11.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC 11 SENSOR OUTPUT OUT OF RANGE

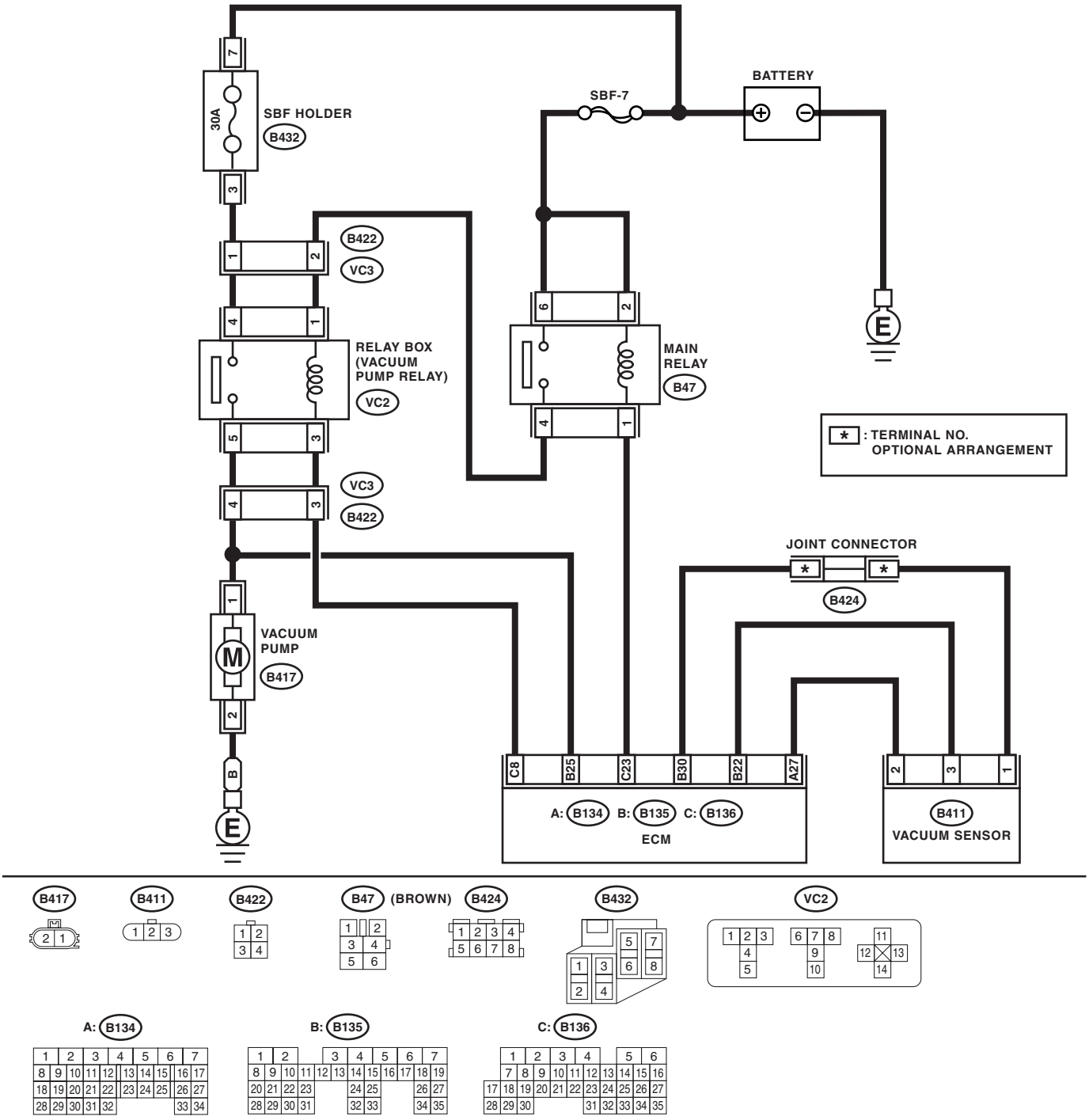
DTC DETECTING CONDITION:

Brake vacuum sensor malfunction

TROUBLE SYMPTOM:

Brake vacuum pump does not operate.

