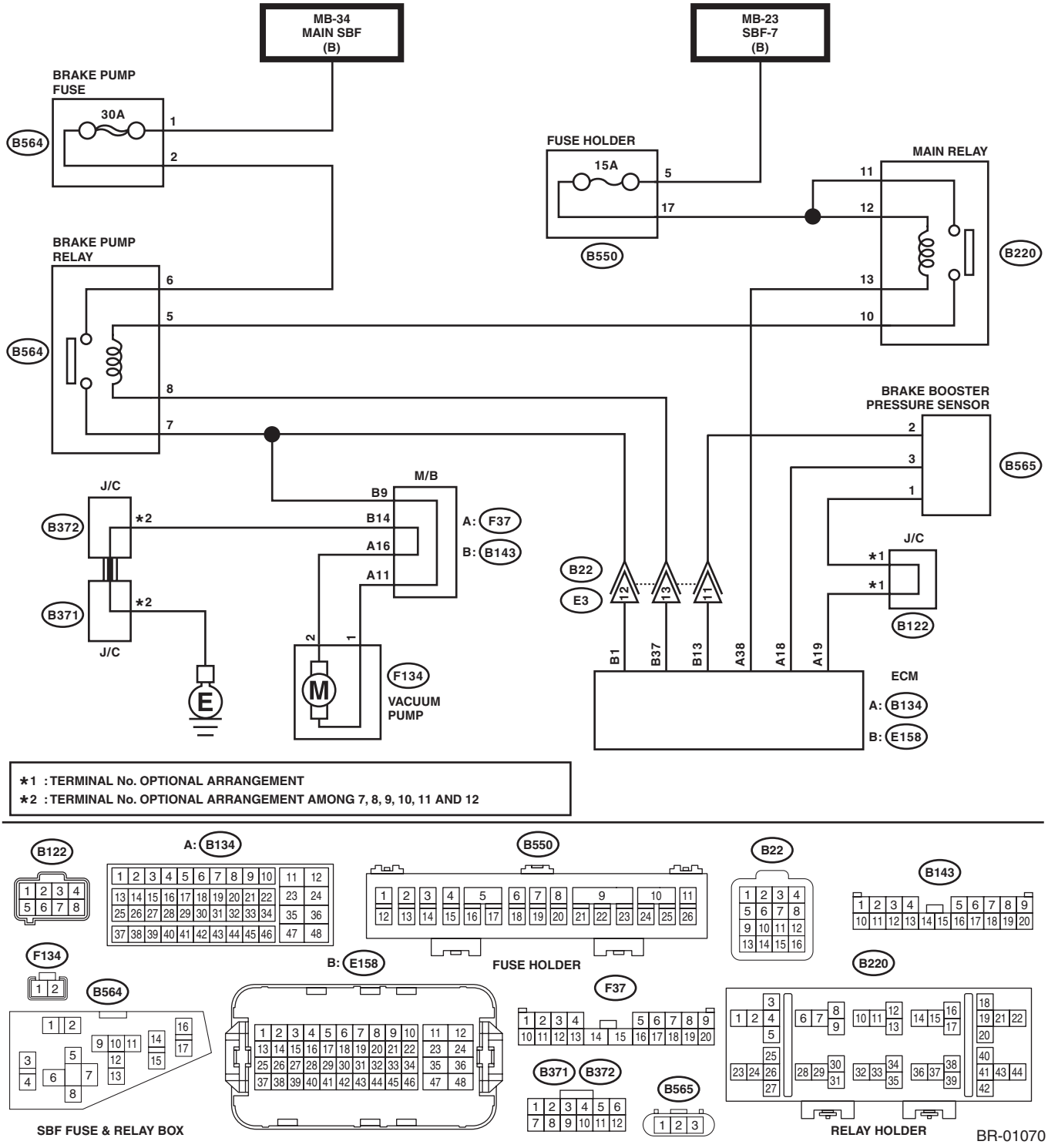
11.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC 11 SENSOR OUTPUT OUT OF RANGE

DTC DETECTING CONDITION:
Brake vacuum sensor output error
TROUBLE SYMPTOM:
Brake vacuum pump does not operate.
WIRING DIAGRAM:
Vacuum pump control system<Ref. to WI-409, WIRING DIAGRAM, Vacuum Pump Control System.>



