17.Diagnostics for Engine Starting Failure

A: PROCEDURE

1. Inspection of starter motor circuit. <Ref. to EN(H4SO)-60, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
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2. Inspection of ECM power supply and ground line. <Ref. to EN(H4SO)-64, CONTROL MODULE POWER SUPPLY AND GROUND LINE, Diagnostics for Engine Starting Failure.>
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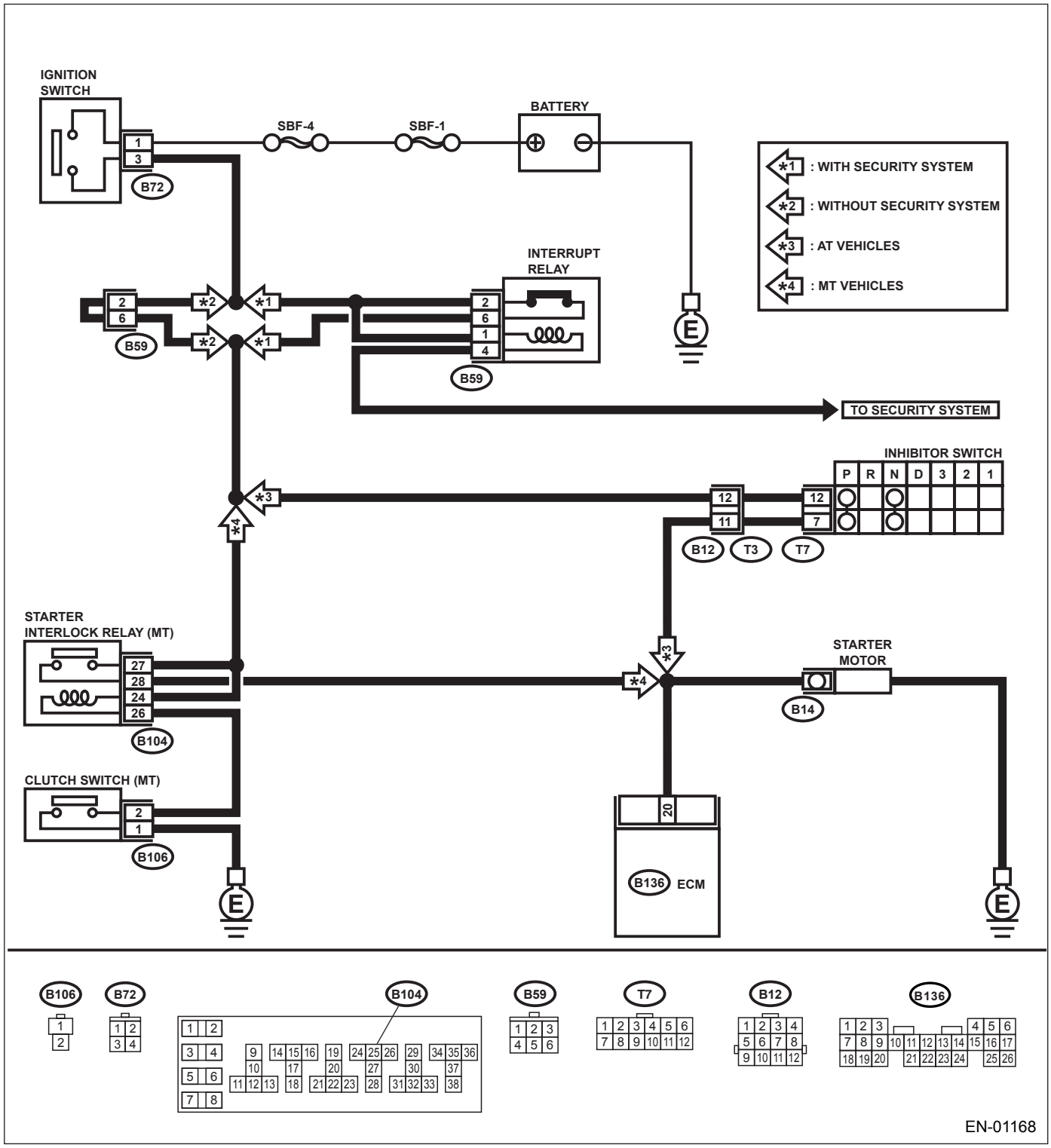
3. Inspection of ignition control system. <Ref. to EN(H4SO)-67, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
4. Inspection of fuel pump circuit. <Ref. to EN(H4SO)-70, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel injector circuit. <Ref. to EN(H4SO)-73, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

