1.5 Maintenance accesses

Maintenance openings

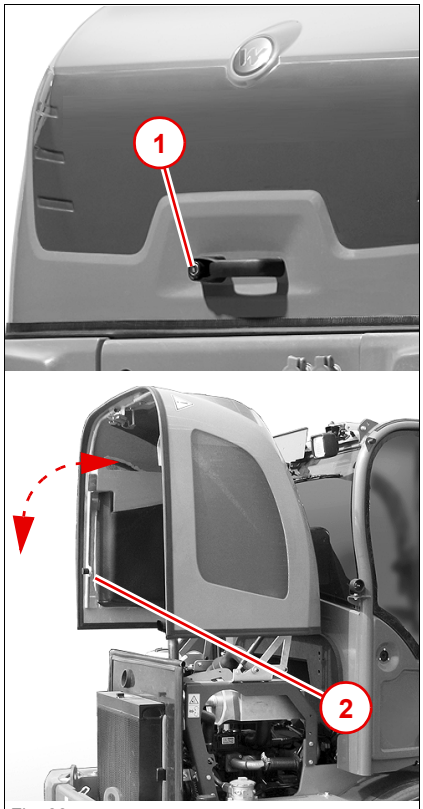


Fig. 22

Opening the engine cover

CAUTION

Injury hazard due to hot and moving engine parts!

Hot and moving engine parts can cause injury.

- ► Do not open the engine cover if the engine is running.
- ► Let the engine cool down.
- ► Wear protective equipment.

NOTICE

Engine damage due to loose objects in the engine compartment.

- ► Remove all tools and objects from the engine compartment before closing the engine cover.

Open the engine cover with the handle. The handle is lockable.

1. Open the engine cover lock by pressing button **1**.
   ➥ The engine cover is unlocked.
2. Raise the engine cover by pulling the handle.
   ➥ The engine cover is held open by gas struts.

Closing the engine cover

1. Hold the engine cover at bar **2** at the lower edge and pull it downward against the pressure of the gas struts.
2. Make the engine cover lock into place by pressing it downward.
3. Pull on the handle to check whether the engine cover is locked in place.

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E.3 Tightening torques

General tightening torques

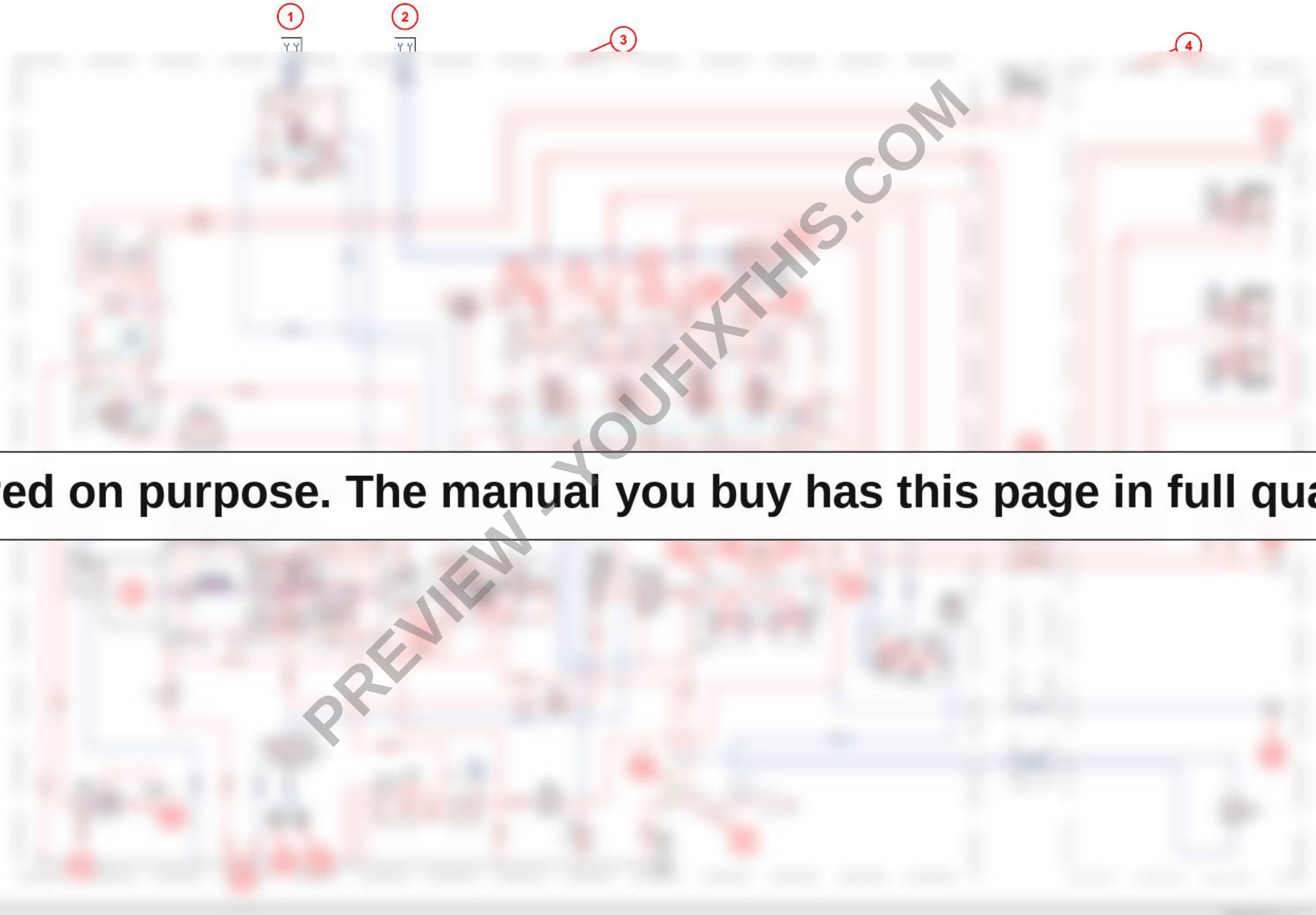
Screw dimensions	Tightening torques in Nm[1]

