VOLVO
Construction Equipment

Service Information

Document Title: **Drivetrain, component location**	Function Group: **400**	Information Type: **Service Information**	Date: **2014/4/8 0**
Profile: **WLO, L110G [GB]**			

Drivetrain, component location

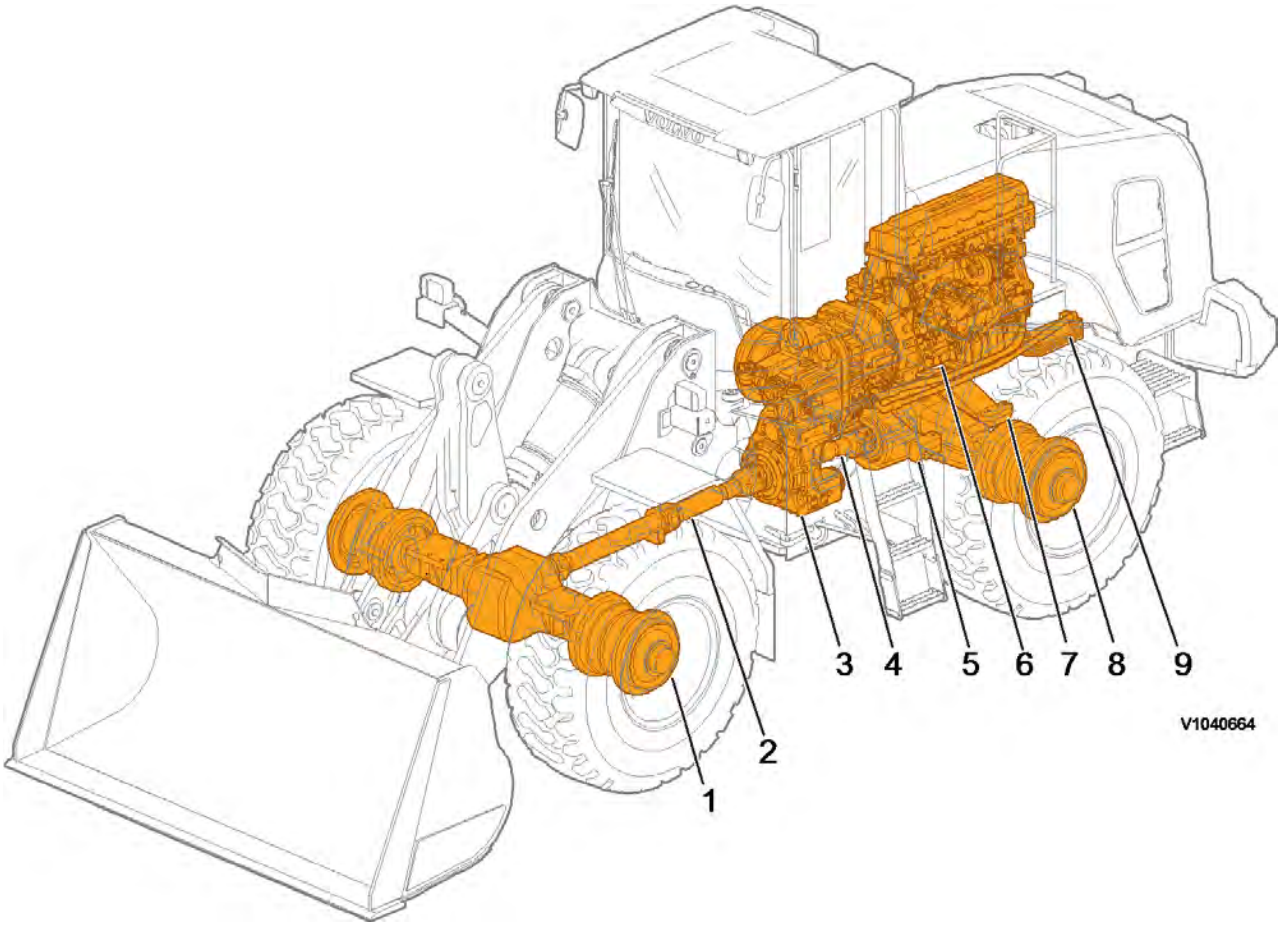

Figure 1

1. Front axle
2. Front propeller shaft
3. Hydraulic transmission
4. Rear propeller shaft
5. Front rear axle bridge
6. Engine
7. Rear rear axle bridge
8. Rear axle
9. Oil cooler