B: STARTER MOTOR CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4SO)-46, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4SO)-39, Inspection Mode.>

- **WIRING DIAGRAM:**



	Step	Check	Yes	No
1	**CHECK BATTERY.** Is the measured value more than the specified value?	12 V	Go to step **2.**	Charge or replace the battery.
2	**CHECK INPUT SIGNAL FOR STARTER MOTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from starter motor. 3)Turn ignition switch to ST. 4)Measure the power supply voltage between starter motor connector terminal and engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (−):*** Is the measured value more than the specified value? NOTE: •On AT vehicles, place the selector lever in the "P" or "N" position. •On MT vehicles, depress the clutch pedal.	10 V	Go to step **3.**	Go to step **4.**
3	**CHECK GROUND CIRCUIT OF STARTER MOTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the terminal from starter motor. 3)Measure the resistance of ground cable between ground cable terminal and engine ground. Is the measured value less than the specified value?	5 Ω	Check the starter motor. <Ref. to SC(H4SO)-7, Starter.>	Repair open circuit of ground cable.
4	**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. 1 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **5.**	Repair open circuit in harness between ignition switch and battery, and check fuse SBF No. 4 and SBF No. 1.
5	**CHECK IGNITION SWITCH.** 1)Disconnect the connector from ignition switch. 2)Measure the resistance between ignition switch terminals while turning ignition switch to the "ST" position. ***Terminal*** ***No. 1 — No. 3:*** Is the measured value less than the specified value?	5 Ω	Go to step **6.**	Replace the ignition switch.
6	**CHECK TRANSMISSION TYPE.** Is the transmission AT?	AT.	Go to step **7.**	Go to step **9.**

