VOLVO
Construction Equipment

**Service Information**

| Document Title: **Hydraulic brake system, description** | Function Group: **520** | Information Type: **Service Information** | Date: **2014/4/27** |
|---|---|---|---|
| Profile: **EXC, EW140D [GB]** | | | |

# Hydraulic brake system, description

**Travel brake**

**Step 1**

When the diesel engine is started, pump **76** supplies oil to brake valve **38**. The oil flow passes through priority valve **38:1** and on via non-return valves **38:2**, **38:3** and **38:4** to brake accumulators **74** and to valve **38:5**, which controls the charging of the brake system. The charging is controlled via signal lines to both sides of valve **38:5**.

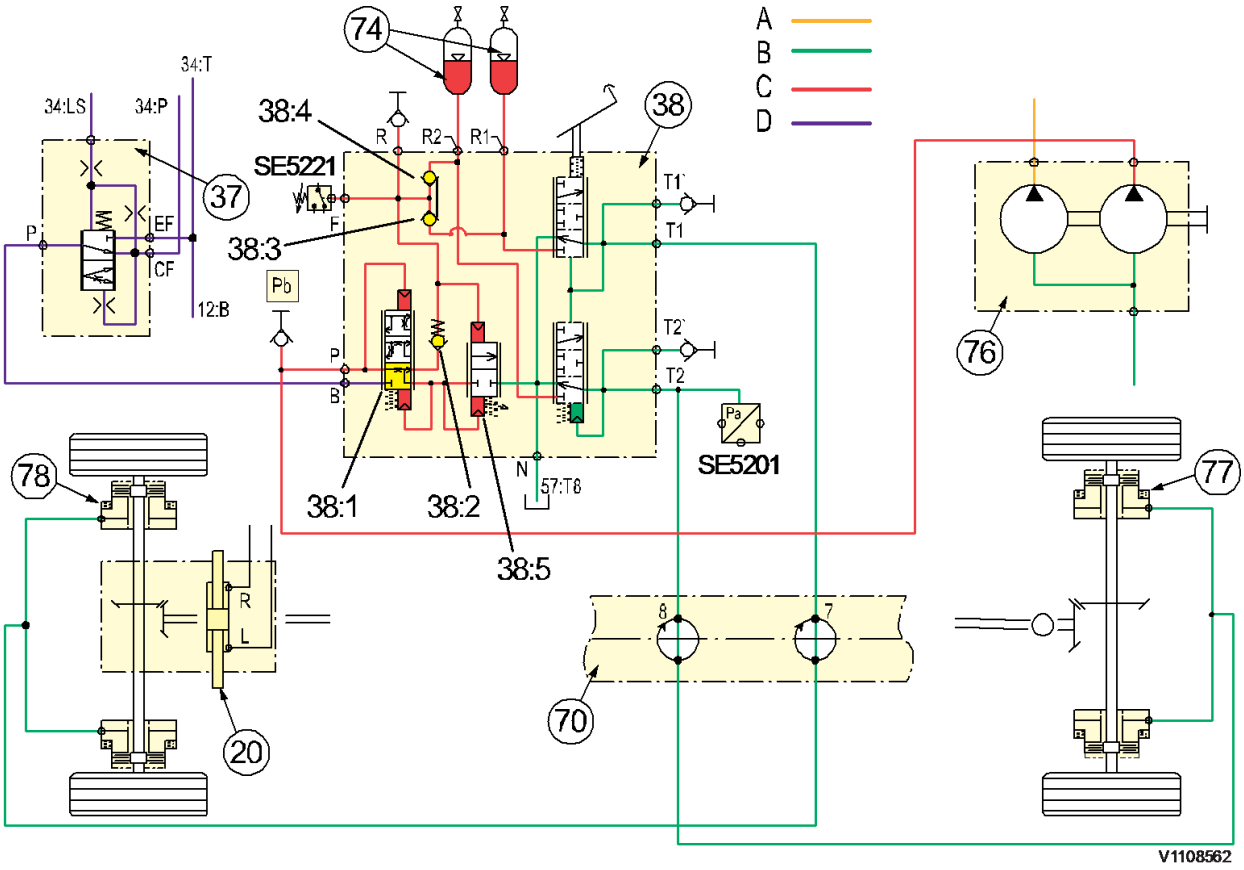



**Figure 1**
**Step 1**

| | | | | | |
|---|---|---|---|---|---|
| 20 | Steering cylinder | 77 | Rear axle brake | 38:1 | Priority valve, brake |
| 37 | Priority valve, steering | 78 | Front axle brake | 38:2 | Non-return valve with spring |
| 38 | Brake valve | A | Servo pressure | 38:3 | Non-return valve |
| 70 | Centre passage | B | Return pressure | 38:4 | Non-return valve |
| 74 | Accumulator tank for brake pressure | C | Pump pressure | 38:5 | Valve, charging accumulators |
| 76 | Pump | D | Trapped oil | | |