Component positions

Engine: 200 Component locations

Hydraulic transmission: 420 Transmission, component position

Component descriptions

Front axle: 460 Front axle, component description
Rear axle: 460 Rear axle, component description
Rear axle mounting: 460 Rear axle mounting, component description
Propeller shaft: 450 Propeller shaft, component description
Oil cooler: 490 Oil cooler, component description

Document Title: **VCADS Pro, Operations**	Function Group: **400**	Information Type: **Service Information**	Date: **2014/4/8 0**
Profile: **WLO, L110G [GB]**			

VCADS Pro, Operations

Tests

The following VCADS Pro operations are available for function group 4.

Operation	**Use**
17012-3 - error codes	Read error codes, always done first
40012-3 Position sensor, gear selector, test	Testing gear selectors
40025-3 Solenoid valves, test	Check solenoids. Possible to see the pressure with connected pressure gauge.
40901-3 Sensors, transmission, test	When checking sensors, do they give a reasonable value.

Calibrating

Operation	**Use**
42101-3 Transmission, calibrating	Calibration shall be performed: — When changing transmission. — If transmission has been dismantled. — When changing V-ECU — When changing components that may affect pressure.

Programming

Operation	**Use**
36646-3 - MID187 ECU, programming	Programming V-ECU

Document Title: **Error codes when calibrating**	Function Group: **400**	Information Type: **Service Information**	Date: **2014/4/8 0**
Profile: **WLO, L110G [GB]**			

Error codes when calibrating

When calibrating the hydraulic transmission with VCADS Pro, the following error messages may be shown.

Error message	Possible cause	Check/Action
An undefined error/failure has occurred.	VCADS Pro does not recognize the value.	Restart calibration. VCADS Pro, 40901-3 Sensors, transmission, test. VCADS Pro, 40025-3 Solenoid valves, test. Checking pressure, 421 Hydraulic transmission, checking oil pressure . Check-measuring solenoids 302 PWM4213 - PWM4218, description and measuring .
The turbine rpm did not reach the lower rpm level during calibration of each clutch.	Failure turbine rpm sensor. Binding solenoid core. Binding in disc pack. Oil leakage in clutch shaft.	VCADS Pro, 40901-3 Sensors, transmission, test. VCADS Pro, 40025-3 Solenoid valves, test. Checking pressure, 421 Hydraulic transmission, checking oil pressure . Check-measuring solenoids , 302 PWM4213 - PWM4218, description and measuring .
The turbine rpm did not leave the lower rpm level during calibration of each clutch.		
The calibration values are above the upper level for each clutch.		
The calibration values are below the lower level for each clutch.		
Too big difference between values for subsequent calibrations.		

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Document Title: **Transmission, component position**	Function Group: **420**	Information Type: **Service Information**	Date: **2014/4/8 0**
Profile: **WLO, L110G [GB]**			

Transmission, component position

For information on the hydraulic transmission's functions, see: 420 Hydraulic transmission, description.

