



KRAMER
on the safe side

Repair Handbook

Telehandlers

2706
KT276



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Technical data, dimensions and weights are only given as an indication. Responsibility for errors or omissions not accepted.

The cover features the machine with possible optional equipment.

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E Introduction

E.1 Notes on the repair manual

Working with the repair manual

This repair book is intended to help ensure continual operational functionality. This ensures the high weight of the vehicle through careful maintenance and after-sales monitoring.

The experiences of our customer service technicians as well as experience gathered from our sites are summarized in this repair book.

Every sequence of images shows the procedure of a repair process. The provided text contains necessary instructions for adjustment, application of special tools, etc.

Major repair procedures are described in such a way that smaller sub-tasks can also be performed individually following the respective procedures.

The manual is appended according to further technical development of the machines and therefore is kept up-to-date to serve as a reference.

For reasons of safety and security, always compare the setting weights and capacities with the latest operator's manual of the respective machine.

Technical data, dimensions and weights are only given as an indication. Responsibility for errors or omissions not accepted.

Deviations of images are possible.



Information

Careful and prudent working is the best way to avoid accidents!

Explanation of symbols and abbreviations

The indication **left** or **right** in the descriptions always refers to the travel direction of the machine.

Symbols

Symbol	Explanation
•	Identifies a general list
1 2	Identifies a list in a table (position numbers)
1. 2.	Identifies activities that must be performed in a certain order
➡	Identifies results
▶	Identifies things to be avoided in the warning and safety instructions

Abbreviations

Abbreviations	Explanation
poss..	possibly
if nec.	if necessary
min.	minimum
max.	maximum
e.g.	for example
resp.	respectively
Fig.	Figure
o/h	Operating hours
Order no.	Order, item or part number
(option)	Option
(SWxx)	Wrench size, for example SW13 = wrench size 13
etc.	et cetera
Weight %	Weight percentage
i.e..	that is
etc.	et cetera
o.s.	or similar

Abbreviations	Explanation
Pos.	Position
BMK	Equipment identifier (component designation)
LED	Light Emitter Diode
EAT	Exhaust Aftertreatment
DEF	Diesel Emission Fluid (Urea)
ATL	Exhaust turbocharger
DOC	Diesel Oxidation Catalyst
DPF	Diesel particulate filter
CRT	Continuous Regeneration Trap (system made of DOC + downstream DPF)
CSF	Catalyzed Soot Filter (system made of DOC + integrated DPF)
SCR	Selective Catalytic Reduction (catalytic converter for selective catalytic reduction of nitrogen oxides)
HMI	Customer interface
EPA	Environment Protection Agency (American environmental protection agency)
NO	Nitrogen monoxide
N ₂	Nitrogen
NO ₂	Nitrogen oxide
NO _x	Nitric oxide
NH ₃	Ammonia
CO	Carbon monoxide
H ₂ O	Water

Abbreviation for cable colors according to IEC 60757

Abbreviation	Meaning	Explanation
BK	Black	Black
BN	Brown	Brown
RD	Red	Red
OG	Orange	Orange
YE	Yellow	Yellow
GN	Green	Green
BU	Blue	Blue
VT	Violet	Violet
GY	Gray	Gray
WH	White	White
PK	Pink	Pink
TQ	Turquoise	Turquoise

Repair instructions

Technical data

Technical data, dimensions and weights are only given as an indication. Subject to technical modifications. Responsibility for errors or omissions not accepted.

Cause of damage

Identify the cause of damage, avoid further damage, and secure the machine.

Spare parts

Use original Kramer spare parts and corresponding Kramer special tools. When ordering spare parts or submitting technical queries, always provide the machine serial number and, in case of the diesel engine and/or attachments, also the respective serial numbers. This is required to prevent the delivery of wrong spare parts.

Only use spare parts, accessories and accessory devices that come originally from Kramer and that have been tested and approved by Kramer. This is the only way to ensure constructively that the properties of the Kramer vehicle as well as its operational reliability can be maintained. In addition, original parts from Kramer maintain the active and/or passive driving safety and operational safety of the machine.

All liability for damages that, in this regard, result from not using Kramer original parts, Kramer accessories and Kramer accessory devices is excluded by Kramer.

Diesel engine

Always disconnect the battery cable or operate the battery master switch before working on the diesel engine.

Gearbox

When disassembling the gearbox, always drain the gear oil first before removing the gears. Separate parts that are interlocked with a soft-metal or plastic hammer.

Required tools and screw connections

- Standard tools, electric power tools, pit
- 2x 60 bar (900 psi) pressure gauge
- 2x 600 bar (9000 psi) pressure gauge
- 1x 250 bar (4000 psi) pressure gauge
- 2x micro screw connection 7/16 UNF with O-ring
- 2x micro screw connection M12x1.5 with O-ring
- 2x mini screw connection S25 [high pressure up to 600 bar (9000 psi)]
- 2x plugs S25 [high pressure up to 600 bar (9000 psi)]
- 1x diesel engine speed sensor (or diagnosis system)
- 1x multimeter (or diagnosis system)
- Allen key set with spherical lock (retaining function)

Procedure

Replacement of components/warranty handling

Basically, approval is required for replacing the variable displacement pump or the high-speed gearbox. Please always make a note of the name of the person giving the approval and the date of it on the test report. If you are replacing a pump or the gearbox, the following documents must be sent back in paper form together with the old part:

- Standard test report “**Before troubleshooting**”
- Hydraulic pump report
- High-speed gearbox report (only if high-speed gearbox is replaced)
- Standard test report “**After troubleshooting**”

E.2 Safety instructions

Pay particular attention to the following

The information in this repair handbook must be read and observed in order to avoid risks to all persons who use, maintain, repair, service or inspect this machine.

In particular, read this section on safety.

Safety symbols and signal words

Explanation

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



DANGER

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

Consequences in case of non-observance.

► Avoidance of injury or death.



WARNING

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

Consequences in case of non-observance.

► Avoidance of injury or death.



CAUTION

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

Consequences in case of non-observance.

► Avoidance of injury.

NOTICE

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

► Avoidance of damage to property.

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

Safety and accident prevention regulations

- In addition to this service manual also always observe the Operator's Manual of the machine.
- Observe all safety and accident prevention regulations.
- When driving on public roads, observe the respective regulations!
- Before starting the diesel engine, please ensure that no gear is engaged and that all safety devices are attached and set at the safety position.
- Before starting the diesel engine and before switching on the main drive, hoot the horn.
- Start the diesel engine only from the driver's seat. The diesel engine must not be started by short-circuiting the electric connections on the starter because doing so may cause the machine to start moving immediately!
- Do not let the diesel engine run in enclosed areas.
- The assemblers clothes should be close-fitting. Avoid loose-fitting clothes!
- Caution is essential when handling fuel – increased fire hazard.
- Do not smoke during refueling, and avoid fire and sparks.
- Do not smoke when refueling!
- Before refueling, always stop the diesel engine and remove the starting key. Do not refuel in closed rooms.
- Wipe away fuel spills immediately!
- Keep the machine clean to avoid fire hazard.
- Caution is required when handling brake fluids and battery acid. Battery acid is toxic and caustic!
- Only perform work under the lifted machine if safe and secure means of support are used.
- After maintenance work or servicing, reattach the safety devices!

Leaving the machine

- Secure the machine against rolling before leaving it (parking brake, wheel chocks). Stop the engine, remove the starting key and, if necessary, lock the cabin!
- If the vehicle is not going to be moved for a longer period, switch off the battery circuit breaker.
- Never leave the machine untended as long as the engine is still running!
- Before leaving the vehicle, lower the boom completely!

Adjustment and maintenance

Due to their function the machine drives are not automatically secured after stopping the engine.

In addition, adjustment work can require that the drives are rotated.

Observe the following:

- Prior to adjustment, cleaning, and maintenance work as well as rectifying functional disorders:
 - Stop the engine.
 - Disconnect the battery
- Before any adjustment, cleaning or maintenance work or before rectifying any functional faults in the hydraulic system, lower the attachment and/or infeed unit.
- When working on the electrical system, always disconnect the battery circuit breaker or remove the battery.
- You must ensure that no-one can start the vehicle or cause the drives to start rotating.
- Fluids emitted under high pressure (fuel hydraulic oil, etc.) can penetrate the skin and cause serious injuries, therefore call a doctor immediately as otherwise serious infections can be caused!
- Repairs to the hydraulic system may only be carried out by specialist workshops.
- Be careful when opening the radiator cap. The radiator is under pressure when the engine is hot!
- Sufficient knowledge and assembly tools in accordance with regulations are required for mounting tires!
- Dispose of oil, fuels and filters properly!
- Re-tighten the wheel nuts regularly!

Risk of injury from hydraulic fluids



WARNING

Risk of injury due to liquids under high pressure.

Liquids can penetrate the skin and cause death or serious injury.

- ▶ Work on the hydraulic system may only be performed by authorized service centers.
 - ▶ Check the hose pipes regularly.
 - ▶ Search for leaks with a piece of wood or cardboard.
 - ▶ Ensure that the oil jet is not directed toward your body.
 - ▶ Replace damaged hose pipes.
 - ▶ Replace flexible lines no later than 6 years after production date.
 - ▶ If hydraulic fluids penetrate skin or eyes, this must be treated by a specialist doctor immediately.
-

Air conditioning



Environment

The air-conditioning system is filled with an HFC refrigerant which can damage the atmosphere. Be particularly careful when working on the air conditioning system. Maintenance and repair work may only be performed by specialized cryo-service centers. Refrigerant must always be extracted and recycled properly.

Pressure accumulator



WARNING

Risk of injury due to liquids under high pressure.

Fluids penetrate the skin and can cause serious injuries.

- ▶ Work on the hydraulic system may only be carried out by specialist workshops.
-

First-aid measures

Breathing:

- Supply persons with fresh air and seek medical attention depending on symptoms.
- Remove person from the danger zone.

Eye contact:

Rinse thoroughly several minutes with plenty of water. Seek medical attention if necessary.

Skin contact:

Wash thoroughly with plenty of water and soap, immediately remove soaked clothes, seek medical attention in case of skin irritations (reddening, etc.).

Swallowing:

Do not induce vomiting, immediately seek medical attention.

Jack up the machine



WARNING

Crushing hazard due to incorrectly jacked-up machine.

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

- ▶ Use jack/jack stand of sufficient lifting capacity.
- ▶ Use hydraulic jacks/jack stands that function reliably.
- ▶ Use the jack/jack stand on firm and level ground.
- ▶ Install a jack/jack stand at a suitable position on the machine.

Parking the machine

Perform the following steps before working on the machine:

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

E.3 Tightening torques

General tightening torques

Screw dimensions	Tightening torques in Nm (lbf ft) ¹		
	8.8	10.9	12.9
M4	3 (2)	4 (3)	5 (4)
M5	5,5 (4)	8 (6)	10 (7)
M6	10 (7)	14 (10)	16 (12)
M8	23 (17)	34 (25)	40 (30)
M10	46 (34)	67 (49)	79 (58)
M12	79 (58)	115 (85)	135 (100)
M14	125 (92)	185 (136)	220 (162)
M16	195 (144)	290 (214)	340 (251)
M18	280 (207)	400 (295)	470 (347)
M20	395 (291)	560 (413)	660 (487)
M22	540 (398)	760 (561)	890 (656)
M24	680 (502)	970 (715)	1150 (848)
M27	1000 (738)	1450 (1070)	1700 (1254)
M30	1350 (996)	1950 (1438)	2300 (1696)

1. These weights are valid for screws with untreated, non-lubricated surfaces.

Specific tightening torques

Description	Tightening torque
Wheel nut	400 ± 20 Nm (295 ± 15 lbf ft)

Torque values for metric coarse-pitch thread

Screws and nuts

The tightening torques specified below only apply if:

- A friction coefficient of $\mu_{\text{tot}} = 0.14$ is reached in connection with a thread lubricant. A surface protection, for example A3C+L, Dacromet or Termosil, is recommended for this.
- No other tightening torque is specified in the text.
- No additional screw locks, for example MK screws or a liquid screw lock, are used.

Tightening torques in Nm (lbf ft)				
Property class		8.8	10.9	12.9
Description	Dimensions			
Hexagon head cap screw ISO 4014 to ISO 4018 Cheese-head screws ISO 4762 Hexagon nuts ISO 4032	M4	2,9 (2)	4,3 (3)	5 (4)
	M5	5,8 (4)	8,5 (6)	10 (7)
	M6	10 (7)	14,5 (11)	17 (13)
	M8	24,5 (18)	36 (27)	42 (31)
	M10	48,5 (36)	71 (52)	83,5 (62)
	M12	83,5 (62)	123 (91)	144 (106)
	M14	133 (98)	196 (145)	229 (169)
	M16	207 (153)	304 (224)	355 (262)
	M18	296 (218)	422 (311)	494 (364)
	M20	417 (308)	594 (438)	695 (513)
	M22	570 (420)	813 (600)	951 (701)
	M24	718 (530)	1022 (754)	1196 (882)
	M27	1058 (780)	1506 (1111)	1763 (1300)
	M30	1437 (1060)	2046 (1509)	2395 (1767)
	M33	1944 (1434)	2770 (2043)	3240 (2390)
	M36	2500 (1844)	3561 (2627)	4167 (3073)
	M39	3237 (2388)	4610 (3400)	5394 (3978)

Torque values for metric fine-pitch thread

Screws and nuts

The specified tightening torques only apply if:

- A friction coefficient of $\mu_{\text{tot}} = 0.14$ is reached in connection with a thread lubricant. A surface protection, for example A3C+L, Dacromet or Termosil, is recommended for this.
- No other tightening torque is specified in the text.
- No additional screw locks, for example MK screws or a liquid screw lock, are used.

Tightening torques in Nm (lbf ft)				
Property class		8.8	10.9	12.9
Description	Dimensions			
Hexagon head cap screw ISO 8765, ISO 8876 Hexagon nuts ISO 4032	M8X1	26 (19)	38,5 (28)	45 (33)
	M10X1	54 (40)	79 (58)	92,5 (68)
	M10X1.25	51 (38)	74,5 (55)	88 (65)
	M12X1.25	90,5 (67)	134 (99)	156 (115)
	M12X1.5	87 (64)	128 (94)	150 (111)
	M14X1.5	143 (106)	210 (155)	246 (181)
	M16X1.5	219 (162)	323 (238)	378 (279)
	M18X1.5	331 (244)	470 (347)	551 (406)
	M18X2	313 (231)	446 (329)	522 (385)
	M20X1.5	459 (339)	655 (483)	766 (565)
	M22X1.5	622 (459)	886 (654)	1037 (765)
	M24X1.5	809 (597)	1152 (850)	1348 (994)
	M24X2	778 (574)	1108 (817)	1297 (957)
	M27X1.5	1173 (865)	1672 (1233)	1956 (1443)
	M27X2	1135 (837)	1617 (1193)	1892 (1396)
	M30X2	1580 (1165)	2251 (1660)	2634 (1943)
	M33X2	2116 (1561)	3015 (2224)	3528 (2602)
	M36X2	2773 (2045)	3951 (2888)	4623 (3410)
	M39X2	3557 (2624)	5067 (3737)	5930 (4374)

Tightening torques for hydraulic screw connections and air-conditioning screw connections with sealing cone and O-ring DIN 3865

Outer diameter of tube in mm (in)	Tightening torque (lightweight series) in Nm (lbf ft)	Tightening torque (heavyweight series) in Nm (lbf ft)
6 (0,24)	10 (7)	15 (11)
8 (0,31)	15 (11)	25 (18)
10 (0,39)	25 (18)	35 (26)
12 (0,47)	35 (26)	50 (37)
15 (0,59)	50 (37)	–
16 (0,63)	–	80 (59)
18 (0,71)	80 (59)	–
20 (0,79)	–	110 (81)
22 (0,87)	110 (81)	–
25 (0,98)	–	160 (118)
28 (1,1)	160 (118)	–
30 (1,18)	–	210 (155)
35 (1,38)	210 (155)	–
38 (1,5)	–	320 (236)
42 (1,65)	320 (236)	–

Tightening torques for hydraulic screw connections with olive DIN 3861

Outer diameter of tube in mm (in)	Tightening torque (lightweight series) in Nm (lbf ft)	Tightening torque (heavyweight series) in Nm (lbf ft)
6 (0,24)	15 (11)	25 (18)
8 (0,31)	25 (18)	35 (26)
10 (0,39)	35 (26)	50 (37)
12 (0,47)	50 (37)	80 (59)
15 (0,59)	80 (59)	–
16 (0,63)	–	110 (81)
18 (0,71)	110 (81)	–
20 (0,79)	–	160 (118)
22 (0,87)	160 (118)	–
25 (0,98)	–	210 (155)
28 (1,1)	210 (155)	–
30 (1,18)	–	320 (236)
35 (1,38)	320 (236)	–
38 (1,5)	–	400 (295)
42 (1,65)	400 (295)	–

Tightening torques for hydraulic screw struts SDS

Shape B with sealing edge (cutting edge) and shape E with soft O-ring seal

Dimension	Tightening torque (lightweight series) in Nm (lbf ft)	Tightening torque (heavyweight series) in Nm (lbf ft)
M5	2,8 (2)	–
M6	5,2 (4)	–
M8X1	7 (5)	–
M10X1	11 (8)	–
M12X1.5	15 (11)	15 (11)
M14X1.5	25 (18)	25 (18)
M16X1.5	35 (26)	35 (26)
M18X1.5	50 (37)	50 (37)
M20X1.5	–	55 (41)
M22X1.5	80 (59)	80 (59)
M26X1.5	110 (81)	110 (81)
M27X2	110 (81)	160 (118)
M33X2	160 (118)	210 (155)
M42X2	210 (155)	320 (236)
M48X2	320 (236)	420 (310)
G 1/8 A	–	–
G 1/4 A	–	–
G 3/8 A	–	–
G 1/2 A	–	–
G 3/4 A	–	–
G 1 A	–	–
G 1-1/4 A	–	–
G 1-1/2 A	–	–
7/16 - 20	15 (11)	20 (15)
1/2 - 20 (UNF)	20 (15)	25 (19)
9/16-18	30 (22)	30 (22)
3/4-16	35 (26)	60 (44)
7/8-14	70 (52)	90 (66)
1-1/16-12	85 (63)	100 (74)
1-5/16-12	150 (111)	170 (125)
1-5/8-12 (UNF)	250 (184)	300 (222)
1-7/8-12 (UNF)	300 (222)	350 (258)
2-12 (UNF)	350 (258)	400 (295)

Form F with O-ring seal and plugs

Dimension	Tightening torque (lightweight series) in Nm (lbf ft)	Tightening torque (heavyweight series) in Nm (lbf ft)
M5	2,8 (2)	—
M6	5,2 (4)	—
M8X1	7 (5)	—
M10X1	11 (8)	—
M12X1.5	15 (11)	15 (11)
M14X1.5	25 (18)	25 (18)
M16X1.5	35 (26)	35 (26)
M18X1.5	50 (37)	50 (37)
M20X1.5	—	55 (41)
M22X1.5	80 (59)	80 (59)
M26X1.5	110 (81)	110 (81)
M27X2	110 (81)	160 (118)
M33X2	160 (118)	210 (155)
M42X2	210 (155)	320 (236)
M48X2	320 (236)	420 (310)
G 1/8 A	—	—
G 1/4 A	—	—
G 3/8 A	—	—
G 1/2 A	—	—
G 3/4 A	—	—
G 1 A	—	—
G 1-1/4 A	—	—
G 1-1/2 A	—	—
7/16 - 20	15 (11)	20 (15)
1/2 - 20 (UNF)	20 (15)	25 (18)
9/16-18	30 (22)	30 (22)
3/4-16	35 (26)	60 (44)
7/8-14	70 (52)	90 (66)
1-1/16-12	85 (63)	100 (74)
1-5/16-12	150 (111)	170 (125)
1-5/8-12 (UNF)	250 (184)	300 (222)
1-7/8-12 (UNF)	300 (222)	350 (258)
2-12 (UNF)	350 (258)	400 (295)

Form H with O-ring seal and chamber ring

Dimension	Tightening torque (lightweight series) in Nm (lbf ft)	Tightening torque (heavyweight series) in Nm (lbf ft)
G 1/8 A	20 (15)	20 (15)
G 1/4 A	40 (30)	40 (30)
G 3/8 A	75 (55)	75 (55)
G 1/2 A	85 (63)	85 (63)
G 3/4 A	180 (133)	180 (133)
G 1 A	310 (229)	310 (229)
G 1-1/4 A	450 (332)	450 (332)
G 1-1/2 A	540 (398)	540 (398)

Tightening torques for hydraulics rotating screw connections

Dimension	Tightening torque (lightweight series) in Nm (lbf ft)	Tightening torque (heavyweight series) in Nm (lbf ft)
M10X1	20 (15)	30 (22)
M12X1.5	35 (26)	40 (30)
M14X1.5	45 (33)	50 (37)
M16X1.5	60 (44)	70 (52)
M18X1.5	75 (55)	80 (59)
M20X1.5	–	100 (74)
M22X1.5	125 (92)	130 (96)
M26X1.5	130 (96)	–
M27X2	130 (96)	140 (103)
M33X2	300 (221)	300 (221)
M42X2	500 (369)	500 (369)
M48X2	600 (443)	600 (443)
G 1/8 A	20 (15)	–
G 1/4 A	40 (30)	40 (30)
G 3/8 A	65 (48)	70 (52)
G 1/2 A	90 (66)	100 (74)
G 3/4 A	130 (96)	130 (96)
G 1 A	270 (199)	380 (280)
G 1-1/4 A	500 (369)	600 (443)
G 1-1/2 A	600 (443)	700 (516)

Tightening torques for hollow screws DIN 7643

Dimension	Tightening torque in Nm (lbf ft)
M8X1	8 (6)
M10X1	15 (11)
M12X1.5	27 (20)
M14X1.5	38 (28)
M16X1.5	40 (30)
M18X1.5	45 (33)
M20X1.5	58 (43)
M22X1.5	95 (70)
M26X1.5	130 (96)
M30X1.5	183 (135)

Tightening torques for adjustable hydraulic screw struts SDE

Shape F with O-ring

Dimension	Tightening torque (very lightweight series) in Nm (lbf ft)	Tightening torque (lightweight series) in Nm (lbf ft)	Tightening torque (heavyweight series) in Nm (lbf ft)
M8X1	–	–	–
M10X1	20 (15)	15 (11)	–
M12X1.5	–	25 (18)	35 (26)
M14X1.5	–	35 (26)	45 (33)
M16X1.5	–	40 (30)	55 (41)
M18X1.5	–	45 (33)	90 (66)
M20X1.5	–	–	140 (103)
M22X1.5	–	60 (44)	170 (125)
M26X1.5	–	100 (74)	190 (140)
M27X2	–	100 (74)	190 (140)
M33X2	–	160 (118)	310 (229)
M42X2	–	210 (155)	330 (243)
M48X2	–	260 (192)	420 (310)
7/16 - 20 (11.1 mm)	–	15 (11)	20 (15)
1/2 - 20 (UNF)	–	30 (22)	40 (30)
9/16 - 18 (14.3 mm)	–	35 (26)	45 (33)
3/4 - 16 (19.1 mm)	–	55 (41)	60 (44)
7/8 - 14 (22.2 mm)	–	80 (59)	90 (66)
1-1/16 - 12 (27 mm)	–	100 (74)	100 (74)
1-5/16 - 12 (33.3 mm)	–	150 (111)	170 (125)
1-5/8-12 (UNF)	–	290 (214)	340 (251)
1-7/8 - 12 (UNF)	–	325 (240)	415 (306)
2 - 12 (UNF)	–	350 (258)	450 (332)

Form H with O-ring seal and chamber ring

Dimension	Tightening torque (very lightweight series) in Nm (lbf ft)	Tightening torque (lightweight series) in Nm (lbf ft)	Tightening torque (heavyweight series) in Nm (lbf ft)
M8X1	10 (7)	–	–
M10X1	20 (15)	18 (13)	–
M12X1.5	–	30 (22)	35 (26)
M14X1.5	–	45 (33)	55 (41)
M16X1.5	–	60 (44)	80 (59)
M18X1.5	–	70 (52)	105 (77)
M20X1.5	–	–	140 (103)
M22X1.5	–	125 (92)	125 (92)
M26X1.5	–	180 (133)	180 (133)
M27X2	–	180 (133)	180 (133)
M33X2	–	300 (221)	380 (280)
M42X2	–	450 (332)	500 (369)
M48X2	–	600 (443)	600 (443)
G 1/8 A	20 (15)	20 (15)	25 (18)
G 1/4 A	–	35 (26)	45 (33)
G 3/8 A	–	70 (52)	75 (55)
G 1/2 A	–	100 (74)	100 (74)
G 3/4 A	–	180 (133)	180 (133)
G 1 A	–	300 (221)	300 (221)
G 1-1/4 A	–	450 (332)	450 (332)
G 1-1/2 A	–	540 (398)	540 (398)

Tightening torques for brake line screw connections

Form F socket unions and Form FS socket unions with flange

Dimension	Tightening torque in Nm (lbf ft)
M10X1	$14^{+2} (10^{+1})$

Tightening torques for worm drive hose clamps

Width of clamp in mm (in)	Tightening torques for new hoses for first installation in Nm (lbf ft)	Tightening torques for re-tightening or new assembly in Nm (lbf ft)
7,9 (0,31)	$0,9^{+0,2} (1^{+0,1})$	$0,7^{+0,2} (0,5^{+0,1})$
13,5 (0,53)	$4,5^{+0,5} (3^{+0,4})$	$3,0^{+0,5} (2^{+0,4})$
15,9 (0,63)	$7,5^{+0,5} (6^{+0,4})$	$4,5^{+0,5} (3^{+0,4})$

Tightening torques for spring-loaded worm drive hose clamps

Width of clamp in mm (in)	Diameter of clamp in mm (in)	Tightening torque in Nm (lbf ft)
12 (0,47)	60 – 80 (2,36 – 3,15)	$5^{+0,5} (4^{+0,4})$
12 (0,47)	70 – 90 (2,76 – 3,54)	$5^{+0,5} (4^{+0,4})$

1 Maintenance

1.1 Maintenance preparations, instructions

Information on maintenance

Responsibilities and prerequisites

- Operational readiness and the service life of the telehandler are heavily dependent on maintenance.
- The "daily maintenance work" and "work every 20 hours of operation" indicated in the maintenance schedule have to be performed by a specially trained operator – see *"Maintenance plan" on page 1-7*.
- Have the following maintenance performed by an authorized service center otherwise warranty claims will not be acknowledged:
 - Delivery inspection,
 - "A" 1st inspection at 100 o/h
 - "B" every 500 o/h
 - "C" every 1500 o/h (once a year).
- The manufacturer shall not be liable for damage or personal injury caused by failure to observe instructions!



Information

Insist on using original spare parts for repairs!

The machine's permits, certifications, registrations, etc., may be withdrawn if machine parts/components with a prescribed condition or quality, or machine parts/components that can put persons at risk during operation, are subsequently modified or exchanged!

Please contact your dealer if you require more information on maintenance.

Important safety instructions regarding maintenance work



CAUTION

Risk of injury due to maintenance work.

Injury hazard!

- ▶ Lock the service brake.
 - ▶ Stop the engine and remove the starting key.
 - ▶ Observe the danger indications and safety instructions during maintenance tasks.
 - ▶ Always park the machine on firm and level ground and secure it to prevent it from rolling away.
 - ▶ Secure the raised loader unit against unintentional lowering.
 - ▶ Disconnect the battery disconnect relay before working on the electrical system.
 - ▶ Follow the maintenance and safety instructions given in the operator's manuals of the attachments.
-

Parking the machine

Perform the following steps before working on the machine:

1. Park the machine on level and firm ground.
2. Apply the parking brake.
3. Completely retract telescopic boom and lower telescopic boom to the ground.
4. When working with a raised telescopic boom – see "[Safety prop for telescopic boom](#)" on page 1-4.
5. Stop the diesel engine.
6. Remove the starting key.
7. Secure the machine with wheel chocks.
8. Wait until all parts of the machine have come to a complete standstill.
9. Switch off battery master switch **S008** – see "[Switch off the battery master switch S008](#)" on page 1-3.
10. Ensure that the machine cannot be put into operation by other persons.

Jack up the machine

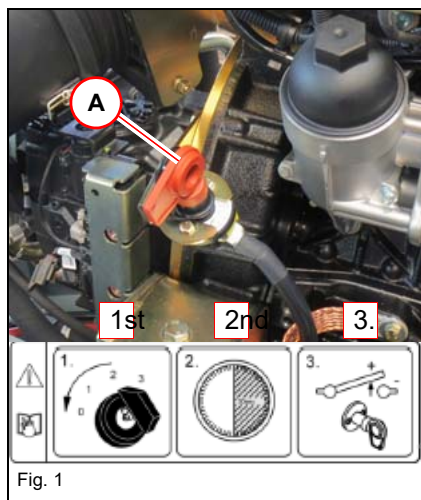
WARNING

Crushing hazard due to incorrectly jacked-up machine.

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

- ▶ Use jack/jack stand of sufficient lifting capacity.
- ▶ Use hydraulic jacks/jack stands that function reliably.
- ▶ Use the jack/jack stand on firm and level ground.
- ▶ Install a jack/jack stand at a suitable position on the machine.

Battery master switch S008



Switch off the battery master switch S008

NOTICE

In order to avoid damage from malfunctions in the electronic regulation of the diesel engine, do not unscrew main battery switch **S008** from the frame immediately after switching off the engine!

Follow the correct order (see label)!

It is not possible to operate an external vehicle heater (optional) when the main battery switch **S008** has been removed.

1. Stop the diesel engine.
2. Apply the parking brake.
3. Switch off the starter and remove the starting key.
4. Open the engine cover.
5. Wait at least 30 seconds.
6. Then turn key **A** out of the notched position and remove it.
 - ➡ The entire electrical system is out of operation.

Switch on battery master switch S008

1. Insert key **A** in the battery master switch **S008** and turn to notched position.
 - ➡ The entire electrical system is in operation.
2. Close the engine cover.
3. Start the diesel engine.

Safety prop for telescopic boom

Installing the safety prop onto the lift cylinder



WARNING

Crushing hazard! Assembly and maintenance on the raised telescopic boom not secured by a prop!

Causes serious injury or death.

- Mount the supplied safety props to the extended lifting cylinder and secure with pins (or screws).

NOTICE

Install it as shown in the figures in order to avoid damage to the piston rod and the safety prop!