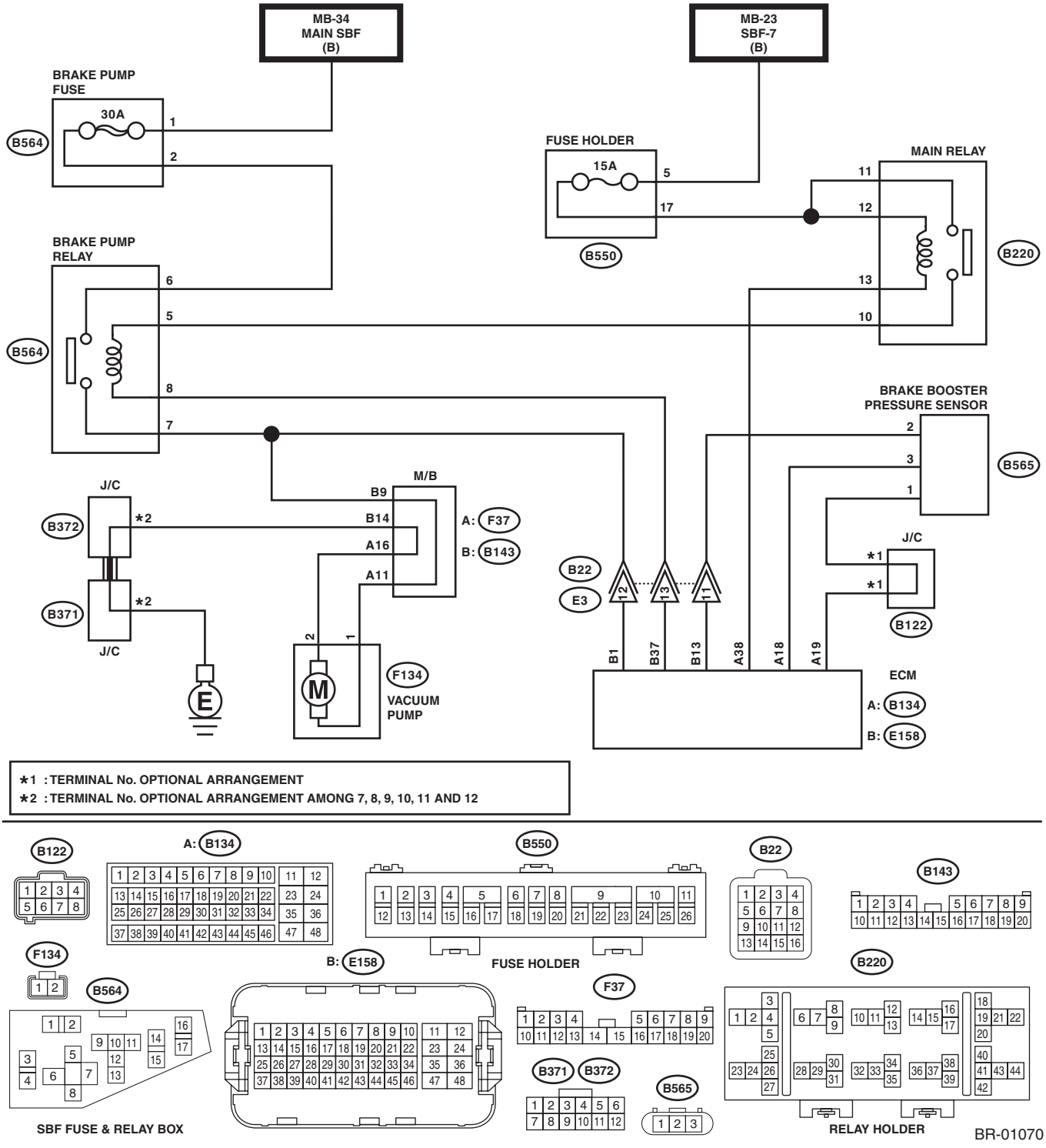
	Step	Check	Yes	No
1	**CHECK BRAKE VACUUM SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum sensor connector. 3) Measure the resistance between brake vacuum sensor connector terminals. ***Terminals*** ***No. 1 — No. 3:*** ***No. 2 — No. 3:***	Is the resistance 15 kΩ or less?	Go to step **2**.	Replace the brake booster.<Ref. to BR-47, Brake Booster.>
2	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and brake vacuum sensor connector terminal. ***Connector & terminal*** ***(B134) No. 18 — (B565) No. 3:*** ***(B134) No. 19 — (B565) No. 1:*** ***(E158) No. 13 — (B565) No. 2:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between ECM and brake vacuum sensor connector terminal.
3	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 18 — Chassis ground:*** ***(B134) No. 19 — Chassis ground:*** ***(E158) No. 13 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **4**.	Repair the ground short circuit of harness between ECM and brake vacuum sensor connector terminal.
4	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 18 (+) — Chassis ground (–):*** ***(B134) No. 19 (+) — Chassis ground (–):*** ***(E158) No. 13 (+) — Chassis ground (–):***	Is the voltage 0.5 V or less?	Go to step **5**.	Repair the short circuit to power supply between the ECM and brake vacuum sensor connector terminal.
5	**CHECK BRAKE VACUUM SENSOR POWER SUPPLY.** 1) Connect the connectors to ECM and brake vacuum sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector terminals. ***Connector & terminal*** ***(B134) No. 18 (+) — (B134) No. 19 (–):***	Is the voltage 4.75 — 5.25 V?	Go to step **6**.	Replace the ECM.<Ref. to FU(H4DOTC)-135, Engine Control Module (ECM).>
6	**CHECK CURRENT DATA.** 1) Turn the ignition switch to ON. 2) Depress the brake pedal several times, until the pedal becomes firm. 3) Read the current data of the brake vacuum pressure pump system using the Subaru Select Monitor.<Ref. to BVC(diag)-9, Subaru Select Monitor.>	Is the barometric pressure — brake booster pressure –1 — +1 kPa?	Temporary poor contact occurs.	Replace the ECM.<Ref. to FU(H4DOTC)-135, Engine Control Module (ECM).>

B: DTC 12 COMPARE ERROR IN OTHER SENSOR

DTC DETECTING CONDITION:
Error in comparison with other brake booster relative pressure

TROUBLE SYMPTOM:
Brake vacuum pump does not operate.