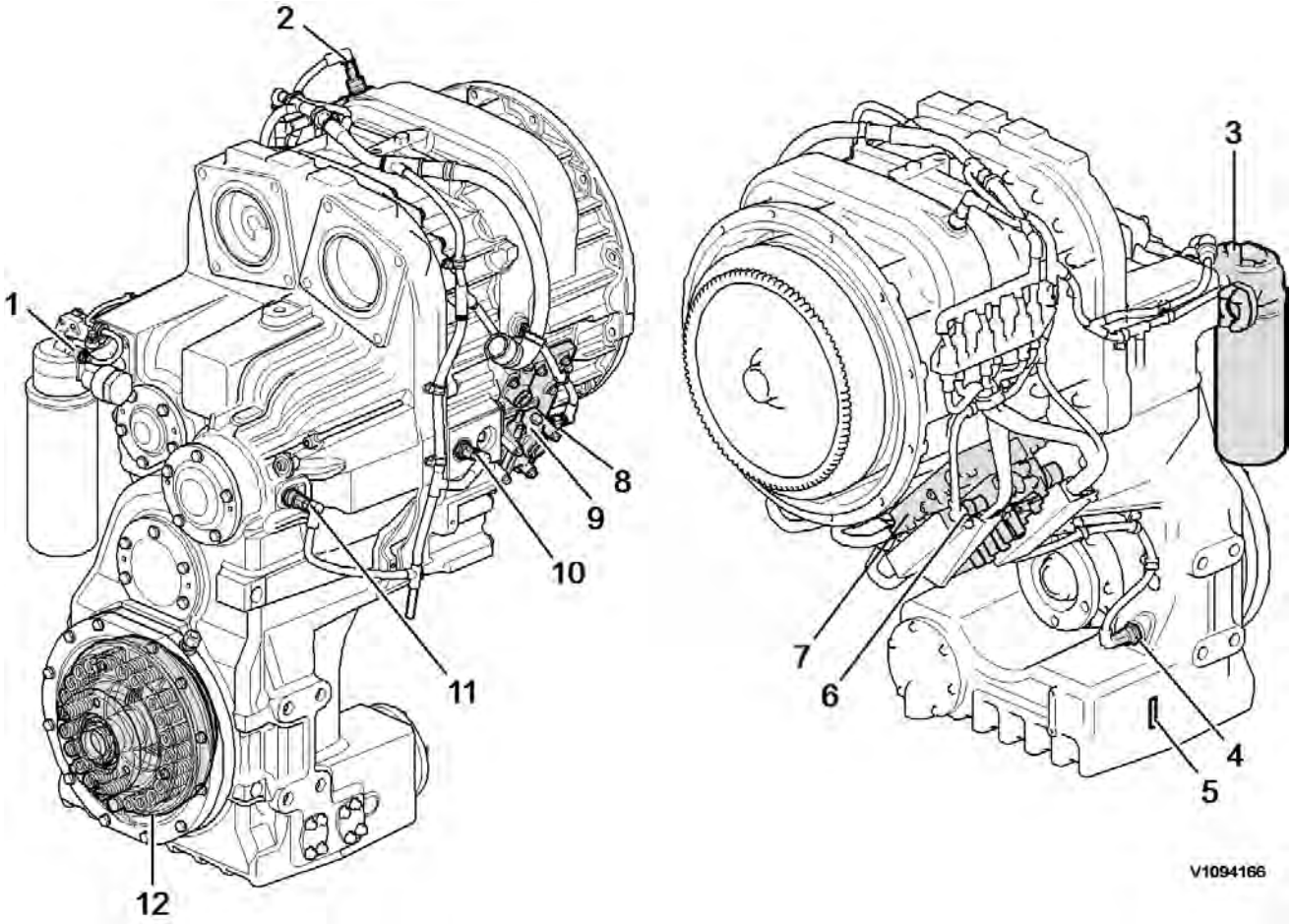

Figure 1

1.	SE4218 Pressure monitor, transmission oil filter	7.	Gear selector valve
2.	SE2704 Engine speed (rpm)	8.	SE4202 Transm. temp.
3.	Filter head	9.	Lubrication oil valve
4.	SE4302 Oil level	10.	SE4213 Turbine speed (rpm)
5.	ID-plate	11.	SE4307 Output speed (rpm)
6.	SE4219 Main pressure	12.	Parking brake

