

17. Diagnostics for Engine Starting Failure

S078533

A: PROCEDURE

S078533E45

1. Inspection of starter motor circuit. <Ref. to EN-70, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
2. Inspection of ECM power supply and ground line. <Ref. to EN-74, CONTROL MODULE POWER SUPPLY AND GROUND LINE, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ignition control system. <Ref. to EN-78, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
4. Inspection of fuel pump circuit. <Ref. to EN-82, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel injector circuit. <Ref. to EN-86, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

DIAGNOSTICS FOR ENGINE STARTING FAILURE

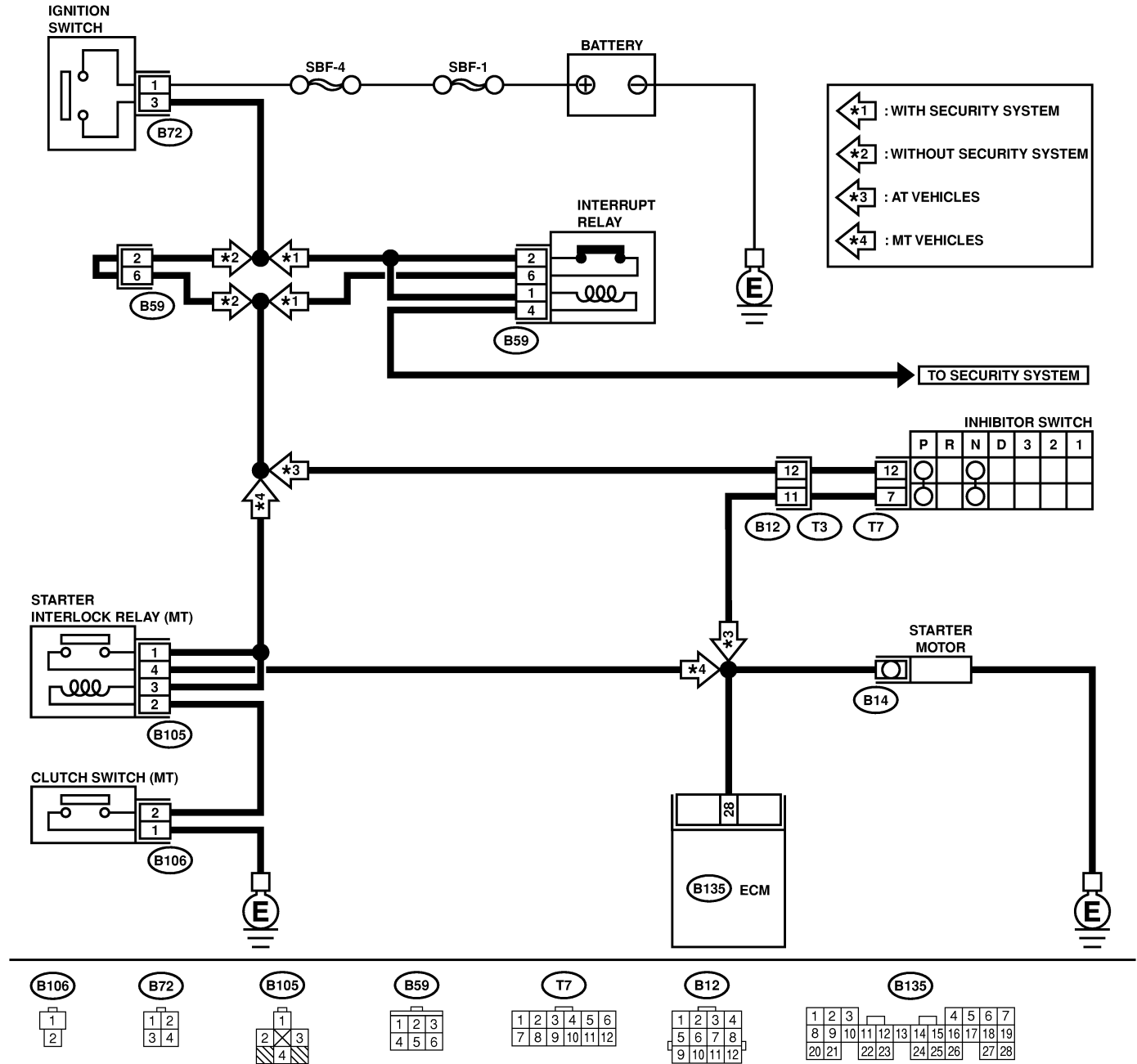
Engine (Diagnostics)

B: STARTER MOTOR CIRCUIT S078533E94

CAUTION:

After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN-55, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN-48, Inspection Mode.>.