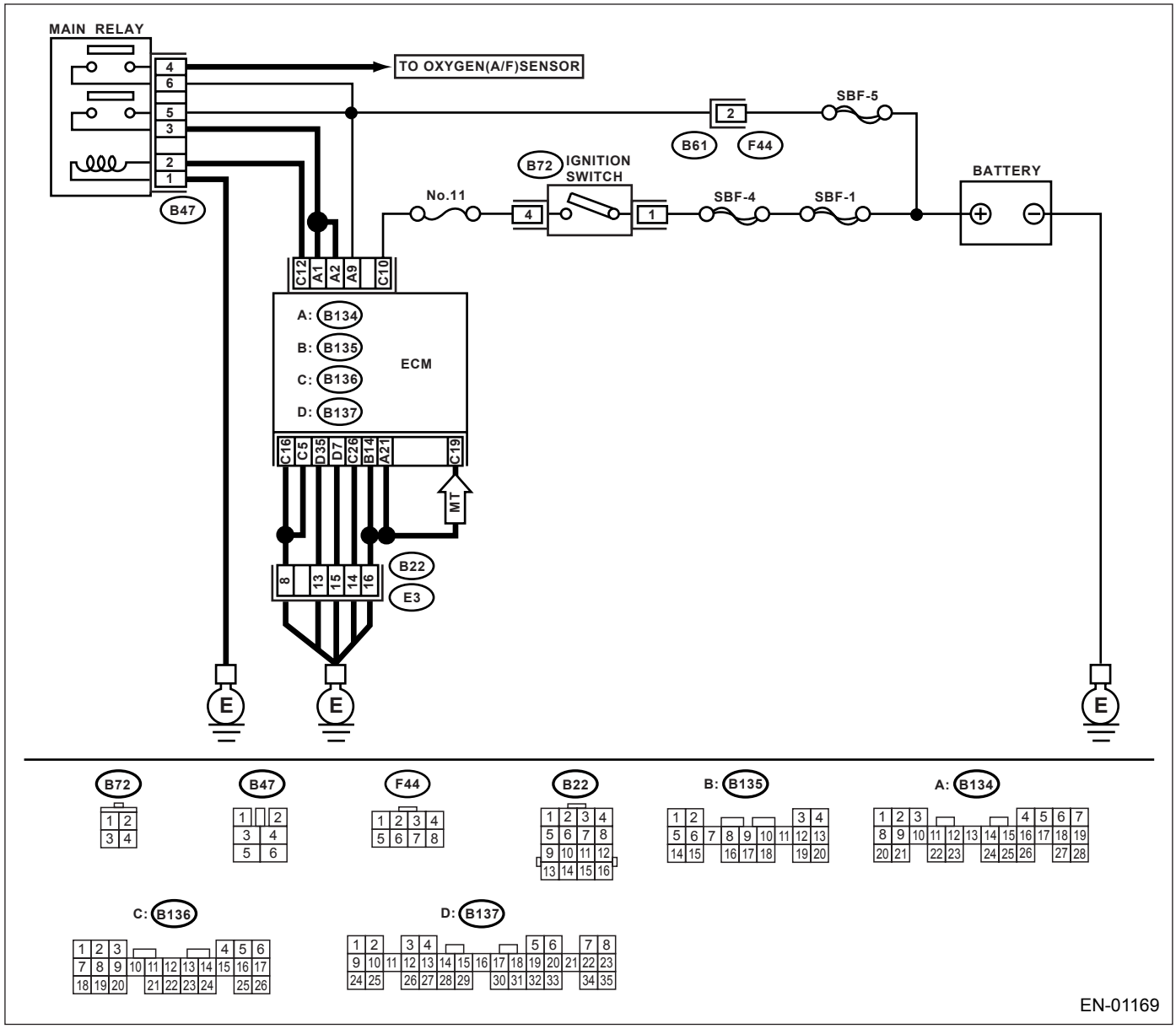
	Step	Check	Yes	No
7	**CHECK INPUT VOLTAGE OF INHIBITOR SWITCH.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from inhibitor switch. 3)Connect the connector to ignition switch. 4)Measure the input voltage between inhibitor switch connector terminal and engine ground while turning ignition switch to ST. ***Connector & terminal*** ***(B12) No. 12 (+) — Engine ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **8.**	Repair open or short circuit to ground in harness between inhibitor switch and ignition switch. NOTE: Check security system (if equipped). <Ref. to SL-23, Security System.>
8	**CHECK INHIBITOR SWITCH.** 1)Place the selector lever in “P” or “N” position. 2)Measure the resistance between inhibitor switch terminals. ***Connector & terminal*** ***(T3) No. 11 — No. 12:*** Is the measured value less than the specified value?	1 Ω	Repair open or short circuit to ground in harness between inhibitor switch and starter motor.	Replace the inhibitor switch. <Ref. to AT-48, Inhibitor Switch.>
9	**CHECK INPUT VOLTAGE OF STARTER INTERLOCK RELAY.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from starter interlock relay. 3)Connect the connector to ignition switch. 4)Measure the input voltage between starter interlock relay connector and chassis ground while turning ignition switch to ST. ***Connector & terminal*** ***(B104) No. 24 (+) — Chassis ground (−):*** ***(B104) No. 27 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **10.**	Repair open or short circuit to ground in harness between starter interlock relay and ignition switch. NOTE: Check security system (if equipped). <Ref. to SL-23, Security System.>
10	**CHECK STARTER INTERLOCK RELAY.** 1)Connect the battery to starter interlock relay terminals No. 26 and No. 24. 2)Measure the resistance between starter interlock relay terminals. ***Terminal*** ***No. 27 — No. 28:*** Is the measured value less than the specified value?	1 Ω	Go to step **11.**	Replace the starter interlock relay.
11	**CHECK GROUND CIRCUIT OF CLUTCH SWITCH.** 1)Disconnect the connector from clutch switch. 2)Measure the resistance between clutch switch connector and chassis ground. ***Connector & terminal*** ***(B106) No. 1 — Chassis ground:*** Is the measured value less than the specified value?	1 Ω	Go to step **12.**	Repair open circuit of ground cable.

	Step	Check	Yes	No
12	**CHECK CLUTCH SWITCH.** 1)Measure the resistance between clutch switch terminals while depressing the clutch pedal. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value less than the specified value?	1 Ω	Go to step **13.**	Replace the clutch switch. <Ref. to CL-30, Clutch Switch.>
13	**CHECK CLUTCH SWITCH CIRCUIT.** 1)Connect the connector to clutch switch. 2)Measure the resistance between starter interlock relay connector and chassis ground while depressing the clutch pedal. ***Connector & terminal*** ***(B104) No. 26 (+) — Chassis ground (−):*** Is the measured value less than the specified value?	1 Ω	Repair short circuit to ground in harness between starter interlock relay and starter motor.	Repair open circuit in harness between starter interlock relay and clutch switch.

