17.Diagnostics for Engine Starting Failure

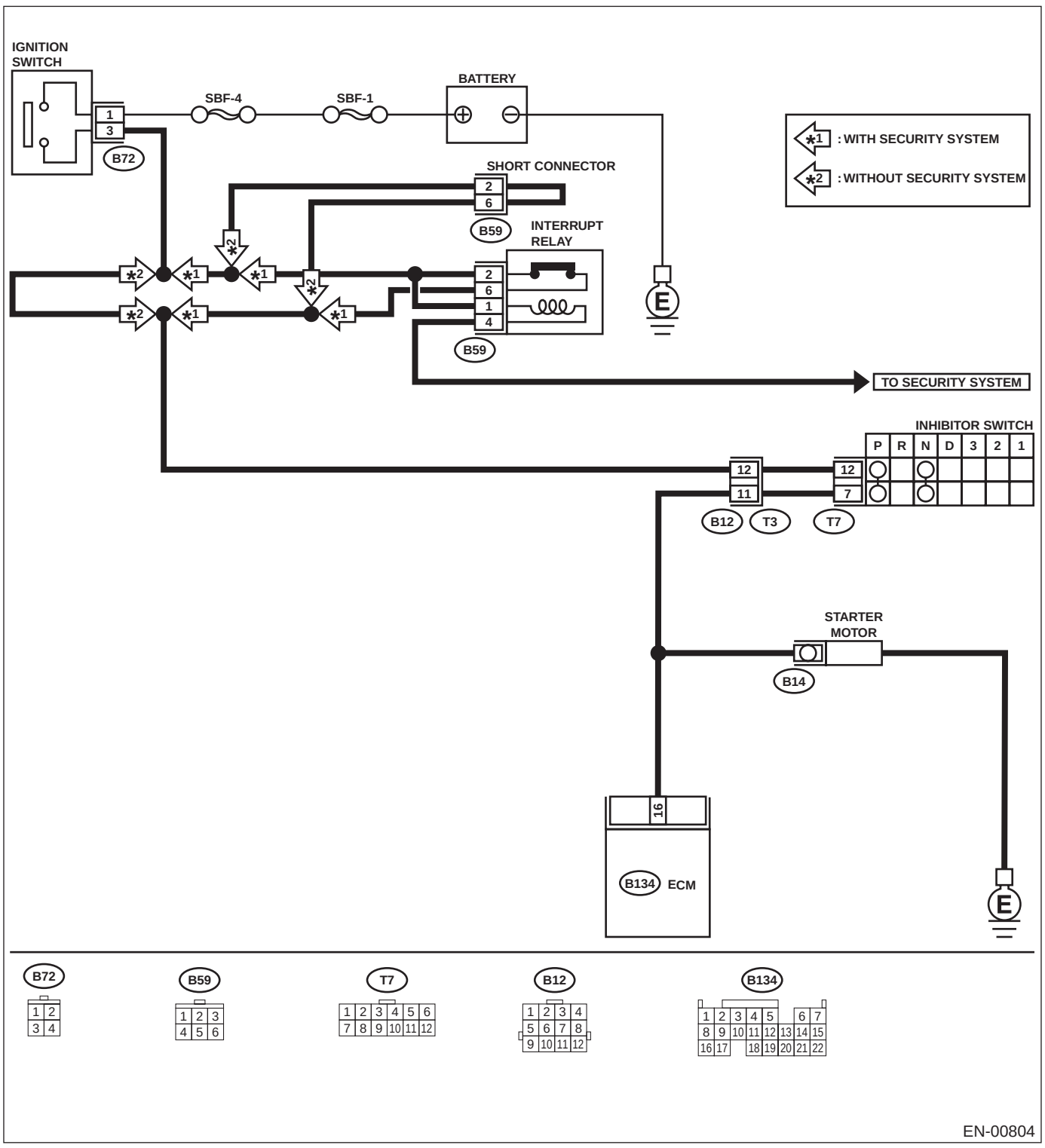
A: PROCEDURE

1. Inspection of starter motor circuit. <Ref. to EN(H6DO)-76, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
2. Inspection of ECM power supply and ground line. <Ref. to EN(H6DO)-80, CONTROL MODULE POWER SUPPLY AND GROUND LINE, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ignition control system. <Ref. to EN(H6DO)-84, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
4. Inspection of fuel pump circuit. <Ref. to EN(H6DO)-88, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel injector circuit. <Ref. to EN(H6DO)-90, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
6. Inspection using Subaru Select Monitor or OBD-II general scan tool <Ref. to EN(H6DO)-100, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> or inspection using “General Diagnostics Table”. <Ref. to EN(H6DO)-380, General Diagnostic Table.>