WIRING DIAGRAM:
Vacuum pump control system<Ref. to WI-409, WIRING DIAGRAM, Vacuum Pump Control System.>

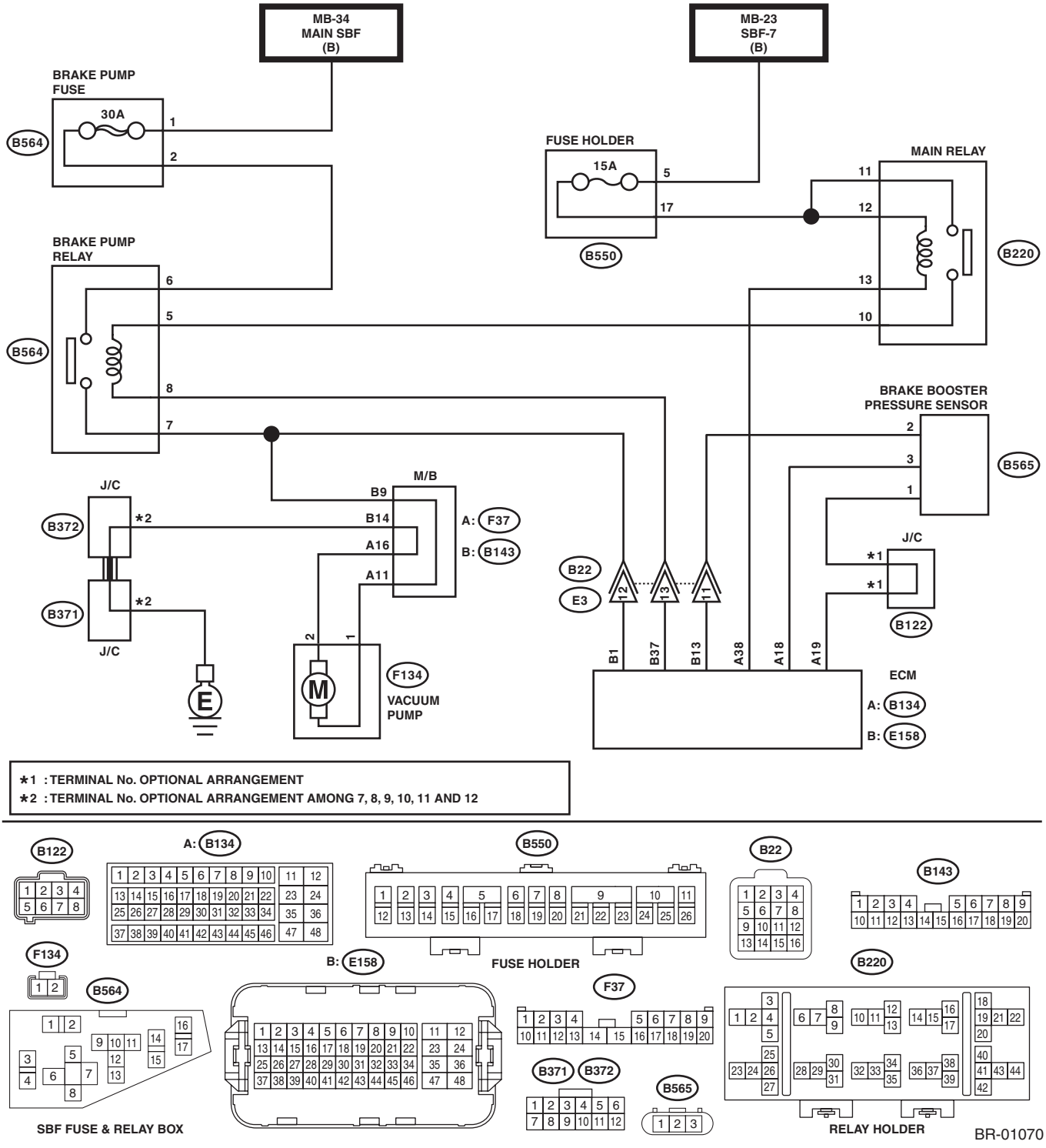


	Step	Check	Yes	No
1	**CHECK BRAKE VACUUM HOSE.** 1) Turn the ignition switch to OFF. 2) Check the status of the brake vacuum hose connection.	Is the brake vacuum hose connected firmly?	Go to step **2**.	Connect the brake vacuum hose.
2	**CHECK BRAKE VACUUM HOSE.** 1) Turn the ignition switch to ON and start engine. 2) Check for leakage from the brake vacuum hose.	Is there a leak from the brake vacuum hose?	Replace the brake vacuum hose.	Go to step **3**.
3	**CHECK BRAKE VACUUM SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum sensor connector. 3) Measure the resistance between brake vacuum sensor connector terminals. ***Terminals*** ***No. 1 — No. 3:*** ***No. 2 — No. 3:***	Is the resistance 15 kΩ or less?	Go to step **4**.	Replace the brake booster.<Ref. to BR-47, Brake Booster.>
4	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and brake vacuum sensor connector terminal. ***Connector & terminal*** ***(B134) No. 18 — (B565) No. 3:*** ***(B134) No. 19 — (B565) No. 1:*** ***(E158) No. 13 — (B565) No. 2:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of harness between ECM and brake vacuum sensor connector terminal.
5	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 18 — Chassis ground:*** ***(B134) No. 19 — Chassis ground:*** ***(E158) No. 13 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **6**.	Repair the ground short circuit between the ECM and brake vacuum sensor connector terminal.
6	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 18 (+) — Chassis ground (–):*** ***(B134) No. 19 (+) — Chassis ground (–):*** ***(E158) No. 13 (+) — Chassis ground (–):***	Is the voltage 0.5 V or less?	Go to step **7**.	Repair the short circuit to power supply in harness between the ECM and brake vacuum sensor connector terminal.
7	**CHECK BRAKE VACUUM SENSOR POWER SUPPLY.** 1) Connect the connectors to ECM and brake vacuum sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector terminals. ***Connector & terminal*** ***(B134) No. 18 (+) — (B134) No. 19 (–):***	Is the voltage 4.75 — 5.25 V?	Go to step **8**.	Replace the ECM.<Ref. to FU(H4DOTC)-135, Engine Control Module (ECM).>