C: CONTROL MODULE POWER SUPPLY AND GROUND LINE

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4SO)-46, Clear Memory Mode.> and INSPECTION MODE. <Ref. to EN(H4SO)-39, Inspection Mode.>

- **WIRING DIAGRAM:**



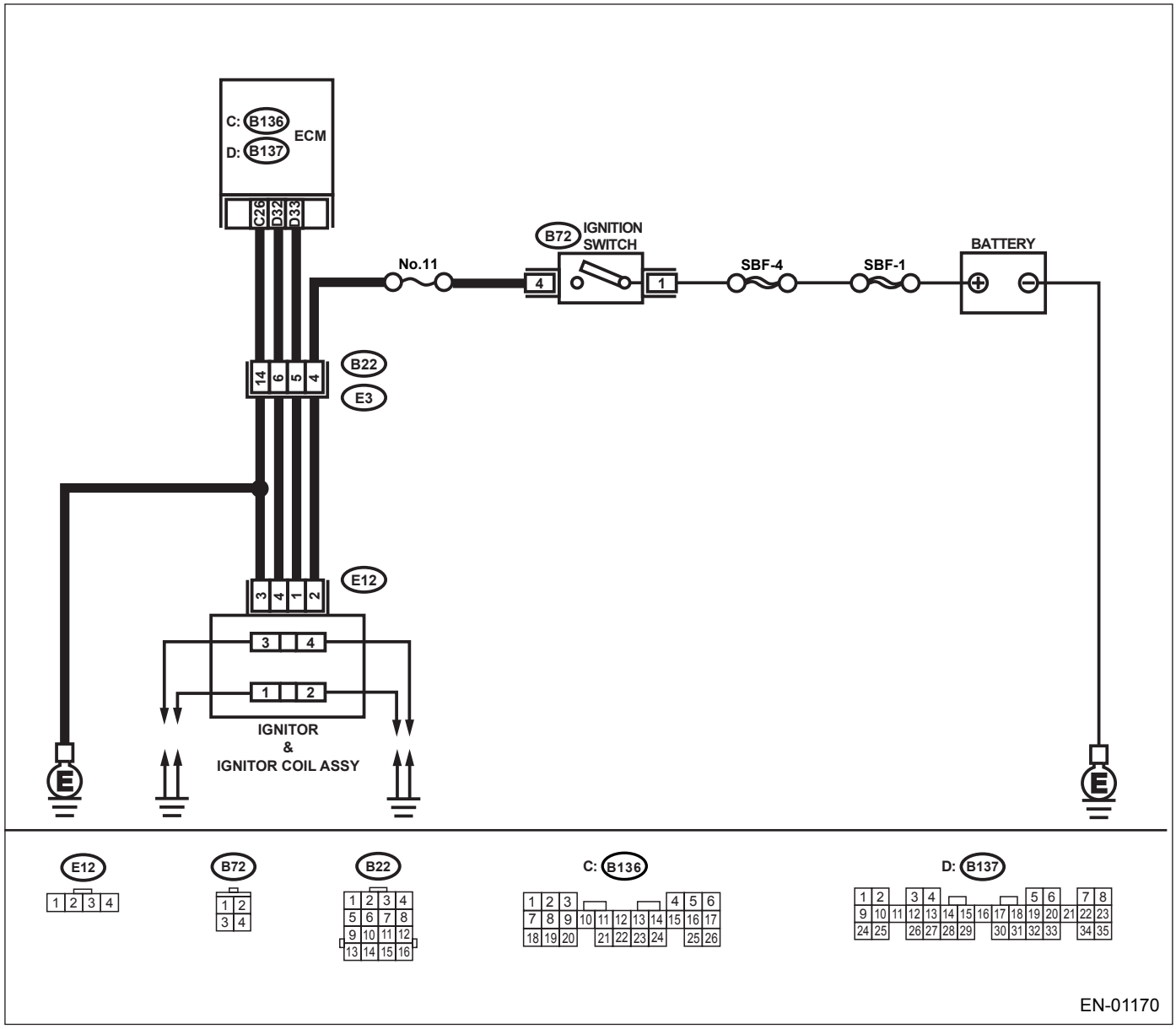
	Step	Check	Yes	No
1	**CHECK MAIN RELAY.** 1)Turn ignition switch to OFF. 2)Remove the main relay. 3)Connect the battery to main relay terminals No. 1 and No. 2. 4)Measure the resistance between main relay terminals. ***Terminal*** ***No. 3 — No. 5:*** ***No. 4 — No. 6:*** Is the measured value less than the specified value?	10 Ω	Go to step **2.**	Replace the main relay.
2	**CHECK GROUND CIRCUIT OF ECM.** 1)Disconnect the connector from ECM. 2)Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 21 — Chassis ground:*** ***(B135) No. 14 — Chassis ground:*** ***(B136) No. 5 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:*** ***(B136) No. 19 — Chassis ground: (MT vehicles)*** ***(B136) No. 26 — Chassis ground:*** ***(B137) No. 7 — Chassis ground:*** ***(B137) No. 35 — Chassis ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **3.**	Repair open circuit in 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*** ***(B134) No. 9 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **4.**	Repair open or short circuit to ground in power supply circuit.
4	**CHECK INPUT VOLTAGE OF ECM.** 1)Turn ignition switch to ON. 2)Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 10 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **5.**	Repair open or short circuit to ground in power supply circuit.
5	**CHECK HARNESS BETWEEN ECM AND MAIN RELAY CONNECTOR.** 1)Turn ignition switch to OFF. 2)Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 12 — Chassis ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **6.**	Repair short circuit to ground in harness between ECM connector and main relay connector, then replace the ECM.