● WIRING DIAGRAM:



B2M4635

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (Diagnostics)

No.	Step	Check	Yes	No
1	CHECK OPERATION OF STARTER MOTOR.	Does starter motor operate when the switch starts?	Go to step 2.	Go to step 3.
2	CHECK DTC. <Ref. to EN-47, OPERATION, Read Diagnostic Trouble Code.>	Is the trouble code stored in memory? <Ref. to EN-88, LIST, List of Diagnostic Trouble Code (DTC).>	Record DTC. Repair the trouble case. <Ref. to EN-26, Engine Control Module (ECM) I/O Signal.>	Go to step 3.
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 (-): NOTE: On AT vehicles, place the selector lever in the "P" or "N" position.	Is the voltage more than 10 V?	Go to step 4.	Go to step 5.
4	CHECK GROUND CIRCUIT OF STARTER MOTOR. 1) Turn ignition switch to OFF. 2) Disconnect starter motor ground cable. 3) Measure resistance of ground cable between ground cable terminal and engine ground.	Is resistance less than 5 Ω ?	Check starter motor. <Ref. to SC-7, Starter.>	Repair open circuit of ground cable.
5	CHECK HARNESS BETWEEN ECM AND STARTER MOTOR CIRCUIT. 1) Turn ignition switch to OFF. 2) Measure resistance between starter motor and ECM. Connector & terminal (B14) No. 1 — Engine ground:	Is resistance less than 1 Ω ?	Repair ground short circuit.	Go to step 6.
6	CHECK HARNESS BETWEEN ECM AND STARTER MOTOR CIRCUIT. 1) Turn ignition switch to START. 2) Measure resistance of fuse. Connector & terminal (B14) No. 1 — Engine ground:	Is resistance less than 1 Ω ?	Go to step 7.	Repair ground short circuit.
7	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 (-):	Is the voltage more than 10 V?	Go to step 8.	Repair open circuit in harness between ignition switch and battery.
8	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 (-):	Is the voltage more than 10 V?	Go to step 9.	Replace ignition switch.

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (Diagnostics)

No.	Step	Check	Yes	No
9	CHECK TRANSMISSION TYPE.	Is the vehicle AT?	Go to step 10.	Repair open circuit between ignition switch and starter motor circuit.
10	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 resistance less than 1 Ω ?	Repair open circuit in harness between starter motor and ignition switch connector.	Go to step 11.
11	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 resistance less than 1 Ω ?	Go to step 12.	Repair open circuit in harness between transmission harness and inhibitor switch connector.
12	CHECK POOR CONTACT. Check poor contact in inhibitor switch connector.	Is there poor contact in inhibitor switch connector?	Repair poor contact in inhibitor switch connector.	Replace inhibitor switch.

MEMO:

DIAGNOSTICS FOR ENGINE STARTING FAILURE

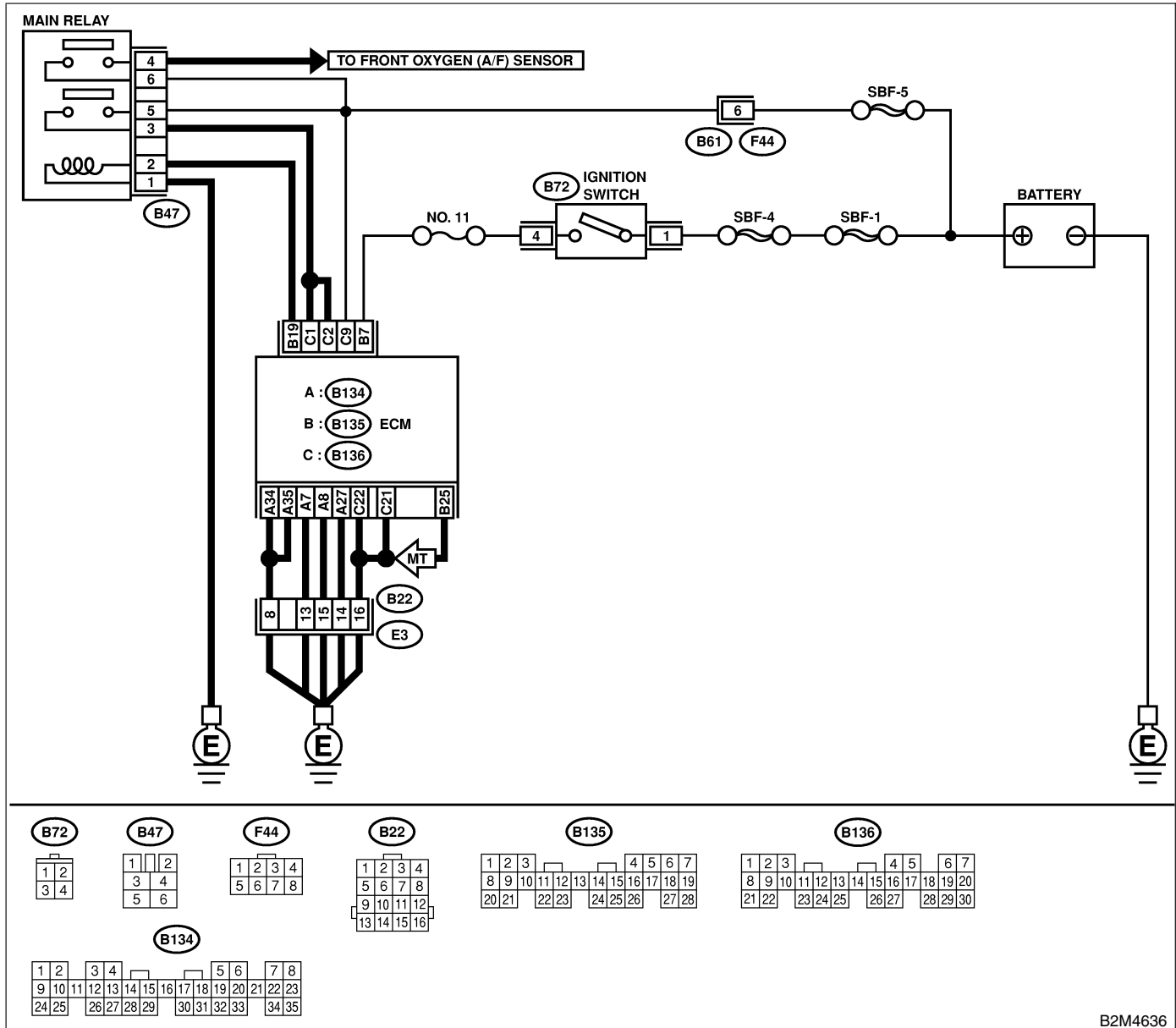
Engine (Diagnostics)

C: CONTROL MODULE POWER SUPPLY AND GROUND LINE S078533E37

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-55, OPERATION, Clear Memory Mode.> and Inspection Mode. <Ref. to EN-48, OPERATION, Inspection Mode.>

● WIRING DIAGRAM:



B2M4636

No.	Step	Check	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 resistance less than 10 Ω?	Go to step 2.	Replace main relay.

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (Diagnostics)

No.	Step	Check	Yes	No
2	CHECK GROUND CIRCUIT OF ECM. 1) Disconnect connector from ECM. 2) Measure resistance of harness between ECM and chassis ground. <i>Connector & terminal</i> <i>(B135) No. 25 — Chassis ground:</i> <i>(B136) No. 21 — Chassis ground:</i> <i>(B136) No. 22 — Chassis ground:</i> <i>(B134) No. 27 — Chassis ground:</i> <i>(B134) No. 8 — Chassis ground:</i> <i>(B134) No. 7 — Chassis ground:</i> <i>(B134) No. 34 — Chassis ground:</i> <i>(B134) No. 35 — Chassis ground:</i>	Is the resistance less than 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. <i>Connector & terminal</i> <i>(B136) No. 9 (+) — Chassis ground (-):</i>	Is the voltage more than 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. <i>Connector & terminal</i> <i>(B135) No. 7 (+) — Chassis ground (-):</i>	Is the voltage more than 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. <i>Connector & terminal</i> <i>(B135) No. 19 — Chassis ground:</i>	Is the resistance more than 1 MΩ?	Go to step 6.	Repair ground short circuit in harness between ECM connector and main relay connector, then replace ECM.
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. <i>Connector & terminal</i> <i>(B135) No. 19 (+) — Chassis ground (-):</i>	Is the voltage more than 10 V?	Go to step 7.	Replace ECM.
7	CHECK INPUT VOLTAGE OF MAIN RELAY. Check voltage between main relay connector and chassis ground. <i>Connector & terminal</i> <i>(B47) No. 2 (+) — Chassis ground (-):</i>	Is the voltage more than 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. <i>Connector & terminal</i> <i>(B47) No. 1 — Chassis ground:</i>	Is the resistance less than 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. <i>Connector & terminal</i> <i>(B47) No. 5 (+) — Chassis ground (-):</i> <i>(B47) No. 6 (+) — Chassis ground (-):</i>	Is the voltage more than 10 V?	Go to step 10.	Repair open or ground short circuit in harness of power supply circuit.