	Step	Check	Yes	No
8	**CHECK CURRENT DATA.** 1) Turn the ignition switch to ON. 2) Depress the brake pedal several times, until the pedal becomes firm. 3) Read the current data of the brake vacuum pressure pump system using the Subaru Select Monitor.<Ref. to BVC(diag)-9, Subaru Select Monitor.>	Is the barometric pressure — brake booster pressure –1 — +1 kPa?	Temporary poor contact occurs.	Replace the ECM.<Ref. to FU(H4DOTC)-135, Engine Control Module (ECM).>

C: DTC 13 PRESSURE SENSOR SIGNAL FREEZE

DTC DETECTING CONDITION:
Brake vacuum sensor seizure malfunction
TROUBLE SYMPTOM:
Brake vacuum pump does not operate.
WIRING DIAGRAM:
Vacuum pump control system<Ref. to WI-409, WIRING DIAGRAM, Vacuum Pump Control System.>



	Step	Check	Yes	No
1	**CHECK BRAKE VACUUM HOSE.** 1) Turn the ignition switch to OFF. 2) Check the status of the brake vacuum hose connection.	Is the brake vacuum hose connected firmly?	Go to step **2**.	Connect the brake vacuum hose.
2	**CHECK BRAKE VACUUM HOSE.** 1) Turn the ignition switch to ON and start engine. 2) Check for leakage from the brake vacuum hose.	Is there a leak from the brake vacuum hose?	Replace the brake vacuum hose.	Go to step **3**.
3	**CHECK BRAKE VACUUM SENSOR CONNECTOR.** Check the status of the brake vacuum sensor connector connection.	Is the brake vacuum sensor connector connected firmly?	Go to step **4**.	Connect the brake vacuum sensor connector.
4	**CHECK BRAKE VACUUM SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum sensor connector. 3) Measure the resistance between brake vacuum sensor connector terminals. ***Connector & terminal*** ***No. 1 — No. 3:*** ***No. 2 — No. 3:***	Is the resistance 15 kΩ or less?	Go to step **5**.	Replace the brake booster.<Ref. to BR-47, Brake Booster.>
5	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and brake vacuum sensor connector terminal. ***Connector & terminal*** ***(B134) No. 18 — (B565) No. 3:*** ***(B134) No. 19 — (B565) No. 1:*** ***(E158) No. 13 — (B565) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between ECM and brake vacuum sensor connector terminal.
6	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 18 — Chassis ground:*** ***(B134) No. 19 — Chassis ground:*** ***(E158) No. 13 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **7**.	Repair the ground short circuit of harness between ECM and brake vacuum sensor connector terminal.
7	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 18 (+) — Chassis ground (–):*** ***(B134) No. 19 (+) — Chassis ground (–):*** ***(E158) No. 13 (+) — Chassis ground (–):***	Is the voltage 0.5 V or less?	Go to step **8**.	Repair the short circuit to power supply in harness between the ECM and brake vacuum sensor connector terminal.
8	**CHECK BRAKE VACUUM SENSOR POWER SUPPLY.** 1) Connect the connectors to ECM and brake vacuum sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector terminals. ***Connector & terminal*** ***(B134) No. 18 (+) — (B134) No. 19 (–):***	Is the voltage 4.75 — 5.25 V?	Go to step **9**.	Replace the ECM.<Ref. to FU(H4DOTC)-135, Engine Control Module (ECM).>

