

Document Title: VCADS Pro, Operations	Function Group: 400	Information Type: Service Information	Date: 2014/3/31
Profile: WLO, L70G [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: 2014/3/31
Profile: WLO, L70G [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.		

Document Title: Transmission, check oil pressure	Function Group: 421	Information Type: Service Information	Date: 2014/3/31
Profile: WLO, L70G [GB]			

Transmission, check oil pressure

Op nbr 421-002

[14290266 Hose](#)

[88830055 Pressure checking set](#)

Use the pressure gauge with interval 0–6 MPa.

1. Place the machine in service position 1 according to: [191 Service position](#). Leave the battery disconnecter turned on. The machine does not have to cool down.
2. Turn the APS–control to service position.

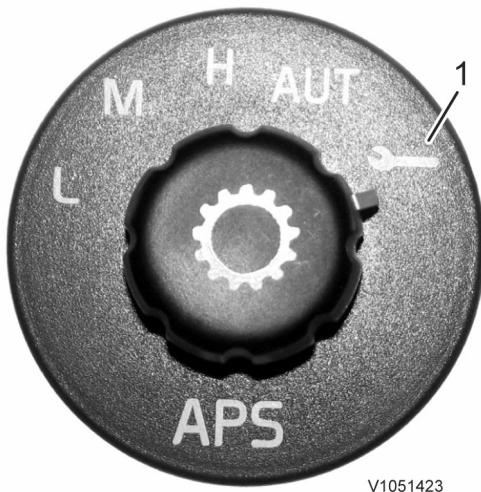




Figure 1

1. Service position
3. Make sure that the transmission disengagement function is not activated. Warm up the transmission oil to operating temperature, see: [420 Transmission, specifications](#). Start the engine and apply the parking brake. Apply the service brake, engage 3rd gear, and give full throttle.

To see the rpm

1. Turn the start key to position 1, press in the button for service , and select service mode.

2. Start the engine and press in the key for power transmission. 

3. Make sure that the parking brake is activated. Apply the service brake and engage 3rd gear. Press 'Esc' to see the rpm and throttle up to 1,800 rpm.

The main pressure is checked at the pressure check connection on the machine's left side.

Main pressure, checking

4. Connect the pressure gauge to MAIN P, start the engine, and run at 1,800 rpm with gear in neutral position. Read off the main pressure.

Pressure, see: [420 Transmission, specifications](#).

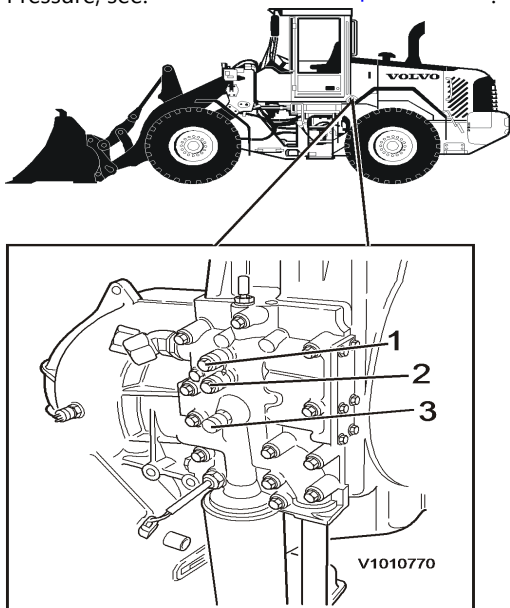


Figure 2

→V1103300

1. Lubrication oil pressure, LUB P
2. Torque converter pressure, CONV
3. Main pressure, MAIN P

Torque converter pressure, checking

5. Connect the pressure gauge to CONV. Start the engine and run at 1,800 rpm with the gear in neutral position. Read off the torque converter pressure.

Pressure, see: [420 Transmission, specifications](#).