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (Diagnostics)

No.	Step	Check	Yes	No
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 <i>(B136) No. 1 (+) — Chassis ground (-):</i> <i>(B136) No. 2 (+) — Chassis ground (-):</i>	Is the voltage more than 10 V?	Check ignition control system. <Ref. to EN-78, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair open or ground short circuit in harness between ECM connector and main relay connector.

MEMO:

DIAGNOSTICS FOR ENGINE STARTING FAILURE

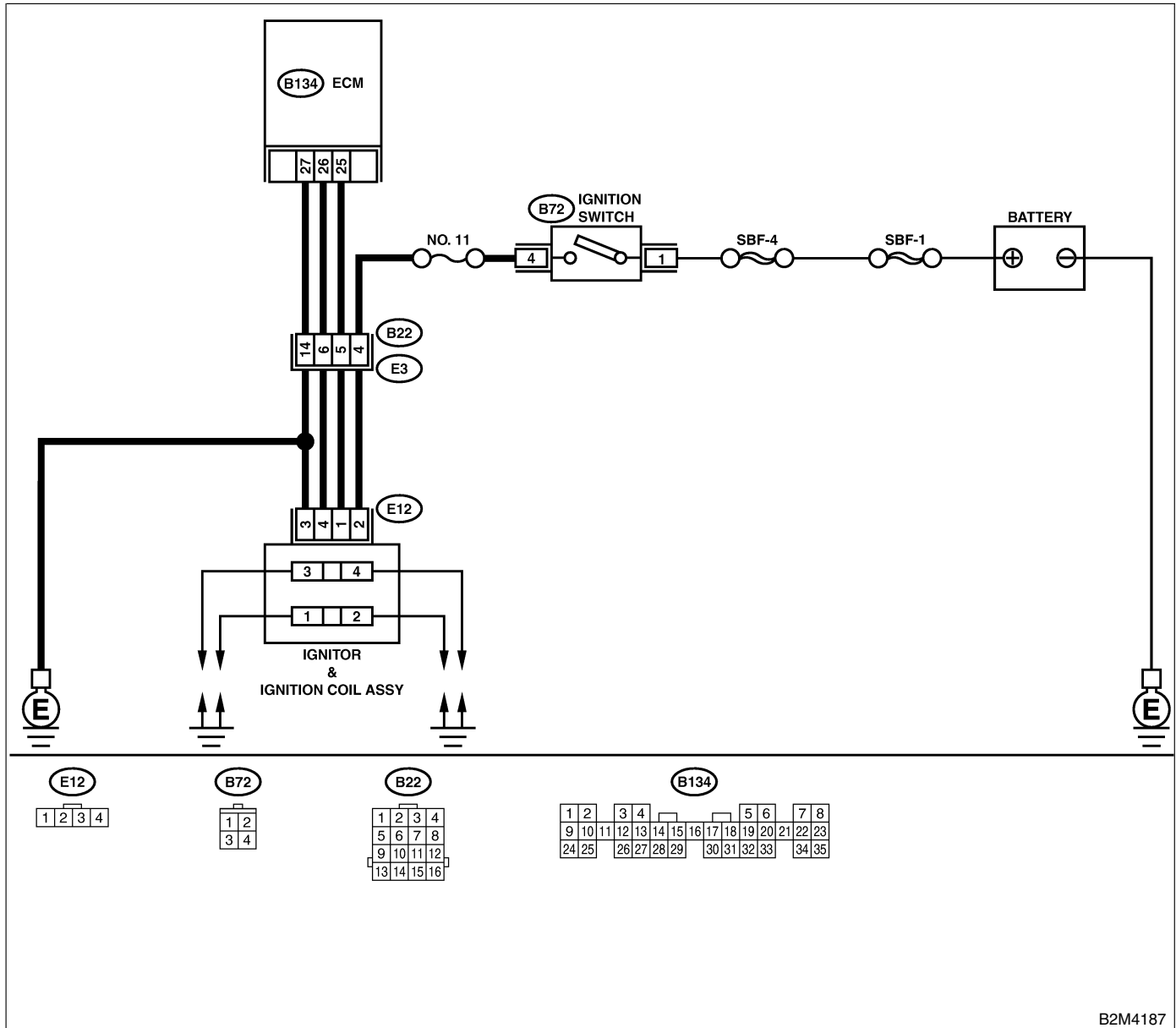
Engine (Diagnostics)