B: STARTER MOTOR CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE<Ref. to EN(H6DO)-59, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H6DO)-51, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Value	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** Does starter motor operate when the switch starts?	Starter motor operates.	Go to step **2.**	Go to step **3.**
2	**CHECK DTC.** Is diagnostic trouble code (DTC) displayed? <Ref. to EN(H6DO)-50, OPERATION, Read Diagnostic Trouble Code.>	Diagnostic trouble code (DTC) is displayed.	Check the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)-93, List of Diagnostic Trouble Code (DTC).>	Repair poor contact of ECM connector.
3	**CHECK INPUT SIGNAL FOR STARTER MOTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from starter motor. 3) Turn ignition switch to ST. 4) Measure power supply voltage between starter motor connector terminal and engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (–):*** Does the measured value exceed the specified value? NOTE: Place the selector lever in the "P" or "N" position.	10 V	Go to step **4.**	Go to step **5.**
4	**CHECK GROUND CIRCUIT OF STARTER MOTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance of ground cable between ground cable terminal and engine ground. Is the measured value less than the specified value?	5 Ω	Check starter motor. <Ref. to SC(H6DO)-6, Starter.>	Repair open circuit of ground cable.
5	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Ignition switch to OFF. 2) Disconnect connector from ignition switch. 3) Measure power supply voltage between ignition switch connector and chassis ground. ***Connector & terminal*** ***(B72) No. 1 (+) — Chassis ground (–):*** Does the measured value exceed the specified value?	10 V	Go to step **6.**	Check the following items and repair, if necessary. • Blown out fuse • Open circuit in harness between ignition switch and battery
6	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Connect connector to ignition switch. 2) Turn ignition switch to START. 3) Measure voltage between ignition switch and chassis ground. ***Connector & terminal*** ***(B72) No. 3 (+) — Chassis ground (–):*** Does the measured value exceed the specified value?	10 V	Go to step **8.**	Go to step **7.**

	Step	Value	Yes	No
7	**CHECK POOR CONTACT.** Check ignition switch connector for poor contact. Is there any poor contact in ignition switch connector?	There is poor contact.	Repair poor contact in ignition switch connector.	Replace ignition switch.
8	**CHECK INHIBITOR SWITCH CIRCUIT.** 1) Turn ignition switch to OFF. 2) Place the selector lever in the “P” or “N” position. 3) Separate transmission harness connector. 4) Measure resistance between transmission harness connector receptacle's terminals. ***Connector & terminal (T3) No. 11 — No. 12:*** Is the measured value less than the specified value?	1 Ω	Repair open circuit in harness between starter motor and ignition switch connector.	Go to step **9.**
9	**CHECK TRANSMISSION HARNESS.** 1) Disconnect connector from inhibitor switch. 2) Measure resistance of harness between transmission harness and inhibitor switch connector. ***Connector & terminal (T3) No. 11 — (T7) No. 7:*** Is the measured value less than the specified value?	1 Ω	Go to step **10.**	Repair open circuit in harness between transmission harness and inhibitor switch connector.
10	**CHECK POOR CONTACT.** Check poor contact in inhibitor switch connector. Is there poor contact in inhibitor switch connector?	There is poor contact.	Repair poor contact in inhibitor switch connector.	Replace inhibitor switch.

