch and ECM ***Connector & terminal*** ***(B12) No. 12 — (B136) No. 6:***	Is the resistance less than 5 Ω?	Go to step **15**.	Repair the open or ground short circuit of harness between inhibitor switch and ECM.
15	**CHECK INHIBITOR SWITCH.** 1) Place the select lever other than “N” and “P” range. 2) Measure the resistance between inhibitor switch connector terminals. ***Terminals*** ***No. 11 — No. 12:***	Is the resistance more than 1 MΩ?	Contact the SOA service center.	Replace the inhibitor switch.
16	**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 (–):*** NOTE: Depress the clutch pedal.	Is the voltage more than 10 V?	Go to step **17**.	Repair the open or ground short circuit of harness between ECM and ignition switch.

	Step	Check	Yes	No
17	**CHECK CLUTCH SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from clutch switch. 3) Measure the resistance between clutch switch terminals while depressing the clutch. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **18**.	Replace the clutch switch.
18	**CHECK HARNESS BETWEEN ECM AND NEUTRAL SWITCH.** 1) Disconnect the connector from the neutral switch. 2) Measure the resistance of harness connector between ECM and neutral switch. ***Connector & terminal*** ***(B136) No. 31 — (B25) No. 1:***	Is the resistance less than 1 Ω?	Go to step **19**.	Repair the open or ground short circuit of harness between ECM and neutral switch.
19	**CHECK NEUTRAL SWITCH GROUND CIRCUIT.** Measure the resistance of harness between neutral switch and ECM. ***Connector & terminal*** ***(B25) No. 2 — (B136) No. 6:***	Is the resistance less than 5 Ω?	Go to step **20**.	Repair the open or ground short circuit of harness between neutral switch and ECM.
20	**CHECK NEUTRAL SWITCH.** 1) Set the shift lever to “N” range. 2) Measure the resistance between neutral switch connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Contact the SOA service center.	Replace the neutral switch.