- The opening of the safety prop must face down!

The safety prop is located at the front of the vehicle frame on the left.

1. Remove the attachment (loader bucket).
2. Park the vehicle on firm and level ground.
3. Apply the parking brake.
4. Retract the telescopic boom and raise the loader unit so that the safety prop can be attached without danger.
5. Stop the engine and remove the starting key.
6. Safety props are to be removed from the storage location, to do this remove the plug-in lock and twist the pins **A** out of the threaded hole.

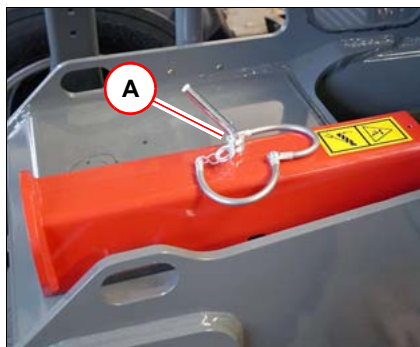


Fig. 2

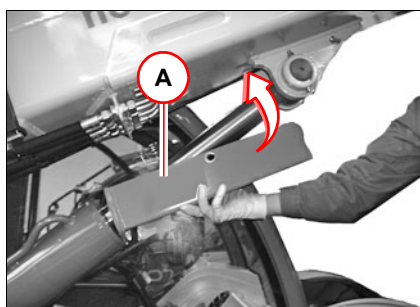


Fig. 3

7. Place the safety props **A** from below on the extended piston rod of the lifting cylinder and turn over the piston rod.

1 Maintenance

Maintenance preparations, instructions

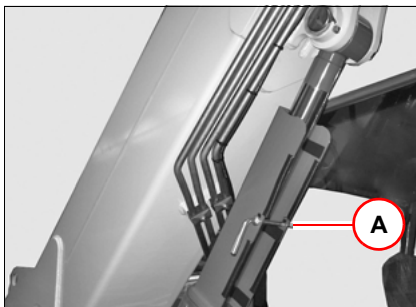


Fig. 4



Fig. 5

8. The opening on the safety prop must point downwards.

9. Lock the safety prop with pins **A** and secure with plug-in lock (see figure).

10. When the diesel engine is turned off, carefully lower the telescopic boom with the help of the emergency lowering onto the safety prop.

11. After maintenance work, remove the safety prop from the lift cylinder and attach at the predetermined installation location (front left in the vehicle frame)!

Vent filter/vacuum pump

Information

Before starting work, read the safety and preparation instructions carefully

- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Dismantle vent filter/connect vacuum pump

1. Dismantle vent filter **A** on hydraulic tank **B** in order to vent any overpressure in the tank.
2. Attach vacuum pump to the opening of the vent filter **A**.

Mount vent filter/remove vacuum pump

1. Remove vacuum pump at the opening of the vent filter **A**.
2. Mount vent filter **A** on hydraulic tank **B**.

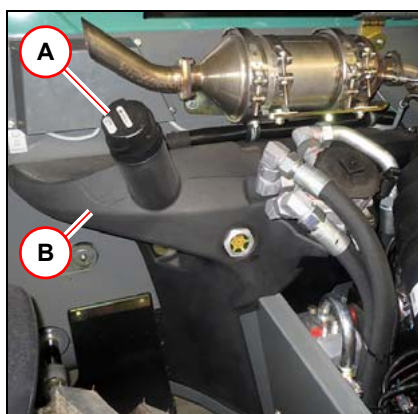


Fig. 6

1.2 Maintenance overview

Maintenance plan

Important information on the maintenance plan

For servicing and maintenance on the attachment, please also refer to the operator's and maintenance manuals provided by the attachment manufacturer.

In order to be able to claim on the warranty, maintenance operations, handover-inspection, 1st review at 100 hours of operation, 2nd review every 500 hours of operation and after every 1500 hours of operation (annually) the inspection has to be carried out by an authorised workshop.

"A", "B" and "C" refer to the respective maintenance kits.

Leakage check

Work description ^{1, 2} (o/h = operating hours)	Service center	User / operator		Service center ²		
		every 10 hours of operation (daily)	Every 20 o/h	"A" 1st inspection at 100 operating hours	"B" 2nd inspection then every 500 operating hours	"C" every 1500 o/h once a year
Leak test ()	Delivery inspection					
Air intake line ³ : air filter, air-charge cooler, turbocharger - engine	●	●		●	●	●
Engine lubrication: engine – filter	●	●		●	●	●
Fuel lines ⁴	●	●		●	●	●
Cooling system: engine - hydraulic oil, hose pipes ³	●	●		●	●	●
Steering system: hose pipes ⁵ and cylinders	●	●		●	●	●
Hydraulic system/loader unit: control unit, hose pipes ⁵ , cylinder, hose burst valve	●	●		●	●	●
Quick couplers, plug-in connectors, additional control circuits, 3rd control circuit, tipping trailer connection	●	●		●	●	●
Braking system: hose pipes ⁵ , cylinder, braking system container	●	●		●	●	●
Hydraulic trailer braking system ⁶ : hose pipes ⁵ , plug-in connections	●	●		●	●	●
Air condition system: hose pipes ⁵ , condenser, dehumidifier/vaporizer	●	●		●	●	●

1. Have maintenance and repairs only performed by an authorized service center (acknowledgment of warranty claims).
2. The maintenance work described here may only be performed by an authorized service center.
3. Air intake lines and coolant hose pipes with crack formation and abrasion marks should be immediately replaced by an authorized service center.
4. Flexible fuel lines to the engine (leak oil lines) should be replaced every 2 years by an authorized service center.
5. Hydraulic hoses and lines should be replaced an authorized service center upon defect detection.
6. Safety part! Maintenance work may only be carried out by an authorized service center.

Lubrication

Work description ¹ (o/h = operating hours)	Service center	User / operator		Service center ²		
		every 10 hours of operation (daily)	Every 20 o/h	"A" 1st inspection at 100 operating hours	"B" 2nd inspection then every 500 operating hours	"C" every 1500 o/h once a year
Lubrication³ 	Delivery inspection					
Rear axle oscillating bearing	●		●	●	●	●
Planetary drive bearing, front and rear axle, left/right	●		●	●	●	●
hinges, joints	●		●	●	●	●
Door hinges	●		●	●	●	●
Trailer coupling/hitch	●		●	●	●	●
Attachments	●		●	●	●	●
Lubricate loader unit:						
Telescopic boom pad tracks ⁴	●		●	●	●	●
Compensating ram bearing	●		●	●	●	●
Telescopic boom bearing, telescopic cylinder bearing	●		●	●	●	●
Tilt lever bearing, tilt rod bearing	●		●	●	●	●
Lift ram bearing	●		●	●	●	●
Tilt ram bearing	●		●	●	●	●
Quickhitch system facility: bearing on telescopic boom	●		●	●	●	●
Multi-coupling guide pins	●		●	●	●	●

1. Have maintenance and repairs only performed by an authorized service center (acknowledgment of warranty claims).
2. The maintenance work described here may only be performed by an authorized service center.
3. Implement lubricating work for the working unit according to the manufacturer's specification!
4. Special lubricant: tables for operating materials and fill volumes.

Functional check, inspection tasks

Work description ¹ (o/h = operating hours)	Service center	User / operator		Service center ²		
		every 10 hours of operation (daily)	Every 20 o/h	1st inspection at 100 operating hours "A"	"B" 2nd inspection then every 500 operating hours	"C" every 1500 o/h once a year
Functional check, inspection tasks ()	Delivery inspection					
Service and parking brake:						
Checking for correct function	●	●		●	●	●
Check linings ³				●	●	●
Check parking brake line including transfer elements, if necessary, replace ³				●	●	●
Check accelerator pedal and brake-inching pedal: contamination, if necessary clean, spray joints with spray lubricant	●	●		●	●	●
Check brake fluid level, if necessary top up (maintain)				●	●	●
Steering system:						
Steering column adjustment, synchronous wheel position	●	●		●	●	●
Electrical system:						
Electrical and lighting system	●	●		●	●	●
Battery: check charge condition					●	●
Drive interlock	●			●	●	●
Work hydraulics:						
Check safe load indicator (loader unit) for functionality	●	●		●	●	●
Joystick: fuse for road travel	●	●		●	●	●
Hydraulic oil: check the level	●	●		●	●	●
Check the hydraulic oil for condensation water ⁴					●	●
Clean suction filter - hydraulics (sieve inset inlet on hydraulic oil tank)						●
Clean line filter (sieve insert control unit)				●		●
Check pressure accumulator, if necessary correct the pressure level ²					●	●

Work description ¹ (o/h = operating hours)	Service center	User / operator		Service center ²		
Functional check, inspection tasks ()	Delivery inspection	every 10 hours of operation (daily)	Every 20 o/h	“A” 1st inspection at 100 operating hours	“B” 2nd inspection then every 500 operating hours	“C” every 1500 o/h once a year
Load stabilizer (option): check the function	●	●		●	●	●
Axles and gearboxes:						
Check the gearbox oil level	●				●	●
Differential lock front axle/rear axle: check fill level	●				●	●
Planetary drive front axle/rear axle (left/right): check fill level	●				●	●
Loader unit/tires:						
Slide and wear plates on telescopic boom: check, readjust, if necessary replace ⁵	●	●		●	●	●
Quickhitch system: lock	●	●		●	●	●
Tires: damage, inflation pressure, tread depth	●	●		●	●	●
Others:						
Air conditioning system: clean condenser ^{6, 7}	●	●		●	●	●
Air conditioning system: check fill level	●	●		●	●	●
Additional control circuit: check function	●	●		●	●	●
Load stabilizer: check the function	●	●		●	●	●
Trailer couplings: check function, damage, wear	●	●		●	●	●
Clean attachments and check for damage	●	●		●	●	●
Aggressive media: check corrosion protection, if necessary replace			●	●	●	●

1. Have maintenance and repairs only performed by an authorized service center (acknowledgment of warranty claims).
2. The maintenance work described here may only be performed by an authorized service center.
3. Safety part! Have maintenance and repairs performed only by an authorized service center.
4. When using bio oil in particular, check for condensation water (oil probe) and replace the hydraulic oil if necessary.
5. Slide and wear plates under the minimum thickness to be replaced by authorized service center, check wear plates on the telescopic boom.
6. Depending on work operation and dust conditions, it can be necessary to clean the radiator more frequently.
7. The dehumidifier must be replaced by an authorized service center at every interference with the refrigeration cycle.

Work description ¹ (o/h = operating hours)	Service center	User / operator		Service center ²		
Functional check, inspection tasks ()	Delivery inspection	every 10 hours of operation (daily)	Every 20 o/h	"A" 1st inspection at 100 operating hours	"B" 2nd inspection then every 500 operating hours	"C" every 1500 o/h once a year
Engine oil: check the level	●	●		●	●	●
Fuel prefilter: drain the water		●		●	●	●
Coolant: check the fill level, top off if necessary ³		●		●	●	●
Water-oil cooler (engine hydraulic oil): Check for contamination, clean if necessary ⁴		●		●	●	●
Charge-air cooler: drain the condensation water						●
V-belts ⁵ (generator, water pump): check for wear and initial stress, if applicable replace		●			●	●
Check flat belts (reverse cooling fan/reverse fan) check for wear and initial stress, if applicable replace ⁶	●	●			●	●
Check V-belt (air conditioning system), retension	●	●		●	●	●
Clean air filter, dust valve ^{7, 8}		●		●	●	●
Check diesel particulate filter (Opt) for ash load, if necessary replace ⁹				every 3000 operating hours		

1. Have maintenance and repairs only performed by an authorized service center (acknowledgment of warranty claims).
2. The maintenance work described here may only be performed by an authorized service center.
3. Have the coolant replaced every 2 years by an authorized service center. Rinse the cooling system with clean water before refilling it.
4. Depending on work operation and dust conditions, it can be necessary to clean the radiator more frequently.
5. Where the vehicle is not used often, V-belt should be changed every 3 years.
6. Flat belt cannot be retensioned (self-tensioning). Where there is a severe extension and/or wear, it must be immediately replaced by an authorized service center.
7. Replace the filter insert as indicated by the maintenance display, and more frequently in an acidic environment.
8. Automatically cleaned on machines equipped with the "Vacuum-operated preliminary separator" option.
9. After checking or replacing the diesel particulate filter, reset the requirement on the display to zero.

Work description ¹ (o/h = operating hours)	Service center	User / operator		Service center ²		
Functional check, inspection tasks ()	Delivery inspection	every 10 hours of operation (daily)	Every 20 o/h	"A" 1st inspection at 100 operating hours	"B" 2nd inspection then every 500 operating hours	"C" every 1500 o/h once a year
Seat setting, safety belt	●	●		●	●	●
Check the seat contact switch	●	●		●	●	●
Windscreen washer system: check fill level of washer fluid	●	●		●	●	●
Clean breather filter (cab interior) ³			●	●	●	●
Check heater, ventilation (cab)			●	●	●	●
Check the warning and information labels: damage, wear and replace if necessary	●		●	●	●	●
Condition of paint coating	●					
State of the lifting and attachment points: damage, wear				●	●	●

1. Have maintenance and repairs only performed by an authorized service center (acknowledgment of warranty claims).
2. The maintenance work described here may only be performed by an authorized service center. Every 500 hours.
3. Clean more frequently and replace as required when used in applications with increased dust development.

Oil and filter change

Work description ¹ (o/h = operating hours)	Service center	User / operator		Service center ²		
		every 10 hours of operation (daily)	Every 20 o/h	“A” 1st inspection at 100 operating hours	“B” 2nd inspection then every 500 operating hours	“C” every 1500 o/h once a year
Oil and filter change(↺↻)	Delivery inspection					
Engine oil ³					●	●
Engine oil filter					●	●
Fuel filter					●	●
Fuel pre-filter					●	●
Air filter insert ⁴					●	●
Air filter insert – safety cartridge ⁴						●
Gearbox oil in front and rear axle differential				●		●
Gearbox oil ⁵ in the transmission				●		●
Gearbox oil in front and rear axle planetary drives (left and right)				●		●
Hydraulic oil					● ⁶	● ⁶
Filter insert – return filter hydraulic oil tank				●	● ⁶	●
Breather filter ⁴ - hydraulic oil tank					● ⁶	●

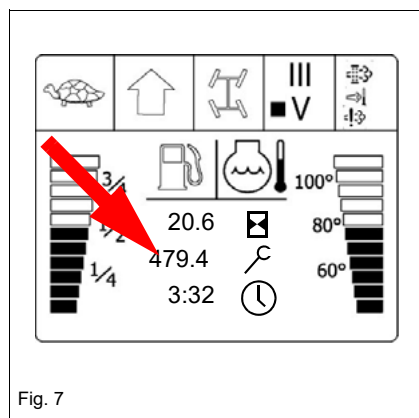
1. Have maintenance and repairs only performed by an authorized service center (acknowledgment of warranty claims).
2. The maintenance work described here may only be performed by an authorized service center.
3. **Important!** Carry out DPF-regeneration whenever possible before every diesel engine oil change.
4. Depending on operation and dust conditions, and in an acidic environment it can be necessary to replace the filters more frequently.
5. At 500 o/h. Oil change after putting the machine into operation for the first time, then every 1500 o/h.
6. Depending on performance. Every 2 years or after 1500 hours of operation.

Threaded fittings

Work description ¹ (o/h = operating hours)	Service center ²	User / operator		Service center ²		
		every 10 hours of operation (daily)	Every 20 o/h	1st inspection at 100 operating hours "A"	"B" 2nd inspection then every 500 operating hours	"C" every 1500 o/h once a year
Screws and nuts or screw connections of the following components must be checked for tight fit, if necessary retighten	Delivery inspection					
Fastening screws of engine and engine suspension	●			●	●	●
Fastening screws of steering system	●			●	●	●
Fastening screws of hydraulic system	●			●	●	●
Fastening screws of loader unit (pin locking), quickhitch facility lock	●			●	●	●
Axle mounting, axle suspension	●			●	●	●
Fastening screws cardan shafts	●			●	●	●
Fastening screws operator cab	●			●	●	●
Wheel nuts	●			●	●	●
Trailer couplings (option)	●			●	●	●
Electrical system: chafe marks on wiring harness, battery terminals, ground and cable connections	●		●	●	●	●

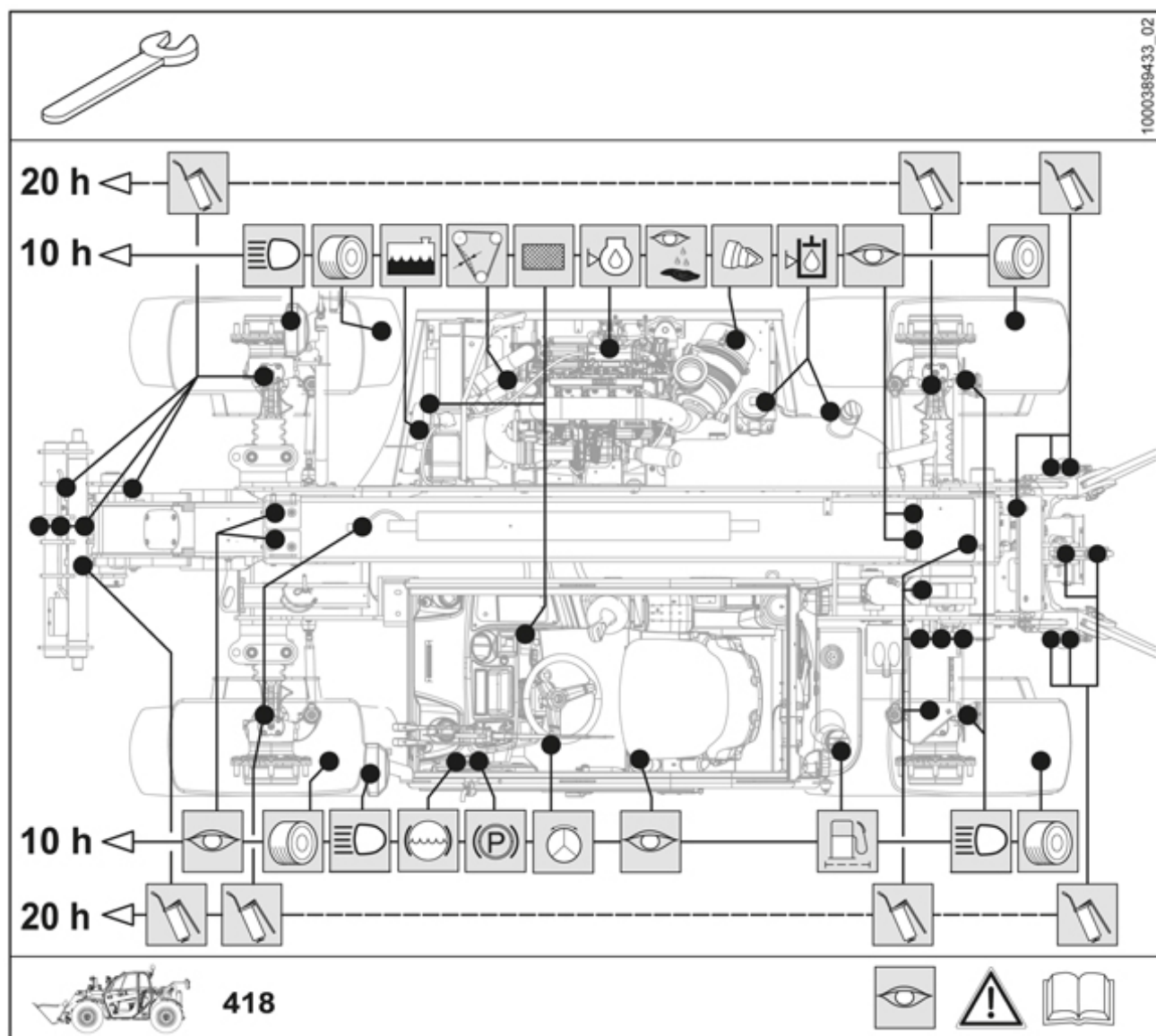
1. Have maintenance and repairs only performed by an authorized service center (acknowledgment of warranty claims).
2. The maintenance work described here may only be performed by an authorized service center.

Service indication



The maintenance intervals are indicated by the service indication in the digital display.

Maintenance label



Information

Explanation of symbols on maintenance label: see next page.

Explanation of symbols on the maintenance label

Affixed to the cabin

Symbol	Explanation
	Before starting maintenance, follow the safety instructions in the Operator's Manual!
	Before starting maintenance, read the "Maintenance" chapter in the Operator's Manual!
	Visual check! Check wear parts and threaded fittings at regular intervals. Loose connections must be immediately re-tightened and worn wear parts must be immediately replaced.
	Check tires for damage, inflation pressure and tread depth!
	Perform a functional check of the light system!
	Check radiator for engine coolant and hydraulic oil for dirt. Clean if necessary!
	Check the coolant. Add coolant if necessary!
	Leakage check: Check for tightness, leaks and chafing: pipes, flexible lines and screw connections. Rectify if necessary!
	Check condition and initial tension of V-belt. Retension or replace it if necessary!
	Compress the dust valve.
	Check engine oil level. Add oil if necessary!
	Leakage check: Check the fuel/water separator. Drain water if necessary.
	Check hydraulic oil level. Add oil if necessary!
	Leakage check: Harnstoff-Tank, Harnstoff pipes and filter! (only with emission level IV, diesel engine)
	Perform a check of the braking system!
	Check the brake fluid. Add fluid if necessary!
	Lubrication service! Lubricate the assemblies concerned.

1.3 Fluids and lubricants

Overview of vehicle fluids and lubricants

Component/application ¹		Fluid/lubricant	SAE grade/specification/ manufacturer designation	Temperature
Diesel engine	About 11.5 l (3.04 gal)	Engine oil ² with filter	EUROLUB CARGO DLC SU-PER SAE 10W-40	Year-round
			PLUS – 50 II 15W-30	-20°C (-4°F) – +30°C (+86°F)
			PLUS – 50 II 15W-40	-15°C (-5°F) – +40°C (+104°F)
Engine cooling	Total approx. 8 l (2.11 gal)	Antifreeze compound ^{3, 4, 5}	4.5 l (1.2 gal) water (55%) + 3.5 (0.92 gal) (45%) ⁵ anti- freeze compound (HAVO- LINE XLC)	Year-round –29°C (–20°F)
Gearbox	About 1.3 l (0.34 gal)	Gearbox oil	SAE 85 W 90 / API CL 5 SAE 90 LS (hypoid gear oil) EXTREME – GARD	Year-round
Planetary drives left/right, front/rear axle	4 x 0.6 l (0.16 gal)		SAE 85 W 90 / API CL 5 SAE 90 LS (hypoid gear oil) EXTREME – GARD LS 90	
Differential Front/rear axle	2 x 6.0 l (1.6 gal)			
Fuel system, fuel tank	About 95 l (25.1 gal)	Diesel ^{6, 7}	DIN EN 590 (EU) / HVO 100% ASTM D975-94 (USA)	Year-round –44°C (–47°F)

Component/application ¹		Fluid/lubricant	SAE grade/specification/ manufacturer designation	Temperature
Oil tank hydraulic system	About 100 l ^{8,9} (26.4 gal)	Hydraulic oil	HVLP-D 46 HVLDP 46 (HYD0530) HY – GARD Hydrau – GARD 46 Hydrau – GARD 46 Plus Hydrau – GARD 46 Arctic	Year-round
		Biodegradable oil	AVIA Syntofluid 46 PANOLIN HLP Synth 46 BIO – Hydrau – GARD 46	
Grease nipples ¹⁰	As required	High pressure Multi-purpose grease	Lithium-saponified Brand-name grease MPG-A3	Year-round
Installation of pins, shafts ¹¹	As required	Acid-proof grease	SP-B3	Year-round
Wiper system	About 3.0 l (0.8 gal)	Cleaning solution ¹²	1 l (0.26 gal) water (33%) + 2 l (0.53 gal) antifreeze compound (67%)	Year-round -20°C (-4°F)
Aggressive media ¹³	As required	Anti-corrosion protection	ELASKON 2000 ML, ELASKON UBS hell ELASKON Aero 46 spezial, ELASKON Multi 80	Year-round
Air conditioning system model 418-12 ¹⁴	About 950 g (33.5 oz)	Refrigerant ¹⁵	R 134a/DIN 6860	Year-round
Air conditioning system Model 418-22 ¹⁴	About 1300 g (45.9 oz)			
Braking system	About 0.5 l (0.13 gal)	Brake fluid ¹⁶	ATF Suffix A	Year-round
Pad tracks ^{17, 18} telescopic boom and inner side of the telescopic boom pipe	As required	Special grease	Optimoly paste TA or Fuchs STABYL TA	Year-round

- The capacities indicated are approximate weights; the oil level check alone is relevant for the correct oil level
- Specification API CI-4
- Factory-fill: antifreeze compound concentrate -60°C (-76°F) and manufacturer specification on the packing.
- To avoid engine damage and possible loss of warranty, only use the approved antifreeze.
- The antifreeze must be replaced every 2 years by an authorized service center.
- To avoid engine damage and possible loss of warranty, only use approved additives by KOHLER (additive or excipients). Observe the Operator's Manual of the engine.
- If fuels that do not comply with DIN EN or ASTM (USA) are used, warranty rights shall not apply in case of diesel engine damage.
- Total filling of hydraulic system approx. 130 liters (34.4 gal).
- DIN 51 524
- Use special grease at temperatures below -15°C (5°F). You can obtain information from your sales partner.
- Before assembly: lubricate the bolts, shafts and bearing with Fuchs "gleitmo" 800. After assembly: lubricate the shafts and bolts via zerk fittings.
- See manufacturer indications on the packaging. Pay attention to the antifreeze compound table.
- Have the sealing checked and repaired at least once a year by ELASKON – see the ELASKON servicing pass supplied with the machine.
- Bear in mind the safety data sheet during maintenance.
- Maintenance work may only be carried out by an authorized service center.
- In order to avoid braking system failure, use only ATF brake fluids. Do not mix the brake fluid with other brake fluids. Read the data safety sheet.
- Lubricate the lower tread radius of the extended telescopic boom and the tread radius in the telescopic boom pipe back, inside, top with a paintbrush or roller.
- Attention! If the telehandler system is treated with the "smooth paint" finish, the pad tracks of the leveling jack as well as the inside of telescopic boom may only be lubricated with the special grease "STABYL TA".

Diesel fuel specification

According to the legal exhaust-gas regulations, diesel engines equipped with exhaust-gas treatment systems must be operated with sulfur-free diesel fuel only.



CAUTION

Health hazard due to diesel fuel!

Diesel fuel and fuel vapors are harmful to health!

- ▶ Avoid contact with the skin, eyes and mouth.
- ▶ Seek medical attention immediately in case of accidents with diesel fuel.
- ▶ Wear protective equipment.

NOTICE

In order to avoid damage to the diesel engine and the exhaust-gas treatment system, use only the diesel fuels specified in the table!

- ▶ If other fuels are used, warranty rights shall not apply in case of damage (guarantee)!
- ▶ When adding additives to the diesel fuel, only use the ones authorized by the engine manufacturer.
- ▶ Operation with RME/PME fuel (biodiesel) or vegetable oils is prohibited!
- ▶ Please contact your dealer if you require more information on fuel.

fuel specification	Cetane number	Use
DIN EN 590 (EU) ASTM D975-94 (USA)	Min. 49	Up to -44°C (-47.2°F) outside temperatures

Coolant

Only the coolant additives listed on page [1-18 "Overview of vehicle fluids and lubricants"](#) may be used.



Environment

Dispose of throwaway containers according to national regulations.

Outside temperature	Water ¹	Antifreeze ²
Up to °C (°F)	% by volume	% by volume
4 (39)	99	–
-10 (14)	79	20
-20 (-4)	65	34
-25 (-13)	59	40
-35 (-31)	55	45
-30 (-22)	50	50

1. Water quality at 20°C (68 °F) = 6.5 – 8.5 ph weight/total hardness 3 – 20 °dGH
(do not use salt, river, brackish or industrial water)
2. Antifreeze concentrate –60°C (–76°F)

Important notice on operation with biodegradable oils

- Use only tested and approved biodegradable hydraulic fluids – see *"Fluids and lubricants" on page 1-18*. Always contact the manufacturer for the use of products other than those that have been recommended. In addition, ask the oil supplier for a written declaration of guarantee. This guarantee is applicable to damage occurring on the hydraulic components that can be proved to be due to the hydraulic fluid.
- Use only biodegradable oil of the same type for adding oil. In order to avoid misunderstandings, a label providing clear information is located on the hydraulic oil reservoir (next to the filler inlet) regarding the type of oil currently used! Replace missing labels!
Mixing two different biodegradable oils can worsen the quality of one of the oil types. Therefore, ensure that the remaining amount of initial hydraulic fluid in the hydraulic system does not exceed 8% when changing biodegradable oil (manufacturer indications).
- Do not add mineral oil – the content of mineral oil should not exceed 2% by weight in order to avoid foaming problems and to ensure biodegradability.
- When running the machine with biodegradable oil, the same oil and filter replacement intervals are valid as for mineral oil – see *"Maintenance plan" on page 1-7*.
- When using biological oil, after every 500 hours of operation an authorized center must take an oil sample and carry out an inspection for condensation; and in any case before the cold season starts. The water content must not exceed 0.1% by weight.
- The instructions in this Operator's Manual concerning environmental protection are also valid for the use of biodegradable oil.
- If additional hydraulic attachments are installed or operated, use the same type of biodegradable oil for these attachments to avoid mixtures in the hydraulic system.



Information

Subsequent change from mineral oil to biodegradable oil must be performed by an authorized service center or by a dealer.

1.4 Maintenance accesses

Engine cover



CAUTION

Risk of injury due to hot and moving engine parts!

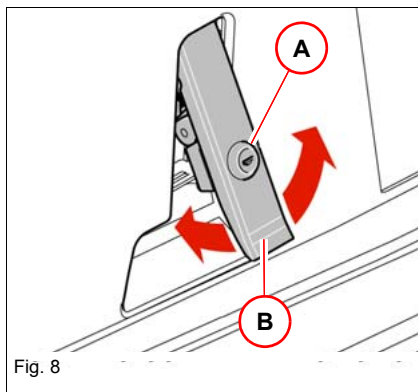
Parts in the engine compartment could be hot or reset when the engine is running and a short while after that. This may cause crushing leading to serious injuries or death.

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

Opening the engine cover

Open the engine cover with the handle.

