

Model range

SMV 10-600B – SMV 60-1500B



YOUR MACHINE FROM KONECRANES LIFTTRUCKS

This user manual tells you all you need to know about starting, driving, servicing and maintaining your machine from Konecranes Lifttrucks.

Correct maintenance and operation will preserve the machine over a long and profitable operational life time and will utilise its features.

The phrases "front", "rear", "right" and "left" refer to the position in which the component in question is installed as viewed from the driver's seat.

Adhere to all the suggestions in the manual for the operation of the machine and perform the maintenance and inspections that are prescribed in the maintenance schedule, regularly and on time using the specified lubricants.

Operation and maintenance must only be performed by qualified staff. The working environment instructions must always be adhered to.

In particular, we wish to point out the importance of adhering to both general traffic regulations and the guidelines that are necessary for a safe use of the machine and for the prevention of work-related accidents.

The regulations that are applicable to the use of industrial machines must be strictly adhered to by the work managers, drivers and maintenance staff.

The responsibility for any risks that may occur when using the machine for applications for which it has not been approved rests with the user and not Konecranes Lifttrucks. The intended use of the machine is clear from its EC assurance.

Konecranes Lifttrucks are constructed for transport and lifting of such loads as stated on the lifting capacity plate. No alterations, and in particular no additions or modifications, may be performed on the machine without the approval of the manufacturer.

For any optional equipment, please refer to the the user instructions issued by the manufacturer.

TECHNICAL REMARK

For questions on machines from Konecranes Lifttrucks and when ordering spare parts, contact your nearest authorised dealer. Please make sure you state the correct delivery address.

For any repairs, please only use Konecranes Lifttruck original spares. This is a prerequisite for ensuring that your machine from Konecranes Lifttrucks shall maintain its original technical standard.

When ordering spare parts, it is important that you state the part number given in the spare parts list and also the following information:

- Machine designation:
- The serial number/year of manufacture of the machine:
- Delivery date:

When ordering parts for the following units, their individual manufacturing number should be stated:

- Engine no.:
- Mast/boom no.:
- Mast/boom lifting height:
- Hydraulic pump no.:
- Transmission no.:
- Drive axle no.:

(The individual numbers are stated on the machine card.)

When the machine is delivered, the details on the machine type plate should be written down in this user manual.

DELIVERY INSPECTION

Every machine from Konecranes Lifttrucks is checked very carefully before leaving the factory in order to ensure that it is in good condition and fully equipped as per the order. Authorised Konecranes Lifttrucks dealers are then obliged to inspect the machine once more prior to delivery to the customer.

In order to avoid later complaints and problems, the customer should also inspect the machine to ensure that it is in fully operational condition and fully equipped at the point of delivery and sign for the receipt of the machine from the dealer.

Always perform maintenance, lubrication, checks and daily inspections in accordance with the instructions in this book.

Prior to taking the machine into use, the inspection points in accordance with the warranty/delivery report must be inspected.

The warranty/delivery report must be filled in and returned to Konecranes Lifttrucks within a week after the first time of use in order for the warranty to be valid from the first time of use. If the warranty/delivery report is not returned within a week, the warranty is valid from the day the machine was delivered from Konecranes Lifttrucks.

The following technical manuals are enclosed with every machine:

- 1 Spare parts catalogue
- 1 Instruction book
- 1 Driver user manual
- 1 Machine card

When contacting your authorised dealer, please always state:

- Machine designation
- Machine serial number
- Year of Manufacture

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SAFETY REGULATIONS



SAFETY RULES

- Adhere to the local safety regulations
- The machine may only be operated by drivers who have been specially trained and who have the permission of the work management.
- Remember: The Road Traffic Act and the Highway Code always applies!
- Prior to start: Ensure that there are no persons or other objects in the way of the machine or its equipment.
- Do not block doors and/or emergency exits.
- The machine must not be used if there is a fault with the brakes, steering, lifting device or other important components.
- It is not allowed to bring along passengers.
- Lifting persons with the machine is prohibited.
- Never exceed the lifting capacity of the machine – see the type plate and load chart.
- The load must always be transported in a lowered position.
- Always repair damage and wear that impacts safety/ functioning and the useful life.
- The hydraulic system of the machine is equipped with a hydraulic accumulator using a high pressure. Take great care when working with the hydraulic system. Only maintenance staff with experience of the hydraulic system may interfere with it.
- Use safety equipment – breathing mask, protective goggles, hearing protection, gloves, helmet – as necessary.
- High pressure tyres. Always follow the instructions for emptying and filling of the tyres.

Safety regulations

WARNING TEXTS AND IMPORTANT INFORMATION

There are three different types of warning texts in the instruction manual. They are divided into different levels of danger. All warning texts are preceded by a warning symbol.



This warning symbol makes the reader aware of areas that may be associated with risk of personal injury and refers them to notices in the instruction manual.



DANGER
Situation that may lead to severe personal injury or fatality if regulations are not followed.



WARNING
Situation that may lead to personal injury if regulations are not followed.



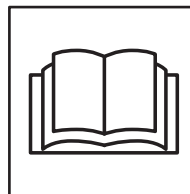
TAKE CARE
Situation that may lead to damage to the product if regulations are not followed.

Always read the instructions that follow the warning symbol or informative text.

Important information is indicated by the abbreviation **NOTE**. The information is not necessarily do to with safety but may also be about making the work easier or clarifying information.

NOTE

Used to indicate important information that makes work or handling easier.



Read the instruction manual carefully before you start using the machine. Incorrect usage may lead to severe injury to person, product or property. The instruction manual contains important information on operation and safety and must always be located

by the machine. Never use a machine that does not have an instruction manual.

BEFORE DRIVING

Responsible staff, in particular drivers and service personnel, must be instructed in the regulations for normal and safe use of industrial machines that accompany this user manual.

Adhere to the guidelines and safety rules that are available for:

- using industrial machines,
- roads and work places,
- drivers (rights, duties and rules of conduct),
- any optional equipment,
- different types of drive units,
- service (maintenance and inspection),
- check for the prevention of accidents.

The driver (/owner) or other persons of responsibility must ensure that the guidelines above and all safety rules are adhered to.

When a trained driver is to commence driving the machine, instruct him on:

- the special functions of Konecranes Lifttrucks,
- extra equipment,
- specific operational features.

Driving, manoeuvring and steering should be practiced until the driver is completely comfortable with this. Only then should training in stacking manoeuvring commence. The stability of the machine within the work area can only be guaranteed if the machine is used correctly. If tendencies of tipping over occur due to prohibited manoeuvres or incorrect driving, the instructions given must be adhered to completely.

Take the following factors of environmental impact into consideration:

1. Driving
Exhaust emissions, fuel consumption, noise level, leaks (oil, fuel, liquids) increase if the machine is driven and operated incorrectly.
2. Service
Oils, fuels, filters and filter elements, cleaning agents must be handled in a way suitable for the environment.
3. Repairs
Metal, batteries, electronics, rubber (tyres, hoses, seals), emulsions and chemicals must be handled or recycled in a way suitable for the environment in accordance with local regulations.

PREVENTIONS OF ACCIDENTS

In some countries, machines must be inspected at least once annually by trained personnel in accordance with regulations for the prevention of accidents.

Authorised dealers of Konecranes Lifttrucks may provide further information on this.

NORMS

This machine is constructed and built in accordance with the following norms:

Machine directive	2006/42/EC
Safety for industrial trucks	EN 1551
Stability for industrial trucks	ISO1074
Noise levels	2005/88/EC
Vibrations	EN 13059
Emission	2004/26/EC
EMC	2004/108/EC

Presentation of the machine

PRESENTATION OF THE MACHINE

TECHNICAL DESCRIPTION

The designation SMV 33-1200 B means:

SMV =	Product name
33 =	33 ton lifting capacity,
1,200 =	1,200 mm load centre
B =	series designation

The engine is a water cooled, turbo charged 6 cylinder diesel engine. The engine drives a transmission through a torque converter. DANA has a transmission version with four forward gears and four backward gears. ZF has a transmission version with four forward gears and three backward gears. Both DANA and ZF have a transmission version with three forward gears and three backward gears.

All machines are provided with a gear lever for four forward but only three gears can be activate on certain models. The gear change is done electrically with gears for driving forward/backward. The torque converter is equipped with an oil cooler under the engine cooler. The transmission has a disconnect valve that is manoeuvred via the brake pedal in the cabin.

The disconnection valve disconnects the transmission so that the operator can control the braking and at the same time retain a high engine revolution during stacking.

The front axle is driven by the transmission via the prop shaft. This axle is of a double-reduction heavy duty type with a conic pinion as its primary gear, hub planetary gear as its secondary gear, load reduced axle pegs and conical roller bearings.

The steering shaft is mounted in "spherical" bushings that allow sufficient wheel movements for stability on uneven surfaces. The parallel tie rods are between the steering cylinders and the wheel axles.

The brake system consists of a oil cooled wet disc brake system. The foot brakes are operated using the foot brake valve and affects the drive axle.

The parking brake operates electrically and affects a hydraulic cylinder on the prop shaft. The parking brake is always active as long as it has not been released using electrical energy.

The axial piston pumps together with a gear pump are fitted directly on the transmission. The gear pump builds up the accumulator pressure for the foot and parking brakes. The variable piston pump provides the steering system and the different lift functions with pressure. The system is load sensing.

The steering is completely servo assisted. In the event of an engine breakdown, it is still possible to steer the machine for a limited period of time without power assistance but it will be heavy.



WARNING

In the event of engine breakdown, the machine must be stopped in a safe manner.

Machine sizes 10-16 are equipped with a directional control valve and machine sizes 18-60 are equipped with two. These directional control valves are fitted to the chassis and operated from the cabin using power assisted levers to the right of the driver. These control the functions for mast lifts, tilts, sideshift movement of the fork carriage and the fork spreading and any extra functions.

The mast consists of an outer and an inner mast, a fork carriage, two lift cylinders and two tilt cylinders. The inner stand section moves along the outer using mast wheels and support rollers. The mast is mounted on two axles in the chassis using bearings. The fork carriage is of a rolling type with sideshift movement and fork spreading.

The driver's cabin fulfils international safety standards and is suspended on the chassis on rubber mounts to protect the driver from vibrations. Getting into the cabin is done from the left using the steps in the machine. When the driver seat is turned 90°, it is also possible to leave the cabin to the right.

All hydraulic controls for the lifting functions are situated on the console to the right of the driver seat.

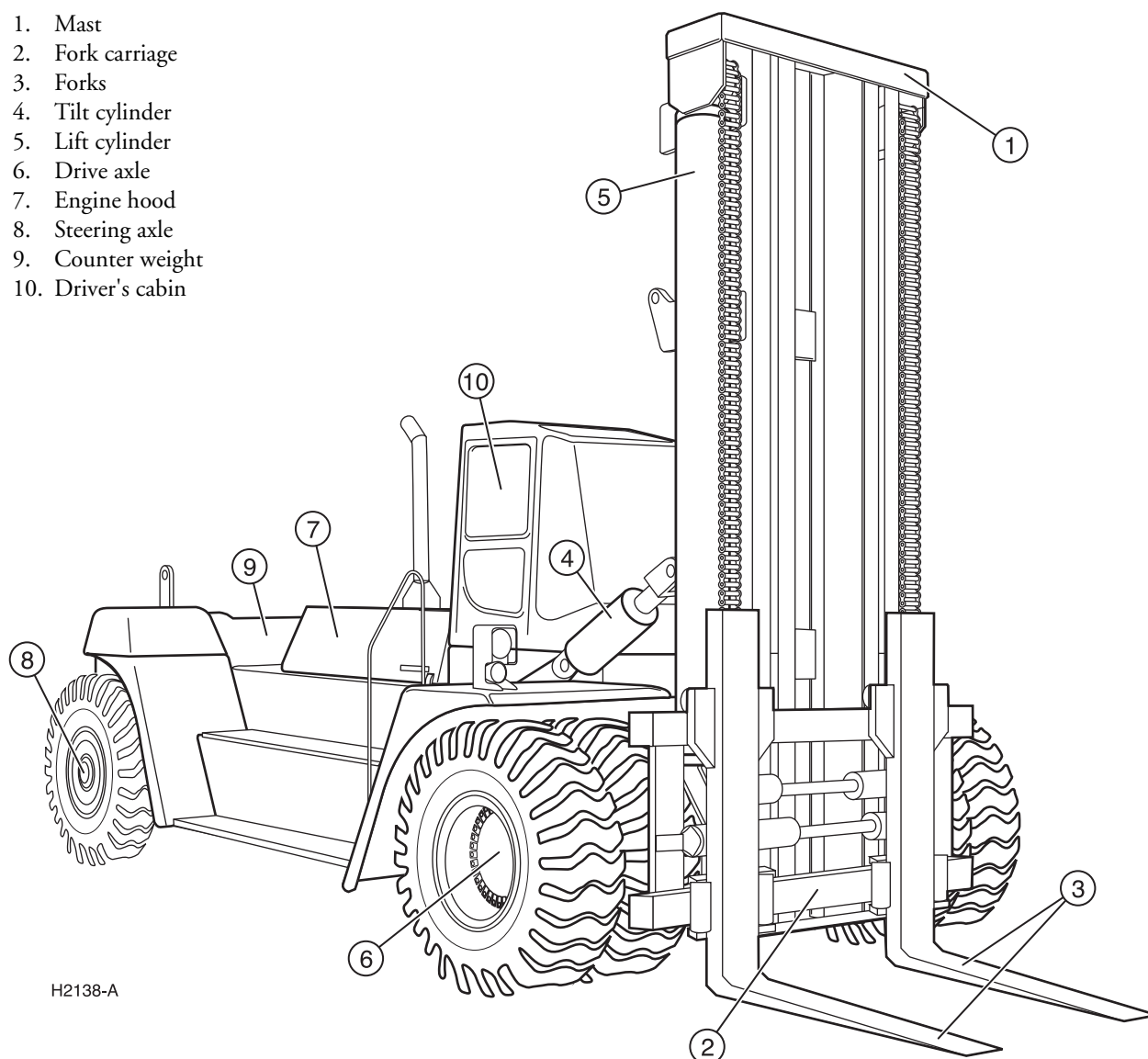
The parking brake, switches for electric optional equipment's, instruments, gauges and warning indicators are on the front instrument panel.

Gear change controls, levers for driving direction indicators and the windscreen wipers are on the steering column.

The electrical system is 24 volt using two heavy duty batteries connected in line.

OVERVIEW OF THE MACHINE

1. Mast
2. Fork carriage
3. Forks
4. Tilt cylinder
5. Lift cylinder
6. Drive axle
7. Engine hood
8. Steering axle
9. Counter weight
10. Driver's cabin

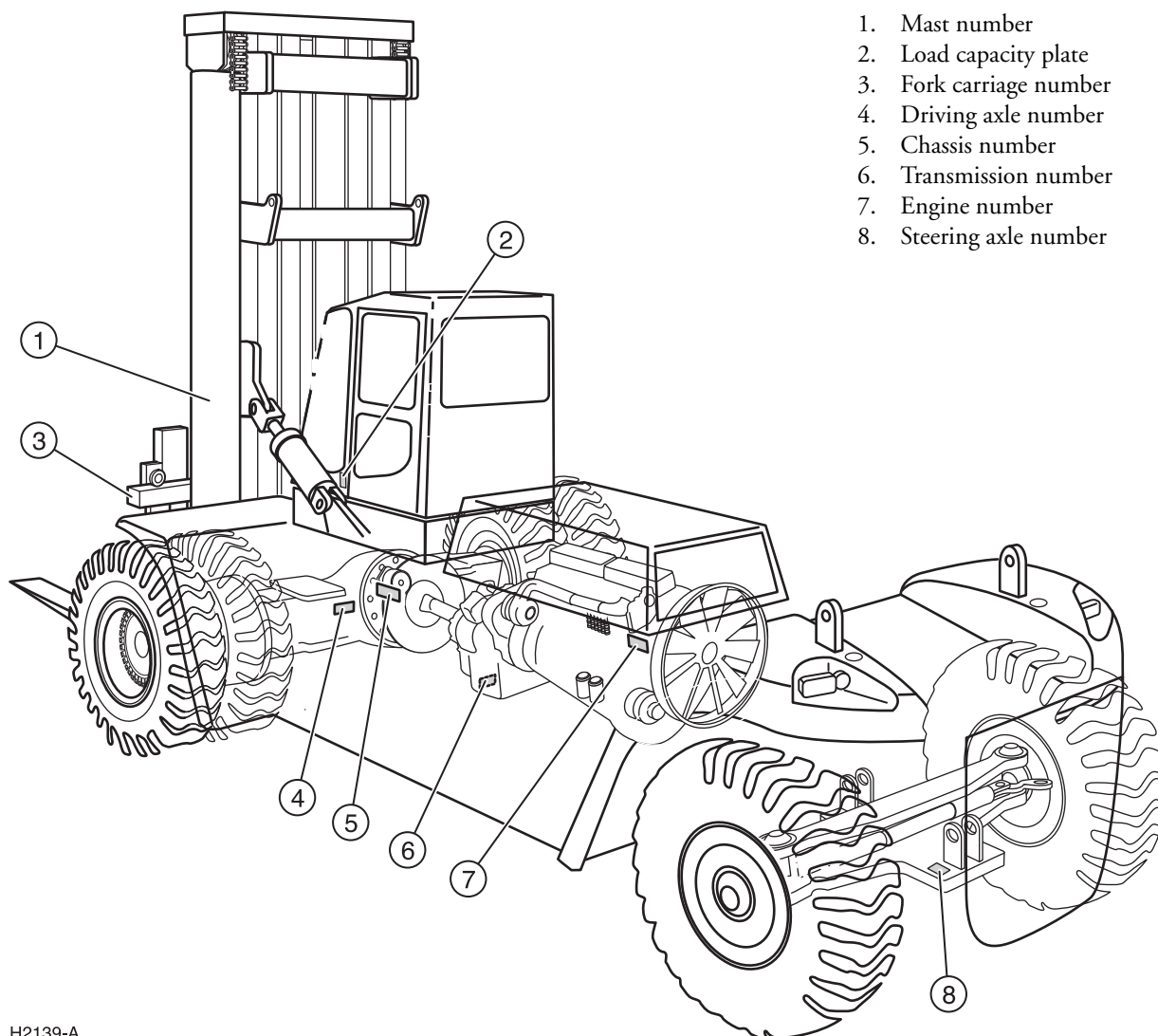


H2138-A

Presentation of the machine

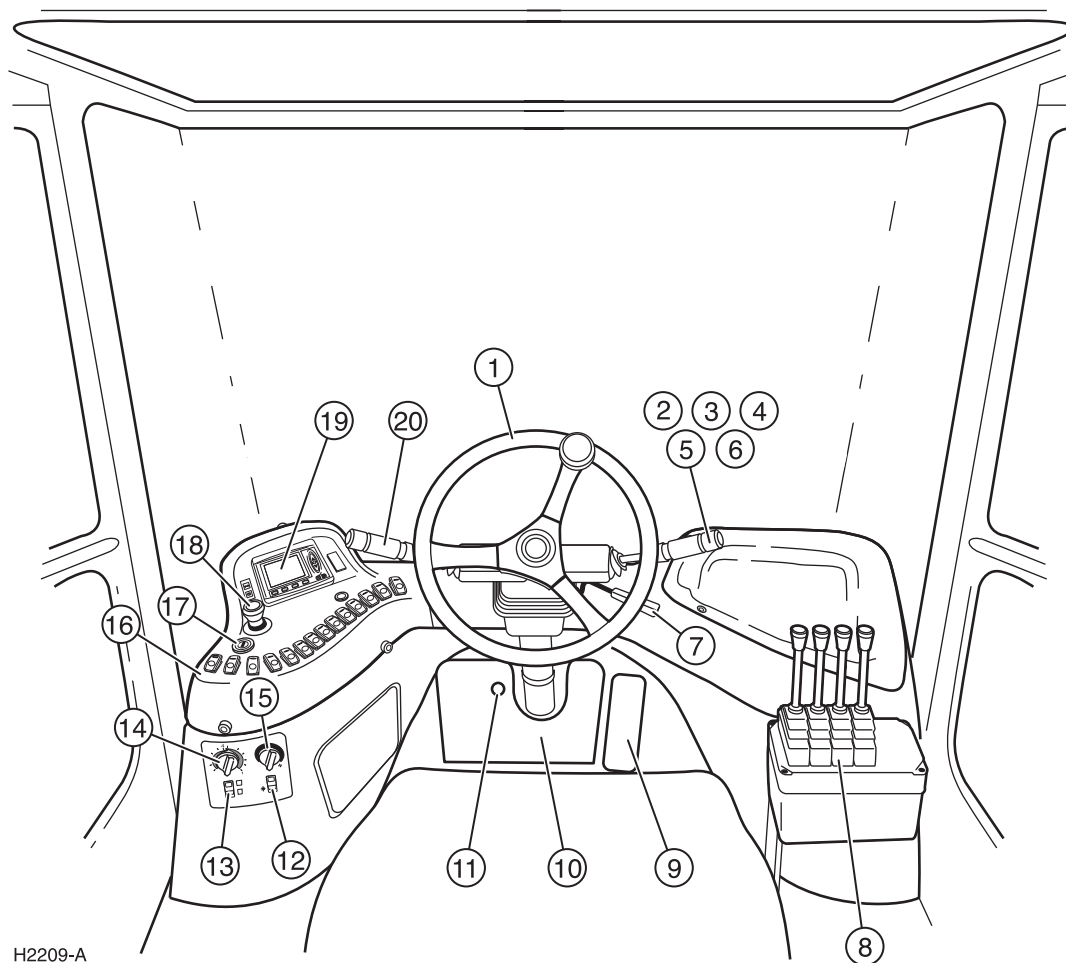
KONECRANES

ID-PLATES AND SERIAL NUMBER



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CABIN CONTROLS AND INDICATORS

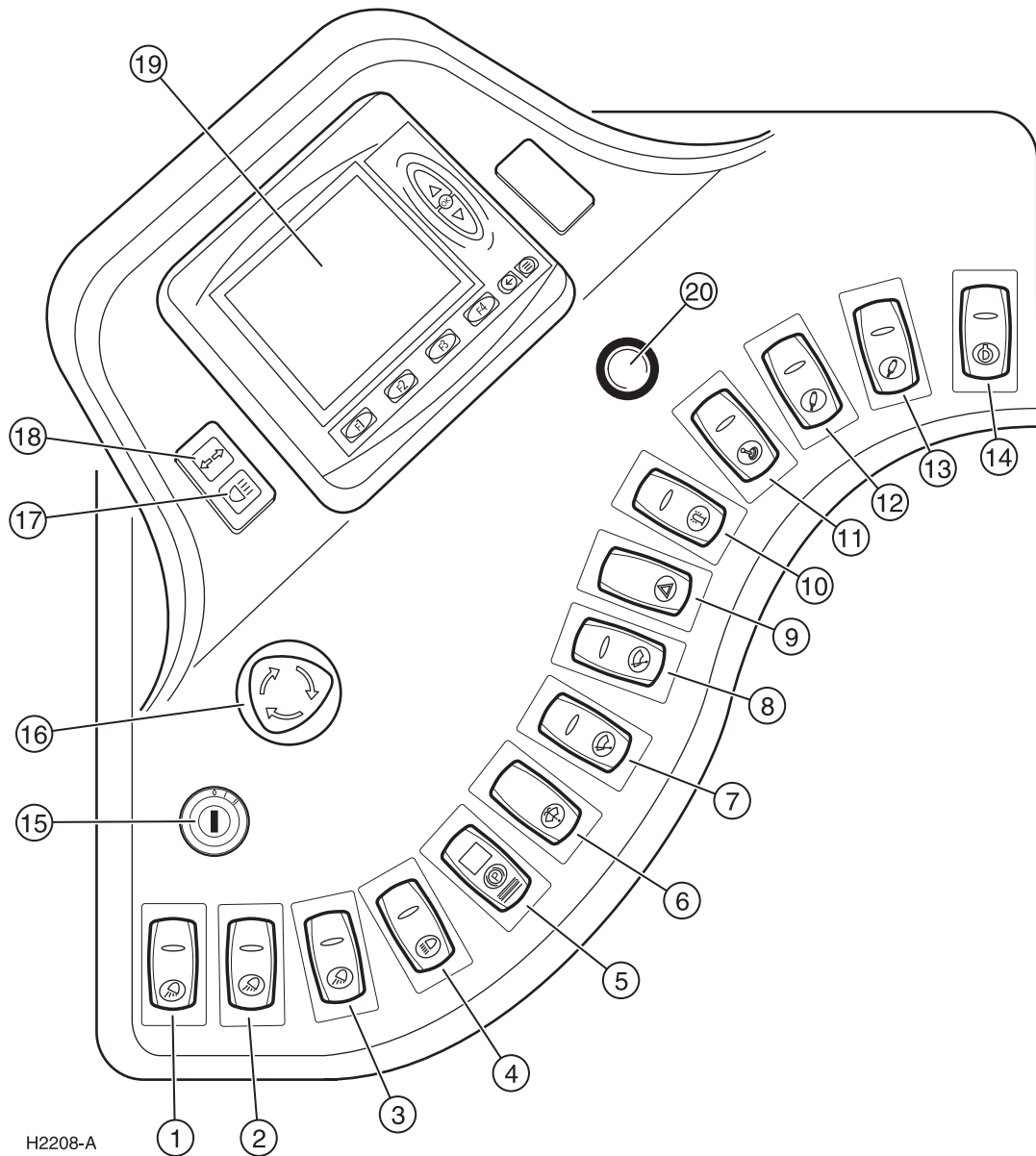


- | | |
|------------------------------------|-----------------------------------|
| 1. Steering wheel | 11. Declutch |
| 2. Wiper windscreen | 12. Cooling (AC) |
| 3. Main beam/dipped beam | 13. Recirculation |
| 4. Horn | 14. Heater controls |
| 5. Driving direction indicator | 15. Fan |
| 6. Windscreen washer | 16. Instrument panel and switches |
| 7. Adjustment lever steering wheel | 17. Ignition lock |
| 8. Control levers hydraulics | 18. Emergency stop |
| 9. Accelerator pedal | 19. Drive monitor IQAN MD3 |
| 10. Brake pedal | 20. Gear lever |

The placing of the controls may vary from machine to machine depending on the requirements of the customer. The image above shows the standard placing of controls.

Presentation of the machine

WARNING INDICATORS AND GAUGES

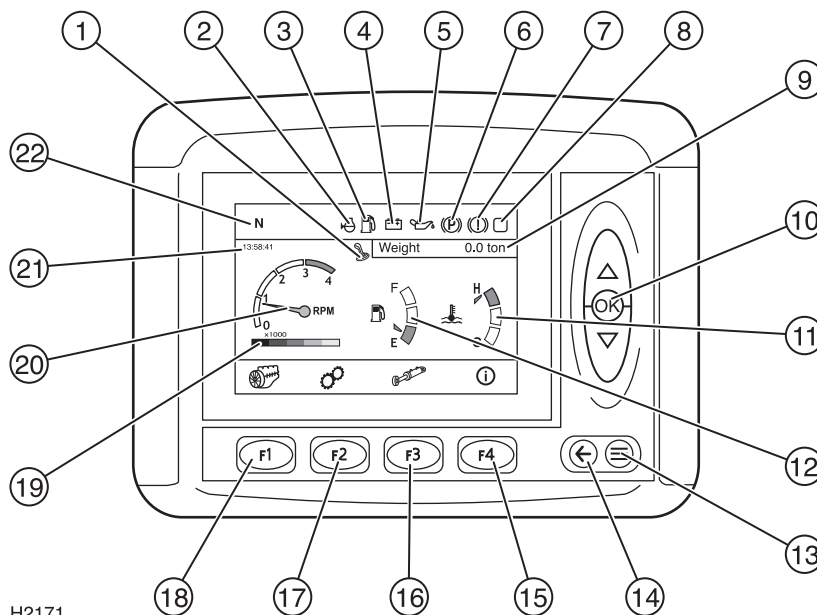


- | | |
|-----------------------------|--|
| 1. Work light mast | 11. Lever steering (optional) |
| 2. Work light roof | 12. Central lubrication (optional) |
| 3. Work light extra | 13. Central lubrication (optional) |
| 4. Driving light | 14. Activation diagnostics engine (optional) |
| 5. Parking brake | 15. Ignition lock |
| 6. Washing roof/rear screen | 16. Emergency stop engine |
| 7. Wiper rear screen | 17. Indicator main beam |
| 8. Wiper roofscreen | 18. Indicator driving direction Right/Left |
| 9. Hazards | 19. Drive monitor IQAN MD3 |
| 10. Rotating warning lights | 20. Warning indicator |

The placing of the controls may vary from machine to machine depending on the requirements of the customer. The image above shows the standard placing of controls.

DESCRIPTION OF DRIVE MONITOR IQAN MD3

The function of the trip computer is to, by using information from different sensors, analogue and digital signals, optimally control the hydraulic system and drive line. The driver has a total overview of the activities of the machine during operation.

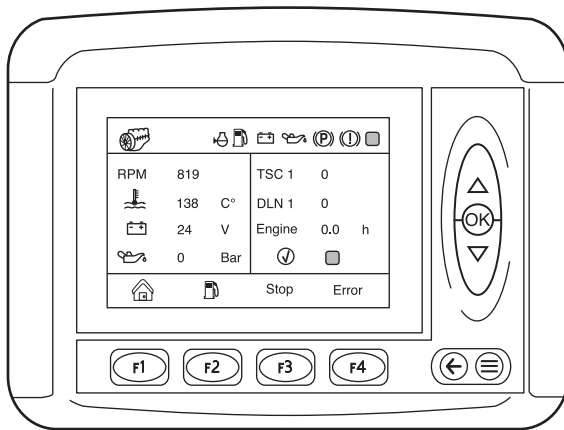


H2171

- | | |
|-------------------------------------|---------------------------------|
| 1. Lever steering active (optional) | 13. Adjustment and measure page |
| 2. Low coolant level (optional) | 14. Previous page |
| 3. Warning low fuel level | 15. Information page |
| 4. Low battery power | 16. Hydraulics page |
| 5. Low oil pressure engine | 17. Transmission page |
| 6. Parking brake activated | 18. Engine page |
| 7. Low accumulator pressure, brakes | 19. Eco driving |
| 8. Indication twist look | 20. Engine RPM |
| 9. Load weight (optional) | 21. Clock |
| 10. Confirms choice | 22. Gear position |
| 11. Engine temperature | |
| 12. Fuel level | |

Presentation of the machine

KONECRANES



H2172

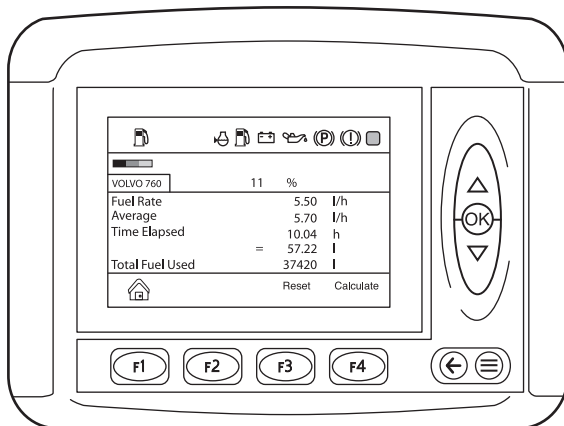
Engine page

- Press F1 on the start page.

The engine page shows:

- The real rpm of the engine
- The temperature of the engine
- Battery power
- Engine oil pressure
- Engine rpm requested by the Transmission
- Requested rpm in % of maximum value
- Operational time engine
- Diagnostics engine, warning and indicator lights (Scania engines)

- F1 – Return to start page
- F2 – Eco driving page
- F3 – Stops the engine
- F4 – Shows error codes (Scania engines)



H2173

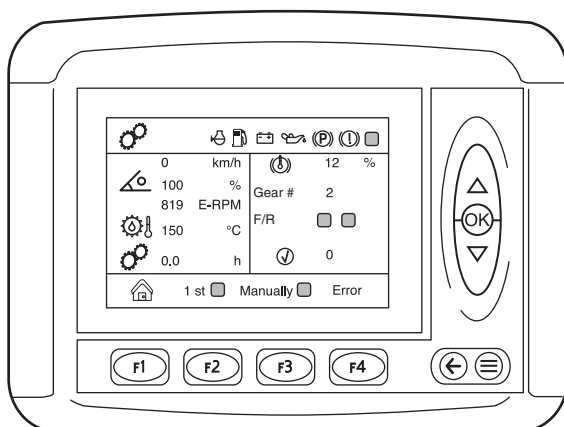
Eco driving page

- Press F2 on the engine page

The Eco driving page shows:

- Current fuel consumption in % of maximum fuel consumption
- Engine type
- Current fuel consumption (litres/hour)
- Average fuel consumption (litres/hour)
- Operational time since last reset
- Estimated fuel consumption, F4 (litres)
- Total amount of consumed fuel in litres since the engine was started

- F1 – Return to start page
- F3 – Reset, expect for the value Total Fuel Used
- F4 – Estimated fuel consumption (litres)



H2174

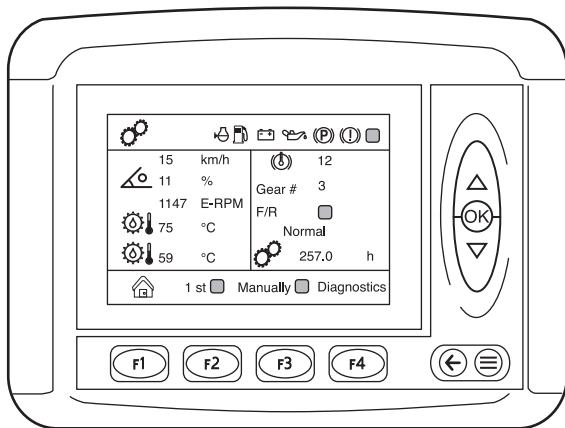
Transmission page Dana

- Press F2 on the start page

Transmission page Dana shows:

- Driving speed
- Accelerator position 0-100%
- Input rpm Transmission
- Temperature Transmission
- Driving time
- Brake temperature drive axle
- Gear position 0-4
- Driving direction indicator F-R
- Error codes from transmission
- OK – Activates the diagnostics page

- F1 – Return to start page
- F2 – Start in first gear
- F3 – Manual gear change
- F4 – Error codes from transmission Scrolls error codes

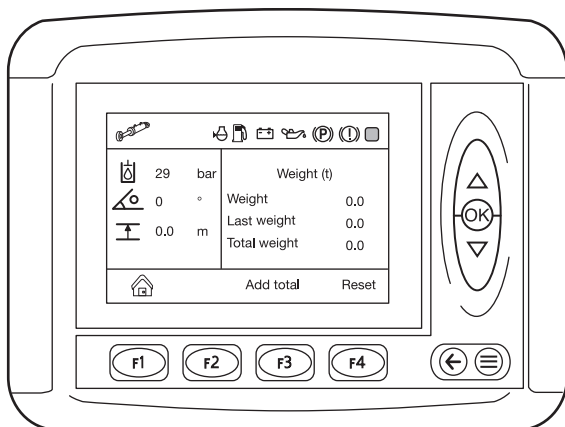


H2176

Transmission page ZF (optional, replaces DANA)

- Press F2 on the start page
- Transmission page ZF shows:
 - Driving speed
 - Accelerator position 0-100%
 - Input rpm Transmission
 - Temperature converter
 - Temperature oil tray
 - Brake temperature drive axle
 - Gear position 0-4
 - Driving direction indicator F-R
 - Status transmission
 - Driving time

- F1 – Return to start page
- F2 – Start in first gear
- F3 – Manual gear change
- F4 – Activates the diagnostics page

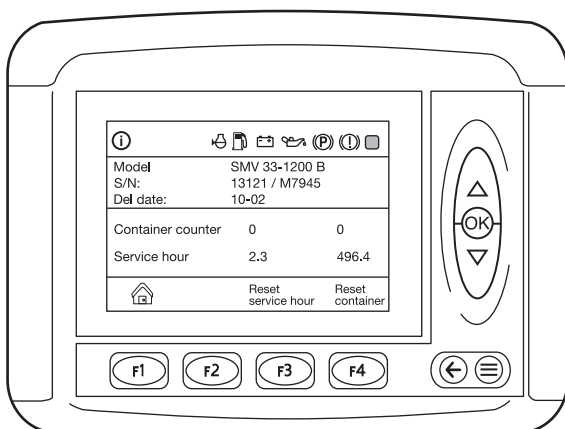


H2177

Hydraulics page (optional)

- Press F3 on the start page
- The hydraulics page shows:
 - Pressure lift cylinder
 - Tilt angel
 - Height indicator
 - Weight
 - Last added weight
 - Total added weight
 - Weight calibration without load
 - Weight calibration with known load

- F1 – Return to start page
- F3 – Add "weight" to "total added weight"
- F4 – Resets all measurements



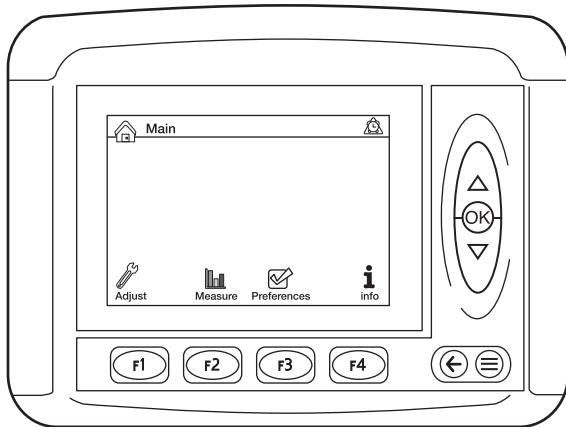
H2178

Information page

- Press F4 on the start page
- The information page shows:
 - Machine model
 - Serial number
 - Delivery date
 - Container counter (the first value cannot be reset)
 - Container counter (the second value can be reset using F4)
 - Operational time counter (the first value cannot be reset)
 - Operational time counter (the second value can be reset using F3)

- F1 – Return to start page
- F3 – Resets the operational time counter
- F4 – Resets the container counter

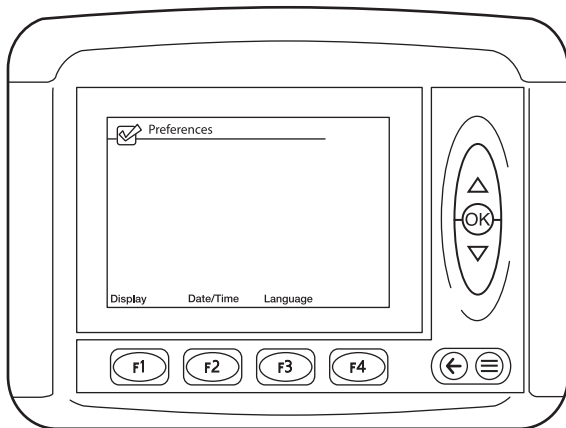
Presentation of the machine



H2179

Adjustment and measuring page

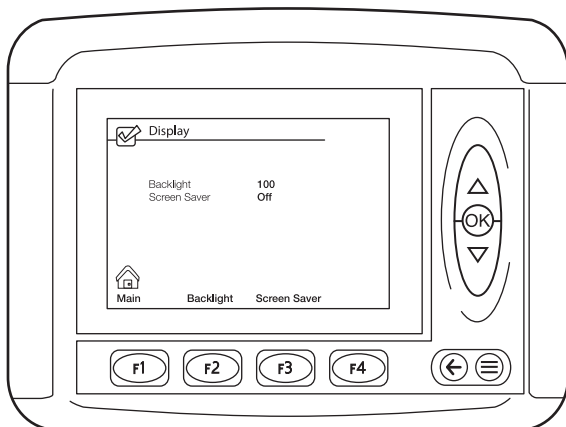
- Press $\equiv$ on the start page
- The adjustment and measure page shows:
- Any alarm, warning of message is shown
 - F1 – Shows submenu Adjust
 - F2 – Shows submenu Measure
 - F3 – Shows submenu Settings
 - F4 – Shows submenu Info
 - $\leftarrow$ – Cancel
 - $\equiv$ – Return to previous page



H2180

Settings page

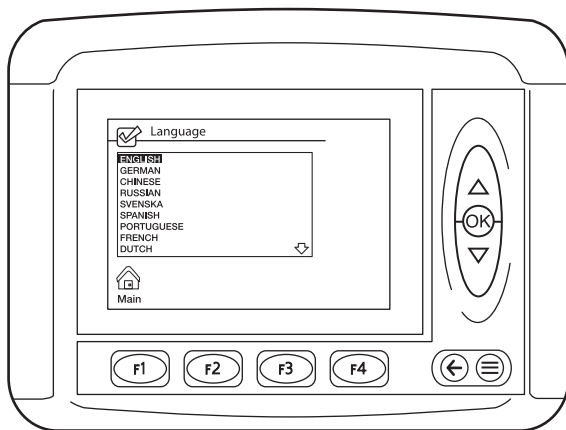
- Press F3 on the adjustment and measuring page
- The settings page shows:
- F1 – Shows display settings
 - F2 – Shows the page for setting date and time
 - F3 – Shows language settings page
 - $\leftarrow$ – Return to previous page
 - $\equiv$ – Return to the adjustment and settings page



H2181

Display settings page

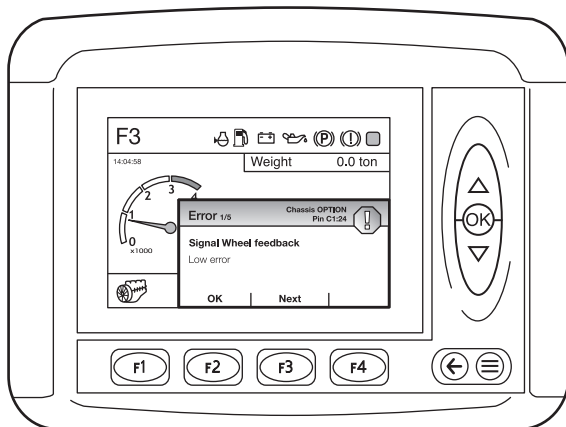
- Press F1 on the settings page
- The display settings page shows:
- F1 – Return to start page
 - F2 – Setting of background light
 - F3 – Setting of screen saver
 - Scroll using the arrow keys and save with OK
 - $\leftarrow$ – Return to previous page
 - $\equiv$ – Return to the adjustment and settings page



H2182

Language adjustment page

- Press F3 on the settings page
- The language settings page shows:
 - Select a language using the arrow keys
 - Save by pressing OK
- F1 – Return to start page
- ← – Return to previous page
- ≡ – Return to the adjustment and settings page



H2183

Presentation of error messages

This message is shown when the electronic register input data from sensors etc. are outside the permitted ranges.