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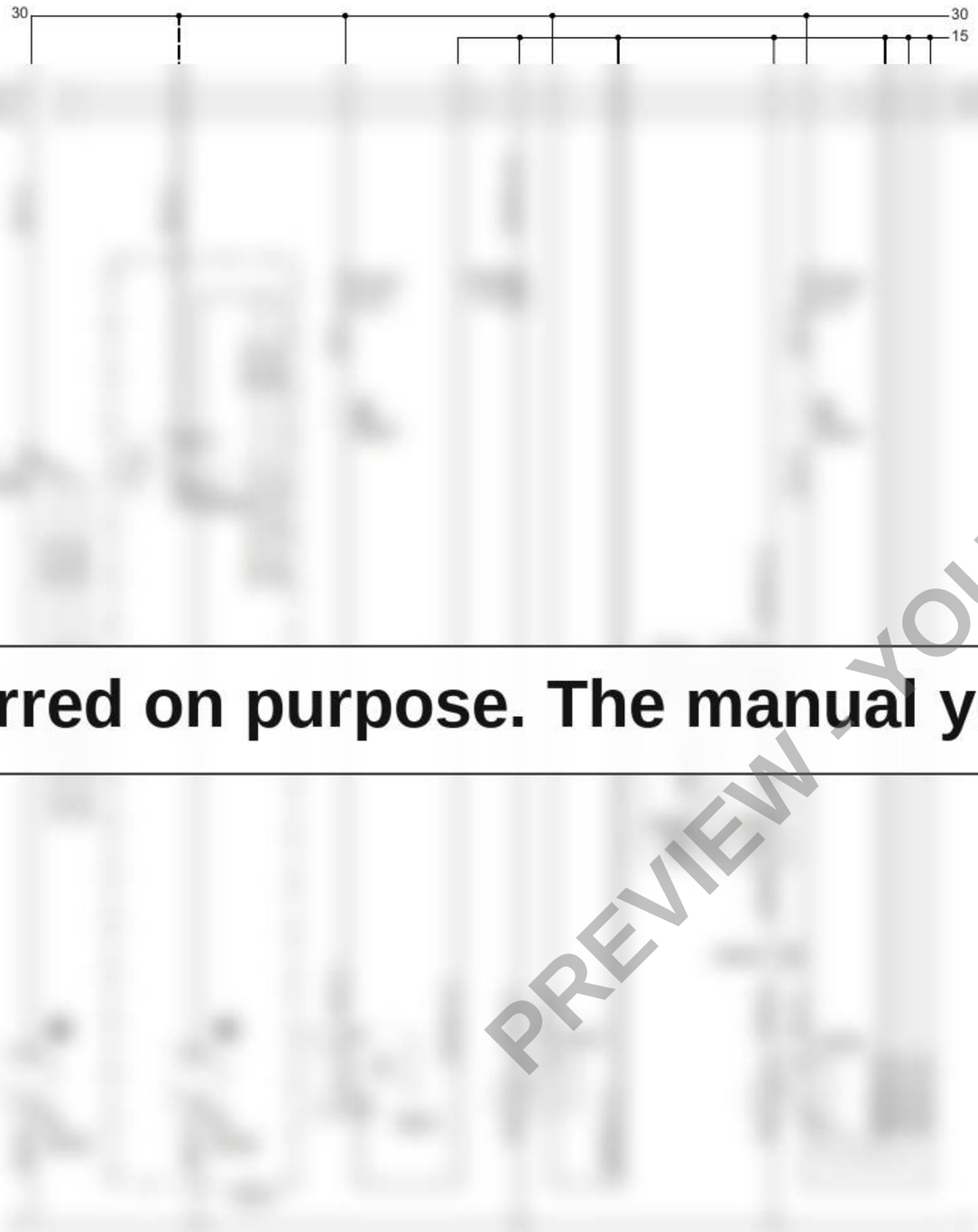
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8.15 Hydraulics diagram – HDS21/4 with HDS21/1 or 6/2 multiple way valve