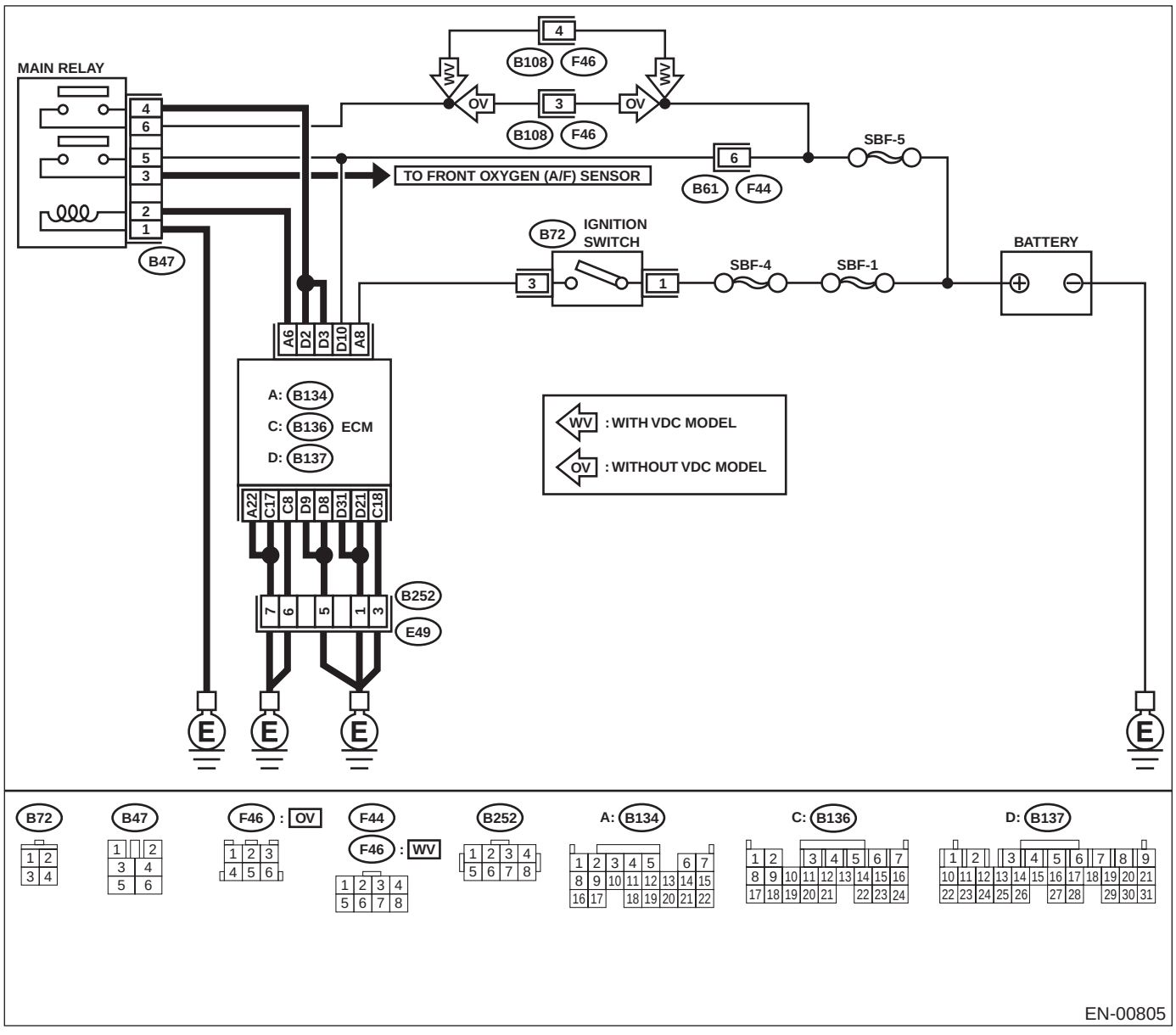
DIAGNOSTICS FOR ENGINE STARTING FAILURE

MEMO:

C: CONTROL MODULE POWER SUPPLY AND GROUND LINE

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H6DO)-59, OPERATION, Clear Memory Mode.> and INSPECTION MODE. <Ref. to EN(H6DO)-51, OPERATION, Inspection Mode.>