1. Stop the engine and remove starting key.
2. Unlock the lock **A** with the starting key and at the same time pull the handle **B** up.
3. Remove the starting key.



Engine vat

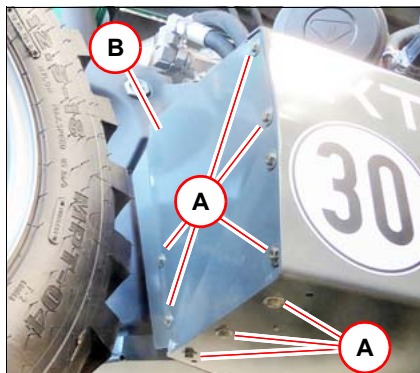


Fig. 9

Engine bay rear

➔ Battery, line filter (control unit)

Open the maintenance access

1. Stop the engine.
2. Open the engine cover.
3. Remove screws **A**.
4. Remove maintenance cover **B**.

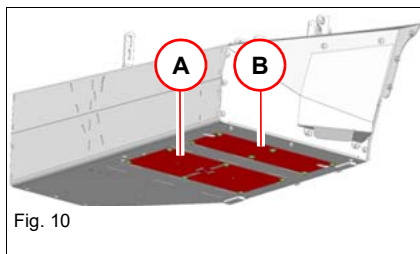


Fig. 10

Lower engine vat

➔ Engine oil change, fuel filter, radiator

Open maintenance access A and B

1. Stop the engine.
2. Remove screws.
3. Remove the maintenance cover.

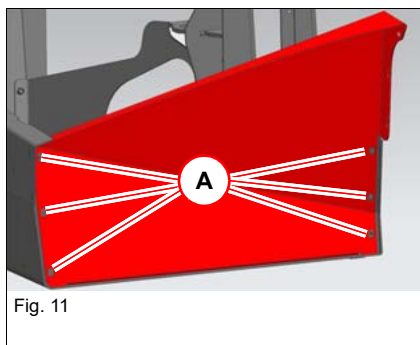


Fig. 11

Engine bay front

➔ Radiator

Open the maintenance access

1. Stop the engine.
2. Open the engine cover.
3. Remove screws **A**.
4. Remove the maintenance cover.
5. Reverse steps to install.

Rear of machine

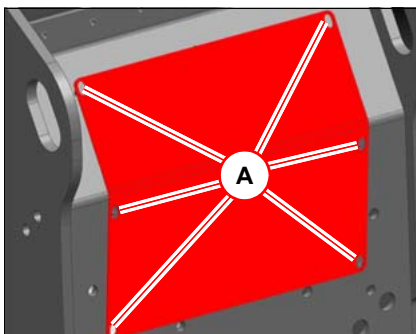


Fig. 12

- ➡ Check the slide plates in the telescopic boom for wear and spray

Opening the cover

1. Stop the engine and remove the starting key.
2. Remove screws **A**.
3. Remove the maintenance cover.
4. Reverse steps to install.

Cab front

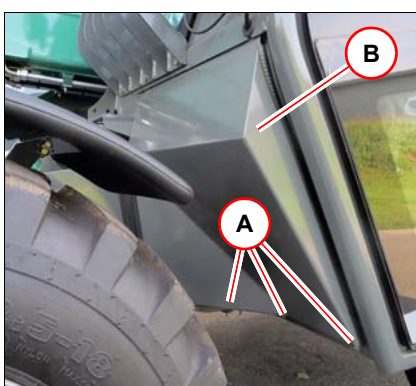


Fig. 13

- ➡ Dehumidifier air conditioning system (Opt)
- ➡ Heating valve
- ➡ Servostat

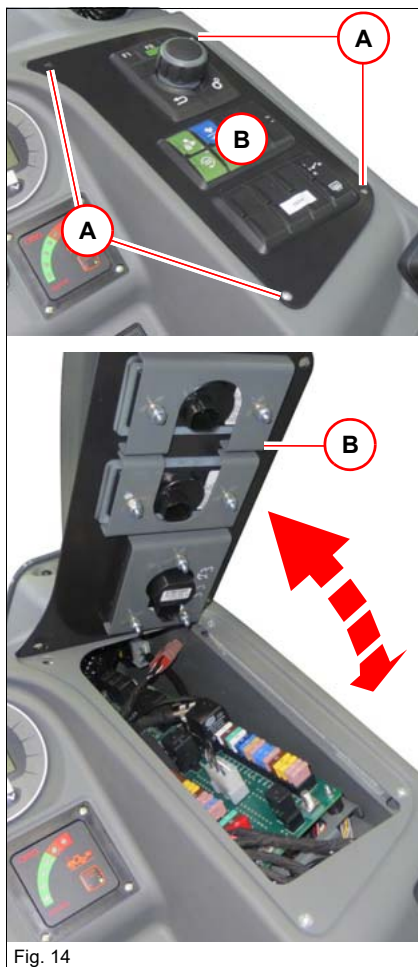
Opening the cover

1. Stop the engine and remove the starting key.
2. Remove 3x **A** screws.
3. Remove maintenance cover **B** downwards.

Closing the cover

1. Push maintenance cover **B** up from below.
2. Tighten 3x **A** screws.

Access vehicle fuses, relay



NOTICE

Damage to the electrical system due to short circuit.

- Always disconnect the battery before performing work on the electrical system in which tools, spare parts, etc. can touch electrical components or contacts.
- Do not clean very sensitive electrical components with a high-pressure cleaner.
- Do not touch light bulbs or headlight reflectors with your fingers.

Open control panel

1. Stop the engine and remove the starting key.
2. Switch off battery master switch **S008** – see *"Switch off the battery master switch S008" on page 1-3.*
3. Unscrew screws **A**.
4. Take off cover **B**.
5. Reverse steps to install.

Relays in the foot area (start interlock)

The relays are located under the cover, next to the accelerator.

1. Switch off battery master switch **S008** – see *"Switch off the battery master switch S008" on page 1-3.*
2. Remove screws **A**.
3. Remove cover **B** from the expansion tank.
4. Remove the trim.
5. Reverse steps to install.

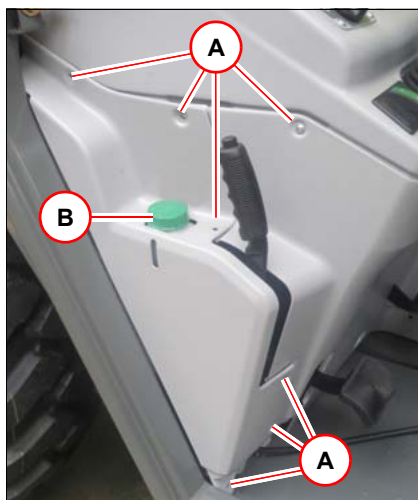


Fig. 15

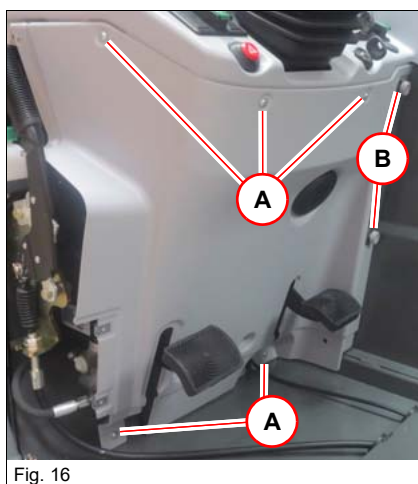


Fig. 16

6. Remove knurled screws **B** and take out interior filter.
7. Remove screws **A**.
8. Move trim forward a little and pull heater hose off of the air nozzle.
9. Take trim off.
10. Reverse steps to install.

1.5 Cleaning and maintenance work

Important information on cleaning and maintenance

The wrong choice of cleaning equipment and agents can impair the operating safety of the machine on the one hand, and on the other put the health of the persons in charge of cleaning the machine at risk. Therefore always observe the following instructions.

NOTICE

Damage to machine due to cleaning work.

- ▶ Pay attention to the lower side in particular when cleaning the machine. Do not allow dirt to collect on the engine or gearbox.
- ▶ Ensure that the spaces between the radiator fins are clean and not blocked.
- ▶ Do not damage the radiator fins when cleaning with a high-pressure cleaner.
- ▶ Always cover the intake connection of the air filter before washing the engine.
- ▶ Do not point the water jet of the high-pressure cleaner at the seals of hydraulic cylinders.
- ▶ Do not clean sensitive electrical components (instrument panel, alternator, compact connectors, control levers, etc.) with a high-pressure cleaner.



Information

Machines with anti-corrosion protection ("aggressive media") must be cleaned separately!



Environment

In order to avoid damage to the environment, clean the machine only in wash bays and places provided to this effect.

Cleaning with washing solvents

- Ensure sufficient room ventilation.
- Wear suitable protective clothing.
- Do not use flammable liquids, such as gasoline or diesel.

Cleaning with compressed air

- Work carefully.
- Wear safety glasses and protective clothing.
- Do not aim the compressed air at the skin or at other people.
- Do not use compressed air for cleaning your clothing.

Cleaning with a high-pressure cleaner or steam jet

- Electrical components and damping material must be covered and not directly exposed to the jet.
- Cover the vent filter on the hydraulic oil reservoir and the filler caps for fuel, hydraulic oil, etc.
- Protect the following components from moisture:
 - Engine
 - Electrical components such as the alternator, oil pressure switches, wiring, electric/electronic parts, etc.
 - Control devices and seals
 - Air intake filters, etc.

Cleaning with flammable anticorrosion agents and sprays

- Ensure sufficient room ventilation.
- Do not use unprotected lights or open flames.
- Do not smoke.

Cleaning inside the cabin



WARNING

Danger of accident due to contamination or malfunction of the pedals!

Failure to observe this can cause serious injury or death!

- ▶ Keep the floor under the pedals clean.
 - ▶ Do not place any objects in the leg room.
 - ▶ Clean the pedal plates.
-

NOTICE

Never use high-pressure cleaners, steam jets or high-pressure water to clean inside the cabin.

- ▶ Water under high pressure can penetrate into the electrical system and cause short circuits.
 - ▶ Seals may be damaged and operator's controls may be disabled!
-

The following aids are recommended for cleaning:

- Broom
- Vacuum cleaner
- Damp cloth
- Bristle brush
- Water with mild soap solution

Cleaning the seat belt (lap belt)



CAUTION

Risk of injury! Dirty or malfunctioning automatic safety belts can prevent them from rolling up properly and impair the operator's safety!

Failure to observe this can cause injuries.

- ▶ Clean the seat belt with water and a mild soap solution.
 - ▶ Only wind the seat belt when it is dry!
 - ▶ Have a malfunctioning belt immediately replaced by an authorized service center.
-

- Clean the seat belt (which remains fitted in the machine) only with a mild soap solution; do not use chemical agents as they can destroy the fabric!

Cleaning the outside of the vehicle

NOTICE

Damage to machine due to cleaning work.

- ▶ Pay attention to the lower side in particular when cleaning the machine. Do not allow dirt to collect on the engine or gearbox.
 - ▶ Do not damage the radiator fins when cleaning with a high-pressure cleaner.
 - ▶ Always cover the intake connection of the air filter before washing the engine.
 - ▶ Do not point the water jet of the high-pressure cleaner at the seals of hydraulic cylinders.
 - ▶ Do not clean sensitive electrical components (instrument panel, alternator, compact connectors, control levers, etc.) with a high-pressure cleaner.
-

NOTICE

Damage due to rusting on paint finish, joints, screwed connections, etc.

- ▶ Clean the machine thoroughly with water after any travel on saline ground conditions or roads and after going to a different site!
-

The following aids are recommended for cleaning:

- High-pressure cleaner
- Steam jet

Cleaning the engine and the engine compartment



CAUTION

Risk of injury due to hot and moving engine parts!

Hot and moving engine parts can cause injury.

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

NOTICE

When cleaning the engine with a water or steam jet, the humidity penetrating the electronics causes it to fail and leads to engine damage!

- ▶ The engine must be cold.
 - ▶ Do not point the water jet directly at any of the electric measuring weight transmitters such as temperature and oil pressure switches or control units.
 - ▶ Protect all electric parts, such as the alternator, connectors, relays, etc. from humidity.
 - ▶ If the water jet is unintentionally pointed at electrical components, dry them with compressed air and apply contact spray to them.
-

The following aids are recommended for cleaning:

- High-pressure cleaner
- Steam jet

Checking screw connection

- All threaded fittings must be checked regularly, even if they are not listed in the maintenance plans.
- Retighten loose connections immediately. See chapter „[Tightening torques on page E-12](#) for tightening torques.

Checking pivots and hinges

- Lubricate all mechanical pivot points on the machine (for example door hinges, joints) and fittings (for example door arresters) regularly, even if they are not listed in the lubrication plan.
- Check the accelerator and brake/inching pedals for dirt, clean them if necessary, apply spray oil to the joints.

1.6 Lubrication work

Preparations



Information

Maintenance intervals – see *"Maintenance plan" on page 1-7*.
Lubricants – see *"Overview of vehicle fluids and lubricants" on page 1-18*.

1. Park the telehandler on level ground.
2. Activate the parking brake and secure the vehicle additionally with wheel chocks.
3. Only raise the loader unit until all grease zerks can be accessed without any risk.
4. Stop the engine and remove the starting key.
5. Switch off battery master switch **S008** – see *"Switch off the battery master switch S008" on page 1-3*.

Lubricating the rear axle oscillation-type bearing

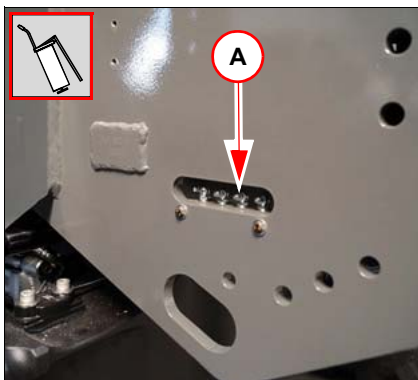


Fig. 17



Information

The machine has an oscillation-type rear axle.
The zerk fitting **A** (3rd from the front) is located on the rear left of the frame and is connected with the axle bearing by means of a hose pipe.

- Maintenance intervals – see *"Maintenance plan" on page 1-7*.
- Lubricants – see *"Fluids and lubricants" on page 1-18*.

1. Remove the protection cap.
2. Apply grease to grease nipple **A** (1x).
3. Attach the protection cap.

Lubricating the planetary drive bearing (front and rear axles)

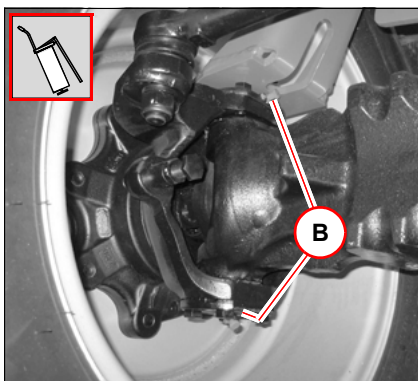


Fig. 18

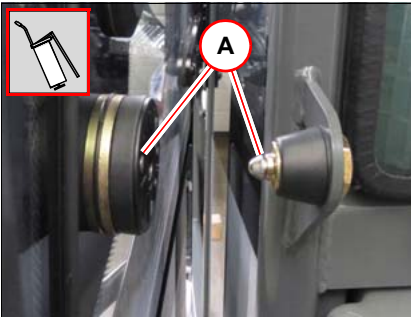


Information

Maintenance intervals – see *"Maintenance plan" on page 1-7*.
Lubricants – see *"Fluids and lubricants" on page 1-18*.

1. Remove the protection cap.
2. Lubricate grease nipple **B** (2 x) on each planetary drive bearing.
3. Attach the protection cap.

Lubricating the door



Information

Maintenance intervals – see *"Maintenance plan" on page 1-7.*

Lubricants – see *"Fluids and lubricants" on page 1-18.*

- Lubricate door arrester **A**.
- Lightly lubricate the door hinge **B** with the oil can.

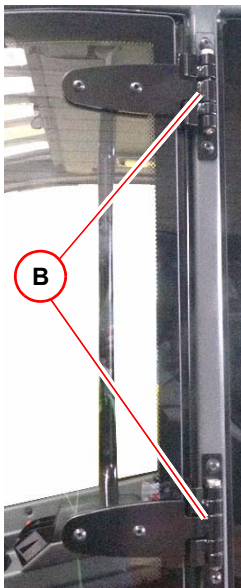
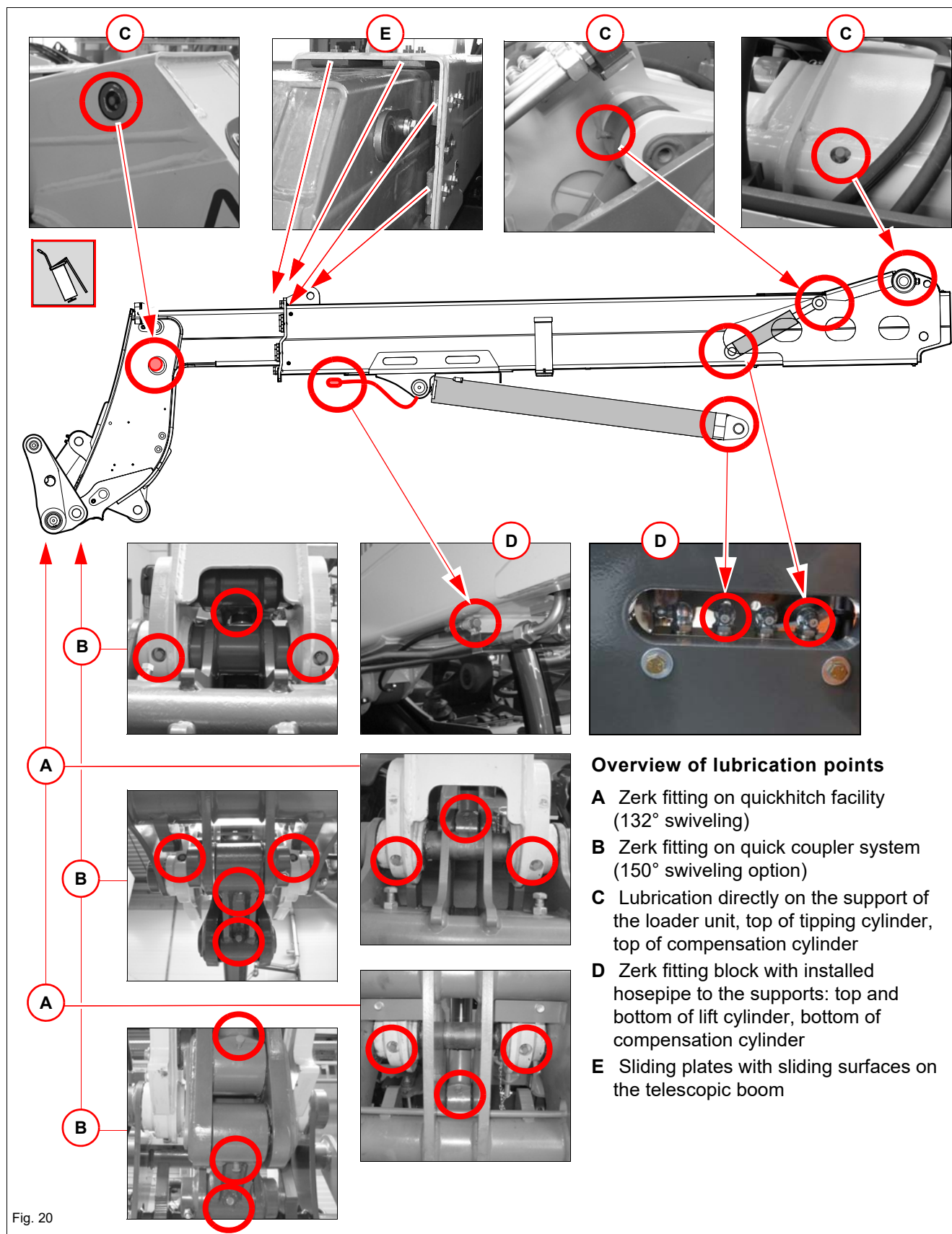


Fig. 19

Lubricating the telescopic boom



Lubricating the telescopic boom



Information

Maintenance intervals – *see "Maintenance plan" on page 1-7.*

Lubricants – *see "Fluids and lubricants" on page 1-18.*

1. Set the quickhitch facility to a horizontal position.
2. Only raise the loader unit until all grease zerks can be accessed without any risk.
3. Stop the engine.
4. Apply the parking brake.
5. Switch off the starter and remove the starting key.
6. Lubricate the lubrication points with a suitable tool.
7. Always lubricate the pad tracks regularly on the inside and outside telescopic boom sections with a suitable tool – *see "Lubricate the pad tracks" on page 1-37.*

Lubricate the pad tracks

NOTICE

Rust formation on the pad tracks leads to serious failures on the telescopic boom as well as the inner tube.

- After washing and drying the telescopic boom, the pad tracks must be lubricated with Optimoly paste TA or Fuchs STABYL TA.

NOTICE

With a horizontally placed loader unit with an extended telescopic boom, if the permissible load-bearing capacity (see load-bearing capacity field 5) can only be retracted jerkily or not at all, the pad tracks must be lubricated with Optimoly paste TA or Fuchs STABYL TA.

Preparing the machine

1. Park the machine on level ground.
2. Apply the parking brake.
3. Raise the loader unit slightly so that the lubrication of the pad tracks can be performed without danger.
4. Extend the telescopic boom completely.
5. Stop the engine and remove the starting key.
6. Remove the cover **A** at the rear of the vehicle
– see *"Rear of machine" on page 1-25.*

Lubricate the pad tracks

1. With a brush or paint roller, lubricate the pad tracks **B** on the telescopic boom on the left side and right as well as top and bottom with Optimoly paste TA or Fuchs STABYL TA – see *"Fluids and lubricants" on page 1-18.*
2. With a brush or paint roller, lubricate the pad tracks **C** of the telescopic boom tube on the **inside** left side, right as well as the top and bottom with Optimoly paste TA or Fuchs STABYL TA.
3. Retract and extend the telescopic boom several times.
4. Attach the cover **A** at the vehicle rear
– see *"Rear of machine" on page 1-25.*

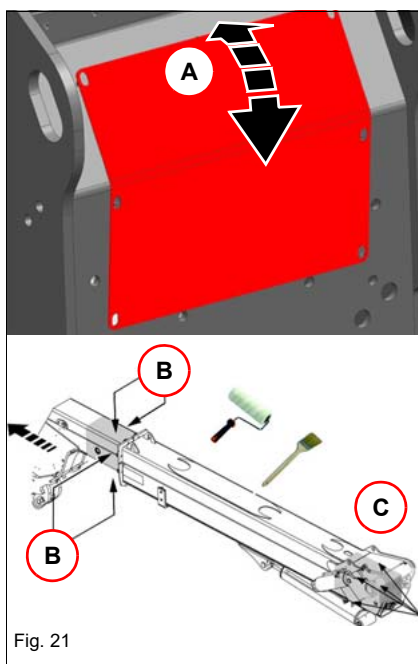


Fig. 21

Treating the pad tracks with applied smooth paint (optional)

The pad tracks of the telescopic boom are treated with the "smooth paint" option.

In order to obtain an optimal mobility of the extension and retraction of the telescopic boom, the bottom side of the telescopic boom as well as the top inside of the telescope outer tube must be treated with special grease.

NOTICE

In order to avoid premature damage from ridges and rust formation of the "smooth paint", the treatment may only be performed using special grease **STABYL TA**.

► Carry out the aftertreatment at the latest **every 20 hours of operation**.

Perform the post-treatment as follows

1. Park the machine on level ground.
2. Apply the parking brake.
3. Raise the loader unit so that the curing can be performed without danger.
4. Extend the telescopic boom completely.
5. Stop the engine and remove the starting key.
6. Remove cover **A** at the vehicle rear.
7. Clean all smooth surfaces of the telescopic boom.
8. Do not use any high-pressure washers, but rather use water with soapsuds.
9. With a brush or paint roller, evenly lubricate the **lower pad track B** of the telescopic boom with special grease **STABYL TA**.
10. If there are signs of rust on the other pad tracks, lubricate these with the special grease as well.
11. With a brush or paint roller, evenly lubricate the **upper pad track** of the inside **C** of the telescopic boom tube with special grease **STABYL TA**.
12. Retract and extend the telescopic boom several times.
13. Attach cover **A** at the vehicle rear.

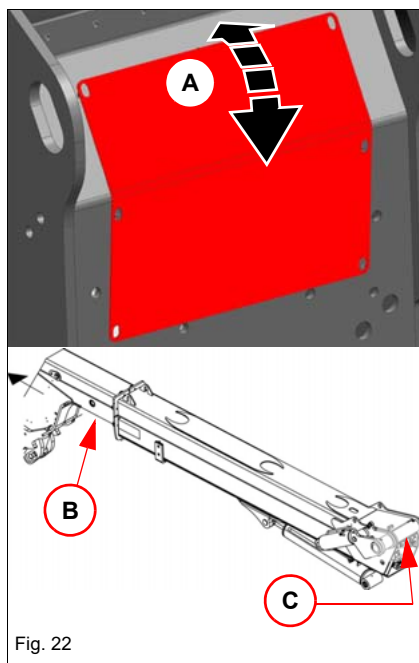


Fig. 22

Spraying oil onto the slide plates after a salt application (with a spray lance)

NOTICE

Rust formation on the slide plates of the telescopic boom causes damage to the machine.

- An oil coating must be applied to them after washing and drying the telescopic boom.



Environment

Risk for the environment due to spray oil!

- When spraying oil onto the machine, position it only on surfaces with oil separators.
- When applying spray oil, place a container to collect the oil as it drips.
- If possible, use biodegradable oil for spraying
– see *"Fluids and lubricants" on page 1-18*

Preparing the machine

1. Park the machine on level ground with an oil separator.
2. Apply the parking brake.
3. Extend the telescopic boom completely before spraying.
4. Stop the engine.
5. Switch off the starter and remove the starting key.
6. Remove cover **A** on the vehicle rear – see *"Rear of machine" on page 1-25*.

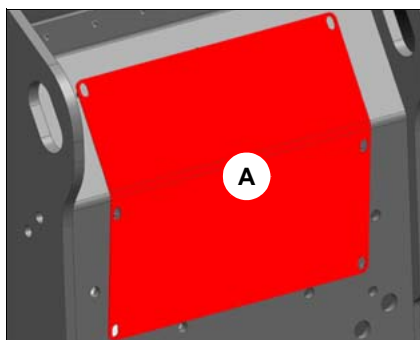


Fig. 23

Spray the telescopic boom

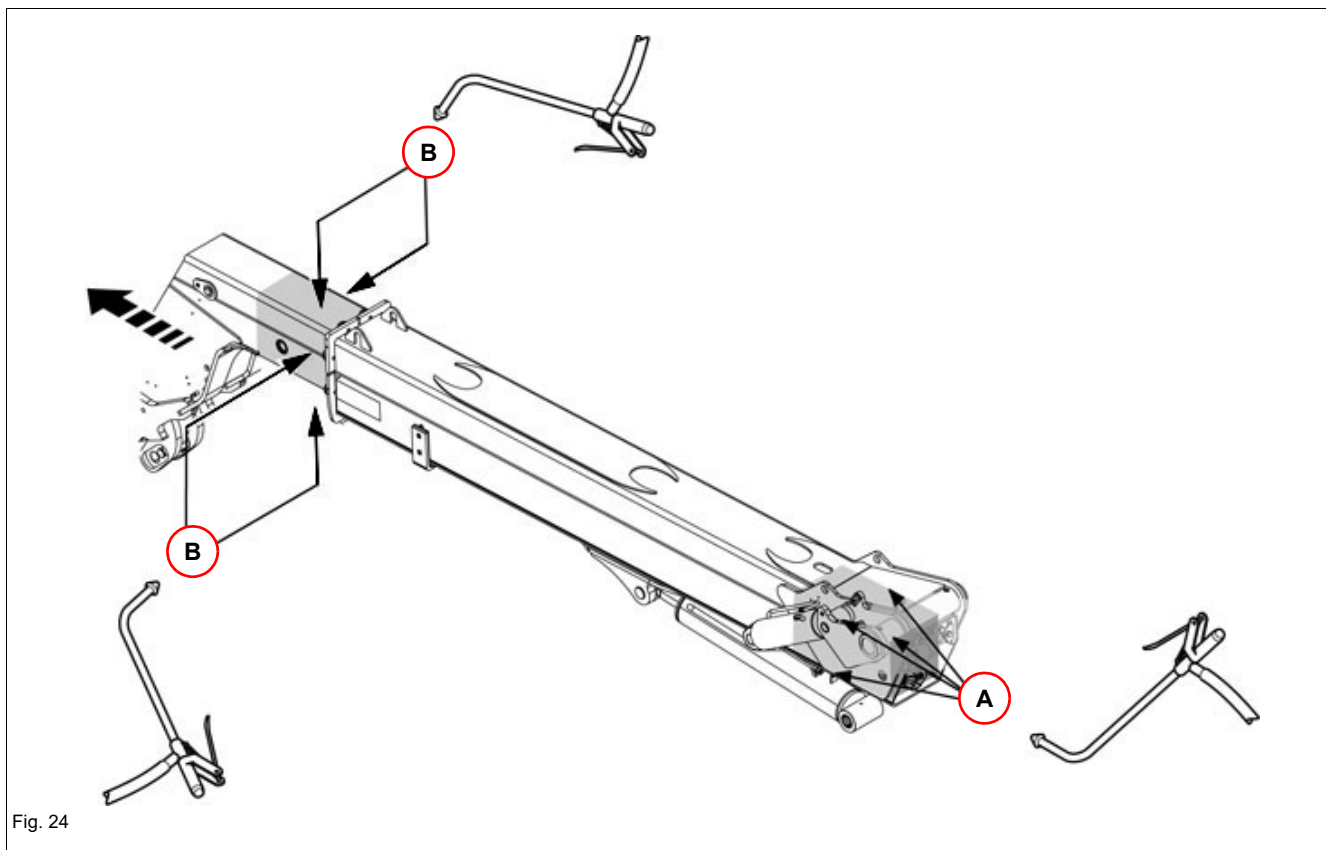


Fig. 24

Information

Check the quantity of sprayed oil: the spray oil must neither run nor drip.

1. Spray oil onto all lateral, upper and lower slide plates **A** inside the telescopic boom.
2. Spray oil onto all lateral, upper and lower slide plates **B** outside the telescopic boom.

After spraying oil

3. Retract and extend the telescopic boom several times.
4. Attach cover **A** on the vehicle rear – see *"Rear of machine"* on [page 1-25](#).