"Low error" or "High error"

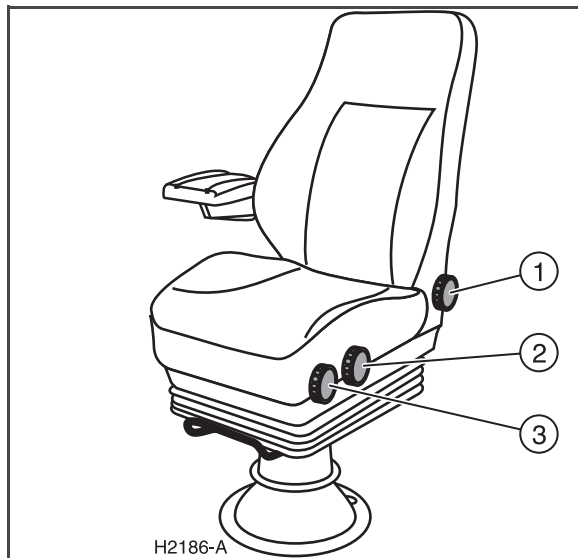
The message indicates sensor fault, cable fault or input fault on module.

The example in accordance with the error message shows:

- Type of message
- Name of sensor
- Type of fault
- For fault finding, it is clear to which control unit and which pin the sensor is connected.
- F2 – Confirm the error message The error message disappears from the screen but the error remains with the machine.
- F3 – Scrolls through more error messages.
- ≡ – Return to the adjustment and settings page

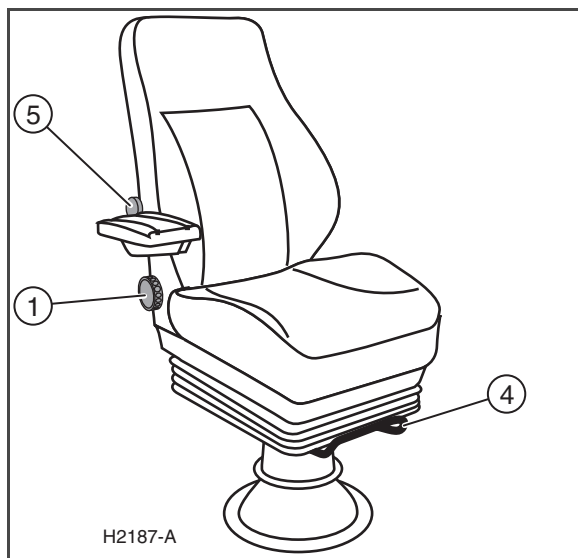
Presentation of the machine

KONECRANES

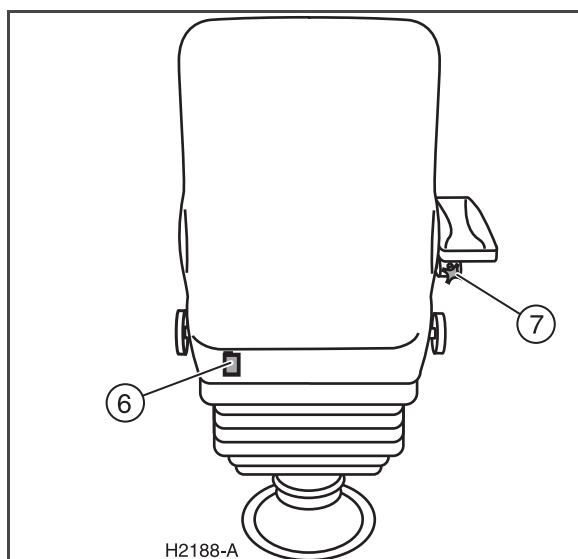


DRIVER SEAT

- In order to set the height of the chair, turn the knob (3) clockwise for raising and counter-clockwise for lowering.
- To adjust the tilt of the seat cushion, adjust with knob (2).
- Set the back rest to the correct position with knob (1).



- Lift the handgrip (4) to adjust the forward/backward position of the chair.
- Adjust the lumbar support with knob (5).



- Height limiter with blocking (6).
 - Position 1 lever to the right is full suspension.
 - Position 2 one step to the left is limited suspension.
 - Position 3 two steps to the right is blocking (delivery position).
- Adjust the arm rest angle with knob (7).



WARNING

Never drive the machine without putting on the seat belt properly.

Danger of serious personal injury or fatality.

The seat belt must always be used when driving the machine.

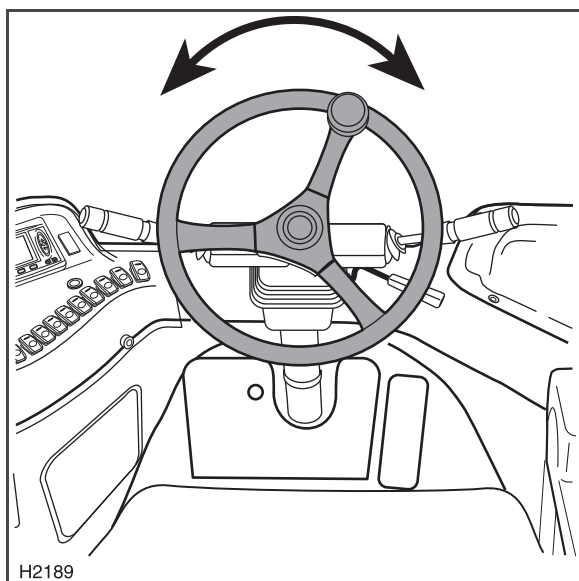


WARNING

Never drive the machine if the seat is not locked in its position.

Danger of serious personal injury or fatality.

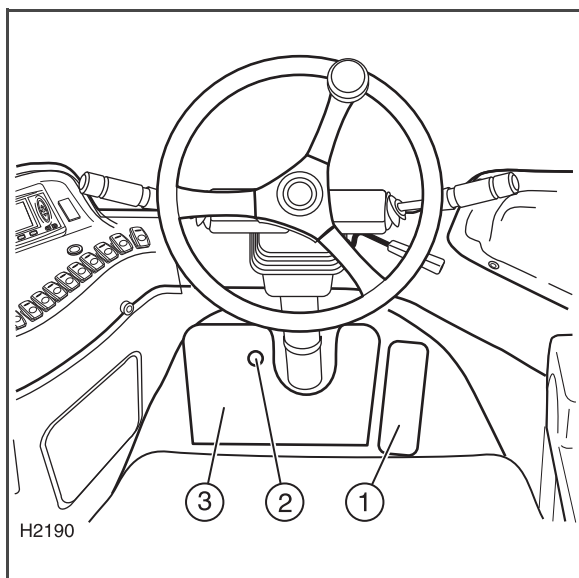
Uncontrolled movements of the driver due to the fact that the seat is not locked in its position may lead to an incorrect manoeuvring of the machine.



STEERING

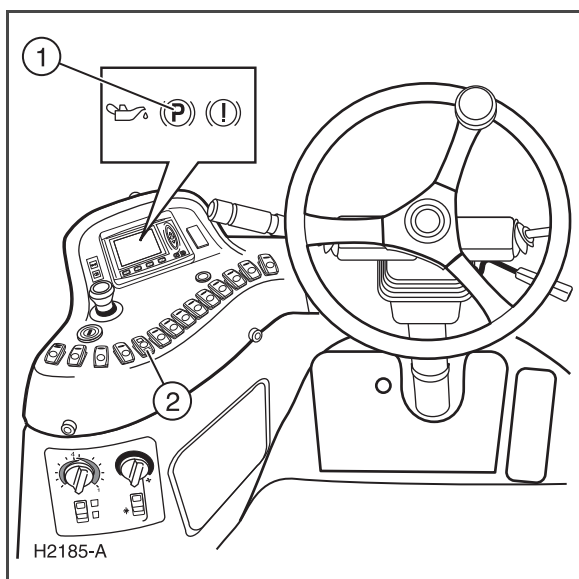
Very little effort is required to turn the steering wheel thanks to the power assisted steering system.

In order to reduce unnecessary tyre wear, the steering wheel should only be turned when the machine is moving.



DECLUTCH FUNCTION

- Release the accelerator pedal (1).
- Activate the declutch using the foot switch (2).
- If the switch is pressed further together with the pedal, the brakes are applied further.
- When braking only with the brake pedal (3), the disconnection is only activated once the brakes have been applied.

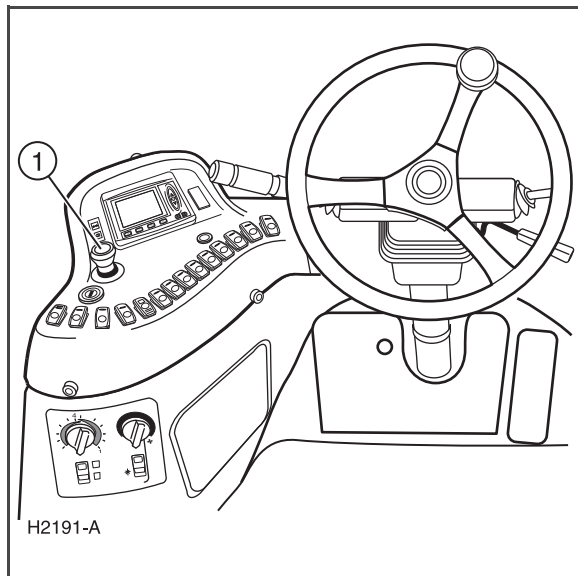


PARKING BRAKE SWITCH

- The parking brake switch (2) is located on the instrument panel.
- Avoid using the parking brake for braking the machine unless it is an emergency.
- When the parking brake is activated, the warning indicator (1) is lit.
- If the driver leaves the driver seat without having activated the parking brake, a signal is sound.

Presentation of the machine

KONECRANES®



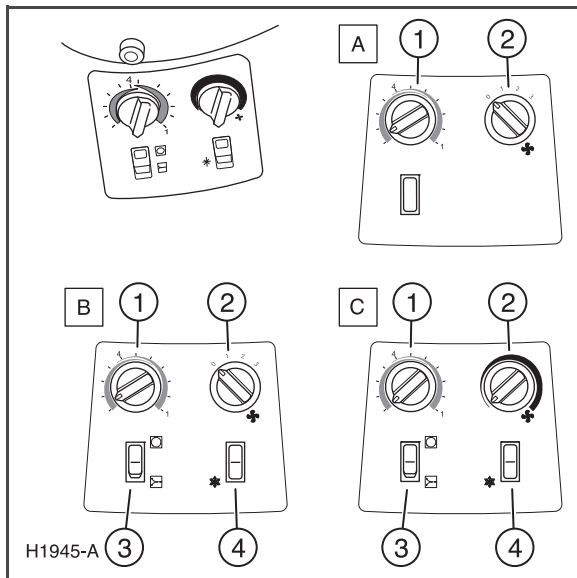
EMERGENCY STOP

- When using the emergency brake (press button (1) downwards), all functions are switched off. The parking brake is activated and the engine stops.



WARNING

There is a risk of tipping when using the brake whilst the machine is moving. Danger of serious personal injury and damage to the vehicle.



VENTILATION

A = Heat

- (1) Temperature
- (2) Fan

B = AC:

- (1) Temperature
- (2) Fan
- (3) Recirculation
- (4) Cold

C = ACC:

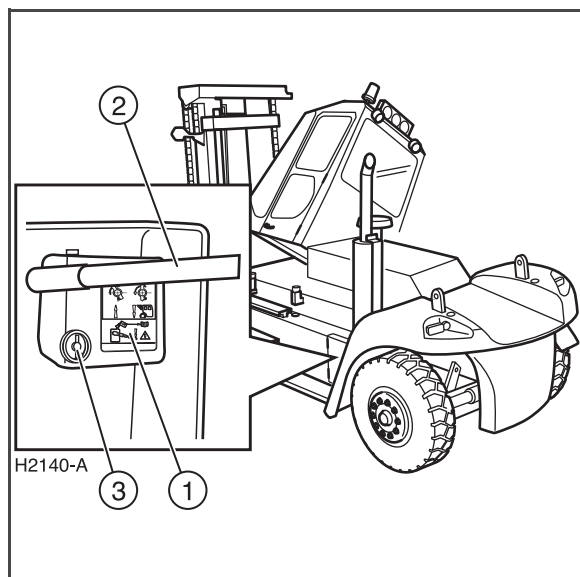
- (1) Temperature
- (2) Fan (stepless)
- (3) Recirculation
- (4) Cold

Settings for different types of weather

- Warm weather with normal air humidity
 - Open the fresh air intake
 - Close the heat regulator
 - Switch on the cooling and set the cold temperature to the desired position.
- Very warm weather with high air humidity
 - Close the fresh air intake
 - Close the heat regulator
 - Switch on the cooling and set the cold temperature to the desired position.
- During autumn and early winter with high air humidity with rain, slush and mist on the windows
 - Switch on the cooling
 - Open the fresh air intake
 - Crank open a window so that the air can circulate in the cabin.
 - Increase the heat if necessary.
- Cold weather in the winter
 - Open the fresh air intake, switch off the cooling
 - Set the heat to the desired position.
- Very cold weather with low air humidity
 - Close the fresh air intake
 - Switch off the cooling.
 - Set the heat to the desired position.
- Winter during cold and dry periods with low degree of use
 - Switch on the cooling and allow the compressor to work for a few minutes once a week so that connections, seals etc. are lubricated.

Presentation of the machine

KONECRANES



CABIN TILTING

All standard machines are equipped with manual, hydraulic cabin tilting. (Electric tilting is available as an optional equipment.)



WARNING

Loose objects can fall out of the cabin and the doors may come off their hinges.

Danger of serious personal injury and damage to the vehicle.

Before the cabin is tilted, both doors must be shut.

Loose objects should be removed from the cabin.

The mast should be vertical and the fork carriage in its lowest position.

Open the hatch (using a special key), placed to the right of the fuel tank on the left side of the machine. In the space there, there is a pump for the tilting with a pump handle. When tilting upwards, the valve is turned clockwise, downwards counter-clockwise, using the bottom end of the pump handle. Fit the pump handle in the bracket and pump.

When driving, the cabin must always be completely raised.



WARNING

The cabin must always be completely tilted.

Danger of serious personal injury.

Ensure that nobody is underneath or near a tilted cabin.

A simple warning sticker is attached to the pump.



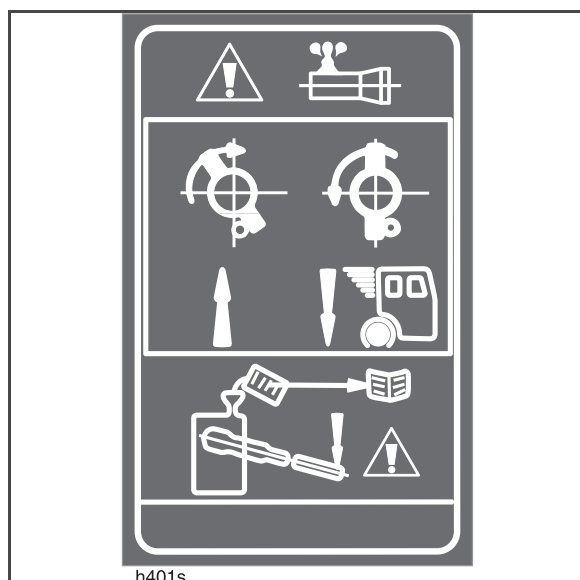
WARNING

Only limited operations are possible with the cabin in its tilted position.

Danger of serious personal injury and damage to

the vehicle.

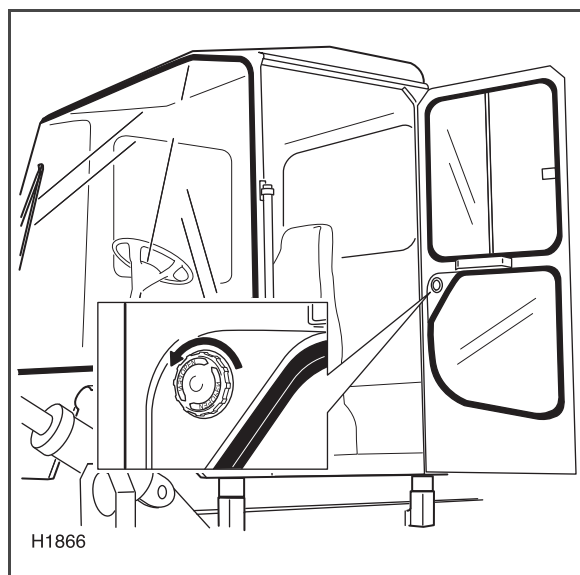
The machine must not be driven with the cabin partially or fully tilted.



LOCKING OF DOORS

The cabin door can be locked in its open position.

- Open the door and push it stuck in the lock.
- Turn the handle on the inside of the cabin door clockwise to lock the door.



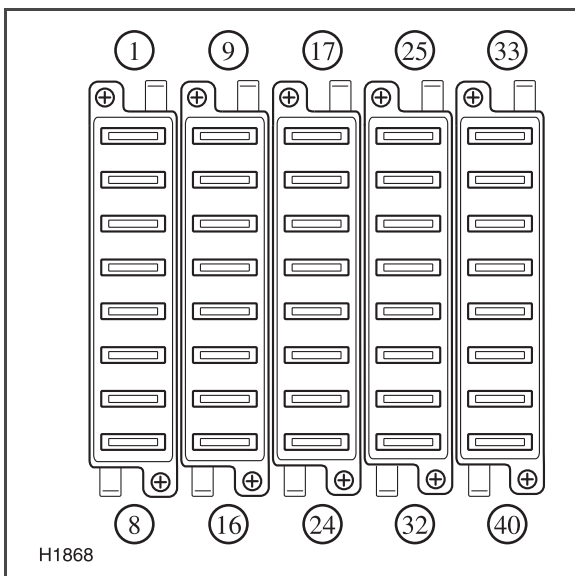
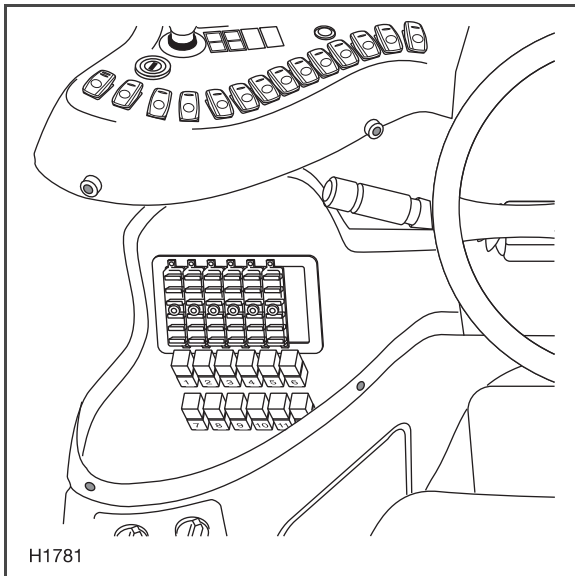
ELECTRICAL SYSTEM

Fuses

The fuses are situated to the left of the instrument panel and in the battery box on the right side of the machine.

Fuses under the instrument panel.

Fuses are situated under the instrument panel. They are numbered 1 (top left) to 40 (bottom right).

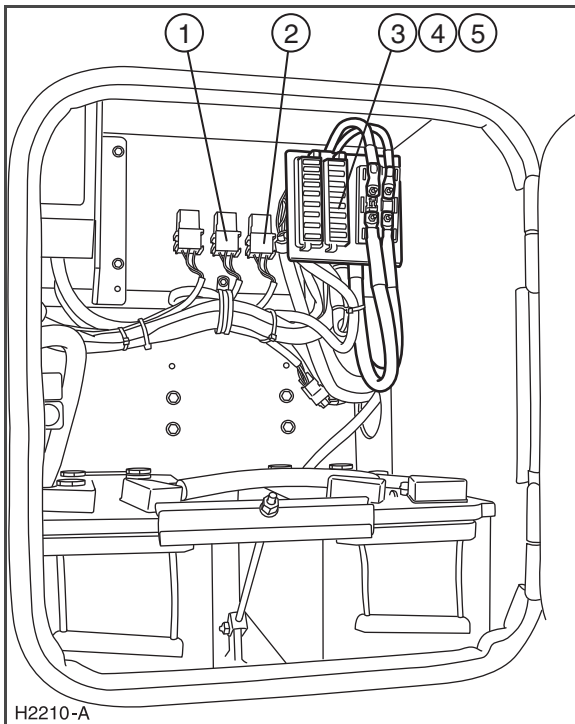


Fuse	Ampacity	Function
F1	10 A	ScaniaEMS, charger light, manoeuvre for work light
F2	7.5 A	Brake light, side light, interior light, switch light
F3	15 A	Heater, ventilation, climate control unit
F4	5 A	Fuel tap, central lubrication, chair buzzer
F5	7.5 A	Condenser
F6	7.5 A	Driving light main beam
F7	7.5 A	Driving light dipped beam
F8	10 A	IQAN MD3/MDL
F9	10 A	IQAN-XS2
F10	10 A	IQAN-XA2-B0
F11	10 A	IQAN-XA2-B1
F12	7.5 A	Hazard lights, climate control unit
F13	7.5 A	Relay ignition key switch
F14	15 A	Driving light
F15	7.5 A	Foot light
F16	10 A	Windscreen wiper, windscreen washer, horn
F17	7.5 A	Indicator, seat heater
F18	10 A	Chair compressor
F19	7.5 A	Extra work light
F20	7.5 A	Rotating warning lights, electric rear view mirror, reading light, search light
F21	7.5 A	Reversing light, reversing indicator
F22	7.5 A	Radio
F23	15 A	Power socket 24 volt
F24	3.0 A	IQAN MD3/MDL (+RTC), timer diesel pre-heater
F25	3 A	Side light left
F26	3 A	Side light right
F27	7.5 A	Work lift, stand right
F28	7.5 A	Work lift, stand left
F29	5 A	Work light roof

Presentation of the machine

Fuse	Ampacity	Function
F30	5 A	Work light roof
F31	10 A	Unit ELME
F32	5 A	Electrically heated rear view mirror
F33		Extra
F34		Extra
F35	15 A	Extra
F36	15	Extra
F37	10 A	Computer
F38	10 A	Computer, reversing camera
F39	15 A	Reserved for chair compressor
F40	10 A	Reversing camera 12 V

Fuses in the battery compartment



WARNING

Short-circuiting the battery may lead to a fire or explosion.

Danger of serious personal injury or fatality.
The battery contains corrosive acid.

Always use necessary protective equipment.

Batteries generate explosive hydrogen gas when being charged.
Ensure good ventilation and avoid sparks.

The main power switch does not cut the power between the alternator and the battery. When working with or in the vicinity of the alternator, the negative cable for the battery must be removed.

In order to reduce the risk of electric shock and personal injuries, jewellery and other conducting material must always be removed prior to working on the electrical system of the machine.

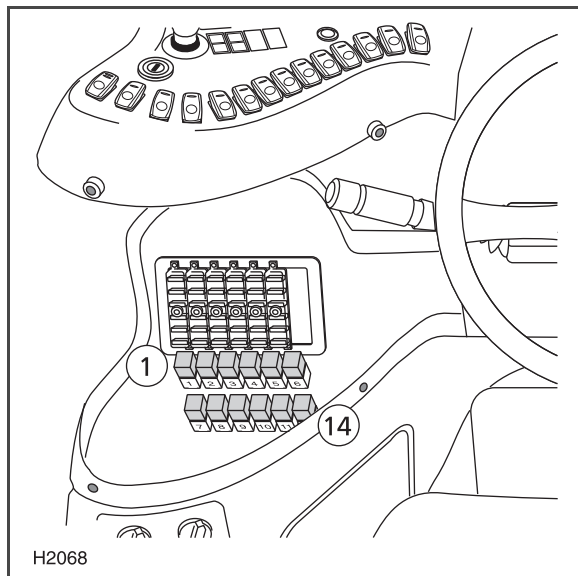
The power may only be cut with the main power switch with the engine running in an emergency.

Fuses F51-F62, F71-F78 and relays K31, K32, K33 and K35 are situated in the battery box on the right-hand side of the machine.

- Relay K33 (1)
- Relay K31 (2)
- Relay K32, underneath the fuse board (3)
- Relay K35, underneath the fuse board (4)
- Fuses 51-78 (5)

Fuse	Ampacity	Function
F51	10 A	Main fuse for F12, F13, F24
F52		Extra
F53		Memory radio, max 0.3
F54	15 A	Diesel pre-heater
F55	15 A	Diesel pre-heater
F56	7.5 A	Transmission
F57	15 A	Engine
F58	15 A	Engine
F61	100 A	Main fuse KL. 15
F62	60 A	Main fuse KL. 30
F71	10 A	Unit ELME
F72	10 A	Extra
F73	10 A	Extra
F74	10 A	Engine
F75	7.5 A	Transmission
F76		Extra
F77		Extra
F78		Extra

Presentation of the machine



Relay list

K1-K14 are situated in the central electrical unit. K31, K32, K22 and K35 are situated next to the main fuses in the battery box.

Relay no.	Function
K1	
K2	
K3	
K4	Work light mast
K5	Work light roof
K6	Work light extra
K7	Reversing light
K8	Driving direction selector
K9	
K10	Windscreen wiper, rear
K11	Windscreen wiper, roof
K12	Windscreen wiper, front
K13	Indicator light
K14	
K15	Side light, turn able driver seat
K16	Brake light, reverse indicator, turn able driver seat
K17	Drive light, reverse light, turn able driver seat
K19	Automatic engine stop
K20	Horn
K31	Starter relay Volvo 620/722
K32	Main relay
K33	Hold relay for K31, Volvo 620/722
K35	Starter relay Cummins 6.7/11

DRIVING AND MANOEUVRING OF LOAD

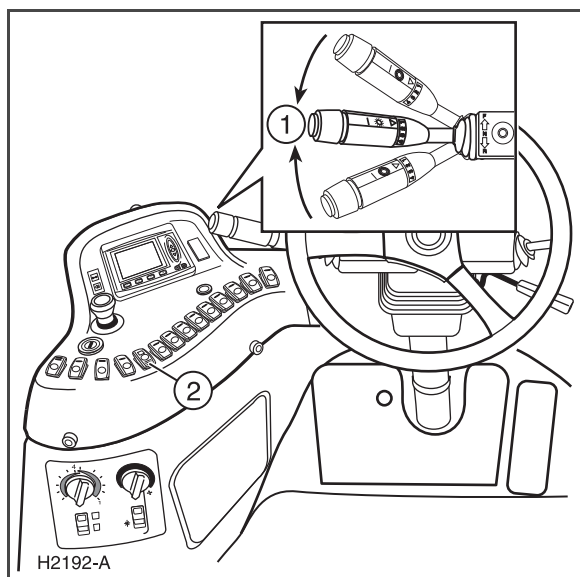
START THE ENGINE



WARNING

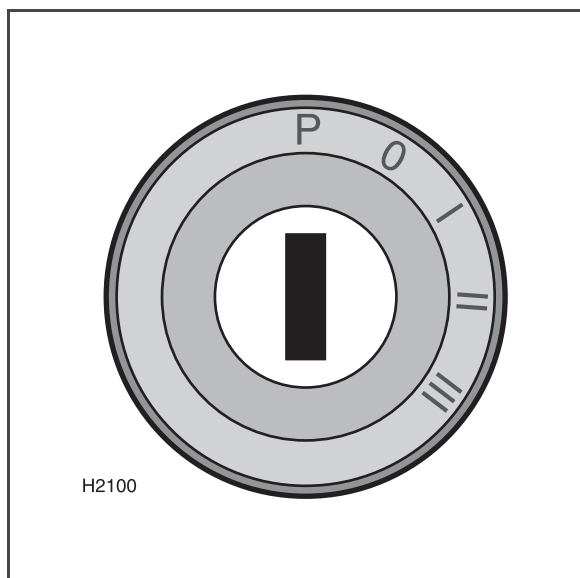
The exhaust fumes are harmful.
Never run the engine in unventilated areas.
Danger of serious personal injury or fatality.
Use fume extraction.

Prior to running the engine, the driving direction indicator (1) to the left of the steering wheel must be in neutral. The parking brake must be activated (2).



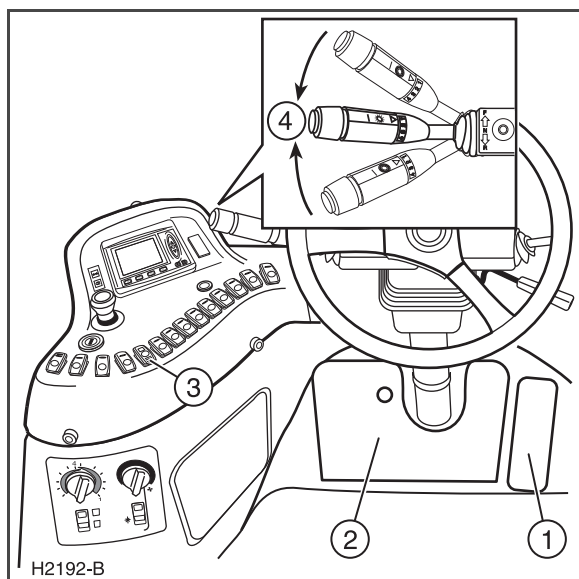
When starting:

- Sit down in the driver's seat.
- Insert the ignition key into the ignition, position (0).
- Turn the key to position (I). The electrical system is now switched on.
- Turn the key to position (III). Release the key as soon as the engine has started.



Driving and manoeuvring of load

KONECRANES



STOP THE ENGINE

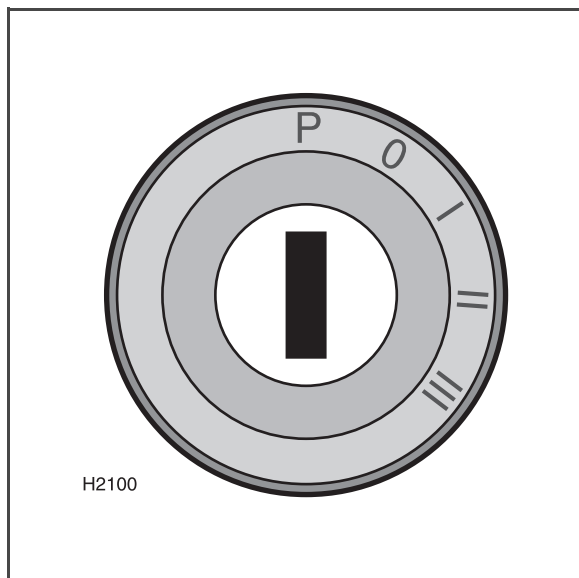
- Release the accelerator pedal (1).
- Brake the machine in a controlled manner (2).
- Activate the parking brake (3).
- Place the driving direction indicator (4) in neutral.



BE CAREFUL

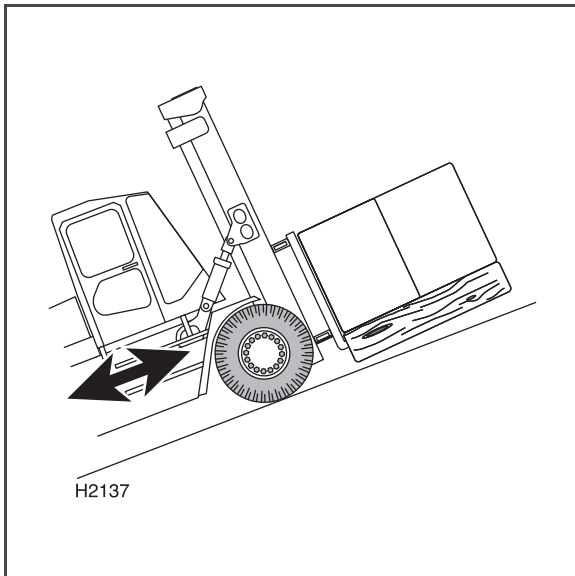
If the engine has been run with a continuously high load, there is a risk of damage to the turbo and of overheating if the engine is stopped without allowing it to cool down. Allow the engine to run without load for a few minutes.

The power must not be shut off before the engine has stopped.



- Turn the key to position (P).
- Remove the key from the ignition lock when you leave the machine.
- Also switch the power off using the main power switch whenever the machine is left without supervision.

The emergency stop is only to be used for an emergency.



DRIVING



WARNING

Off-road driving will damage the machine. Always drive on solid surfaces, otherwise the machine may tip over or sink.

Danger of serious personal injury and damage to the vehicle.
The machine is not designed for off-road driving. The machine is not equipped with suspension and must only be driven on a level surface suitable for the total weight and surface pressure of the machine.



WARNING

Danger of the braking power not being able to stop the machine.

Danger of tipping over.

Danger of serious personal injury and damage to the vehicle.
Driving on slopes with a gradient greater than 15% is normally not permitted due to the minimum prescriptions for braking and the stability characteristics of the machine. If the machine is to be driven on steeper slopes, you should contact your Konecranes Lifttrucks dealer. The hill climbing ability stated in the data sheet is based on the pulling ability of the machine and is only applicable to driving over bumps and smaller differences in level.



WARNING

Always adapt your manner of driving to the conditions of the road surface (unevennesses etc.), risks in the work area and the load.

Danger of serious personal injury and damage to the vehicle.

- Start the engine.
- Tilt the lifting unit somewhat backwards.
- Keep the steering wheel steady. Always hold the steering wheel knob with your whole hand.



WARNING

The work area of the machine is large and the view from the driver's cabin is limited.

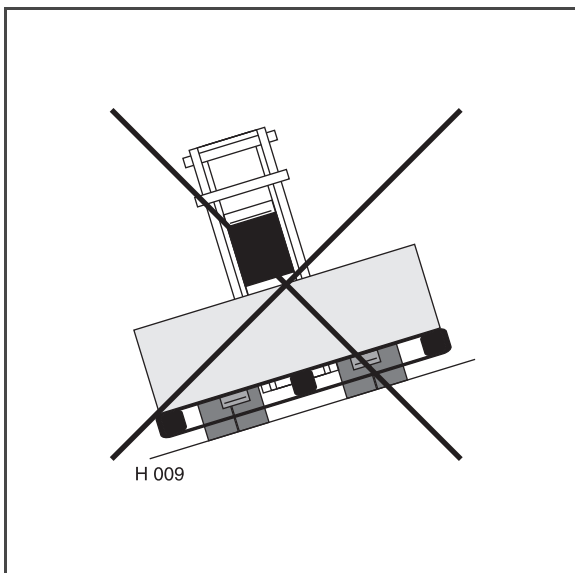
Danger of serious personal injury and damage to the vehicle.

Before you start moving the machine, ensure that the road ahead is free from obstructions and that you have a clear view.



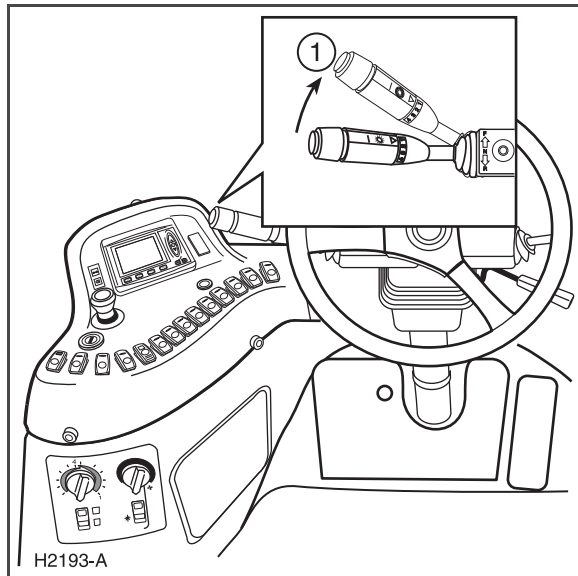
WARNING

Avoid driving on slopes or uneven surfaces when transporting a container. Never drive straight across and never turn on a slope.



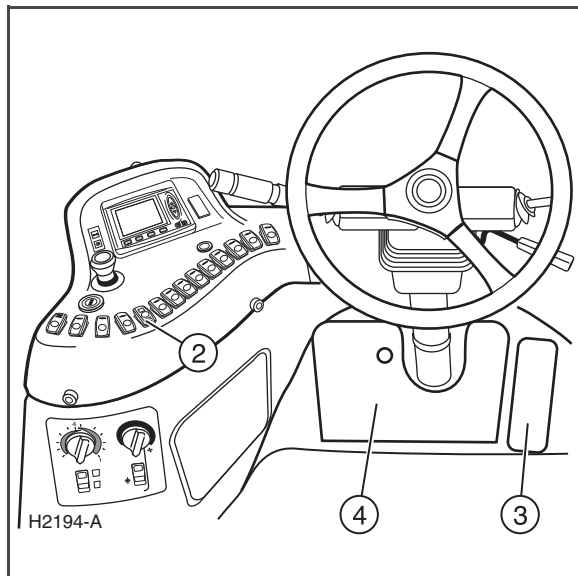
Driving and manoeuvring of load

KONECRANES



Driving forwards

- Depress the brake pedal (4).
- Move the gear selector (1) forwards.