	Step	Check	Yes	No
6	**CHECK OUTPUT VOLTAGE FROM ECM.** 1)Connect the connector to ECM. 2)Turn ignition switch to ON. 3)Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 12 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **7.**	Replace the ECM.
7	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Check the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 2 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **8.**	Repair open circuit in harness between ECM connector and main relay connector.
8	**CHECK GROUND CIRCUIT OF MAIN RELAY.** 1)Turn ignition switch to OFF. 2)Measure the resistance between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 1 — Chassis ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **9.**	Repair open circuit between main relay and chassis ground.
9	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Check the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 5 (+) — Chassis ground (−):*** ***(B47) No. 6 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **10.**	Repair open or short circuit to ground in harness of power supply circuit.
10	**CHECK INPUT VOLTAGE OF ECM.** 1)Connect the main relay connector. 2)Turn ignition switch to ON. 3)Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 1 (+) — Chassis ground (−):*** ***(B134) No. 2 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Check ignition control system. <Ref. to EN(H4SO)-67, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair open or short circuit to ground in harness between ECM connector and main relay connector.

D: IGNITION CONTROL SYSTEM

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4SO)-46, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4SO)-39, 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 the new spark plug on plug cord cap. **CAUTION:** **Do not remove the spark plug from engine.** 3)Bring the spark plug's threaded portion in contact with the engine. 4)With the throttle wide open, crank the engine to check that sparks occur at each cylinder. Do sparks occur at each cylinder?	Sparks occurs.	Check fuel pump system. <Ref. to EN(H4SO)-70, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **2.**