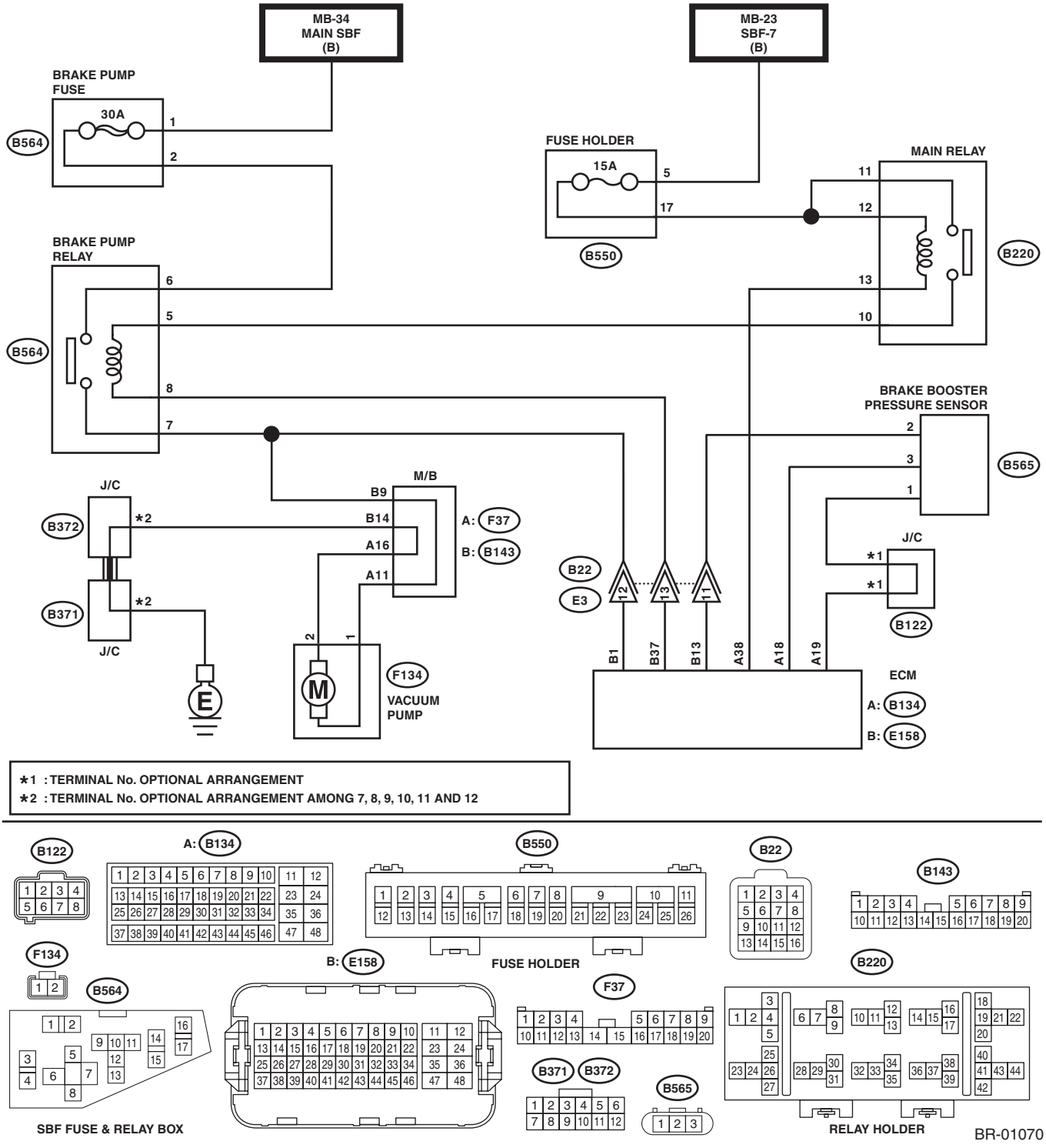
	Step	Check	Yes	No
9	**CHECK CURRENT DATA.** 1) Turn the ignition switch to ON. 2) Depress the brake pedal several times, until the pedal becomes firm. 3) Read the current data of the brake vacuum pressure pump system using the Subaru Select Monitor.<Ref. to BVC(diag)-9, Subaru Select Monitor.>	Is the barometric pressure — brake booster pressure –1 — +1 kPa?	Temporary poor contact occurs.	Replace the ECM.<Ref. to FU(H4DOTC)-135, Engine Control Module (ECM).>

D: DTC 21 DISCREPANCY IN RELAYS (ON)

DTC DETECTING CONDITION:
Drive does not match between brake vacuum pump relay and brake vacuum pump.

TROUBLE SYMPTOM:
Brake vacuum pump does not operate.

WIRING DIAGRAM:
Vacuum pump control system <Ref. to WI-409, WIRING DIAGRAM, Vacuum Pump Control System.>



	Step	Check	Yes	No
1	**CHECK CONNECTOR.** Check the status of the brake vacuum sensor and brake vacuum pump connection.	Are the brake vacuum sensor and brake vacuum pump connected firmly?	Go to step **2**.	Connect the connector.
2	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the brake vacuum pump fuse. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step **3**.
3	**CHECK BRAKE VACUUM PUMP RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the brake vacuum pump relay from relay box. 3) Connect the battery to the brake vacuum pump relay terminals No. 5 and No. 8. 4) Measure the resistance between brake vacuum pump relay terminals. ***Terminals*** ***No. 6 — No. 7:***	Is the resistance less than 1 Ω?	Go to step **4**.	Replace the brake vacuum pump relay.
4	**CHECK BRAKE VACUUM PUMP RELAY POWER SUPPLY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between brake vacuum pump replay connector and chassis ground. ***Connector & terminal*** ***(B564) No. 5 (+) — Chassis ground (–):*** ***(B564) No. 6 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **5**.	Repair the open or ground short circuit of power supply circuit.
5	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the ECM connector. 3) Measure the resistance of harness between ECM and brake vacuum pump relay connector terminal. ***Connector & terminal*** ***(E158) No. 37 — (B564) No. 8:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between ECM and the brake vacuum pump relay connector terminal.
6	**CHECK HARNESS BETWEEN THE BRAKE VACUUM PUMP AND BRAKE VACUUM PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum pump connector. 3) Measure the resistance of harness between brake vacuum pump and brake vacuum pump relay connector terminal. ***Connector & terminal*** ***(B564) No. 7 — (F134) No. 1:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair the open circuit of harness between brake vacuum pump and brake vacuum pump relay connector terminal.
7	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM PUMP CONNECTOR.** Measure the resistance of harness between brake vacuum pump connector and chassis ground. ***Connector & terminal*** ***(F134) No. 1 — Chassis ground:***	Is the resistance 1 MΩ or more?	Go to step **8**.	Repair the ground short circuit of harness between ECM and brake vacuum pump connector terminal.