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9.4 Electrical diagram – power supply



Assign-ment	Designation

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12.2 Error code lists

Engine control unit Perkins 404F

Error code				Error setting condition (detection threshold)	Reaction motor
SPN (component)		FMI (error type)			
SPN	SPN text	FMI	FMI text		
29	Accelerator pedal 2	3	Voltage too high	Above setting	-
29	Accelerator pedal 2	4	Voltage too low	Below setting	-
91	Accelerator pedal 1	3	Voltage too high	Above setting	-
91	Accelerator pedal 1	4	Voltage too low	Below setting	-
100	Oil pressure sensor	1	Oil pressure too low	Switch: On	-
102	Intake air pressure sensor	3	Voltage too high	33.3 bar and over 4.75 V	-
102	Intake air pressure sensor	4	Voltage too low	6.6 bar and below 0.25 V	-
108	Air-pressure sensor	3	Voltage too high	Above setting and over 4.75 V	- Incorrect assessment of the soot load - High exhaust-gas temperature - Low performance
108	Air-pressure sensor	4	Voltage too low	4 bar and below 0.25 V	- Incorrect assessment of the soot load - High exhaust-gas temperature - Low performance
110	Engine coolant temperature sensor	3	Voltage too high	Below −40 °C and over 4.85 V	- Limited engine speed and torque - Suppression of the required regeneration - Increased idling speed - Engine start suppressed
110	Engine coolant temperature sensor	4	Voltage too low	Over 125 °C and below 0.08 V	- Limited engine speed and torque - Suppression of the required regeneration - Idling speed regulation faulty in cold temperatures - Engine start suppressed
110	Engine coolant temperature sensor	15	Valid data, but above the normal range	Over 112 °C	- Limited engine speed and torque
168	Battery voltage	0	Valid data, but above the normal range	16.5 V	- Engine stop - Engine emergency stop - Suppression of the required regeneration
168	Battery voltage	3	Voltage too high	Over 16.5 V	- Faulty generated supply voltage for sensors and ECU - Engine speed fluctuates - Suppression of the required regeneration
168	Battery voltage	4	Voltage too low	Under 6 V	- Faulty generated supply voltage for sensors and ECU - Engine speed fluctuates - Suppression of the required regeneration
172	Engine intake-air temperature sensor	3	Voltage too high	-40 °C and over 4.85 V	- Engine start suppressed - Incorrect assessment of the soot load
172	Engine intake-air temperature sensor	4	Voltage too low	125 °C	- Engine start suppressed - Incorrect assessment of the soot load
190	Engine speed	0	Valid data, but above the normal range	High Idle + 500 rpm	- Engine stop - Engine emergency stop - Suppression of the required regeneration