D: IGNITION CONTROL SYSTEM S078533E95

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-55, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-48, OPERATION, Inspection Mode.>

● WIRING DIAGRAM:



B2M4187

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (Diagnostics)

No.	Step	Check	Yes	No
1	CHECK SPARK PLUG CONDITION. 1) Remove the spark plug. <Ref. to IG-4, REMOVAL, Spark Plug.> 2) Check the spark plug condition. <Ref. to IG-5, INSPECTION, Spark Plug.>	Is the spark plug's status OK?	Go to step 2.	Replace the spark plug.
2	CHECK IGNITION SYSTEM FOR SPARKS. 1) Remove plug cord cap from each spark plug. 2) Install new spark plug on plug cord cap. CAUTION: Do not remove spark plug from engine. 3) Contact spark plug's thread portion on engine. 4) While opening throttle valve fully, crank engine to check that spark occurs at each cylinder.	Does spark occur at each cylinder?	Check fuel pump system. <Ref. to EN-82, 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 (E12) No. 2 (+) — Engine ground (-):	Is the voltage more than 10 V?	Go to step 4.	Repair harness and connector. NOTE: In this case, repair the following: <ul style="list-style-type: none"> ● 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 (E12) No. 3 — Engine ground:	Is the resistance between less than 5 Ω ?	Go to step 5.	Repair harness and connector. NOTE: In this case, repair the following: <ul style="list-style-type: none"> ● Open circuit in harness between ignition coil & ignitor assembly connector and engine grounding terminal
5	CHECK IGNITION COIL & IGNITOR ASSEMBLY. 1) Remove spark plug cords. 2) Measure 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 k Ω ?	Go to step 6.	Replace ignition coil & ignitor assembly. <Ref. to IG-7, Ignition Coil and Ignitor Assembly.>

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (Diagnostics)

No.	Step	Check	Yes	No
6	<p>CHECK INPUT SIGNAL FOR IGNITION COIL & IGNITOR ASSEMBLY.</p> <p>1) Connect connector to ignition coil & ignitor assembly.</p> <p>2) Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignition coil & ignitor assembly connector and engine ground.</p> <p>Connector & terminal (E12) No. 1 (+) — Engine ground (-): (E12) No. 4 (+) — Engine ground (-):</p>	Is the voltage more than 10 V?	Go to step 7.	Replace ignition coil & ignitor assembly. <Ref. to IG-7, Ignition Coil and Ignitor Assembly.>
7	<p>CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.</p> <p>1) Turn ignition switch to OFF.</p> <p>2) Disconnect connector from ECM.</p> <p>3) Disconnect connector from ignition coil & ignitor assembly.</p> <p>4) Measure resistance of harness between ECM and ignition coil & ignitor assembly connector.</p> <p>Connector & terminal (B134) No. 25 — (E12) No. 1: (B134) No. 26 — (E12) No. 4:</p>	Is the resistance less than 1 Ω?	Go to step 8.	<p>Repair harness and connector.</p> <p>NOTE: In this case, repair the following:</p> <ul style="list-style-type: none"> ● Open circuit in harness between ECM and ignition coil & ignitor assembly connector ● Poor contact in coupling connector
8	<p>CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSEMBLY CONNECTOR.</p> <p>Measure resistance of harness between ECM and engine ground.</p> <p>Connector & terminal: (B134) No. 25 — Engine ground: (B134) No. 26 — Engine ground:</p>	Is the resistance more than 1 MΩ?	Go to step 9.	Repair ground short circuit in harness between ECM and ignition coil & ignitor assembly connector.
9	<p>CHECK POOR CONTACT.</p> <p>Check poor contact in ECM connector.</p>	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Check fuel pump circuit. <Ref. to EN-82, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>

MEMO:

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (Diagnostics)