Lubrication oil pressure, checking

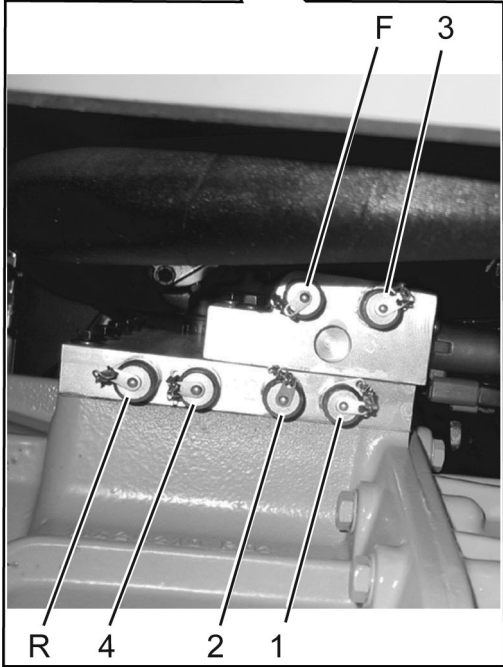
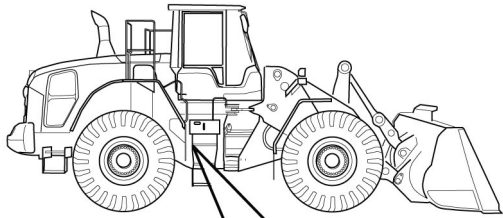
6. Connect the pressure gauge to LUB P. Start the engine and run at 1,800 rpm with the gear in neutral position. Read off the lubrication oil pressure.

Pressure, see: [420 Transmission, specifications](#).

Clutch pressure, checking

7. Apply the parking brake and press down the service brake pedal all the way. Connect the pressure gauge on each connection on the gear selector unit, the machine's right side. Start the engine and run at 1,800 rpm with the gear in each position.

Pressure, see: [420 Transmission, specifications](#)



V1103308

Figure 3

View from below.

Document Title: Transmission, function check	Function Group: 421	Information Type: Service Information	Date: 2014/3/31
Profile: WLO, L70G [GB]			

Transmission, function check

Op nbr 421-100

1. Check the oil level before start.
2. Start the machine and check that there are no active error messages for the transmission.
3. Warm up the transmission. Check the oil level with warm transmission.
4. Operate the machine and check that gearshifting works. Forward/reverse as well as all gears (1–4) in all positions of the mode selector APS.
5. Activate transmission disengagement and operate the machine. During braking, the transmission should be disengaged.
6. After finished test, check that there are no error messages.

Document Title: Transmission, calibration	Function Group: 421	Information Type: Service Information	Date: 2014/3/31
Profile: WLO, L70G [GB]			


Transmission, calibration

Op nbr 421-099

Calibration shall be run

1. According to service program.
2. When changing transmission.
3. If transmission has been dismantled.
4. When changing V-ECU.
5. When changing components that may affect pressure.

Calibration is performed with VCADS Pro

1. Place the machine in service position 1 according to [191 Service position](#). Leave the battery disconnecter turned on. The machine does not have to cool down.
2. Select position (mode)  on the mode selector (SW4212)
Turn on the ignition and select service mode on the display.
Make sure that the transmission disengagement function is not activated.
3. Start the engine. Apply the service brake, engage 3rd gear, and give full throttle. Warm up the transmission to 80 °C (176 °F).
4. Calibrate the transmission with VCADS Pro according to: 42101-3 Transmission, calibration.
5. After finished calibration, perform a function check, see [421 Transmission, function check](#).

Document Title: Hydraulic transmission diagram	Function Group: 421	Information Type: Service Information	Date: 2014/3/31
Profile: WLO, L70G [GB]			