WIRING DIAGRAM:



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	Step	Check	Yes	No
1	**CHECK BRAKE VACUUM SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum sensor connector. 3) Remove the brake vacuum sensor. <Ref. to BR-40, REMOVAL, Brake Vacuum Sensor.> 4) 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 vacuum sensor. <Ref. to BR-40, Brake Vacuum Sensor.>
2	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** 1) Disconnect the connectors from ECM. 2) Measure the resistance of the harness between ECM and the brake vacuum sensor connector. ***Connector & terminal*** ***(B135) No. 30 — (B411) No. 1:*** ***(B135) No. 22 — (B411) No. 3:*** ***(B134) No. 27 — (B411) 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.
3	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 30 — Chassis ground:*** ***(B135) No. 22 — Chassis ground:*** ***(B134) No. 27 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair the ground short of the harness between ECM and brake vacuum sensor connector.
4	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 30 (+) — Chassis ground (–):*** ***(B135) No. 22 (+) — Chassis ground (–):*** ***(B134) No. 27 (+) — Chassis ground (–):***	Is the voltage less than 0.5 V?	Go to step **5**.	Repair the battery short circuit between ECM and brake vacuum sensor connector.
5	**CHECK THE 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*** ***(B135) No. 22 (+) — (B135) No. 30 (–):***	Is the voltage 4.75 — 5.25 V?	Go to step **6**.	Replace the ECM. <Ref. to FU(H6DO)-32, 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 negative pressure pump system using the Subaru Select Monitor. <Ref. to BVC(diag)-9, Subaru Select Monitor.>	Is the atmospheric pressure — brake booster pressure between –8 — +8 mmHg?	Temporary poor contact occurs.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

B: DTC 12 COMPARE ERROR IN OTHER SENSOR

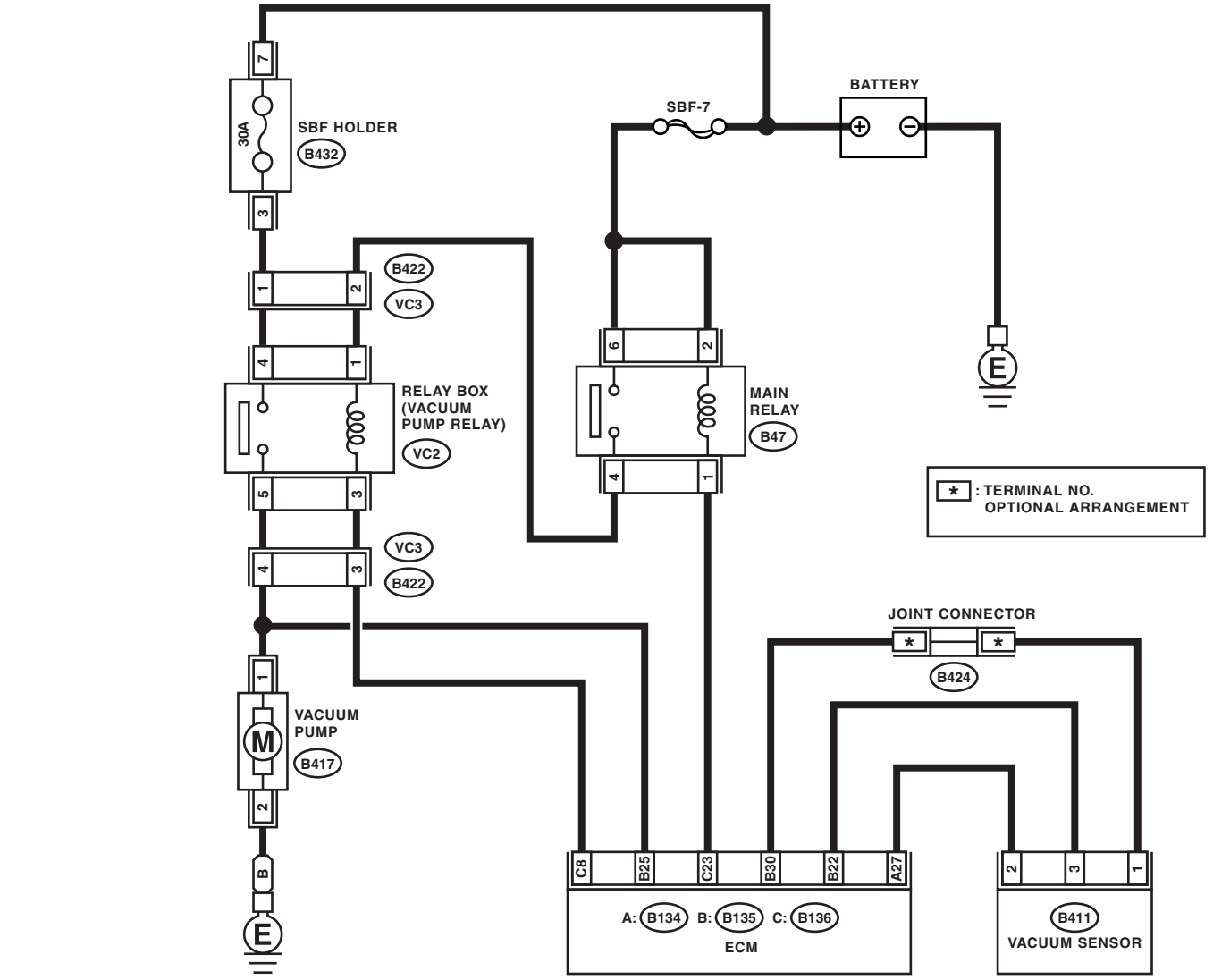
DTC DETECTING CONDITION:

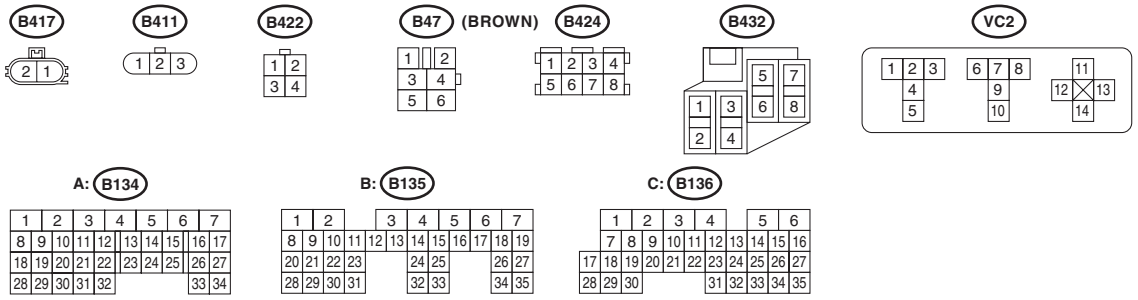
Brake vacuum sensor malfunction

TROUBLE SYMPTOM:

Brake vacuum pump does not operate.

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK BRAKE VACUUM HOSE.** 1) Turn the ignition switch to OFF. 2) Check that 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) Remove the brake vacuum sensor. <Ref. to BR-40, REMOVAL, Brake Vacuum Sensor.> 4) 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 vacuum sensor. <Ref. to BR-40, Brake Vacuum Sensor.>
4	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** 1) Disconnect the connectors from ECM. 2) Measure the resistance of the harness between ECM and the brake vacuum sensor connector. ***Connector & terminal*** ***(B135) No. 30 — (B411) No. 1:*** ***(B135) No. 22 — (B411) No. 3:*** ***(B134) No. 27 — (B411) 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.
5	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 30 — Chassis ground:*** ***(B135) No. 22 — Chassis ground:*** ***(B134) No. 27 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair the ground short circuit between ECM and brake vacuum sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 30 (+) — Chassis ground (–):*** ***(B135) No. 22 (+) — Chassis ground (–):*** ***(B134) No. 27 (+) — Chassis ground (–):***	Is the voltage less than 0.5 V?	Go to step **7**.	Repair the battery short of the harness between ECM and brake vacuum sensor connector.
7	**CHECK THE 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*** ***(B135) No. 22 (+) — (B135) No. 30 (–):***	Is the voltage 4.75 — 5.25 V?	Go to step **8**.	Replace the ECM. <Ref. to FU(H6DO)-32, 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 negative pressure pump system using the Subaru Select Monitor. <Ref. to BVC(diag)-9, Subaru Select Monitor.>	Is the atmospheric pressure — brake booster pressure between –8 — +8 mmHg?	Temporary poor contact occurs.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