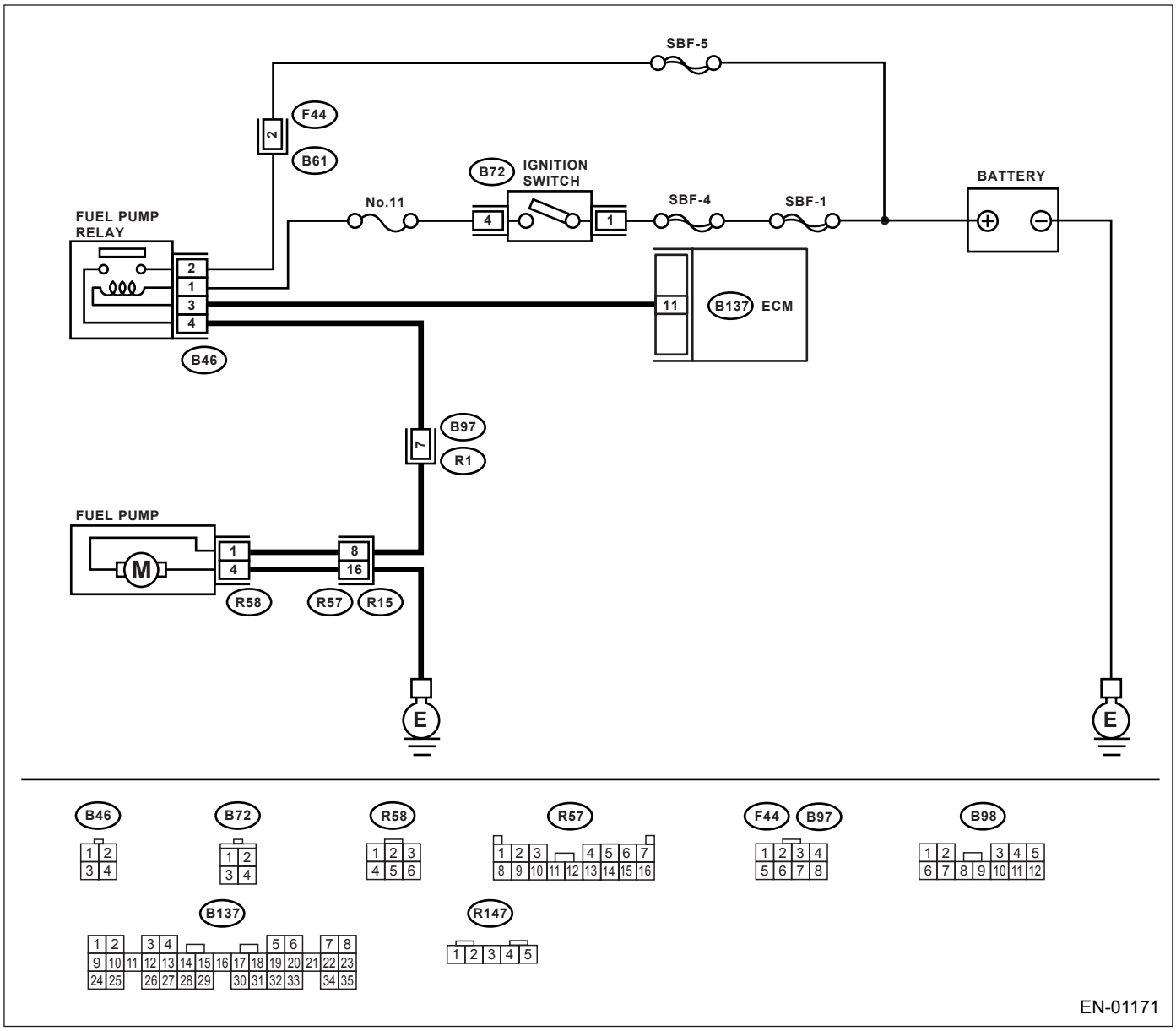
	Step	Check	Yes	No
2	**CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL & IGNITOR ASSEMBLY.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ignition coil & ignitor assembly. 3)Turn ignition switch to ON. 4)Measure the power supply voltage between ignition coil & ignitor assembly connector and engine ground. ***Connector & terminal*** ***(E12) No. 2 (+) — Engine ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ignition coil & ignitor assembly, and ignition switch connector • Poor contact in coupling connector
3	**CHECK HARNESS OF IGNITION COIL & IGNITOR ASSEMBLY GROUND CIRCUIT.** 1)Turn ignition switch to OFF. 2)Measure the resistance between ignition coil & ignitor assembly connector and engine ground. ***Connector & terminal*** ***(E12) No. 3 — Engine ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **4.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ignition coil & ignitor assembly connector and engine grounding terminal
4	**CHECK IGNITION COIL & IGNITOR ASSEMBLY.** 1)Remove the spark plug cords. 2)Measure the resistance between spark plug cord contact points to check secondary coil. ***Terminal*** ***No. 1 — No. 2:*** ***No. 3 — No. 4:*** Is the measured value within the specified range?	10 — 15 kΩ	Go to step **5.**	Replace the ignition coil & ignitor assembly. <Ref. to IG(H4SO)-8, Ignition Coil and Ignitor Assembly.>
5	**CHECK INPUT SIGNAL FOR IGNITION COIL & IGNITOR ASSEMBLY.** 1)Connect the connector to ignition coil & ignitor assembly. 2)Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignition coil & ignitor assembly connector and engine ground. ***Connector & terminal*** ***(E12) No. 1 (+) — Engine ground (−):*** ***(E12) No. 4 (+) — Engine ground (−):*** Is the measured value more than the specified value?	10 V	Go to step **6.**	Replace the ignition coil & ignitor assembly. <Ref. to IG(H4SO)-8, Ignition Coil and Ignitor Assembly.>

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Disconnect the connector from ignition coil & ignitor assembly. 4)Measure the resistance of harness between ECM and ignition coil & ignitor assembly connector. ***Connector & terminal*** ***(B137) No. 33 — (E12) No. 1:*** ***(B137) No. 32 — (E12) No. 4:*** Is the measured value less than the specified value?	1 Ω	Go to step **7.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and ignition coil & ignitor assembly connector • Poor contact in coupling connector
7	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.** Measure the resistance of harness between ECM and engine ground. ***Connector & terminal:*** ***(B137) No. 33 — Engine ground:*** ***(B137) No. 32 — Engine ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **8.**	Repair short circuit to ground in harness between ECM and ignition coil & ignitor assembly connector.
8	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Check fuel pump circuit. <Ref. to EN(H4SO)-70, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>