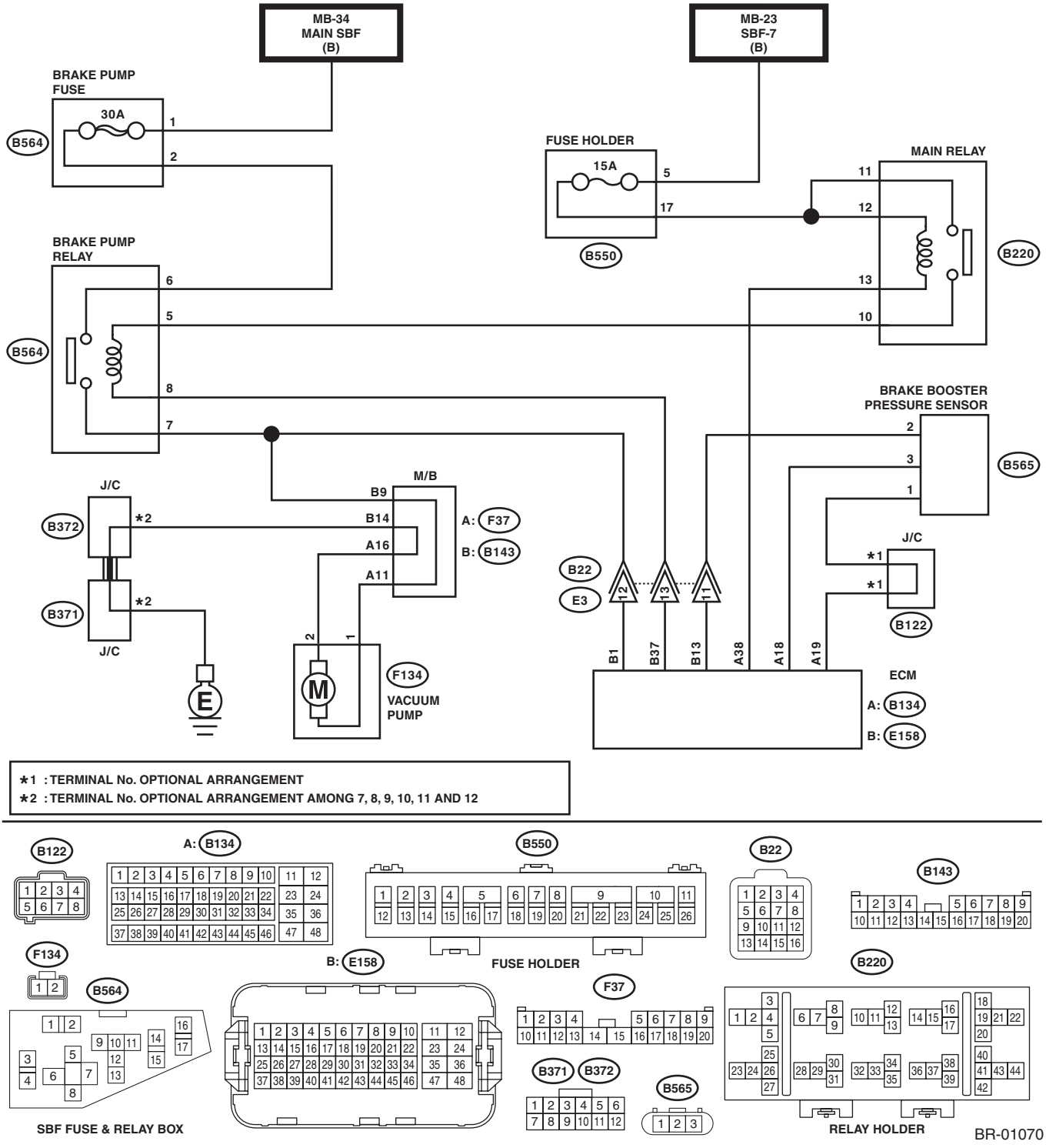
	Step	Check	Yes	No
8	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM PUMP CONNECTOR.** Measure the voltage between brake vacuum pump connector and chassis ground. ***Connector & terminal*** ***(F134) No. 1 (+) — Chassis ground (–):***	Is the voltage 0.5 V or less?	Go to step **9**.	Repair the short circuit to power supply in harness between the ECM and brake vacuum pump connector terminal.
9	**CHECK BRAKE VACUUM PUMP.** 1) Turn the ignition switch to OFF. 2) Remove the brake vacuum pump. <Ref. to BR-75, REMOVAL, Brake Vacuum Pump.> 3) Connect the battery positive terminal to the brake vacuum pump terminal No. 1, and the negative terminal to terminal No. 2.	Does the brake vacuum pump operate?	Go to step **10**.	Replace the brake vacuum pump. <Ref. to BR-75, Brake Vacuum Pump.>
10	**CHECK BRAKE VACUUM PUMP.** 1) Connect the brake vacuum pump relay. 2) Connect the connectors to the brake vacuum pump and ECM. 3) Turn the ignition switch to ON. 4) Execute the Function Check Mode of the brake vacuum pressure pump system using the Subaru Select Monitor. <Ref. to BVC(diag)-9, Subaru Select Monitor.>	Does the brake vacuum pump operate?	Temporary poor contact occurs.	Replace the ECM. <Ref. to FU(H4DOTC)-135, Engine Control Module (ECM).>