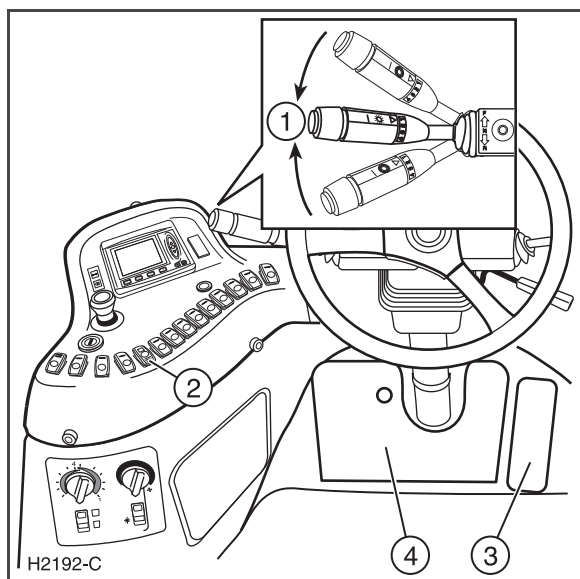
NOTE

Always start in first or second gear in order to avoid damage and to prevent the transmission from overheating.

- Release the parking brake (2).
- Move driving direction indicator (1) forwards.
- Release the brake pedal (4).
- Depress the accelerator pedal (3) slowly so that the machine starts gently.

NOTE

When starting on an upwards slope, keep the machine still with the brake pedal (4), until you have sufficient pulling power.



Stop the engine

- Release the accelerator pedal (3).
- Depress the foot brake (4) and stop the machine in a gentle and controlled manner.



WARNING

Sudden braking or acceleration may lead to the machine tipping forward or over. Danger of serious personal injury and damage to the vehicle. Avoid heavy acceleration or braking.



BE CAREFUL

Do not use the transmission as a brake.

- When the machine has stopped completely, activate the hand parking (2) before you release the foot brake.
- Place the driving direction indicator (1) in neutral.

Driving forward, changing driving direction



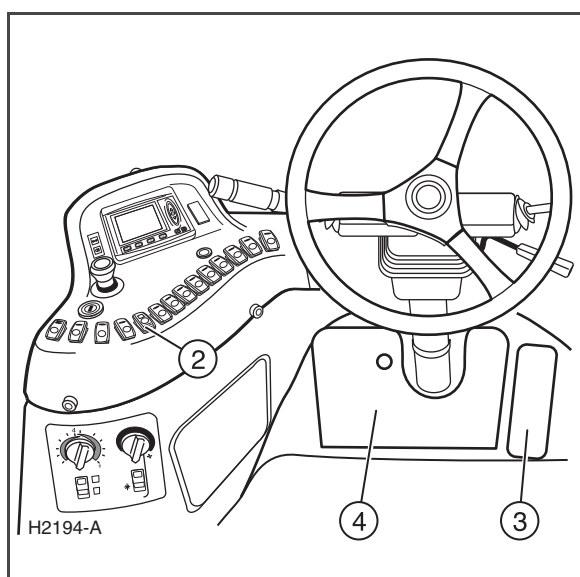
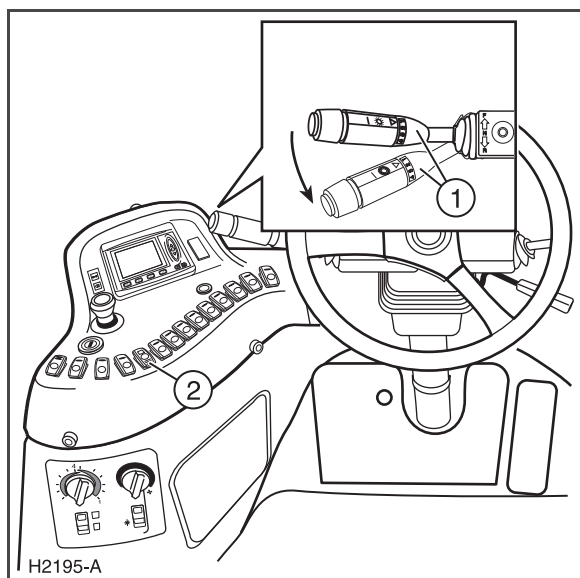
WARNING

Before the driving direction is changed, the machine must come to a complete stop. Otherwise, serious damage may be done to the transmission and the driving shaft.

- Release the parking brake (2).
- Move the driving direction indicator (1) forwards.
- Depress the accelerator pedal (3) slowly so that the machine starts gently.

NOTE

When starting on an upwards slope, keep the machine still with the brake pedal (4), until you have sufficient pulling power.



Driving and manoeuvring of load

KONECRANES

MANOEUVRING OF LOAD



WARNING

Incorrect lifting of a load may lead to serious personal injury and damage to vehicles. Always ensure that the centre of gravity of the load is between the forks. Always ensure that the forks are in good condition.



WARNING

When exceeding the maximum load or maximum load torque, the stability and safety margins of the truck are affected. The truck must therefore under no circumstances be used for handling a greater load than what is stated on the capacity plate.



WARNING

Konecranes are responsible for the safety of the machine and the warranty only applies as long as it is used within the areas of limitation that are clear from its machine plate and EC assurance.

CD5970

KONECRANES LIFTTRUCKS AB			
P.O.BOX 103 • S-285 23 MARKARYD • SWEDEN			
TYPE TYPE TYPE	SMV33-1200B		
MANUFACTURING NO. HERSTELL. NR. NUMERO DE FABRICATION MANUFACTURING YEAR HERSTELL. JAHR ANNEE DE FABRICATION	M7945		
	2009		
MAX LIFTING HEIGHT MAX HUBHÖHE ELEVATION MAXIMUM MACHINE HEIGHT MASCHINENHÖHE HAUTEUR DU CHARIOT SERVICE WEIGHT EIGENWICHT POIDS DE SERVICE	4500		
	4260		
	42500 KG		
CAPACITY KAPAZITÄT CAPACITY	AT LIFTING HEIGHT BEI HUBHÖHE A LEVAGE MAXIMUM	LOAD CENTRE LASTSCHWERPUNKTSABST. CENTRE DE GRAVITE	
33000 KG	4000 MM	1200 MM	
	ALTERNATIVE CAPACITY ALTERNATIVE KAPAZITÄT CAPACITE ALTERNATIVE		
33000 KG	4500 MM	1200 MM	
22800 KG	4500 MM	1500 MM	
19500 KG	4500 MM	1800 MM	

H2242-A

Capacity plate

Before you lift a load, read the load capacity plate on the left side of the cabin.

If optional equipment has been fitted, read the capacity plate for this. The values that are stated on the capacity plate applies to compact and regular load and if they are exceeded, the stability of the machine is at risk as is the strength of the forks and of the stand.

The capacity is dependent on the height of the lift and the distance to the centre of the load "LC". "LC" is calculated from the front of the fork shaft to the centre of gravity of the load. The plate is read in accordance with the following example:

Main capacity

Capacity 33,000 kg when lifting 4,000 mm and load centre 1,200 mm (relating to the model type).

Alternative capacities

The capacity is reduced when the "LC" or lift height is extended in accordance with the following example:

- Capacity 33,000 kg when lifting 4,500 mm and load centre 1,200 mm (relating to the model type).
- Capacity 22,800 kg when lifting 4,500 mm and load centre 1,500 mm (relating to the model type).
- Capacity 19,500 kg when lifting 4,500 mm and load centre 1,800 mm (relating to the model type).

MANOEUVRING OF MAST

Manoeuvre levers



WARNING

Incorrect lifting of a load may lead to serious personal injury and damage to vehicles.

Handling of the machine outside of its area of use may lead to overloading and instability.

Use the stand and its additional equipment only

for approved work.

The driver must be trained in the handling of the machine and its equipment.

Always manoeuvre the levers gently and slowly.

The speed of the hydraulic functions are decided by the movement of the lever.

The lever automatically returns to its original position when released.

All hydraulic levers are situated on the console to the right of the driver seat.

NOTE

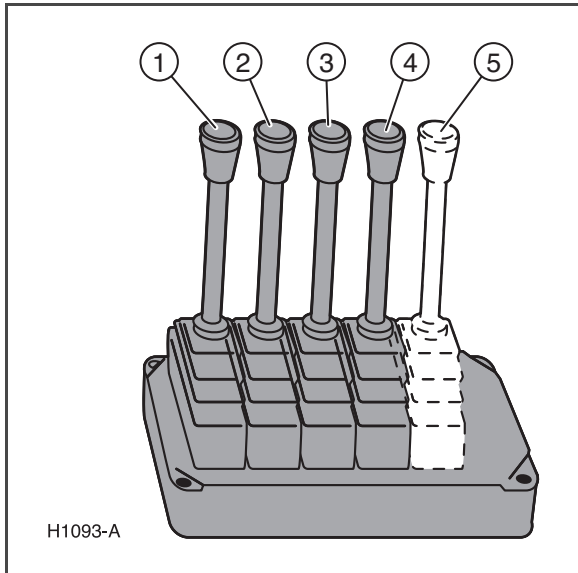
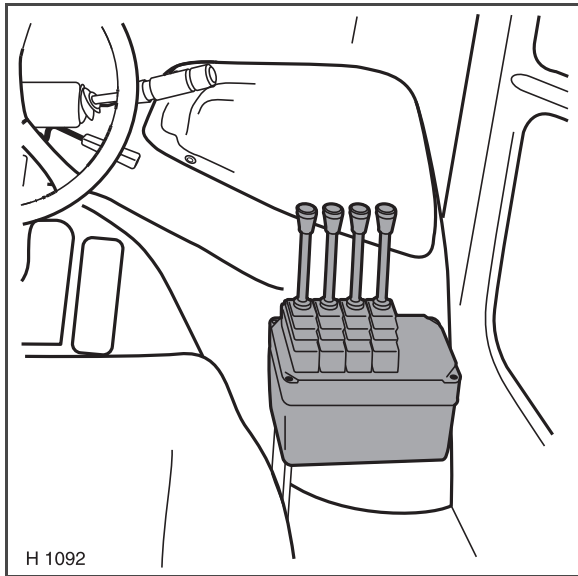
Pay attention to the operational symbols and the directional arrows.

- Raising of the fork carriage.
 - Pull the lever (1) backwards.
- Lowering of fork carriage.
 - Move lever (1) forwards.
- Backward tilting of the fork carriage.
 - Pull the lever (2) backwards.
- Forward tilting of the fork carriage.
 - Move lever (2) forwards.
- Side manoeuvring.
 - Push the lever (3) forward in order to move the forks to the left.
 - Push the lever (3) backward in order to move the forks to the right.
- Manoeuvring of the fork position/fork spreading.
 - Push the lever (4) forward in order to increase the distance between the forks.
 - Push the lever (4) backward in order to reduce the distance between the forks.
- Extra function (5) optional.



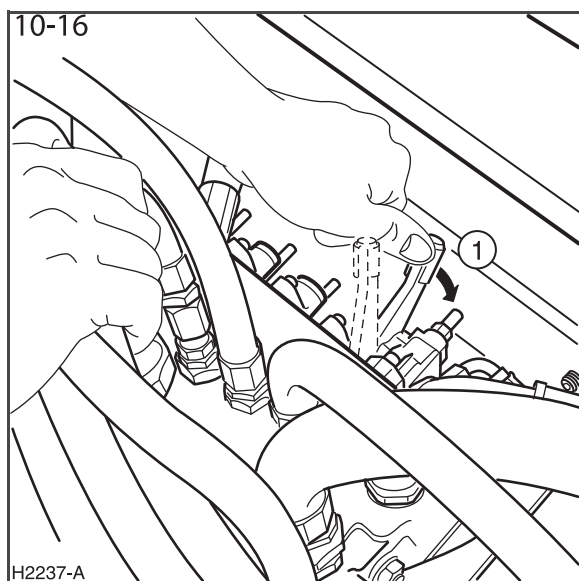
WARNING

Optional equipment that was not supplied with the machine may only be used if an authorised Konecrane Lifttruck dealer has ensured that safe operations can be guaranteed in terms of load capacity and stability.



Driving and manoeuvring of load

KONECRANES



Emergency lowering

The machine has been equipped with hydraulic assistance (optional electric/hydraulic assistance). If the engine should stop or if a fault should occur in the hydraulics preventing the assistance from working, it will not be possible to lower using the manoeuvre levers.

The directional valve is therefore equipped with a mechanical control that allows manual lowering.



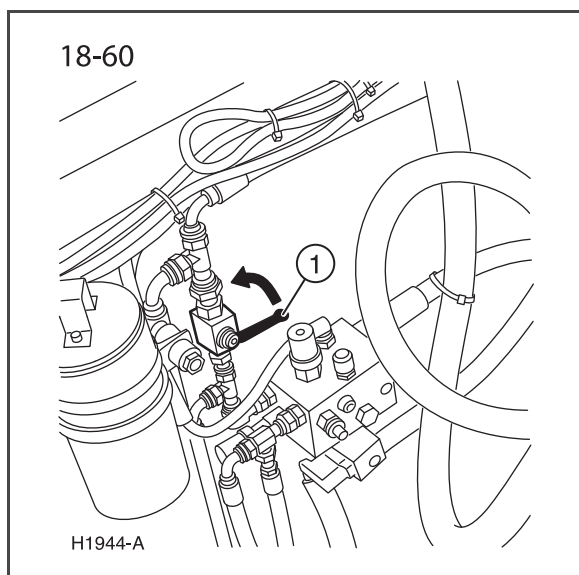
DANGER

Ensure that the carriage and the mast can be lowered without hindrance.

Ensure that there are no people or items below or near to the load.

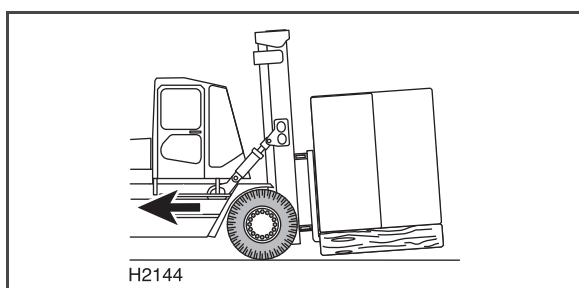
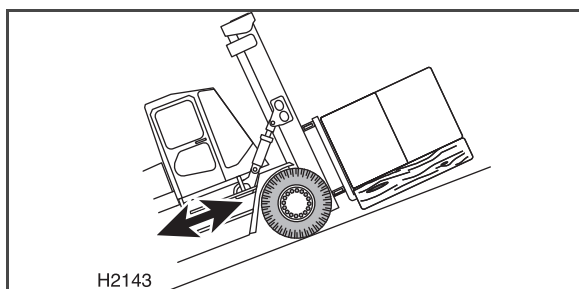
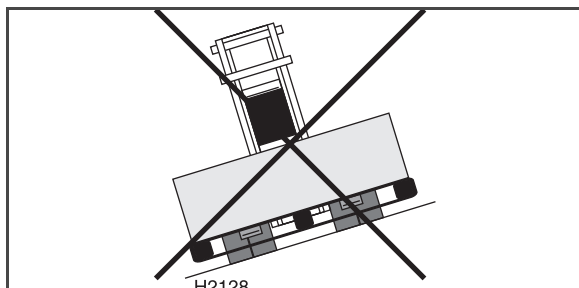
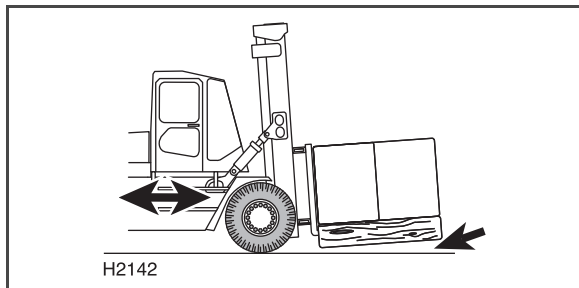
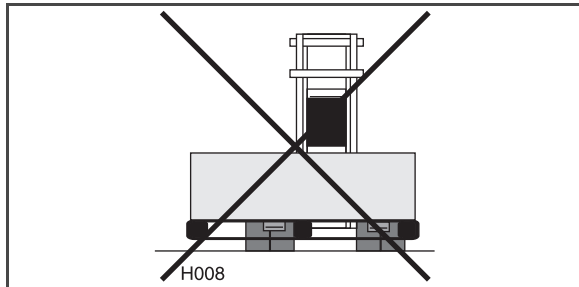
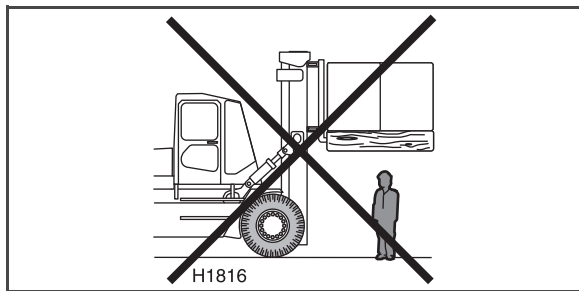
Danger of serious personal injury or damage to vehicle.

- Tilt the cabin upwards.
- For SMV 10-16: push the lever (1) forward.
- For SMV 18-60: turn the lever (1) upward.



BE CAREFUL

When the mast has been lowered, it will not be possible to raise it again until the engine is running and the hydraulics are working correctly.



Driving with load



WARNING

Load and attachment can fall down.
Danger of serious personal injury or fatality.
Do not permit any person to be under raised load and/or unit.



WARNING

Load and attachment can fall down.
Danger of serious personal injury or fatality.
Never park or leave the machine with raised load unsupervised.

- Do not drive with the load displaced sideways (e.g. by side manoeuvring).

- Transport the load close to the ground.



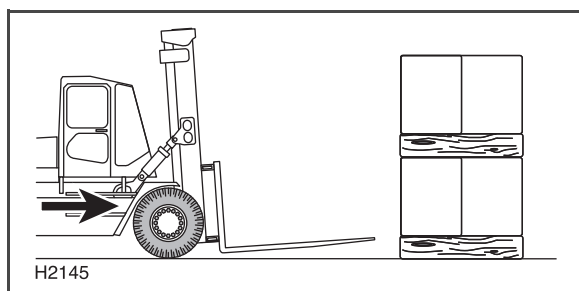
WARNING

Avoid driving on slopes or uneven surfaces when transporting a load.
Always drive with the load turned upwards on a slope, never drive across or turn on a slope.
Never drive with raised forks or a raised load.

- If the view is reduced, ask someone to guide you.
- If the load has been stacked so high that it prevents a forward view, drive the machine backwards.

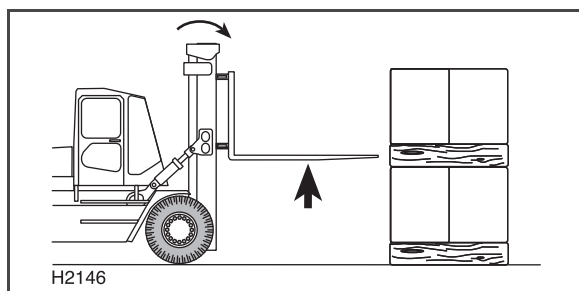
Driving and manoeuvring of load

KONECRANES

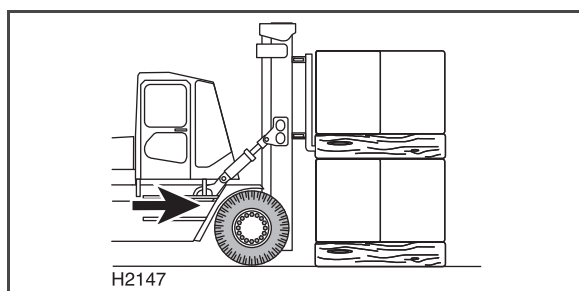


Lifting of load

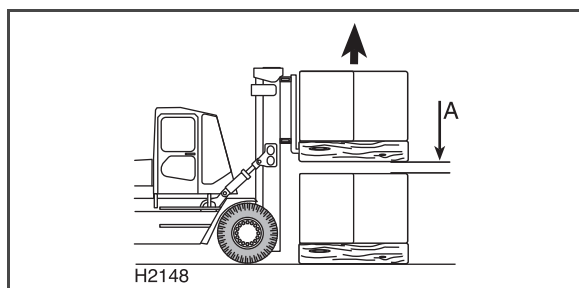
- Drive up towards the load that is to be loaded as carefully and precisely as possible.



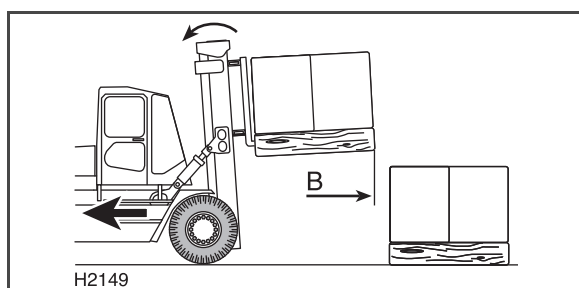
- Raise or lower the forks to the correct height.
- Place the stand in its vertical position.



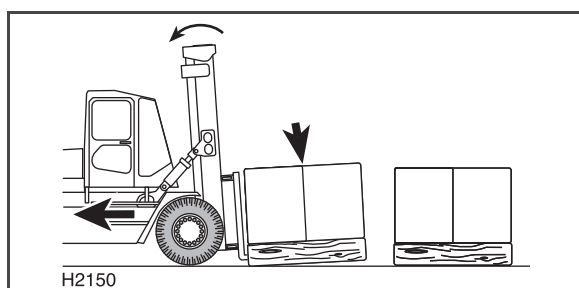
- Carefully push the forks under the load until the fork shafts touch the load.
- Ensure that the centre of gravity of the load is in the middle between the forks.



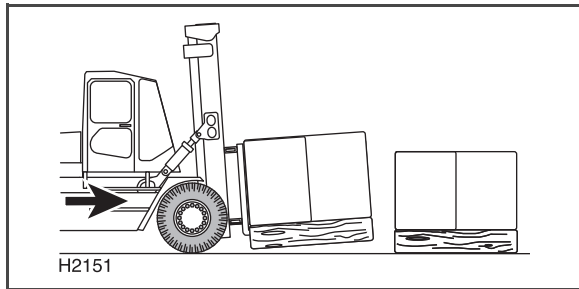
- Raise the stand until the load is resting on the forks but only so much so that the load is free from the surface below. A = 20-40 cm.



- Tilt the mast somewhat backwards.
- Drive the machine backwards until the load is free from the front of the stack. B = 20-40 cm.

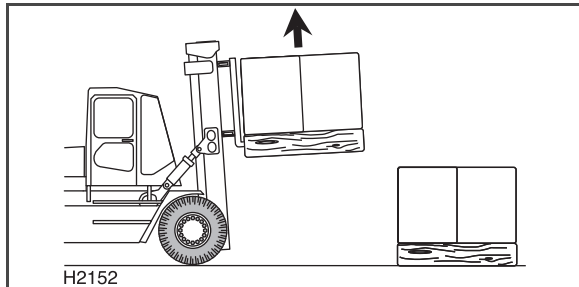


- Tilt the mast somewhat backwards.
- Lower the load to the transport position.

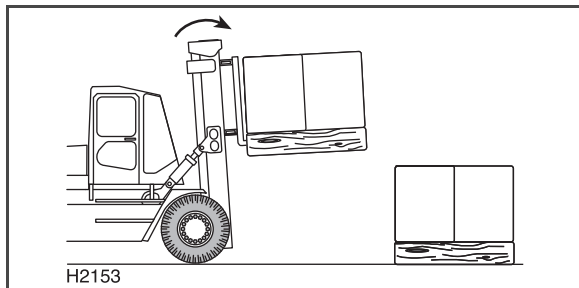


Unloading

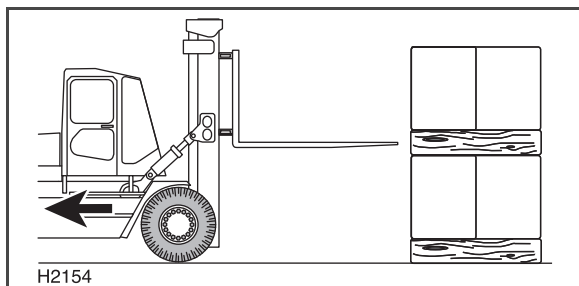
- Drive up to the stack or unit to receive the load as carefully or precisely as possible.



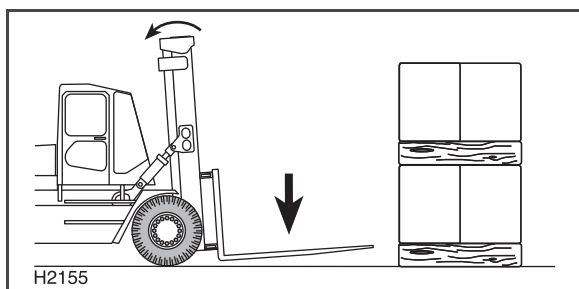
- Raise the fork carriage to the correct height.



- Place the mast vertically.
- Carefully drive up to the stack.
- Lower the load.



- Carefully reverse from the stack. Ensure that the forks are free.



- Lower the forks to the transport position. Tilt the mast somewhat backwards.



WARNING

Never drive with the forks or load in the raised position!

LIFTING AND TRANSPORTING THE MACHINE

TOWING



BE CAREFUL

As the machine is equipped with a hydraulic brake system, power assisted steering and a hydraulic transmission, the engine must be idling when the machine is being towed.

If this is not possible, the hydraulic parking brake (1) must be manually released. See also "Releasing the parking brake" on page 95.

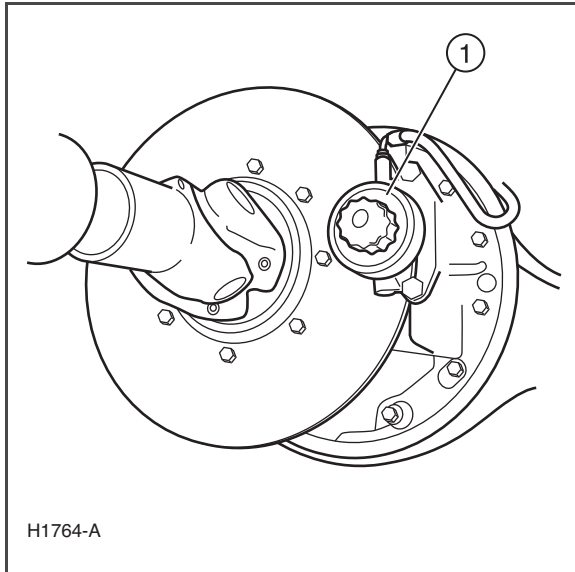
- When towing the machine longer distances, the prop shaft must be removed.



WARNING

The machine will now not have any brakes and must only be towing using a vehicle that has sufficient braking capacity to stop both vehicles.

- Use the rear towing peg when fitting a sturdy towing pole on the machine.
- Fix the other end of the pole to the towing vehicle.
- Place large blocks by the wheels.
- Release the parking brake by tightening the bolt (1).
- When towing, the prop shaft must be disassembled before towing.
- Tow the machine with great care never exceeding 3-5 kph.
- It will still be possible to steer the machine even though it will be very heavy due to the loss of power assisted steering.
- After repairs have been performed, the functioning of the brakes must be inspected and the parking brake be adjusted.
- The prop shaft must be fitted and retightened.



LIFTING THE MACHINE



BE CAREFUL

Only use lifting equipment and cranes with a sufficient lifting capacity. With regards to the weight of the machine, see the manufacturer's type plate.

Unloading the machine SMV 10-25

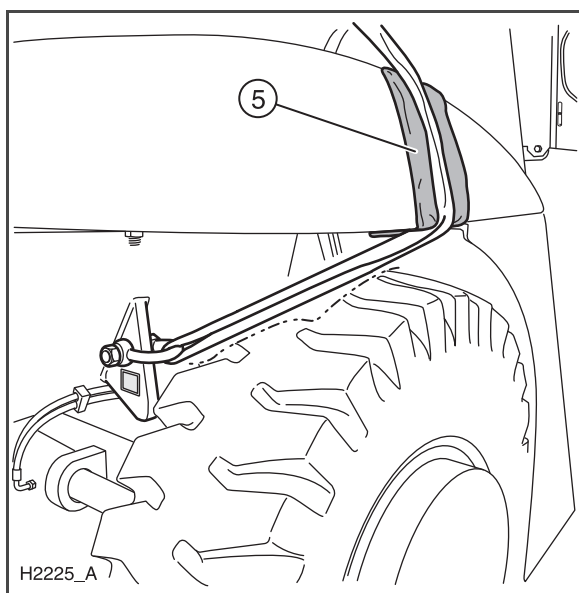
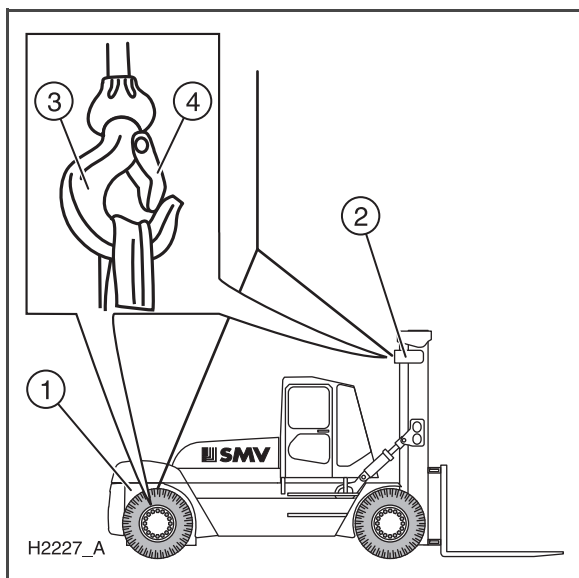
Fix lifting straps to the four anchor points indicated:

- Fix two lifting straps to the rear lifting eyes (1), situated on each side of the counter-weight.
- Fix two lifting straps to the front lifting eyes (2), situated in the upper cross-beam of the outside stand.
- Fit lifting straps to the lifting hook of the crane (3).



BE CAREFUL

When the lifting straps have been fixed to the hook, the safety lock (4) must be closed. When the truck is being lifted, the lifting links must not rub against any part of the truck (5).



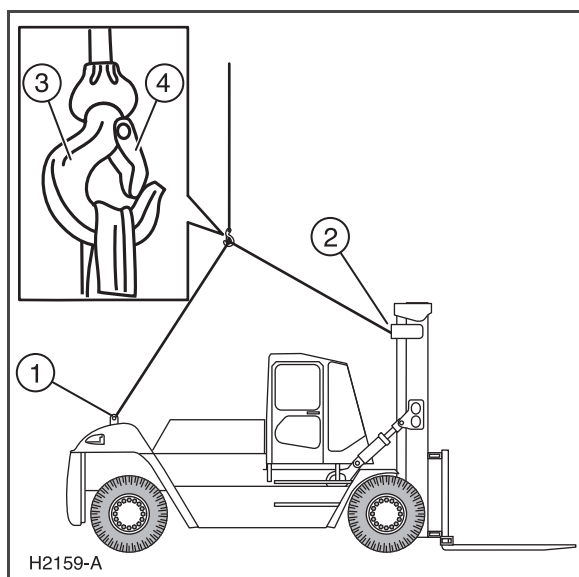
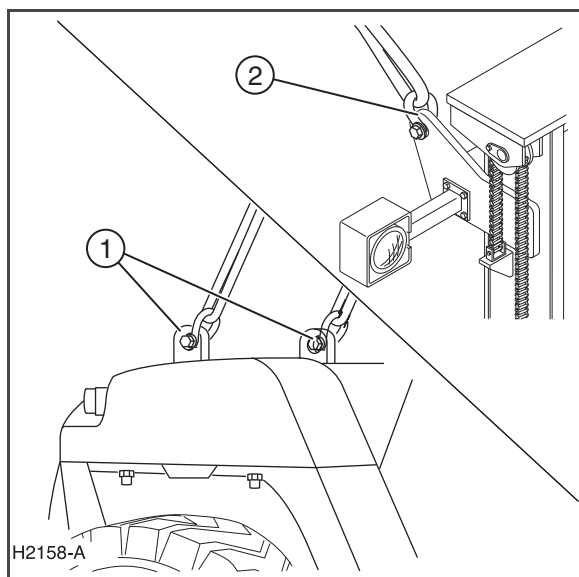
Lifting and transporting the machine

KONECRANES

Unloading the machine SMV 28-60

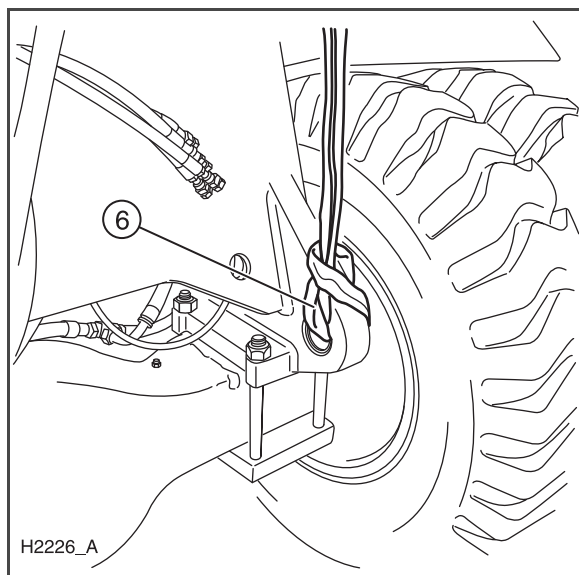
Fix lifting straps to the four anchor points indicated:

- Fix two lifting straps to the rear lifting eyes (1), situated on the top of the counter-weight.
- Fix two lifting straps to the front lifting eyes (2), situated in the upper cross-beam of the outside stand.
- Fit lifting straps to the lifting hook of the crane (3).



BE CAREFUL

When the lifting straps have been fixed to the hook, the safety lock (4) must be closed. When the machine is being lifted, the lifting links must not rub against any part of the machine.



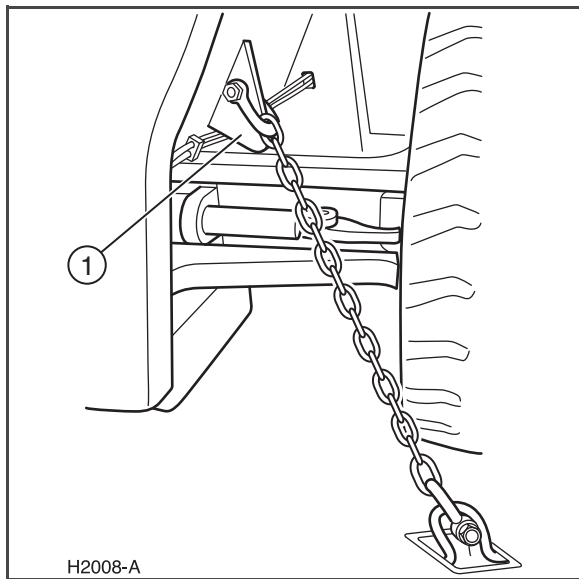
Unloading the machine without a mast

When the mast is dismantled, the mast's suspension ears may be used as lifting eyes.



BE CAREFUL

Attach the lifting straps (6) to the mast's suspension ears. Shackles may damage the bushings.



TRANSPORT



BE CAREFUL

The maximum capacity of the transport vehicle must not be exceeded. With regards to the weight of the machine, see the manufacture's type plate.

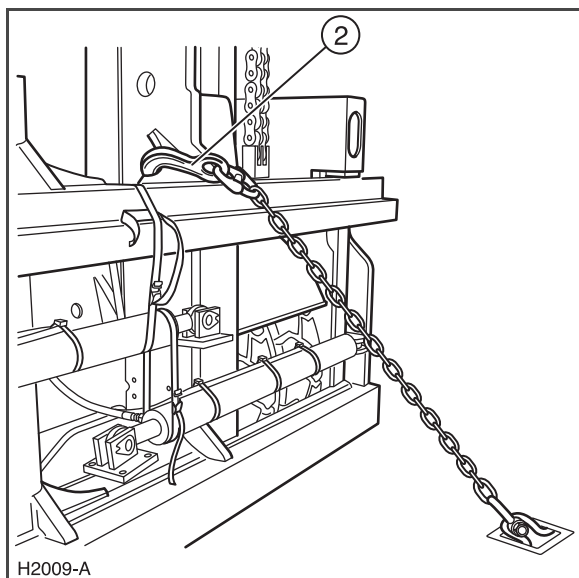


BE CAREFUL

Check the total height of the machine and the transport vehicle combined. There might be height-restricted passages along the transport route.

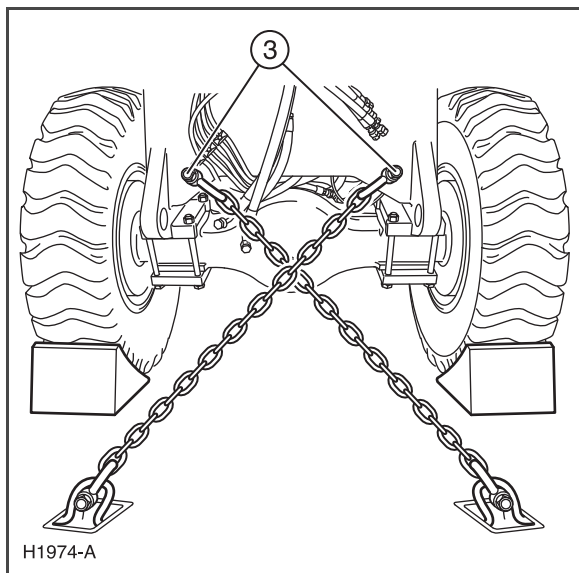
Securing of the rear of the machine

- Activate the parking brake.
- Place blocks by every wheel preventing movement forwards and backwards.
- Make sure that the machine stays in place by fixing shackles in the lifting eyes underneath the counterweight (1).



Securing the front of the machine

- Lower and secure the stand and the fork carriage.
- Fix 2 lifting hooks (2) in the fork carriage in order to keep the machine in place.



Securing the machine without mast

- Fix 2 shackles in the front lifting eyes (3) on the chassis.

SERVICE AND MAINTENANCE

GENERAL

Prior to maintenance work



WARNING

The machine contains a number of chemical substances that may cause skin irritations and allergies.

Danger of personal injury in the event of long-term contact with the skin!

Avoid direct contact with the skin when handling oil, hydraulic fluid, fuel, grease, etc. Use protective gloves.

In the event of direct skin contact with chemical substances, wash your skin immediately.

In order for the machine to work as well as possible, the prescribed maintenance and inspections must be performed regularly and in accordance with the descriptions that are given in the inspection schedule.

Maintenance must only be performed by trained personnel or by authorised Konecranes Lifttrucks dealers in accordance with a service contract. If you wish to perform the maintenance of the machine yourself, we recommend that the first three customer service inspections are done in the presence of Konecranes Lifttrucks authorised personnel who can ensure that the maintenance instructions are adhered to.