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1.2 Maintenance overview

Daily/weekly maintenance

Work to be performed by the operator	Daily	Every week
Clean the machine	•	
Clean the air filter	•	
Check the machine for general damage	•	
Check the coolant level	•	
Checking the engine-oil level	•	
Check the engine for leaks		•
Check the hydraulic oil level	•	
Check the tire condition and pressure		•
Check all bolts for tightness		•
Check the wheel bolts		•
Check the braking system for correct function	•	
Check the brake fluid		•
Check the washer system and wiper water level	•	
Check the seat belt	•	
Check the instruments and indicator lights, and the acoustic warning devices for correct function	•	
Check the electrical system and lights for correct function	•	
Check the brake/inching pedal for correct function	•	
Check the steering system	•	
Check control levers and switches for correct function	•	
Check the attachments	•	
Check the exhaust for malfunctions and excessive smoke		•
Perform grease lubrication according to the lubrication plan, including of the attachments		•
Check the protective ROPS/FOPS structure		•
Clean the preliminary separator of the fuel filter		•
Check the machine axles for leaks		•
Check the hydraulic oil and water radiator for leaks and dirt, clean it if necessary		•
Check the attachments for safety and correct function		•
Check the routing of the hoses, pipe lines and electric lines		•
Check the air filter and intake hose		•
Check the engine mounting and axle mounting		•
Perform a general safety check, *General safety check on page 1-20*		•

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E.4 Safety instructions

Pay particular attention to the following

To eliminate risks, the instructions in this service manual must be read and observed by every person using, servicing, repairing, maintaining or inspecting this machine.

In particular, read this section on safety.

Safety symbols and signal words

Explanation

The following symbol identifies safety instructions. It is used for warning against potential personal risk or danger.

DANGER

DANGER identifies a situation causing death or serious injury if it is not avoided.

Consequences in case of non-observance.

► Avoidance of injury or death.

WARNING

WARNING identifies a situation that can cause death or serious injury if it is not avoided.

Consequences in case of non-observance.

► Avoidance of injury or death.

CAUTION

CAUTION identifies a situation that can cause injury if it is not avoided.

Consequences in case of non-observance.

► Avoidance of injury.

NOTICE

NOTICE identifies a situation that causes damage to the machine if it is not observed.

► Avoidance of damage to property.

The warning and safety signs attached to the machine provide important information for safe operation. Compliance is for your safety.

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Adjustment and maintenance

Observe the following:

Jack up the machine

WARNING

Crushing hazard due to incorrectly jacked-up machine.

Serious injury or death of persons underneath the machine can be caused if the machine lowers or falls down.

► Use jack/trestle of sufficient lifting capacity.
► Use functionally safe jack/trestle.
► Use the jack/trestle on firm and level ground.
► Install a jack/trestle at a suitable position on the machine.

Parking the machine

Perform the following steps before working on the machine:

- Stop the diesel engine.
- Apply the parking brake.
- Remove the starting key.
- Remove the key of the battery master switch.
- Wait until all parts of the machine have come to a complete standstill.
- Secure the machine with wheel chocks.
- Ensure that the machine cannot be put into operation by other persons.

Safety instructions for repair work

Repair personnel

- Repair personnel must possess the necessary expertise and experience with the repair of this machine or comparable machines!
- If this is not the case they must be thoroughly instructed by experienced repair personnel, for example by service personnel of the manufacturer.
- Personnel to be trained, taught, instructed or those placed in an apprenticeship may only work on or with the machine while under the constant supervision of an experienced, authorized person!
- Repair personnel must wear close-fitting clothes. Avoid loose-fitting clothes!

Equipment and occupational safety

- For maintenance or repair work, tools and service center equipment adapted to the task at hand are absolutely indispensable.
- Use climbing aids and working platforms provided for this purpose and corresponding to safety requirements for installation work above head height! Do not use machine parts as a climbing aid! Keep all handholds, steps, handrails, platforms, landings and ladders free from dirt, snow and ice.
- If the machine is used in areas with special hazards (for example toxic gases, caustic vapors, toxic environments), wear appropriate protective equipment (breathing filters, protective clothing)!