- **WIRING DIAGRAM:**



EN-00805

	Step	Value	Yes	No
1	**CHECK MAIN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove main relay. 3) Connect battery to main relay terminals No. 1 and No. 2. 4) Measure resistance between main relay terminals. ***Terminals*** ***No. 3 — No. 5:*** ***No. 4 — No. 6:*** Is the measured value less than the specified value?	10 Ω	Go to step **2.**	Replace main relay.
2	**CHECK GROUND CIRCUIT OF ECM.** 1) Disconnect connector from ECM. 2) Measure resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 22 — Chassis ground:*** ***(B136) No. 8 — Chassis ground:*** ***(B136) No. 17 — Chassis ground:*** ***(B136) No. 18 — Chassis ground:*** ***(B137) No. 8 — Chassis ground:*** ***(B137) No. 9 — Chassis ground:*** ***(B137) No. 21 — Chassis ground:*** ***(B137) No. 31 — 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 voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 10 (+) — Chassis ground (–):*** Does the measured value exceed the specified value?	10 V	Go to step **4.**	Repair open or ground short circuit of power supply circuit.
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (–):*** Does the measured value exceed the specified value?	10 V	Go to step **5.**	Repair open or ground short circuit of power supply circuit.
5	**CHECK HARNESS BETWEEN ECM AND MAIN RELAY CONNECTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 6 — Chassis ground:*** Does the measured value exceed the specified value?	1 MΩ	Go to step **6.**	Repair ground short circuit in harness between ECM connector and main relay connector, then replace ECM.

	Step	Value	Yes	No
6	**CHECK OUTPUT VOLTAGE FROM ECM.** 1) Connect connector to ECM. 2) Turn ignition switch to ON. 3) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 6 (+) — Chassis ground (–):*** Does the measured value exceed the specified value?	10 V	Go to step **7.**	Replace ECM.
7	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Check voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 2 (+) — Chassis ground (–):*** Does the measured value exceed 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 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.** Measure voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 5 (+) — Chassis ground (–):*** ***(B47) No. 6 (+) — Chassis ground (–):*** Does the measured value exceed the specified value?	10 V	Go to step **10.**	Repair open or ground short circuit in harness of power supply circuit.
10	**CHECK INPUT VOLTAGE OF ECM.** 1) Connect main relay connector. 2) Turn ignition switch to ON. 3) Measure voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 2 (+) — Chassis ground (–):*** ***(B137) No. 3 (+) — Chassis ground (–):*** Does the measured value exceed the specified value?	10 V	Check ignition control system. <Ref. to EN(H6DO)-84, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair open or ground short circuit in harness between ECM connector and main relay connector.