Prior to all service work, ensure:

- that the machine is parked on an solid, level ground.
- that the machine is blocked so that it cannot roll.
- that the engine is switched off and that the key has been removed.
- that the fork carriage and the mast have been secured, if they are in the raised position.
- that the machine has been safely supported if work is to be performed underneath the machine whilst it is raised.

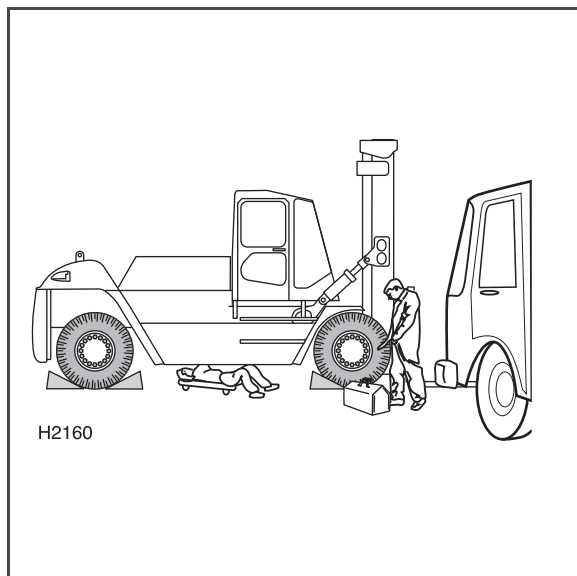
After every service, perform a function check and test-drive the machine.



BE CAREFUL

If the machine is being used in extremely warm, cold or dusty environments or in other adverse conditions, the intervals stated in the inspection schedule should be reduced.

Clean the area around each component prior to lubrication, filter replacement or repairs on the hydraulic system. Only use clean containers when the lubricant is filled.



Measures when performing electrical welding



BE CAREFUL

It is important that these instructions are adhered to when performing electrical welding on the machine, or it can result in serious damage of the machine. Battery cables must be disconnected and all control units disconnected.

1. Remove the cables for the batteries and the alternator.
2. **Important!** Disconnect **all** control units in and on the machine.
3. Connect the weld clamp to the component that is to be welded and close to the area of the weld, never to the engine or so that the electricity can go through a bearing.

When the welding is done, reconnect the cables to the alternator and the control units before you reconnect the battery.

Correct procedure for jump-starting



BE CAREFUL

It is prohibited to jump-start using a quick-charger, booster, power pack or similar. It may cause power surges and serious damage to the control units.

1. Connect the first cable from the positive pole on the starter battery to the positive pole on the starter.
2. Then connect the second cable from the negative pole on the starter battery to the chassis of the machine, e.g the fixing bolts of the starter or a cross-beam near the starter.
3. When the engine has started: remove the cables in reverse order.

Running-in/Service after the first 150 operating hours.

The machine may be run at full speed from the start. Consistent maximum load of the hydraulic system and the transmission should however be avoided during the first 50 hours of operation.

After the first 150 hours, a first service is performed in accordance with the maintenance schedule.

DAILY INSPECTION AND SERVICE PRIOR TO START

Service items:

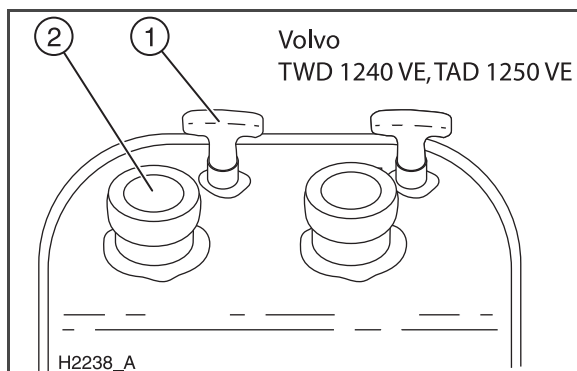
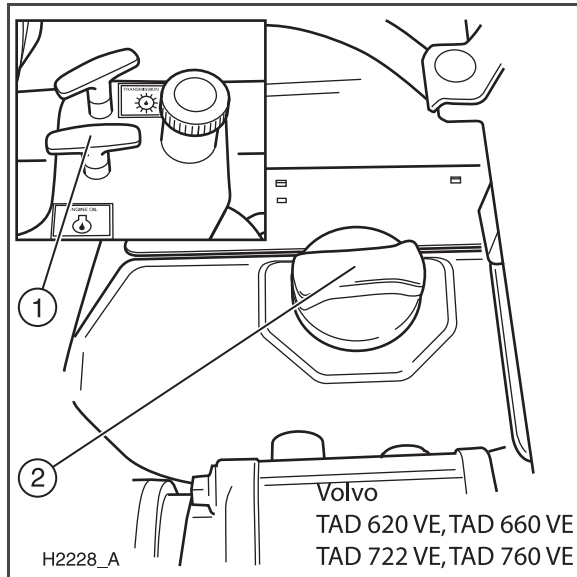
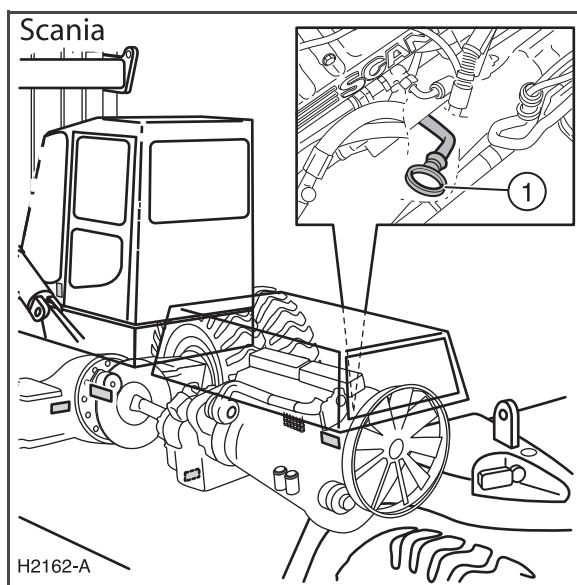
- Engine oil level
- Transmission oil level
- Hydraulic system oil level
- Radiator coolant level
- Fuel level
- Windscreen washer liquid level
- Air filter indicator (engine air filter)
- Air filter coarse cleaner
- Main power switch
- Check the pressure, condition and bolts of the wheels
- Functioning of brake system
- Functioning of the steering system
- Functioning of the hydraulic system
- Lights and horn

Check engine oil level

- Lift up the inspection lid
- Remove the dipstick (1) and clean it with a cloth.
- Reinsert the dipstick completely and remove it again.
- The oil level should be between the MIN- and MAX-levels.
- If necessary, remove the refill lid (2) and fill up with oil to the MAX-level on the dipstick.

Volumes, see "Liquid volumes" on page 100.

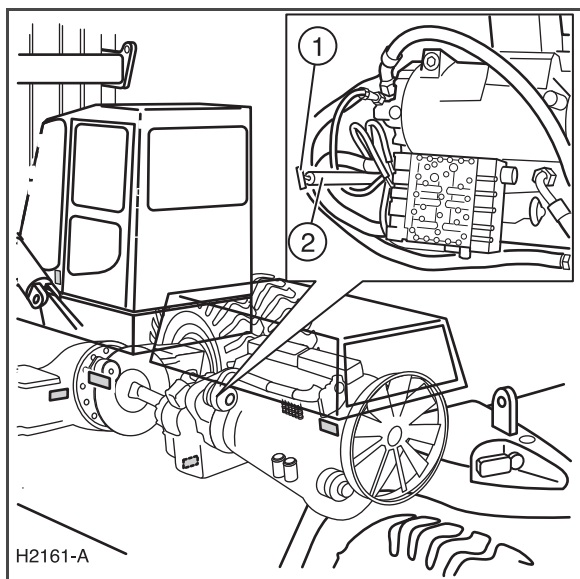
- The dipstick (1) on a Scania engine is situated on the right-hand side of the machine.



Check oil level in transmission ZF

- Start the engine and run until the oil has reached operating temperature.
- Remove the dipstick (1) and clean it with a cloth.
- Reinsert the dipstick and remove it again.
- The oil level should be between the MIN- and MAX-levels (HOT).
- If necessary, fill oil through the refill lid (2) to the MAX-level on the dipstick.
- Stop the engine.

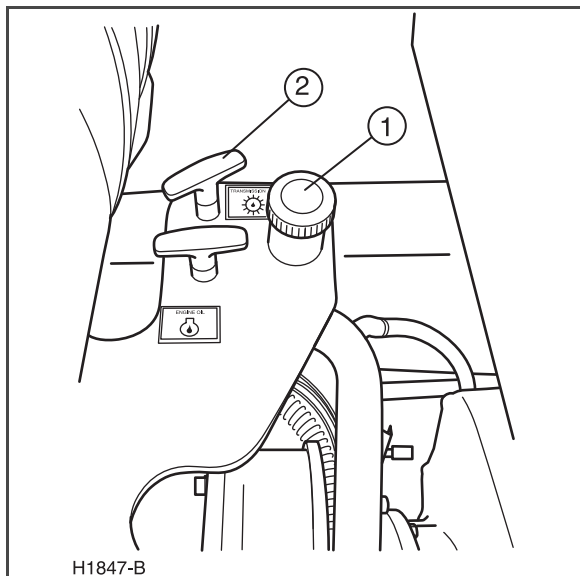
Volumes, see "Liquid volumes" on page 100.

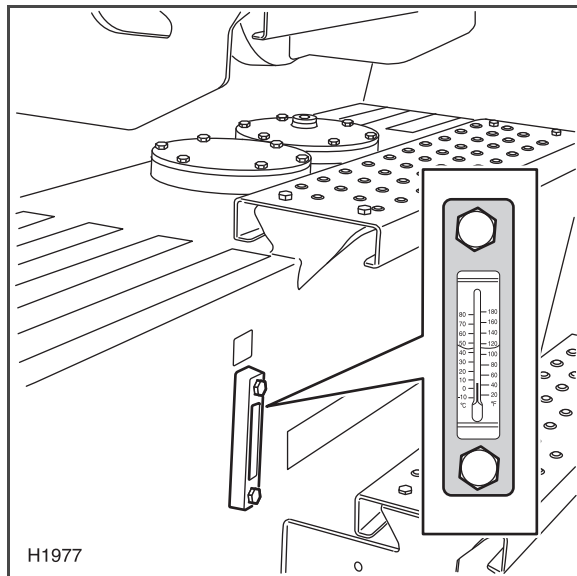


Check oil level in transmission DANA

- Start the engine and run until the oil has reached operating temperature.
- Remove the dipstick (2) and clean it with a cloth.
- Reinsert the dipstick and remove it again.
- The oil level should be between the MIN- and MAX-levels.
- If necessary, fill oil through the refill lid (1) to the MAX-level on the dipstick.
- Stop the engine.

Volumes, see "Liquid volumes" on page 100.

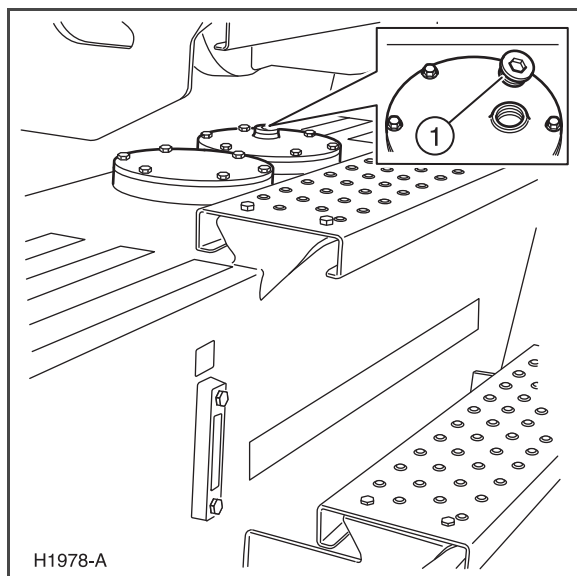




Inspection of hydraulic oil level

The machines are equipped with twin hydraulic oil filters.

- Ensure that the oil level is between the MIN- and MAX-levels on the indicator on the side of the hydraulic oil tank (the stand must be lowered).



Filling up hydraulic oil



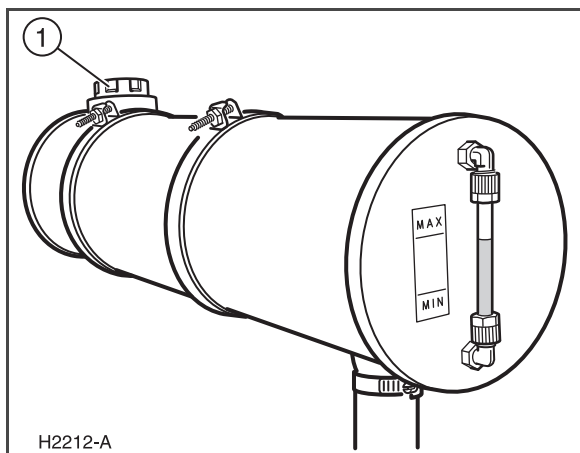
WARNING

Hot hydraulic oil may squirt from the refill hole.
Risk of serious injury!

Do not open the oil refill lid with the engine running.

- Unscrew the refill lid (1).
- Fill hydraulic oil to the upper mark on the indicator.
- Refit the lid.

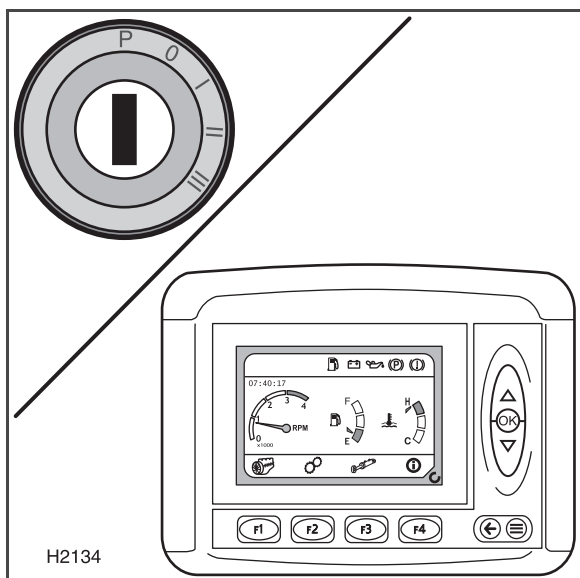
Radiator coolant level



WARNING

The system is under pressure!

- Open the refill lid (1) on the overflow tank. First, a 1/4 turn carefully to release any pressure.
- The level should be at the MAX-level on the side of the overflow tank.



Inspection of fuel level

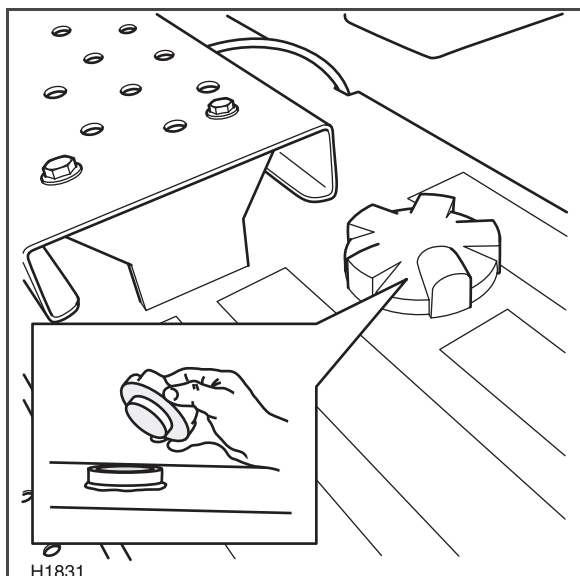
- Turn the key to position I.
- Wait until the fuel gauge (2) on the instrument panel has stabilised.
- If necessary, fill with the recommended diesel fuel.



WARNING

In order to avoid that air is sucked into the fuel injection system, the fuel tanks should never be allowed to run dry. If air enters the fuel system, the engine will stop and the fuel system must be bled.

- Disconnect the ignition.
- Fill as per below.



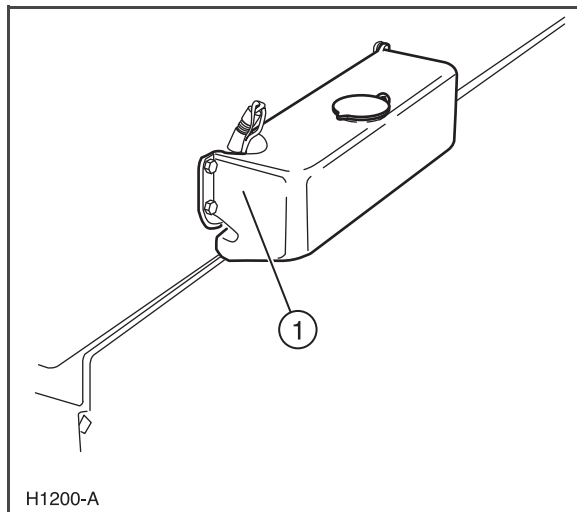
Filling up fuel

- Open the filler cap placed on the left side of the machine and fill with the recommended fuel.
- Refit the lid.
- In order to avoid that air is sucked into the fuel injection system, the fuel tanks should never be allowed to run dry. There should be about 20-25 litres left in the tank.

Fuel tank capacity, see "Liquid volumes" on page 100.

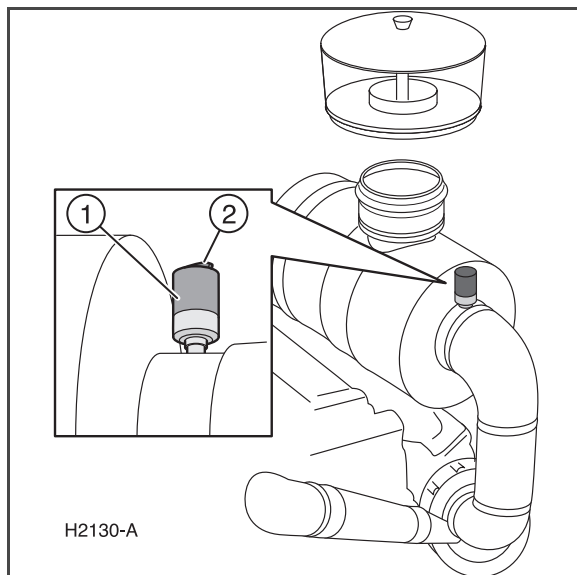
Check the windscreen washer liquid level

The windscreen washer liquid bottle (1) is placed behind the cabin. Fill as necessary.



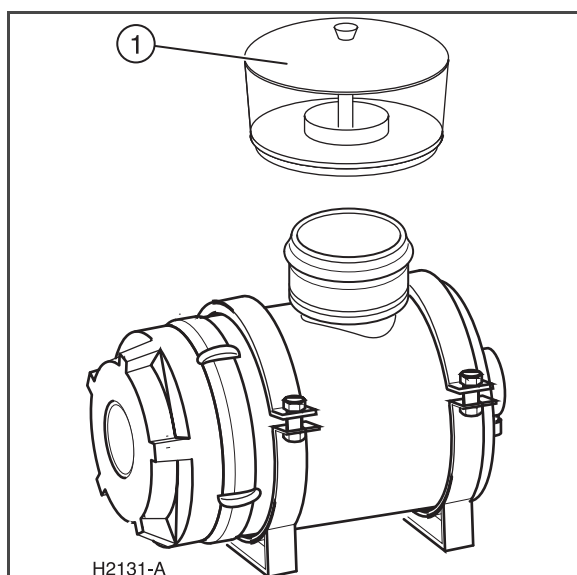
Inspection of the air filter indicator

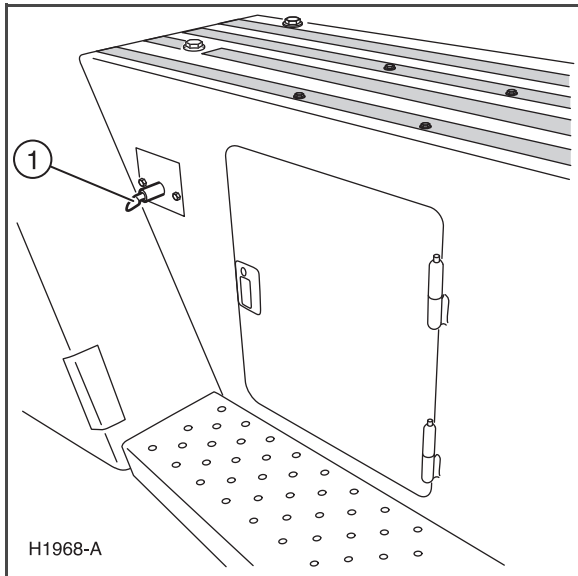
- Check the indicator (1).
- If the indicator shows RED, replace the indicator by pressing button (2) on the unit.
- Start the engine. If the indicator still shows red, stop the engine and clean or replace the air filter.



Cleaning the coarse cleaner for the air filter

- Remove the lid on the coarse cleaner (1).
- Remove the conic coarse cleaner. Empty out the dirt particles and clean it.
- Refit the coarse cleaner as per the diagram and refit the lid.





Main power switch



WARNING

The main power switch does not cut the power between the alternator and the battery. When working with or in the vicinity of the alternator, the negative cable for the battery must be removed.

In order to reduce the risk of electric shock and personal injuries, jewellery and other conducting material must always be removed prior to working on the electrical system of the machine.

The power may only be cut with the main power switch with the engine running in an emergency.

Short-circuiting the battery may lead to a fire or explosion.

Danger of serious personal injury or fatality.

The battery contains corrosive acid.

Always use necessary protective equipment.

Batteries generate explosive hydrogen gas when being charged.

Ensure good ventilation and avoid sparks.

- The switch (1) is located on the right side of the machine.
- Turn the switch clockwise to switch it on.
- When switching off, turn the switch counter-clockwise and the key will be released.

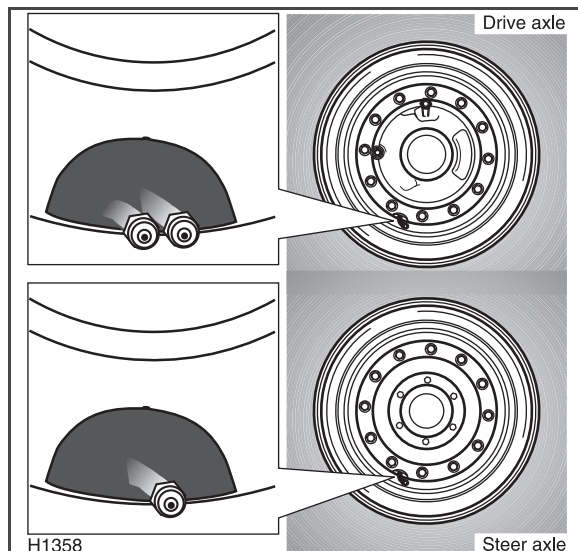
Control of the conditions and pressure of the tyres

- Ensure that the tyres are not damaged or too worn.
- Remove any foreign objects from the tread pattern.
- Ensure that the tyres have the correct pressure in accordance with the recommendations of the tyre manufacturer.
- Pump the tyres in accordance with applicable regulations.



WARNING

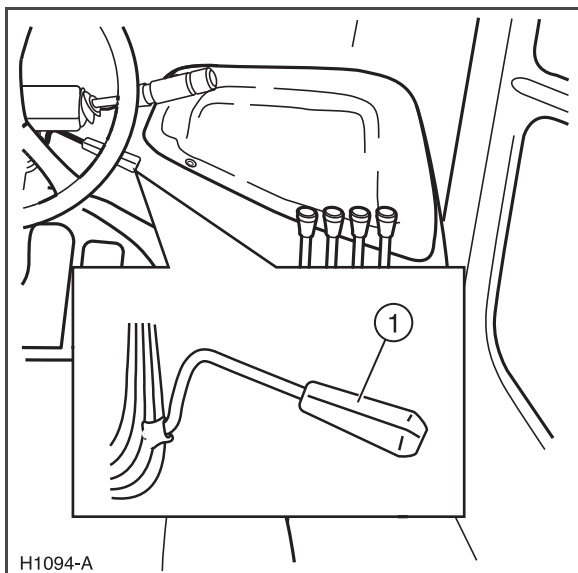
When replacing the tyres, only tyres from approved manufacturers are approved.



Steering wheel and the control lever on the panel

When adjusting the position of the steering wheel and the panel:

- For height adjustment, push the lever (1) upwards.
- For tilt adjustment, push the lever (1) downwards.





CLEANING

Clean the machine

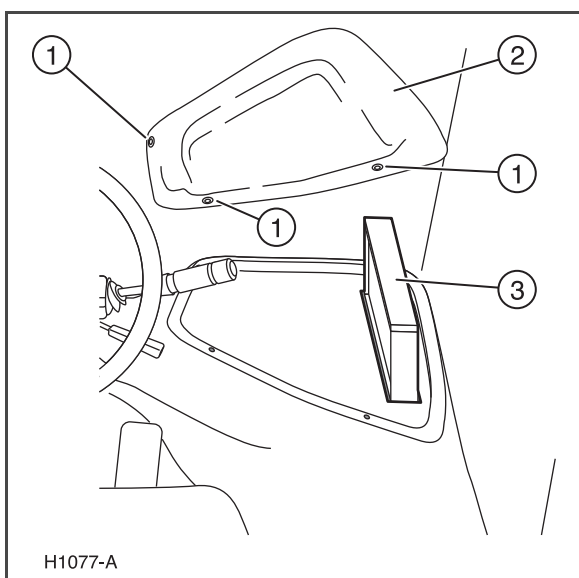
The intervals between the cleanings depend on the type of work performed by the machine. If it is used in extremely aggressive environments where it is exposed to, for example, salt water, fertiliser, chemicals, cement etc., it should be cleaned thoroughly when the work is finished.



WARNING

Hot steam or aggressive degreasers should be used with great care. Use protective clothing and goggles.

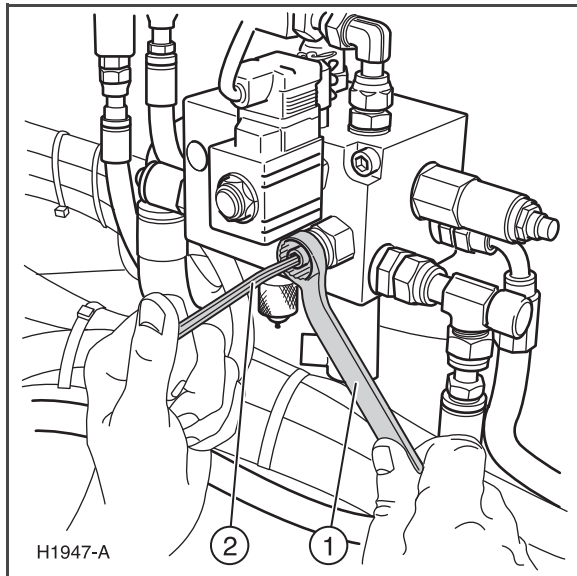
- Protect all electrical components and the air cleaner intake so that steam, water etc. does not penetrate during cleaning.
- Clean in particular the areas around the oil filling and the lubrication points prior to service.
- If a degreasing agent is used when cleaning, ensure that the agent has sufficient time to penetrate and then rinse with a hard water jet.
- After cleaning the engine, it should be run warm to allow it to dry and to ensure that penetrating water has not caused any faults.
- All the materials used for cleaning should be taken care of in an environmentally friendly way.
- Always lubricate after cleaning.



Change the cabin filter

The filter for the climate control is under the right panel.

- Loosen the screws (1).
- Remove the lid (2).
- Pull up the filter (3) carefully in order to avoid that dust enter the climate control or the cabin.
- Replace the filter with a new one.



PRESSURE DRAINING OF THE HYDRAULIC SYSTEM



WARNING

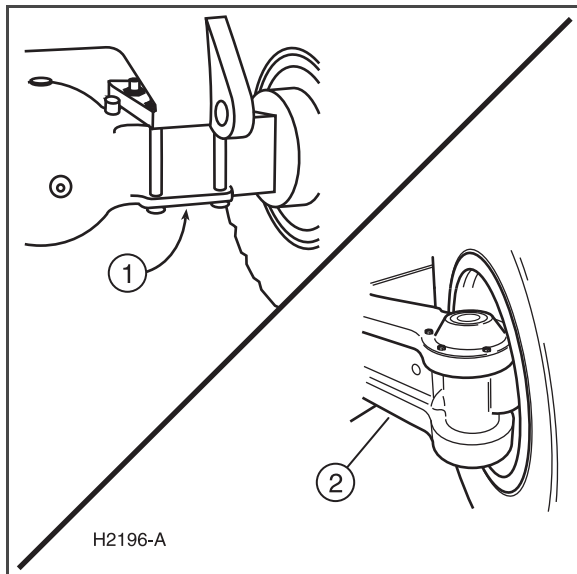
High pressure accumulators in the hydraulic system maintains the braking function in the event of an engine breakdown.

Danger of serious personal injury

Always drain the brake pressure before performing maintenance or service work on the machine.

Never loosen a hydraulic hose or connection without first ensuring that the brake pressure has been drained.

- Loosen the locking nut using a 11/16" ring spanner (1).
- Loosen the draining nut using a 3/16" Allen key (2).



WHEEL REPLACEMENT

Placing of the jack when replacing a wheel



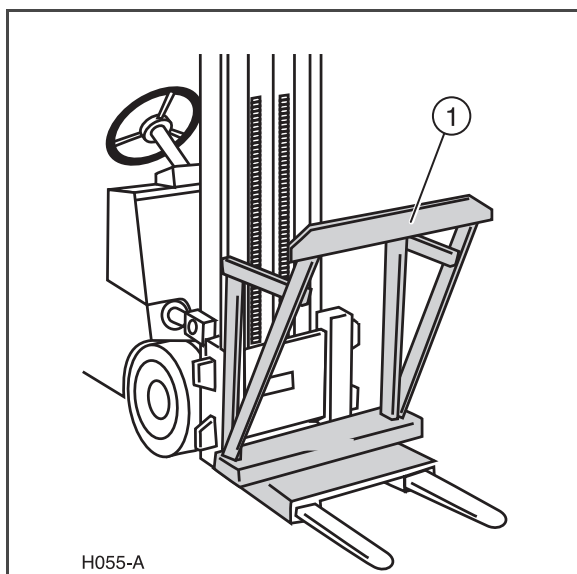
WARNING

Adhere to the following precautions before jacking up the machine. Only use a jack with sufficient lifting capacity. For axel load, see the technical data sheet.

In order to lift the machine driving shaft, place the jack under the driving shaft (1) and block the wheels on the steering shaft.

In order to lift the machine steering shaft, place the jack under the steering shaft main shield (2) and block the wheels on the driving shaft.

When working under the machine, support the chassis with a suitable support. NEVER trust just the jack.



General

Replacing the wheel is a two-man procedure.

- A support truck equipped with a holder for the wheel (1) makes the job easier.
- Place the machine on level ground.
- Lift the side of the machine and support the chassis in accordance with the recommendations.

Specifications for the tyres on the driving and steering shafts

See machine card.

Specifications for the wheels

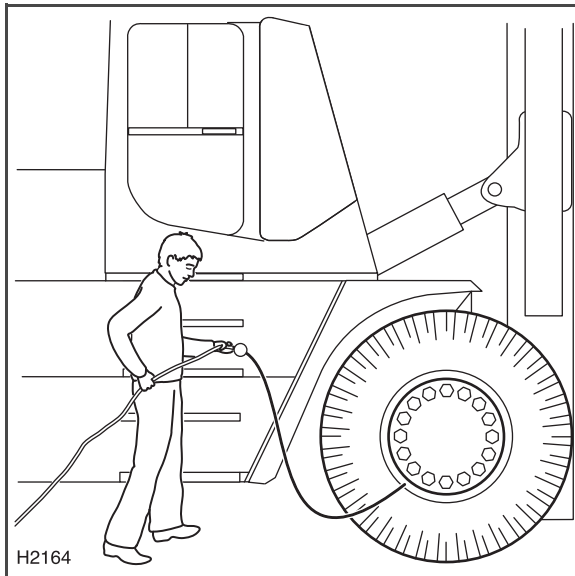
Only use wheels approved by the machine manufacturer.

Other types of tyres

The machine is designed for air rubber wheels. Tyres of type solid/semi-solid must only be used in agreement with the machine manufacturer.

Service and maintenance

KONECRANES



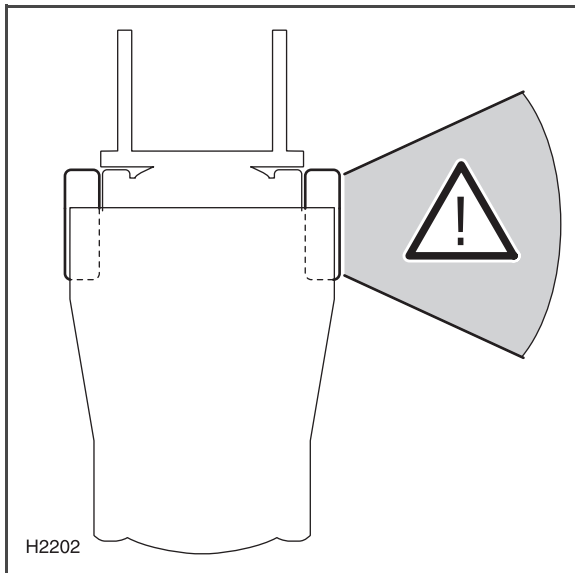
DANGER!

High pressure tyres. Danger of serious personal injury and fatality. In order to avoid accidents – always follow these instructions for emptying and filling of tyres.



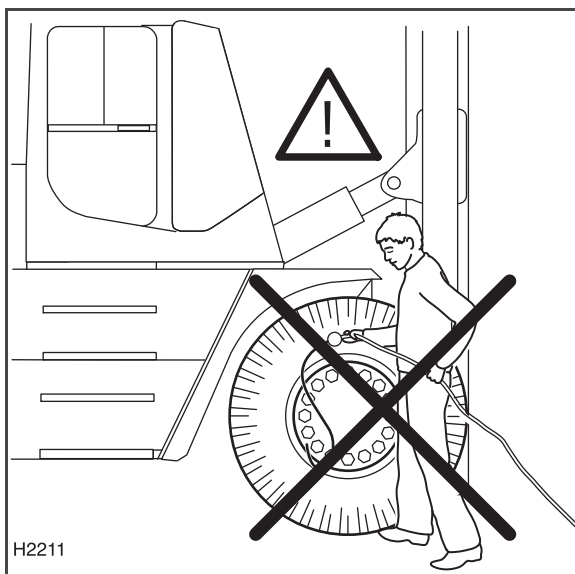
DANGER

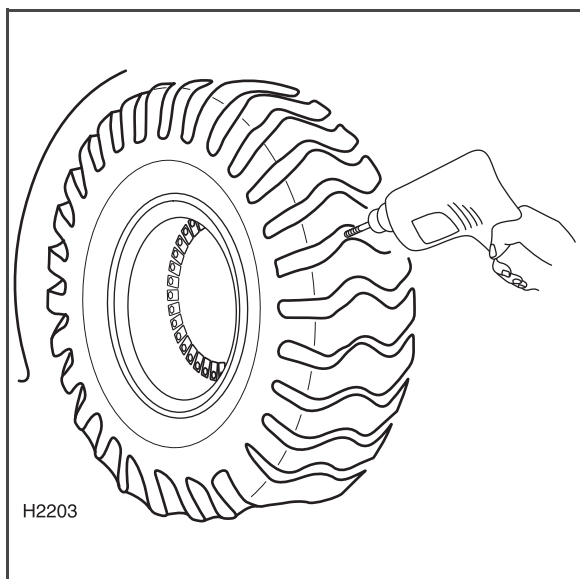
High pressure tyres. Always stand on the side of the wheels when you release the air from or fill the tyres.



DANGER

High pressure tyres. Prohibited area when you release the air from or fill the tyres.





Deflating the tyres



WARNING

Note that the valves may be damaged or that a valve can be blocked by ice when the air is released. If the air cannot be released via the valve or if there is doubt as to the functioning of the valve, a hole must be drilled in the thread pattern.

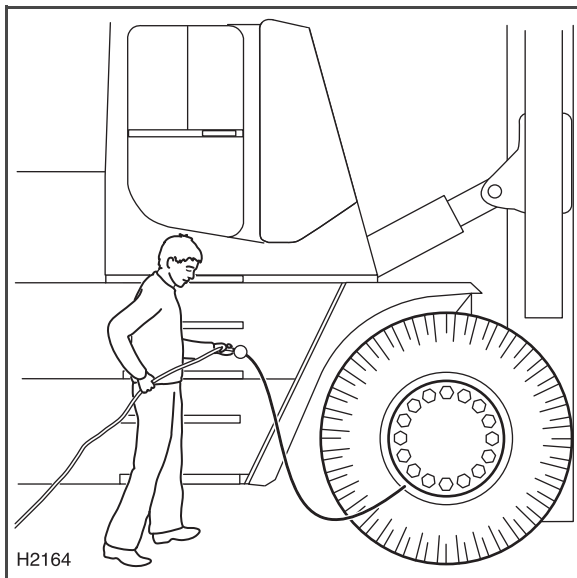


DANGER

High pressure tyres. Always stand on the side of the wheels when you release the air from the tyres.

Empty the tyres according to the following

- Use protective goggles when emptying the tyres.
- Unscrew the valve top.
- Unscrew the gate valve. Be cautious as the gate valve may shoot off as it loosens from the valve.



Inflating of tyres



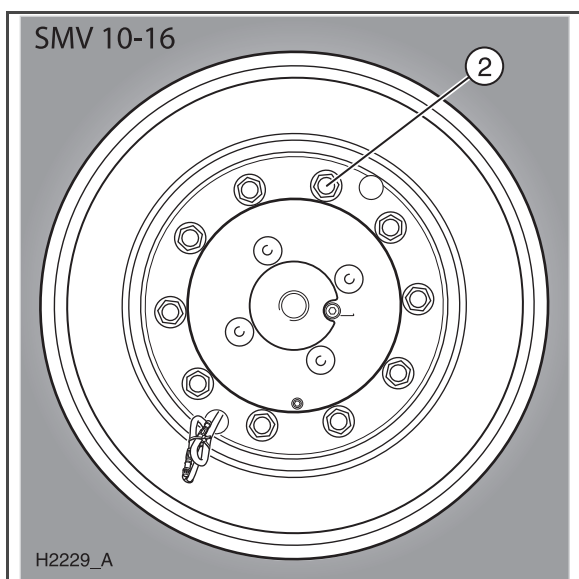
DANGER

High pressure tyres. Always stand on the side of the wheels when you release the air from or fill the tyres.

- Never hit a tyre or wheel that is partially or fully filled.
- The tyre must not be inflated until all parts have been fitted.
- The wheel components must never be fitted by being hit with a hammer when the tyre is being inflated.
- If the tyre has been deflated, remove the wheel and examine it for any damage.
- It is important to always use approved components for the wheels.
- Ensure that all the parts are in place when the fitting pressure has been reached.
- Final inflating to the maximum pressure must be done on machine or in a safety cage with the correct dimensions for the tyre in question.
- If a safety cage is being used, the tyre can be filled to full pressure.
If not, the tyre must be filled to the fitting pressure stated by the tyre manufacture.
- Do not exceed the tyre pressure that has been prescribed. If the type of tyre or wheel is changed, another tyre pressure may be applicable, please contact Konecranes Lifttrucks.

Fill in accordance with the following.