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

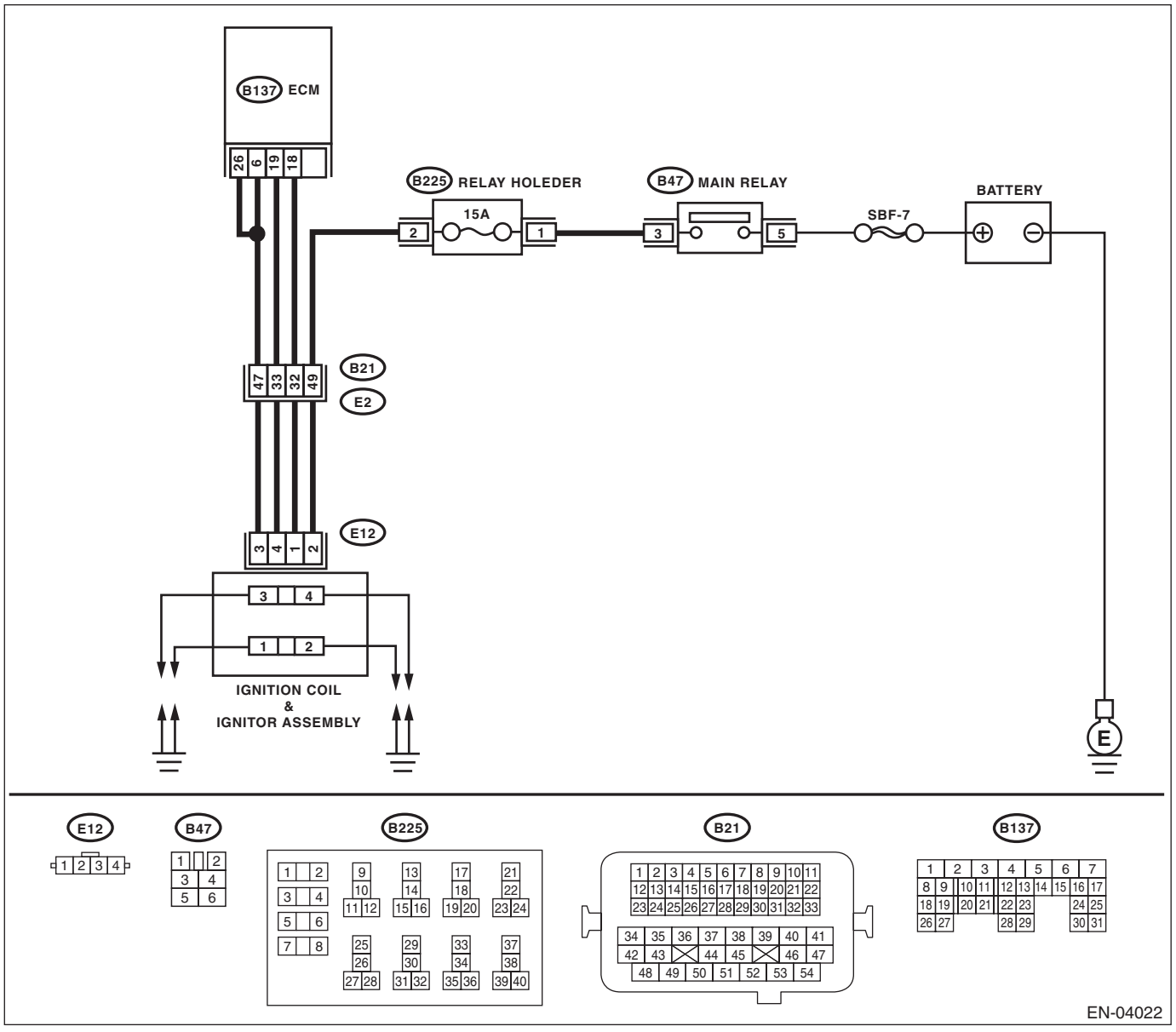
CAUTION:
After repairing or replacing the defective part, perform the Clear Memory Mode <Ref. to EN(H4SO)(diag)-43, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-34, PROCEDURE, Inspection Mode.>.
WIRING DIAGRAM:



	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. 5:*** ***No. 4 — No. 6:***	Is the resistance less than 10 Ω?	Go to step **2**.	Replace the main relay.
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Disconnect the connectors from 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 open circuit of harness between ECM connector and engine grounding terminal.
3	**CHECK INPUT VOLTAGE OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 (+) — Chassis ground (–):*** ***(B135) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	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*** ***(B47) No. 1 (+) — Chassis ground (–):*** ***(B47) No. 5 (+) — Chassis ground (–):*** ***(B47) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	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 ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 7 (+) — Chassis ground (–):*** ***(B135) No. 2 (+) — Chassis ground (–):*** ***(B136) No. 23 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Check ignition control system. <Ref. to EN(H4SO)(diag)-62, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair the open or ground short 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)-43, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-34, Inspection Mode.>.
WIRING DIAGRAM:

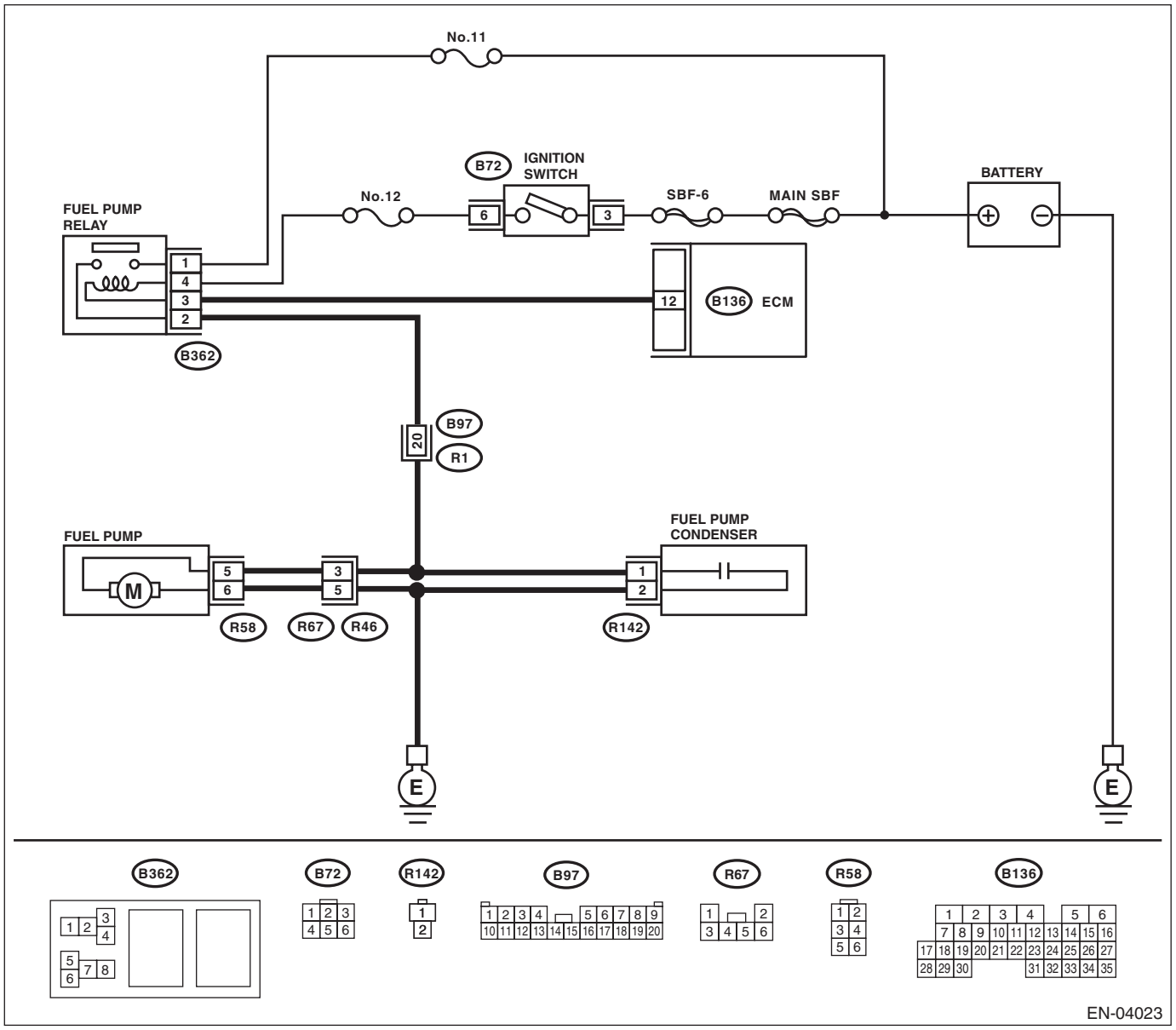


	Step	Check	Yes	No
1	**CHECK IGNITION SYSTEM FOR SPARKS.** 1) Remove the plug cord cap from each spark plug. 2) Install a new spark plug on plug cord cap. **CAUTION:** **Do not remove the spark plug from engine.** 3) Contact the spark plug thread portion on engine. 4) While opening the throttle valve 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)-65, 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 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 more than 10 V?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between the ignition coil and ignitor assembly, and main 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 ECM. ***Connector & terminal*** ***(E12) No. 3 — (B137) No. 6:*** ***(E12) No. 3 — (B137) No. 26:***	Is the resistance less than 5 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: Open circuit in harness between ignition coil and ignitor assembly connector, and ECM
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)-7, 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 more than 10 V?	Go to step **6**.	Replace the ignition coil and ignitor assembly. <Ref. to IG(H4SO)-7, Ignition Coil and Ignitor Assembly.>

	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 ECM. 3) Disconnect the connector from 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 of 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 more than 1 MΩ?	Go to step **8**.	Repair the ground short circuit of harness between ECM and ignition coil and ignitor assembly connector.
8	**CHECK POOR CONTACT.** Check poor contact of ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact of ECM connector.	Check fuel pump circuit. <Ref. to EN(H4SO)(diag)-65, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>