**Step 2**

The area of the upper signal line on valve **38:5** is larger than the area of the lower signal line. Therefore valve **38:5** opens to

tank when accumulators **74** are fully charged. The pressure in the lower signal line on priority valve **38:1** drops and the priority valve changes over to the middle symbol, if the steering is not actuated (draining to tank via port EF in steering valve 37). If the steering is actuated, the pressure in the upper signal line on priority valve **38:1** increases and the upper symbol is engaged. The pump flow goes directly to the steering without passing through any restrictions.

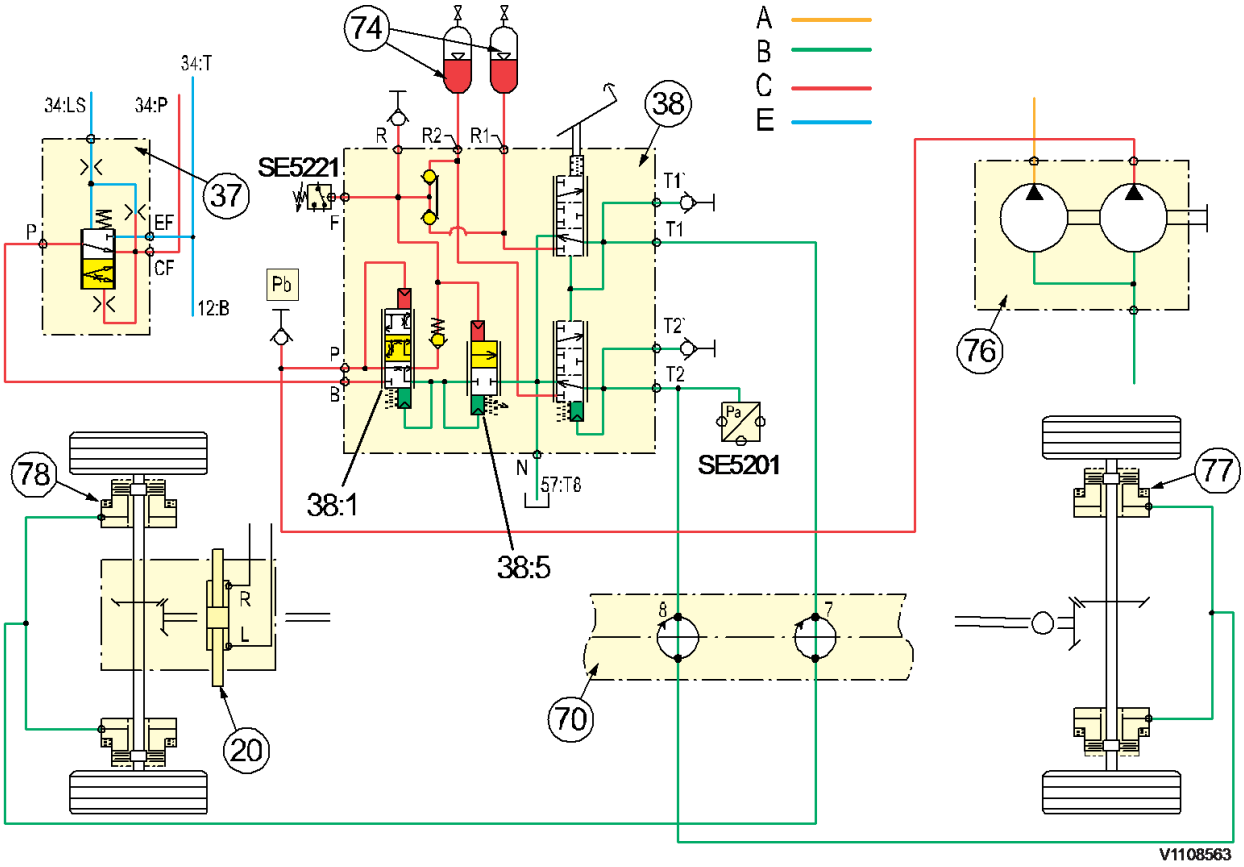



**Figure 2**
**Step 2**

| | | | | | |
|---|---|---|---|---|---|
| 20 | Steering cylinder | 76 | Pump | C | Pump pressure |
| 37 | Priority valve, steering | 77 | Rear axle brake | E | Raised return pressure |
| 38 | Brake valve | 78 | Front axle brake | 38:1 | Priority valve, brake |
| 70 | Centre passage | A | Servo pressure | 38:5 | Valve, charging accumulators |
| 74 | Accumulator tank for brake pressure | B | Return pressure | | |