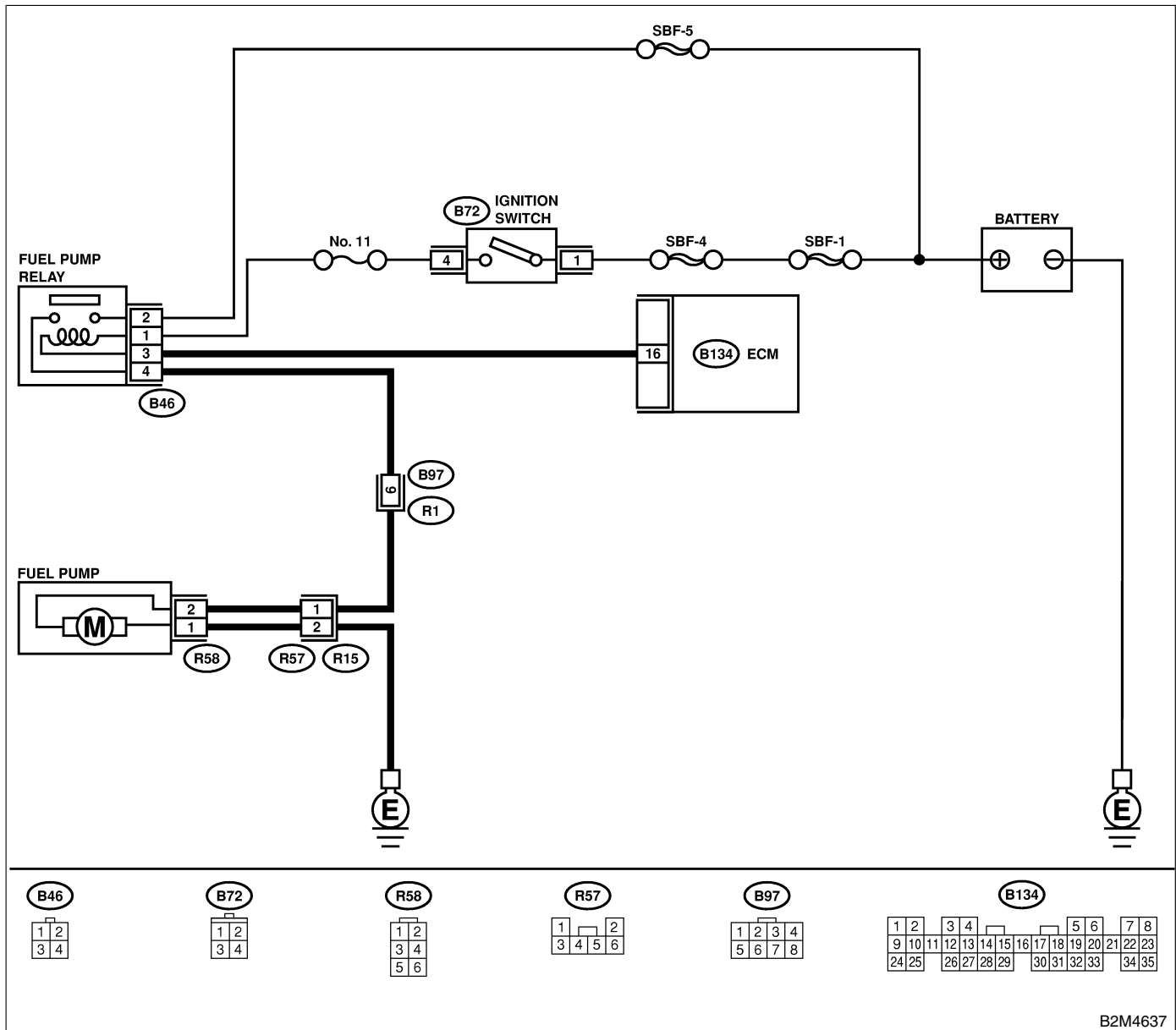
E: FUEL PUMP CIRCUIT

S078533E96

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-55, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN-48, OPERATION, Inspection Mode.>.

● WIRING DIAGRAM:



B2M4637

No.	Step	Check	Yes	No
1	<p>CHECK OPERATING SOUND OF FUEL PUMP.</p> <p>Make sure that fuel pump is in operation for two seconds when turning ignition switch to ON.</p> <p>NOTE: Fuel pump operation can also be executed using Subaru Select Monitor (Function mode: FD01). For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN-56, Compulsory Valve Operation Check Mode.></p>	Does fuel pump produce operating sound?	Check fuel injector circuit. <Ref. to EN-86, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step 2.

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (Diagnostics)