E: FUEL PUMP CIRCUIT

CAUTION:
After repairing or replacing the defective part, perform the Clear Memory Mode <Ref. to EN(H4SO)(diag)-43, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-34, PROCEDURE, Inspection Mode.>.
WIRING DIAGRAM:



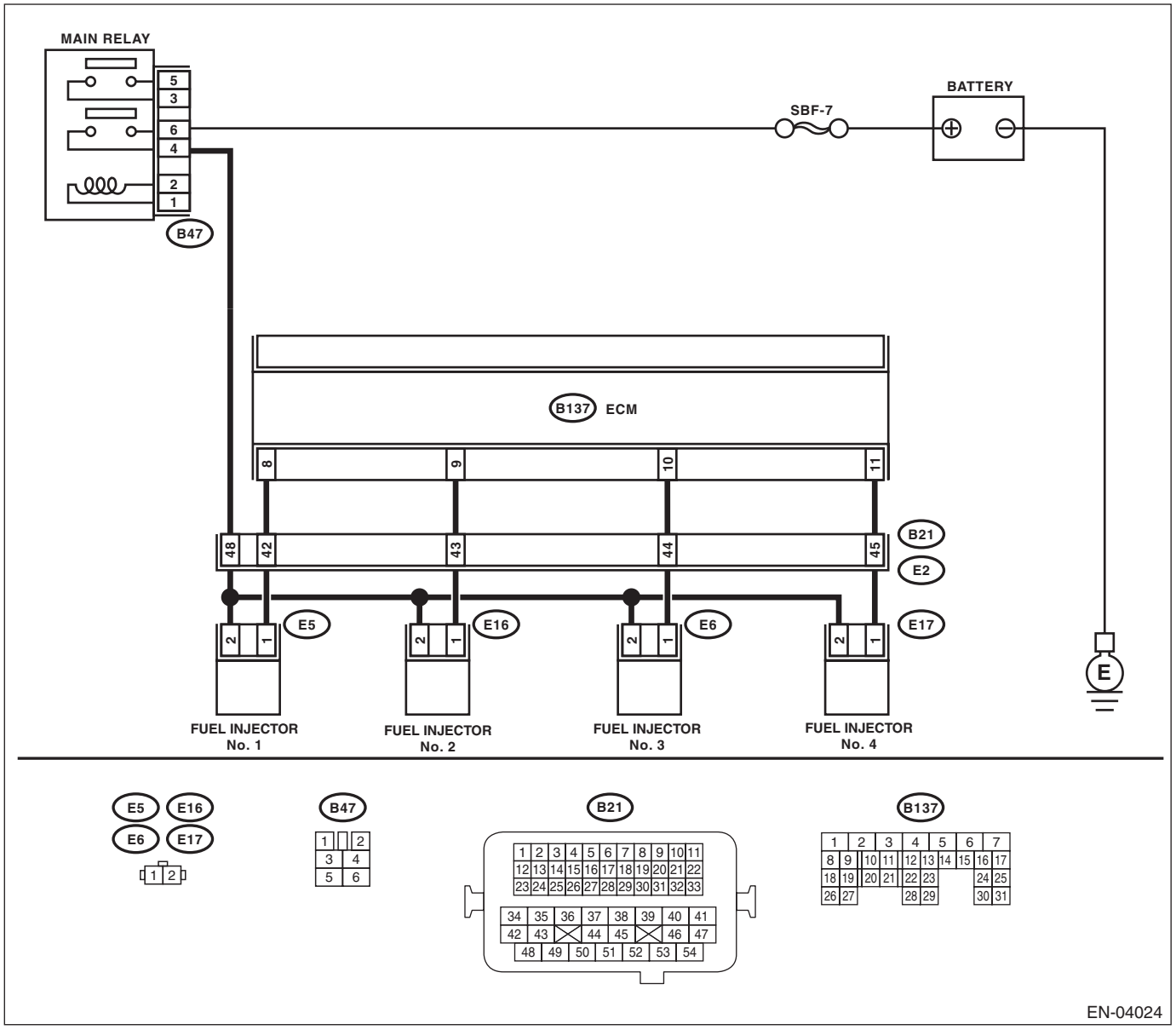
	Step	Check	Yes	No
1	**CHECK OPERATING SOUND OF FUEL PUMP.** Check if the fuel pump operates for two seconds when turning the ignition switch to ON. NOTE: Fuel pump operation can also be executed using Subaru Select Monitor. Refer to "Compulsory Valve Operation Check Mode" for procedures. <Ref. to EN(H4SO)(diag)-44, Compulsory Valve Operation Check Mode.>	Does the fuel pump emit operating sound?	Check the fuel injector circuit. <Ref. to EN(H4SO)(diag)-68, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **2**.
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 connector 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
3	**CHECK POWER SUPPLY TO FUEL PUMP.** 1) Turn the ignition switch to ON. 2) Measure the voltage of power supply circuit between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 5 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the fuel pump. <Ref. to FU(H4SO)-50, 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) Measure the resistance of harness connector between fuel pump and fuel pump relay. ***Connector & terminal*** ***(R58) No. 5 — (B362) No. 2:***	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 chassis grounding terminal • Poor contact of coupling connector
5	**CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.** Measure the resistance of harness between fuel pump and fuel pump relay connector. ***Connector & terminal*** ***(R58) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair the short circuit of harness between fuel pump and fuel pump relay connector.
6	**CHECK FUEL PUMP RELAY.** 1) Disconnect the connectors from fuel pump relay and main relay. 2) Remove the fuel pump relay and main relay with bracket. 3) Connect the battery to fuel pump relay connector terminals No. 3 and No. 4. 4) Measure the resistance between connector terminals of fuel pump relay. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 10 Ω?	Go to step **7**.	Replace the fuel pump relay. <Ref. to FU(H4SO)-50, Fuel Pump.>