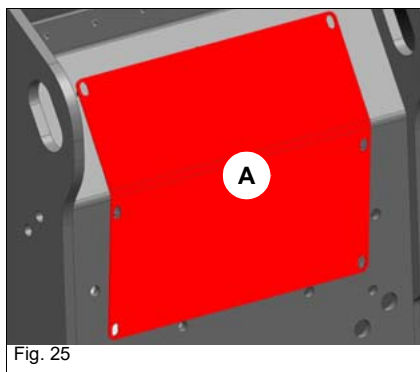


Fig. 25

Central lubrication system (option)

Functional description of the central lubrication system

The central lubrication system allows you to lubricate all lubrication points of the telescopic loader in one single step.



Information

Maintenance intervals – see *"Maintenance plan" on page 1-7*.
Specifications and capacities – see *"Fluids and lubricants" on page 1-18*.

- The yellow LED illuminates for 1.5 seconds upon switching on ignition to indicate functional readiness of the controls (switch-on check). It stays lit during the entire lubrication procedure.
- The integrated electronic control unit has a data memory for saving the times that have been set or that have elapsed. The time is taken and saved if the starter is switched off during lubrication or during a break. The remaining lubrication time or break time is read from the memory upon switching the starter on again, and lubrication is resumed where it was interrupted.

Time control

- Break and lubrication times can be set with the time-dependent control of the central lubrication system. Break times are the periods between two lubrication times.



Information

Pressing the push button **A** on the side of the pump starts intermediate lubrication at any time if the starter is switched on. This also serves as a functional check.

The pump then immediately starts with a lubrication cycle. The lubrication or break time that has elapsed so far or that has been saved is reset and starts over again.

A lubrication system malfunction can also be reset by pressing the intermediate lubrication switch, and the pump restarts lubrication.

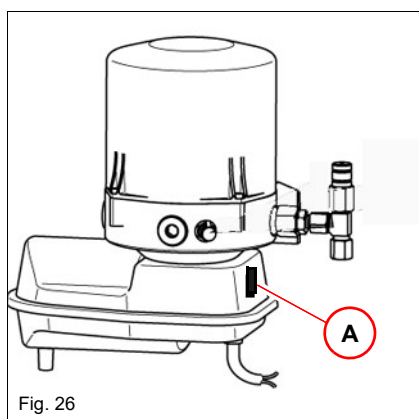


Fig. 26

Repair work

Repair work on the central lubrication system may only be performed by authorized service centers!

Lubricating with the central lubrication system (option)

Setting the lubrication and break times

Break times and lubrication times are set with the notched switches **S** and **P** in the window of the controls.

1. Remove the red frame on the protective motor housing of the pump with a flat screwdriver to set the time.
2. Loosen the four cross-slotted screws and remove the transparent cover.
3. Set the break time **P** and the lubrication time **S** with a flat screwdriver.
4. Install the transparent cover (window) once the settings are performed.

Lubrication time (S)

- 1 to 16 min. (16 notches each up to 1 min.)
- 2 to 32 min. (16 notches each up to 2 min.)

Break time (P)

- 0.5 to 8 h (16 notches, 0.5 h each)

Yellow LED (L)

- **(B)** lubrication system in operation
- **(A)** lubrication in progress: 0.5 seconds LED ON/0.5 seconds LED OFF

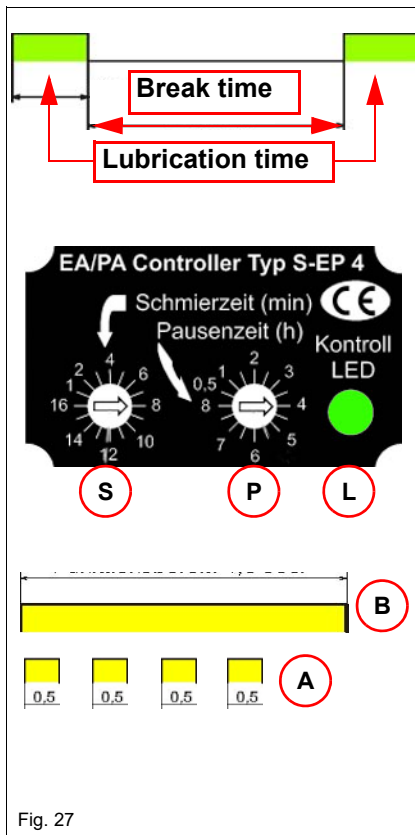
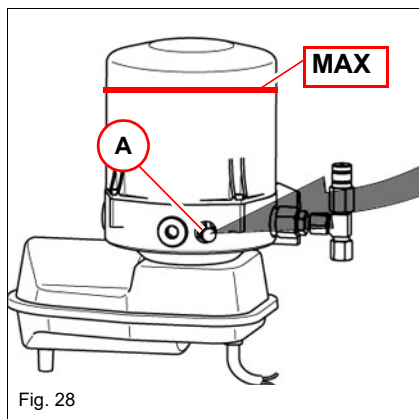


Fig. 27

NOTICE

Water can penetrate into the controls and cause lubrication system failure if the cover is not fitted and closed correctly!

Filling the central lubrication system (option)



The lubrication system is filled via conical grease nipple **A** or a fill coupling with a manual or pneumatic grease gun.

NOTICE

Damage to central lubrication system due to penetration of humidity to the controls.

- Always close the cover correctly, otherwise water can penetrate into the controls and destroy them.

NOTICE

Only fill up to the maximum level in order to ensure the ventilation of the central lubrication system.



Information

Maintenance intervals – see *"Maintenance plan" on page 1-7*.
Specifications and capacities – see *"Fluids and lubricants" on page 1-18*.

1.7 Slide plates

Checking the slide plates

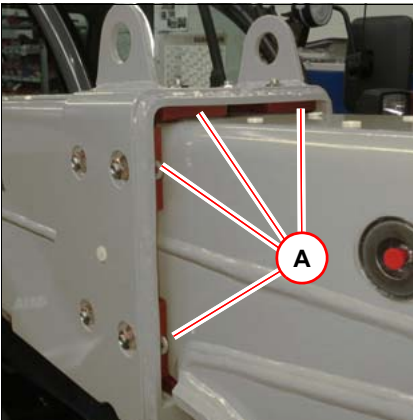


Fig. 29

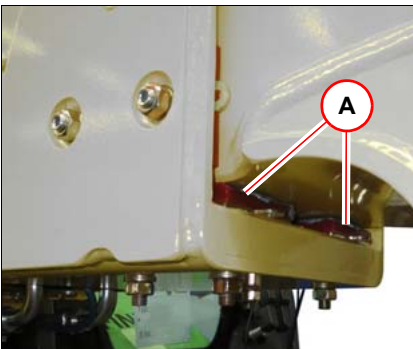


Fig. 30

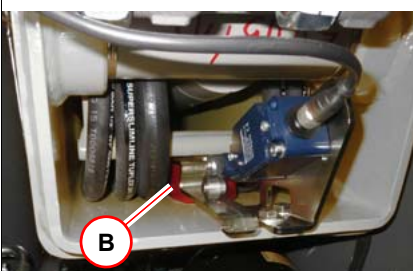
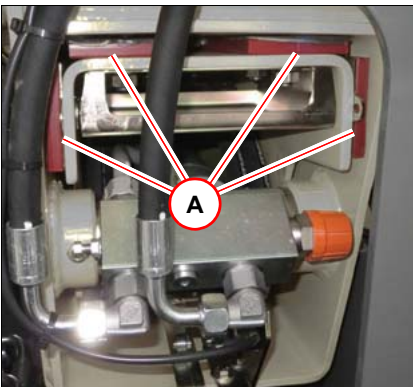


Fig. 31

In the outer tube of the telescopic loader unit there are slide plates for the telescopic boom, on the front and rear.

Information

Maintenance intervals – see *"Maintenance plan"* on page 1-7.

NOTICE

Check the wear limits of the sliding plates regularly!

- ▶ Have the sliding plates readjusted with compensating panels if wear exceeds 1 mm (0.004 in).
- ▶ Replace the wear pads if they are below the specified minimum thickness!
- ▶ Have the sliding plates only readjusted or replaced by an authorized service center.
- ▶ **Caution!** If the checking, adjusting and/or replacing of sliding plates is not performed, this may lead to severe damage (formation of furrows due to scoring) on the pad tracks, making a complete replacement of the telescopic boom necessary.

Pos.	Location	Slide plates in new condition	Slide plates minimum thickness
A	Front/rear top/side	13 mm (0.51 in)	> 10.5 mm (0.41 in)
B	Lower rear center	40 mm (1.57 in)	> 35 mm (1.38 in)

Information

Have the slide plates only readjusted or replaced by an authorized service center.

Changing the slide plates

Readjusting with balance weights

The sliding plates are located between the inside and outside boom sections of the telescopic arm.

Information

If the slide plates are not below the minimum thickness – [see "Checking the slide plates" on page 1-44](#) all that needs to be done is to readjust them with additional filler plates, inserted between the outer telescopic boom and the slide plates themselves.

Dismount the stripper (opt.)

1. Lower the boom and extend it a little.
2. Loosen the **A** nuts on both sides.
3. Remove stripper **B**.

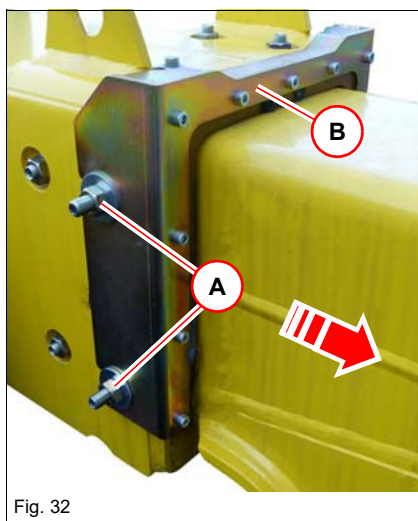


Fig. 32

Replace front slide plates

Information

When changing the lower slide plates:

Extend the boom by about 20 cm (7.87 in) and push it up even further by placing the quickhitch facility on the floor.

1. Lower the boom and extend it a little.
2. Loosen nuts **C**.
3. Remove setscrew **B**.
4. Pull out slide plate **D** and any filler plate(s) **A** from the boom.
5. Insert the new slide plate **D** and any required filler plate(s) **A** into the boom.
6. Install setscrew **B**.
7. Tighten nuts **C**.
8. Retract the telescopic arm.

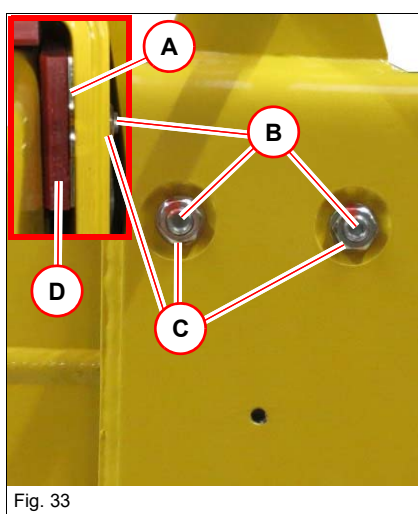


Fig. 33

Mount the stripper (opt.)

1. Position stripper **B**.
2. Tighten the **A** nuts on both sides.
3. Retract the telescopic arm.

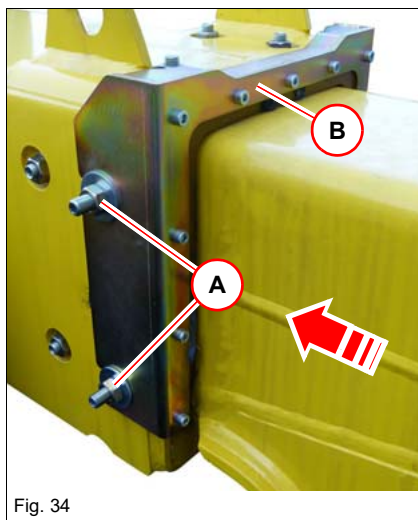


Fig. 34

Replace rear top slide plates

1. Expand telescopic boom by about 20 cm (7.87 in).
2. Push the boom even further upwards by placing the quickhitch facility on the floor.
3. Loosen 4 **A** nuts.
4. Remove deflector plate **D**.
5. Dismount 4 threaded **C** pins.
6. Pull out slide plates **B** and any filler plate(s) from the boom.
7. Insert the new slide plates **B** and any required filler plate(s) into the boom.
8. Mount 4 threaded **C** pins.
9. Position deflector plate **D**.
10. Tighten the 4 nuts **A**.
11. Raise boom in order to lift quickhitch facility from ground.
12. Retract the telescopic arm.

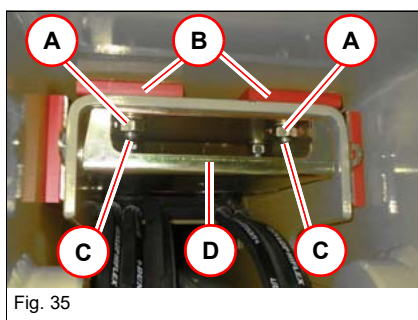


Fig. 35

Replace rear lateral slide plates

1. Loosen 4 **A** nuts.
2. Remove deflector plate **B**.
3. Remove 2 **D** nuts together with washers.
4. Dismount 2 threaded **C** pins.
5. Pull out slide plate **E** and any filler plates **F** from the boom.
6. Insert new slide plates **E** and any required filler plate(s) **F** into the boom.
7. Mount 2 threaded **C** pins.
8. Remove 2 **D** nuts together with washers.
9. Position deflector plate **B**.
10. Tighten the 4 nuts **A**.

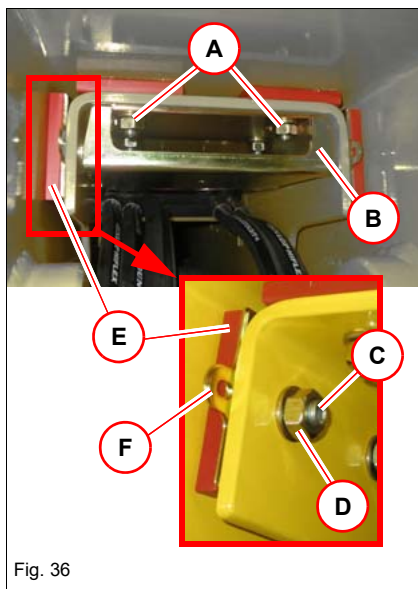


Fig. 36

Replace rear bottom slide plate

1. Mount connector to limit switch **A**.
2. Release screws **B** and remove mount **C** with limit switch **A**.
3. Remove nuts **D** together with discs.
4. Dismantle threaded pin **E**.
5. Remove slide plate **F**, limit switch plate **G** and any **H** filler plate(s) from the boom.
6. Insert new slide plate **F**, limit switch plate **G** and any required filler plate(s) into the boom.
7. Mount threaded pin **E**.
8. Mount nuts **D** together with discs.
9. Place holding support **C** with limit switch **A** into the telescopic boom.
10. Tighten **D** screws together with washers.
11. Mount connector to limit switch **A**.

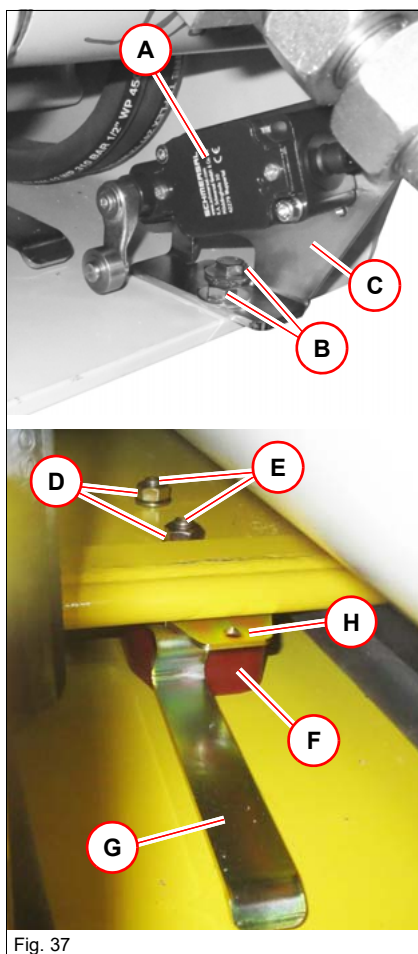


Fig. 37

1.8 Fuel system

Safety instructions for fuel system



WARNING

Risk of burns due to flammable vapors from diesel fuel!

Non-compliance can lead to serious injuries or even death.

- ▶ Do not smoke, avoid fire and open flames.
- ▶ Spilled diesel must be immediately cleared up
- ▶ Gasoline mixtures are not permitted in the diesel fuel!



CAUTION

Health hazard due to diesel fuel!

Diesel and its vapors are harmful to health!

- ▶ Avoid contact with the skin, eyes and mouth.
- ▶ Seek medical attention immediately in case of accidents with diesel fuel.
- ▶ Wear protective equipment.

NOTICE

Damage to machine due to diesel fuel.

- ▶ Maintain fuel systems according to the intervals stipulated in the repair manual.
- ▶ Only use clean, high-weighted diesel fuel.
- ▶ Do not add gasoline.
- ▶ After working on the fuel system, engine or engine area, clean away any potential adherent fuel.
- ▶ Use a fine-filter in the fill line of the diesel fuel.
- ▶ Maintain the diesel fuel specification – see *"Diesel fuel specification" on page 1-20.*



Environment

Use a suitable container to collect the fuel as it drains and dispose of it in an environmentally friendly manner! In order to lower the risk of fire, keep the vehicle clean and wipe away any spilled fuel immediately!

Stationary fuel pumps

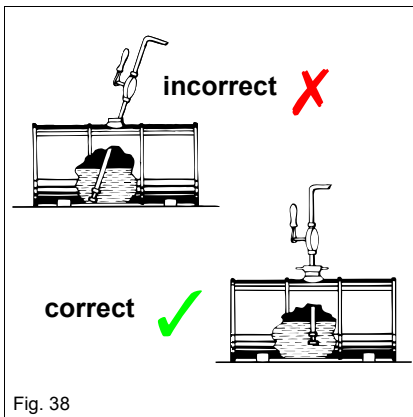


Fig. 38

NOTICE

To avoid damage to the fuel system, only fill up fuel at stationary fuel dispensing systems.

- Fuel from barrels or canisters is often impure and leads to an increase in engine wear.
- Impure fuel leads to damage in the fuel system and lower efficacy for the fuel filter.

If filling up from barrels is unavoidable, the following should be observed:

- Barrels should be neither rolled nor tipped prior to filling up.
- Protect the intake pipe for the barrel pump with a fine mesh sieve.
- Put the intake pipe for the barrel pump up to within max. 15 cm (5.9 in) of the barrel base.
- Only fill the tank with filling aids (hopper or filling tube) with built-in filter.
- All vessel for refueling must always be kept clean.

Filling up with fuel

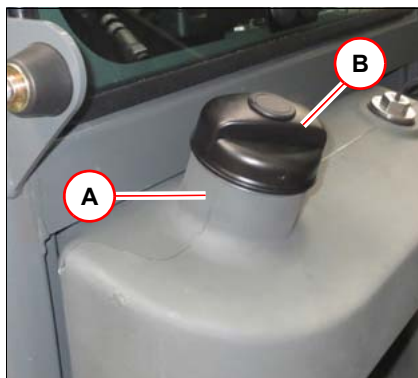


Fig. 39

Filler inlet **A** of the fuel tank is located on the left in travel direction, behind the cab. (refer to the label affixed near the filler opening).



WARNING

Fire and explosion hazard due to flammable vapors!

Failure to observe this can cause serious injury or death!

- ▶ Ensure that there are no naked flames or sources of sparks nearby.
- ▶ Do not smoke.



WARNING

Fire and suffocation hazard due to refueling in closed rooms!

Non-compliance can lead to serious damage to health or even death!

- ▶ Do not refuel in closed rooms.

Refuel as follows

1. Lower the loader unit to the ground.
2. Stop the engine and remove starting key.
3. Clean the area around the filler opening before opening the filler cap.
4. Open the filler cap and refuel the fuel tank via the filling screen.



Information

Technical data and fill capacities – see *"Fluids and lubricants"* on page 1-18 and – see *"Diesel fuel specification"* on page 1-20.

Drain fuel

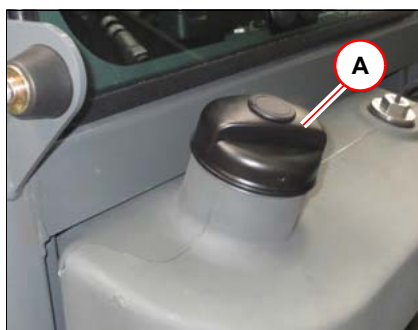


Fig. 40

1. Lower the loader unit to the ground.
 2. Stop the engine and remove starting key.
 3. Clean the area around the filler opening before opening the filler cap.
 4. Open fuel cap **A** and remove filling sieve.
 5. Pump off the fuel into one or more barrels, using a pump to do so.
- ➡ Capacity about 80 liters (21.13 gal.)

Check / clean fuel filter

CAUTION

Injury hazard due to rotating parts!

Rotating parts can cause serious injury.

- ▶ Stop the engine before opening the engine hood.
- ▶ Turn off ignition and take out starting key.
- ▶ Switch off battery master switch **S008** – see *"Switch off the battery master switch S008" on page 1-3.*
- ▶ Apply the parking brake.

Information

Maintenance interval – see *"Maintenance plan" on page 1-7*
Specifications and fill volumes – see *"Fluids and lubricants" on page 1-18.*

- ▶ The condensation in the fuel filter must be drained at the latest when the control light illuminates on the instrument panel.

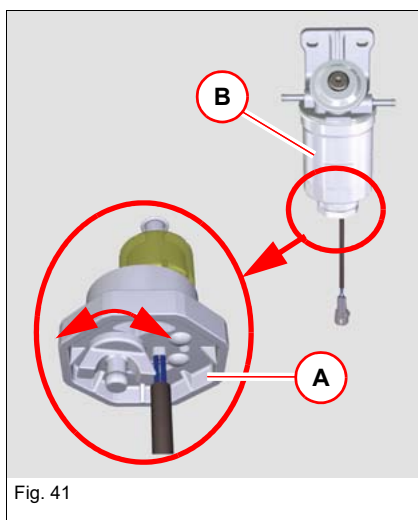


Fig. 41

Drain condensation water as follows

1. Lower the loader unit to the ground.
2. Stop the diesel engine and remove starting key.
3. Apply the parking brake.
4. Open the engine cover – see *"Engine cover" on page 1-23.*
5. Place a suitable container underneath to collect the oil.
6. Open drip cock **A** on fuel filter **B**, to do this, turn drip cock **A** anti-clockwise.
7. Drain condensation water.
8. Close drip cock **A** on fuel filter **B**, to do this, turn drip cock **A** clockwise.
9. Start diesel engine and check fuel filter **B** for leaks.
10. Close engine cover – see *"Engine cover" on page 1-23.*

Environment

Collect condensation water/leaking fuel with suitable vessel and dispose of in an environmentally-friendly way!

Information

Drain water more frequently at temperatures around or below 0°C/32°F, otherwise problems can arise even if winter diesel is used.

Replace the fuel filter



WARNING

Explosion and fire risk when handling fuel!

Can lead to severe burns or even death.

► Never bleed fuel system when the engine is hot!



Environment

Collect leaking fuel with suitable vessel and dispose of in an environmentally-friendly way!



Information

Maintenance intervals – see *"Maintenance plan" on page 1-7.*

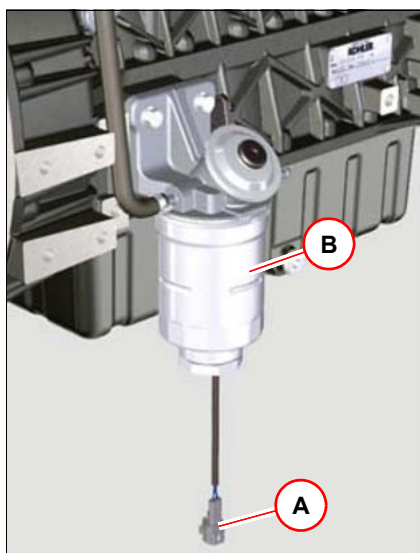


Fig. 42

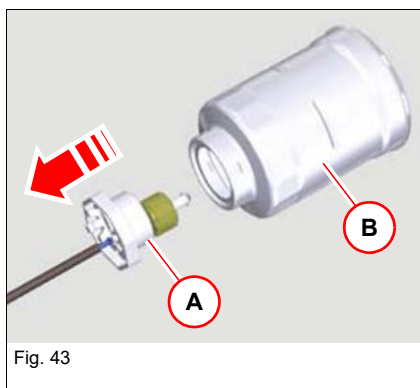


Fig. 43

1. Park the vehicle on firm and level ground.
 2. Lower the telescopic boom fully.
 3. Apply the parking brake.
 4. Stop the engine.
 5. Turn off ignition and take out starting key.
 6. Open engine cover – see *"Opening the engine cover" on page 1-23.*
 7. Put down a suitable collecting container.
 8. Disconnect the connector **A** on the water sensor.
 9. Loosen and unscrew filter cartridge **A** with a commercially available filter spanner.
10. Unscrew water sensor **A** from the filter cartridge **B**.

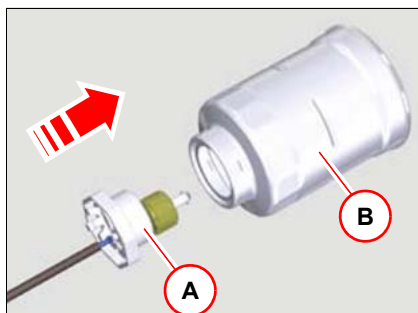


Fig. 44

11. Screw water sensor **A** into the new filter cartridge **B**.

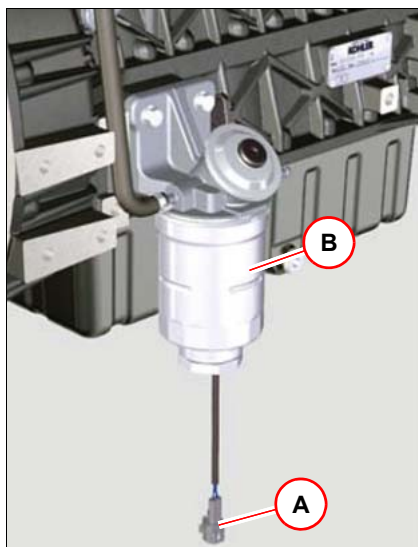


Fig. 45

Information

Do not fill the new filter cartridge **B** with fuel!

12. Lightly grease the rubber seal on the new filter cartridge **B**.
13. Screw the new filter cartridge **B** into place by hand, until it touches the seal.
14. Tighten the filter cartridge **B** with 17 Nm (12.5 lbf ft).
15. Connect the connector **A** to the water sensor.
16. Bleed the fuel system – see ["Bleeding the fuel system" on page 1-53](#).
17. Start engine and check tightness of filter cartridge **B**.
18. Close engine cover – see ["Opening the engine cover" on page 1-23](#).

Bleeding the fuel system

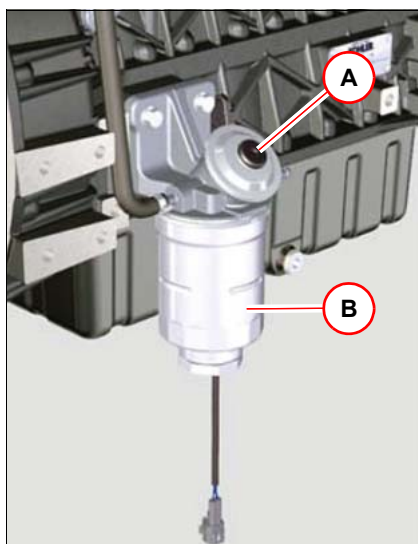


Fig. 46

Information

After fuel tank runs empty or servicing the fuel system (filter change, cleaning the water separator, etc.) the hand pump **A** must be used several times in order to fill the fuel filter **B**. After this, the fuel system vents the air automatically as soon as the motor is started!

1.9 Exhaust gas treatment

ExhaustAfter-treatment System

Depending on the country-specific approval, various exhaust after-treatment systems can be installed in the vehicles.

- ➔ In all EU countries, the USA, Canada and Switzerland, the systems must be installed with a diesel oxidation catalyst (DOC) with a diesel particle filter according to the EU emission tier IV, tier 4F
- ➔ In non-EU countries with a standard exhaust system, they must be installed according to the guidelines of the emission tier III/A without a certificate.

Emission system overview

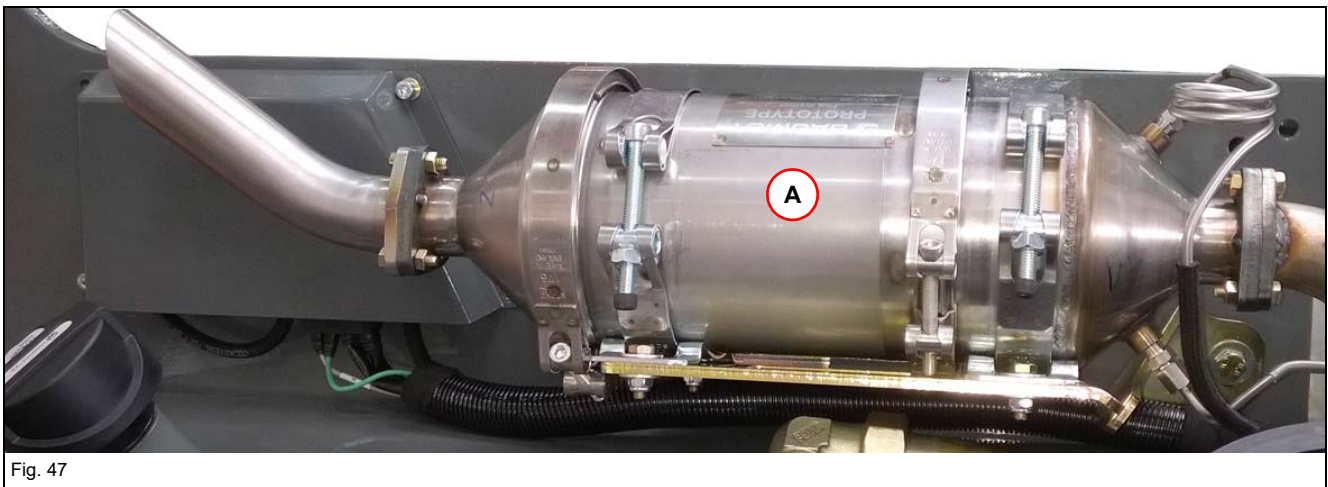


Fig. 47

A Diesel oxidation catalytic converter (DOC) with DPF.