Gear selector valve

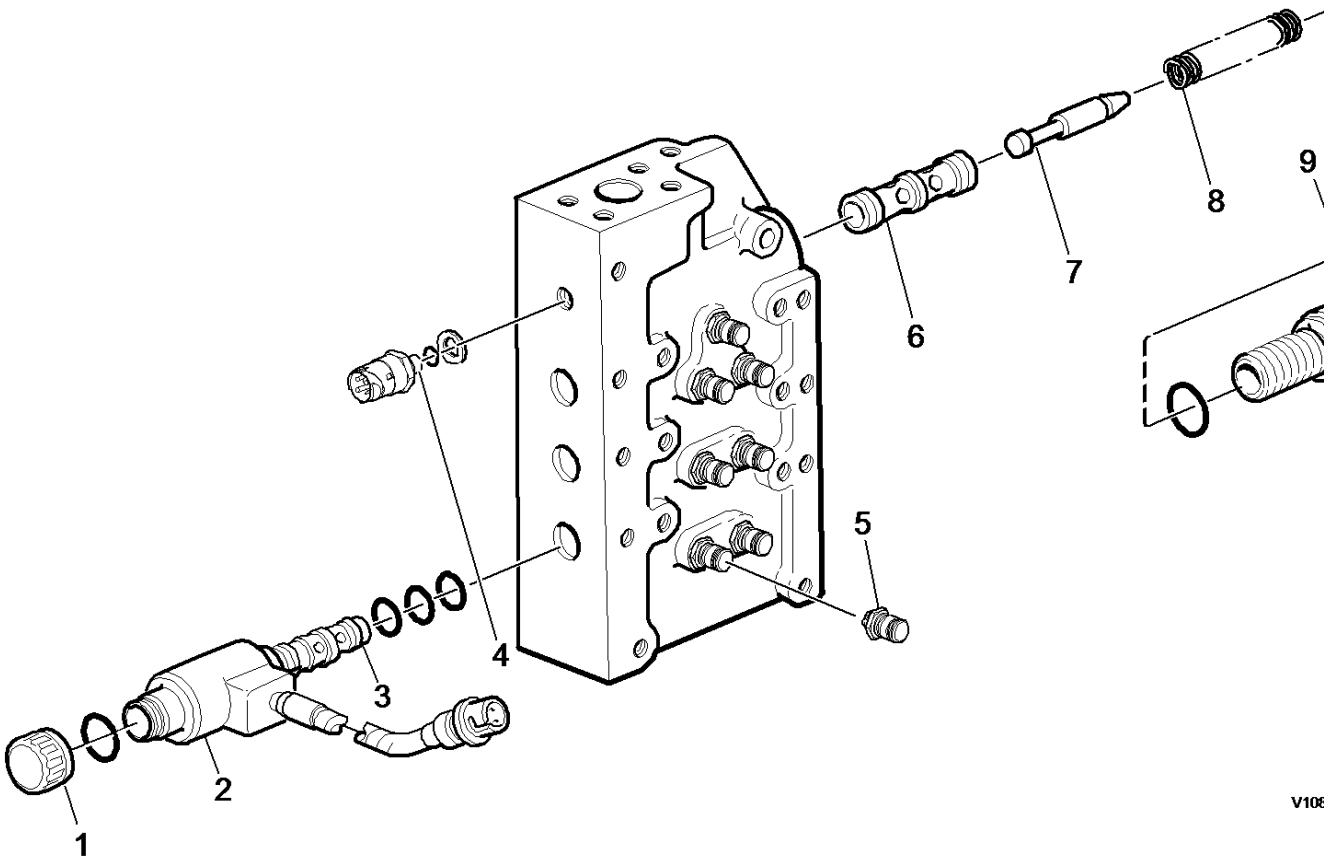

Figure 2

1. Top nut, solenoid valve
2. PWM, solenoid valve
3. Slide, solenoid valve
4. SE4219 Pressure sensor, transmission oil
5. Measuring nipple
6. Sleeve, main pressure valve
7. Slide, main pressure valve
8. Spring, main pressure valve
9. Spring housing, main pressure valve