E: FUEL PUMP CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4SO)-46, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4SO)-39, Inspection Mode.>

- **WIRING DIAGRAM:**

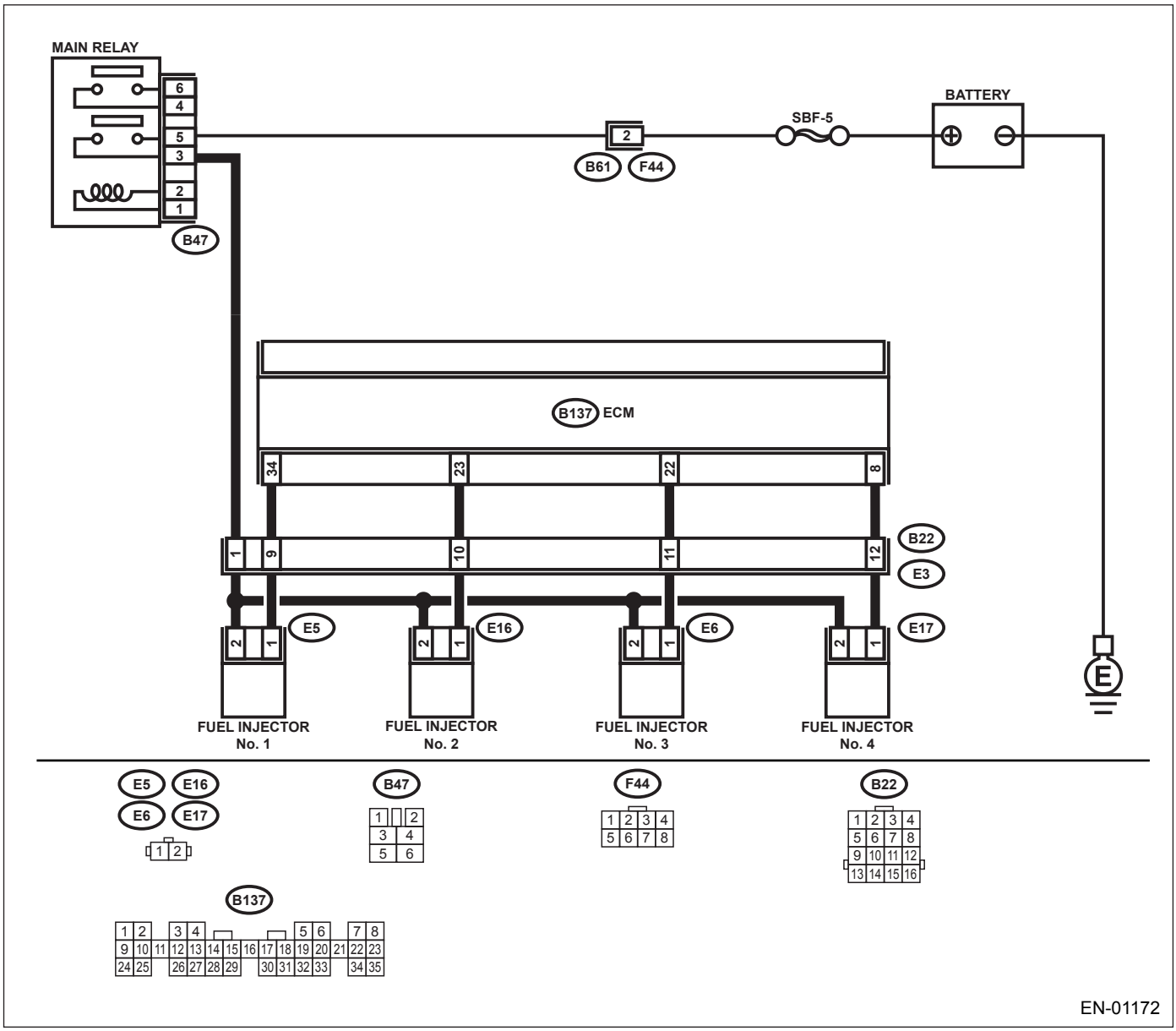


	Step	Check	Yes	No
1	**CHECK OPERATING SOUND OF FUEL PUMP.** Make sure that the fuel pump operates for two seconds when the ignition switch is tuned to ON. Does the fuel pump produce an operating sound? NOTE: Fuel pump operation can also be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4SO)-47, Compulsory Valve Operation Check Mode.>	Fuel pump operates.	Check fuel injector circuit. <Ref. to EN(H4SO)-73, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **2.**
2	**CHECK GROUND CIRCUIT OF FUEL PUMP.** 1)Turn 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. 4 — Chassis ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between fuel pump connector and chassis grounding terminal • Poor contact in coupling connector
3	**CHECK POWER SUPPLY TO FUEL PUMP.** 1)Turn ignition switch to ON. 2)Measure the voltage of power supply circuit between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 1 (+) — Chassis ground (−):*** Is the measured value more than the specified value?	10 V	Replace the fuel pump. <Ref. to FU(H4SO)-60, Fuel Pump.>	Go to step **4.**
4	**CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.** 1)Turn ignition switch to OFF. 2)Measure the resistance of harness connector between fuel pump and fuel pump relay. ***Connector & terminal*** ***(R58) No. 1 — (B46) No. 4:*** Is the measured value less than the specified value?	1 Ω	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between fuel pump connector and chassis grounding terminal • Poor contact in 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. 1 — Chassis ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **6.**	Repair short circuit in harness between fuel pump and fuel pump relay connector.

	Step	Check	Yes	No
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. 1 and No. 3. 4)Measure the resistance between connector terminals of fuel pump relay. ***Terminal*** ***No. 2 — No. 4:*** Is the measured value less than the specified value?	10 Ω	Go to step **7.**	Replace the fuel pump relay. <Ref. to FU(H4SO)-50, Fuel Pump Relay.>
7	**CHECK HARNESS BETWEEN ECM AND FUEL PUMP RELAY CONNECTOR.** 1)Disconnect the connector from ECM. 2)Measure the resistance of harness between ECM and fuel pump relay connector. ***Connector & terminal*** ***(B137) No. 11 — (B46) No. 3:*** Is the measured value less than the specified value?	1 Ω	Go to step **8.**	Repair open circuit in harness between ECM and fuel pump relay connector.