Hydraulic diagram transmission

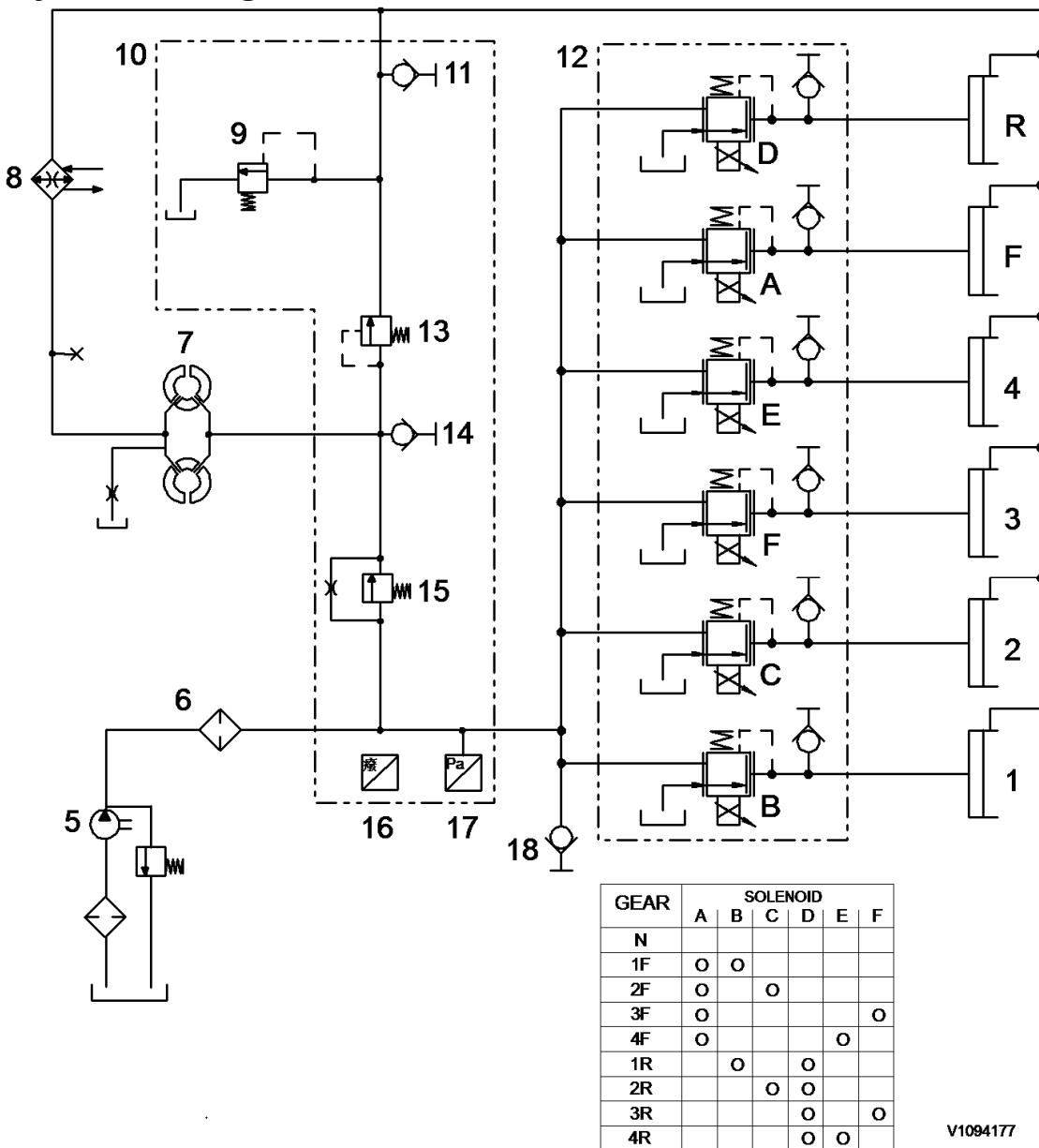


Figure 1

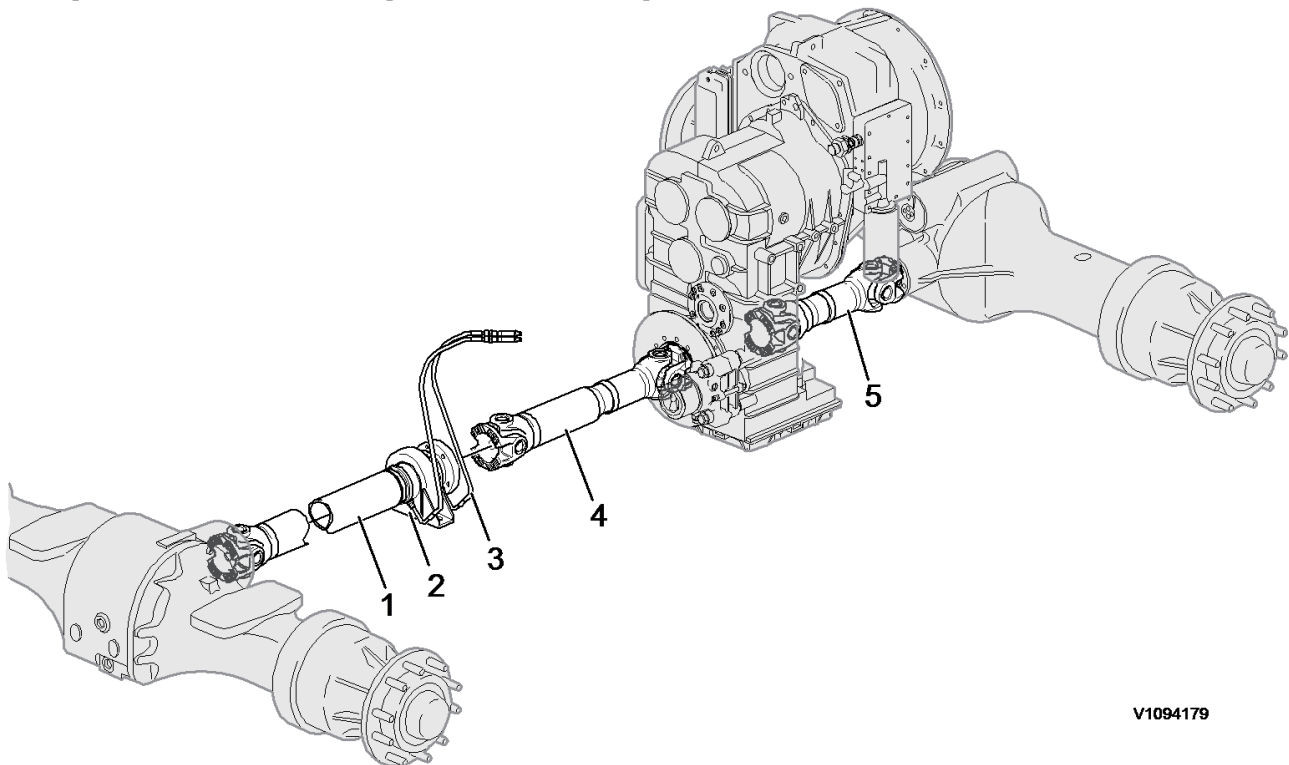
- A PWM4213, Forward gear
- B PWM4215, 1st gear
- C PWM4216, 2nd gear
- F Clutch, Forward gear

- D PWM4214 Reverse gear
- E PWM4218, 4th gear
- F PWM4217, 3rd gear
- R Clutch, reverse gear

- | | | | |
|---|-------------------------|----|--|
| 1 | Clutch, 1st gear | 10 | Pressure control valve |
| 2 | Clutch, 2nd gear | 11 | Pressure check connection, lubrication oil pressure |
| 3 | Clutch, 3rd gear | 12 | Gear selector unit |
| 4 | Clutch, 4th gear | 13 | Torque converter pressure valve |
| 5 | Pump with bypass valve | 14 | Pressure check connection, torque converter pressure |
| 6 | Filter | 15 | Main pressure valve |
| 7 | Torque converter | 16 | SE4202 Transmission oil temperature |
| 8 | Transmission oil cooler | 17 | SE4214 Transmission oil pressure |
| 9 | Lubrication oil valve | 18 | Pressure check connection, main pressure |

Document Title: Propeller shaft, component description	Function Group: 450	Information Type: Service Information	Date: 2014/3/31
Profile: WLO, L70G [GB]			

Propeller shaft, component description



V1094179

Figure 1

1. Front propeller shaft
2. Support bearing
3. Lubrication hoses
4. Intermediate propeller shaft
5. Rear propeller shaft

Propeller shafts shall be installed with all spiders and propeller shaft forks pointing in the same direction. The support bearing's height shall be adjusted with shims so that the propeller shaft ends up in a straight line.

Document Title: Drive axles, description	Function Group: 460	Information Type: Service Information	Date: 2014/3/31
Profile: WLO, L70G [GB]			

Drive axles, description

The drive axle reduces the speed (rpm) from the propeller shaft in the final drive (differential carrier assembly) and hub reduction to wheel speed. The final drive has a differential with differential pinions, enabling the wheels to rotate at different speeds. The differential may be equipped with differential lock or differential brake.

The drive axles have floating drive shafts (half shafts) and planetary gear hub reductions with built-in, oil-cooled disc brakes. The axles have a common oil space for the hub reductions and final drive (differential carrier assembly).