Diesel oxidation catalytic converter (DOC)

The DOC module consists of a diesel oxidation catalyst DOC, which oxidizes the carbon monoxide (CO) and the unburnt hydrocarbons (HC) with its catalytic surface. In addition, the carbon monoxides (NO) are oxidized into carbon dioxides (NO₂) in a temperature range between 200°C (392°F) and 450°C (842°F).

Diesel particulate filter DPF

Particulates gather in the DPF which are combusted along with nitrogen dioxide if the exhaust gas temperature is sufficient. This procedure requires a minimum NO_x-soot ratio in the engine exhaust. This ensures the DPF continually regenerates.

Coated Soot Filter or Catalyzed Soot Filter CSF

The particulate filter system consists of a diesel oxidation catalyst DOC and an integrated diesel particulate filter DPF, which are referred to as a CSF System.

Regeneration of the diesel particulate filter



WARNING

**The parts of the exhaust after-treatment become very hot.
There is a risk of fire and explosion!**

Failure to observe this can cause serious injury.

- ▶ Keep your hands clear of the exhaust outlet!
- ▶ During machine operation, ensure that there is no easily flammable material in the immediate vicinity of the exhaust system, in particular near the exhaust pipe!
- ▶ When stopping the machine while the engine is running, ensure that there is no flammable or combustible material in the immediate vicinity of the exhaust opening (for example paper, dry grass, straw, wood, wood ceilings, oil, fuel, etc.).
- ▶ Do not park the machine in high dry grass or straw.
- ▶ Never use corrosion-protection agents for exhaust pipes, heat shields or the diesel particulate filter. They can catch fire if the engine is hot.

Automatic regeneration

The automatic regeneration is a continuous process that starts as soon the conditions required for it (soot load and exhaust-gas temperature) are fulfilled.

- Ash is also collected during the combustion of soot, however it is not eliminated from the system by regeneration. This ash load leads to reduced regeneration intervals which then makes it necessary to replace the diesel particulate filter within the framework of maintenance.

The control lamp illuminates during the regeneration .

The vehicle can be operated without restriction during the automatic regeneration so long as there is no highly flammable material within the vicinity of the vehicle.

If the ignition is put into the position **0** during the regeneration phase, the regeneration stops and the indicator lights illuminate.

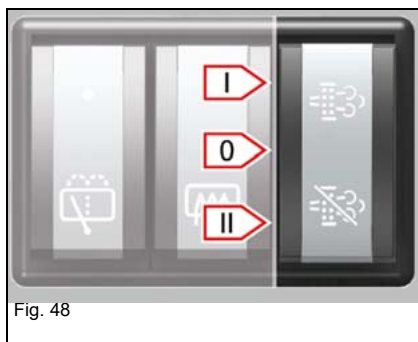
Regeneration is automatically triggered again when the engine is restarted and the as soon as the required temperature is reached. The previous manual interruption causes the subsequent regeneration to take longer as a result of the higher load.

If the regeneration does not occur automatically (exhaust temperature too low due to short distances or low load operation), then the system indicates that a manual regeneration is necessary, display exhaust emission treatment.

Regeneration must then be manually initiated by the operator.

Consequences of an interruption

If regeneration is manually interrupted or the ignition is switched off, regeneration stops. This leads to the load not being removed from the diesel particulate filter. The subsequent regeneration takes longer due to the increased load.



Manual regeneration

- Required time is about 30 minutes, during which time the machine must not be moved.
 - Engine coolant temperature at least 75°C (167°F).
 - Park the machine on firm, non-flammable ground.
 - Loader unit lowered to the floor.
 - Activated parking brake.
 - Disable the joystick lock.
 - Electric consumers switched off.
1. Warm up the vehicle [coolant temperature at least 75°C (167°F)].
 2. Do not stop the diesel engine. Allow it to idle.
 3. Initiate regeneration by pressing button for approx. 2 seconds in position I.
- ➔ Regeneration is in operation (time-frame of regeneration approx. 30 minutes)
 - ➔ The engine speed is automatically increased after a few seconds.
 - ➔ If the idling speed of the diesel engines reduces, the symbol in the display and the warning lights goes out, the regeneration has been successfully completed.

If manual regeneration is interrupted for one reason or another

1. Repeat the entire regeneration as described above.
2. If there is another interruption to manual regeneration, the system for exhaust emission treatment must be checked by an authorized service center or replaced.

Interrupt/prevent regeneration

Under certain circumstances the running regeneration can/must be interrupted or the start of an automatic regeneration can be prevented:

- Vehicle is on flammable ground and in flammable surroundings.
- Vehicle must be refueled immediately.

If the diesel particulate filter's soot load is already over 90%, a running regeneration cannot be interrupted and the start of an automatic regeneration cannot be prevented.

1. Press button for approx. 2 seconds in position II.
- ➔ Regeneration is interrupted/cancelled immediately.
 - ➔ Engine speed of the diesel engine is reduced.
 - ➔ Symbol goes out on the display.
2. Manually start regeneration at next possible opportunity.

Prevention of regeneration can be offset by pressing the button in position II again.

Notes

The DPF-BA-B regenerates itself continuously, as long as the exhaust gas temperature raises to above 220°C (428°F).

This regeneration temperature must be attained for around 25% of the overall operating time of the diesel motor. If this temperature has not been reached for a long period of time, the particulate filter will become clogged with soot particles and exhaust gas pressure will rise.

The longer the exhaust gas temperature remains below the regeneration temperature, the higher the exhaust gas pressure in front of the particulate filter will rise. This will be indicated by the data logger **B** or the pressure gauge (if one is present). With the rising counter-pressure, the soot emission of the diesel motor also rises.



Information

An extended free-wheeling of the diesel motor should be avoided without fail.

The filter function control with visual/audible warning must be installed in parallel with the particulate filter. When the counter-pressure rises to above 250 mbar (3.6 psi) a visual alarm is activated (after 5 sec) and an audible alarm (after 2 min).

The filter regeneration must be initiated as follows by the operator through an increase in exhaust emission temperature where there is high counter-pressure and also after the alarm for electronic counter-pressure monitoring (illumination of warning lights/sounding of alarm).

- Hydraulic systems are to be left running at intervals against the end stop (15 – 20 seconds)
- Diesel motors with heavy load (full load) are to be left running (approx. 2 minutes)

After a short time (approx. 1 - 2 minutes) the warning light or the audible warning (buzzer) must have switched off or the pressure at the pressure gauge must have reduced significantly.

The operator or machinist must be instructed to implement the aforementioned measures in the event of a counter pressure that is too high (warning lights, sound alarm, high counter-pressure weight). Any damage caused to the particulate filter by the prolonged operation of a filter with excessive exhaust counter-pressure, will lead to a loss of guarantee assurance.

Should the aforementioned measure for the initiation of the filter regeneration not lead to a reduction in the exhaust back pressure, which is recognizable by expiration of the alarm or the warning lights, as well as the counter-pressure weight declining, the particulate filter operation should be immediately set.

After this, the filter and DOC must be cleaned under the supervision of a BAUMOT engineer. In case the counter-pressure is indicated as too high, an inspection and maintenance of the counter-pressure pipe and the condensate water trap is to be conducted in addition to cleaning the filter and the DOC.

The check and maintenance of the counter-pressure monitoring is required every 500 hours.

1.10 Engine lube oil system

Safety instructions for engine lubrication oil system



CAUTION

Risk of injury due to hot and moving engine parts!

Hot and moving engine parts can cause injury.

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



CAUTION

Burn hazard due to hot engine oil!

Splashes of hot oil can cause burns to the skin.

- ▶ Let the engine cool down.
- ▶ Wear protective equipment.

-
- Follow the safety instructions and country-specific regulations when handling lube oil!
 - Dispose of drained lube oil correctly. Do not allow used oil to seep into the ground!
 - Perform a test run every time work has been performed!
 - Check for leaks and correct lube oil pressure, and then check the lube oil level in the diesel engine!

Checking the engine oil level



CAUTION

Risk of injury due to hot and moving engine parts!

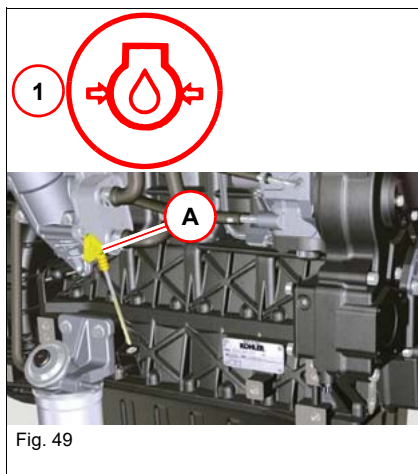
Hot and moving engine parts can cause injury.

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



Information

Maintenance intervals – see *"Maintenance plan" on page 1-7*.
Specifications and capacities – see *"Fluids and lubricants" on page 1-18*.



The warning light 1 (with acoustic warning) on the indicating instrument monitors the engine oil pressure.

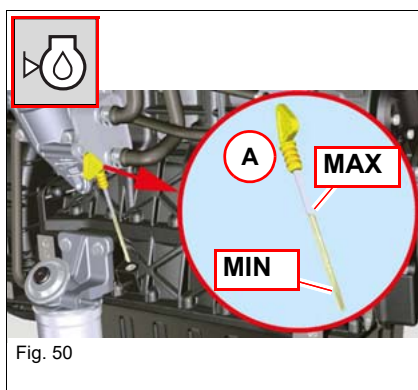
1. Park the machine on level ground and stop the engine.
2. Switch off the starter and remove the starting key.
3. Apply the parking brake.
4. Open the engine cover – see *"Engine cover" on page 1-23*.
5. Pull out oil dipstick A and wipe it with a lint-free cloth.
6. Insert oil dipstick A as far as possible, pull it back out and read the oil level.
7. Add oil if the oil level is near the MIN mark.

Example: oil dipstick with 2 notches

- 1st notch = MIN mark
- 2nd notch = MAX mark

Example: oil dipstick with 4 notches

- Cold engine – 1st notch = MIN mark, 3rd notch = MAX mark
- Warm engine – 2nd notch = MIN mark, 4th notch = MAX mark



Information

If the engine oil level is too low or if an oil change is overdue, this can cause **engine damage or loss of output!**

- ▶ Change the oil!

Adding engine oil

NOTICE

Damage due to incorrect engine oil level.

- ▶ The oil level must not drop below the "Min" mark on the engine oil dipstick.
- ▶ The oil level must not rise above the "Max" mark on the engine oil dipstick.

NOTICE

Damage due to wrong engine oil.

- ▶ Maintenance intervals – see *"Maintenance plan" on page 1-7.*
- ▶ Specifications and capacities – see *"Fluids and lubricants" on page 1-18.*



Environment

Use a suitable container to collect the engine oil as it drains and dispose of it in an environmentally friendly manner!

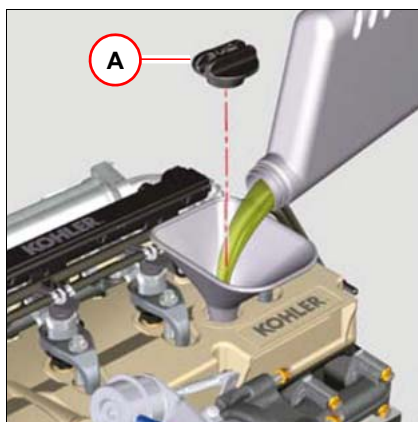


Fig. 51

1. Clean the area around oil filler cap **A** with a lint-free cloth.
2. Open the filler cap **A**.
3. Pull out oil dipstick **B** and wipe it with a lint-free cloth.
4. Add engine oil.
5. Wait a moment until all the oil has run into the oil sump.
6. Check the oil level with oil dipstick **B**.
7. Add oil if necessary and check the oil level again.
8. Close filler cap **A**.
9. Completely remove all oil spills from the engine.

NOTICE

If the engine oil level is too low or if an oil change is overdue (black engine oil), this can cause **engine damage or loss of output!**

- ▶ Change the oil every 500 hours of operation.

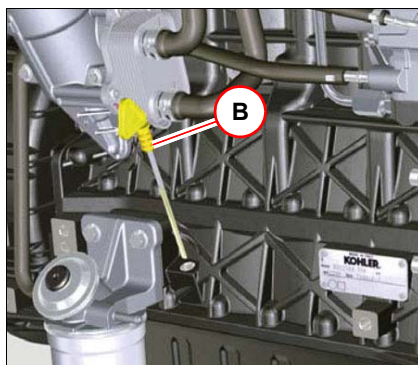


Fig. 52

CAUTION

Splashes of hot oil can cause burns to the skin.

- ▶ Let the engine cool down.
- ▶ Wear protective equipment.



Use a suitable container to collect the engine oil as it drains and dispose of it in an environmentally friendly manner!



Maintenance intervals – see *"Maintenance plan" on page 1-7.*
Specifications and capacities – see *"Fluids and lubricants" on page 1-18.*

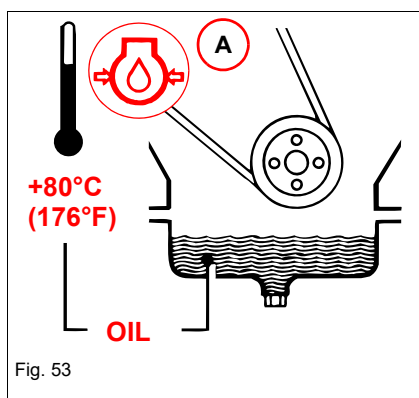


Fig. 53

1. Park the machine on level ground and stop the engine.
2. Lower the telescopic boom fully.
3. Apply the parking brake.
4. Let the engine run until it reaches its operating temperature [approx. 70° – 80°C (158° – 176°F)]
5. Switch off the starter and remove the starting key.
6. Open the engine cover – *see "Engine cover" on page 1-23.*
7. Remove the service lid underneath the engine vat – *see "Engine bay rear" on page 1-24.*
8. Place oil collection container [load capacity approx. 20 l (5.3 gal)] under the opening.
9. Remove drain plug **A** and seal **B**.

➡ The engine oil is drained.

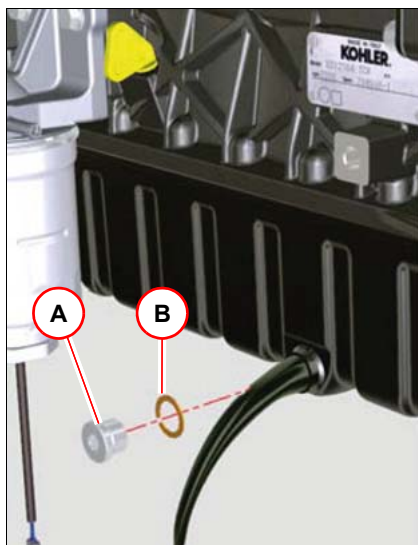


Fig. 54

Refill engine oil

1. Mount drain plug **A** with new sealing ring **B**.
2. Tighten drain plugs **A** to 35 Nm (25.8 lbf ft).
3. Replace the engine oil filter – see *"Changing engine oil" on page 1-61*.
4. Add engine oil and check the oil level – see *"Checking the engine oil level" on page 1-59*.
5. Start the engine and let it run briefly at low speed.
6. Check indicator light for the engine oil pressure **A**.
7. Stop the engine and wait (about 10 seconds) until all the oil has run into the oil sump.
8. Check the oil level again.
9. Add if necessary and check again.
10. Completely remove all oil spills from the engine.
11. Close the engine cover – see *"Engine cover" on page 1-23*.

Replacing the engine oil filter

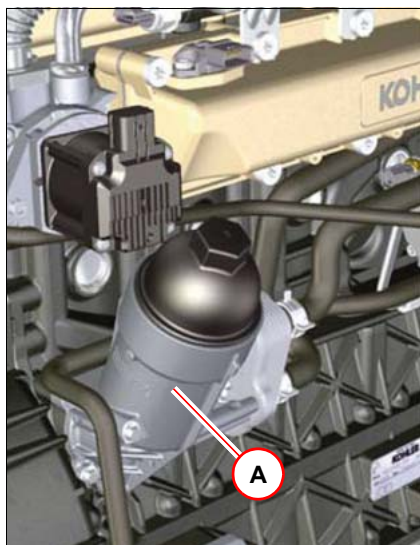


Fig. 55

The engine oil filter **A** is in the engine.



CAUTION

Burn hazard due to hot engine oil when replacing the oil filter!

Failure to observe this can cause serious injury.

- ▶ Wear protective gloves and eye protection.
- ▶ Use suitable tools (filter spanners, torque wrenches are commercially available).



Environment

Collect the drained engine oil in a suitable container. Dispose of used oil and filters in an environmentally friendly manner!



Information

Maintenance intervals – see *"Maintenance plan" on page 1-7.*

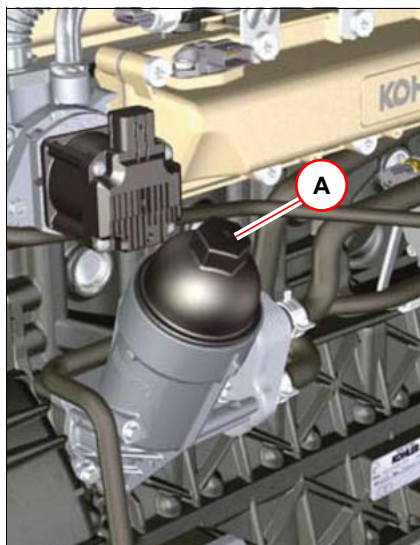


Fig. 56

1. Park the machine on level ground.
 2. Apply the parking brake.
 3. Lower the telescopic boom fully.
 4. Stop the engine and remove the starting key.
 5. Open the engine cover – see *"Engine cover" on page 1-23.*
 6. Place a suitable container under the oil filter.
 7. Loosen the oil filter lid **A** and open it by 3 turns.
- ➡ Approx. Wait about 1 minute until the engine oil has flowed out of the filter housing into the engine oil sump.

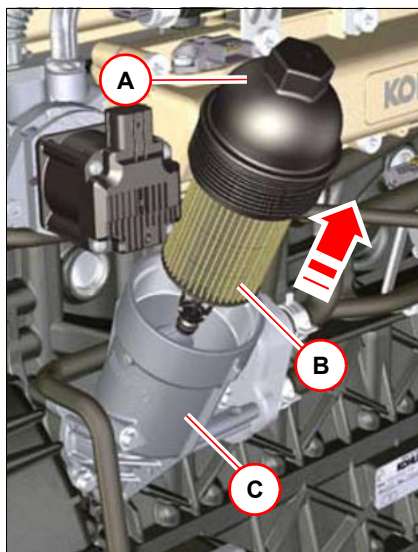


Fig. 57

8. Unscrew the oil filter lid **A** and together with the filter cartridge **B** pull out of the filter housing **C**.

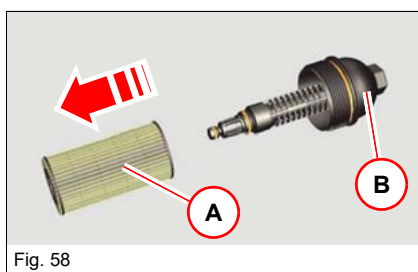


Fig. 58

9. Remove filter cartridge **A** from oil filter cover **B**.

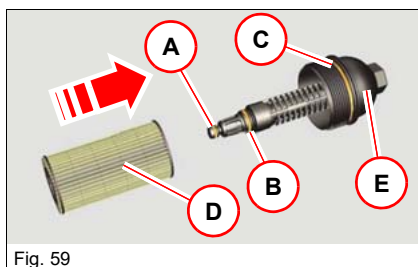


Fig. 59

10. Replace the seals **A**, **B** and **C** for new seals.
11. Lightly grease seals **B** with oil.
12. Place new filter cartridge **D** on the oil filter cover **E**.
13. Lightly grease seals **A** and **C** with oil.

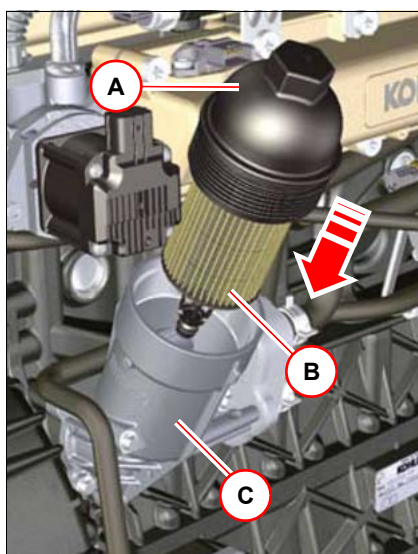
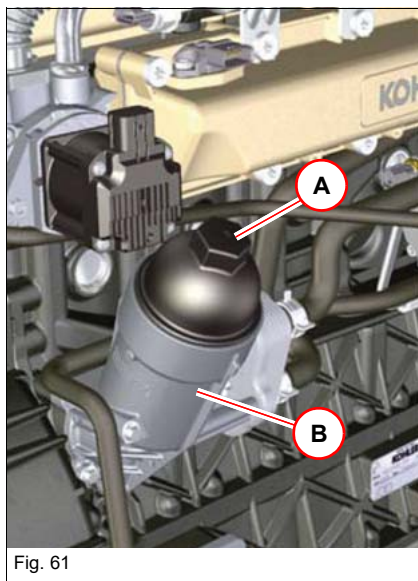


Fig. 60

14. Apply oil filter cover **A** with filter cartridge **B** into the filter housing **C**.



15. Screw oil filter cover **A** into the filter housing **B**.
16. Tighten oil filter cover **A** to 25 Nm (18.4 lbf ft).
17. Change the engine oil – [see "Changing engine oil" on page 1-61](#).
18. Let the engine run briefly.
19. Check indicator light for the engine oil pressure.
20. Switch off engine and check seal on oil filter cover **A**.
21. Check the oil level – [see "Checking the engine oil level" on page 1-59](#) and add engine oil if necessary – [see "Adding engine oil" on page 1-60](#)
22. Completely remove all oil spills from the engine.
23. Dispose of filter cartridges in an environmentally friendly manner.
24. Close the engine cover – [see "Engine cover" on page 1-23](#).

1.11 Cooling system

Safety instructions for cooling system



Fig. 62

The combined water, oil and charge air cooler is located in the engine compartment. It cools the diesel engine coolant, the hydraulic oil of the drive and operating hydraulics and the charge air.



CAUTION

Burn hazard due to hot coolant!

Hot coolant can cause burns to the skin.

- ▶ Do not open the coolant reservoir if the engine is hot or if the cooling system is under pressure.
- ▶ Let the engine cool down.
- ▶ Wear protective equipment.



CAUTION

Caustic injury hazard! Risk of swallowing antifreeze when handling it!

Can cause serious injury or death!

- ▶ Seek medical attention immediately if antifreeze has been swallowed.
- ▶ Keep antifreeze out of reach of children.

NOTICE

To prevent damage to the engine and the cooling system, the coolant should only be changed by an authorized service center.

Information on inspection and cleaning work on the cooling system

Dirt on the radiator fins reduces the radiator's cooling capacity! To avoid this:

- Clean the outside of the radiator at regular intervals. The cleaning intervals can be found in the [Maintenance plan on page 1-7](#).
- In dusty or dirty work conditions, clean more frequently than indicated in the maintenance plans.
- An insufficient coolant level reduces the cooling capacity as well and can cause engine damage! Therefore:
 - Check the coolant level once a day.
- If the coolant must be replaced frequently, have the cooling system checked for leaks by an authorized service center!
- Never add cold water/coolant if the engine is warm!
- After filling the radiator, make a test run with the engine and check the coolant level again after stopping the engine.
- Add enough antifreeze to the coolant
- Use brand-name antifreeze agents since they already contain anticorrosion agents.

NOTICE

In order to avoid sludge in the cooling system that damages the engine, do not use cooler-cleaning compounds if an antifreeze agent has been added to the coolant.

NOTICE

In order to ensure the radiator's cooling capacity, do not damage the radiator fins as you clean them with a compressed-air gun!

- When blowing clear, ensure that excessively high air pressure does not occur.
-



Environment

Use a suitable container to collect the coolant as it drains and dispose of it in an environmentally friendly manner!

Checking the coolant level

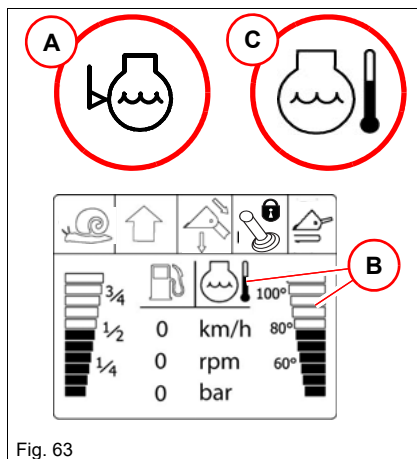


Fig. 63

The coolant level in the expansion tank of the radiator is monitored by the warning light **A** (with acoustic warning) on the instrument panel.

➔ If the coolant level drops below minimum, the indicator light **S** illuminates and an acoustic warning sounds.

The coolant temperature is monitored via the indicator light **C** and temperature display **B** with an acoustic warning on the digital display.

➔ If the coolant temperature rises above 110°C (230°F), indicator warning light **C** illuminates and an acoustic warning sounds.

NOTICE

The coolant temperature should lie between 80° and 105 °C (221°F) [max. permissible coolant temperature 110 °C (230°F)] (see arrow).

- ▶ If the acoustic warning sounds [115°C (239°F)],
- ▶ the engine should be left to run at idling speed until the temperature drops to 110°C (230°F) (acoustic warning turns off),
- ▶ Stop the engine and check the coolant level.
- ▶ Perform leakage checks (visual checks) of cooling system and heating.
- ▶ Clean the radiator fins.



Information

Maintenance intervals – see *"Maintenance plan" on page 1-7*.
Specifications and capacities – see *"Fluids and lubricants" on page 1-18*.

Check before starting the engine.

Check the antifreeze at temperatures below 4°C (39.2°F).

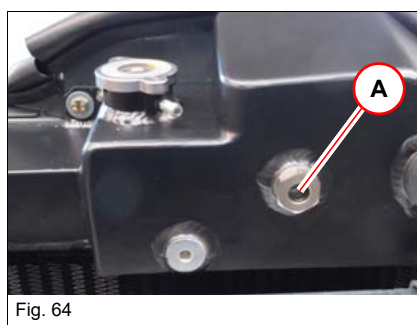


Fig. 64

Checking the coolant level

1. Park the machine on level ground.
 2. Lower the telescopic boom fully.
 3. Apply the parking brake.
 4. Stop the engine.
 5. Switch off the starter and remove the starting key.
 6. Open the engine cover – see *"Engine cover" on page 1-23*.
 7. Check the coolant level on sight glass **A**.
- ➔ If the coolant level is below the **middle of the sight glass**, add coolant up to the **middle of the sight glass** – see *"Adding coolant" on page 1-69*.
8. Close the engine cover – see *"Engine cover" on page 1-23*.

Adding coolant



CAUTION

Burn hazard due to hot coolant!

Hot coolant can cause burns to the skin.

- ▶ Do not open the coolant reservoir if the engine is hot or if the cooling system is under pressure.
- ▶ Let the engine cool down.
- ▶ Wear protective equipment.

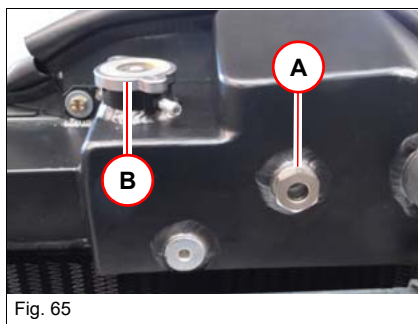


Information

Maintenance intervals – see *"Maintenance plan" on page 1-7*.
Specifications and capacities – see *"Fluids and lubricants" on page 1-18*.

Preparations

1. Park the machine on level ground.
2. Lower the telescopic boom fully.
3. Apply the parking brake.
4. Switch off the starter and remove the starting key.
5. Allow the engine/cooling system to cool down.
6. Open the engine cover – see *"Engine cover" on page 1-23*.



Adding coolant

1. Reduce any overpressure in the cooler by carefully opening the lid **A** and venting any pressure.
2. Open filler cap **B** fully.
3. Only fill coolant up to **the middle of the sight glass A**.
➔ Use brand-name antifreeze compounds with anti-corrosion agent – [see "Fluids and lubricants" on page 1-18](#).
4. Close filler cap **B**.

Leakage check

1. Start and warm up the engine.
2. Set the temperature regulator (rotary switch) for the heating to the **MAXIMUM** temperature.
➔ Heating regulator is open
3. Stop the engine and remove the starting key.
4. Check the cooling system and the heating water circuit for leaks.
➔ Rectify any leaks immediately.
5. Check coolant level again – [see "Checking the coolant level" on page 1-68](#).
6. If necessary, add coolant and repeat the procedure until reaching the correct coolant level.

Draining coolant



CAUTION

Burn hazard due to hot coolant!

Hot coolant can cause burns to the skin.

- ▶ Do not open the coolant reservoir if the engine is hot or if the cooling system is under pressure.
- ▶ Let the engine cool down.
- ▶ Wear protective equipment.



Information

Maintenance intervals – see *"Maintenance plan" on page 1-7*.
Specifications and capacities – see *"Fluids and lubricants" on page 1-18*.