C: DTC 13 PRESSURE SENSOR OUTPUT

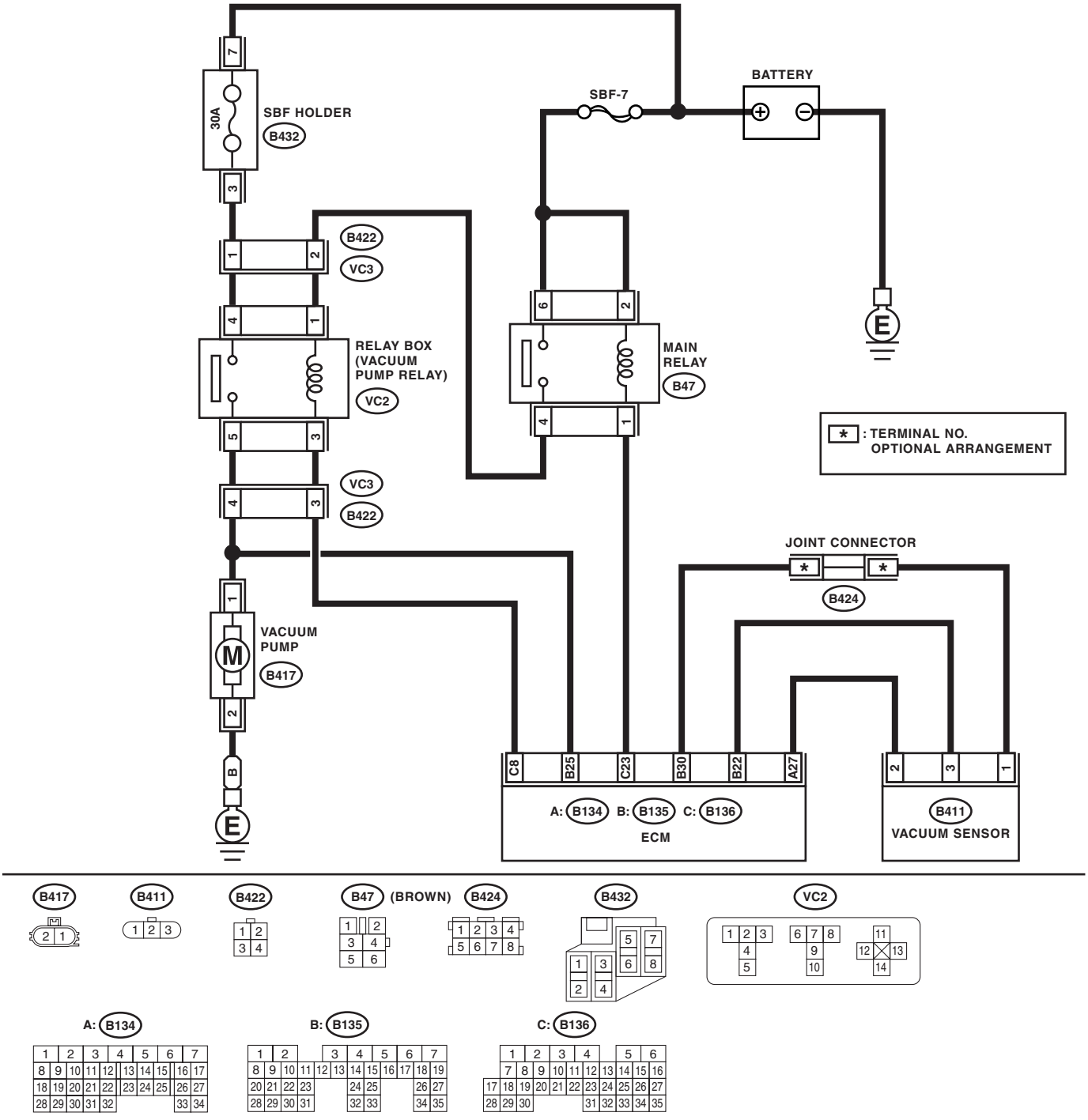
DTC DETECTING CONDITION:

Brake vacuum sensor malfunction

TROUBLE SYMPTOM:

Brake vacuum pump does not operate.

WIRING DIAGRAM:



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	Step	Check	Yes	No
1	**CHECK BRAKE VACUUM HOSE.** 1) Turn the ignition switch to OFF. 2) Check that 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 that 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) Remove the brake vacuum sensor. <Ref. to BR-40, REMOVAL, Brake Vacuum Sensor.> 4) 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 vacuum sensor. <Ref. to BR-40, Brake Vacuum Sensor.>
5	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** 1) Disconnect the connectors from ECM. 2) Measure the resistance of the harness between ECM and the brake vacuum sensor connector. ***Connector & terminal*** ***(B135) No. 30 — (B411) No. 1:*** ***(B135) No. 22 — (B411) No. 3:*** ***(B134) No. 27 — (B411) 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.
6	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 30 — Chassis ground:*** ***(B135) No. 22 — Chassis ground:*** ***(B134) No. 27 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Repair the ground short of the harness between ECM and brake vacuum sensor connector.
7	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 30 (+) — Chassis ground (–):*** ***(B135) No. 22 (+) — Chassis ground (–):*** ***(B134) No. 27 (+) — Chassis ground (–):***	Is the voltage less than 0.5 V?	Go to step **8**.	Repair the battery short of the harness between ECM and brake vacuum sensor connector.
8	**CHECK THE 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*** ***(B135) No. 22 (+) — (B135) No. 30 (–):***	Is the voltage 4.75 — 5.25 V?	Go to step **9**.	Replace the ECM. <Ref. to FU(H6DO)-32, 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 negative pressure pump system using the Subaru Select Monitor. <Ref. to BVC(diag)-9, Subaru Select Monitor.>	Is the atmospheric pressure — brake booster pressure between –8 — +8 mmHg?	Temporary poor contact occurs.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

D: DTC 21 DISCREPANCY IN RELAYS (ON)

