Service Manual

Mobile excavator

6503



Machine model	**6503**
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3 Maintenance

3.1 Fluids and lubricants

Component/ application	Engine/machine fluid	Specification	Season/ temperature	Capacities[1]
Diesel engine	Engine oil	SAE10W-40 [2]; API: CF, CF-4, CI-4 ACEA: E3, E4, E5 JASO: DH-1	-20 °C (-4 °F) +40 °C (104 °F)	10.2 l (2.7 gal)
Planetary drive Steering axle differential Rigid axle differential Transfer gearbox	Gearbox oil[3]	Q8 T 55, SAE 85W-90[4]	Year-round	1 l (0.26 gal) 5 l (1.32 gal) 6 l (1.58 gal) 2.5 l (0.66 gal)
		Q8 T 55, SAE 80W-90[5]		
		FINA PONTONIC GLS, SAE85W-90		
Hydraulic oil tank	Hydraulic oil	HVLP46[6]	Year-round	83 l (22 gal)
	Biodegradable oil[7]	PANOLIN HLP Synth 46		
		FINA BIOHYDRAN SE 46		
		BP BIOHYD SE-46		
Grease	Roller and friction bearings (live ring ball bearing race)	FINA Energrease L21M[8]	Year-round	As required
	Open gear (live ring gears)	BP Energrease MP-MG2[9]	Year-round	As required
Grease nipples	Multipurpose grease	FINA Energrease L21 M[10]	Year-round	As required
Battery terminals	Acid-proof grease[11]	FINA Marson L2	Year-round	As required
Fuel tank	Diesel fuel	2-D ASTM D975 – 94 (USA)	Summer or winter diesel depending on outside temperatures	93 l (24.6 gal)
		1-D ASTM D975 – 94 (USA)		
		EN 590 : 96 (EU)		
		ISO 8217 DMX (International)		
		BS 2869 – A1 (GB)		
		BS 2869 – A2 (GB)		
Radiator	Coolant	Soft water + antifreeze ASTM D4985	Year-round	7 l (1.8 gal)
		Distilled water + antifreeze ASTM D4985		
Air conditioning	Refrigerating agent	R134a[12]	Year-round	~ 950 g (2.1 lb)
	Compressor oil	Sanden SP10	Year-round	122 cm³ (7.4 in³) from AH00708
Washer system	Cleaning agent	Water + antifreeze	Year-round	2 l (0.5 gal)

1. The capacities indicated are approximative values; the oil level check alone is relevant for the correct oil level
2. According to DIN 51502
3. Hypoid gearbox oil based on basic mineral oil (SAE85W-90 according to DIN 51502), (API GL-4, GL5)
4. The Q8 T55 SAE 85W-90 gearbox oil is no longer produced
5. The Q8 T55 SAE 80W-90 gearbox oil is used from 10/2005 onwards. Do not mix both gearbox oils!
6. According to DIN 51524 section 3
7. Hydraulic ester oils (HEES)
8. KF2K-25 according to DIN 51502 multipurpose lithium grease with MoS^2 additive
9. KP2N-20 according to DIN 51502 EP multipurpose calcium sulphonate complex grease
10. KF2K-25 according to DIN 51502 multipurpose lithium grease with MoS^2 additive
11. Standard acid-proof grease
12. According to DIN 8960

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Work description

1. Check the wiring harness for continuity:

- Disconnect the manual throttle sensor and the E-ECU from the wiring harness.
- Check the wiring harness for continuity by means of a multimeter.

Clamp	Continuity	Status
Sensor signal line E35	Yes	OK: normal
[between E-ECU and sensor connector]	No	NG: open wiring harness
Sensor GND line E28	Yes	OK: normal
[between E-ECU and sensor connector]	No	NG: open wiring harness
5 V sensor line E38	Yes	OK: normal
[between E-ECU and sensor connector]	No	NG: open wiring harness
Between E35 and other terminal/GND and between E38 and other terminal/GND	No	OK: normal
	Yes	NG: wiring harness short-circuited to GND
Between E28 and GND/E45/E47	Yes	OK: normal
	No	NG: open wiring harness
Between E28 and other terminals	No	OK: normal
	Yes	NG: wiring harness short-circuited with other cable

NG	• Check whether the wiring harness is damaged, or whether the wiring is correct. • Replace the wiring harness.
OK	Check output voltage of manual throttle sensor. -> Next: [4. Check manual throttle sensor output voltage:]

2. Check manual throttle sensor output voltage:

- Connect the maintenance wiring harness between the E-ECU and the machine wiring harness (see [Important information on the maintenance wiring harness] *4-34* for details). Connect all connectors (sensors, E-ECU).
- Measure the voltage between sensor terminals E35 and E28 by means of a multimeter.

Voltage	Status	Action
E35 ≤ 0.2 [V]	NG	• Replace the wiring harness. • Replace the manual throttle sensor.
0.2 [V] < E35 < 3.8 [V]	OK (normal range)	Replace the E-ECU.
3.8 V ≤ E35	NG	• Replace the wiring harness. • Replace the manual throttle sensor.