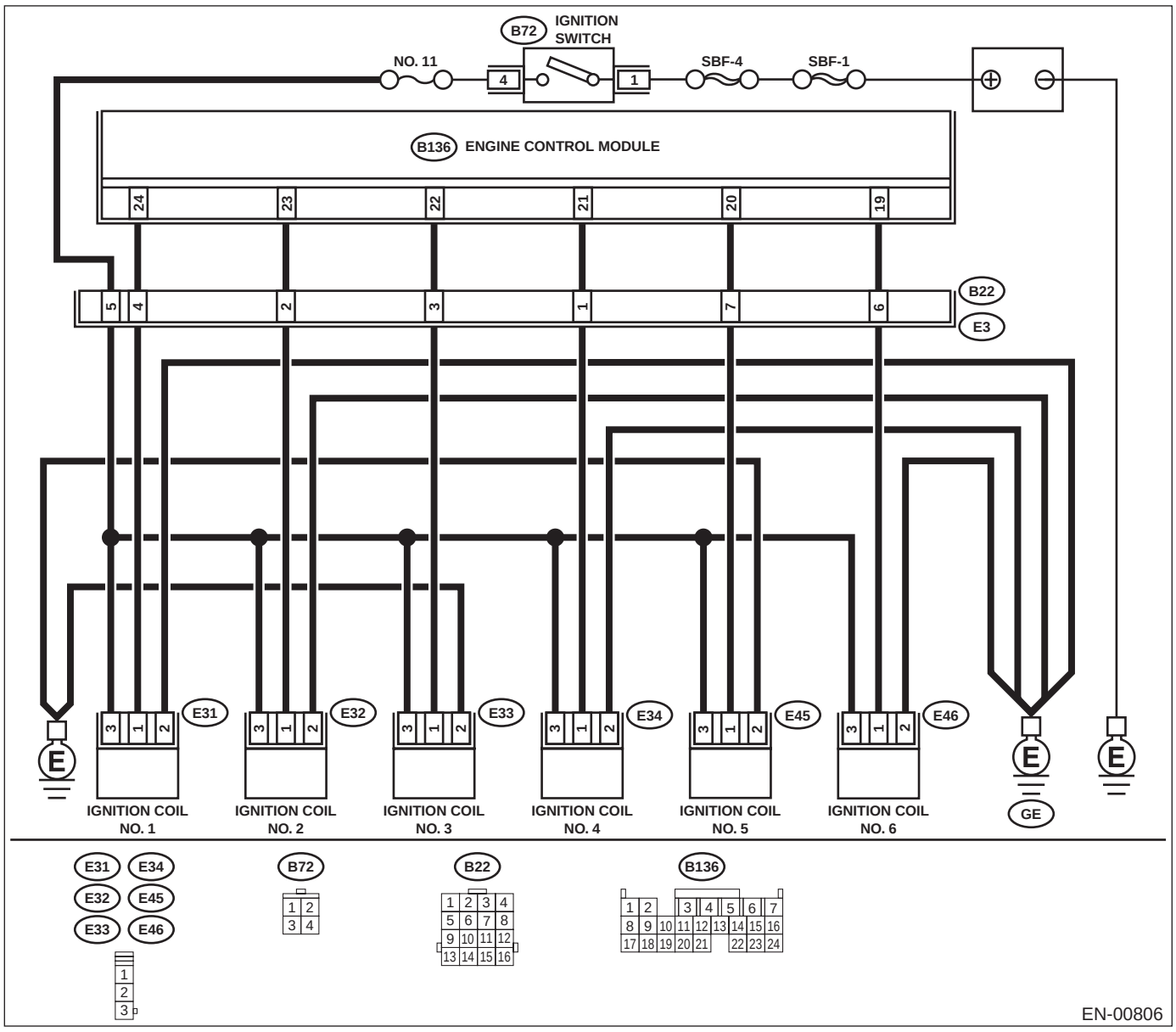
DIAGNOSTICS FOR ENGINE STARTING FAILURE

MEMO:

D: IGNITION CONTROL SYSTEM

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE<Ref. to EN(H6DO)-59, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H6DO)-51, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**



	Step	Value	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.> Is the spark plug OK?	Spark plug is OK.	Go to step **2.**	Replace the spark plug.
2	**CHECK IGNITION SYSTEM FOR SPARKS.** 1) Connect spark plug to ignition coil. 2) Lower fuel pressure. 3) Contact spark plug thread portion with engine block. 4) While opening throttle valve fully, crank engine to check that spark occurs at each cylinder. Does spark occur at each cylinder?	Spark occurs.	Check fuel pump system. <Ref. to EN(H6DO)-88, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **3.**
3	**CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL & IGNITOR ASSEMBLY.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ignition coil & ignitor assembly. 3) Turn ignition switch to ON. 4) Measure power supply voltage between ignition coil & ignitor assembly connector and engine ground. ***Connector & terminal*** ***(E31) No. 3 (+) — Engine ground (–):*** ***(E32) No. 3 (+) — Engine ground (–):*** ***(E33) No. 3 (+) — Engine ground (–):*** ***(E34) No. 3 (+) — Engine ground (–):*** ***(E45) No. 3 (+) — Engine ground (–):*** ***(E46) No. 3 (+) — Engine ground (–):*** Does the measured value exceed the specified value?	10 V	Go to step **4.**	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 connectors
4	**CHECK HARNESS OF IGNITION COIL & IGNITOR ASSEMBLY GROUND CIRCUIT.** 1) Turn ignition switch to OFF. 2) Measure resistance between ignition coil & ignitor assembly connector and engine ground. ***Connector & terminal*** ***(E31) No. 2 — Engine ground:*** ***(E32) No. 2 — Engine ground:*** ***(E33) No. 2 — Engine ground:*** ***(E34) No. 2 — Engine ground:*** ***(E45) No. 2 — Engine ground:*** ***(E46) No. 2 — Engine ground:*** Is the measured value less than the specified value?	5 Ω	Go to step **5.**	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