E: DTC 22 DISCREPANCY IN RELAYS (OFF)

DTC DETECTING CONDITION:
Drive does not match between brake vacuum pump relay and brake vacuum pump.

TROUBLE SYMPTOM:
Vacuum pump does not operate properly.

WIRING DIAGRAM:
Vacuum pump control system <Ref. to WI-409, WIRING DIAGRAM, Vacuum Pump Control System.>



	Step	Check	Yes	No
1	**CHECK BRAKE VACUUM PUMP RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the brake vacuum pump relay from relay box. 3) Connect the battery to the brake vacuum pump relay terminals No. 5 and No. 8. 4) Measure the resistance between brake vacuum pump relay terminals. ***Terminals*** ***No. 6 — No. 7:***	Is the resistance less than 1 Ω?	Go to step **2**.	Replace the brake vacuum pump relay.
2	**CHECK BRAKE VACUUM PUMP RELAY POWER SUPPLY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between brake vacuum pump replay connector and chassis ground. ***Connector & terminal*** ***(B564) No. 5 (+) — Chassis ground (–):*** ***(B564) No. 6 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **3**.	Repair the open or ground short circuit of power supply circuit.
3	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the ECM connector. 3) Measure the resistance of harness between ECM and brake vacuum pump relay connector terminal. ***Connector & terminal*** ***(E158) No. 1 — (B564) No. 7:*** ***(E158) No. 37 — (B564) No. 8:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between ECM and the brake vacuum pump relay connector terminal.
4	**CHECK HARNESS BETWEEN THE BRAKE VACUUM PUMP AND BRAKE VACUUM PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum pump connector. 3) Measure the resistance of harness between brake vacuum pump and brake vacuum pump relay connector terminal. ***Connector & terminal*** ***(B564) No. 7 — (F134) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of harness between brake vacuum pump and brake vacuum pump relay connector terminal.
5	**CHECK MOTOR GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum pump connector. 3) Measure the resistance between brake vacuum pump connector and chassis ground. ***Connector & terminal*** ***(F134) No. 2 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the ground circuit.
6	**CHECK BRAKE VACUUM PUMP.** 1) Turn the ignition switch to OFF. 2) Remove the brake vacuum pump. <Ref. to BR-75, REMOVAL, Brake Vacuum Pump.> 3) Connect the battery to the brake vacuum pump terminals No. 1 (+) and No. 2 (–).	Does the brake vacuum pump operate?	Go to step **7**.	Replace the brake vacuum pump. <Ref. to BR-75, Brake Vacuum Pump.>