- When filling the tyre, an air filter and water separator should be installed on the line from the compressor in order to avoid corrosion on the wheel.
- Ensure that the locking ring and locking lug are in the correct position before filling is commenced.
- Connect the compressor to the nipple on the tyre.
- Stand on the side of the tyre until the fitting pressure has been reached.
- Ensure that all the parts are in place when the fitting pressure has been reached.
- Fit the tyre in accordance with instructions.
- Fill the tyre to the prescribed pressure in accordance with the tyre manufacturer's specifications.



Removal of the outside driving wheel



DANGER

High pressure tyres.

Danger of serious personal injury and fatality.

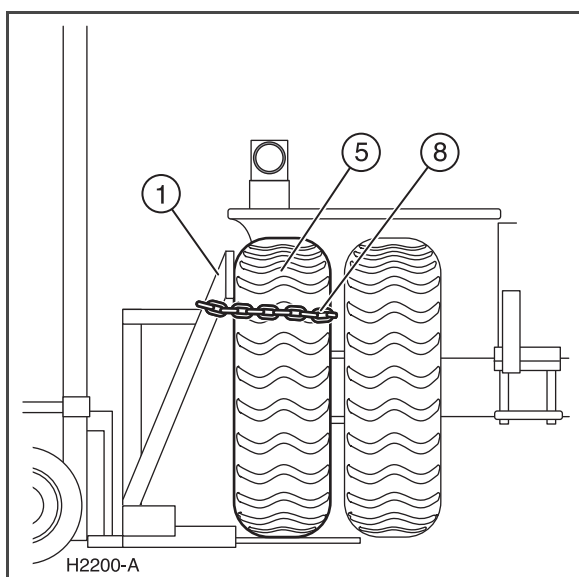
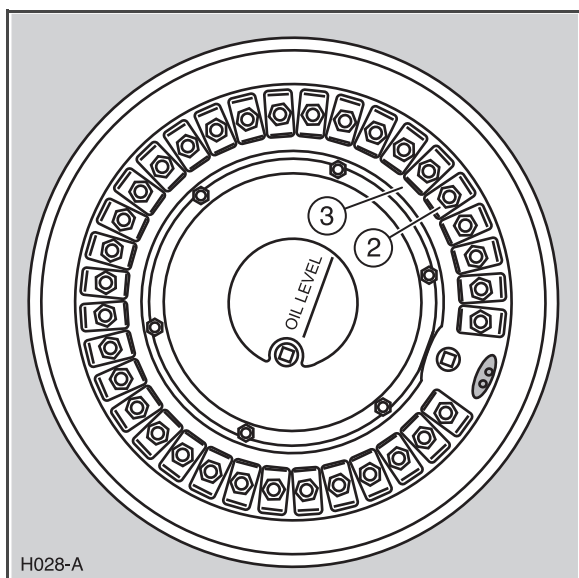
Release the air from both tyres. If this is not done, the wedge band and the clamps may shoot loose when the pressure changes.

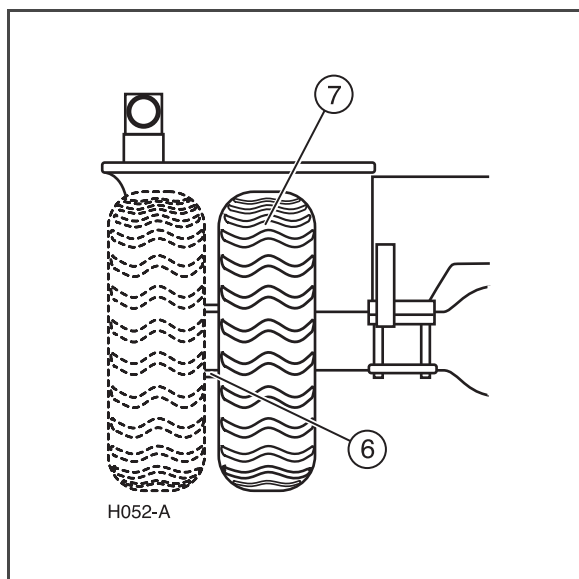


WARNING

Only use tyres approved by the machine manufacturer.

- Remove all nuts (2) and clamps (3) except two.
- Support the weight of the outer wheel (5) using the forks of the support truck.
- Remove the remaining nuts (2) and clamps (3).
- Lean the outer wheel (5) against the wheel holder on the support truck (1) and fixate it with a chain (8).
- Carefully reverse the support truck away and unload the outer wheel (5).



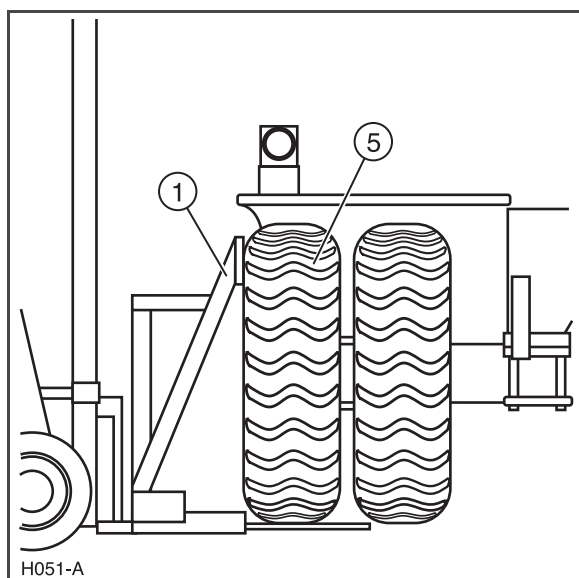


Removal of the inside driving wheel

- Remove the outer driving wheel.
- Remove the spacer (6).
- Support the weight of the inner wheel (7) using the forks of the support truck.
- Lean the wheel (7) against the wheel holder on the support truck (1) and fixate it with a chain (8).
- Carefully reverse the support truck away and unload the outer wheel (7).

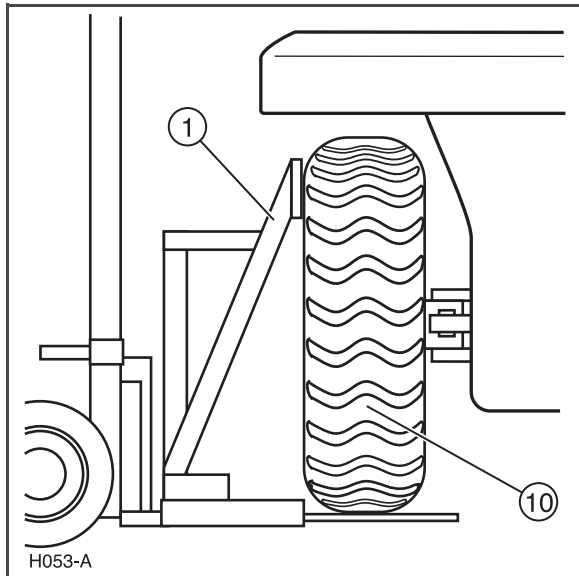
Fitting of the inside driving wheel

- Load the inner driving wheel (7) on the support truck and fit it to the holder.
- Clean the contact surfaces.
- Carefully manoeuvre the support truck into place and position the inner wheel (7) over the driving shaft and hub.
- Remove the fixing device from the wheel holder (1) and the inner wheel (7) and straighten up the wheel (7).
- Lower the fork on the support truck until the inner wheel (7) rests on the hub.
- Carefully reverse the support truck away.
- Refit the spacer (6).



Fitting of the outside driving wheel

- Load the outer wheel (5) on the support truck and fit it to the holder.
- Carefully manoeuvre the support truck into place and position the outside wheel (5) over the hub.
- Remove the fixing device from the wheel holder (1) and the outer wheel (5) and straighten up the wheel (5).
- Fit the clamps (3) and the nuts (2), placed diagonally against each other in order to keep the wheel in place.
- Carefully reverse the support truck away.
- Fit the remaining clamps (3) and nuts (2) and cross-wise tighten the wheel nuts applying the torque stated in section "Retightening of bolt joints, torque" on page 57.
- Fill the tyres in accordance with the tyre manufacturers recommendations.



Steering wheel removal

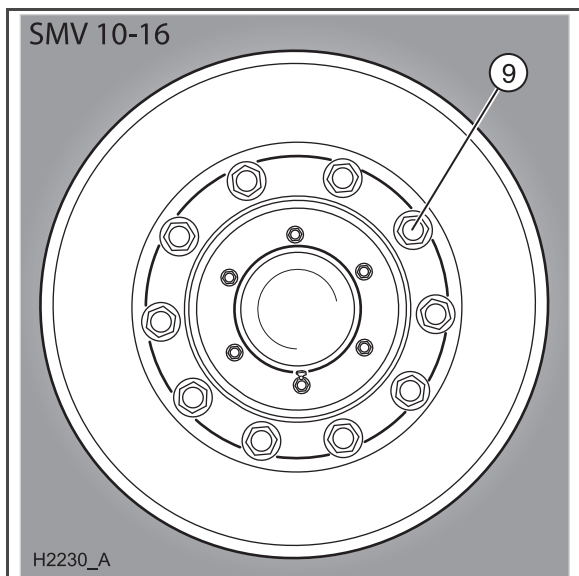


DANGER

High pressure tyres. Danger of serious personal injury and fatality. Never stand above the wheels when you release the air from or fill the tyres.

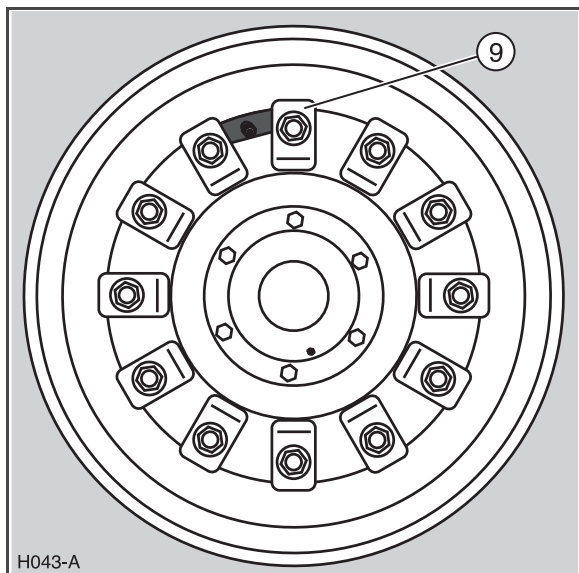
Release the air from the tyre. If this is not done, the wedge band and the clamps may shoot loose when the pressure changes. Note that the valves may be damaged or that a valve can be blocked by ice when the air is released. If the air cannot be released via the valve or if there is doubt as to the functioning of the valve, a hole must be drilled in the thread pattern.

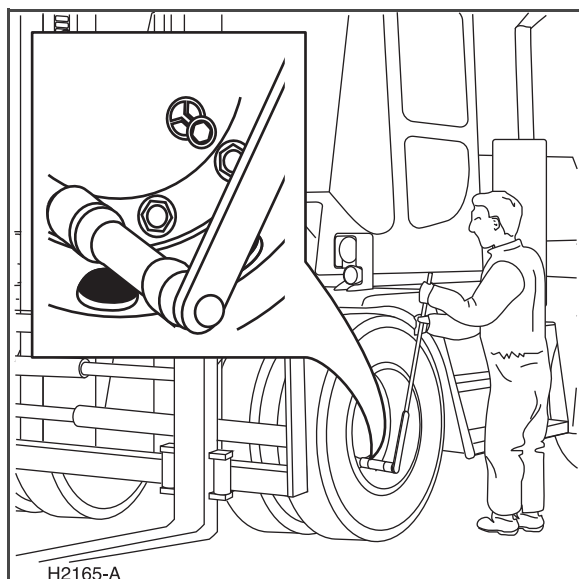
- Remove all wheel nuts and clamps except two (9).
- Support the weight of the steering wheel (10) using the fork of the support truck.
- Remove the remaining nuts and clamps.
- Lean the steering wheel (10) against the wheel holder (1) and fixate it with a chain (8).
- Carefully reverse the support truck away and unload the outer wheel (10).



Fitting of steering wheel

- Load the steering wheel (10) on the support truck and fit it to the holder.
- Clean the contact surfaces.
- Carefully manoeuvre the support truck into place and position the outside wheel (10) over the hub.
- Support the weight of the steering wheel (10) using the fork of the support truck.
- Fit and tighten the two clamps and nuts (9) cross-wise against each other.
- Remove the support of the fork.
- Fit and tighten the remaining clamps and nuts (9) applying the torque stated in section "Retightening of bolt joints, torque" on page 57.
- Carefully reverse the support truck away.
- Fill the tyres in accordance with the tyre manufacturers recommendations.





RETIGHTENING OF BOLT JOINTS, TORQUE

In order to choose exactly the correct torque, information about the friction conditions is required.



WARNING

It is important that the torque of the bolt joints is regularly checked.

It is in particularly important that all bolts are checked at the "first service".



WARNING

The torque of the wheel nuts must be checked daily for the first 14 days, or until the wheels, clamps and nuts have been tightened and no

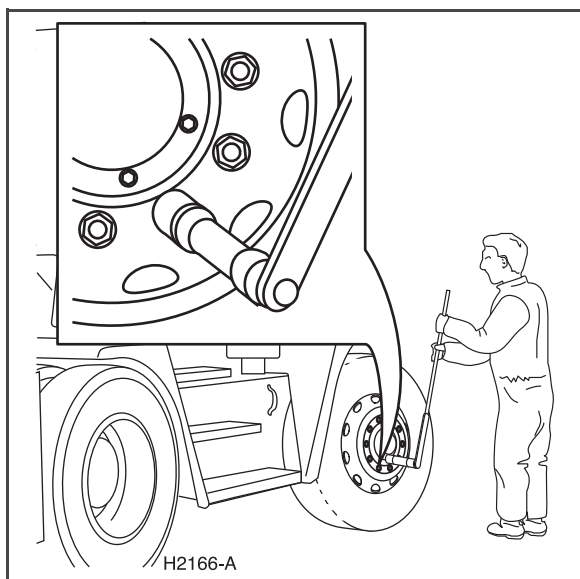
further retightening is possible. This must be done:

- after new delivery of a machine
- after first use of the machine
- after the removal or replacement of a wheel

The bolt joints described on the following pages are to be tightened with a torque wrench.

The chart below states the torque for bolts "slightly lubricated".

Metric thread				UTS thread			
Thread M	Strength classification			Thread UNC	Strength classification		
	8.8 Nm	10.9 Nm	12.9 Nm		8.8 Nm	10.9 Nm	12.9 Nm
6	9.8	14	17	1/4"	11	15	19
8	24	33	40	5/16"	22	31	38
10	47	65	79	3/8"	38	54	68
12	81	114	136	7/16"	61	87	108
14	128	181	217	1/2"	93	131	163
16	197	277	333	9/16"	133	187	234
18	275	386	463	5/8"	183	259	323
20	385	541	649	3/4"	322	455	568
22	518	728	874	7/8"	516	729	909
24	665	935	1,120	1"	772	1,090	1,360
27	961	1,350	1,620	1 1/8"	1,090	1,550	1,930
30	1,310	1,840	2,210	1 1/4"	1,530	2,160	2,690
33	1,770	2,480	2,980	1 3/8"	2,020	2,850	3,550
36	2,280	3,210	3,850	1 1/2"	2,650	3,750	4,680



Tightening of wheel nuts



WARNING

The torque of the wheel nuts must be checked daily for the first 14 days, or until the wheels, clamps and nuts have been tightened and no further retightening is possible. This must be done:

- after new delivery of a machine
- after first use of the machine
- after the removal or replacement of a wheel

The nuts are tightened cross-wise to the torque as per below.

Wheel nuts driving shaft

SMV 10-16	M22 x 1.5	10.9	650 Nm
SMV 18-60	M18 x 2	10.9	350 Nm

Wheel nuts steering shaft

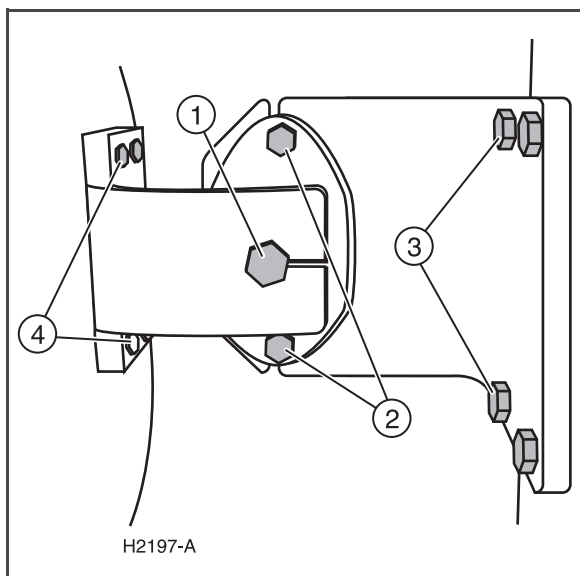
Steering axle	M22 x 1.5	8.8	400 Nm
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Engine mounts

Check the condition of the rubber mounts.

If any wear is discovered, replace the damaged parts.

The engine mounts can be reached from the engine bay, one on each side of the rear of the engine.



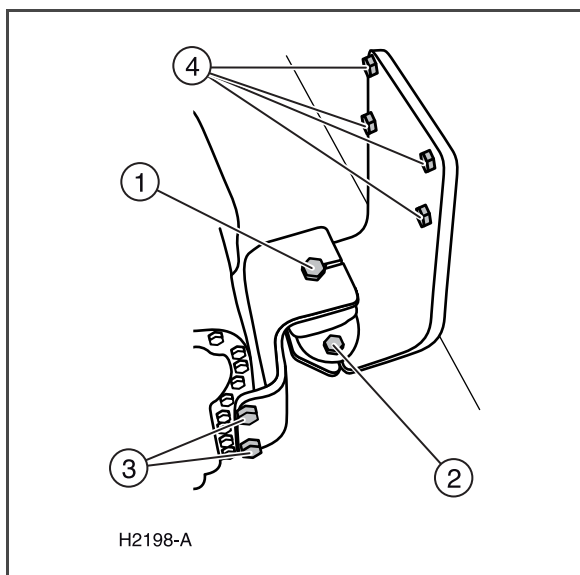
(1)	M20	8.8	385 Nm
(2)	M16	8.8	197 Nm
(3)	M16	8.8	197 Nm
(4)	M16x1.5	10.9	277 Nm (Scania)
	M16x2	10.9	277 Nm (Volvo)

Transmission

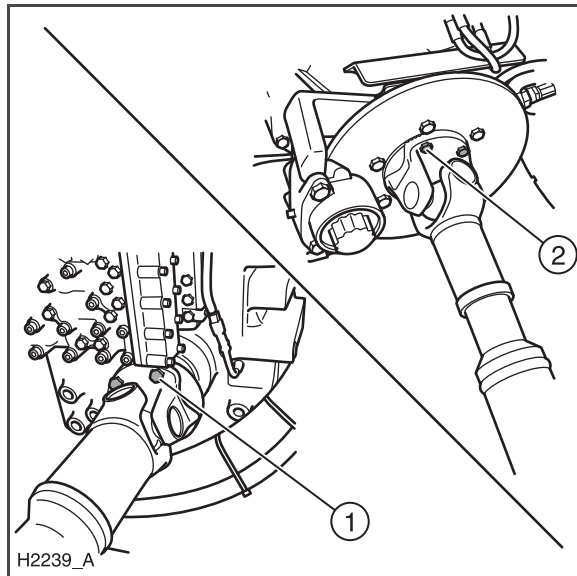
Check the conditions of the rubber mounts and the brackets.

If any wear is discovered, replace the damaged parts.

The brackets (one on each side of the transmission), can be reached from the engine bay.



(1)	M20	8.8	385 Nm
(2)	M16	8.8	197 Nm
(3)	M20	8.8	385 Nm
(4)	M16	8.8	197 Nm



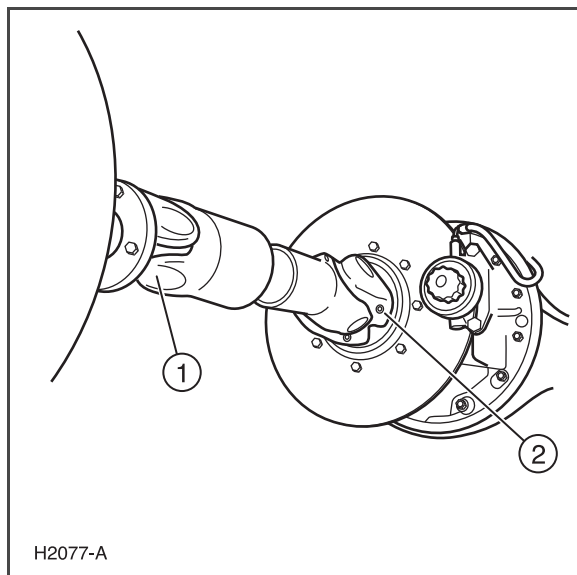
Prop shaft

SMV 10-18B

Towards transmission (1)	M12	8.8	81 Nm
Towards drive axle (2)	M12	8.8	81 Nm

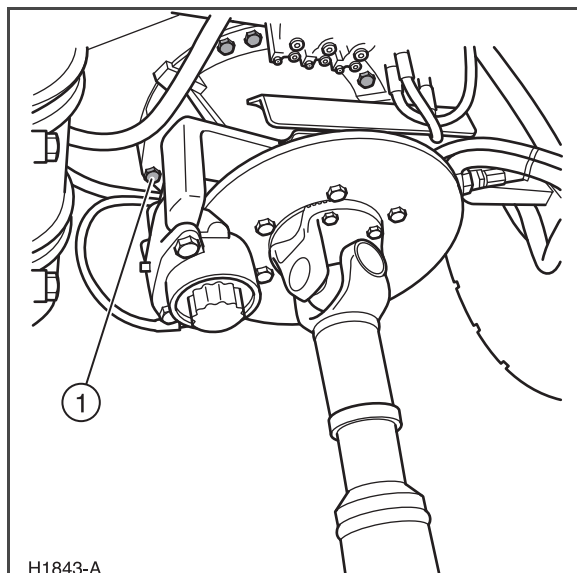
SMV 28B

Towards transmission (1)	M12	8.8	81 Nm
Towards drive axle (2)	M14x2	8.8	128 Nm



SMV 32-60B

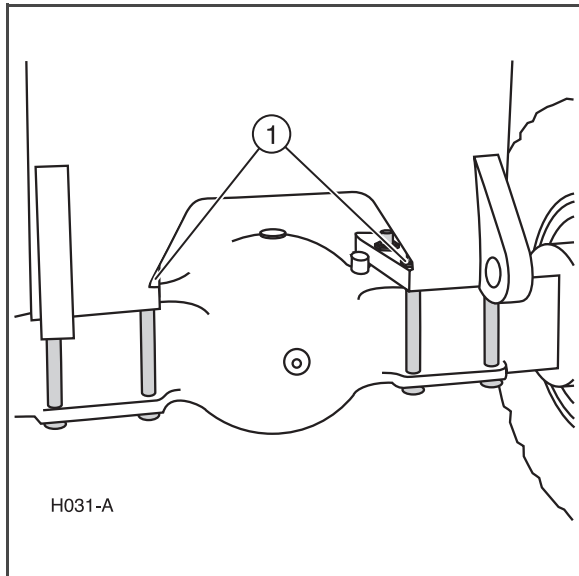
Towards transmission (1)	M14x1.5	8.8	128 Nm
Towards drive axle (2)	M14x2	8.8	128 Nm



Differential bolts

SMV 10-60B

(1)	M14	10.9	181 Nm
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Drive axle mounting

SMV 10-16

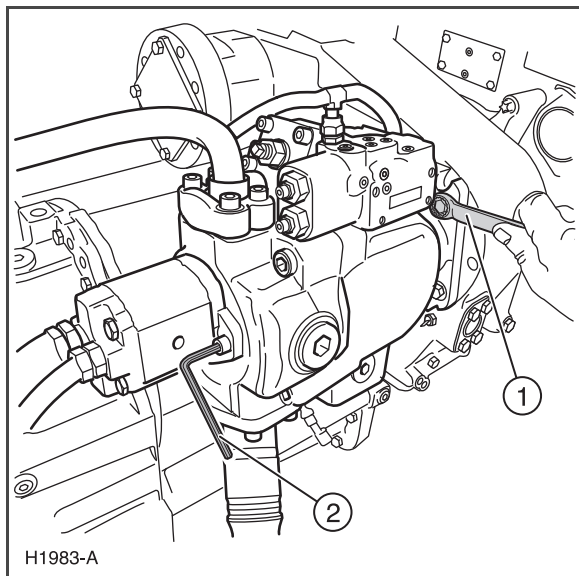
(1)	M24	10.9	935 Nm
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SMV 18-33

(1)	M 30	10.9	1,840 Nm
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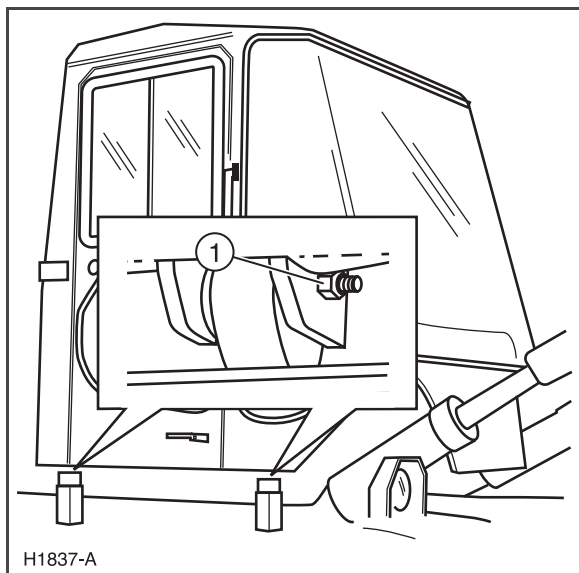
SMV 37-60

(1)	M 36	10.9	3,210 Nm
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Hydraulic pumps

1)	M12	8.8	81 Nm
(2)	M10	10.9	65 Nm



Cabin bracket

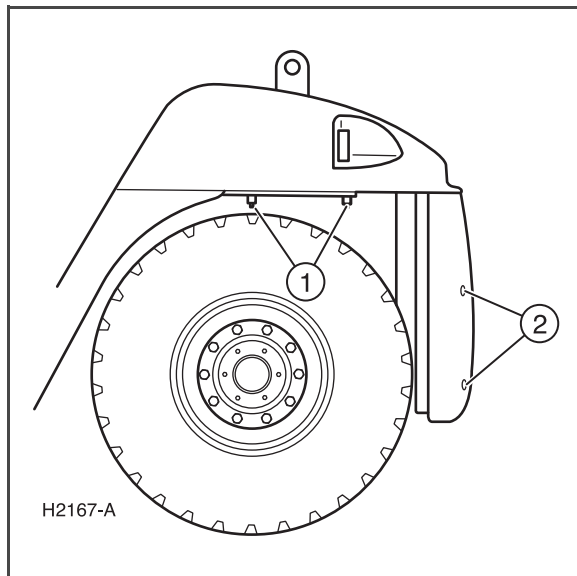
NOTE

The torque for the cabin bracket should not exceed the one stated below. The mounting ears for the cabin bracket may otherwise be pressed together and damage the fitting.

(1)	M24	8.8	245 Nm
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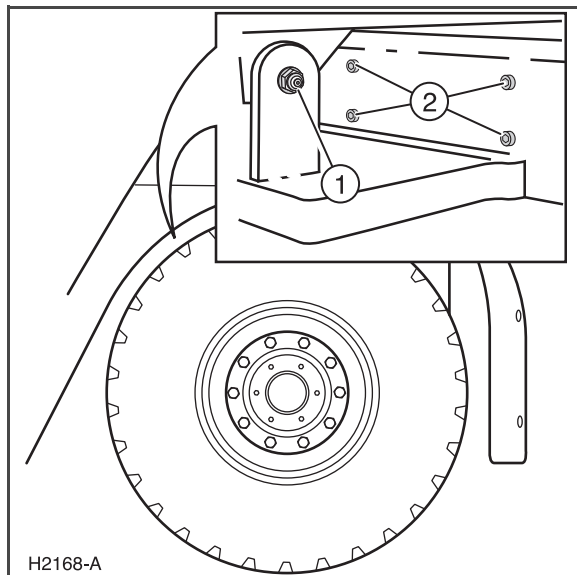
Service and maintenance

KONECRANES®



Counter weights

(1)	M24	8.8	665 Nm
(2)	M24	8.8	665 Nm



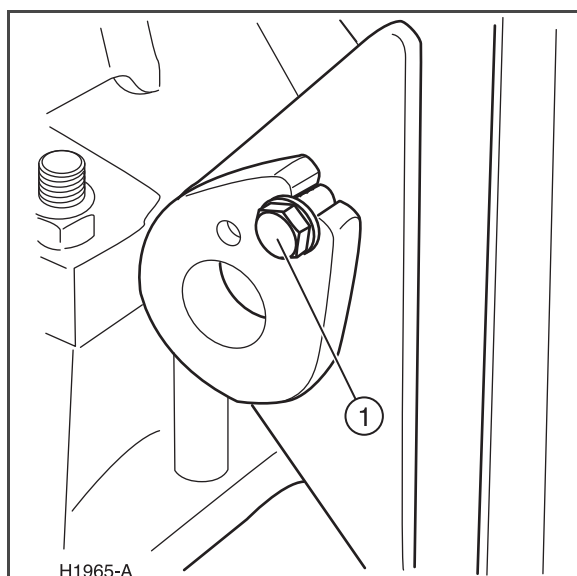
Steering axle

SMV 10-16

(1)	M30	8.8	1,310 Nm
(2)	M20	8.8	1,310 Nm

SMV 18-60

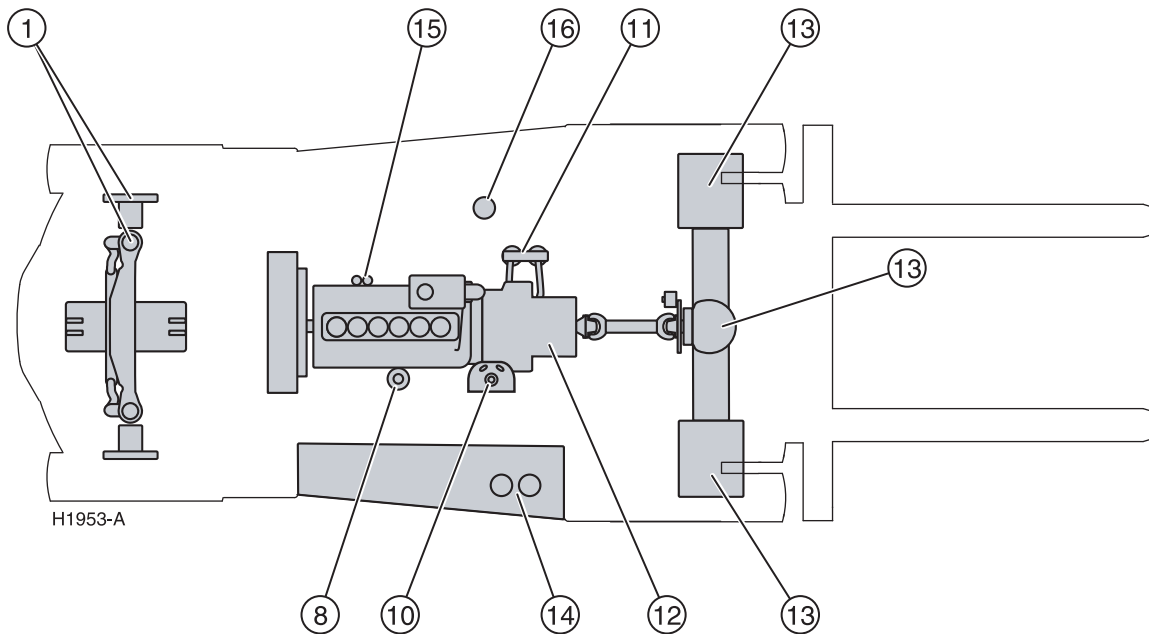
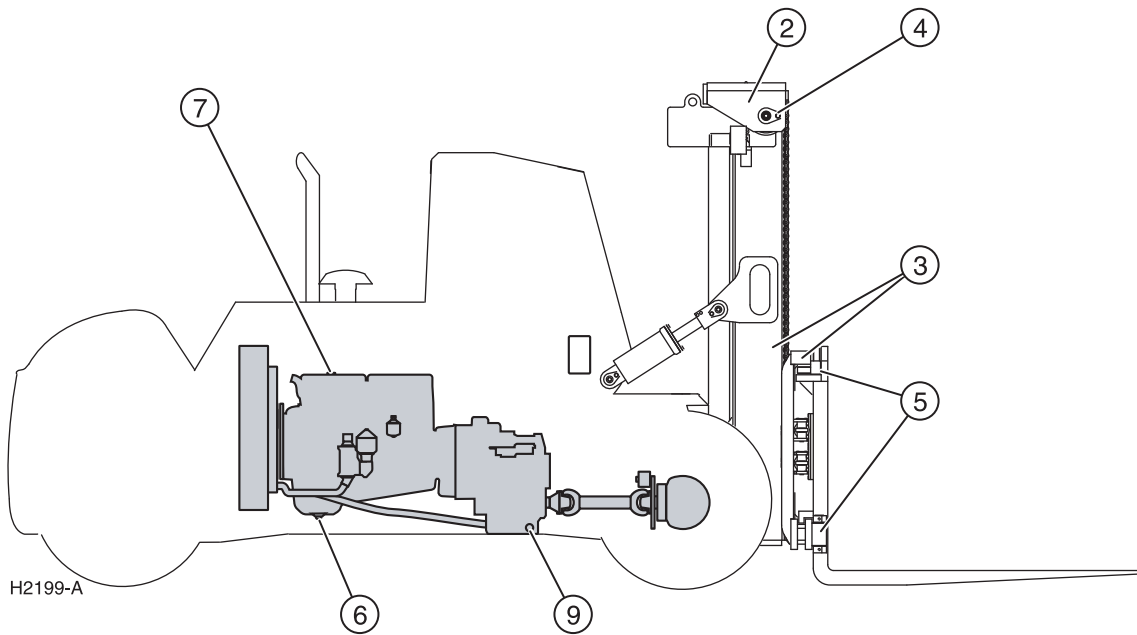
(1)	M36		2,280 Nm
(2)	M30	8.8	1,310 Nm



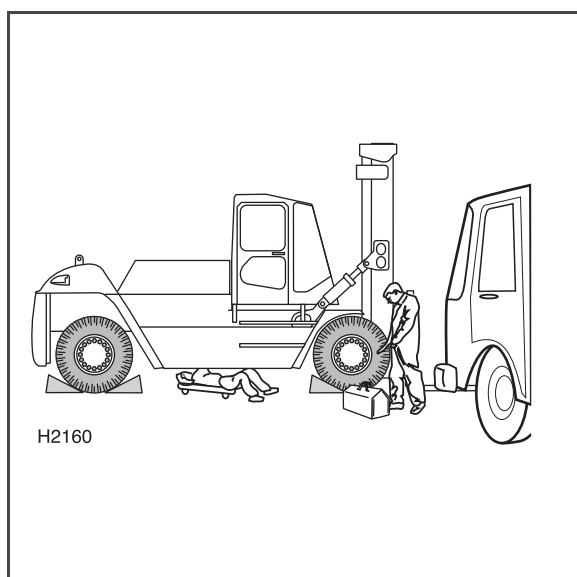
Mast suspension

(1)	M16	8.8	197 Nm
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OVERVIEW LUBRICATION SCHEDULE



Pos.no.	Naming	Illustration	Page no.
1.	Steering axle	H2092-A	page 84
2.	Mast	H124-A	page 82
3.	The carriage and the inner mast	H124-A	page 82
4.	Upper support roller for the outer mast and chain wheel	H124-A	page 82
5.	Forks	H126-A	page 84
6.	Oil tap, engine	H1961-A	page 64
7.	Refill, engine oil	H1985-A	page 65
8.	Oil filter SCANIA	H1839-A+H1661-A	page 64
9.	Oil tap, transmission	H1958-A	page 74
10.	Refill, transmission oil	H1847-A	page 75
11.	Oil filter, transmission	H1959-A	page 74
12.	Breathing filter, transmission	H1840-A	page 75
13.	Drive axle	H2095-A	page 78
14.	Hydraulic filter	H1979-A	page 80
15.	Fuel filter SCANIA	H1976-A	page 66
16.	Water separator	H1894-A	page 66



General rules applicable to lubrication

- Remove old grease and dirt from the nipples.
- Grease until clean grease appears.
- Only use the recommended grease.
- All sliding bearings must be relieved in order for the grease to be able to penetrate.
- Sliding bearings require frequent greasing with small amounts of grease. Roller bearings require more grease but are not greased as often.
- Also check the function and bearing play when greasing.
- The stated greasing intervals are applicable under beneficial conditions. For more demanding applications, more frequent greasing intervals are recommended. This is in particular true for sliding bearings.

ENGINE, OIL, OIL FILTER AND OIL CLEANER, SCANIA

Emptying of engine oil

The oil should be replaced when the engine has reached operating temperature.

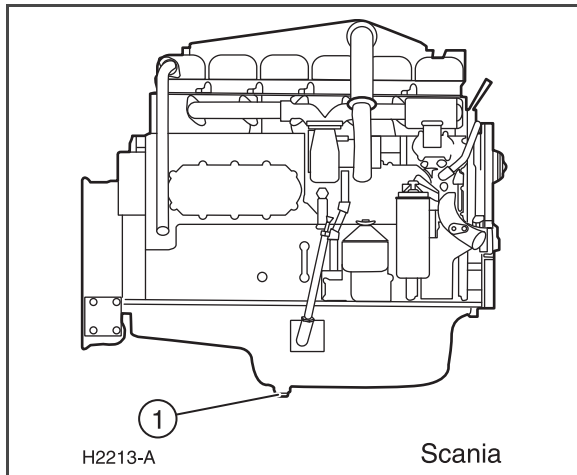
Change oil at least once a year.

- Place a suitable container under the drain plug.
- Unscrew the draining plug (1).
- Allow the oil to drain.
- Ensure that the seal is not damaged. Replace if necessary.
- Refit the drain plug.
- Tighten the drain plug.



WARNING

**The engine oil may be hot.
Danger of personal injury.
Carefully open the lid to avoid burns.**



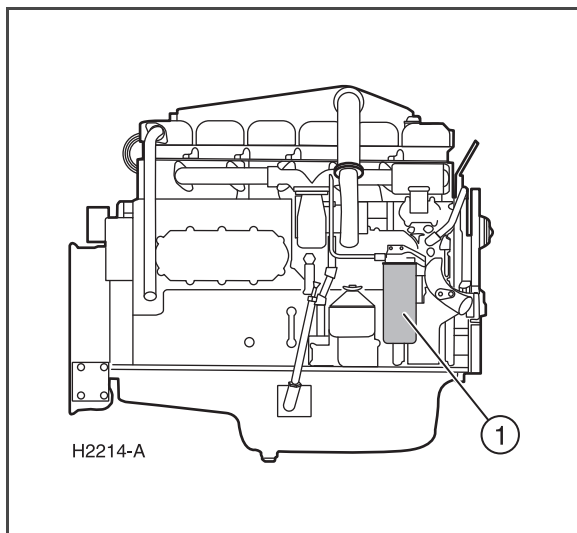
Replacement of engine oil filter

- Remove and dispose of the old filter (1).
- Grease the rubber seal and fit a new genuine filter.
- Tighten the filter by hand.

NOTE

Never use tools. The filter may be damaged and the circulation blocked.

- Start the engine and check for leaks.