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Work to be performed	Operating hours: 250, 750, 1000, 1250, 1750, 2000, 2250, 2750, 3000, etc.	Operating hours: 1500, 2500, 3500, 4500, etc.	Once a month	Once a year
Check the gearbox, engine and hydraulic system for leaks	•	•	•	•
Check the hydraulic and water radiators for dirt	•	•	•	•
Check the coolant and antifreeze levels	•	•	•	•
Check the tension and condition of the V-belt	•	•	•	•
Check the routing of the hoses and pipes		•		•
Check the piston rods of the hydraulic cylinders		•		•
Check the air filter hose	•	•	•	•
Examine the intake muffler for damage or exceptional wear		•		
Check the routing of Bowden cables and electric cables		•		•
Tighten all screws; pay particular attention to the engine mountings, axle mountings and universal joint shaft		•		•
Check the acid level of the battery	•	•	•	•
Clean the battery terminals and check the acid density		•		•
Check the instruments, indicator lights and acoustic warning devices	•	•	•	•
Check the electrical system	•	•	•	•
Check the service brake and parking brake, adjust them if necessary	•	•	•	•
Check the hydraulic steering	•	•	•	•
Check the light system (if equipped)	•	•	•	•
Check the exhaust system		•		•
Check the pivot pins and joint bushes		•		•
Check the center pivot bolts and bearings		•		•
Check the pressure limiting valves of the hydraulic system		•		•
Check the idling speed	•	•	•	•
Check the speed under load and without load		•		•
Check the starter motor and generator (see manual of the engine manufacturer)		•		•
Check the glow plug and injection nozzles (see manual of the engine manufacturer)		•		•
Check the tapped clearance, possibly adjust (see the manual of the engine manufacturer)**		•		
If the machine is equipped with a Deutz engine: Check the toothed belt for the engine control and, if installed, for the auxiliary drive (do not retension, replace every 5 years or after 4500 operating hours)				
Check the injectors (every 3000 operating hours)				
Check the engine cover lock for correct funtion, adjust it if necessary	•	•	•	•

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Information

After cleaning the main engine air filter **H**, the symbol in the indicating instrument must not appear when the engine is running. If the opposite should be the case, replace the main engine air filter.

After installing a new main engine air filter **H**, the symbol in the indicating instrument must not appear when the engine is running. If the opposite should be the case, replace the safety engine air filter **S**.

Installing the engine air filter

Install a new or cleaned engine air filter in the reverse order.

Checking/replacing the safety engine air filter

NOTICE

Technical damage due to dirty engine air filter.

► Replace the safety engine air filter as required, however after cleaning the main engine air filter for the fifth time under all circumstances!

If engine air filter maintenance shows that there is a maintenance error, or that the main engine air filter is damaged, replace the safety engine air filter.

1. Remove the fasteners on the cover.
   ➥ Remove the cover.
2. Pull out the main engine air filter.
   ➥ The safety engine air filter can be seen.
3. Pull out the safety engine air filter.
4. Insert a new safety engine air filter.

Assemble the engine air filter in the reverse order.

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Function description

The engine drives the variable displacement pump **P35** via a coupling.

Function

The engine is a so-called chamber diesel engine. The ECM controls a solenoid valve via a pulse width modulated signal. This valve actuates the fuel injection pump.

Every cylinder of the cylinder head assembly is equipped with one inlet valve and one exhaust valve. Every cylinder valve has one single valve spring.

Every piston has two compression rings and one oil scraper ring. The piston height must be adjusted in such a way that the piston does not touch the cylinder head. The proper piston height also ensures the efficient combustion of the fuel, which serves to fulfill the emission requirements.

The crankshaft of the 4-cylinder engine has five main crank pins. The axial play on the rear main bearing is controlled with the help of pressure disks.

Reference marks are stamped into the transmitter wheels to ensure proper assembly. When the reference marks of the crankshaft and camshaft wheels and of the intermediate pinion are aligned, then piston no. 1 is at the top dead center of the compression stroke.

The crankshaft wheel drives the camshaft wheel through the intermediate pinion. The camshaft wheel in turn drives the gear wheel of the engine oil pump.

The injection pump, which is actuated by the camshaft, is installed in the cylinder block. The electrically operated fuel pump is located on the right side of the cylinder block.

The injection pump complies with the emission requirements. If it is necessary to adjust the valve timing of the injection pump or the upper idling speed, please contact your Perkins supplier or dealer.

An oil gear pump is located in the middle of the intermediate pinion. The engine oil pump conveys lubricating oil to the main oil distribution line via a pressure relief valve and an engine oil filter. Pressurized oil is distributed to the tilt levers through an external oil line from the main oil distribution line to the cylinder head.