No.	Step	Check	Yes	No
2	<p>CHECK GROUND CIRCUIT OF FUEL PUMP. 1) Turn ignition switch to OFF. 2) Remove fuel pump access hole lid located on the right rear of trunk compartment floor (Sedan) or luggage compartment floor (Wagon). 3) Disconnect connector from fuel pump. 4) Measure resistance of harness connector between fuel pump and chassis ground. Connector & terminal (R58) No. 4 — Chassis ground:</p>	Is the resistance less than 5 Ω ?	Go to step 3.	Repair harness and connector. NOTE: In this case, repair the following: <ul style="list-style-type: none"> ● Open circuit in harness between fuel pump connector and chassis grounding terminal ● Poor contact in coupling connector
3	<p>CHECK POWER SUPPLY TO FUEL PUMP. 1) Turn ignition switch to ON. 2) Measure voltage of power supply circuit between fuel pump connector and chassis ground. Connector & terminal (R58) No. 1 (+) — Chassis ground (-):</p>	Is the voltage more than 10 V?	Replace fuel pump. <Ref. to FU-73, Fuel Pump.>	Go to step 4.
4	<p>CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR. 1) Turn ignition switch to OFF. 2) Measure resistance of harness connector between fuel pump and fuel pump relay. Connector & terminal (R58) No. 1 — (B46) No. 4:</p>	Is the resistance less than 1 Ω ?	Go to step 5.	Repair harness and connector. NOTE: In this case, repair the following: <ul style="list-style-type: none"> ● Open circuit in harness between fuel pump connector and chassis grounding terminal ● Poor contact in coupling connectors
5	<p>CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR. Measure resistance of harness between fuel pump and fuel pump relay connector. Connector & terminal (R58) No. 1 — Chassis ground:</p>	Is the resistance more than 1 M Ω ?	Go to step 6.	Repair short circuit in harness between fuel pump and fuel pump relay connector.
6	<p>CHECK FUEL PUMP RELAY. 1) Disconnect connectors from fuel pump relay and main relay. 2) Remove fuel pump relay and main relay with bracket. 3) Connect battery to fuel pump relay connector terminals No. 1 and No. 3. 4) Measure resistance between connector terminals of fuel pump relay. Terminals No. 2 — No. 4:</p>	Is the resistance less than 10 Ω ?	Go to step 7.	Replace fuel pump relay. <Ref. to FU-53, Fuel Pump Relay.>

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (Diagnostics)

No.	Step	Check	Yes	No
7	CHECK HARNESS BETWEEN ECM AND FUEL PUMP RELAY CONNECTOR. 1) Disconnect connectors from ECM. 2) Measure resistance of harness between ECM and fuel pump relay connector. Connector & terminal (B134) No. 16 — (B46) No. 3:	Is the resistance less than 1 Ω ?	Go to step 8.	Repair open circuit in harness between ECM and fuel pump relay connector.
8	CHECK POOR CONTACT. Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Check fuel injector circuit. <Ref. to EN-86, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

MEMO:

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (Diagnostics)