Lubrication oil valve

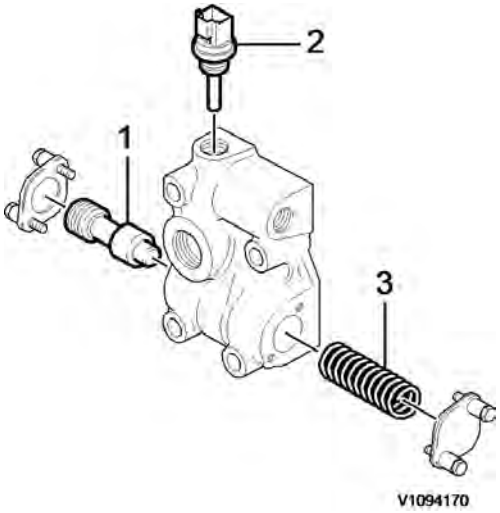

Figure 3

1. Valve slide
2. SE4202 Temperature sensor
3. Spring

Filter head

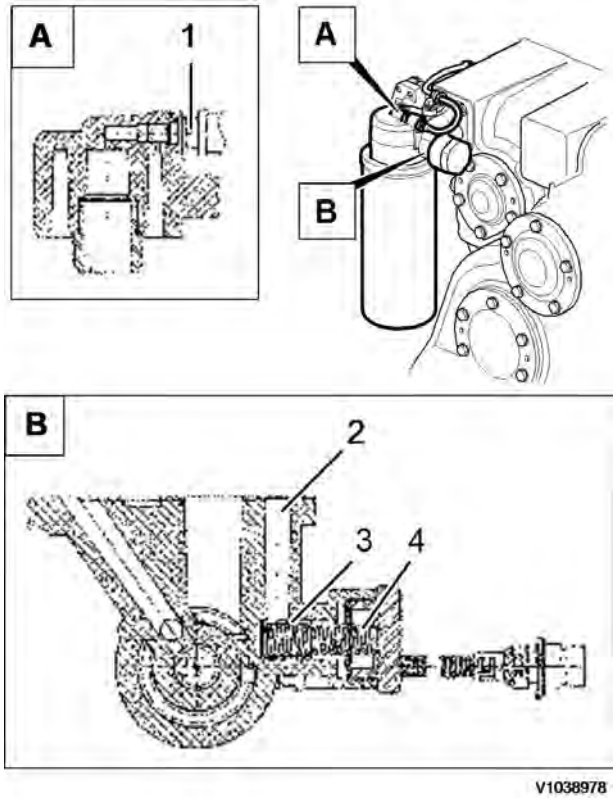

Figure 4

1. SE4218 Pressure monitor, transmission oil filter
2. Return channel, bypass
3. Slide, bypass valve
4. Spring, bypass valve

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Service Information

Document Title:	Function Group:	Information Type:	Date:
Hydraulic transmission, description	**420**	**Service Information**	**2014/4/8 0**
Profile: **WLO, L110G [GB]**			

Hydraulic transmission, description

Mechanics

The hydraulic transmission is driven by the engine. The transmission transmits the torque via the torque converter and clutch shafts as well as output shafts to the front and rear propeller shafts. In the hydraulic transmission, the gears are in constant mesh (always engaged). The disc packs on the clutch shafts are applied with oil pressure for the different gears. The transmission has a closed oil system.

The oil's flow in the transmission

Transmission oil pump

The transmission oil pump is a rotor pump installed on the torque converter base. The pump draws its oil from the transmission's oil sump, through the suction strainer, and delivers the oil to the oil filter.

The oil filter

The oil flows from the pump to the filter holder, where the filter is installed. The overflow valve returns the oil to the oil sump in case of too high pressure across the filter (clogged filter). SE4218 measures the pressure across the filter. Then the cleaned oil continues to the gear selector valve.

Gear selector valve

When the flow reaches the gear selector valve it fills the space containing the transmission oil pressure sensor SE4219, main pressure limiter, and the PWM-controlled valves for each gear. Without PWM-signal from the V-ECU the solenoid valves are closed. The main pressure limiter opens when main pressure is reached and leads the oil to the torque converter.

Clutch shafts

E.g., in second gear forward/2nd, PWM4213 and PWM4216 open in the gear selector valve and oil pressure is applied on disc clutches forward on forward/1st gear's clutch shaft and 2nd on reverse/2nd gear's clutch shaft.

Torque converter

The torque converter is a hydraulic clutch consisting of a pump rotor connected to the engine's flywheel, a turbine rotor connected to the input shaft in the transmission, and a stator.
The pump rotor (a centrifugal pump) rotates with engine's rpm and pumps the oil to the turbine rotor, and which wants to rotate with the pump. The stator helps to direct the oil.

The oil from the main pressure limiter fills the torque converter. The torque converter is provided with a safety valve. When the safety valve opens, the surplus oil is led back to the sump.

Transmission oil cooler

The transmission oil cooler cools and warms, respectively, the return oil from the torque converter using the engine's coolant.

Lubrication

From the transmission oil cooler, the oil is led on to lubrication of the clutch shafts. The lubrication oil pressure valve ensures the lubrication oil pressure. In case of too high pressure, the oil goes to the sump.