The brakes are operated hydraulically and are located on the half shafts. When the brake discs rotate, they work like a pump and circulate the oil in the axle. See also: [520 Braking system, description](#).

The front axle version of the axle has a hydraulically controlled differential lock which is operated with SW4602. The dog-clutch locks the differential and the road wheels must rotate with the same speed. The rear axles, as well as the front axle in L220G, may be provided with an automatic differential brake of the type "Limited Slip".

See also: [468 Differential lock, description](#) and [460 Automatic differential brake - Limited Slip, description](#).

Final drive (differential carrier assembly)

The final drive consists of the crown wheel, pinion, and the differential. The differential enables both wheels on the axle to roll at different speeds. The propeller shafts turn the pinion, which in turn causes the crown wheel, installed on the differential housing, to rotate. Since the pinion has fewer gear teeth than the crown wheel, a reduction of the rotational speed (rpm) is obtained. When the differential housing rotates, the differential spider also turns. A differential pinion is located on each of the four arms on the spider. These four pinions are in mesh between both half shafts' differential side gears. When the differential spider and its gears turn, the half shafts (drive shafts) also turn. The outer ends of the half shafts are located in the hub reduction. Since the differential pinions are located between the half shafts' differential side gears, the half shafts can rotate at different speeds.

Hub reduction

The half shaft transmits the power to the sun gear. The sun gear drives the planet gears, which in turn are in mesh with the ring gear. The ring gear is one with the hub reduction's housing. When the planet gears rotate in the ring gear they pull along the planet carrier, which in its turn drives the hub on which the road wheel is installed. The planet gear further reduces the speed (rpm) between the half shaft and hub.

Software

Axle oil temperature

Sensor SE5222 on the front axle and SE5223 on the rear axle monitor the oil temperature and inform the operator in case of too high temperature.

In case of too high axle oil temperature, an alarm is triggered at two levels for each axle.

Supplementary information

[400 Drivetrain, component location](#)

[460 Front and rear axles, specifications](#)

Function check

-

Parameters

-

Diagnostics

Detailed information about relevant warnings and error codes below is available under the diagnostics tab.

Component	Control unit	Message ID	Description
SE5222	MID187	PPID1154	Axle oil temperature, front axle
SE5223	MID187	PPID1153	Axle oil temperature, rear axle

Document Title: Automatic differential brake, "Limited Slip", description	Function Group: 460	Information Type: Service Information	Date: 2014/3/31
Profile: WLO, L70G [GB]			