**Step 3**
When the brake pedal is depressed, oil flows to both circuits T2 for the rear axle and T1 for the front axle. The pressure in accumulators **74** and on top of valve **38:5** drops. When the pressure has dropped to below 11.5 MPa (1668 psi, 115 bar), valve **38:5** changes position and the accumulators will begin to be charged again.

The signals from pressure sensor **SE5201** and pressure monitors **SE5221** pass via the machine control unit V-ECU.

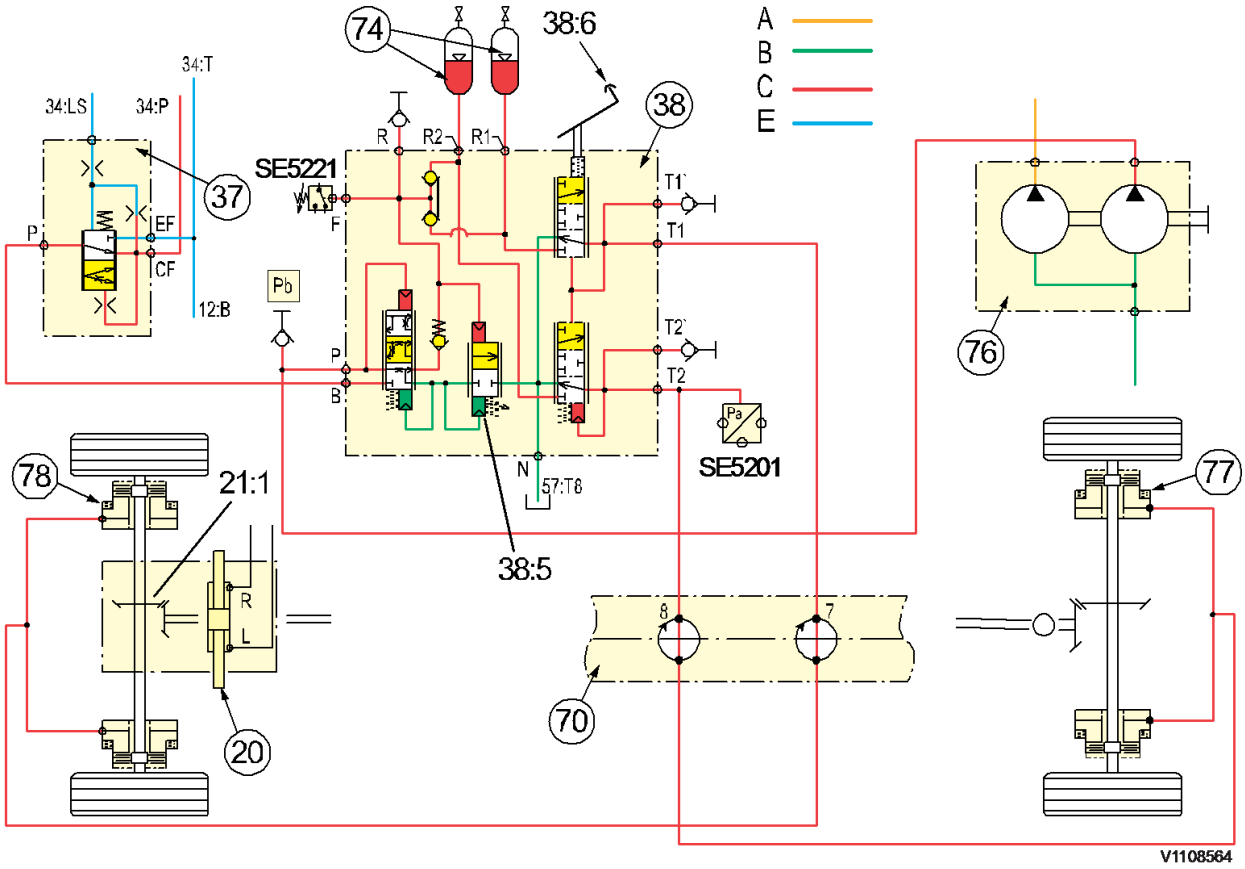



**Figure 3**
**Step3**

| | | | | | |
|---|---|---|---|---|---|
| 20 | Steering cylinder | 76 | Pump | C | Pump pressure |
| 37 | Priority valve, steering | 77 | Rear axle brake | E | Raised return pressure |
| 38 | Brake valve | 78 | Front axle brake | 21:1 | Pendulum axle |
| 70 | Centre passage | A | Servo pressure | 38:5 | Valve, charging accumulators |
| 74 | Accumulator tank for brake pressure | B | Return pressure | 38:6 | Brake pedal |