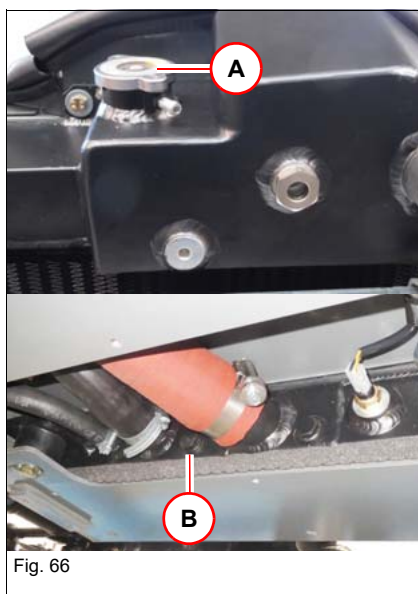


Fig. 66

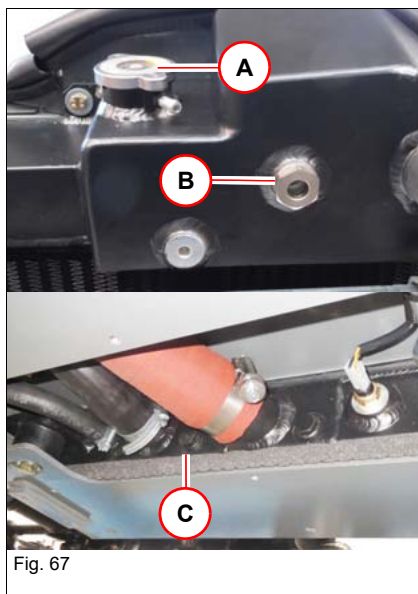
Draining/replacing coolant

1. Park the machine on level ground.
2. Lower the telescopic boom fully.
3. Apply the parking brake.
4. Stop the engine.
5. Switch off the starter and remove the starting key.
6. Set the temperature controller of the heating to **MAXIMUM** temperature.
 - Heating regulator is open
 - This also drains the coolant from the heating circuit.
7. Open the engine cover – see *"Engine cover" on page 1-23*.
8. Remove the service lid underneath the engine vat – see *"Engine vat" on page 1-24*.
9. Allow the engine/cooling system to cool down.
10. Place a suitable container under the cooler.
11. Reduce any overpressure in the radiator by carefully opening the filler cap **A** and venting any pressure.
12. Open filler cap **A** fully.
13. Remove drain plug **B** at the bottom of the radiator and drain the coolant.



Environment

Use a suitable container to collect the coolant as it drains and dispose of it in an environmentally friendly manner!



Adding coolant

1. Install drain plug **C** at the bottom of the radiator.
2. Only fill coolant up **the middle of the sight glass B**.
➔ Use brand-name antifreeze compounds with anti-corrosion agent – [see "Fluids and lubricants" on page 1-18](#).
3. Close filler cap **A** fully.
4. Set the temperature controller of the heating to **MAXIMUM** temperature.
5. Heating regulator is open.
6. Bring engine up to operating temperature.
7. Stop the engine.
8. Check the cooling system and the heating water circuit for leaks.
9. Rectify any leaks immediately.
10. Check the coolant level **from the middle of the sight glass B** on the radiator – [see "Checking the coolant level" on page 1-68](#).
11. If necessary, add coolant – [see "Adding coolant" on page 1-69](#) and repeat the procedure until the correct coolant level has been reached.
12. Mount maintenance cover below the engine vat – [see "Engine vat" on page 1-24](#).
13. Close the engine cover – [see "Engine cover" on page 1-23](#).

Cleaning the radiator



CAUTION

Burn hazard during maintenance on a hot engine and radiator!

Failure to observe this can cause serious injury.

- ▶ Wear protective gloves and eye protection.
- ▶ Let the radiator cool down at least 10 minutes after stopping the diesel engine.



Information

Maintenance intervals – see *"Maintenance plan"* on page 1-7.

NOTICE

Dirt on the radiator fins reduces the radiator's heat dissipation capacity and can cause damage to the engine and the hydraulic system!

- ▶ Check and clean the outside of the radiator once a day.
- ▶ Clean the radiator more frequently in dusty or dirty work conditions.

Preparations

1. Park the machine on level ground.
2. Lower the telescopic boom fully.
3. Apply the parking brake.
4. Switch off the starter and remove the starting key.
5. Allow the engine/cooling system to cool down.
6. Open the engine cover – see *"Engine cover"* on page 1-23.

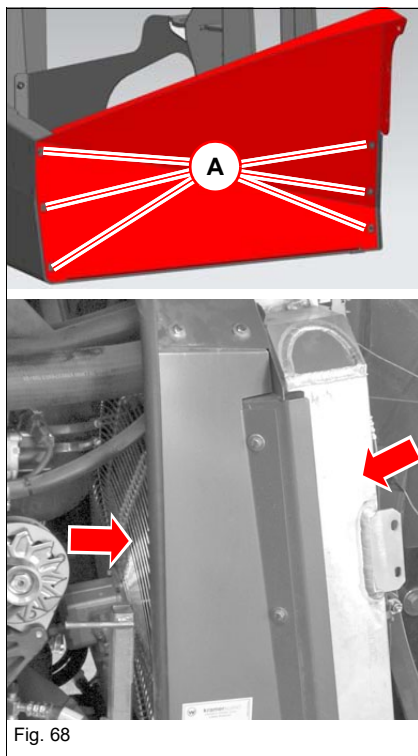
Cleaning the radiator

7. Remove the front maintenance cover **A** on the engine bay.
8. Clean the radiator fins by blowing compressed air from either side of the radiator.
9. Remove dirt in the intake area of the radiator.

NOTICE

In order to ensure the radiator's cooling capacity, do not damage the radiator fins as you clean them with a compressed-air gun!

10. Install the front maintenance cover **A** on the engine bay.



Cleaning the radiator with the reversing fan (option)

The telehandler can be equipped with an reverse cooling fan (reverse fan) (optional).

By using the button **C** (operating field right), the rotating direction of the cooling fan can be reversed and the radiator is freed of contaminant deposits.



CAUTION

Respiratory irritation from dusty air!

Ignoring this can cause injury to the respiratory tracts.

- ▶ Do not have the cooler cleaned with the reversing fan in closed areas.
- ▶ Ensure that nobody is in the area of the vehicle.

NOTICE

Dirt on the radiator fins reduces the radiator's heat dissipation capacity and can cause damage to the engine and the hydraulic system!

- ▶ Check and clean the radiator once a day.
- ▶ Clean the radiator more frequently in dusty or dirty work conditions.



Information

The blowing clear of the radiator can take place at a reasonable rpm (1000–1200 rpm) of the diesel engine and during the work operation!

Radiator cleaning may not be performed while driving on public roads.

For operating the reversing fan – see *"Cleaning the radiator with the reversing fan (option)" on page 1-74.*

The machine can be equipped with a reversing fan (option).

By using the button **A** (instrument panel right), the rotating direction of the cooling fan can be reversed and the radiator is freed of contaminant deposits.

Information

The radiator can be cleaned during vehicle operation and only with the diesel engine running!

NOTICE

Dirt on the radiator fins reduces the radiator's heat dissipation capacity and can cause damage to the engine and the hydraulic system!

- ▶ Check and clean the radiator once a day.
- ▶ Clean the radiator more frequently in dusty or dirty work conditions.
- ▶ Do not clean in closed premises.

Cleaning with the reversing fan

1. Park vehicle on level ground
2. Lower the telescopic boom fully.
3. Apply the parking brake.
4. With the engine running, briefly press the button **A**.
 - ➔ The fan rotates the other way round with a certain delay.
 - ➔ The fan is in cleaning mode and dirt is removed from the radiator.
 - ➔ This can be seen by the dust blown out from the intake screen on the engine cover.
5. The fan automatically switches back to normal cooling mode after about 1 minute.
 - ➔ The cleaning is completed in reverse operation.

Information

When working in especially dusty environment, clean the radiator repeatedly and more frequently!



Fig. 69

1.12 Air filter

Advice on air filter cleaning

NOTICE

In order to avoid damage to the engine due to dirty intake air, bear in mind the following:

- ▶ The air-filter elements must be replaced when the indicator light comes on.
 - ▶ Do not clean the air-filter elements, but always **replace them**.
 - ▶ Never reuse damaged air-filter elements.
 - ▶ Ensure cleanliness in the entire filter area when replacing the air-filter elements!
 - ▶ Do not operate the engine without the air-filter elements.
-

NOTICE

Filter elements are prematurely damaged during prolonged use in acidic air and must therefore be replaced frequently.

- ▶ This risk is present, for example, in acid production facilities, steel and aluminum mills, chemical plants and other nonferrous-metal plants.
 - ▶ Maintenance intervals – see *"Maintenance plan" on page 1-7*.
-

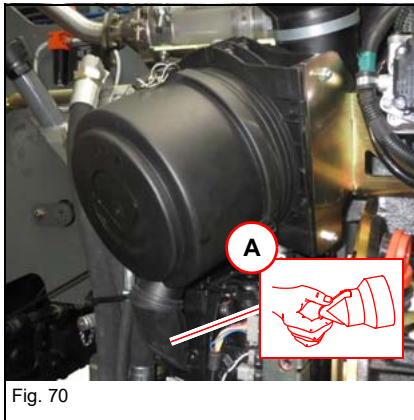
Cleaning the dust valve

Information

Maintenance intervals – see *"Maintenance plan" on page 1-7.*

Cleaning the dust valve

1. Stop the engine.
2. Apply the parking brake.
3. Switch off the starter and remove the starting key.
4. Open the engine cover – see *"Engine cover" on page 1-23.*
5. Press the dust valve **A** together several times until no more dust comes out of the valve.
6. Close the engine cover – see *"Engine cover" on page 1-23.*

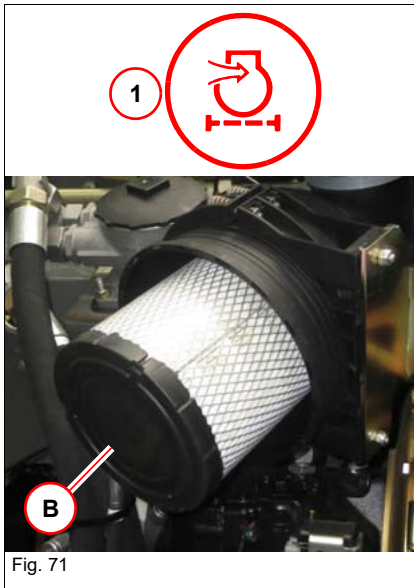


Information

The machine can be fitted with a vacuum-operated preliminary separator (option). In this case, there is no dust discharge valve because dust from the filter is automatically siphoned through a hose pipe into the cooler area.

Checking the filter cartridge for dirt

- Indicator light **1** on the indicating instrument allows you to monitor the filter cartridge. Replace filter cartridge **B** if this indicator light illuminates.
- Change interval of the filter cartridge – see *"Maintenance plan" on page 1-7.*



Replacing the filter cartridge

NOTICE

In order to avoid damage to the engine due to dirty intake air, bear in mind the following:

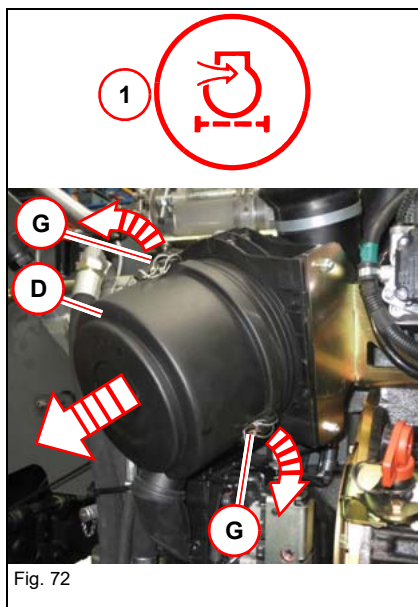
- ▶ Do not clean the air-filter elements with compressed air or a brush.
 - ▶ Replace the air-filter elements when the indicator light illuminates.
 - ▶ Never reuse damaged air-filter elements.
 - ▶ Ensure cleanliness in the entire filter area when replacing the air-filter elements!
 - ▶ Do not operate the engine without the air-filter elements.
-



Information

Maintenance intervals – [see "Maintenance plan" on page 1-7.](#)

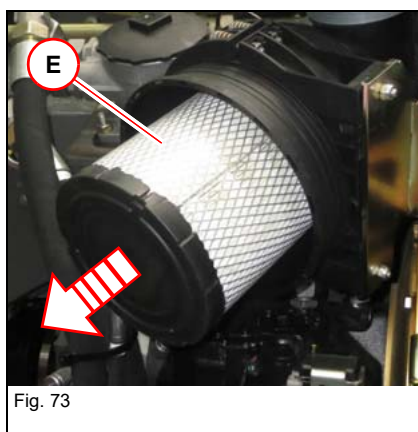
Replacing the filter element and safety cartridge



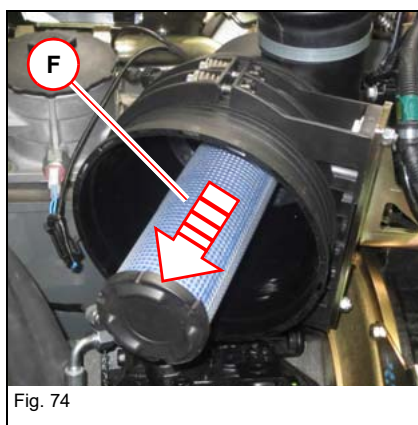
i Information

To monitor the filter cartridge **E** there is a warning light **1** on the indicating instrument. If this illuminates, immediately replace the filter cartridge.

1. Stop the engine.
2. Apply the parking brake.
3. Switch off the starter and remove the starting key.
4. Open the engine cover – see ["Engine cover" on page 1-23](#).
5. Pull lock **G** outward on housing cover **D**.
6. Remove housing cover **D**.



7. Carefully remove the filter cartridge **E** by gently rotating it.



8. In addition, after every 3rd filter change, carefully remove the safety cartridge **F** by gently rotating it.

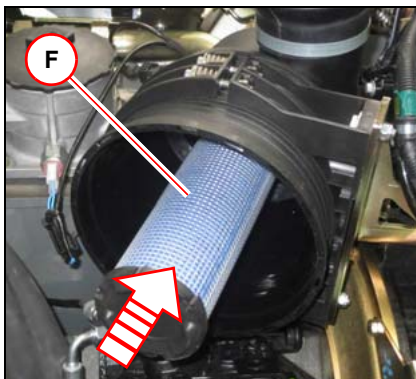


Fig. 75

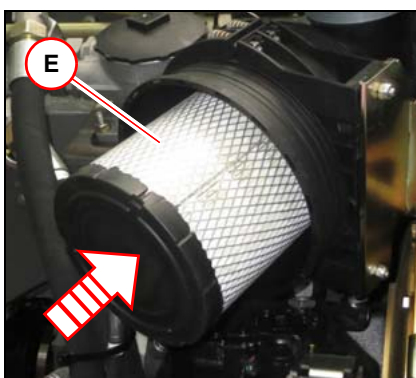


Fig. 76

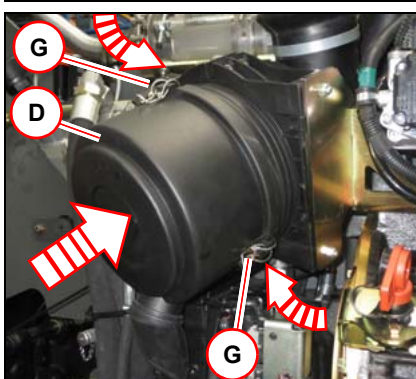


Fig. 77

9. Ensure that all the dirt (dust) inside the filter housing and the housing cover has been removed.

10. Place new safety cartridge **F** into the filter housing.

11. Place new filter cartridge **E** into the filter housing.

12. Position the housing cover **D** (ensure that it is properly positioned) and close lock **G**.

NOTICE

Air filter elements degrade prematurely when in service in acidic air for longer periods of time.

- This risk is present, for example, in acid production facilities, steel and aluminum mills, chemical plants and other nonferrous-metal plants.

13. Close the engine cover – see ["Engine cover" on page 1-23](#).

1.13 V-belt/toothed belt

Checking/re-tensioning the V-belt (alternator/water pump)



CAUTION

Injury hazard due to rotating parts!

Rotating parts can cause serious injury.

- ▶ Stop the engine before opening the engine cover.
- ▶ Only check or retension the V-belt and flat belt when the engine is stopped.



Information

Maintenance intervals – see *"Maintenance plan"* on page 1-7.

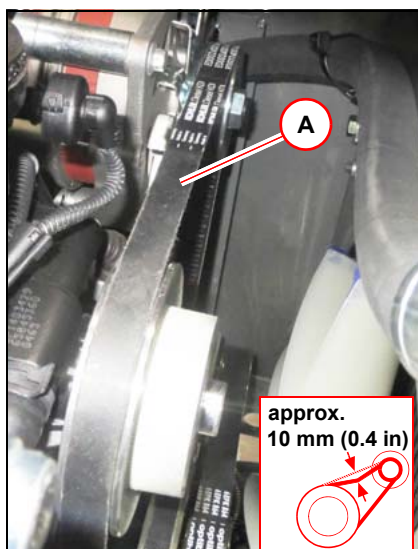


Fig. 78

Checking the V-belt (alternator/water pump)

1. Stop the engine.
2. Apply the parking brake.
3. Switch off the starter and remove the starting key.
4. Open the engine cover – see *"Engine cover"* on page 1-23.
5. Carefully check the V-belt **A** for damage.
6. Press with your thumb to check whether V-belt **A** can be pressed in between the V-belt pulleys by no more than **about 10 mm (0.4 in)**.

NOTICE

A cracked and stretched V-belt causes engine damage!

- ▶ Replace the damaged V-belt.

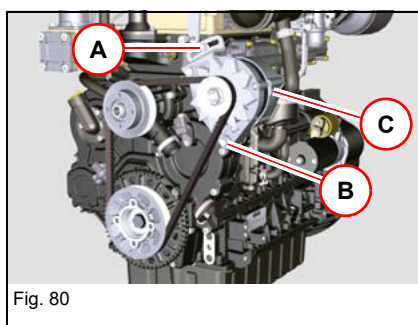


Fig. 80

Re-tensioning the V-belt (alternator/water pump)

1. Loosen screws **A** and **B**.
2. Carefully press the alternator **C** towards the vehicle chassis to tighten the V-belt.
3. Tighten screw **B** to 69 Nm (50.9 lbf ft), in doing so keep the V-belt stretched.
4. Tighten screw **A** to 25 Nm (18.4 lbf ft).
5. Check tension of V-belt – see *"Checking/re-tensioning the V-belt (alternator/water pump)"* on page 1-81.
6. Retension the V-belt if necessary.

Change the V-belt (alternator/water pump)



CAUTION

Injury hazard due to rotating parts!

Rotating parts can cause serious injury.

- Stop the engine before opening the engine cover.
- Only check or retension the V-belt and flat belt when the engine is stopped.



Information

Maintenance intervals – see *"Maintenance plan" on page 1-7.*

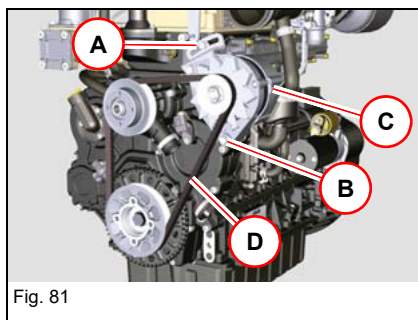


Fig. 81

Remove the V-belt (alternator/water pump)

1. Stop the engine.
2. Apply the parking brake.
3. Switch off the starter and remove the starting key.
4. Open the engine cover – see *"Engine cover" on page 1-23.*
5. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
6. Remove the V-belt of the reversing fan (opt) – see *"Changing the reversing fan V-belt (optional)" on page 1-84.*
7. Remove V-belt air conditioning (opt) – see *"Changing the V-belt air conditioning system (opt)" on page 1-88.*
8. Loosen screws **A** and **B**.
9. Carefully press alternator **C** towards the motor to release V-belt **D** tension.
10. Remove V-belt **D**.

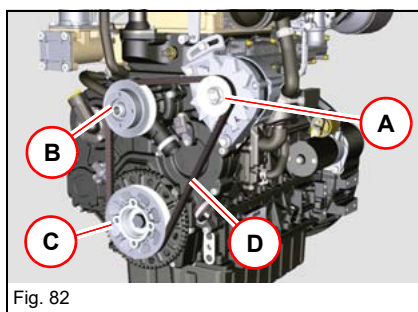


Fig. 82

Install the V-belt (alternator/water pump)

1. Check the alternator **A**, the water pump **B** and the crankshaft **C** for damage and bearing clearance.
2. Raise the new V-belt **D**.
3. Tighten V-belt **D** – see *"Checking/re-tensioning the V-belt (alternator/water pump)" on page 1-81.*
4. Check tension of V-belt – see *"Checking/re-tensioning the V-belt (alternator/water pump)" on page 1-81.*
5. Re-tension the V-belt **D** if necessary.
6. Install the V-belt air conditioning (opt) – see *"Changing the V-belt air conditioning system (opt)" on page 1-88.*
7. Install the V-belt reversing fan (opt) – see *"Changing the reversing fan V-belt (optional)" on page 1-84.*
8. Switch on battery master switch **S008** – see *"Switch on battery master switch S008" on page 1-3.*
9. Close the engine cover – see *"Engine cover" on page 1-23.*

Check/retension flat reversing fan belts (opt)



CAUTION

Injury hazard due to rotating parts!

Rotating parts can cause serious injury.

- ▶ Stop the engine before opening the engine cover.
- ▶ Only check or retension the V-belt and flat belt when the engine is stopped.



Information

Maintenance intervals – see *"Maintenance plan" on page 1-7.*



Fig. 83

Check/retension flat reversing fan belts (opt)

1. Stop the engine.
2. Apply the parking brake.
3. Switch off the starter and remove the starting key.
4. Open the engine cover – see *"Engine cover" on page 1-23.*
5. Carefully check flat belt **A** for damage and correct tension.



Information

Flat belt **A** is a maintenance-free, self-tensioning V-belt!

The flat belt **A** must be replaced in the event of low flat belt tension or damage!

Changing the reversing fan V-belt (optional)



CAUTION

Injury hazard due to rotating parts!

Rotating parts can cause serious injury.

- ▶ Stop the engine before opening the engine cover.
- ▶ Only check or retension the V-belt and flat belt when the engine is stopped.



Information

Maintenance intervals – see *"Maintenance plan" on page 1-7.*



Information

The flat belt of the reversing fan is a maintenance-free, self-tensioning V-belt!

The flat belt must be replaced in the event of low flat belt tension or damage!



Fig. 84

NOTICE

In order to replace the flat belt, special Optibelt tools are required – see *Fig. 84!*

- ▶ Mounting carried out without the use of special tools will damage the flat belt!

Removing the reversing fan flat belt (optional)

1. Stop the engine.
2. Apply the parking brake.
3. Switch off the starter and remove the starting key.
4. Open the engine cover – see *"Engine cover" on page 1-23.*
5. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
6. Place belt **A** on the pulley **C** of the fan motor.
7. Slowly turn pulley **C** of the fan motor, bring belt **A** between flat belt **B** and pulley **C** of the fan motor.
8. Wind belt **A** approx. up to half length of the pulley **C** of the fan motor.

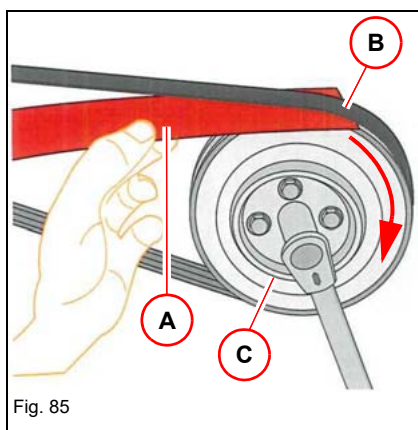
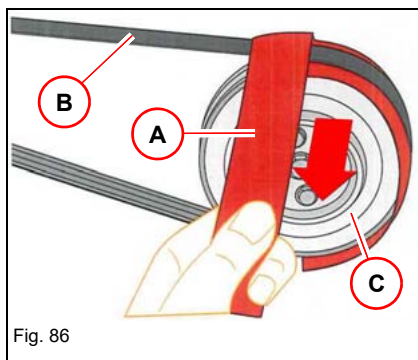
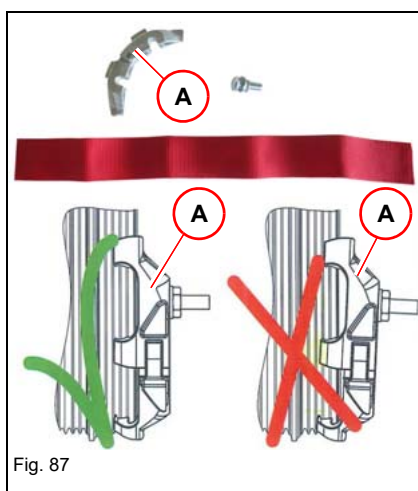


Fig. 85

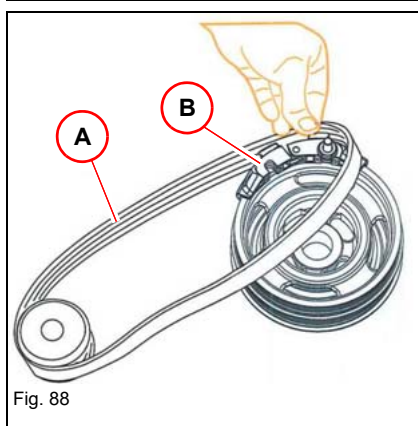


9. By pulling on the other end of belt **A** pull off the flat belt **B** from pulley **C** of the fan motor.
10. Remove V-belt **B** from the pulley of the fan impeller.
11. Remove flat belt **B**.

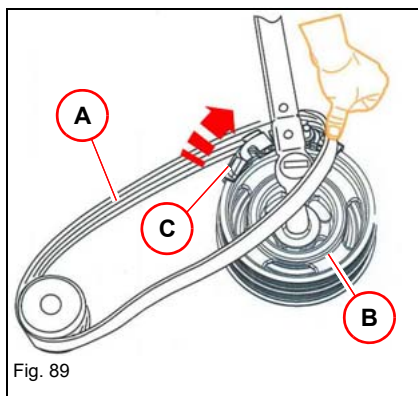
Changing the reversing fan flat belt (optional)



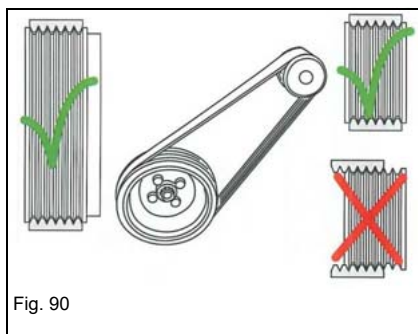
1. Check the fan impeller and the fan motor for any damage and bearing clearance.
2. Put new flat belts on the belt pulley of the fan propeller.
3. Place the special tool **A** onto the pulley of the fan motor and check that the position of the special tool is correct – see [Fig. 87](#).



4. Pull new V-belt **A** over the special tool **B**.



5. By turning the pulley **B** of the fan motor, pull flat belt **A** over the special tool **C** on pulley **B** of the fan motor.



6. Check that the flat belt is correctly placed on both pulleys – see [Fig. 90](#).
7. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
8. Close the engine cover – see ["Engine cover" on page 1-23](#).

Checking/re-tensioning the V-belt air conditioning (opt)



CAUTION

Injury hazard due to rotating parts!

Rotating parts can cause serious injury.

- Stop the engine before opening the engine cover.
- Only check or retension the V-belt and flat belt when the engine is stopped.



Information

Maintenance intervals – see *"Maintenance plan" on page 1-7.*

Checking the V-belt air conditioning (opt)

1. Stop the engine.
2. Apply the parking brake.
3. Switch off the starter and remove the starting key.
4. Open the engine cover – see *"Engine cover" on page 1-23.*
5. Carefully check the V-belt **A** for damage.
 - ➔ Replace cracked and badly stretched V-belts **A**.
6. Press with your thumb to check whether V-belt **A** can be pressed in between the V-belt pulleys by no more than **about 10 mm** (0.4 in).

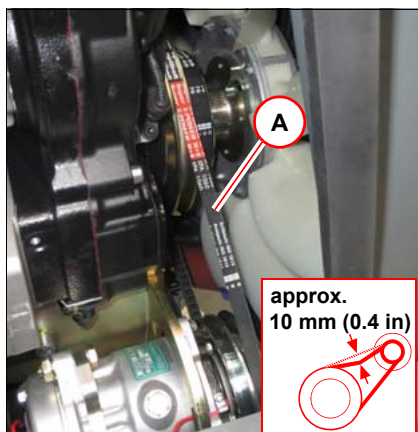


Fig. 91

Retension V-belt air conditioning system (opt)

1. Release fastening screw **A** on the air-conditioning compressor **B**.
2. Release fastening screw **C**.
3. Insert customary 1/2" ratchet spanner into the recess **D**.
4. Using the 1/2" ratchet spanner, pull air conditioning compressor **B** to the outside in the direction of the engine bay.
5. Tighten fastening screw **C**.
6. Tighten fastening screw **A** on the air-conditioning compressor **B**.
7. Remove 1/2" ratchet spanner from the recess **D**.
8. Check tension of V-belt – see *"Checking/re-tensioning the V-belt air conditioning (opt)" on page 1-87.*
9. Retension the V-belt if necessary.

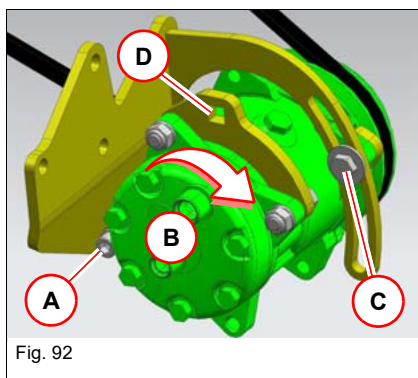


Fig. 92

Changing the V-belt air conditioning system (opt)

CAUTION

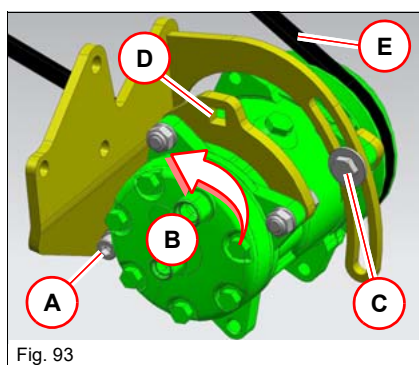
Injury hazard due to rotating parts!

Rotating parts can cause serious injury.

- Stop the engine before opening the engine cover.
- Only check or retension the V-belt and flat belt when the engine is stopped.