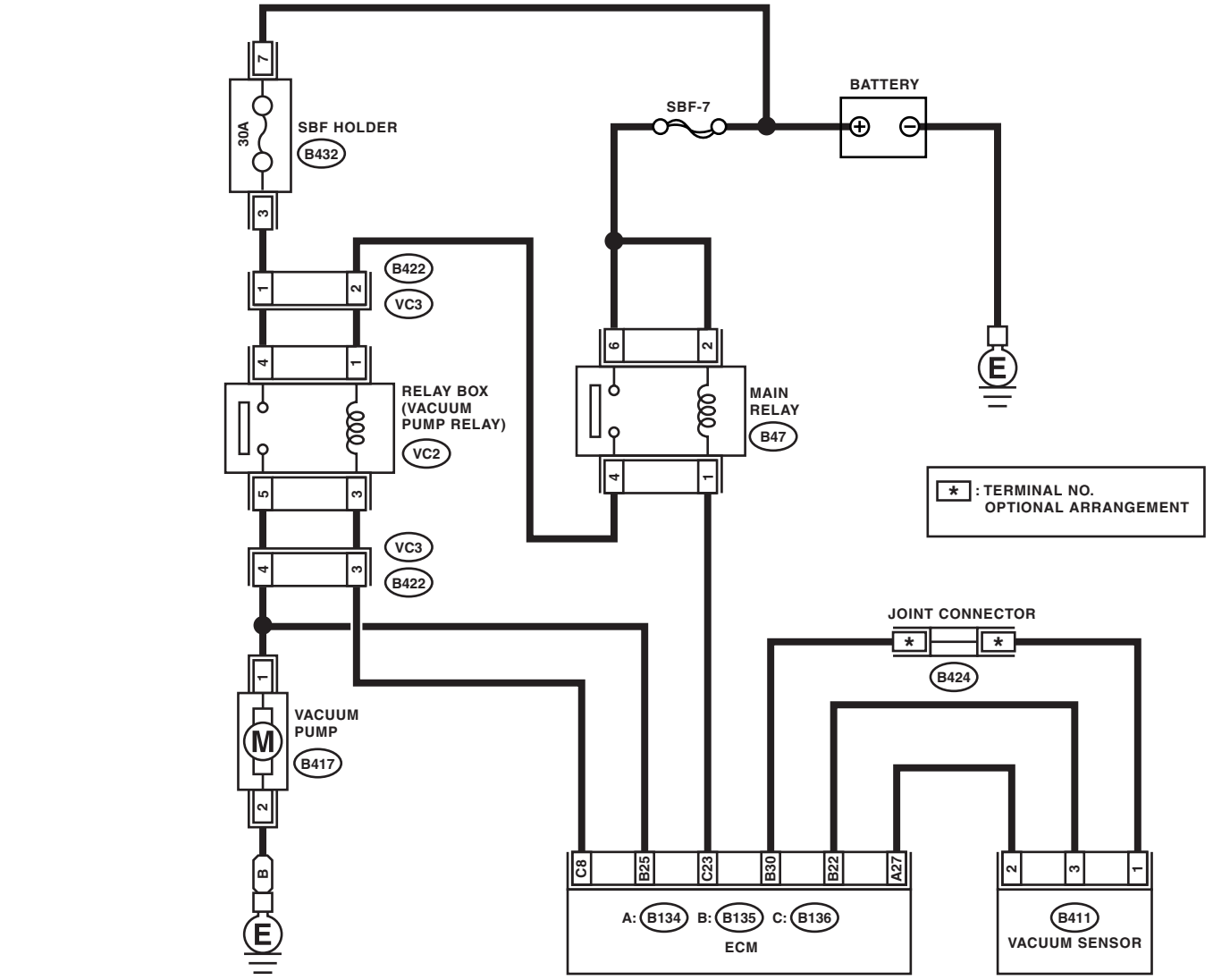
DTC DETECTING CONDITION:

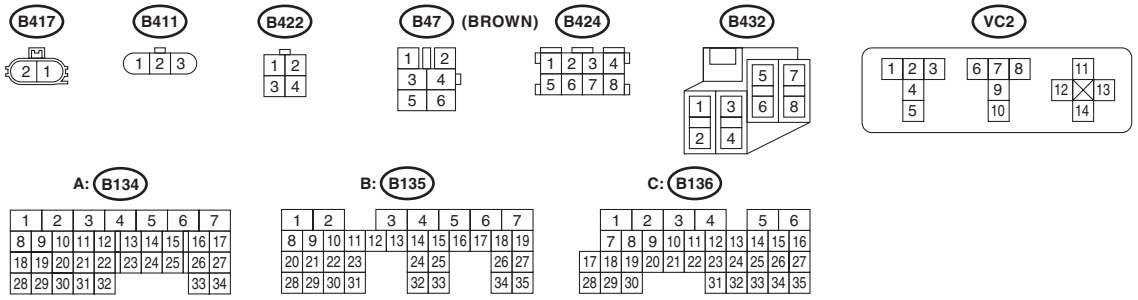
Brake vacuum pump relay malfunction

TROUBLE SYMPTOM:

Brake vacuum pump does not operate.