**Digging brake**

**Mechanical locking**

When the brake pedal **38:6** is depressed the pressure in the brake circuit reaches 0,5 MPa (72,5 psi, 5 bar), the brake lights light up via pressure sensor **SE5201** and brake light relay **RE5201**. When the pedal is locked with the catch **38:7** and the brake pressure increases further to 4–5 MPa (580–725 psi, 40–50 bar) a signal from sensor **SE5201** send's to the vehicle control unit V-ECU and activate a “timer”. After two minutes' cut the voltage between V-ECU and the relay **RE5201** which result the brake lights **LA5201** and **LA5202** turnoffs.

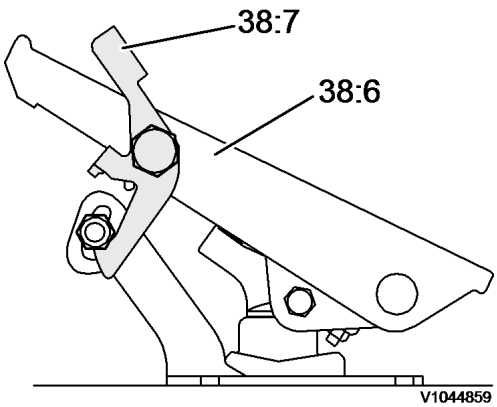


**Figure 4**
**Brake pedal with mechanical locking**

| | |
|---|---|
| 38:6 | Brake pedal |
| 38:7 | Catch |

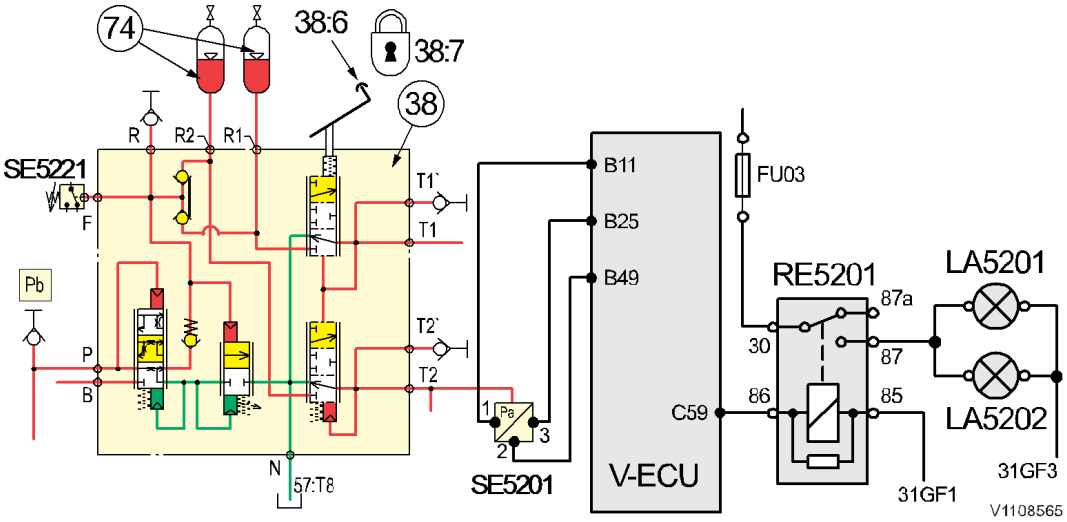



**Figure 5**
**Hydraulic and electric sub-diagram**

| | | | | | |
|---|---|---|---|---|---|
| 38 | Brake valve | 38:7 | Catch | RE5201 | Relay brake lights |
| 74 | Accumulator tank for brake pressure | LA5201 | Brake light, right | SE5201 | Pressure sensor brake |
| 38:6 | Brake pedal | LA5202 | Brake light, left | V-ECU | Vehicle control unit |

**Safety regulations**

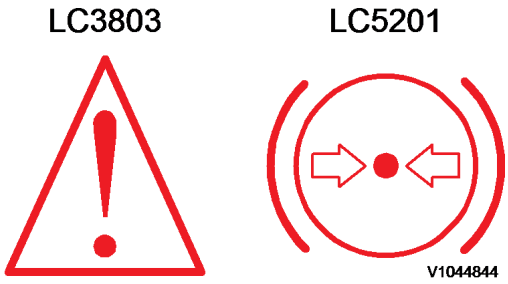



**Figure 6**
**Symbols**

| | |
|---|---|
| LC3803 | Central warning |
| LC5201 | Brake pressure low |

Basically:
If the pressure in the accumulators drops to below 8.0 MPa (1160 psi, 80 bar), this will be indicated on the instrument control unit I-ECU via pressure monitor **SE5221**. The symbol **LC5201** show's on the main screen, the central warning lamp **LC3803** lights up and the buzzer sounds when the engine is running.