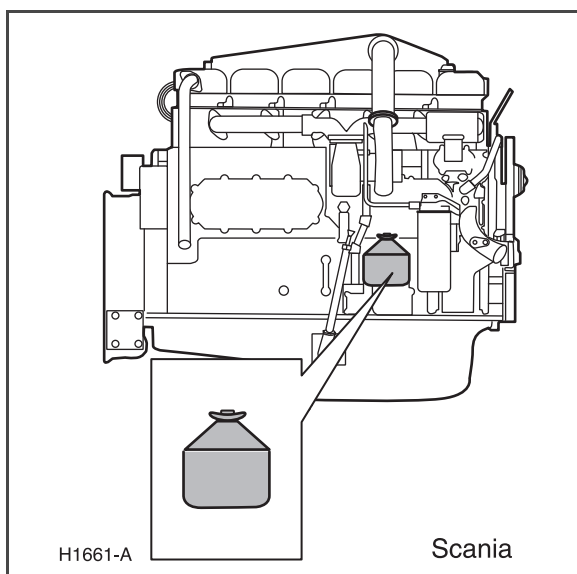


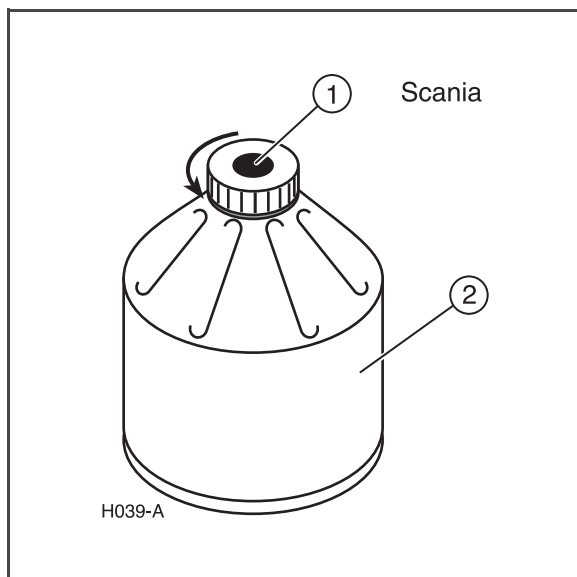
Cleaning of oil cleaner, engine



WARNING

**The engine oil may be hot.
Danger of personal injury.
Carefully open the lid to avoid burns.**

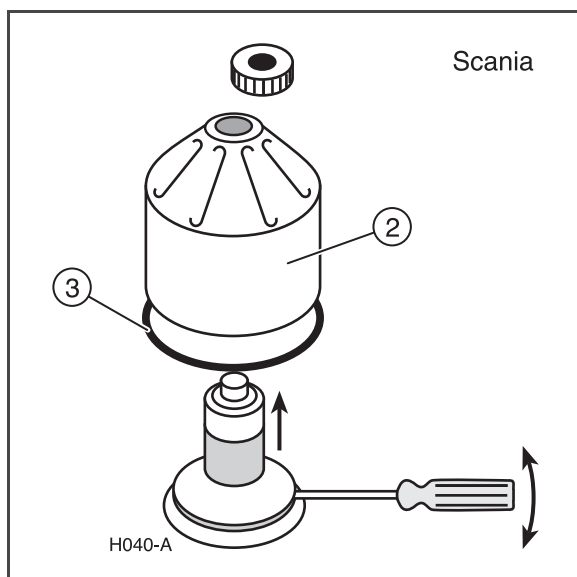




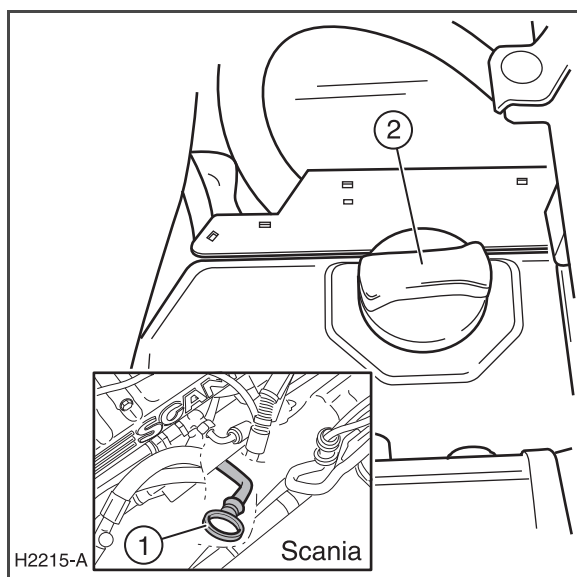
- Unscrew the nut (1) and remove the cover.
- Lift up the rotor and loosen the nut on the cover three turns.

NOTE

- If the nut is stuck, fixate it (1), **but not the cover**, in a vice and turn the cover three turns by hand or using a screw driver.
- Knock on the nut with your hand or a plastic hammer to remove the cover from the base plate.
- Loosen the nut and remove the cover (2).



- Carefully prise the filter from the base plate.
- Remove any deposits from inside the cover. If there are no deposits, the cleaning is not working.
- If the deposits are thicker than 20 mm, clean more often.
- Clean all parts in diesel oil.
- Return the o-ring (3) inside the cover. It must not be damaged. Replace if necessary.



Filling up engine oil

- Remove the filling lid (2).
- Fill oil through the refill opening.
- Check the oil level with the oil dipstick (1). Fill to the maximum level.
- Replace the filling lid (2).
- Close the engine cover.



BE CAREFUL

When test driving after replacing the oil and filter, pay attention to the oil pressure gauge and warning indicator on the instrument panel.

Also check that there are no leaks by the drain plug and oil filter. In order to perform a careful inspection of the oil level, in particular when the oil filter has been replaced, it is necessary to switch off the engine again and then recheck the oil level after about a minute.

FUEL SYSTEM, SCANIA

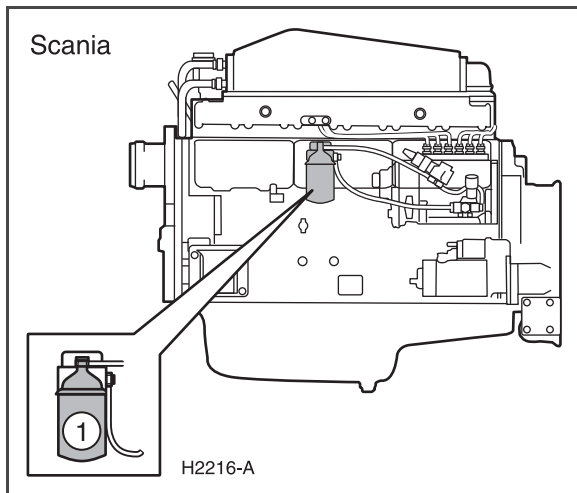
Replacement of fuel filter

- Open the engine cover.
- Carefully clean the outside of the filter unit.
- Place a container under the fuel filter (1) to collect any fuel leaks.
- Loosen the fuel filter with a filter wrench.
- Unscrew and remove the filter by hand.
- Examine the new filter and check that the seal is in good condition.
- Lightly grease the new seal with fuel.
- Fit the new filter by hand until the seal comes into contact with the cover.
- Then, tighten the filter another 1/2 turn by hand.
- Bleed the fuel system.
- Close the engine hood.
- After a test-drive, make sure that there are no leaks.



BE CAREFUL

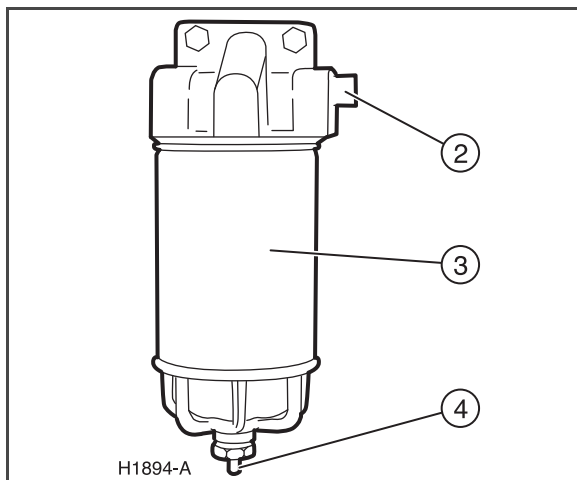
Never use sealing compound or grease. Tools must never be used to tightening the filter. Always use original parts when replacing the filters.



Replacement of water separator

The water separator is drained when fuel is filled.

- Close the drain tap (2), situated before the filter.
- Unscrew the filter container and the drain valve (4).
- Unscrew the filter (3) and replace it with a new one. Grease the seal and tighten the filter by hand.
- Fit the container and the drain valve.
- Open the drain tap (2).
- Bleed the fuel system.



Bleeding of fuel system

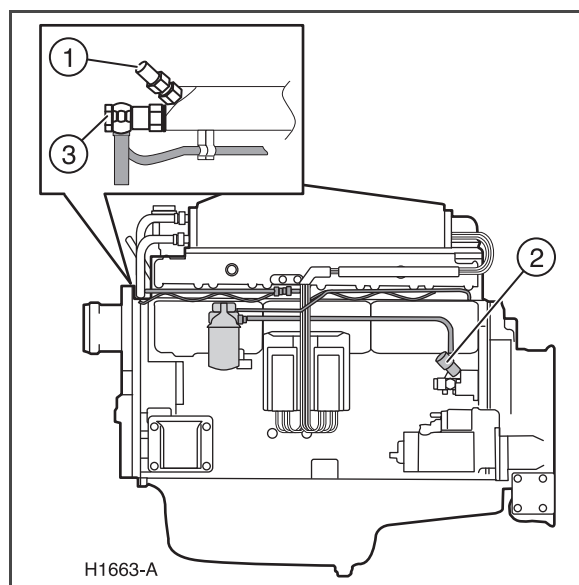
Air might enter the fuel system when:

- the fuel tank has run completely dry.
- fuel pipes are replaced.
- the fuel filter is replaced.



BE CAREFUL

A leaking seal will allow air to enter the system and thus prevent the flow of fuel from the tank to the fuel pump.



To bleed the fuel system, do as follows:

- Ignition on.
- Connect a clean plastic hose to the bleeding screw (1). Connect the other end to a clean container with fuel.
- Open the bleeding screw (1).
- Pump the fuel using a hand pump (2) until the fuel coming out is free from air (1).
 - If the system is completely empty, you need about 250 pumping actions.
 - After replacing the fuel filter, about 170 pumping actions are needed.
 - To bleed a fuel pipe, about 150 pumping actions are needed.
- Open the bleeding screw (1).
- Loosen the connection on the excess pressure valve (3) and pump using the hand pump (2) until the excess pressure valve (3) opens.

If the engine does not start.

- Reopen the bleeding screw (1) and pump with the hand pump until fuel free from air streams out from the bleeding screw (1).
- Fit the bleeding screw (1). Start the engine and check that there are no leaks.

ENGINE, OIL, AND OIL FILTER, VOLVO

Emptying of engine oil

The oil should be replaced when the engine has reached operating temperature.

- Place a suitable container under the drain plug.
- Unscrew the draining plug (1).
- Allow the oil to drain.
- Ensure that the seal is not damaged. Replace if necessary.
- Refit the drain plug.
- Tighten the drain plug.



WARNING

**The engine oil may be hot.
Danger of personal injury.
Carefully open the lid to avoid burns.**

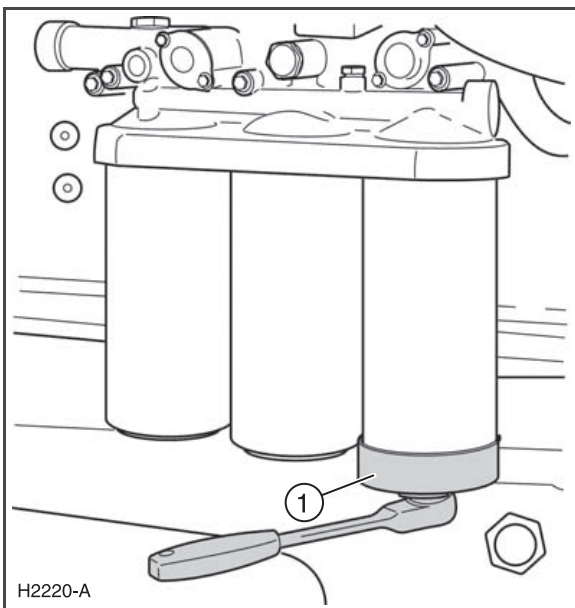
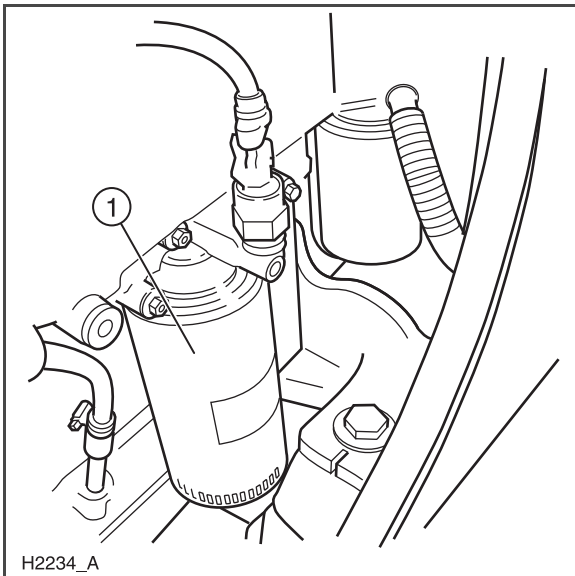
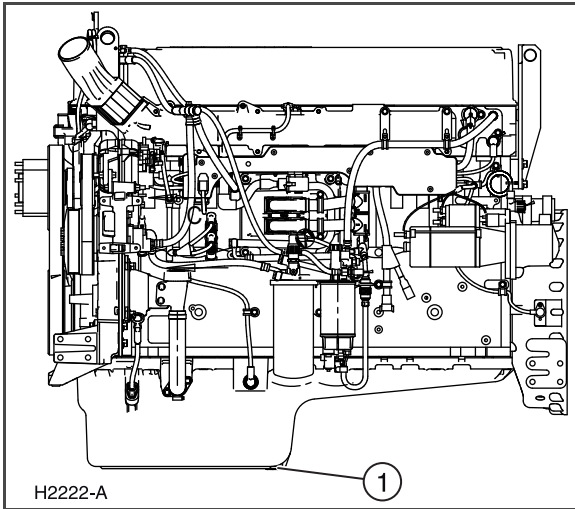
Replacement of engine oil filter

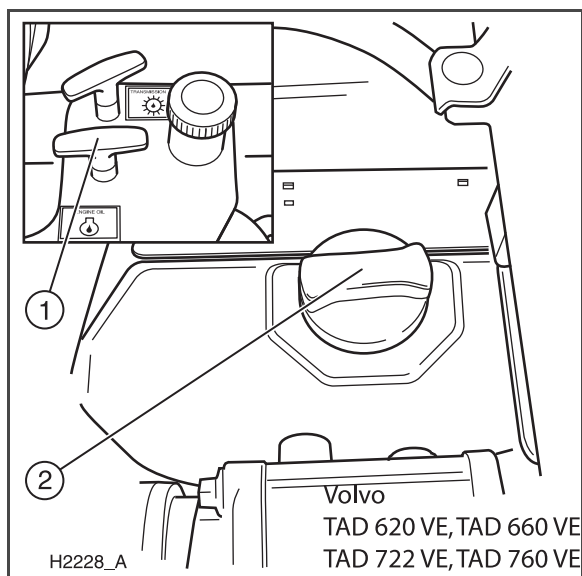
Volvo TAD 620 VE, TAD 722 VE, TAD 660 VE, TAD 760 VE

- Remove and dispose of the old filter (1).
- Grease the rubber seal and fit a new genuine filter.
- Tighten the filter by hand.
- **Never use tools. The filter may be damaged and the circulation blocked.**
- Start the engine and check for leaks.

VolvoTWD 1240 VE, TAD 1250 VE

- Clean the oil filter housing.
- Remove the old filter (1) by hand or using a filter wrench and dispose of it.
- Clean the area around the filter housing and ensure that there are no remains of the rubber seal left.
- Grease the new rubber seal with a thin layer of engine oil.
- Fit a new genuine filter.
- Tighten the filter by hand. The two Full Flow filters are tightened by a 1/2 to a 3/4 turn once the seal has made contact. The by-pass filter is tightened by a 3/4 to a complete turn once the seal has made contact.
- Fill with engine oil. Start the engine and allow it to run for 20 to 30 seconds.
- Switch off the engine. Check the oil level and fill as necessary.
- Check the filters for leaks.





Filling up engine oil

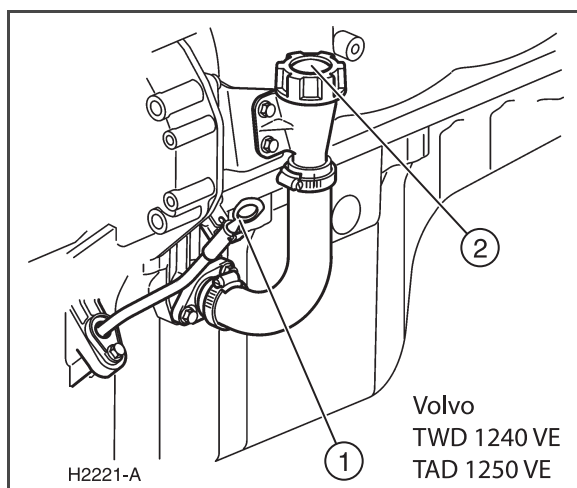
- Remove the filling lid (2).
- Fill oil through the refill opening.
- Check the oil level with the oil dipstick (1). Fill to the maximum level.
- Replace the filling lid (2).
- Close the engine cover.



BE CAREFUL

When test driving after replacing the oil and filter, pay attention to the oil pressure gauge and warning indicator on the instrument panel.

Also check that there are no leaks by the drain plug and oil filter. In order to perform a careful inspection of the oil level, in particular when the oil filter has been replaced, it is necessary to switch off the engine again and then recheck the oil level after about a minute.



FUEL SYSTEM, VOLVO

Replacement of fuel filter, water separator, and fuel prefilter

Replace the fuel filter (1) as follows.

- Open the engine cover.
- Carefully clean the outside of the filter unit.
- Place a container under the fuel filter (1) to collect any fuel leaks.
- Loosen the fuel filter with a filter wrench.
- Unscrew and remove the filter by hand.
- Examine the new filter and check that the seal is in good condition.
- Lightly grease the new seal with fuel.
- Fit the new filter in accordance with the instructions on the fuel filter.
- If necessary, bleed the fuel system.
- Close the engine hood.
- After a test-drive, make sure that there are no leaks.



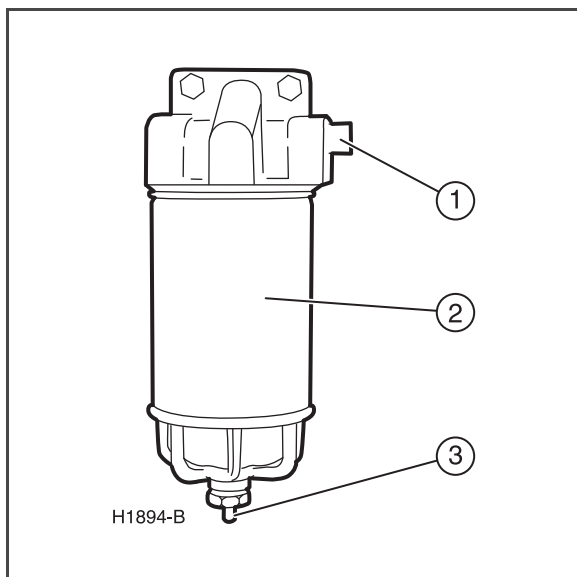
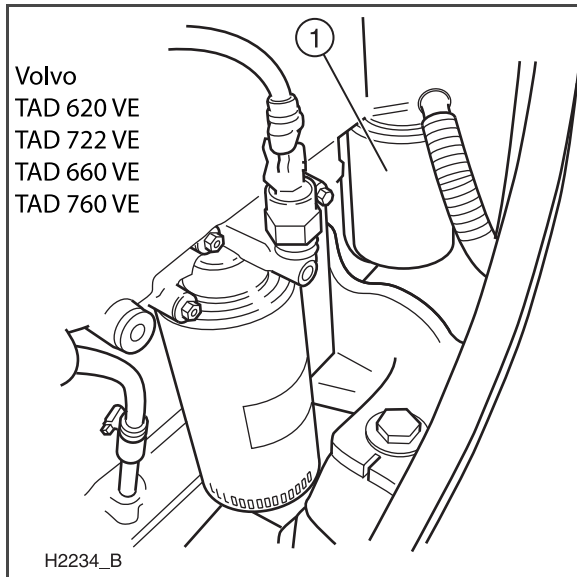
BE CAREFUL

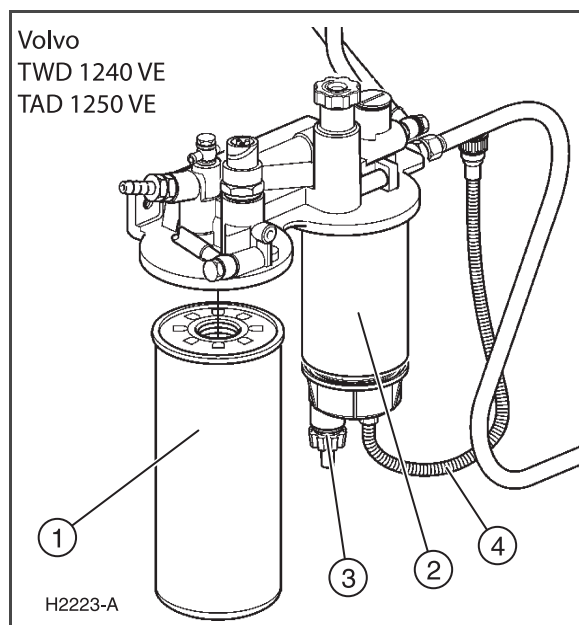
Never use sealing compound or grease. Tools must never be used to tightening the filter. Always use original parts when replacing the filters.

Replacement of water separator

The water separator is drained when fuel is filled. Intervals for filter replacement, see section "Inspection and maintenance schedule".

- Close the drain tap (1), situated before the filter.
- Unscrew the filter container and the drain valve (3).
- Unscrew the filter (2) and replace it with a new one. Grease the seal and tighten the filter by hand.
- Close the container tightly and the drain valve.
- Open the drain tap (1).
- Bleed the fuel system.





Replace the fuel pre-filter (2) as follows.

- Place a container under the fuel pre-filter (1) to collect any fuel leaks.
- Remove the hose (4) from the sensor for the water separator.
- Remove the filter from the filter holder.
- Remove the bottom section of the water separator from the filter.
- Clean the bottom part of the water separator with a soft cloth.
- Ensure that the drain hole in the bottom part is not blocked.
- Fit a new seal in the bottom part and lubricate it with diesel. Refit the bottom part of the filter.
- Lubricate the seal with diesel. Fit the new filter to the filter holder by hand until the seal comes into contact with the holder. Then turn the fuel pre-filter another 1/2 turn, not more.
- Replace the hose (4).
- If necessary, bleed the fuel system.

Empty the fuel pre-filter (2) of water as follows.

- Place a container under the fuel pre-filter to collect any fuel leaks.
- Open the drain tap (3) to the fuel pre-filter.
- Tighten the drain tap when fuel without water starts to drain out.

Bleeding the fuel system

The fuel system will only need bleeding if it has been run completely dry. Bleeding is done with the hand pump on the fuel filter holder.

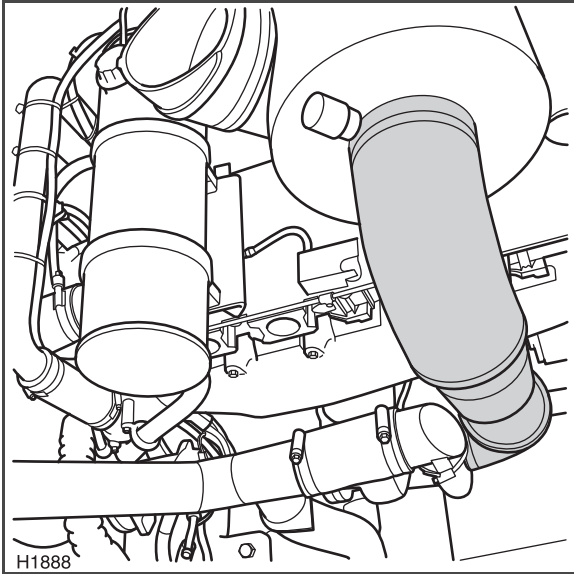
AIR INTAKE SYSTEM

Inspection of the intake system

It is very important that the intake system is intact. Broken and leaking pipes can drastically reduce the lifetime of the engine.

Regularly inspect the system.

- Inspect all hoses for cracks and damages.
- If necessary, replace them.
- Ensure that all hose clips are tightened and keep tight properly.
- Ensure that the filter holder is intact.



Cleaning/replacement of air filter



WARNING

The air filter contains large amounts of dust particles.

Danger of breathing problems!

Protective mask must be worn for all work on the air intake system. Do not breath in the dust particles. Consider the surrounding environment when the work is done. Great risk of engine damage if the air filter has been damaged.



BE CAREFUL

There is a great danger of damaging the filter when cleaning it. The filter may be cleaned a maximum of four times per year. After cleaning, the filter has worse filtering ability than a new filter.



BE CAREFUL

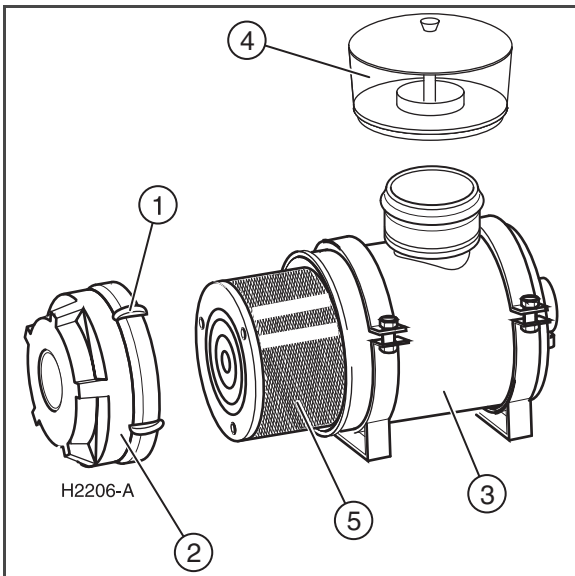
Do not clean the filter using pressurised air from the inside. All maintenance of the air intake system must be done with the engine switched off. This is a dry filter element and it must not be cleaned with wet fluids.

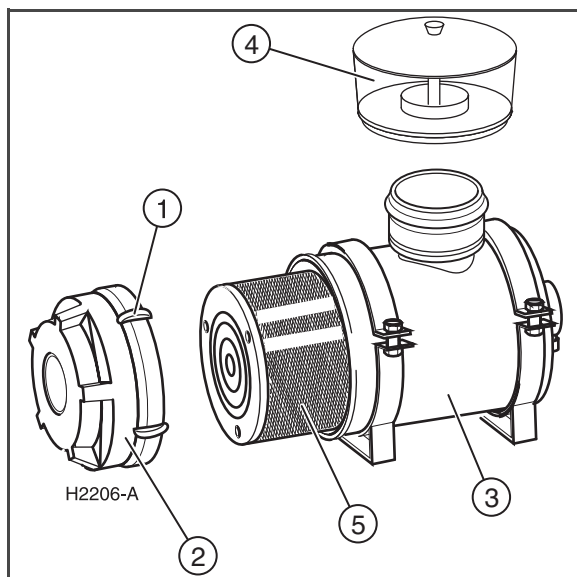
NOTE

All maintenance of the air intake system must be done with the engine switched off. Do not clean the inside of the filter housing with pressurised air, use a damp cloth.

Cleaning of coarse cleaner

- Remove the lid on the coarse cleaner (4).
- Remove the conic coarse cleaner. Empty out the dirt particles and clean it.
- Refit the coarse cleaner as per the diagram and refit the lid.

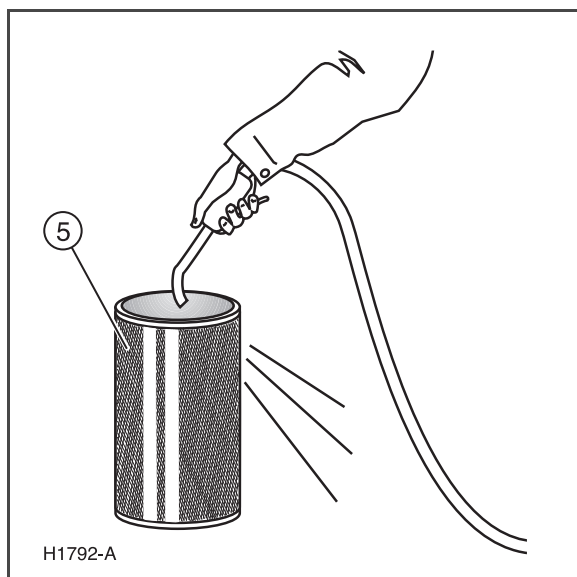




Cleaning/replacement of main filter

Clean or replace the filter if the indicator for low pressure is switched on.

- Open all clips (1) and remove the cover (2).
- Remove any dust that has collected in the cover and dry it with a damp cloth.
- Carefully remove the filter element (5).
- Clean the inside of the filter cover (3) with a damp cloth.
- Shine with a light inside the filter element and check from the outside that there are no holes or cracks in the filter paper.



- Clean the filter element (5) using dry pressurised air, max. 1 bar, from the inside until no more dust comes out.
- Mark the filter element when it has been cleaned.

NOTE

This is a dry filter element and it must not be cleaned with wet fluids.

NOTE

Consider the surrounding environment when the work is being performed.

Dispose of the filter element:

- if it has been cleaned four times
- if it is damaged
- after about 1,000 operating hours
- after no more than 12 months use

Note every service on the filter element.

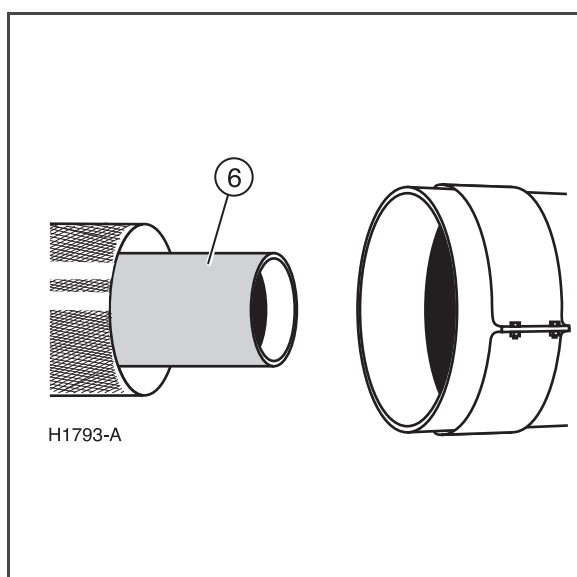
- Fit the filter in the reverse order.
- Reset the indicator by pushing the button under the unit.

Safety cartridge

NOTE

Never clean the safety cartridge.

Do not remove the safety cartridge unnecessarily.



- The safety cartridge (6) is normally replaced after intervals as per the section in the inspection and maintenance schedule, or if the main filter has been damaged.
- Disassemble the filter insert as per above.
- Fit a new safety cartridge.

TRANSMISSION DANA, OIL, OIL FILTER AND BREATHING VALVE

Draining of the transmission oil

The transmission must have reached operating temperature when the oil is replaced.

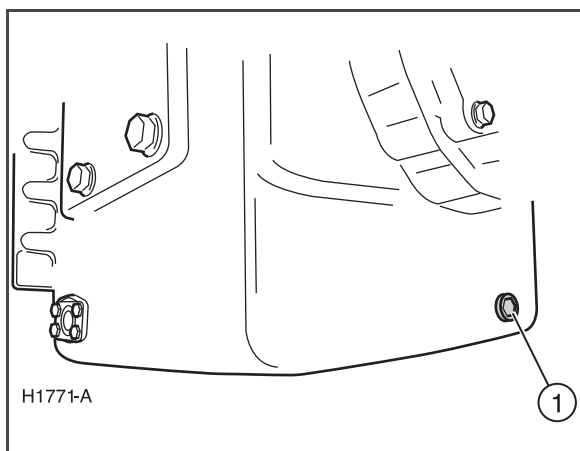
- Clean around the drain plug and the oil sump valve.
- Place a suitable container under the drain plug (1).
- Remove the drain plug and allow the oil to drain.
- Replace the drain plug (1).



WARNING

The transmission oil may be hot. Danger of serious personal injury.

Carefully undo the drain plug to avoid burns.



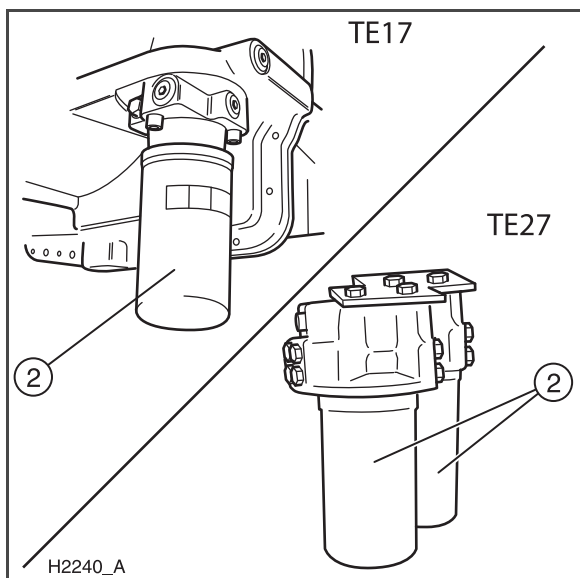
Replacing of the transmission oil filter

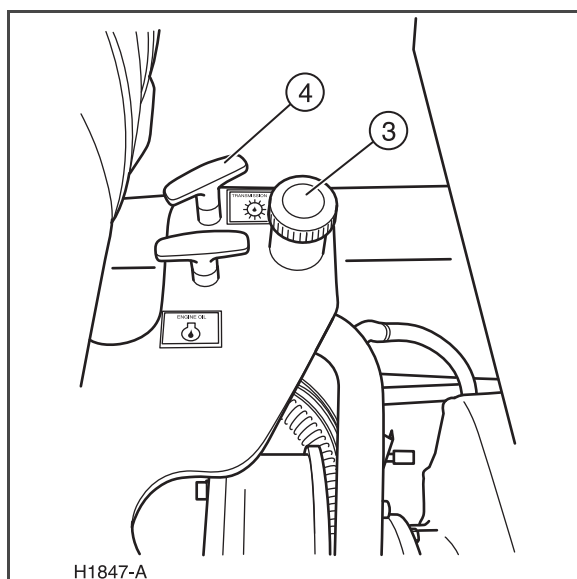
- Carefully clean the outside of the filter unit.
- Place a container under the filter (2) to collect any oil.
- Loosen the filter by hand or using a filter wrench and dispose of the filter in manner safe for the environment.
- Slightly lubricate the seal on the new filter.
- Screw on the new filter by hand until the O-ring seals.

NOTE

Do not fit too tightly.

- Start the engine and check that the filter is free from leaks.
- Check the oil level with the oil dipstick.

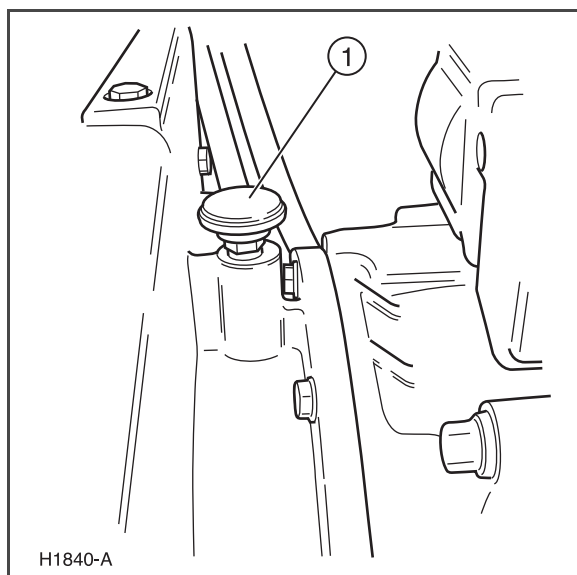




Filling of oil in the transmission

- Remove the filling lid (3).
- Fill the transmission with oil to the MAX-level on the stick (4).
- Run the engine on idle for one minute to fill the torque converter and pipes.
- Check the oil level when the engine has run for one minute and then refill oil to the MIN-level.
- Recheck the oil level when the transmission has reached operating temperature. Then fill to the MAX-level.
- Return the dip stick (4) and the refill lid (3).

For information on the amount of oil in the transmission, see "Liquid volumes" on page 100.



Inspection of the transmission breathing valve

- Check that the breathing valve (1) is cleaned so that the air exchange in the transmission works and that the valve is not damaged.
- Replace the breathing valve if necessary.

TRANSMISSION ZF, OIL, OIL FILTER AND BREATHING VALVE

Draining the transmission oil

The transmission must have reached operating temperature when the oil is replaced.

- Clean around the drain plug (1).
- Place a suitable container under the drain plug.
- Remove the drain plug and allow the oil to drain.
- Clean the drain plug.
- Replace the drain plug with an o-ring.



WARNING

The transmission oil may be hot. Danger of serious personal injury. Carefully undo the drain plug to avoid burns.

Replacing the transmission oil filter (rough filter)



BE CAREFUL

Handle the filter with care. Damaged filter may not be fitted. Carefully ensure that no dirt or sludge penetrates into the transmission.

- Carefully clean the outside of the filter unit.
- Place a container under the filter (2) to collect any oil.
- Loosen the filter. Ensure that no larger particles (metal pieces and similar) have stuck to the filter.
- Clean the filter.
- Slightly lubricate the oil filter seal.
- Fit the filter.
- Start the engine and check that the filter is free from leaks.
- Check the oil level with the oil dipstick

Replacing the transmission oil filter (fine filter)



BE CAREFUL

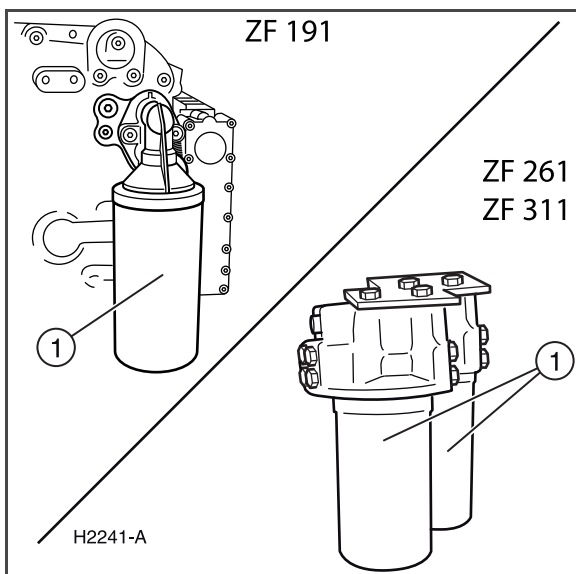
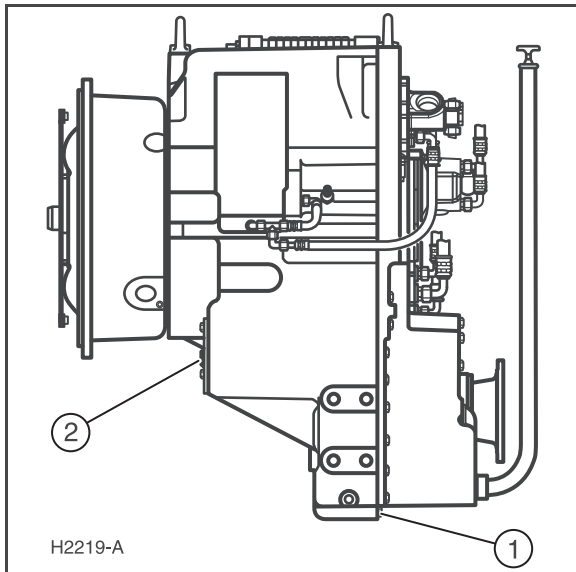
Handle the filter with care. Damaged filter may not be fitted. Carefully ensure that no dirt or sludge penetrates into the transmission.