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK CONNECTOR.** Check that 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 the relay box. 3) Connect the battery to terminals No. 1 and No. 3 of the brake vacuum pump relay. 4) Measure the resistance between the brake vacuum pump relay terminals. ***Terminals*** ***No. 4 — No. 5:***	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 relay connector and chassis ground. ***Connector & terminal*** ***(VC2) No. 1 (+) — Chassis ground (–):*** ***(VC2) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	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 connector of ECM. 3) Measure the resistance of the harness between ECM and the brake vacuum pump relay connector. ***Connector & terminal*** ***(B136) No. 8 — (VC2) No. 3:***	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.
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 the harness between the brake vacuum pump and brake vacuum pump relay connector. ***Connector & terminal*** ***(VC2) No. 5 — (B417) No. 1:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair the open circuit of the harness between the brake vacuum pump and the brake vacuum pump relay connector.
7	**CHECK THE HARNESS BETWEEN ECM AND BRAKE VACUUM PUMP CONNECTOR.** Measure the resistance of the harness between brake vacuum pump connector and the chassis ground. ***Connector & terminal*** ***(B417) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8**.	Repair the ground short of the harness between ECM and brake vacuum pump connector.
8	**CHECK THE HARNESS BETWEEN ECM AND BRAKE VACUUM PUMP CONNECTOR.** Measure the voltage between brake vacuum pump connector and the chassis ground. ***Connector & terminal*** ***(B417) No. 1 (+) — Chassis ground (–):***	Is the voltage less than 0.5 V?	Go to step **9**.	Repair the battery short of the harness between the ECM and the brake vacuum pump connector.

	Step	Check	Yes	No
9	**CHECK BRAKE VACUUM PUMP.** 1) Turn the ignition switch to OFF. 2) Remove the brake vacuum pump. <Ref. to BR-39, 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.	Is the brake vacuum pump operating?	Go to step **10**.	Replace the brake vacuum pump. <Ref. to BR-39, 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 brake negative pressure pump system function check mode using the Subaru Select Monitor. <Ref. to BVC(diag)-9, Subaru Select Monitor.>	Is the brake vacuum pump operating?	Temporary poor contact occurs.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

E: DTC 22 DISCREPANCY IN RELAYS (OFF)

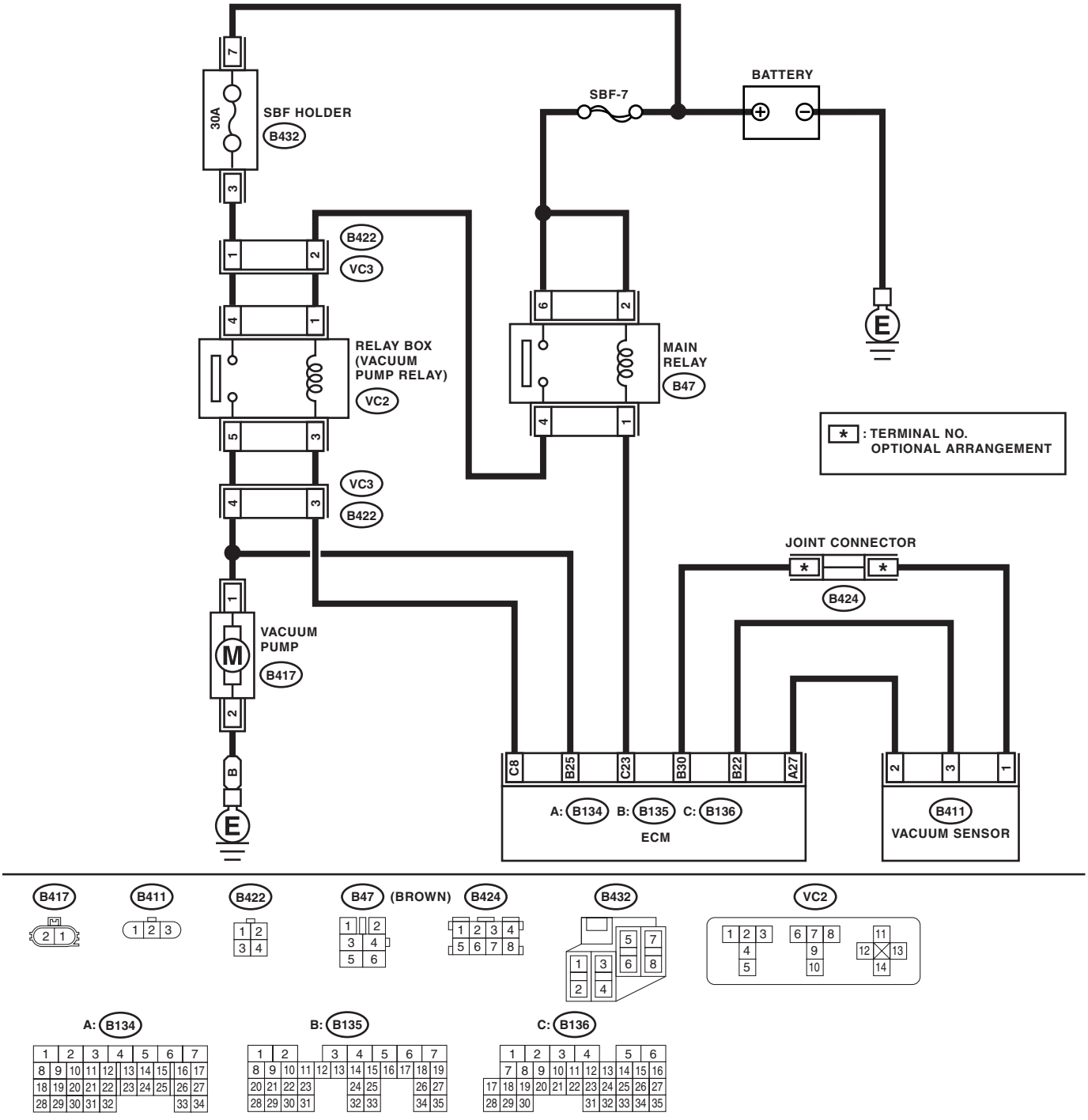
DTC DETECTING CONDITION:

Brake vacuum pump relay malfunction

TROUBLE SYMPTOM:

Vacuum pump does not operate properly.

WIRING DIAGRAM:



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	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 the relay box. 3) Connect the battery to terminals No. 1 and No. 3 of the brake vacuum pump relay. 4) Measure the resistance between the brake vacuum pump relay terminals. ***Terminals*** ***No. 4 — No. 5:***	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 relay connector and chassis ground. ***Connector & terminal*** ***(VC2) No. 1 (+) — Chassis ground (–):*** ***(VC2) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	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 connector of ECM. 3) Measure the resistance of the harness between ECM and the brake vacuum pump relay connector. ***Connector & terminal*** ***(B136) No. 8 — (VC2) No. 3:*** ***(B135) No. 25 — (VC2) No. 5:***	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.
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 the harness between the brake vacuum pump and brake vacuum pump relay connector. ***Connector & terminal*** ***(VC2) No. 5 — (B417) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of the harness between the brake vacuum pump and the brake vacuum pump relay connector.
5	**CHECK ECM.** 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) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 8 — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Temporary poor contact occurs.

F: DTC 23 PUMP CONTINUOUS OPERATION

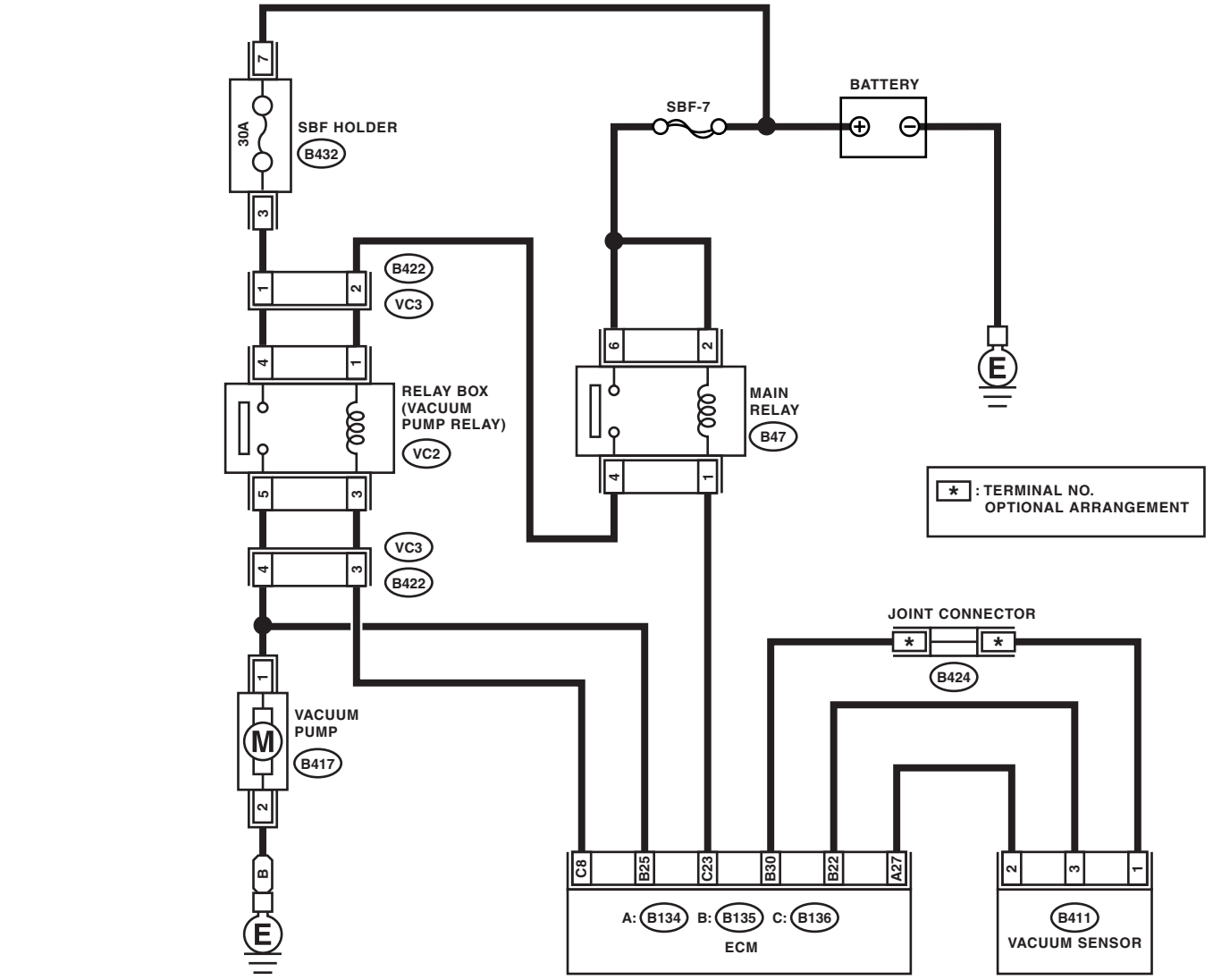
DTC DETECTING CONDITION:

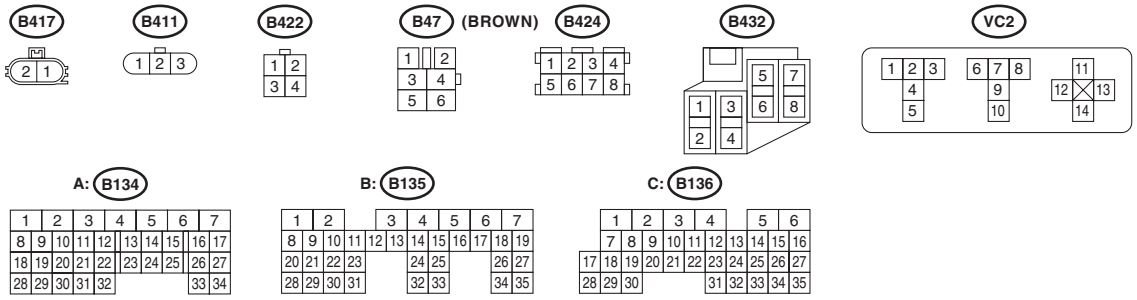
Brake vacuum pump malfunction

TROUBLE SYMPTOM:

Break vacuum pump operates continuously.

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK BRAKE VACUUM HOSE.** 1) Turn the ignition switch to OFF. 2) Check that 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 the relay box. 3) Connect the battery to terminals No. 1 and No. 3 of the brake vacuum pump relay. 4) Measure the resistance between the brake vacuum pump relay terminals. ***Terminals*** ***No. 4 — No. 5:***	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 relay connector and chassis ground. ***Connector & terminal*** ***(VC2) No. 1 (+) — Chassis ground (–):*** ***(VC2) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	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 connector of ECM. 3) Measure the resistance of the harness between ECM and the brake vacuum pump relay connector. ***Connector & terminal*** ***(B136) No. 8 — (VC2) No. 3:*** ***(B135) No. 25 — (VC2) No. 5:***	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.
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 the harness between the brake vacuum pump and brake vacuum pump relay connector. ***Connector & terminal*** ***(VC2) No. 5 — (B417) No. 1:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair the open circuit of the harness between the brake vacuum pump and the brake vacuum pump relay connector.
7	**CHECK ECM.** 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) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 8 — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Temporary poor contact occurs.