**Function check:**

- Charge accumulators then switch off engine and turn the ignition key to position ignition on.

- Depress the brake pedal until the pressure drops to the charging point of 11.5 MPa (1668 psi, 115 bar).
- After that depress the brake pedal twice at full stroke and the warning lamp on IECU must not light up.
- Remaining pressure must be > 8.0 MPa (1120 psi, 80 bar).
- Depress the brake pedal now slowly further until the warning lamp lights up. Then it must be possible to perform four (4) full brake applications. At the fifth time there must be a minimum pressure of > 5.8 MPa (841 psi, 58 bar), see 910 Hydraulic pressure, specifications. During full brake applications, the pedal must be pressed down completely and then released. Between each application of the brake pedal there should be a regeneration time of approx. 60 seconds.

**Function check: brake lights and axle lock**

If the pressure in the brake circuit increases to 0,5 MPa (72,5 psi, 5 bar), the brake lights light up via pressure sensor **SE5201**.
If the pressure increases further to 6.0 MPa (870 psi, 60 bar), pendulum axle **21:1** will be locked via pressure sensor **SE5201** and the solenoid for axle locking MA9152 (without voltage).

| Document Title: | Function Group: | Information Type: | Date: |
|---|---|---|---|
| **Brake system, bleeding** | **520** | **Service Information** | **2014/4/27** |
| Profile: **EXC, EW140D [GB]** | | | |

# Brake system, bleeding

**Op nbr 520-037**

Tools:
Drain hose

**WARNING**

**Hot hydraulic oil and hydraulic oil under pressure may result in severe personal injuries**

**NOTICE**

**Always handle oils and other environmentally hazardous fluids in an environmentally safe manner.**

1. Block the wheels.

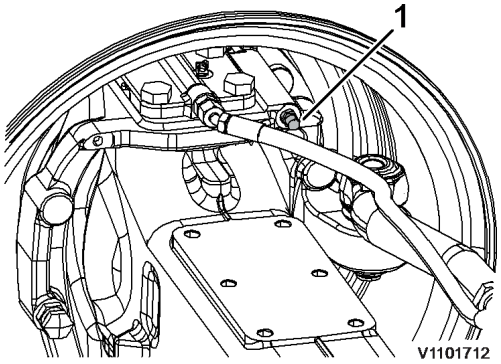



**Figure 1**
**Brake bleeder screw, front axle**

1. Brake bleeder screw

2. Remove the protective cap from the bleeder screw (1).

3. Connect a cap key on the bleeder screw (1).
**NOTE!**
Draining oil must be collected in a container.

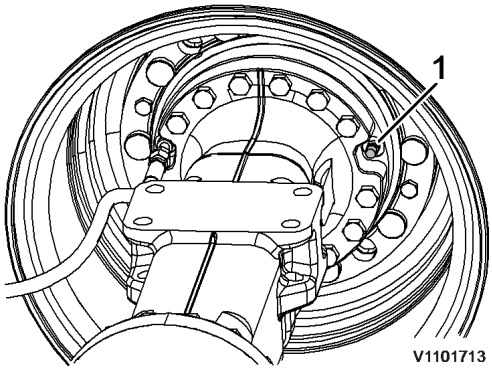
4. 


**Figure 2**

**Brake bleeder screw, rear axle**

1. Brake bleeder screw

Connect the drain hose on the bleeder screw and the free end of the drain hose in a container.

5. Loose the bleeder screw (1) approximately half a turn.
6. Start the diesel engine and press down the brake pedal until oil free of air flows out.
7. Tighten the bleeder screw (1) when the brake pedal is pressed.
8. Stop the diesel engine.
9. Refit the protective on the bleeder screw.
10. Repeat the steps for all wheels.
11. **Function check:**
    After any work has been done in a safety related electrical or hydraulic system, a function check must be performed. For information on how to perform the function check see other service information. See 520 Brake system, checking function

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