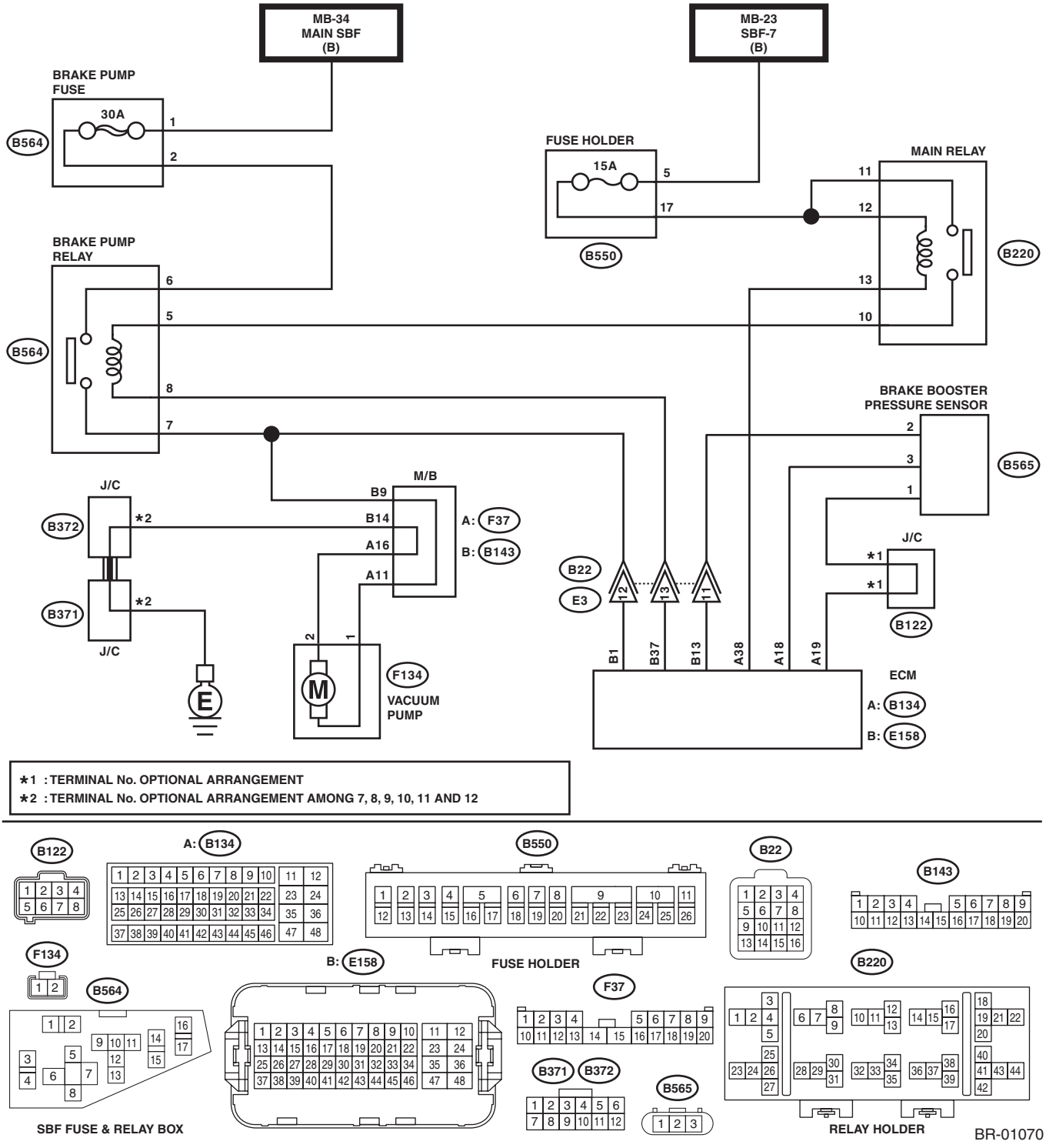
Step		Check	Yes	No
7	**CHECK ECM.** 1) Connect the brake vacuum pump, brake vacuum pump relay, and connector. 2) Perform the Sequence Control Mode. <Ref. to BVC(diag)-9, SEQUENCE CONTROL MODE, OPERATION, Subaru Select Monitor.>	Does the brake vacuum pump operate?	Temporary poor contact occurs.	Replace the ECM. <Ref. to FU(H4DOTC)-135, Engine Control Module (ECM).>

F: DTC 23 PUMP CONTINUOUS WORK

DTC DETECTING CONDITION:
Malfunction in brake vacuum pump continuous drive error

TROUBLE SYMPTOM:
Brake vacuum pump operates continuously.

WIRING DIAGRAM:
Vacuum pump control system <Ref. to WI-409, WIRING DIAGRAM, Vacuum Pump Control System.>



	Step	Check	Yes	No
1	**CHECK BRAKE VACUUM HOSE.** 1) Turn the ignition switch to OFF. 2) Check the status of the brake vacuum hose connection.	Is the brake vacuum hose connected firmly?	Go to step **2**.	Connect the brake vacuum hose.
2	**CHECK BRAKE VACUUM HOSE.** 1) Turn the ignition switch to ON and start engine. 2) Check for leakage from the brake vacuum hose.	Is there a leak from the brake vacuum hose?	Replace the brake vacuum hose.	Go to step **3**.
3	**CHECK BRAKE VACUUM PUMP RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the brake vacuum pump relay from relay box. 3) Connect the battery to the brake vacuum pump relay terminals No. 5 and No. 8. 4) Measure the resistance between brake vacuum pump relay terminals. ***Terminals*** ***No. 6 — No. 7:***	Is the resistance less than 1 Ω?	Go to step **4**.	Replace the brake vacuum pump relay.
4	**CHECK BRAKE VACUUM PUMP RELAY POWER SUPPLY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between brake vacuum pump replay connector and chassis ground. ***Connector & terminal*** ***(B564) No. 5 (+) — Chassis ground (–):*** ***(B564) No. 6 (+) — Chassis ground (–):***	Is the voltage 10 V or more?	Go to step **5**.	Repair the open or ground short circuit of power supply circuit.
5	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the ECM connector. 3) Measure the resistance of harness between ECM and brake vacuum pump relay connector terminal. ***Connector & terminal*** ***(E158) No. 1 — (B564) No. 7:*** ***(E158) No. 37 — (B564) No. 8:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between ECM and the brake vacuum pump relay connector terminal.
6	**CHECK HARNESS BETWEEN THE BRAKE VACUUM PUMP AND BRAKE VACUUM PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum pump connector. 3) Measure the resistance of harness between brake vacuum pump and brake vacuum pump relay connector terminal. ***Connector & terminal*** ***(B564) No. 7 — (F134) No. 1:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair the open circuit of harness between brake vacuum pump and brake vacuum pump relay connector terminal.
7	**CHECK ECM.** 1) Connect the brake vacuum pump, brake vacuum pump relay, and connector. 2) Perform the Sequence Control Mode. <Ref. to BVC(diag)-9, SEQUENCE CONTROL MODE, OPERATION, Subaru Select Monitor.>	Does the brake vacuum pump operate?	Temporary poor contact occurs.	Replace the ECM. <Ref. to FU(H4DOTC)-135, Engine Control Module (ECM).>