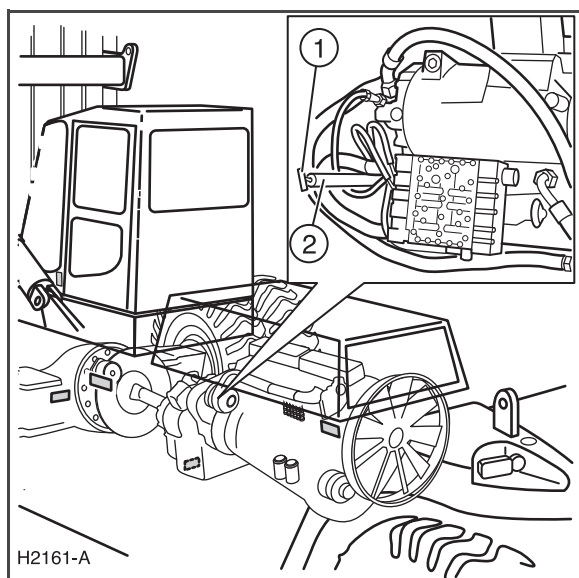
- Carefully clean the outside of the filter unit.
- Place a container under the filter (1) to collect any oil.
- Loosen the filter by hand or using a filter wrench and dispose of the filter in manner safe for the environment.
- Slightly lubricate the seal on the new filter.
- Screw on the new filter by hand until the O-ring seals.

NOTE

Do not fit too tightly.

- Start the engine and check that the filter is free from leaks.
- Check the oil level with the oil dipstick

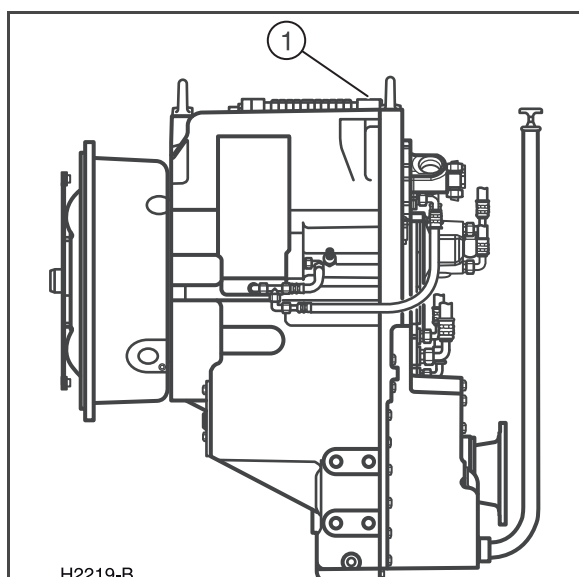




Filling oil in the transmission

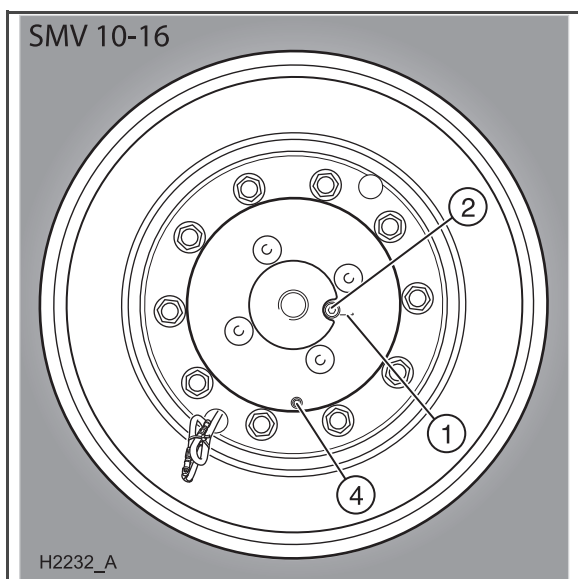
- Remove the filling lid (2).
- Fill the transmission with oil to the MAX-level on the stick (1).
- Run the engine on idle for one minute to fill the torque converter and pipes.
- Check the oil level when the engine has run for one minute and then refill oil to the MIN-level.
- Recheck the oil level when the transmission has reached operating temperature. Then fill to the MAX-level.
- Return the dip stick (1) and the refill lid (2).

For information on the amount of oil in the transmission, see "Liquid volumes" on page 100.



Inspection of the transmission breathing valve

- Check that the breathing valve (1) is cleaned so that the air exchange in the transmission works and that the valve is not damaged.
- Replace the breathing valve if necessary.



DRIVING SHAFT, INSPECTION AND REPLACEMENT OF OIL

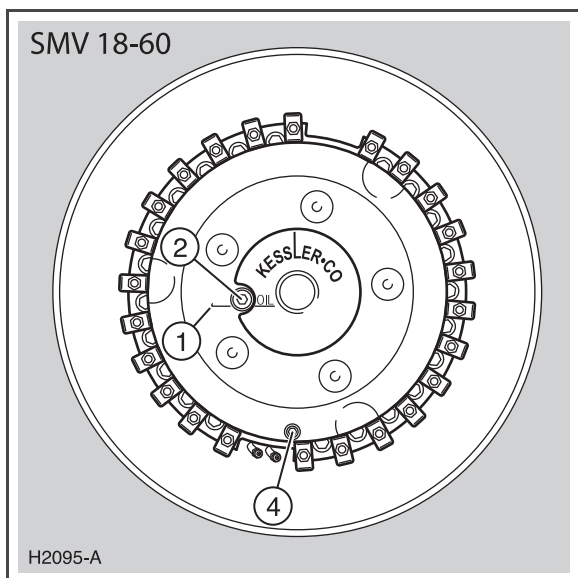
Inspection of the oil level

The oil in both hubs and banjo cover must be checked.

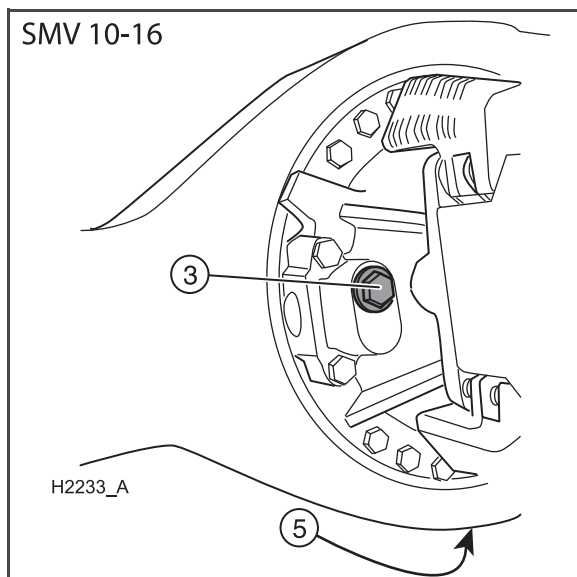
- Place the machine on level ground.
- Place the machine so that the level markings on the hubs (1) are horizontal.
- Carefully unscrew the filling plug/level plug (2) and check the oil level.
- If oil drains out from the plug, refit it.
- If no oil drains out, fill up with oil until some starts draining from the filling plug/level plug (2).
- Repeat the procedure for the second hub.
- Check the oil level in the banjo cover by unscrewing the filling plug/level plug (3), see the picture on the next page.
- If oil drains out from the plug, refit it.
- If no oil drains out, fill up with oil until some starts draining.

NOTE

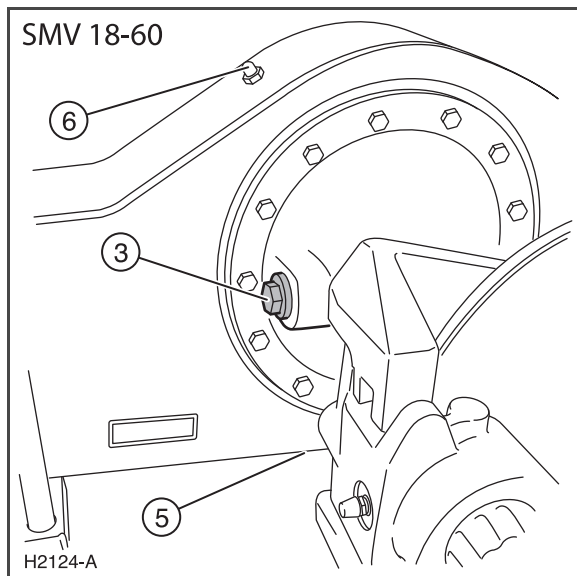
There might be excess pressure in the shaft.



SMV 10-16



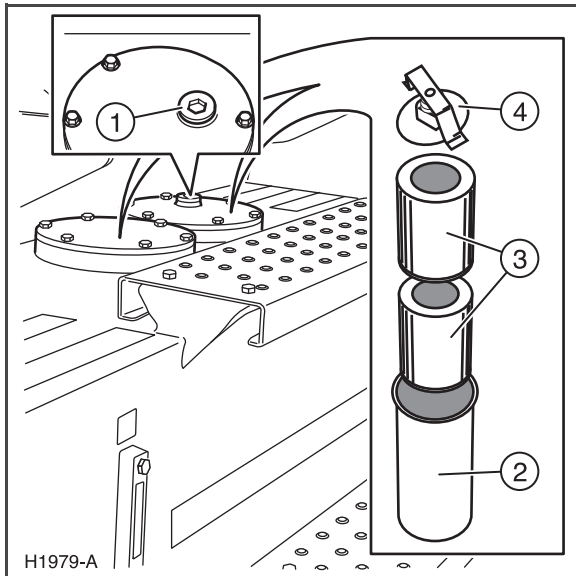
SMV 18-60



Oil replacement in the driving shaft

The oil in both hubs and banjo cover must be replaced.

- Place the machine on level ground.
- Make a drain hose with a thread that fits in the drain hole (4), see picture on the previous page.
- Fit the hose in the drain hole whilst it is in its upper most position.
- Carefully run the machine forwards/backwards so that the drain hole ends up in its bottom most position.
- Allow the oil to run out through the hose into a suitable container.
- Repeat the procedure on the other side.
- Drain the banjo cover through the drain plug (5).
- As the engine oil has a high degree of viscosity, it is suitable to drain the oil when hot or over night.
- Replace the three drain plugs (4 and 5).
- Place the machine so that the level markings on the hubs (1) are horizontal.
- Fill the drive axle with oil through the three filling holes/level holes (2 and 3).
- Replace the three drain plugs/level plugs (2 and 3).
- Inspect the breathing valve (6) and clean as necessary.



HYDRAULIC SYSTEM

Replacement of return filter hydraulic oil

The return filters are placed on the right hand side of the hydraulic tank, at the refill lid.

SMV 33-1,200B – 60-1,500 B are equipped with two filter sets.



BE CAREFUL

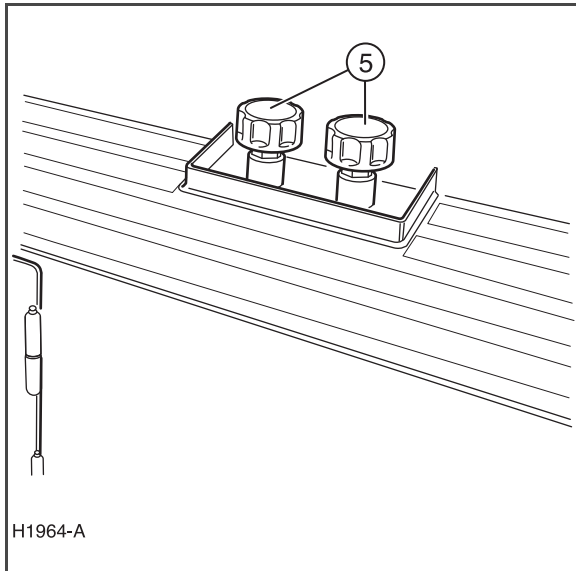
Adhere to these instructions, otherwise the hydraulic system might be damaged.

- Remove the first step.
- Carefully clean around the filter lid (1).
- Remove the filter lid.
- Loosen the filter housing down in the return chamber by the four screws.
- Lift up the filter housing (2) together with the filter elements (3).

NOTE

Do not take the filter apart inside the tank.

- Remove the elements by pushing and turning the by pass valve (4).
- Check that the valve is closed.
- If the tank is empty: check the bottom of the tank as well for any deposits.
- Clean the filter container.
- Fit new filters and lock with the by-pass valve (4). Push and turn to the correct position.
- Fit the filter housing in the tank.
- Fill with oil if the draining has been done.
- Fit the lids.
- Start the engine and check for any leaks.
- Stop the engine and check the level.



Replacement of breathing filter for the hydraulic oil tank

- Unscrew the filter (5).
- Replace with a new one.

Replacing of hydraulic oil

The hydraulic oil should be replaced in conjunction with a filter replacement.

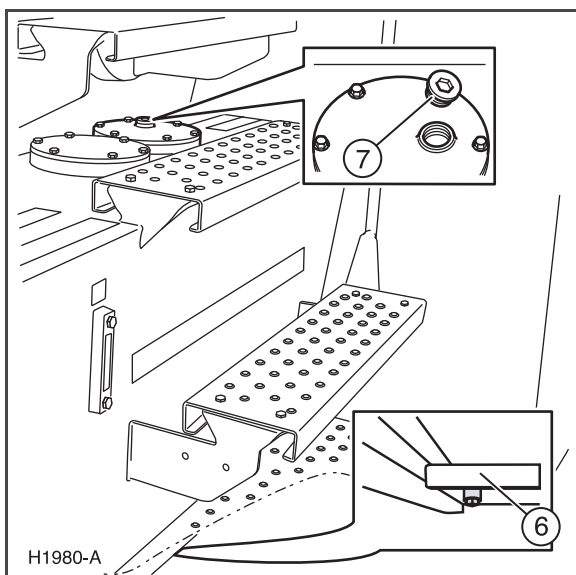
For recommended oil replacement intervals, see section "Inspection and maintenance schedule" on page 96.

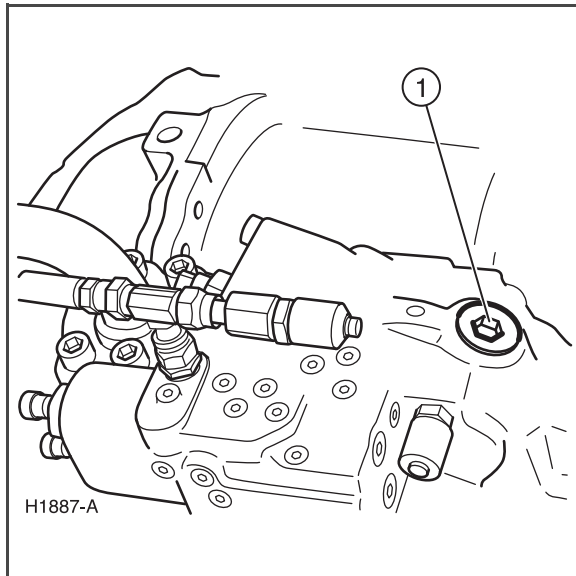
This may vary depending on the working environment of the machine.

- Drain the oil through the drain plug (6). Use a suitable container.
- Alternatively, the oil can be sucked up through the filter housings, if the filters have been removed.
- Check the bottom of the tank for any deposits.
- Fit the filter and lid as per above.
- Filling of hydraulic oil is done through the filling nipple (7) in the filter lid.

The filled oil is thereby filtered through the filters.

It is preferable if the filling can be done under some pressure.



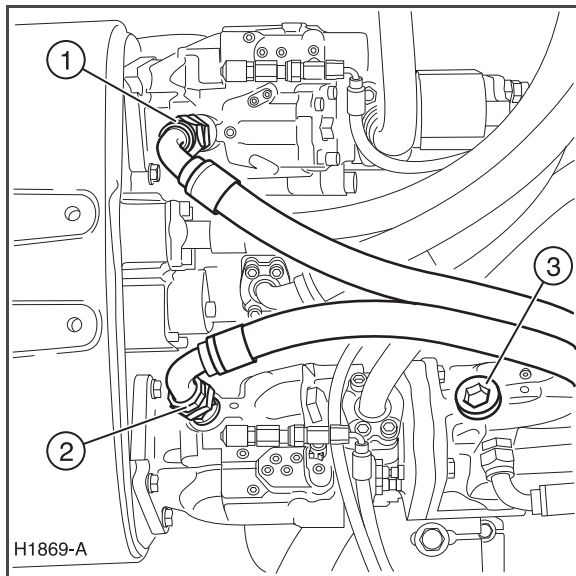


Start of hydraulic pump

When maintenance work on the pump of the hydraulic system has been completed, the pump should be started as per the following:

Hydraulic pump, alternative 1

- Loosen the plug (1).
- Fill the pump housing with hydraulic oil.
- Fit the plug (1).
- Start the engine and raise the fork carriage.



Hydraulic pump, alternative 2

- Loosen the hose connectors (1) and (2) and plug (3).
- Fill the pump housing with hydraulic oil.
- Fit the hoses (1) and (2) and plug (3).
- Start the engine and raise the fork carriage.

Any jarring noises should disappear with a few seconds of running. If not – stop the engine and review the hydraulic system for faults.

LUBRICATION

Greasing of the mast

SMV 10-16

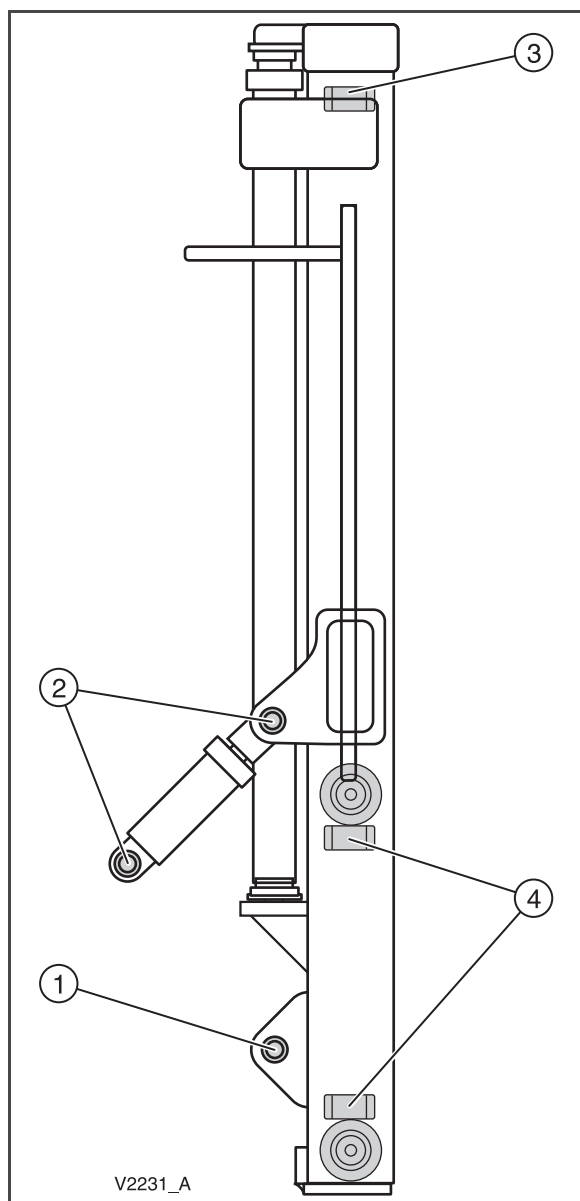


WARNING:

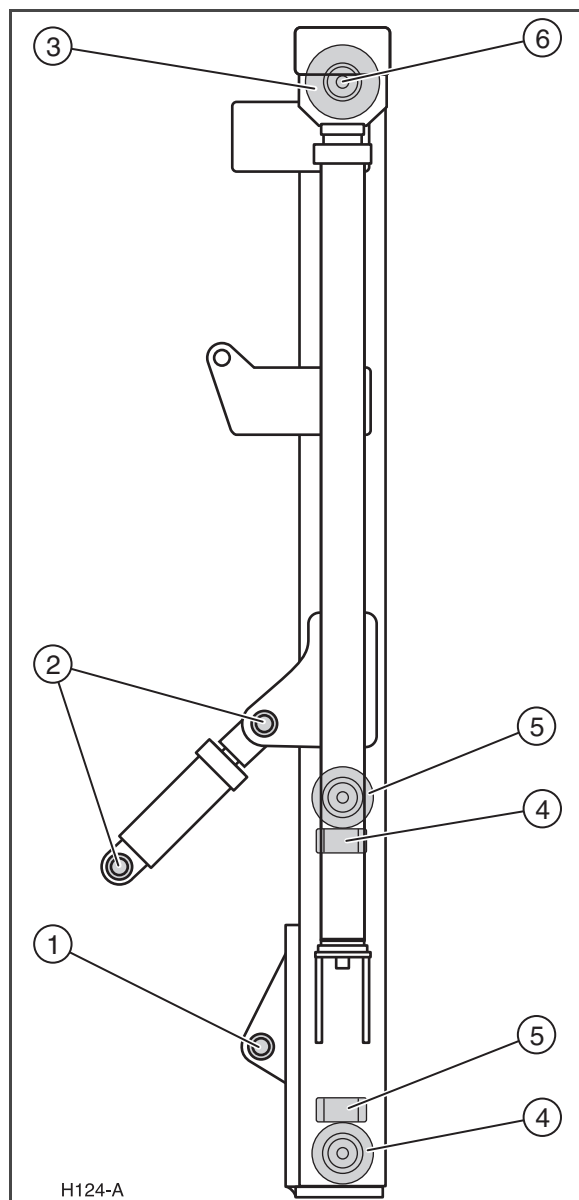
Certain tasks require that the inner mast and carriage are raised. Secure these items before starting work.

- Grease the mast's suspension shafts (1) at the nipples, one on each side, accessible through the mast. Unload the shaft pins by lifting the mast either using a jack or a bench trestle and tilting it forwards.
- The tilt cylinders (2) are greased from the centre of the shafts, two on each side. Unloaded by tilting the mast backwards.
- The outer mast's top support rollers (3) are reached when the mast is raised slightly. A nipple on each side.
- Grease the fork carriage's side support rollers (4) from the inside of the carriage. Two on each side (slide bearings).
- The inner masts corresponding rollers and wheel are reached by raising the carriage.
- Grease the chain's and hoses' return wheel.

Don't grease too much. Grease in the mast beams makes the rollers and wheel slide instead of roll.



V2231_A



SMV 18-60



WARNING

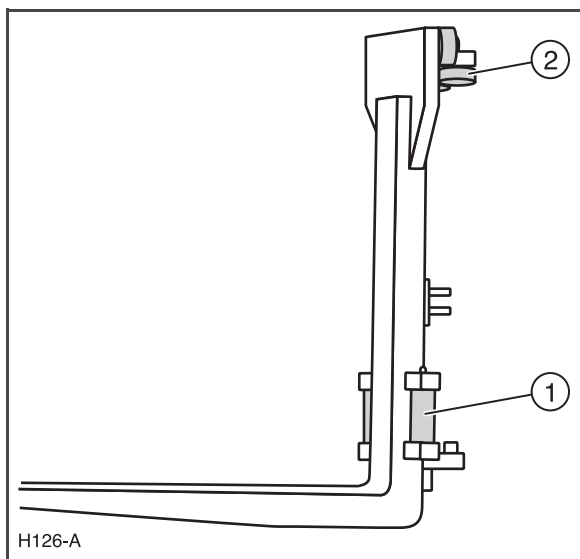
The mast and the unit are heavy and must be handled with the outmost care. Danger of serious personal injury or damage to vehicle. Ensure that the mast and the carriage are secure as they must be raised for certain lubrication items.

- Grease the nipples on the mast suspension (1), one on each side. These are accessible through the inside of the mast when the carriage is raised. Release the shaft pegs by lifting the mast either using a jack or a piece of wood and tilt it forwards.
- Grease the tilting cylinders (2) in the middle of the shaft pegs, two on each side. Release the shafts by tilting the mast backwards.
- The upper support rollers (3) are accessible when the mast is somewhat raised. One nipple on each side.
- Grease the rollers (4) on the carriage from the inside of the carriage, two on each side (sliding bearings).
- Grease the wheels on the carriage (5) from the inside, two on each side.
- The corresponding rollers and wheels of the inner mast are reached by raising the carriage.
- Grease the chain wheels (6) through the nipples.



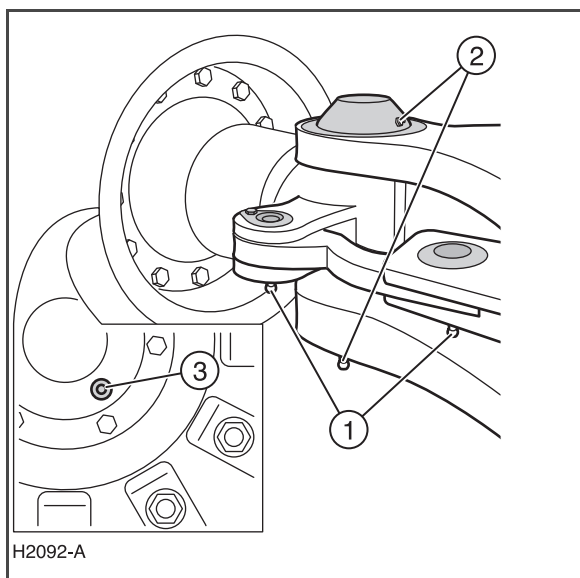
WARNING

Do not apply too much grease on the support rollers. Too much grease in the mast channels will make the rollers and wheels glide rather than roll. The lubrication points may vary between different types of masts.



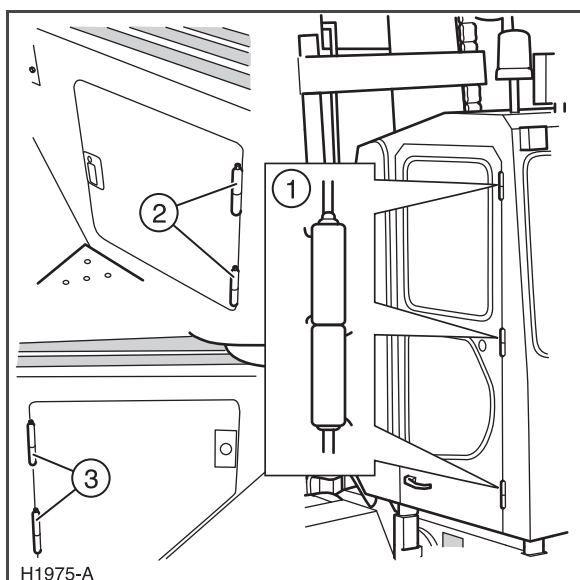
Greasing of forks and blades

- (1) The lower support rollers, two on each fork.
- (2) Upper support rollers, four per fork.



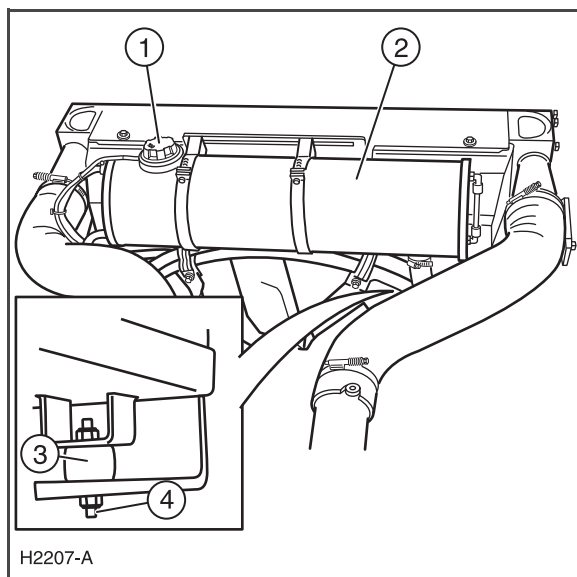
Greasing of the steering axle

- Remove old grease and dirt from the nipples.
- Grease the parallel tie rods, four points (1), two points on each parallel tie rods (sliding bearing).
- Grease the spindle bolts (2), one top and one bottom on each side.
- Grease the hub bearing (3), one nipple on each side. Grease penetrates on the inside.



Greasing of the hinges

- Inspect and clean the hinges to the cabin door (1), the battery cover (2) and the lid for the equipment for cabin tilting (3).
- Grease the hinges, open and close the doors in order to ensure that all parts of the hinges have been greased.



INSPECTION OF THE COOLING SYSTEM

- Inspect all the hoses by pressing on them in order to discover leaks and cracks. When in doubt, replace.
- Inspect the radiator for damages, leaks and blocks.
- Inspect the functioning of the cabin heater.
- Inspect the coolant in terms of:
 - level, see "Replacing coolant" on page 85,
 - glycol level, see "Fuel and oil recommendations" on page 101
 - Any contaminations.
- Replace the coolant if it is not clean and clear.
- Inspect the rubber mounts (3) in the radiator brackets at the bottom of the radiator, replace as necessary.
- Ensure that the fixing bolts (4) are tightened.

Replacing coolant

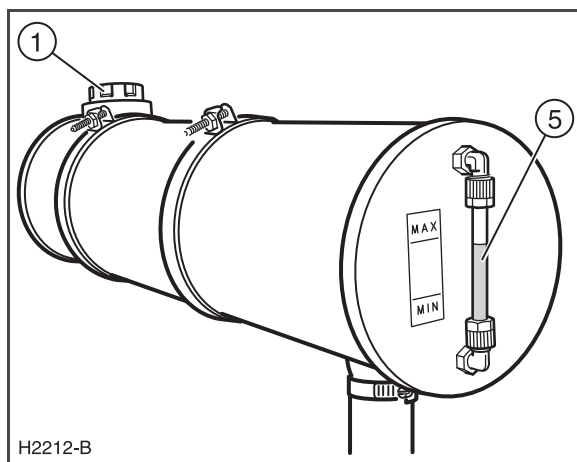


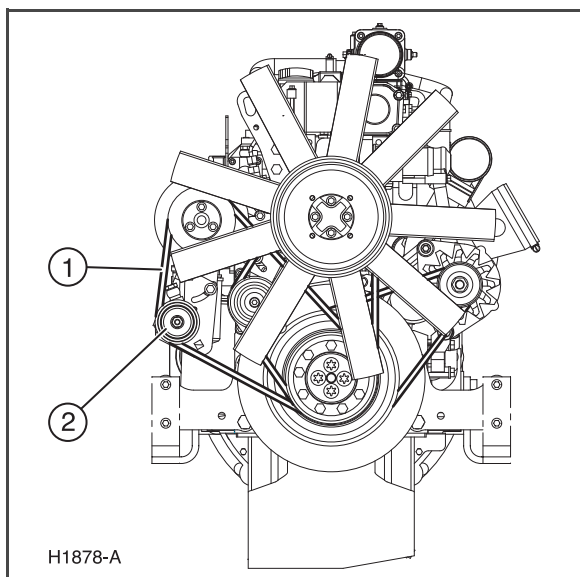
WARNING

**The coolant may be under pressure and hot.
Danger of serious personal injury.**

The system may be under pressure even if it is not of the high pressure type.

- Open the lid on the overflow tank (1) carefully – first turn 1/4 to ensure that the system is not under pressure when the lid is removed.
- Refilling is done via the overflow tank (2).
- Drain the whole system using the drain tap on the side of the radiator when replacing hoses and components in the system.
- Set the dial for the cabin heater to max. Place a suitable container under the drain tap.
- Open the drain tap and drain the whole system.
- Close the tap.
- Fill through the lid on the overflow tank (1) to the max level.
- Start the engine and run on idle.
- Observe the level and fill as necessary.
- When the operating temperature has been reached, the level should stabilise.
- The level should be at the max mark on the side of the overflow tank (5).





DRIVE BELT

- If the drive belts (1) are worn or damaged, they must be replaced.
- Also check that the automatic belt tensioners (2) function and maintain the tension in the belts.
- Loosen the screws that keep the alternator in place when tightening the alternator belt.

It should be possible to depress the belt 10 mm in-between the pulley discs.

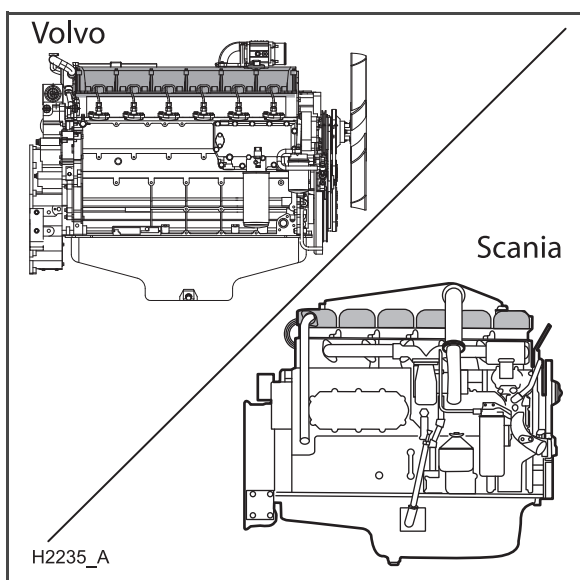
ENGINE

Valve play

NOTE

The valve play must be inspected on a cold engine and no earlier than 30 minutes after driving.

Follow the instructions in the engine manufacturer's instruction manual.



Fuel injectors

Check the fuel system for leaks as per image.

Inspecting and adjustment of the injectors should be done outside the normal service interval if the engine:

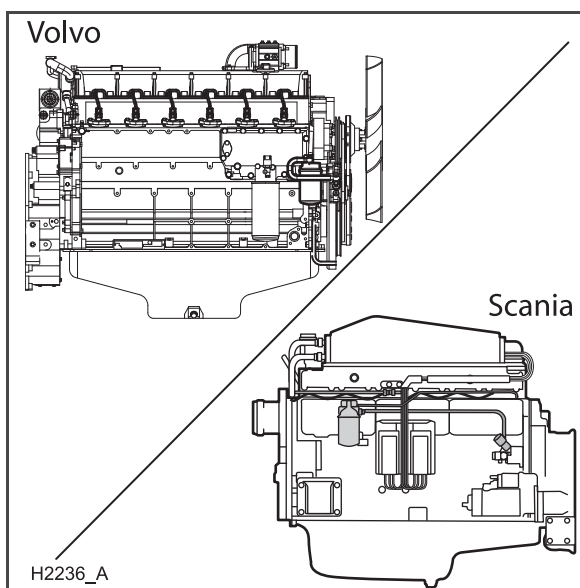
- misfires
- pinks on one or more cylinders
- overheats
- losses power
- emits black exhaust smoke
- consumes too much fuel

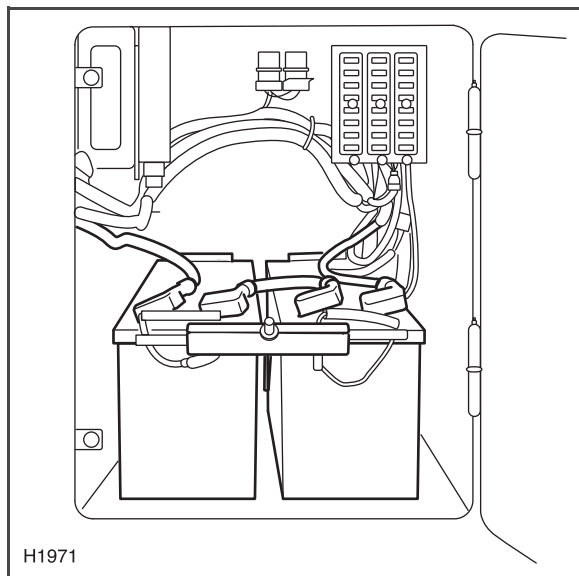
Follow the instructions in the engine manufacturer's instruction manual.



BE CAREFUL

Examination and adjustment of the injectors must be performed by an authorised workshop that has the necessary specialist equipment.





INSPECTION OF THE BATTERY

The batteries are placed in the box on the right side of the machine. The batteries are maintenance free.

- Keep the batteries clean.
- Remove the corrosion from the battery connections and ensure that the cable connectors are tightened.
- Grease the battery poles with acid-free grease.



WARNING

**The battery contains corrosive acid.
Always use necessary protective equipment.
Batteries generate explosive hydrogen gas when being charged.**

Ensure good ventilation and avoid sparks.

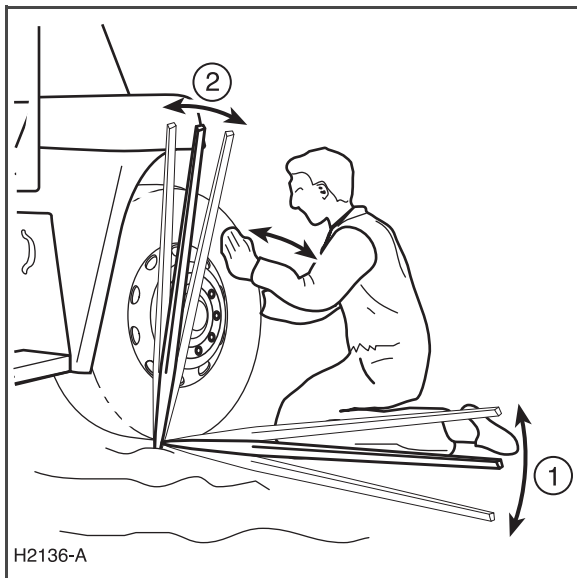
Short-circuiting the battery may lead to a fire or explosion.

Danger of serious personal injury or fatality.

The main power switch does not cut the power between the alternator and the battery. When working with or in the vicinity of the alternator, the negative cable for the battery must be removed.

In order to reduce the risk of electric shock and personal injuries, jewellery and other conductive material must always be removed prior to working on the electrical system of the machine.

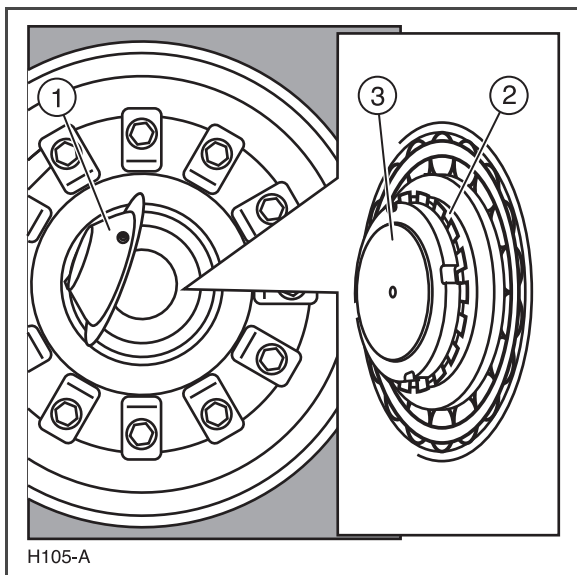
The power may only be cut with the main power switch with the engine running in an emergency.