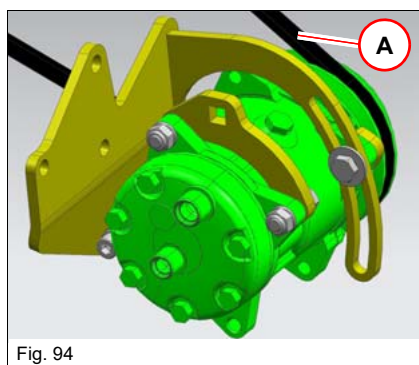
Information

Maintenance intervals – see *"Maintenance plan" on page 1-7.*



Remove V-belt air conditioning system (opt)

1. Stop the engine.
2. Apply the parking brake.
3. Turn off ignition and take out starting key.
4. Open engine cover – see *"Engine cover" on page 1-23.*
5. Switch off the main switch **S008** on the battery – see *"Battery master switch S008" on page 1-3.*
6. Remove the V-belt of the reversing fan (opt) – see *"Changing the V-belt air conditioning system (opt)" on page 1-88.*
7. Release fastening screw **A** on the air-conditioning compressor **B**.
8. Release fastening screw **C**.
9. Insert customary 1/2" ratchet spanner into the recess **D**.
10. Using the 1/2" ratchet spanner, press air conditioning compressor **B** to the inside in the direction of the engine bay.
11. Remove V-belt **E**.



Install V-belt air conditioning system (opt)

1. Check air-conditioning compressor pulley and crankshaft for damage and play.
2. Installing a new V-belt **A**.
3. Tensioning the V-belt **A** – see *"Checking/re-tensioning the V-belt air conditioning (opt)" on page 1-87.*
4. Check tension of V-belt – see *"Checking/re-tensioning the V-belt air conditioning (opt)" on page 1-87.*
5. Re-tension V-belt **A** if necessary.
6. Install the V-belt reversing fan (opt) – see *"Changing the reversing fan V-belt (optional)" on page 1-84.*
7. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
8. Close engine cover – see *"Engine cover" on page 1-23.*

1.14 Hydraulic system

Safety instructions for hydraulic system



Fig. 95



CAUTION

Burn hazard due to hot hydraulic oil!

Hot hydraulic oil can cause burns to the skin.

- ▶ Release the residual pressure in the hydraulic system.
- ▶ Let the engine cool down.
- ▶ Wear protective equipment.



CAUTION

Risk of injury from maintenance work!

Injury hazard.

- ▶ Secure the raised telescopic boom on the lift cylinder with a safety prop to prevent unintentional lowering.
- ▶ Release the pressure in all lines carrying hydraulic oil prior to any maintenance and repair work. To do this:
 - ▶ Lower the attachments to the ground.
 - ▶ Stop the engine and remove the starting key.
 - ▶ Apply the parking brake.
 - ▶ Actuate all control levers of the hydraulic controller several times for pressure relief.
- ▶ Only work on the hydraulic system when the engine is switched off.

NOTICE

Contaminated hydraulic oil, lack of oil or wrong hydraulic oil poses a risk of serious damage to the hydraulic system!

- ▶ Take care to avoid dirt when working!
- ▶ Always add hydraulic oil using the filling screen!
- ▶ Only use authorized oils of the same type.
- ▶ Always add hydraulic oil before the level gets too low.
- ▶ If the hydraulic system is filled with biodegradable oil, then only use biodegradable oil of the same type for adding oil – observe the sticker on the hydraulic oil reservoir.

Hydraulic oil filter monitoring

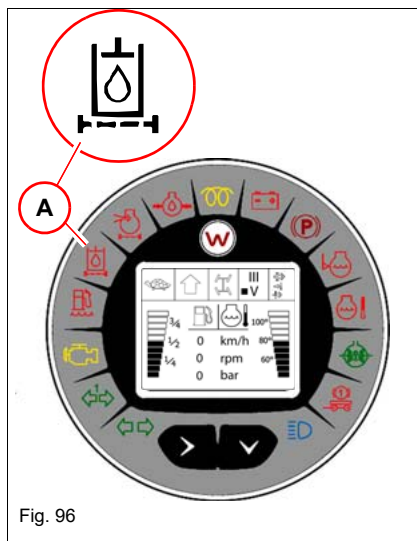


Fig. 96

To monitor the hydraulic oil filter, a red indicator light **A** is located on the indicating instrument **P014**.

NOTICE

The indicator light **A** (in the indicating instrument) illuminates if the resistance of the oil flow in the return filter is too high!

- The filter element is dirty and must be replaced.
- The filter element and the hydraulic oil may be replaced by an authorized service center only!

Information

In cold weather, indicator light **A** can illuminate immediately when the engine is started. This is caused by increased oil viscosity. In this case, regulate the engine speed so that the indicator light **A** does not illuminate.

Bear in mind the instructions concerning warmup.

Hydraulic oil temperature monitoring

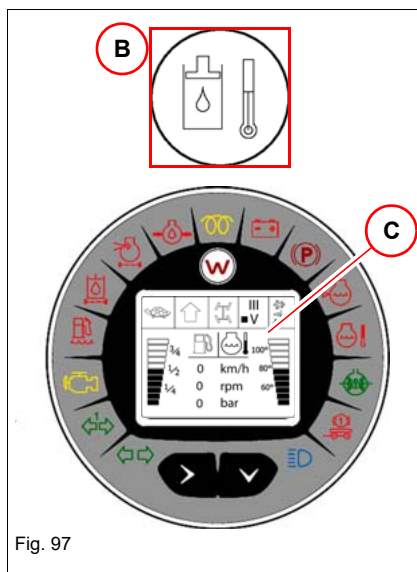


Fig. 97

Monitoring of the hydraulic oil temperature is in the digital display **C** of the display instrument **P014**.

NOTICE

If the hydraulic oil temperature is too high, digital display **C** shows symbol **B**!

- Check the hydraulic oil level and fill up missing oil – see ["Adding hydraulic oil" on page 1-92](#).
- The filter element or the hydraulic oil is dirty and must be replaced by an authorized service center.
- The hydraulic oil cooler is dirty and must be cleaned – see ["Cleaning the radiator" on page 1-73](#)

Checking the hydraulic oil level

Oil level sight glass **A** is visible in the hydraulic oil tank (right of vehicle) outside the engine hood.

NOTICE

Damage to hydraulic system due to incorrect hydraulic oil level.

- ▶ The hydraulic oil level must never be higher or below the oil level sight glass.
- ▶ Any excess quantity of hydraulic oil in the tank escapes via the breather as soon as the temperature rises!

Information

Maintenance intervals – see *"Maintenance plan" on page 1-7*.
Specifications and capacities – see *"Fluids and lubricants" on page 1-18*.

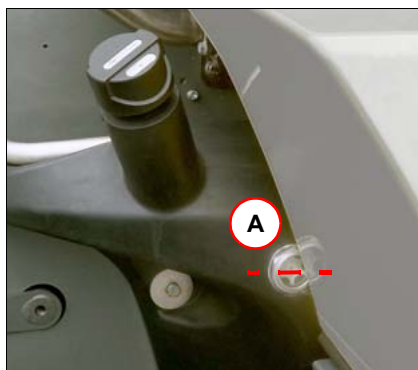


Fig. 98

Checking the hydraulic oil level

1. Park the machine on level ground.
2. Retract all hydraulic cylinders.
3. Apply the parking brake.
4. Stop the engine.
5. Switch off the starter and remove the starting key.
6. Clean oil level sight glass **A** and check the oil level.
 - ➡ If the oil level is visible in the middle of the oil level sight glass **A** the oil level is OK.
 - ➡ If the oil level is no longer visible in the lower half of the oil level sight glass **A**
Too little oil Immediately top up hydraulic oil – see *"Adding hydraulic oil" on page 1-92*
 - ➡ If necessary, uncouple the hydraulic hoses from the consumers.

Information

Any excess quantity of hydraulic oil in the reservoir escapes via the breather as soon as the temperature rises!

Adding hydraulic oil

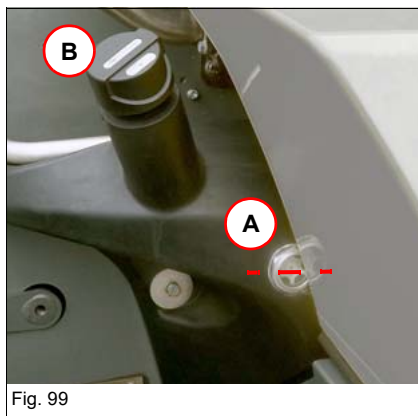
NOTICE

Damage to hydraulic system due to incorrect or dirty hydraulic oil.

- ▶ If the oil is cloudy this means that either water or air has entered the system; this can damage the hydraulic oil pump. Do not use the machine unless the problem has been rectified.
- ▶ Do not add hydraulic oil unless the diesel engine is stopped.
- ▶ Take care to avoid dirt when working.
- ▶ Add oil with a screen to avoid dirt.
- ▶ If the hydraulic system is filled with biodegradable oil, then use only biodegradable oil of the same type for filling up – observe the sticker on the hydraulic oil reservoir.

Information

Maintenance intervals – see *"Maintenance plan" on page 1-7*.
Specifications and capacities – see *"Fluids and lubricants" on page 1-18*.



1. Park the machine on level ground.
2. Retract all hydraulic cylinders.
3. Apply the parking brake.
4. Stop the engine and remove the starting key.
5. Clean the area around the filler and breather filter **B**.
6. Place a container under the hydraulic oil reservoir to collect the oil.
7. Open breather filter **B** by hand.
8. Add hydraulic oil with the filter insert in place.
9. Check the oil level in the oil level sight glass **A** – see *"Checking the hydraulic oil level" on page 1-91*.
10. Add if necessary and check again.
11. Firmly close breather filter **B** by hand.

Information

Excess hydraulic oil is released via the breather filter during loader unit operation.

- ▶ Drain the oil in a suitable container until the oil level is visible in the oil level sight glass.

Changing hydraulic oil

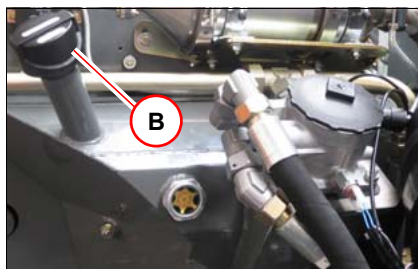


Fig. 100

NOTICE

Contaminated or the wrong hydraulic oil and lack of oil can severely damage the hydraulic system.

- Only change the hydraulic oil when the diesel engine is shut off.
- Take care to avoid dirt when working.
- Add oil with a screen to avoid dirt.
- Only use authorized oils of the same type.
- If the hydraulic system is filled with biodegradable oil, then use only biodegradable oil of the same type for filling up – observe the sticker on the hydraulic oil reservoir.

Replace the hydraulic oil

1. Park the machine on level ground.
2. Lower loader unit completely by pushing the lever forwards.
3. Tilt-in the bucket entirely by pushing the lever to the left.
4. Stop the engine and secure the machine against rolling away.
5. Open the engine cover.
6. Remove ventilation filter **B** from the hydraulic oil tank.
7. Place a suitable container under the hydraulic oil tank.
[capacity min. 55 l (15 gal)]
8. Remove cap **C** on the oil drain valve.
9. Place the end of the hose of the oil drain coupling in the container.
10. Mount oil drain coupling **D** onto the oil drain valve.
11. Oil drain valve **E** opens and the oil runs into the container.
12. Rinse the hydraulic oil tank with a little hydraulic oil.
13. Remove oil drain coupling **D** from oil drain valve **E**.
14. Mount cap **C** of the oil drain valve.
15. Replace the hydraulic oil filter element.
16. Check the filling screen for damage.
17. Refill new hydraulic oil up to the middle of oil level sight glass **A**.
18. Mount ventilation filter **B** of the hydraulic oil tank.
19. Start the engine and at low engine speed, fully extend and retract the lift and tilt rams.
20. Turn the steering wheel several times left and right.
21. Retract all hydraulic cylinders.
22. Stop the engine.
23. Check the hydraulic oil level again and fill up if necessary.

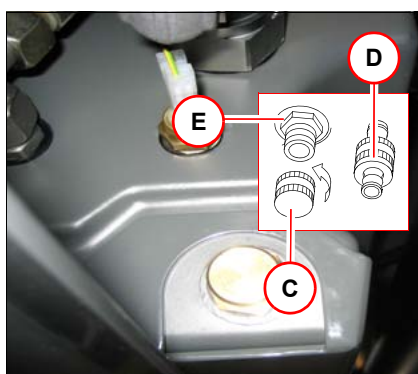


Fig. 101

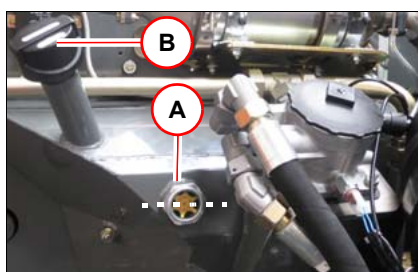


Fig. 102



Environment

Dispose of drained hydraulic oil by an ecologically safe method.

Replace the hydraulic oil suction and return flow filter.

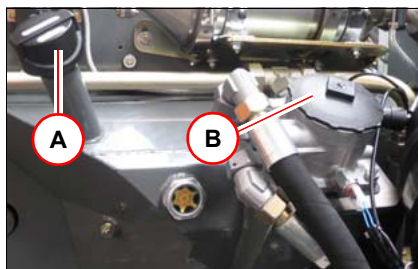


Fig. 103

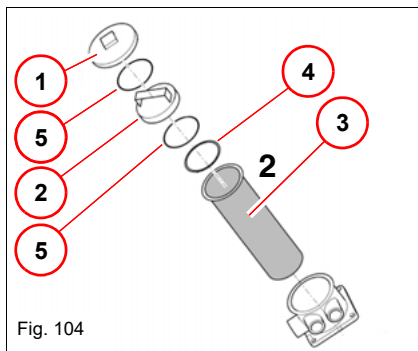


Fig. 104

1. Park the machine on level ground.
2. Retract all hydraulic cylinders.
3. Stop the engine.
4. Apply the parking brake.
5. Switch off the starter and remove the starting key.
6. Clean the area around the filler and ventilation filter **A** and the suction/return filter **B**.
7. Open breather filter **A** by hand.
8. Loosen cover **1** of the hydraulic oil filter by about 2 turns and wait 3 minutes until the oil level in the filter housing has dropped to the oil level in the hydraulic oil tank.
9. Completely loosen cover **1** and remove.
10. Pull out filler pipe **2** together with filter insert, **3** turning them slightly.
11. Remove filter insert **3** from filler pipe **2** and dispose of it.
12. Check that flat seal **4** on filter cover **1** and O-ring **5** on the filler pipe are in a perfect condition (replace if necessary).
13. Slide filler pipe **2** onto the new filter insert **3** and insert it into the filter.
14. Mount cover **1** (tightening torque 20 Nm (14.75 lbf ft)).
15. Mount ventilation filter/**A** (tighten by hand).
16. Perform a test run of the hydraulic system.
17. With the engine stopped, check filter for leaks.
18. Check level of hydraulic oil – see ["Checking the hydraulic oil level" on page 1-91](#) and refill if needed – see ["Adding hydraulic oil" on page 1-92](#).



Environment

Dispose of drained hydraulic oil by an ecologically safe method.

Hydraulic tank - change ventilation filter

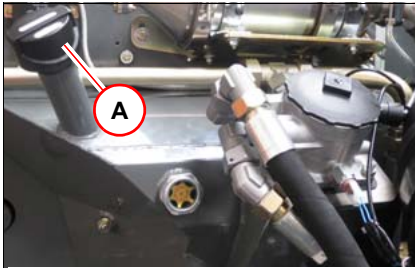


Fig. 105

1. Park the machine on level ground.
2. Retract all hydraulic cylinders.
3. Stop the engine.
4. Apply the parking brake.
5. Switch off the starter and remove the starting key.
6. Clean the area around the filler and breather filter **A**.
7. Unscrew the breather filter **A** by hand.
8. Install new breather filter **A**.
 - ➡ Before installing the new filter check whether the designation corresponds to the dismantled filter
9. Check level of hydraulic oil – see ["Checking the hydraulic oil level" on page 1-91](#) and refill if needed – see ["Adding hydraulic oil" on page 1-92](#).

Clean the line filter (high pressure filter) strainer insert

Remove the line filter

1. Place the machine on firm ground.
2. Stop the engine.
3. Switch off the starter and remove the starting key.
4. Apply the parking brake.
5. Open the engine cover – see *"Engine cover" on page 1-23*.
6. Remove the maintenance access (engine vat, rear) – see *"Engine vat" on page 1-24*.
7. Remove hydraulic hose **B** on the line filter.
8. Open fixing clip **C**.
9. Release union nut **A** by holding the pipe and take out the line filter.
10. Seal openings with suitable plugs.
11. Carefully clamp line filter **A** into a vise.
12. Dismantle the screw connection **B** on the line filter **A**.

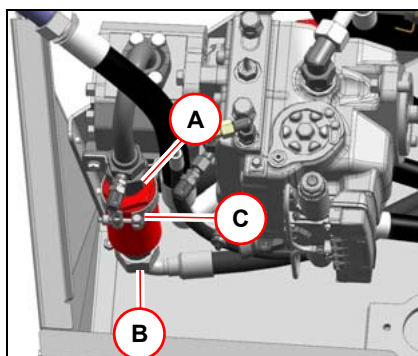


Fig. 106

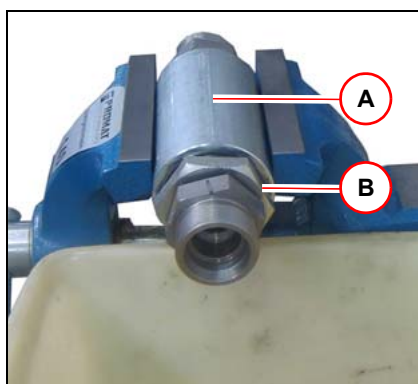


Fig. 107

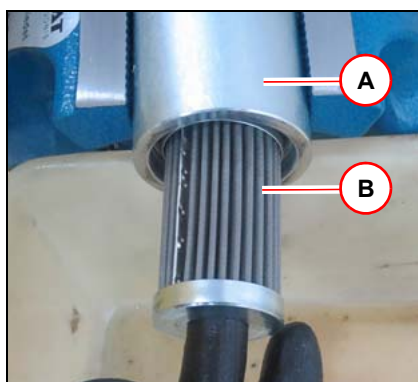


Fig. 108

13. Remove the filter element **B** from the housing **A**.
14. Wash the filter element **B** with petroleum benzine or cold cleaner.

Mount the line filter

1. Insert the filter element **B** into the housing **A**.

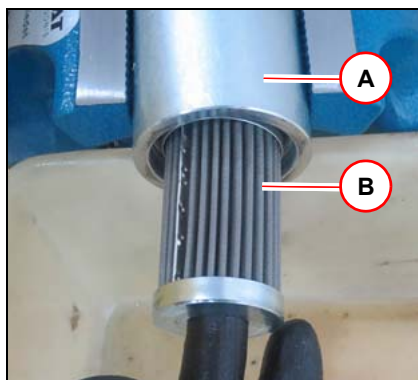


Fig. 109

2. Replace the sealing ring **E** on the screw connection **D** with a new sealing ring.
3. Oil the new sealing ring **E**.
4. Insert the spring **C** and centering piece **F** as shown between the screw connection **D** and the filter element **B**.
5. Screw in screw connections **D** in housing **A** and tighten to 180 Nm (132 lbf ft).

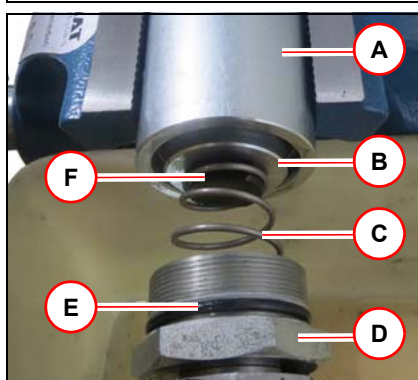


Fig. 110

6. Position line filter and position union nut **A**.
7. Tighten fixing clip **C**.
8. Position hydraulic hose **B** on the line filter and tighten.
9. Check line filter for leaks.
10. Check the hydraulic oil level – see ["Checking the hydraulic oil level" on page 1-91](#) and refill if necessary – see ["Adding hydraulic oil" on page 1-92](#).
11. Mount the maintenance access (engine vat, rear) – see ["Engine vat" on page 1-24](#).

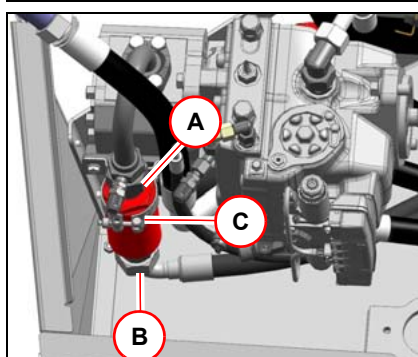


Fig. 111

Checking the hydraulic system for leaks

Safety instructions regarding pressure line checks



CAUTION

Burn and injury hazard if hot hydraulic oil escapes under high pressure!

Hydraulic oil escaping under high pressure can catch fire, damage property, penetrate the skin, and cause serious burns.

- ▶ Do not operate the machine with leaking or damaged hydraulic system components.
- ▶ Never search for leaks with your bare hands, wear protective gloves and clothes.
- ▶ Wear safety glasses to protect the eyes. If oil contacts the eye, flush immediately with clean water and seek emergency medical treatment.
- ▶ Seek immediate medical attention if oil penetrates the skin. Oil can cause serious infections.
- ▶ Retighten leaking screw connections and hose connections only when the hydraulic system is not under pressure. In other words, release the pressure before working on pressurized lines.
- ▶ Never weld or solder defect or leaky pressure hoses and screw connections, but replace defect parts.
- ▶ Do not check for leaks with an open flame due to explosive fire risk from vaporized oil mist.

Checking the condition and age of hydraulic hoses

Important information for the owner of the machine:

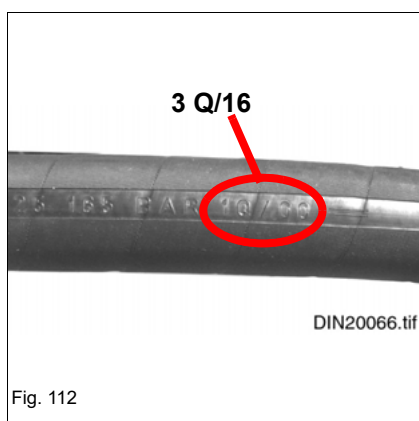
The entrepreneur/owner of the machine must ensure that hose pipes are replaced in appropriate intervals, even if no safety-relevant malfunctions can be detected on the hose pipe.

Have flexible lines inspected by an expert (competent person) before the first commissioning, and then at least once a year for safe working condition.



Information

Maintenance intervals – see *"Maintenance plan"* on page 1-7.



- Leakages and damaged pressure lines must be immediately repaired or replaced by an authorized service center or after-sales personnel. This not only increases the operating safety of your machine but also helps to protect the environment.
- Replace hydraulic hoses every 6 years from the date of manufacture, even if they do not seem to be damaged.

In this respect, we also recommend that you observe all the relevant safety regulations for hydraulic lines, as well as the safety regulations regarding accident prevention and occupational health and safety in your country. Also observe DIN 20066, part 5.

The date of manufacture (month or quarter and year) is indicated on the flexible line.

Example:

- The indication **"3 Q/16"** means "manufactured in the 3rd quarter of 2016".

1.15 Electrical system

Safety instructions for electrical system



WARNING

Injury hazard due to malfunctioning batteries!

Batteries give off explosive gases that can cause deflagrations if ignited.

- ▶ Do not smoke, avoid fire and open flames.
 - ▶ Do not place any tools on the battery.
-



WARNING

Risk of injury due to chemicals!

Battery acid can cause serious burns in case of skin contact.

- ▶ Avoid contact of the battery acid with the skin, eyes and mouth.
 - ▶ In case of contact with battery acid, immediately flush the affected parts of the body with plenty of clear water and seek medical attention at once.
 - ▶ Wear protective equipment.
-

NOTICE

Charge a low battery with a regulated battery charger equipped with an automatic shutoff.

- ▶ Refer to the Operator's Manual of the battery charger.
-

NOTICE

In order to avoid damage from malfunctions in the electronic regulation of the diesel engine, do not unscrew circuit breaker **S008** from the frame immediately after switching off the engine!

- ▶ Follow the correct order (see label)!

It is not possible to operate an external vehicle heater (optional) when the main battery circuit breaker **S008** has been removed.

Checking/replacing the battery

The battery is located in the engine vat near the rear wheel.

It is low in maintenance and no fluid needs to be refilled under normal operating conditions. However have it checked at regular intervals to ensure that the electrolyte level is between the **MIN** and **MAX** marks.

Preparing for battery replacement

1. Park the machine on level ground.
2. Lower the loader unit.
3. Apply the parking brake.
4. Turn wheel to the right.
5. Switch off the starter and remove the starting key.
6. Open the engine cover – *see "Engine cover" on page 1-23.*
7. Switch off battery master switch **S008** – *see "Battery master switch S008" on page 1-3.*
8. Remove maintenance cover at the back of the engine vat – *see "Engine vat" on page 1-24.*

NOTICE

Short circuit due to wrong order when disconnecting the battery.

- To disconnect: First the negative terminal, and then the positive terminal.
 - To connect: First the positive terminal, and then the negative terminal.
-

Removing the battery

1. Release nuts **A** on the negative terminal and remove the earth cable.



Fig. 113

2. Loosen nut **A** at the positive terminal and remove the battery cable.

3. Remove screws **B** and take mount out.

4. Pull the battery out in the direction of the rear wheel and remove.

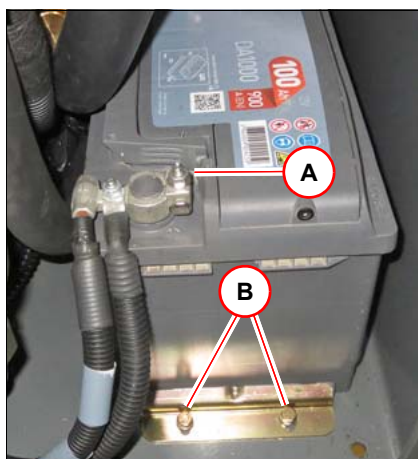


Fig. 114

Install the battery

1. Push new battery into the engine bay.

NOTICE

In order to avoid damage to the machine electronics, only use batteries of the specified capacity!

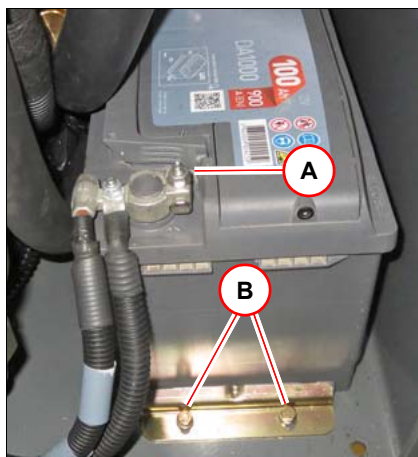


Fig. 115



Fig. 116

2. Position the battery in the engine bay.
3. Position mount and tighten screws **B**.
4. Push the battery cable onto the positive pole and tighten screw **A**.
5. Mount maintenance cover at the back of the engine vat – see *"Engine vat"* on page 1-24.
6. Insert the earth cable onto the negative terminal and tighten nut **B**.
7. Switch on battery master switch **S008** – see *"Battery master switch S008"* on page 1-3.

Regular checks and maintenance work of the electrical system



Information

Maintenance intervals – [see "Maintenance plan" on page 1-7.](#)

Daily checks before operating the machine

- Is the light system OK?
- Is the signaling and warning system OK?

Weekly checks

- Electric fuses: Replace malfunctioning fuses with new ones with the specified load capacity (amperage) only.
 - ➔ Blown fuses indicate overloading or short circuits. Therefore, the electrical system should be checked by a qualified technician before installing the new fuse.
- Electric and ground connections: When performing maintenance on the electrical system, pay particular attention to ensuring good contact in leads and fuses.
- Battery charge condition and condition of battery terminals.
- Check that the electric cables are positioned securely and show no signs of wear and tear. If necessary replace them.

Checking the alternator

- Only test run the engine with the battery connected.
- When connecting the battery, ensure that the poles (+/–) are not inverted.
- Always disconnect the battery before performing welding work or connecting a quick battery charger
- Replace defect charger pilot lights immediately.

Checking/replacing relays and fuses

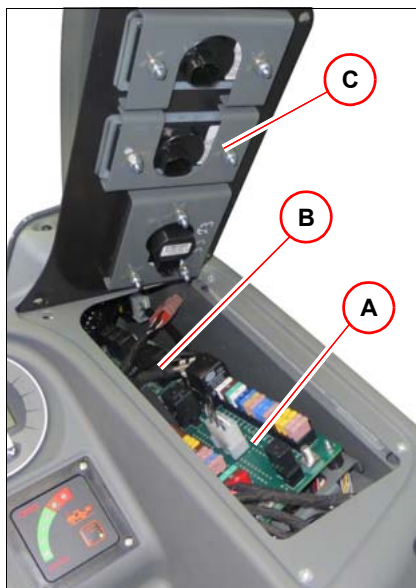


Fig. 117

The printed circuit board **A** with the fuses and board **B** with the relays are situated below the switch console **B** of the right instrument panel.

Checking/replacing fuses and switching relays

1. Switch off the ignition.
2. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
3. Open control panel **C** – see ["Access vehicle fuses, relay" on page 1-26](#).
4. Remove malfunctioning fuses or relays from the board and replace them with new ones.
5. Close control panel **C** – see ["Access vehicle fuses, relay" on page 1-26](#).
6. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
7. Check the electrical system for correct function.

NOTICE

Blown fuses indicate overloading or short circuits. The electrical system must therefore be checked before installing the new fuse!

► Only use fuses with the specified load capacity (amperage)

Check/change relays in foot area (start interlocking)



Fig. 118

The relays are located under the cover, next to the accelerator.

Checking/replacing switching relays

1. Switch off the ignition.
2. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
3. Remove the cladding – see ["Relays in the foot area \(start interlock\)" on page 1-27](#).
4. Remove defective relays and replace them with new ones.
5. Mount cladding – see ["Relays in the foot area \(start interlock\)" on page 1-27](#).
6. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
7. Check the electrical system for correct function.

Main fuse box with switching relays

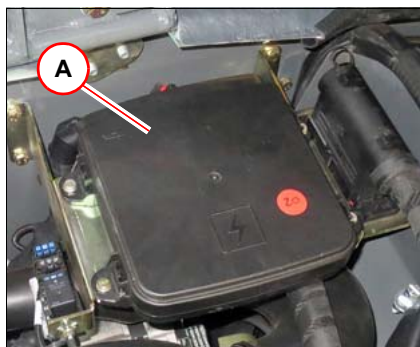


Fig. 119

The main fuse box is attached above the engine (near the radiator).