NG	• Check whether the wiring harness is damaged, or whether the wiring is correct. • Replace the wiring harness.
OK	Replace the E-ECU.

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Flash code 9 – overspeed error

(1) P0219/0: overspeed error

DTC	P0219/0	Overspeed error

DTC detection conditions

1 – Prerequisite; 2 – Detection condition(s); 3 – Flash code in error display	Check points
1. Engine runs.	Wiring harness
2. Sensor signal at or above the upper limit (high idling speed +600[min^{-1}])	Revs sensor
3. 2 flash pulses followed by 3 flash pulses.	Proportional injection pump solenoid E-ECU

Troubleshooting

Error mode	[Immediate stop]: The engine stops running.
Operation restrictions?	Yes: The proportional solenoid relay of the injection pump is switched off and the control rack position is forced to the engine stop position.
Recovery conditions	No.
Remarks	

Possible error cause/condition

- Wiring defect in wiring harness
  - The wiring of the proportional injection pump solenoid is possibly short-circuited to GND.
- Revs sensor signal pulse created incorrectly
  - Incorrect wiring of revs sensor
- Engine overspeed due to consumer
- Control error of injection pump
  - The wiring of the proportional injection pump solenoid is possibly short-circuited to GND.
- Defect in internal E-ECU circuit.

Diagnosis description

1) Initial diagnosis with the diagnosis tool	• Check the error display.
2) Engine inspection	• Switch off ignition to stop the engine. • Inspect the engine and the machine. • Switch on ignition after a short time to check whether a DTC has been detected.
	*Refer to the Service Manual ("Engine") for a description of the engine inspection and how to carry it out.
3) Error diagnosis	• Check the proportional injection pump solenoid.
	*See *4-58* for more details on the diagnosis method and procedure

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6.2 Main valve block with 3rd control circuit and triple articulation boom

Ports

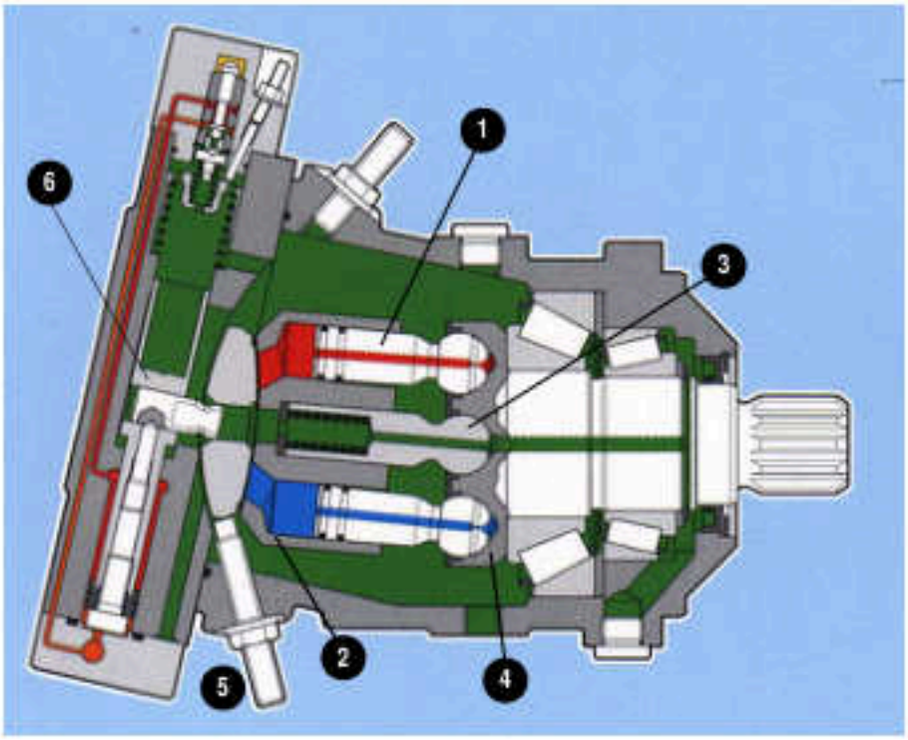
- Bucket
- Boom
- Forwards driving
- Inputs P1 and P2
- Forwards and reverse driving
- Boom 2
- 3rd control circuit
- Stick
- Auxiliary hydraulics
- Auxiliary hydraulics flow rate adjustment segment
- Swivel boom
- Triple articulation
- Stabiliser blade
- Rotating the upper
- Input P3 output T2



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5 Undercarriage

5.1 Hydraulic motor



	Engine
Drive	Travelling drive
Type	A6VM
Installation position	Vertical, curved upwards
Slewing range	38 – 80 cm^3/rev (2.3 – 4.9 in^3/rev)
Control initiation	145 bar (2103 psi)
Control end	10 bar (145 psi) pressure increase spring
Positioning time limitation	Throttle screw 0.8 mm (0.03")
Engine revs	3000 rpm at Vg_{min}

Measure the speed (2290 rpm) at the central brake drum with machine jacked up if it does not reach the indicated speed.