CONTROL STEERING AXLE BEARING

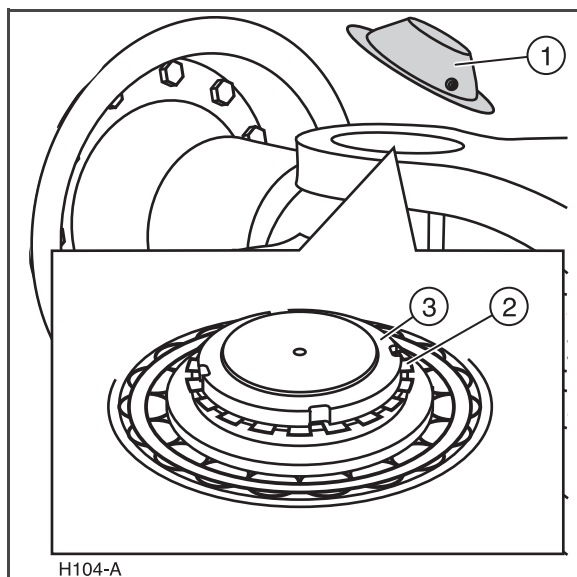
Regularly inspect the play in the bearing and always when replacing tyres. Particularly important during the period of running in. As the hub and spindle ball bearings are subjected to high loads and sometimes even chock loads, it is very important that there is no play at all. Play will eventually lead to a bearing failure. Hub and spindle bearings are adjustable as per below. 1-2 mm play per bearing is acceptable for the bearings in the steering joints. This is not adjustable.

- Lift the machine up as per instructions in the section Wheel replacement.
- Inspect the spindle bearings by lifting the wheels off vertically using a lever (1).
- Inspect the wheel hub bearings by twisting the wheel horizontally using a lever (2).
- Inspect the steering joint bearings by turning the wheels in the steering direction (3).



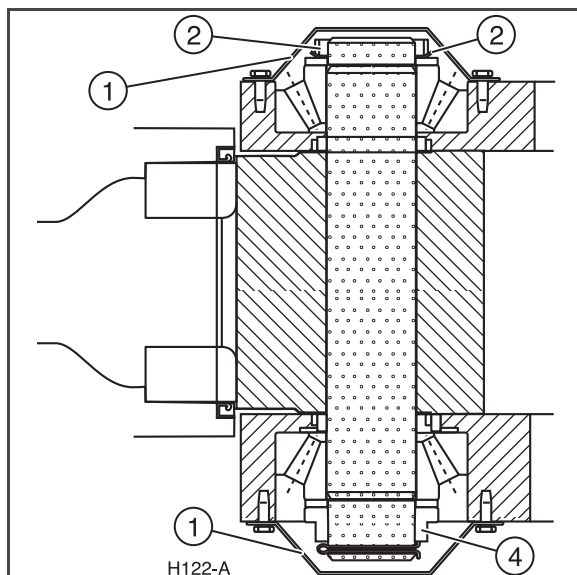
WHEEL BEARINGS

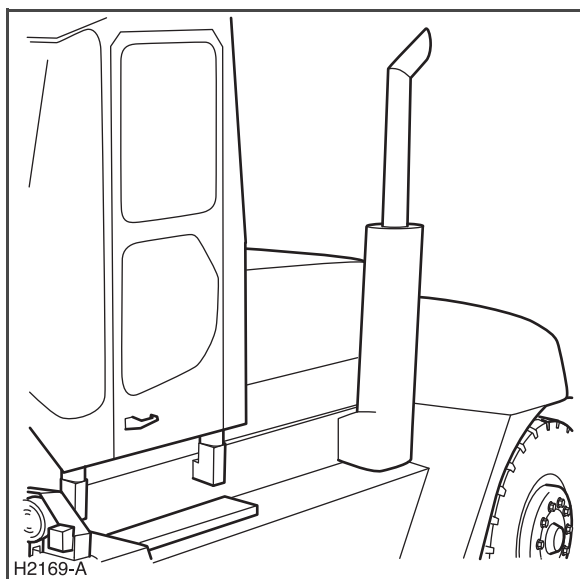
- Loosen the cover (1).
- Ensure that the bearing grease is clean and free from deposits. If not, the reason for the play may be a bearing failure.
- Fold the locking washer up (2).
- Tighten the bolt (3), the correct torque is 245-294 Nm.
- Rotate the hub. It should only give some light resistance. Jarring noises or irregular rotation is due to bearing failure. Replace the bearing.
- Inspect the play.
- Lock the bolt (3) using the folding washer (2).
- Refit the the cover (1).



SPINDLE BEARING

- Disassemble the steering joint.
- Remove the covers (1). Inspect the grease.
- Fold the locking washer down (2).
- Loosen the bolt (3) a few turns.
- Ensure that the lower bolt (4) is tight, the correct torque is about 980 Nm.
- **NOTE!** The nut (4) is not used for pre-tensioning the bearings.
- All bearing pre-tensioning is done with the upper bolt (3).
- Tighten the upper bolt (3) with about 245-294 Nm.
- Ensure that there is no play and that the spindle can be turned easily without any jarring noise or irregular resistance.
- Refit the the covers (1).





INSPECTION OF THE EXHAUST SYSTEM FOR LEAKS



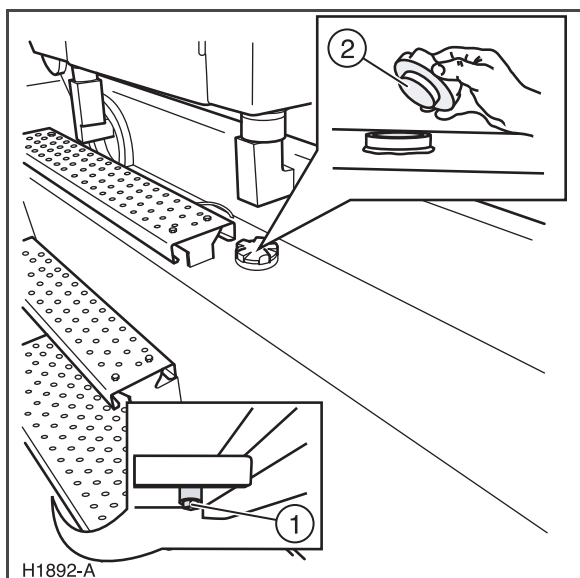
WARNING

The exhaust system may be hot.

Risk of burns.

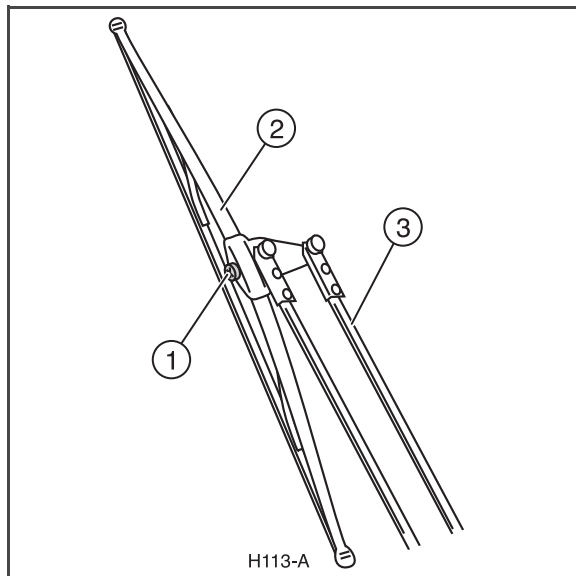
Wait until the exhaust system has cooled down before working on it.

- Inspect the general condition of the exhaust system, replace pipes or silencers if they leak due to corrosion.
- Check all joints and connections.
- Check the exhaust manifolds.
- Check the rubber mounts on the silencer. Replace if necessary.
- Start the engine.
- Check if there are any leaks in the exhaust system.



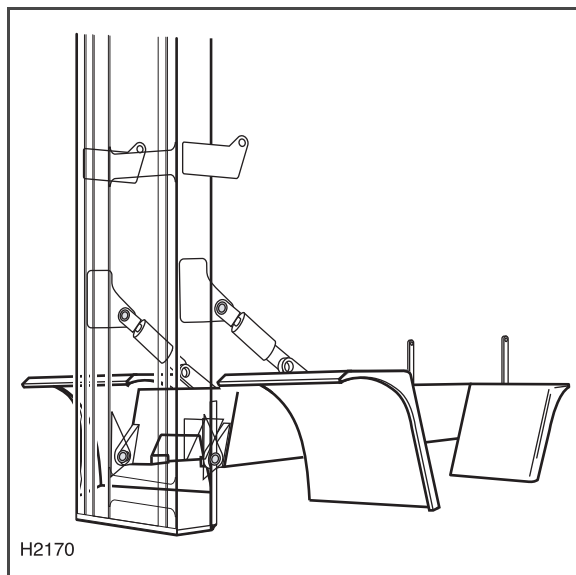
FUEL TANK

- Check the tank for any leaks.
- Drain the tank of any dirt and water through the drain plug (1).
- Place a suitable container underneath.
- When clear fuel is coming out, replace the drain plug.
- Check the seal around the filling lid (2).



WIPER BLADE REPLACEMENT

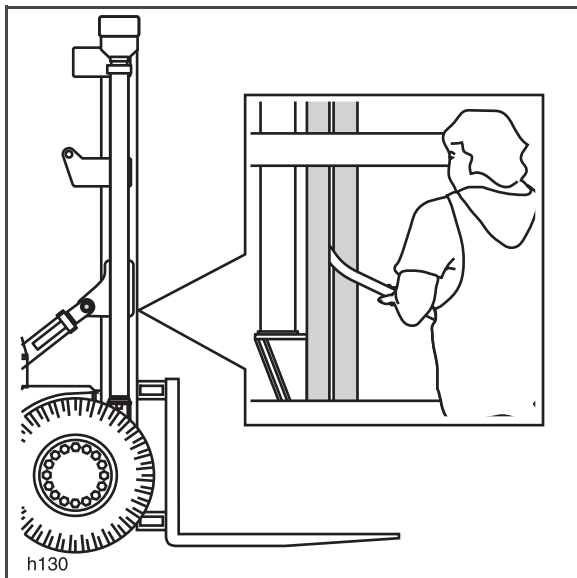
- Remove the bolt (1).
- Remove the blade (2) from the arm (3).
- Refit the new blade (2) on the arm (3)
- Fit the bolt (1).
- Replace the wiper arm to the windscreen.



WELD CONSTRUCTION

Inspect the mast, the chassis and all welded components for visible signs of damage, deformation, metal fatigue etc. Should be done at least once a year.

Closer intervals if the machine works in shifts. If in doubt, contact the Konecranes Lifttrucks workshop.



MAST AND FORK CARRIAGE

Use a crowbar or a lever to assess the play between:

- The carriage and the inner mast.
- Inner and outer mast.

If there is a noticeable play exceeding 5 mm, seek the advice of the nearest authorised Konecranes Lifttrucks workshop.

Wear inspection – fork arms

Inspect the fork arms for the thickness of the fork blade, crack formation and deformation.

- The wear on the fork blade must not exceed 10% (based on the original dimension and measured 150 mm from the heel of the fork (1)).
- Cracks visible to the naked eye must under no circumstances exist. Give particular attention to any crack formation in the fork heel. Surface cracks are normally not longer than 5 mm. If surface cracks are discovered – grind off about 0.5 mm and then use magnetic powder detection if the crack is still visible (must be performed by an authorised company).
- Inspect the fork suspension for play.
- If the forks are in need of repair, Konecranes Lifttrucks should be contacted, or alternatively, service personnel authorised by Konecranes Lifttrucks. They are able to assess if it is possible to repair the forks.
- Surface cracks and wear must not be rectified using welding.

NOTE

The forks must be inspected once annually for crack indications by specially trained staff.

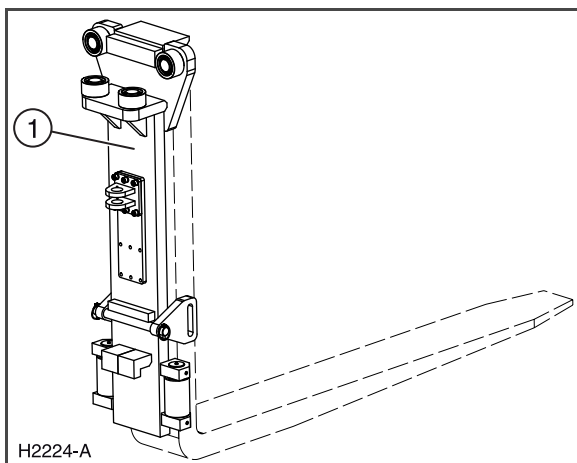
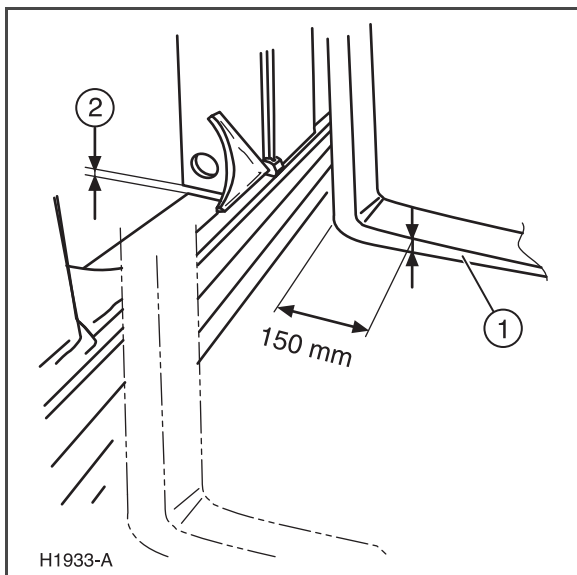
Chains, adjustments and inspection

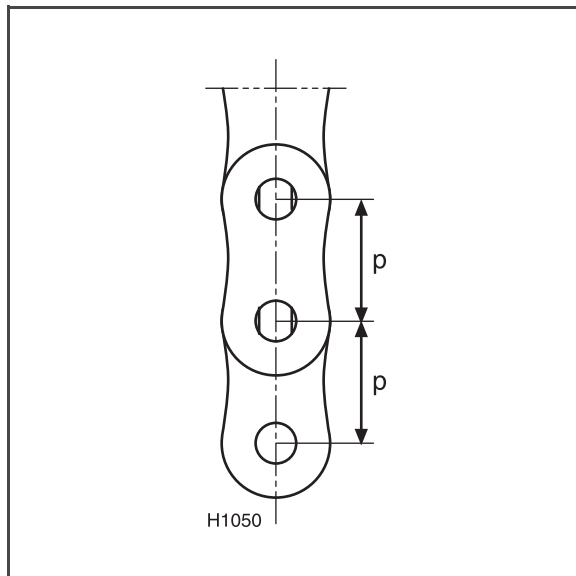
Ensure that there is a space of 10 mm between the base plate and the fork carriage (2). If not, the lifting chains must be readjusted equally.

Fork shaft system, function and inspection

Check the fork shaft system (1) in terms of:

- Weld on locking mechanism being undamaged.
- The locking pin being undamaged.
- The ball bearings being undamaged.





Inspection of lifting chains

In order to ensure a high degree of safety, the lifting chains must be inspected on the following items using the time intervals available in section "Inspection and maintenance schedule" on page 98.

The chains must be properly cleaned in their entire length. Inspection is performed without a load.

- The chain must not have increased by more than 3% based on its original length.
- Measuring is done over the 25 links that are lifted first and (most often) break on the return wheel. This is where the extension is the greatest.
- Compare with the value for the given machine size in the chart below.
- If the 3% limit has been exceeded, the chain/chains must be replaced.

NOTE

Local regulations, or if safety depends on a single chain, may require that the chain is replaced in the event of a 2% extension.

Machine	Parting (p)		New chain, measurement over 25 links mm	Measurement over 25 links for 2% extension mm	Measurement over 25 links for 3% extension mm
	inches	mm			
SMV 10-12	1 1/2	38.10	952.50	971	981
SMV 12-33	2	50.8	1,270	1,295	1,308
SMV 37-45	2 1/2	63.50	1587.50	1,619	1,635
SMV 52-60	3	76.2	1,905	1,943	1,962



WARNING

If a chain breaks, the load may fall uncontrollably and cause damage or injury. Danger of serious personal injury or fatality.

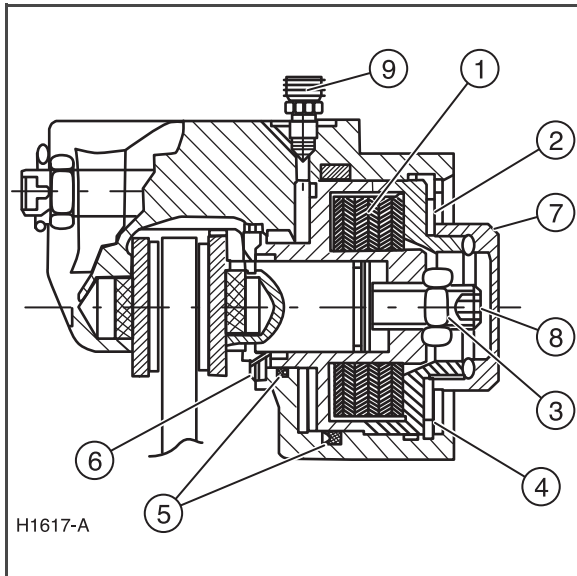
If in doubt, the chain must be replaced.

Chains are always replaced in their entirety, it is not permitted to splice or re-rivet lifting chains.

Also ensure that:

- there are no loose pins in the outside washers,
- there are no visible cracks in any washer (link section),
- there is no visible mechanical damage,
- there is no jarring noise when the chain moves,
- the chain is not corroding,
- that the chain bends easily over the return wheel (does not resist bending).

Lubricate the chains after inspection using a thin oil or lubrication spray.



1. Spring
2. Locking ring
3. Locking bolt
4. Pressure ring
5. Piston gasket
6. Dust protector
7. Lid
8. Adjustment screw
9. Bleeding screw

PARKING BRAKE



WARNING

The brake is purely a parking brake and should only be used for stopping the machine in an emergency.

Due to the gear-ratio through the driving shaft, the brake is very powerful. This means that the pads are heavily worn when braking. After every such braking, the brake must be adjusted and the pads replaced if necessary. As the brake is an emergency brake, the function must be inspected daily by the driver. To ensure the function and to make the adjustment procedure below easier, it is important to keep the brake well greased and the parts in good condition. In the event of any doubt, disassemble, clean and grease.

Adjustment of the parking brake

The brake must be adjusted after new brake pads or brake discs have been fitted, after all repairs and to improve the braking effect. Adjust the brake when it is cold.

The brake must be in the neutral position when adjusted.

- Park the vehicle on an even surface.

NOTE

Block the wheels to prevent the machine from rolling.

- Pressurise the brake by releasing it.



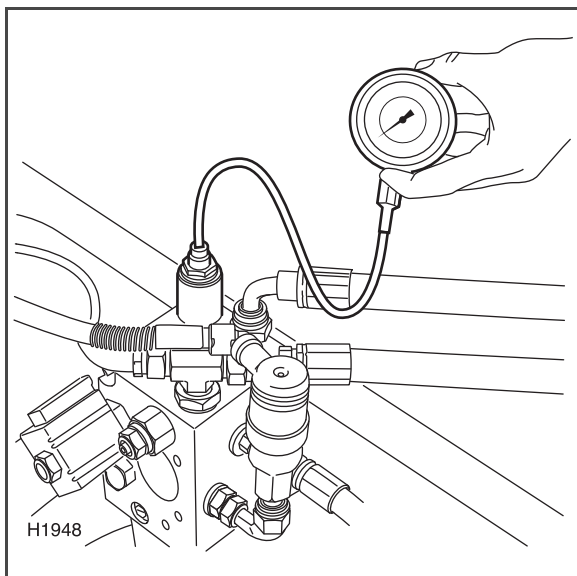
BE CAREFUL

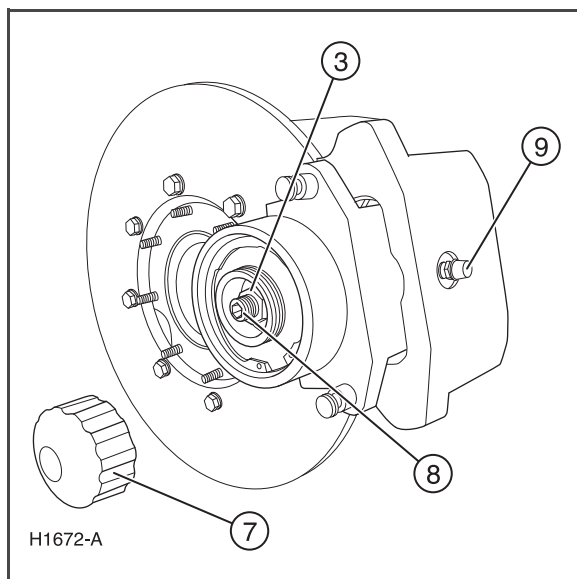
Ensure that the brake pressure is correct.
See below.

- Unscrew the cover (7).
- Loosen the locking bolt (3). Turn the adjustment screw (8) clockwise until both brake pads are touching the brake disc.
- Turn the adjustment screw counter-clockwise until the total play is 1-0.5 mm.
- Tighten the locking screw.
- Inspect the play.

Measuring the brake pressure of the parking brake

- Connect a pressure gauge (300 bar) to the measurement output (11) marked PRM on the accumulator block.
- Start the engine and run on idle.
- Read the pressure. Compare with the machine card.





Releasing the parking brake



WARNING

When the parking brake is released, the machine parking brake can no longer brake.

Danger of serious personal injury and fatality.

Block the wheels to prevent the machine from rolling.

If there is no hydraulic pressure available, the parking brake can be released manually.

- Block the wheels to prevent the machine from rolling.
- Unscrew the cover (7).
- Loosen the locking bolt (3).
- Turn the adjustment screw (8) counter-clockwise until the brake disc is completely free.
- Loosen the locking bolt (3). Tighten the cover (7) by hand.
- Before the machine is used again, the parking brake must be adjusted in accordance with the description in this section.

Bleeding of the parking brake

When any of the hydraulic connectors in the brake system has been loosened, the system must be bled. The brake cylinder must be filled with brake fluid so that no air can be sucked into the system.

- Connect a transparent plastic hose to the bleeding screw (9). Lower the other end of the hose into a transparent container with brake fluid.
- Slowly pressurise the brake.
- Loosen the bleeding screw (9).
- Continue to pressurise the brake until no air bubbles are visible in the container.
- Retighten the bleeding screw and release the pressure.

INSPECTION AND MAINTENANCE SCHEDULE**DELIVERY INSPECTION AND START-UP**

Always perform maintenance, lubrication, checks and daily inspections in accordance with the instructions in this book. Prior to the machine being taken into use, the inspection points as per the warranty/delivery report must be inspected.

The warranty/delivery report must be filled in and returned to Konecranes Lifttrucks within a week after the machine being taken into use in order for the warranty to be valid from the date of first use.

If the warranty/delivery report is not returned within a week, the warranty is valid from the day the machine was delivered from Konecranes Lifttrucks.

SERVICE ITEMS

Pos.	Service items to inspect or perform	Measure
1	Clean the machine	X
2	Tighten the wheel bolts to the correct torque	X
3	Check the pressure and conditions of the tyres	X
4	Check the level of washer liquid and fill if necessary	X
5	Check the fuel level	X
6	Check the coolant level	X
7	Check the oil level in the transmission	X
8	Check the oil level in the engine	X
9	Check the oil level in the hydraulic system	X
10	Check the functioning of the foot and the parking brake	X
11	Check the functioning of the steering system	X
12	Lubricate the machine as per lubrication schedule	X
13	Check the condition of and functioning of the electrical system, lights, instruments, switches and the safety system	X
14	Check the functioning of the hydraulic system	X
15	Check the oil level in the drive axle	X
16	Check the condition of the batteries	X
17	Check the safety and condition of the cabin, the tanks, the body, counterweights, lifting equipment and units	X
18	Check the condition of paintwork and windows	X
19	Check the specifications against the customer's order approval	X
20	Check the ID-plate and the warning stickers	X
21	Check that the correct driver handbook is supplied with the machine	X

Inspection and maintenance schedule

KONECRANES

DAILY INSPECTION AND SERVICE PRIOR TO START

Pos.	Service items to inspect or perform	Measure
1	Check the oil level of the engine	X
2	Check the oil level in the transmission	X
3	Check the hydraulic oil level	X
4	Check the coolant level	X
5	Check the fuel level	X
6	Check the washer liquid level	X
7	Check the air filter indicator	X
8	Clean the air filter cleaner	X
9	Check the main power switch	X
10	Check the pressure, condition and bolts of the wheels	X
11	Check the functioning of the brake system	X
12	Check the functioning of the steering system	X
13	Check the functioning of the hydraulic system	X
14	Check lights and horns	X

SERVICE ITEMS FOR THE FIRST 150 HOURS

Pos.	Service items to inspect or perform	Measure
1	Change engine oil	X
2	Change the turbo filter/oil filter of the engine	X
3	Change the transmission oil filter	X
4	Change the transmission oil filter	X
5	Lubricate the machine as per lubrication schedule	X
6	Check the oil level in the drive axle	X
7	Check the coolant level	X
8	Check the freezing point of the coolant	X
9	Check the engine drive belts	X
10	Check the oil level in the hydraulic system	X
11	Check the condition of the batteries	X
12	Check the exhaust system	X
13	Check (and if necessary clean) the air filter and intake pipes	X
14	Check the lifting chains	X
15	Check the pressure and conditions of the tyres	X
16	Tighten the wheel bolts to the correct torque	X
17	Check the bearings on the steering axle	X
18	Check/retighten of bolt joints	X
19	Check the condition of and functioning of the electrical system, lights, instruments, switches and the safety system	X
20	Check the safety and condition of the cabin, the tanks, the body, counterweights, lifting equipment and units	X
21	Check the condition of paintwork and windows	X
22	Check the functioning of the foot and the parking brake	X
23	Check the functioning of the steering system	X
24	Check the functioning of the hydraulic system	X
25	Check/adjust valve play	X
26	Retighten injectors	X

NOTE Extra service after the first 500 hours on Scania engines.

27	Inspection and adjustment of valve play ¹⁾	X
28	Inspect and adjust PDE injector rocker arms	X

NOTE

1) Inspection/adjustment after the first 500 hours, see manufacture's handbook for instructions.

INSPECTION AND MAINTENANCE SCHEDULE

Pos.	Service items to perform	If necessary	500 h service	1,000 h service	2,000 h service	4,000 h service
1.	Clean the machine	X				
2.	Clean the radiator	X				
Fluid and filter changes						
3.	Lubricate the machine as per lubrication schedule		X	X	X	X
4.	Change engine oil ²⁾		X	X	X	X
5.	Clean the engine oil cleaner ^{2) 3)}		X	X	X	X
6.	Change the turbo filter/oil filter of the engine ²⁾		X	X	X	X
7.	Change the fuel filter			X	X	X
8.	Change the filter insert of the fuel-water separator			X	X	X
9.	Change/clean the engine air filter	X		X	X	X
10.	Change the transmission oil filter			X	X	X
11.	Change the transmission oil filter			X	X	X
12.	Change the cabin filter	X		X	X	X
13.	Change the hydraulic oil filter				X	X
14.	Change the hydraulic oil	X				X
15.	Change the hydraulic oil tank breathing filter	X				X
16.	Change the drive axle oil					X
17.	Change the safety cartridge of the engine air filter					X
Inspection and cleaning						
18.	Clean the engine air filter coarse cleaner	X	X	X	X	X
19.	Drain the fuel filter water separator	X	X	X	X	X
20.	Check the pressure and conditions of the tyres	X	X	X	X	X
21.	Tighten the wheel bolts to the correct torque	X	X	X	X	X
22.	Check/retighten bolt joints	X	X	X	X	X
23.	Check the coolant level	X	X	X	X	X
24.	Check the oil level in the drive axle		X	X	X	X
25.	Check the condition of the batteries		X	X	X	X
26.	Check the engine drive belts		X	X	X	X
27.	Check the exhaust system		X	X	X	X
28.	Check the adjustment of the parking brake		X	X	X	X
29.	Check stand and fork carriage		X	X	X	X
30.	Check the lifting chains		X	X	X	X
31.	Visually check the fork		X	X	X	X
32.	Check the condition of paintwork and windows		X	X	X	X
33.	Check the safety and condition of the cabin, the tanks, the body, counterweights, lifting equipment and units		X	X	X	X
34.	Check the ID-plate and the warning stickers		X	X	X	X
35.	Check the functioning of the electrical system		X	X	X	X
36.	Check the functioning of the foot and the parking brake		X	X	X	X
37.	Check the functioning of the steering system		X	X	X	X
38.	Check the functioning of the hydraulic system		X	X	X	X
39.	Inspection/adjustment of valve play ¹⁾	See "Service schedule engines" on page 99				
40.	Inspection/adjustment of injectors ¹⁾	See "Service schedule engines" on page 99				
41.	Inspection/adjustment of injector rocker arms ¹⁾	See "Service schedule engines" on page 99				
42.	Check the bearings on the steering axle	X		X	X	X
43.	Check the anti-corrosion and freezing point of the coolant				X	X
44.	Check weld constructions				X	X
45.	Clean/drain fuel tank	X				X
Calibration						
46.	Calibration of transmission		X	X	X	X
NOTE						
1) See "Service schedule engines" on page 99, for service intervals for the different engines.						
2) The intervals for the replacement of oil and filter depends on the level of sulphur in the fuel and the surrounding environment						
3) Only applies to Scania engines						

SERVICE SCHEDULE ENGINES

Scania DC9, DI12/DC12

First service at 500 hours

Inspection/adjustment of valve play ¹⁾

Inspection/adjustment of PDE injector rocker arms ¹⁾

Inspection items at every 2,500 hours

Inspection/adjustment of valve play ¹⁾

Inspection/adjustment of PDE injector rocker arms ¹⁾

Volvo TAD 620VE and TAD 722VE, Volvo TAD 660VE and TAD 760VE

First service at 150 hours

Inspection/adjustment of valve play ¹⁾

Retighten the injectors 50 Nm ¹⁾

Inspection items at every 1,500 hours

Inspection/adjustment of valve play ¹⁾

Inspection items at every 3,000 hours

Inspection of injectors ¹⁾

Volvo TWD 1240VE, Volvo TAD 1250VE

Inspection items at every 2,000 hours

Inspection/adjustment of valve play ¹⁾

Cummins QSB6,7

Inspection items at every 5,000 hours

Inspection/adjustment of valve play ¹⁾

Cummins QSM11

Inspection items at every 1,500 hours

Inspection/adjustment of valve play ¹⁾

¹⁾ NOTE! See the engine manufacturer's manual for instructions.

LIQUID VOLUMES

No.	Unit	Material/oil/ lubricant		
1.			Volvo	
			TAD 620 VE, filter and oil replacement	16 l
			TAD 722 VE, filter and oil replacement	23 l
			TAD 660 VE, filter and oil replacement	15.5 l
			TAD 760 VE, filter and oil replacement	21.5 l
			TWD 1240 VE, filter and oil replacement	35 l
			TAD 1250 VE, filter and oil replacement	35 l
			Scania	
			DI9, filter and oil replacement	37 l
			DI12, filter and oil replacement	33 l
			DC12, filter and oil replacement	33 l
			Cummins	
			QSM 6.7, filter and oil replacement	16.7 l
			QSM 11, filter and oil replacement	37 l
2.	Fuel tank	Diesel	SMV 1012-600 B	131 l
			SMV 10-1200B/13.6-600 B	168 l
			SMV 12-1200B/16-600B/900B	206 l
			SMV 15-1200B/16-1200 B	243 l
			SMV 18-20-1200 B	280 l
			SMV 22-25-1200 B	336 l
			SMV 28-1200 B	316 l
			SMV 32-33-1200 B	371 l
			SMV 37-1200 B	385 l
			SMV 42-52-1200 B	552 l
			SMV 60-1500 B	496 l
3.	Cooling system	Glycol/water mixture	SMV 10-28-1200 B	50 l
			SMV 32-60-1200 B	60 l
4.	Hydraulic oil system (total volume)	Hydraulic oil	SMV 1012-600 B	152 l
			SMV 10-1200 B/13.6-600 B	192 l
			SMV 12-1200B/16-600 B/900B	227 l
			SMV 15-1200 B/16-1200 B	272 l
			SMV 18-20-1200 B	312 l
			SMV 22-25-1200 B	368 l
			SMV 28-1200 B	355 l
			SMV 32-33-1200 B	406 l
			SMV 37-1200 B	420 l
			SMV 42-52-1200 B	525 l
			SMV 60-1500 B	575 l
5.	Drive axle	Drive axle oil	Every hub	Diff.
			D81 PL478	1.5 l 21 l
			D91 PL448	2.5 l 26 l
			D91 PL408 (SMV 28.33)	4 l 35 l
			D102 PL341 (small) (SMV 37-50)	9 l 58 l
			D102 PL341 (SMV 37-50)	9 l 72 l
			D106 PL341 (large) (SMV 52-55)	9 l 80 l
			D111 PL351 (SMV 60)	34 l 80 l
6.	Transmission	Dexron III	DANA TE17	25-30 l
			DANA TE27/TE32	60-70 l
		Engine oil	ZF 191	25-30 l
			ZF 261/311	40-50 l

Fuel and oil recommendations

FUEL AND OIL RECOMMENDATIONS

THE QUALITY OF THE ENGINE OIL

The engine oil must fulfil one of the quality requirements below:

- ACEA E3, E4, or E5
- The TBN value should be at least 12-13
- ASTM 2896)

Check with your supplier if the oil fulfils the quality requirements.

The stated oil replacement intervals apply if the fuel sulphur level does not exceed 0.3%. If the sulphur level exceeds 0.3%, the replacement interval should be halved (250 hours).

During the running of the engine, some of the oil used for lubricating the pistons will be burnt (used). The combustion products in combination with the high temperatures will lead to "oil wear", in particular of the chemical additives.

Because this oil wear is due to running conditions, the quality of the oil (the productivity of the oil) and the fuel used, the intervals between the oil changes may vary.

The longest possible interval for replacing the engine lubrication oil is one year, i.e. the oil should be replaced after a maximum of one years' running.

Oils that are too thick will lead to problems with starting. Therefore, the surrounding temperature when starting the engine must decide what type of oil to use during the winter months. Oil replacements due to changing seasons can be avoided by the use of so-called multigrade oils. Specified intervals for oil replacements are also applicable to multigrade oils.

NOTE

No oil additives of any kind may be added to the recommended oils! The use of such additives endangers the warranty of the engine. Mixing of different brands of oil should be avoided.

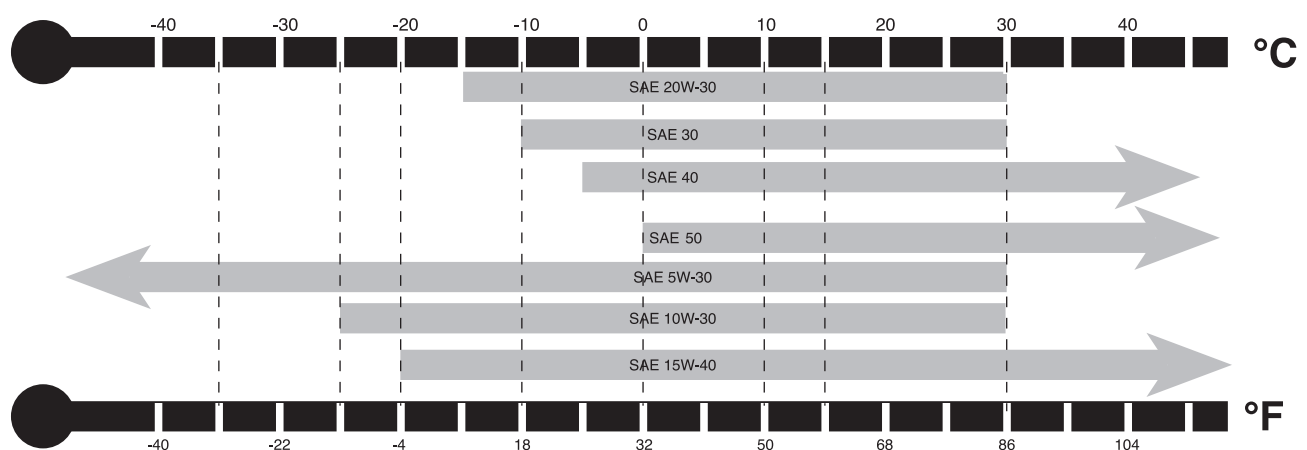
Because the temperature ranges for neighbouring SAE classifications overlap, the oil does not need to be replaced when short-term temperature changes occur.

NOTE

In order to ensure problem-free cold starts, it is important to select an SAE classification taking into consideration the surrounding temperature when the engine is started.

EXTENDED OIL REPLACEMENT INTERVALS

Synthetic oils can extend the lifetime of the oil. By measuring the oxidation and degree of metal deposits during a period, a suitable replacement interval may be calculated. An analysis of the metal deposits should however not form the entire basis for the servicing of the engine.



RECOMMENDED FUELS AND HYDRAULIC OILS**Diesel fuels**

Only use fuel which fulfil DIN 51601 with a CET-value that does not fall below 45.

The sulphur level of the diesel fuel must not exceed 0.3%. If the sulphur level exceeds 0.3%, the service intervals of the maintenance schedule must be halved.

For higher levels, contact the manufacturer of the machine or the lubricant.

NOTE

As the surrounding temperature decreases, the flow characteristics of the diesel fuel deteriorate to a point where paraffin is being secreted. If "summer quality" diesel fuel is being used, this may cause problems when running. For this reason, diesel fuel of "winter quality", which can sustain the cold better and functions reliably down to -15°C, should be used during the cold part of the year.

The use of so-called flow improving additives is not recommended. These may worsen the cold starting ability.

Transmission oil

DANA:
ATF Dexron III

ZF:
Mineral oil based engine oil (API CD/CE/CF-4/CF/CG-4/CH-4/CI-4/SF/SG/SH/SJ/SL or ACEA, categories A, B, E)

Viscosity degrees: SAE 20W-20 / 30 / 10W-30 / 10W-40 / 15W-30 / 15W-40 / 20W-40

Oil replacement intervals

Empty and refill the system every 1,000th operational hour in order to maintain maximum function with the least possible impact on the environment. Long-term high operating temperatures or very dusty environments lead to reduction of quality in the oil and an increased impact on the environment.

Drive axle oil

API GL5 SAE 80W-140

NOTE

The above are only recommendations. If in doubt, we recommend that you seek the advice of the Konecranes Lifttrucks dealer.

Hydraulic oil

Universal Tractor Transmission Oil (UTTO)

The oil must fulfil one of the requirements below:

- John Deere JD20C
- Massey Ferguson MF1141/MF1135/ MF1143
- ZF TE-ML 03E/TE-ML 05F/TE-ML 06K

It is also possible to use a hydraulic oil with the specifications below.

DIN 51524 Part 2 HLP and Part 3 HVLP
with 1.5% LUBRIZOL added.

Use hydraulic fluids for mobile use from a well-known oil manufacture.

Viscosity	Temperature range
SHS 32	-30°C – +10°C
SHS 46	-20°C – +50°C
SHS 68	±0°C – +50°C

Grease

Universal grease type E.P. as per NLGI grade 2.

Coolant

Only use ethylene glycol based cooling liquids with a corrosion inhibiting additive.

Do not mix with antifreeze containing ethanolamine.

Antifreeze mixture for the lowest temperature °C	% Volume mixture antifreeze	Mixture antifreeze/water
-12	25	1:3
-18	30	1:2
-25	40	1:1.5
-37	50	1:1
-60	66	2:1