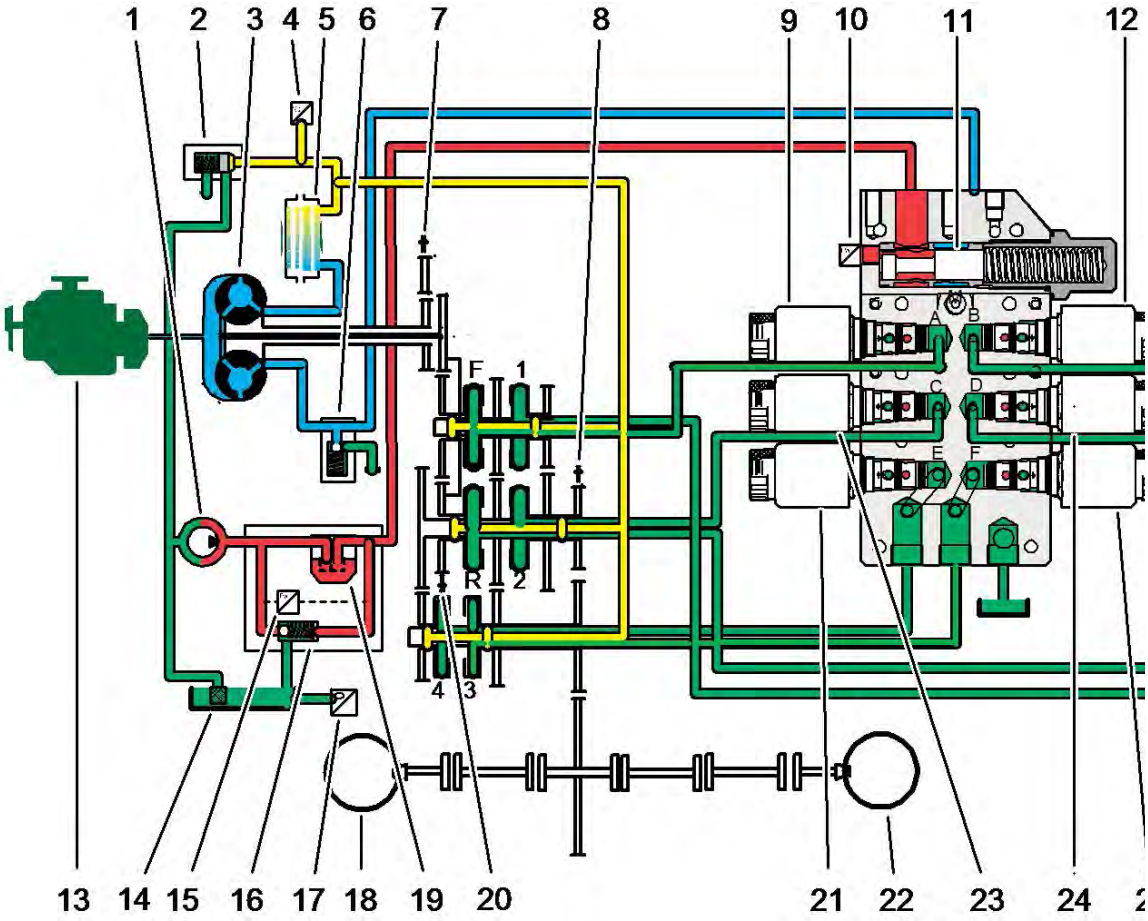

Figure 1

Red	Main pressure
Blue	Torque converter pressure
Yellow	Lubrication pressure
Green	Return oil

1. Pump
2. Lubrication oil valve
3. Torque converter
4. SE4202 Temperature sensor
5. Oil cooler
6. Safety valve, torque converter
7. SE2704 Engine speed
8. SE4307 Output speed (rpm)
9. PWM4213, Forward
10. SE4219 Transmission oil pressure
11. Main pressure valve
12. PWM4215, 1st
13. Engine
14. Sump with suction strainer
15. SE4218 Pressure monitor, oil filter
16. Safety valve, filter
17. SE4203 Oil level
18. Front axle
19. Oil filter
20. SE4213 Turbine speed (rpm)
21. PWM4218, 4th
22. Rear axle
23. PWM4216, 2nd
24. PWM4214, Reverse
25. PWM4217, 3rd

Software

Mode selector, APS (Automatic Power Shift)

The function controls gearshifting based on current operating mode[1] ⓘ which gears are optimal for different operating conditions. With the mode selector, the operator can select different gearshifting programs depending on operating conditions. is a manual mode for the service technician.