The coolant flows from the lower side of the radiator and through the centrifugal pump driven by a belt. The coolant is cooled by the radiator. The temperature is controlled by means of a coolant thermostat.

The efficiency of the engine, the effectiveness of the emission control and the engine output depend on strict adherence to the operation and maintenance instructions. Engine output and efficiency depend on the use of the mandatory fuels, lubricating oils and coolants.

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Checking/adjusting the inching

Information

Pedal travel “X” during which the loader rolls backward, should exist, but be as small as possible.

Checking

1. Stop the loader on an upward slope with the help of the service brake.
2. Maintain travel direction and apply full throttle.
3. Slowly release the service brake until the loader begins to roll backward.
4. Continue releasing the service brake until the loader begins to travel forward.
5. Adjust the inching if necessary.

Adjustment

1. Pull off cap (– *see “Overview” on page 4-3*, position 7).
2. Loosen the nut.
3. To adjust the inching with the screw:
   - Turn the screw clockwise: pedal travel “X” decreases.
   - Turn the screw anticlockwise: pedal travel “X” increases.
4. Tighten the nut.
5. Check inching again.

Checking/adjusting the starting speed

Checking

1. Park the loader on level ground.
2. Start the engine.
3. Increase engine speed until machine travel starts (specified value: 1200 to 1250 rpm).

➥ If the starting speed is too low or too high, adjust it.

Adjustment

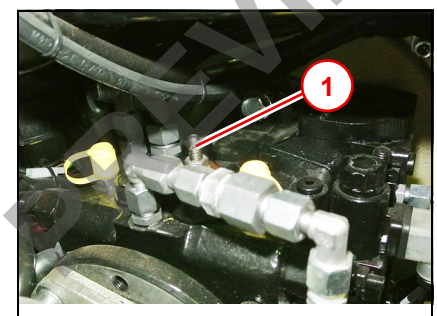


Fig. 156

1. Loosen nut **1** (– *see “Overview” on page 4-3*, position 2).
2. Turn the screw clockwise for 1/8 revolution.
3. Tighten the nut.
4. Check the starting speed again.

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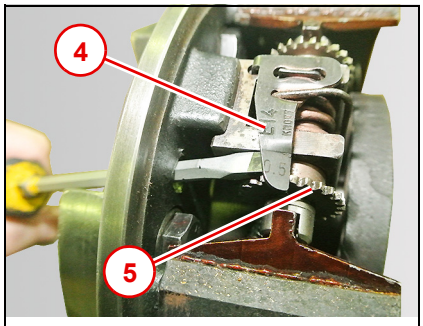


Fig. 205

11. Carefully raise the adjusting lever **4** by leveraging it with a screwdriver so that the adjuster wheel **5** can turn back freely (representation here without brake drum).

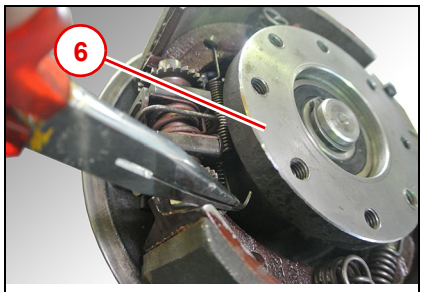


Fig. 206

12. Unhitch spring **6**.

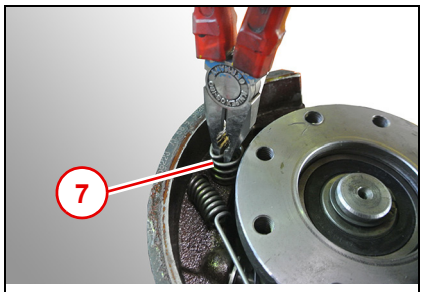


Fig. 207

13. Grab the brake shoe locking springs **7** on the grouser with combination pliers, compress the spring and loosen by a quarter turn.