	Step	Value	Yes	No
5	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Disconnect connector from ignition coil & ignitor assembly. 4) Measure resistance of harness between ECM and ignition coil & ignitor assembly connector. ***Connector & terminal*** ***(B136) No. 24 — (E31) No. 1:*** ***(B136) No. 23 — (E32) No. 1:*** ***(B136) No. 22 — (E33) No. 1:*** ***(B136) No. 21 — (E34) No. 1:*** ***(B136) No. 20 — (E45) No. 1:*** ***(B136) No. 19 — (E46) No. 1:*** Is the measured value less than the specified value?	1 Ω	Go to step **6.**	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
6	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.** Measure resistance of harness between ECM and engine ground. ***Connector & terminal:*** ***(B136) No. 24 — Engine ground:*** ***(B136) No. 23 — Engine ground:*** ***(B136) No. 22 — Engine ground:*** ***(B136) No. 21 — Engine ground:*** ***(B136) No. 20 — Engine ground:*** ***(B136) No. 19 — Engine ground:*** Does the measured value exceed the specified value?	1 MΩ	Go to step **7.**	Repair ground short circuit in harness between ECM and ignition coil & ignitor assembly connector.
7	**CHECK INPUT SIGNAL FOR IGNITION COIL & IGNITOR ASSEMBLY.** 1) Connect 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*** ***(E31) No. 1 (+) — Engine ground (–):*** ***(E32) No. 1 (+) — Engine ground (–):*** ***(E33) No. 1 (+) — Engine ground (–):*** ***(E34) No. 1 (+) — Engine ground (–):*** ***(E45) No. 1 (+) — Engine ground (–):*** ***(E46) No. 1 (+) — Engine ground (–):*** Does the measured value exceed the specified value?	10 V	Go to step **8.**	Replace ignition coil & ignitor assembly. <Ref. to IG(H6DO)-7, Ignition Coil and Ignitor Assembly.>
8	**CHECK POOR CONTACT.** Check 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(H6DO)-88, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>