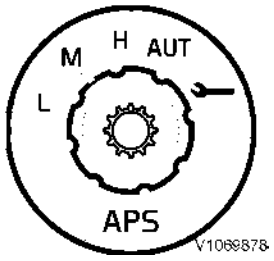

Figure 2

SW4212

L	The machine shifts automatically at low engine speed and at low travel speed.
M	The machine shifts automatically at higher engine speed than in position (mode) L.
H	The machine shifts automatically at higher engine and travel speed than in position (mode) M.
AUT	The machine shifts automatically and selects gearshifting program in order to achieve best comfort and economy.
	The gears are shifted manually

Fully automatic shifting, FAPS (Fully Automatic Power Shift)
SW4211, upper end pressed in:

- Automatic shifting 1-4.
- Can skip gears for fast speed change.
- Shifting to 1st gear does not take place when braking the machine.

NOTE!
In positions 1–4 and gear-dependent setting on the BSS, it is disengaged at 1st gear.

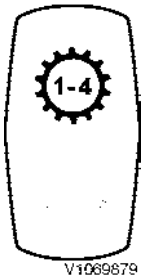

Figure 3

SW4211

SW4211, lower end pressed in:

- Automatic shifting 2-4.
- Cannot skip gears during fast downshifting, always 4-3-2-1.
- Downshifting to 1st is automatic (protective downshift) at high rpm only in position Forward. Manual downshifting is also possible using the kick-down buttons.
- Protective downshift to 1st gear takes place to protect the hydraulic transmission. Protective downshift to 1st does not take place when braking the machine.

NOTE!
In positions 2–4 and gear-dependent setting on the BSS, it is not disengaged at 1st gear, only with the kick-down button.

Kick-down

Kick-down, that is, downshifting to 1st gear, is activated with the kick-down button, SW4209 or SW4220. The machine downshifts when machine speed is below 5–7 km/h and is fulfilled within 8 seconds of pressing the kick-down button. 1st gear is engaged as long as machine speed is below 5–7 km/h.
If machine speed is above 5–7 km/h within 3 seconds after activating, 1st gear remains engaged until 3 seconds have passed, then upshifting takes place.

Press the kick-down button within 3 seconds after activating, then 1st gear remains engaged for max. 5 seconds. When directional gear is changes in 1st gear, upshifting takes place. Press the kick-down button 3–5 seconds after kick-down has been activated and upshifting takes place.

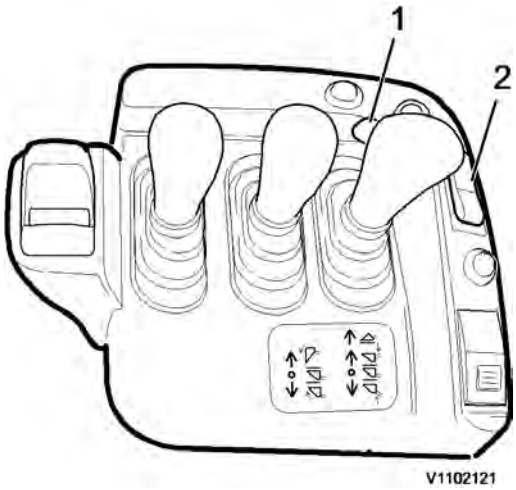

Figure 4

1. SW4209 kick-down
2. SW4208 forward/neutral/reverse

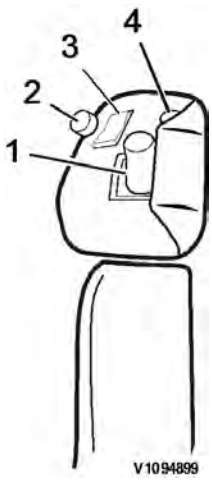

Figure 5

1. SE6601 lever steering CDC
2. SW4220 kick-down
3. SW4217 forward/neutral/reverse
4. SW4216 activation CDC

Protective functions
Overspeeding protection of the transmission gives automatic upshifting to the next gear when rpm is exceeded. Warning for overspeeding transmission is shown on the display. There must be at least 1 second between two upshifts or downshifts.

- The gearshifting points vary depending on if the engine is pulling or braking.