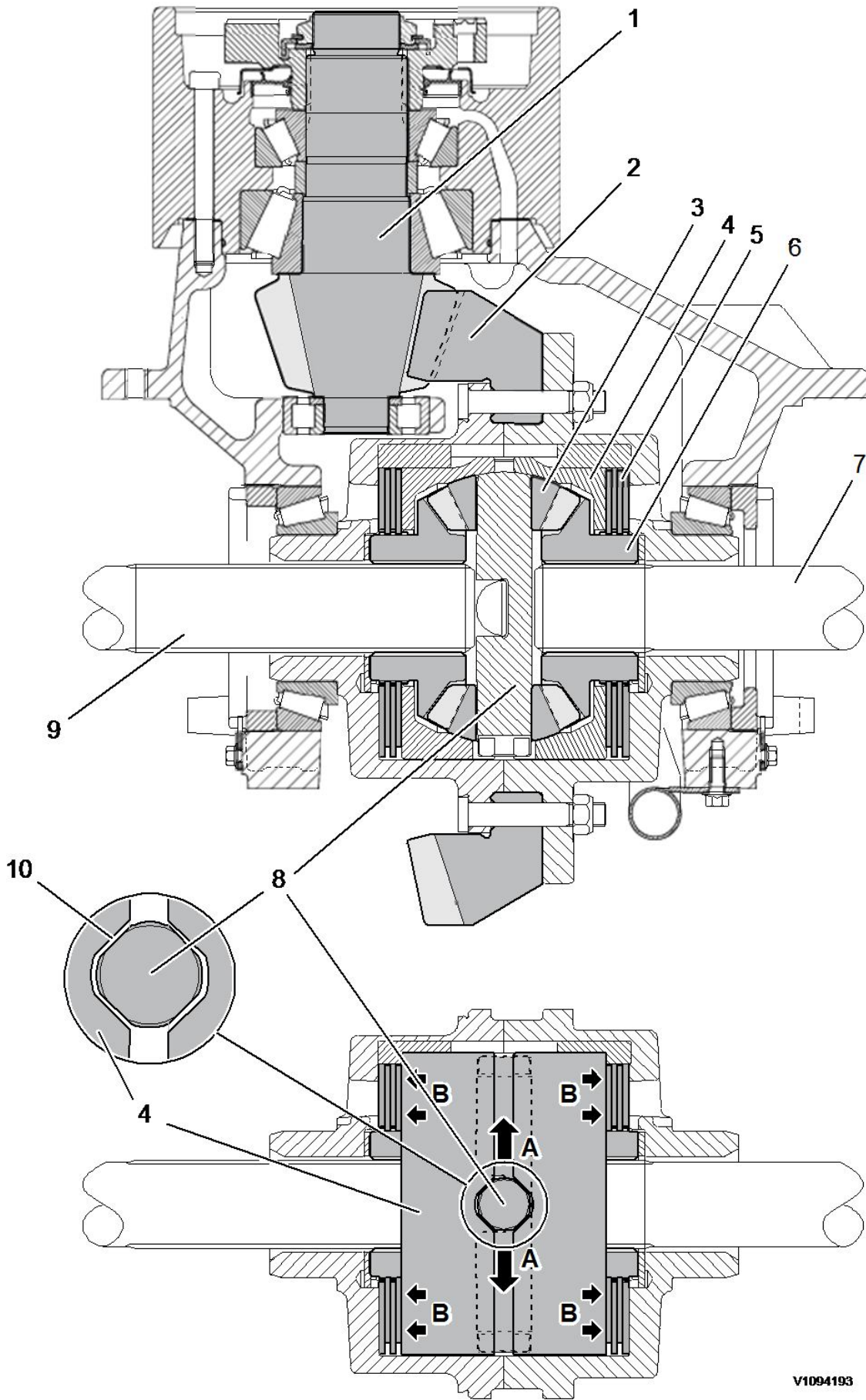
Automatic differential brake, "Limited Slip", description

The difference between a conventional differential lock and a differential brake is that the differential lock locks 100% while the differential brake brakes up to 80% of the incoming power. The automatic differential brake strives to make the wheels rotate at the same speed.

Function in the differential brake

The thrust plates have drive flanges and are driven around by the differential housing. The four differential pinions are located on two shafts. The shafts are shaped like rhomboids \diamond at the ends and are mounted in the thrust plates which have matching slots.

When a wheel slips, the differential shaft's bevelled end is pressed against the thrust plate's bevelled slot, and that force results in the thrust plate being pressed outward against the discs. The discs transmit the force and the half shafts are locked together. This forces the wheels to rotate at the same speed. When the torque reaches approx. 80% of max., the discs begin to slip.



V1094193

Figure 1

A The differential shaft is pressed outward against the sloped surface when the wheel rotates forward.

B Thrust plates slide outward.

- | | | | |
|----|---------------------|-----|---|
| 1. | Pinion | 6. | Half shaft's differential pinions |
| 2. | Crown wheel | 7. | Half shaft |
| 3. | Differential pinion | 8. | Differential shaft |
| 4. | Thrust plate | 9. | Half shaft |
| 5. | Discs | 10. | Sloped contact surfaces which allow sliding |

Document Title: Differential lock, adjusting	Function Group: 468	Information Type: Service Information	Date: 2014/3/31
Profile: WLO, L70G [GB]			

Differential lock, adjusting

Op nbr 468-051

[9990008 Measuring equipment](#)

[9993831 Support](#)

[11666013 Pump](#)

[11668007 Standard Jack Single](#)

[11668007 Standard Jack Single](#)

Multimeter

The differential lock is located on the front axle's left side.

1. Place the machine in service position 2, see [191 Service position](#).



- 2.

Figure 1

1. 11668007 Standard Jack Single, 2 pcs.

Place two jacks under the jacking points in the front frame and raise the front axle so that both front wheels are off the ground and can rotate freely. The wheels should rotate in opposite directions.

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