8	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Check fuel injector circuit. <Ref. to EN(H4SO)-73, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

F: FUEL INJECTOR CIRCUIT

CAUTION:
- **Check or repair only faulty parts.**
- **After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4SO)-46, Clear Memory Mode.> and INSPECTION MODE. <Ref. to EN(H4SO)-39, Inspection Mode.>**
- **WIRING DIAGRAM:**



Step		Check	Yes	No
1	**CHECK OPERATION OF EACH FUEL INJECTOR.** While cranking the engine, check that each fuel injector emits an “operating” sound.Use a sound scope or attach a screwdriver to the injector for this check. Does the fuel injectors operate?	Fuel injectors operate.	Check the fuel pressure. <Ref. to ME(H4SO)-29, INSPECTION, Fuel Pressure.>	Go to step **2.**

	Step	Check	Yes	No
2	**CHECK POWER SUPPLY TO EACH FUEL INJECTOR.** 1)Turn ignition switch to OFF. 2)Disconnect the connector from #1 cylinder fuel injector. 3)Turn ignition switch to ON. 4)Measure the power supply voltage between the 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 measured value more than the specified value?	10 V	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and fuel injector connector • Poor contact in main relay connector • Poor contact in coupling connector • Poor contact in fuel injector connector
3	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1)Disconnect the connector from ECM. 2)Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***#1 (B137) No. 34 — (E5) No. 1:*** ***#2 (B137) No. 23 — (E16) No. 1:*** ***#3 (B137) No. 22 — (E6) No. 1:*** ***#4 (B137) No. 8 — (E17) No. 1:*** Is the measured value less than the specified value?	1 Ω	Go to step **4.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in 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. 34 — Chassis ground:*** ***#2 (B137) No. 23 — Chassis ground:*** ***#3 (B137) No. 22 — Chassis ground:*** ***#4 (B137) No. 8 — Chassis ground:*** Is the measured value more than the specified value?	1 MΩ	Go to step **5.**	Repair short circuit to ground in harness between ECM and fuel injector connector.
5	**CHECK EACH FUEL INJECTOR.** 1)Turn ignition switch to OFF. 2)Measure the resistance between each fuel injector terminals. ***Terminal*** ***No. 1 — No. 2:*** Is the measured value within the specified range?	5 — 20 Ω	Go to step **6.**	Replace the faulty fuel injector.
6	**CHECK FOR POOR CONTACT.** Check for poor contact in ECM connector. Is there poor contact in ECM connector?	There is poor contact.	Repair poor contact in ECM connector.	Inspection using “General Diagnostic Table”. <Ref. to EN(H4SO)-340, INSPECTION, General Diagnostic Table.>