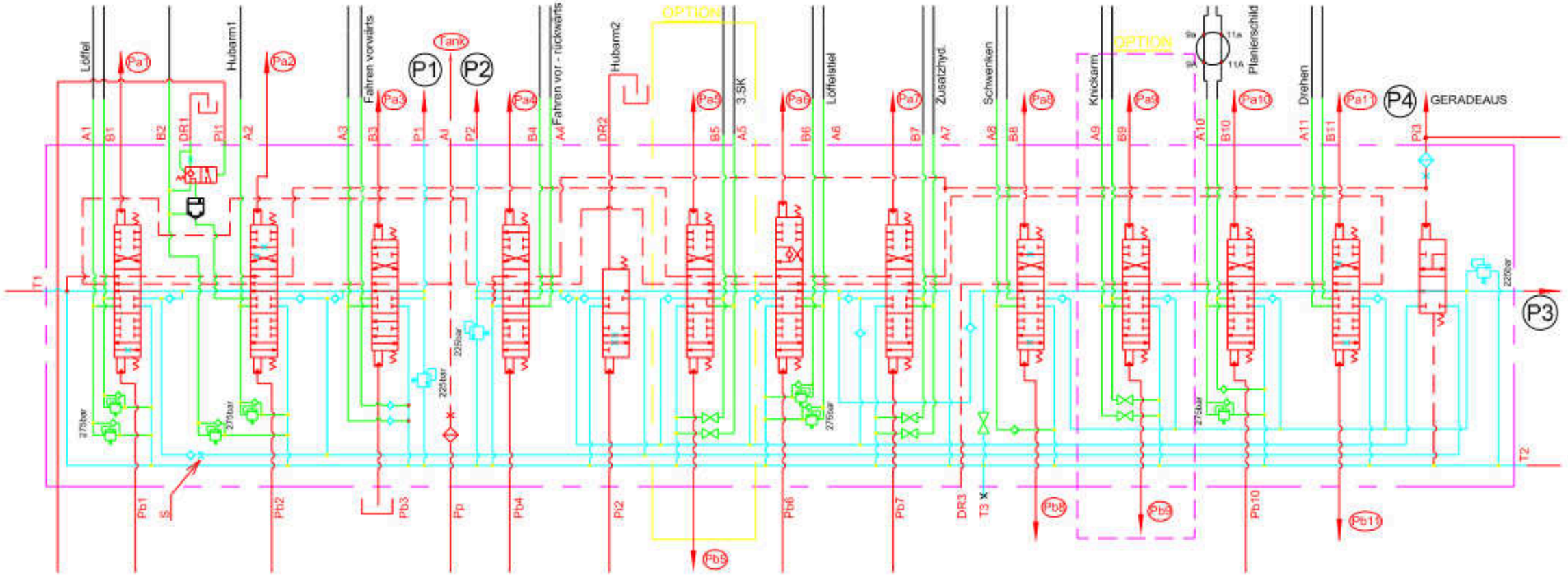
Set V_{max} via the minimum tilting angle specified by stop screw **5**.

Danger!

Measure the speed only at 65 °C (149 °F) oil temperature. Drive speed may not exceed 25 kph (15.5 mph) otherwise there is no sufficient engine braking effect.

Danger of racing on steep slopes!

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Pilot control lines

Port	Legend	Controlled via
Pa1, Pb1	Bucket control	Joystick (right)
Pa2, Pb2	Boom control	Joystick (right)
Pa3, Pb3	Forwards drive control	Drive pedal – forwards driving
Pa4, Pb4	Forwards/reverse drive control	Drive pedal (forwards/reverse)
Pa5, Pb5	3rd control circuit (control)	– *see 3rd control circuit* on page 8-24
Pa6, Pb6	Stick control	Joystick (left)
Pa7, Pb7	Auxiliary hydraulics control	Auxiliary hydraulics pedal
Pa8, Pb8	Boom swivel control	Hammer pedal
Pa9, Pb9	Articulated boom control	Hammer pedal
Pa10, Pb10	Stabiliser blade control	Stabiliser blade lever
Pa11, Pb11	Upper carriage rotation control	Joystick (right)
Pi1, Pi2	Boom summation control	Joystick (right)

Main control lines

Port	Legend
A1 rod side, B1 base side	Bucket ram
A2 rod side, B2 base side	Boom ram
A3, B3	Drive unit (forwards) via swivel joint
A4, B4	Drive unit forwards/reverse via swivel joint
A5, B5	3rd control circuit
A6 base side, B6 rod side	Stick
A7, B7	Auxiliary hydraulics
A8 rod side, B8 base side	Swivel boom
A9 rod side, B9 base side	Articulated boom
A10 rod side, B10 base side	Stabiliser blade
A11,B11	Gear motor

Pump/tank lines

Port	Legend
P1	Pump 1 port
P2	Pump 2 port
P3	Pump 3 port
P4	Pump 4 port
T1	Tank line via non-return valve and filter in tank
T2	Tank line via oil cooler and filter in tank
DR1, DR2	Tank lines for boom summation

S: bucket pre-tension – *see Bucket pre-tension* on page 6-10

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