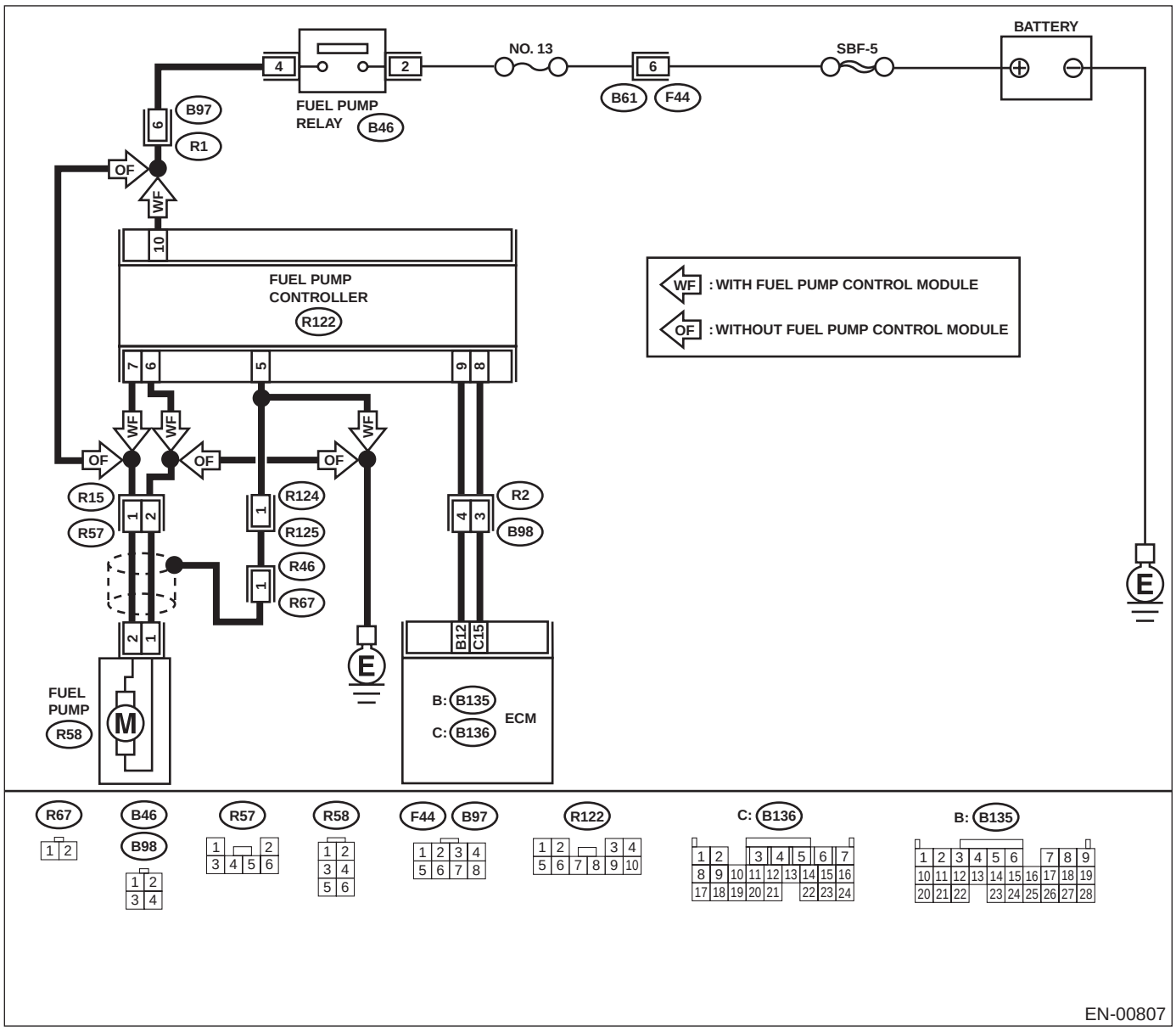
DIAGNOSTICS FOR ENGINE STARTING FAILURE

MEMO:

E: FUEL PUMP CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE<Ref. to EN(H6DO)-59, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H6DO)-51, OPERATION, Inspection Mode.>.