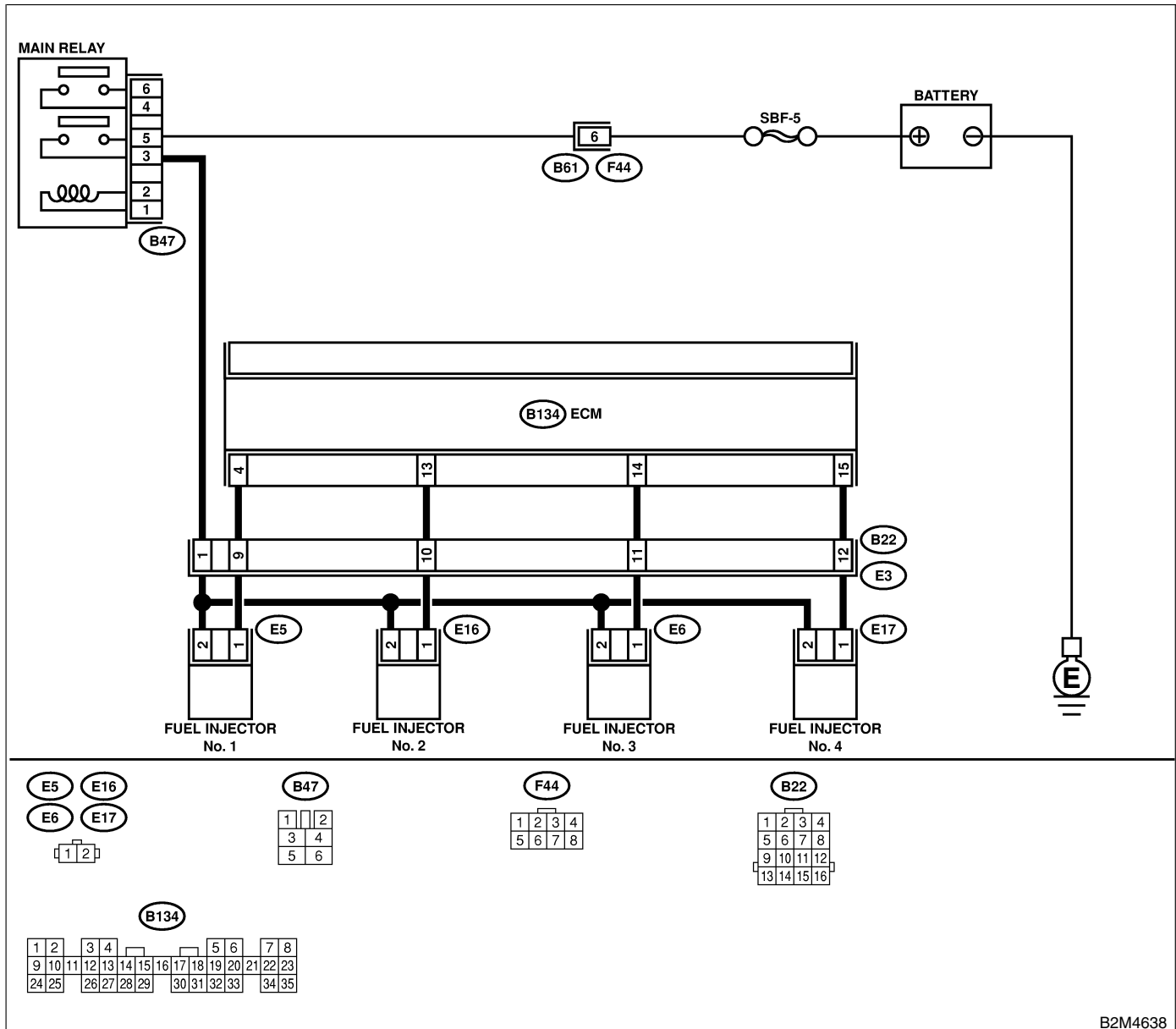
F: FUEL INJECTOR CIRCUIT

S078533E97

CAUTION:

- Check or repair only faulty parts.
- After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN-55, OPERATION, Clear Memory Mode.> and Inspection Mode. <Ref. to EN-48, OPERATION, Inspection Mode.>

● WIRING DIAGRAM:



B2M4638

No.	Step	Check	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.	Is the fuel injector emits "operating" sound?	Check fuel pressure. <Ref. to ME-28, INSPECTION, Fuel Pressure.>	Go to step 2.

DIAGNOSTICS FOR ENGINE STARTING FAILURE

Engine (Diagnostics)

No.	Step	Check	Yes	No
2	<p>CHECK POWER SUPPLY TO EACH FUEL INJECTOR.</p> <p>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.</p> <p>Connector & terminal</p> <p>#1 (E5) No. 2 (+) — Engine ground (-): #2 (E16) No. 2 (+) — Engine ground (-): #3 (E6) No. 2 (+) — Engine ground (-): #4 (E17) No. 2 (+) — Engine ground (-):</p>	Is the voltage more than 10 V?	Go to step 3.	<p>Repair harness and connector.</p> <p>NOTE: In this case, repair the following:</p> <ul style="list-style-type: none"> ● 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	<p>CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.</p> <p>1) Disconnect connector from ECM and fuel injector. 2) Measure resistance of harness between ECM and fuel injector connector.</p> <p>Connector & terminal</p> <p>(B134) No. 4 — (E5) No. 1: (B134) No. 13 — (E16) No. 1: (B134) No. 14 — (E6) No. 1: (B134) No. 15 — (E17) No. 1:</p>	Is the resistance less than 1 Ω?	Go to step 4.	<p>Repair harness and connector.</p> <p>NOTE: In this case, repair the following:</p> <ul style="list-style-type: none"> ● Open circuit in harness between ECM and fuel injector connector ● Poor contact in coupling connector
4	<p>CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.</p> <p>Measure resistance of harness between ECM and fuel injector connector.</p> <p>Connector & terminal</p> <p>(B134) No. 4 — Chassis ground: (B134) No. 13 — Chassis ground: (B134) No. 14 — Chassis ground: (B134) No. 15 — Chassis ground:</p>	Is the resistance more than 1 MΩ?	Go to step 5.	Repair ground short circuit in harness between ECM and fuel injector connector.
5	<p>CHECK EACH FUEL INJECTOR.</p> <p>1) Turn ignition switch to OFF. 2) Measure resistance between each fuel injector terminals.</p> <p>Terminals</p> <p>No. 1 — No. 2:</p>	Is the resistance between 5 and 20 Ω?	Go to step 6.	Replace faulty fuel injector.
6	<p>CHECK POOR CONTACT.</p> <p>Check poor contact in ECM connector.</p>	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Inspection using "General Diagnostic Table". <Ref. to EN-350, INSPECTION, General Diagnostic Table.>