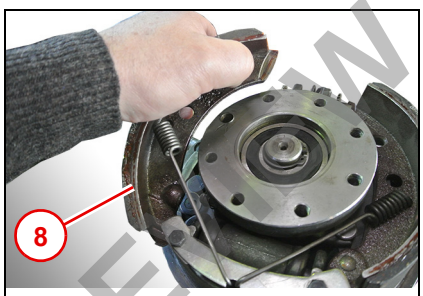


Fig. 208

14. Remove the brake shoe **8**, spring, washer and ram.

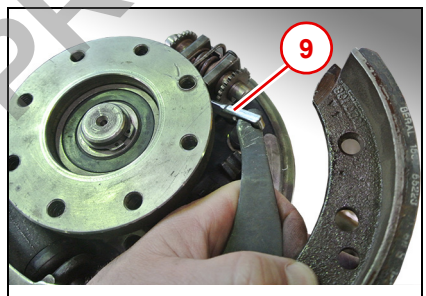


Fig. 209

15. Unhook the pull wire adapter **9** and remove the brake shoe.

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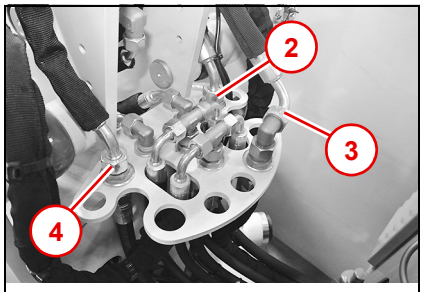


Fig. 269

3. Unscrew and close hydraulic lines **2**, **3** and **4**.

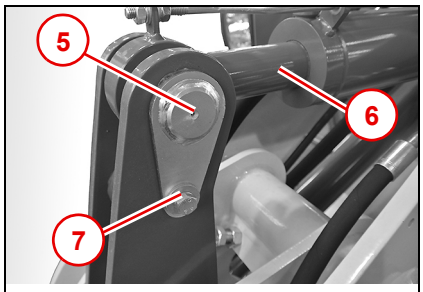


Fig. 270

4. Secure the tilt cylinder with suitable lifting gear.
5. Unscrew screw **7**.
6. Expel pin **5**.
7. Raise tilt cylinder **6**.
8. Unscrew the compensation rings if necessary.

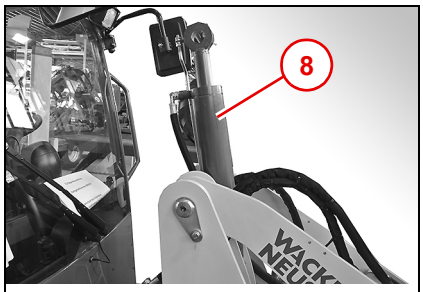


Fig. 271

9. Tip tilt cylinder **8** backward and set it aside.

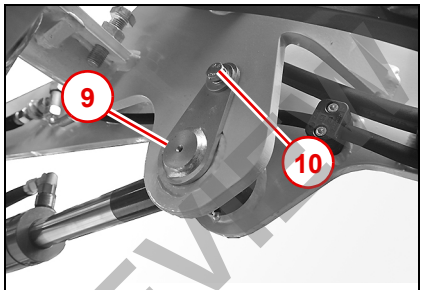


Fig. 272

10. Remove both lift cylinders from the loader unit. Unscrew one screw **10** each for this.
11. Expel one pin **9** each.
12. Place the lift cylinders on the front chassis section.

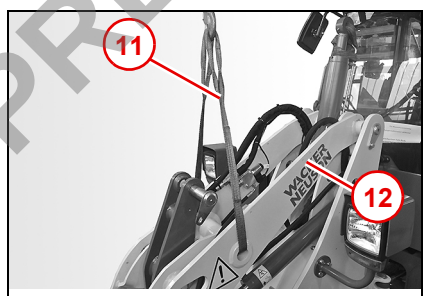


Fig. 273

13. Secure loader unit **12** with suitable lifting gear **11**.

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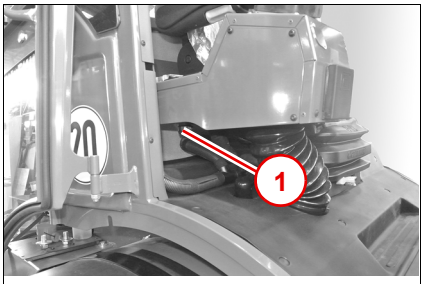


Fig. 303

NOTICE

Failure to observe the error codes can cause serious technical damage!

► For troubleshooting, connect the Wacker Neuson diagnostic system WANDA. To do this, remove the screwed nose cap **1** below the console. Then follow the instructions in the WANDA Operator's Manual.

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