- **WIRING DIAGRAM:**

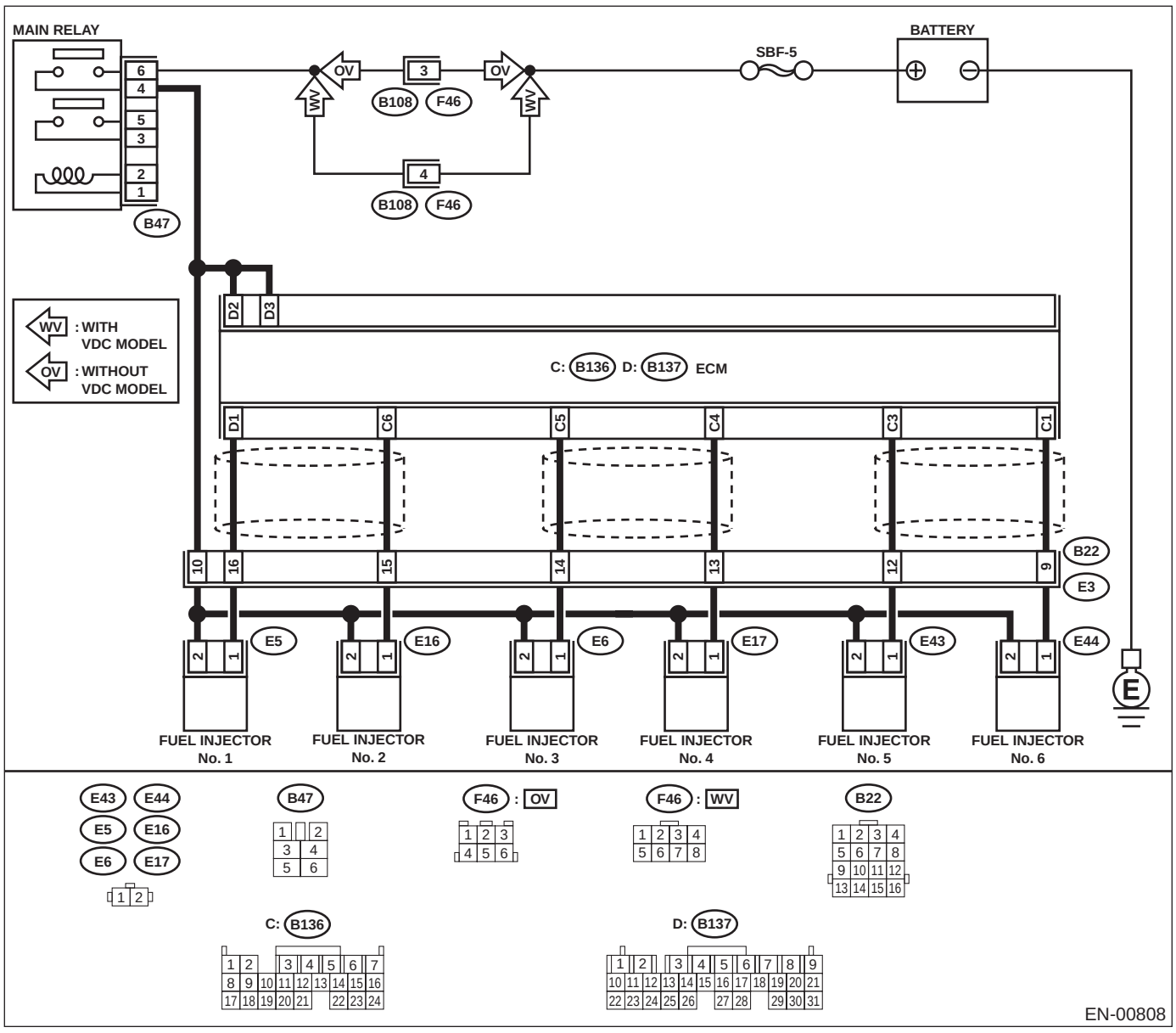


DIAGNOSTICS FOR ENGINE STARTING FAILURE

	Step	Value	Yes	No
1	**CHECK OPERATING SOUND OF FUEL PUMP.** Make sure that the fuel pump is in operation for 2 seconds when turning ignition switch to ON. NOTE: Fuel pump operation check can also be executed using Subaru Select Monitor. For the procedure, refer to “Compulsory Valve Operation Check Mode”. <Ref. to EN(H6DO)-60, Compulsory Valve Operation Check Mode.> Does the fuel pump produce operating sound?	Operating sound produced.	Check fuel injector circuit. <Ref. to EN(H6DO)-90, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Read the diagnostic Trouble Code (DTC) and check related DTC. <Ref. to EN(H6DO)-93, List of Diagnostic Trouble Code (DTC).>

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(H6DO)-59, OPERATION, Clear Memory Mode.> and INSPECTION MODE. <Ref. to EN(H6DO)-51, OPERATION, Inspection Mode.>**
- **WIRING DIAGRAM:**



	Step	Value	Yes	No
1	**CHECK OPERATION OF EACH FUEL INJECTOR.** While cranking the engine, check that each fuel injector emits “operating” sound. Use a sound scope or attach a screwdriver to injector for this check. Does the fuel injector emit “operating” sound?	Operating sound produced.	Check fuel pressure. <Ref. to FU(H6DO)-50, Fuel.>	Go to step **2.**
2	**CHECK POWER SUPPLY TO EACH FUEL INJECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from fuel injector. 3) Turn ignition switch to ON. 4) Measure 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 (–):*** ***#5 (E43) No. 2 (+) — Engine ground (–):*** ***#6 (E43) No. 2 (+) — Engine ground (–):*** Does the measured value exceed 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 connector from ECM and fuel injector. 2) Measure resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B137) No. 1 — (E5) No. 1:*** ***(B136) No. 6 — (E16) No. 1:*** ***(B136) No. 5 — (E6) No. 1:*** ***(B136) No. 4 — (E17) No. 1:*** ***(B136) No. 3 — (E43) No. 1:*** ***(B136) No. 1 — (E44) 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 resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B137) No. 1 — Chassis ground:*** ***(B136) No. 6 — Chassis ground:*** ***(B136) No. 5 — Chassis ground:*** ***(B136) No. 4 — Chassis ground:*** ***(B136) No. 3 — Chassis ground:*** ***(B136) No. 1 — Chassis ground:*** Does the measured value exceed the specified value?	1 MΩ	Go to step **5.**	Repair ground short circuit in harness between ECM and fuel injector connector.

	Step	Value	Yes	No
5	**CHECK EACH FUEL INJECTOR.** 1) Turn ignition switch to OFF. 2) Measure resistance between each fuel injector terminals. ***Terminals*** ***No. 1 — No. 2:*** Is the measured value within the specified range?	5 — 20 Ω	Go to step **6.**	Replace faulty fuel injector.
6	**CHECK POOR CONTACT.** Check 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(H6DO)-380, INSPECTION, General Diagnostic Table.>