	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND FUEL PUMP RELAY CONNECTOR.** 1) Disconnect the connectors from ECM. 2) Measure the resistance of harness between ECM and fuel pump relay connector. ***Connector & terminal*** ***(B136) No. 12 — (B362) No. 3:***	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 POOR CONTACT.** Check poor contact of ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact of ECM connector.	Check the fuel injector circuit. <Ref. to EN(H4SO)(diag)-68, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

F: FUEL INJECTOR CIRCUIT

CAUTION:
- **Check or repair only faulty parts.**
- **After repairing or replacing the defective part, perform the Clear Memory Mode <Ref. to EN(H4SO)(diag)-43, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-34, PROCEDURE, Inspection Mode.>.**

WIRING DIAGRAM:



	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 for this check.	Does the fuel pump emit operating sound?	Check the fuel pressure. <Ref. to ME(H4SO)-25, 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*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between main relay and fuel injector connector • Poor contact of main relay connector • Poor contact of coupling connector • Poor contact of fuel injector connector
3	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Disconnect the connectors from ECM. 2) Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***#1 (B137) No. 8 — (E5) No. 1:*** ***#2 (B137) No. 9 — (E16) No. 1:*** ***#3 (B137) No. 10 — (E6) No. 1:*** ***#4 (B137) No. 11 — (E17) 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 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*** ***#1 (B137) No. 8 — Chassis ground:*** ***#2 (B137) No. 9 — Chassis ground:*** ***#3 (B137) No. 10 — Chassis ground:*** ***#4 (B137) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	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*** ***No. 1 — No. 2:***	Is the resistance between 5 and 20 Ω?	Go to step **6**.	Replace the faulty fuel injector.
6	**CHECK POOR CONTACT.** Check poor contact of ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact of ECM connector.	Inspection using “General Diagnostic Table” <Ref. to EN(H4SO)(diag)-315, INSPECTION, General Diagnostic Table.>