Checking/replacing fuses and relays

1. Lower the loader unit.
2. Apply the parking brake.
3. Switch off the ignition.
4. Open the engine cover – see ["Engine cover" on page 1-23](#).
5. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
6. Remove cover **A** from the fuse box.
7. Replace the malfunctioning fuses or relays.
8. Names and power ratings for main fuses and relays are in the operator's manual.
9. Mount cover **A** on fuse box.
10. Check the electrical system for correct function.

NOTICE

Blown fuses indicate overloading or short circuits. The electrical system must therefore be checked before installing the new fuse!

► Only use fuses with the specified load capacity (amperage)

Checking/changing relay of 14-pin socket



Fig. 120

The relays **A** are under the cover in the front of the cab.

Checking/replacing switching relays

1. Switch off the ignition.
2. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
3. Remove the cladding – see ["Cab front" on page 1-25](#).
4. Remove defective relays and replace them with new ones.
5. Mount cladding – see ["Cab front" on page 1-25](#).
6. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
7. Check the electrical system for correct function.

1.16 Heating, ventilation, air conditioning

Safety instructions for heating, ventilation, air conditioning

The cabin is equipped with a fine-dust filter and recirculated-air filter.
According to EN 15695-1:2009, the filter offers no protection against hazardous substances and is therefore not permitted for use with sprays and spray fluids.
Get informed on and follow the legal regulations of your country.



CAUTION

Health hazard! Filter installed incorrectly or damaged!

Penetration of dust in cabin causing damage to health.

- ▶ In order to comply with the required safety measures regarding occupational safety and health, malfunctioning or dirty filters must be replaced by new ones!
 - ▶ The machine may not be used in an environment requiring protection against aerosols and vapors!
-

Cleaning/replacing the cabin ventilation filter

Cleaning recirculation filter

Information

Maintenance intervals – see *"Maintenance plan" on page 1-7.*

The recirculated-air filter is located underneath the cladding in the cabin, to the left of the steering column.

1. Remove the cladding – see *"Relays in the foot area (start interlock)" on page 1-27.*
2. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
3. Remove the knurled screws **A**.
4. Remove sheet **B** with circulation filter **C**.
5. Clean recirculated-air filter **C** with compressed air or water, replace it with a new one if necessary.
 - Replacing recirculation filter **C** – see *"Cleaning/replacing the cabin ventilation filter" on page 1-108.*
 - If the machine is used in severe dust conditions, recirculation filter **C** needs to be cleaned or replaced several times.
6. Clean the inside of the air cleaner (filter) housing.
7. Place the cleaned/new circulation filter **C** on sheet **B**.

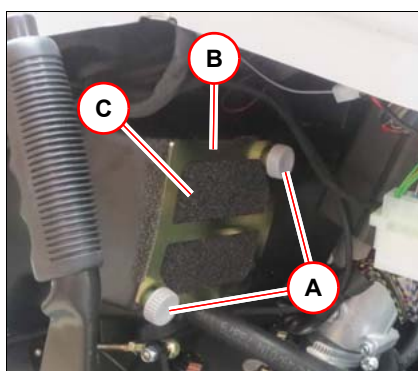


Fig. 121

NOTICE

When inserting the recirculation filter, **C** make sure it is positioned correctly.

- The recirculated air filter **C** must touch all sides evenly.

8. Tighten knurled screw **A**.
9. Mount cladding – see *"Relays in the foot area (start interlock)" on page 1-27.*
10. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*

Cleaning/replacing the fine-dust filter



Information

Maintenance intervals – see *"Cleaning/replacing the fine-dust filter" on page 1-109*.

The fine-dust filter is located in the cabin on the right between the front and side trims.

1. Remove the knurled screws **A**.
2. Remove fine dust filter **A** and check for damage.
3. Knock the fine-dust filter **A** on a plate on either side.
4. Blow compressed air from the inside to the outside or wash it with water and let it dry, or replace it with a new one.
 - ➔ Replacing fine particulate air filter **A**– see *"Cleaning/replacing the fine-dust filter" on page 1-109*.
 - ➔ Replace or clean the filter more frequently if the machine is used in severe dust conditions.
5. Clean the inside of the filter housing.
6. Insert the cleaned/new fine dust filter **A**.

NOTICE

When inserting fine-dust filter **A**, make sure the position is correct.

- The fine-dust filter **A** must touch all sides evenly.

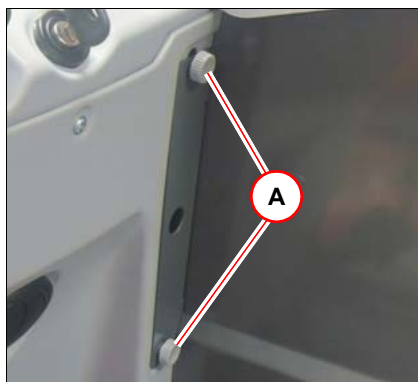


Fig. 122

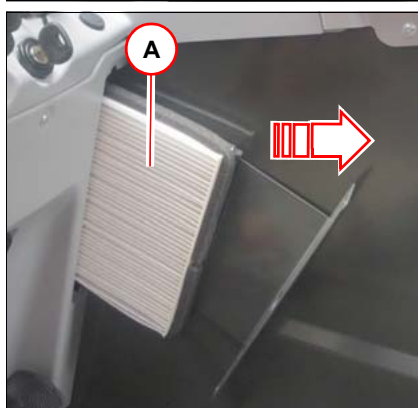


Fig. 123

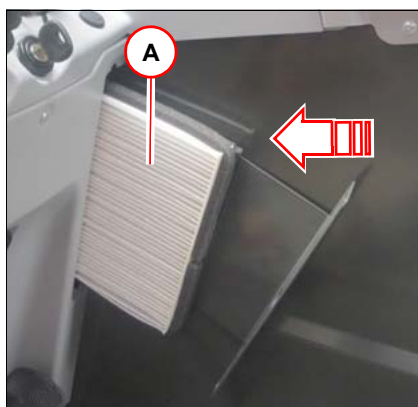


Fig. 124

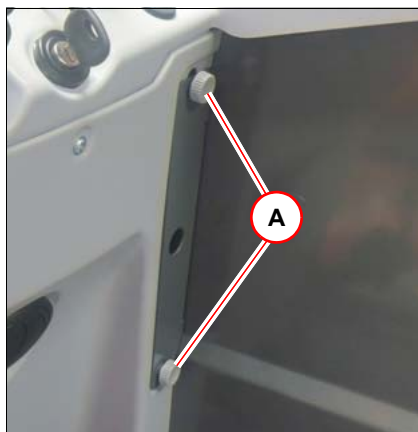


Fig. 125

7. Tighten knurled screw **A**.

Air conditioning (option)

Functional and visual checks must be performed by the operator/user!

All maintenance and repair work may only be carried out by trained specialist personnel.

Safety instructions regarding the air conditioning



WARNING

Injury hazard due to damaged hoses!

Escaping refrigerant can cause serious injury or death.

- ▶ Do not open pipes, hoses or other components containing refrigerant.
- ▶ Avoid all contact with the refrigerant.
- ▶ Do not weld parts of the refrigerant circuit, or in the immediate vicinity of these parts.



CAUTION

Injury hazard due to rotating parts!

Rotating parts can cause serious injury.

- ▶ Stop the engine before opening the engine cover.
- ▶ Switch off the starter and remove the starting key.
- ▶ Disconnect the battery disconnect relay.
- ▶ Apply the parking brake.



CAUTION

Injury hazard during inspection work! The evaporator and heat exchanger have sharp-edged fins. Lines and hoses containing coolant can be hot!

Failure to observe this can cause injury.

- ▶ Wear protective equipment (protective gloves and safety glasses).
- ▶ Do not perform maintenance unless the heating and air conditioning systems are switched off.
- ▶ Observe the pertinent regulations relevant to accident prevention, other generally acknowledged regulations regarding safety and occupational medicine.

Visual check of the air conditioning system



CAUTION

Risk of injury due to hot and moving engine parts!

Hot and moving engine parts can cause injury.

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

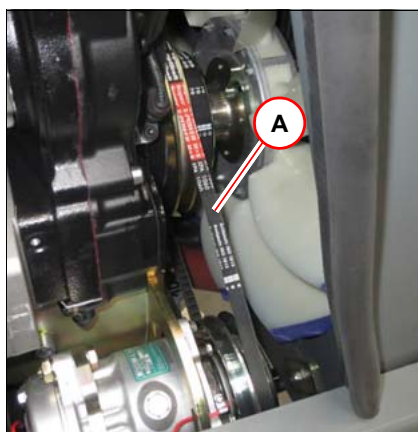


Fig. 126



Fig. 127

1. Stop the engine.
2. Apply the parking brake.
3. Switch off the starter and remove the starting key.
4. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
5. Check V-belt tension **A** and if necessary, re-tension – see *"Checking/re-tensioning the V-belt air conditioning (opt)" on page 1-87* or – see *"Checking/re-tensioning the V-belt air conditioning (opt)" on page 1-87.*
6. Check the hoses for tightness and chafing.
7. Check the electric connections for correct condition and tightness.
8. Check the level of the refrigerant.
 - With the air conditioning system switched on, the refrigerant must be visible and free of air in sight glass **A** of the dehumidifier.
 - If you can see bubbles in sight glass **A**, the system has to be checked for leakages and then refilled.



Information

Replace the receiver drier every 2 years or after repair work on the refrigerating circuit.



Information

Maintenance intervals – see *"Maintenance plan" on page 1-7.*
Specifications and capacities – see *"Fluids and lubricants" on page 1-18.*

Cleaning the heat exchanger (condenser)



CAUTION

Risk of injury due to hot and moving engine parts!

Hot and moving engine parts can cause injury.

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



Information

Maintenance intervals – see *"Maintenance plan" on page 1-7.*

Cleaning the condenser

1. Park the machine on level ground.
2. Lower the loader unit to the ground.
3. Stop the engine.
4. Apply the parking brake.
5. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
6. Switch off the starter and remove the starting key.
7. Open the engine cover – see *"Engine cover" on page 1-23.*
8. Loosen lock **A** on the condenser and tilt it forward.
9. Clean the condenser with compressed air or by spraying water (do not use a high-pressure cleaner).
10. Tilt back the condenser after cleaning and safely lock it **A**.
11. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*

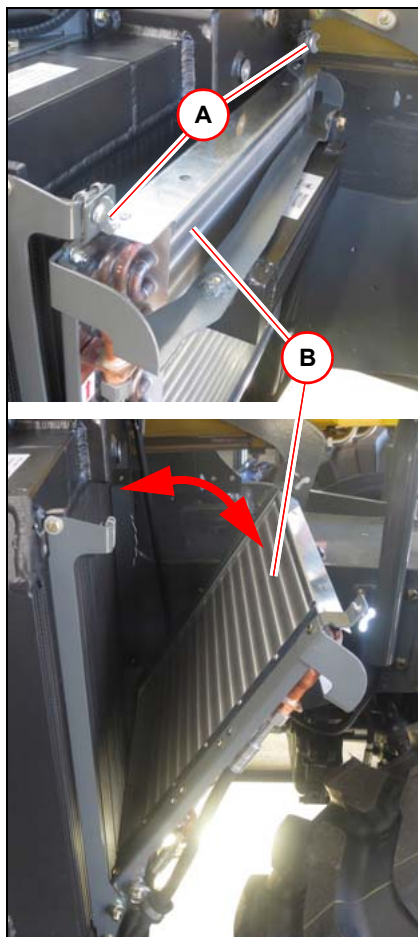
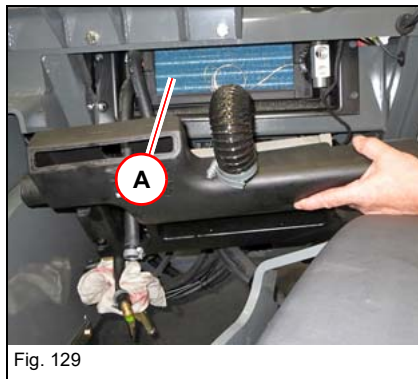


Fig. 128

Clean the condenser



1. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
2. Empty the air conditioning system – see ["Emptying/filling the air conditioning system" on page 1-115](#).
3. Remove the heating – see ["Remove/install heater/air conditioning system" on page 15-2](#).
4. Clean the vaporizer **A**.
5. Install the heater – see ["Remove/install heater/air conditioning system" on page 15-2](#).
6. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
7. Fill air conditioning system – see ["Emptying/filling the air conditioning system" on page 1-115](#).

Emptying/filling the air conditioning system

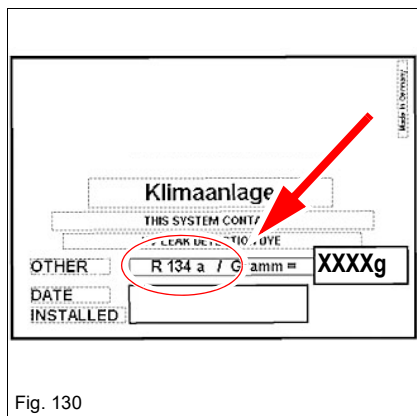


Fig. 130

The air conditioning system has to be checked and serviced twice a year by trained personnel!

- The initial filling of the air conditioning system – see information plate – affixed to the side panel of the cooler.



Information

Use only the refrigerants indicated on the label for refilling the air conditioning system (see arrow).

Empty the air conditioning system.

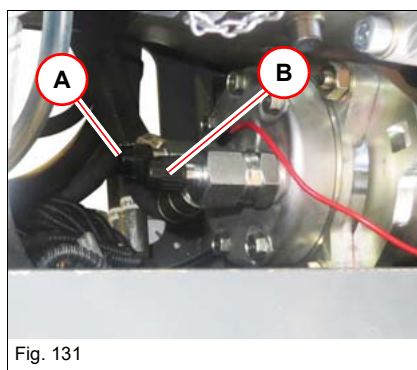


Fig. 131



WARNING

Poisonous gases can be incurred during welding work or in the event of open flames close to the refrigerant circuit.

Poisoning hazard due to poisonous gases.

- Avoid open flames in the proximity of the refrigerant circuit.
- Do not weld close to the refrigerant circuit.

Use an air conditioning service centre to drain the air conditioning system. Observe the relevant operating instructions!

1. Stop the engine.
2. Apply the parking brake.
3. Switch off the starter and remove the starting key.
4. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
5. Remove the V-belt cover.
6. Connect the high-pressure service hose (**red**) to the connection for high pressure **A**.
7. Connect the low-pressure service hose (**blue**) to the connection for low pressure **B**.
8. Drain the air conditioning system with the respective programme in the air conditioning service station.
9. Remove the service hoses.



WARNING

Poisonous gases can be incurred during welding work or in the event of open flames close to the refrigerant circuit.

Poisoning hazard due to poisonous gases.

- ▶ Avoid open flames in the proximity of the refrigerant circuit.
- ▶ Do not weld close to the refrigerant circuit.

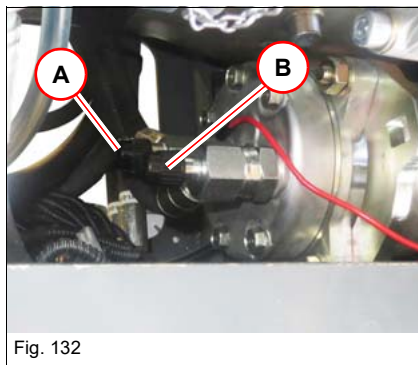


Fig. 132

Filling up the air conditioning system

Use an air condition service centre to fill the air conditioning system. Observe the relevant operating instructions!

1. Stop the engine.
2. Apply the parking brake.
3. Switch off the starter and remove the starting key.
4. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
5. Connect the high-pressure service hose (**red**) to the connection for high pressure **A**.
6. Connect the low-pressure service hose (**blue**) to the connection for low pressure **B**.
7. Fill the air conditioning system with the respective programme in the air conditioning service station.
8. Remove the service hoses.
9. Mount the V-belt cover.
10. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).

1.17 Washer system

Reservoir

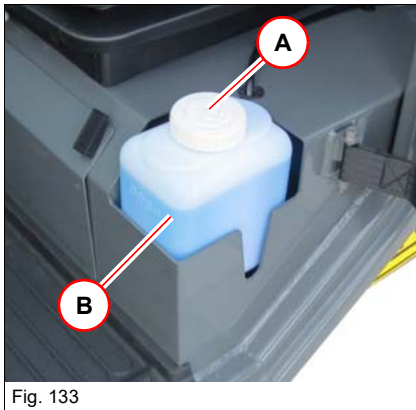


Fig. 133

The filler inlet **B** of the reservoir is located in the cabin to the left of the operator seat.

The level in the reservoir can be checked via inspection window **A**.



Information

Add only clean tap water!

Add a suitable cleaning agent if necessary. In winter: add antifreeze for washer systems to the water. Refer to the antifreeze instructions for further information on concentrations.



Information

Maintenance intervals – see *"Maintenance plan" on page 1-7*.
Specifications and capacities – see *"Fluids and lubricants" on page 1-18*.

1.18 Axles/travelling drive

Checking/filling up the gearbox oil



CAUTION

Risk of burns when emptying hot gear lubricant oil!

Can cause serious injury.

- ▶ Wear protective gloves!
- ▶ Use suitable tools, e.g. to unscrew the oil drain plug!



Environment

Use a suitable container to collect the gearbox oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Only use new sealing rings for filler and drain plugs.

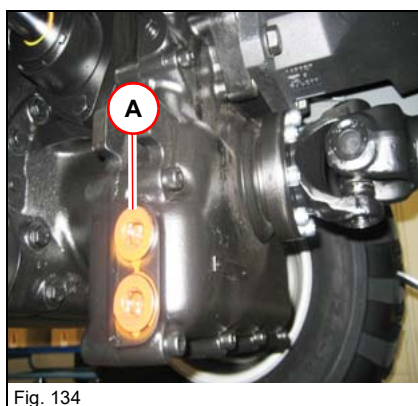


Fig. 134

1. Place the machine with and intermediate gear at operating temperature on firm and level ground.
2. Lower the telescopic boom fully.
3. Stop the engine.
4. Switch off the starter and remove the starting key.
5. Open the engine cover – see ["Engine cover" on page 1-23](#).
6. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
7. Place suitable collecting vessels under the intermediate gearbox.
8. Clean and unscrew the plugs **A** of the filling and control opening on the transfer case.

If the oil level is below the fill or inspection opening or if the oil level cannot be seen:

➔ Add fresh oil through the fill and inspection opening up to the overflow.

If the oil level is correct:

➔ Plugs **A** of the filling and control opening on the transfer case with new seal and tighten.



Information

Maintenance intervals – see ["Maintenance plan" on page 1-7](#).
Specifications and capacities – see ["Fluids and lubricants" on page 1-18](#).

Change gear oil in distribution gear



CAUTION

Risk of burns when emptying hot gear lubricant oil!

Can cause serious injury.

- ▶ Wear protective gloves!
- ▶ Use suitable tools, e.g. to unscrew the oil drain plug!



Environment

Use a suitable container to collect the gearbox oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Only use new sealing rings for filler and drain plugs.

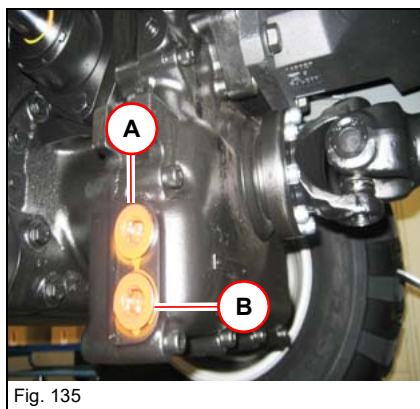


Fig. 135

1. Place the machine with and intermediate gear at operating temperature on firm and level ground.
 2. Lower the telescopic boom fully.
 3. Stop the engine.
 4. Switch off the starter and remove the starting key.
 5. Open the engine cover – [see "Engine cover" on page 1-23](#).
 6. Switch off battery master switch **S008** – [see "Battery master switch S008" on page 1-3](#).
 7. Place suitable collecting vessels under the intermediate gearbox.
 8. Clean and unscrew the plugs **A** of the filling and control opening on the transfer case.
 9. Clean and unscrew drain plugs **B** on transfer case.
 10. Completely drain the old gearbox oil.
 11. Screw in drain plugs **B** on transfer case with new seal and tighten.
 12. Add fresh oil until it runs out of the filler or inspection opening.
- If the oil level in the gearbox remains constant:
- Screw in plugs **A** of the filling and control opening on the transfer case with new seal and tighten.
13. Perform a test run.
- After performing a test run:
 - Check the oil level again after about 5 minutes and add oil if necessary – [see "Checking/filling up the gearbox oil" on page 1-118](#).

Check/top-up oil on differential lock (rear axle)



CAUTION

Risk of burns when emptying hot gear lubricant oil!

Can cause serious injury.

- ▶ Wear protective gloves!
- ▶ Use suitable tools, e.g. to unscrew the oil drain plug!



Environment

Use a suitable container to collect the gearbox oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Only use new sealing rings for filler and drain plugs.

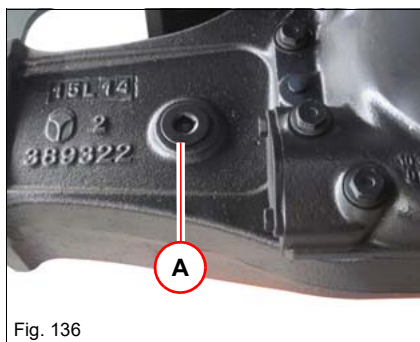


Fig. 136

1. Place the vehicle on firm and level ground with the differential at operating temperature.
2. Lower the telescopic boom fully.
3. Stop the engine.
4. Switch off the starter and remove the starting key.
5. Open the engine cover – see *"Engine cover" on page 1-23*.
6. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.

7. Place a suitable container under the differential.
8. Clean and unscrew the sealing plugs **A** of the filling and inspection opening.

If the oil level is below the fill or inspection opening or if the oil level cannot be seen:

➔ Add fresh oil through the fill and inspection opening up to the overflow.

If the oil level is correct:

➔ Screw in sealing plug **A** in the filling and inspection opening with a new sealing ring and tighten.

Change oil in differential (rear axle)



CAUTION

Risk of burns when emptying hot gear lubricant oil!

Can cause serious injury.

- Wear protective gloves!
- Use suitable tools, e.g. to unscrew the oil drain plug!



Environment

Use a suitable container to collect the gearbox oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Only use new sealing rings for filler and drain plugs.

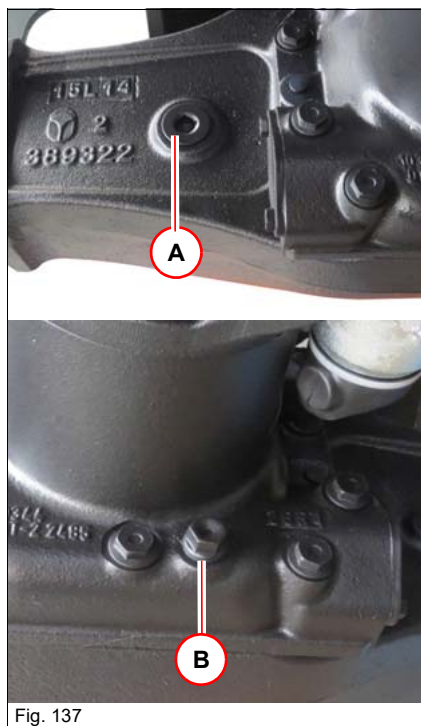


Fig. 137

1. Place the vehicle on firm and level ground with the differential at operating temperature.
 2. Lower the telescopic boom fully.
 3. Stop the engine.
 4. Switch off the starter and remove the starting key.
 5. Open the engine cover – see ["Engine cover" on page 1-23](#).
 6. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
 7. Place a suitable container under the differential.
 8. Clean and unscrew the sealing plugs **A** of the filling and inspection opening.
 9. Unscrew oil drain plug **B**.
 10. Completely drain the old oil.
 11. Insert and tighten oil drain plug **B**.
 12. Add fresh oil through the fill and inspection opening up to the overflow.
- If the oil level in the differential remains constant:
- ➔ Screw in sealing plug **A** in the filling and inspection opening with a new sealing ring and tighten.
13. Perform a test run.
- ➔ After performing a test run:
 - ➔ Check the oil level again after about 5 minutes and add oil if necessary – see ["Check/top-up oil on differential lock \(rear axle\)" on page 1-120](#). – see ["Change oil at the differential lock \(front axle\)" on page 1-123](#).

Check/top-up oil on differential lock (front axle)



CAUTION

Risk of burns when emptying hot gear lubricant oil!

Can cause serious injury.

- ▶ Wear protective gloves!
- ▶ Use suitable tools, e.g. to unscrew the oil drain plug!



Environment

Use a suitable container to collect the gearbox oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Only use new sealing rings for filler and drain plugs.

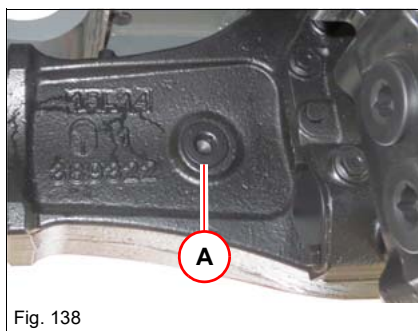


Fig. 138

1. Place the vehicle on firm and level ground with the differential at operating temperature.
2. Lower the telescopic boom fully.
3. Stop the engine.
4. Switch off the starter and remove the starting key.
5. Open the engine cover – see *"Engine cover" on page 1-23*.
6. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.

7. Place a suitable container under the differential.
8. Clean and unscrew the sealing plugs **A** of the filling and inspection opening.

If the oil level is below the fill or inspection opening or if the oil level cannot be seen:

➔ Add fresh oil through the fill and inspection opening up to the overflow.

If the oil level is correct:

➔ Screw in sealing plug **A** in the filling and inspection opening with a new sealing ring and tighten.

Change oil at the differential lock (front axle)



CAUTION

Risk of burns when emptying hot gear lubricant oil!

Can cause serious injury.

- Wear protective gloves!
- Use suitable tools, e.g. to unscrew the oil drain plug!



Environment

Use a suitable container to collect the gearbox oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Only use new sealing rings for filler and drain plugs.

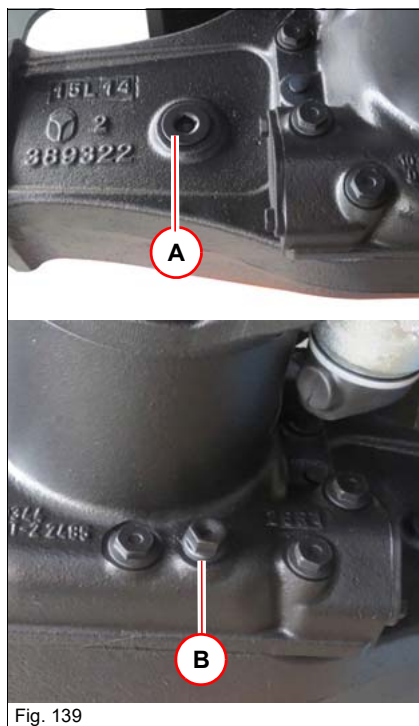


Fig. 139

1. Place the vehicle on firm and level ground with the differential at operating temperature.
 2. Lower the telescopic boom fully.
 3. Stop the engine.
 4. Switch off the starter and remove the starting key.
 5. Open the engine cover – see ["Engine cover" on page 1-23](#).
 6. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
 7. Place a suitable container under the differential.
 8. Clean and unscrew the sealing plugs **A** of the filling and inspection opening.
 9. Unscrew oil drain plug **B**.
 10. Completely drain the old oil.
 11. Insert and tighten oil drain plug **B**.
 12. Add fresh oil through the fill and inspection opening up to the overflow.
- If the oil level in the differential remains constant:
- ➔ Screw in sealing plug **A** in the filling and inspection opening with a new sealing ring and tighten.
13. Perform a test run.
- ➔ After performing a test run:
 - ➔ Check the oil level again after about 5 minutes and add oil if necessary – see ["Check/top-up oil on differential lock \(rear axle\)" on page 1-120](#). – see ["Check/top-up oil on differential lock \(front axle\)" on page 1-122](#).

Checking/refilling oil at the planetary drives



CAUTION

Risk of burns when emptying hot gear lubricant oil!

Can cause serious injury.

- Wear protective gloves!
- Use suitable tools, e.g. to unscrew the oil drain plug!



Environment

Use a suitable container to collect the gearbox oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Fit new sealing rings! Drain oil only after running the machine for a longer period of time!

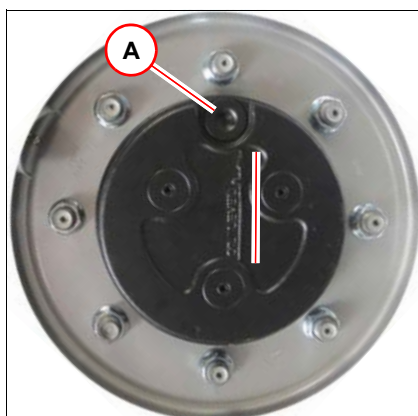


Fig. 140

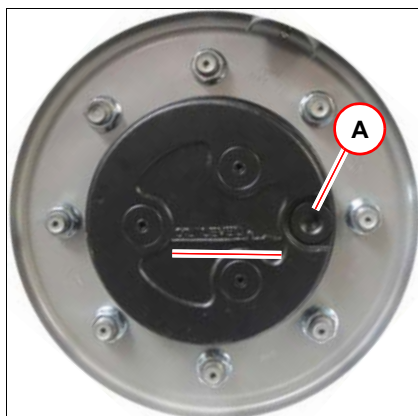


Fig. 141

1. Park the vehicle on firm and level ground with the planetary drive at operating temperature.
 2. Lower the telescopic boom fully.
 3. Stop the engine.
 4. Switch off the starter and remove the starting key.
 5. Open the engine cover – see *"Engine cover" on page 1-23*.
 6. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
 7. Place a suitable container under the respective planetary drive.
 8. Bring the plug **A** into the position as shown above *Fig. 140* (plug **A** must be at the top).
 9. Clean and loosen plug **A** (any overpressure can be released).
 10. Bring the opening **A** into position as shown in *Fig. 141* (screw must be horizontal).
- If the oil level is below the opening or if the oil level cannot be seen at all:
- Add fresh oil through opening **A** until it runs out of the filler opening
- If the oil level is correct:
- Screw in plug **A** with a new seal ring and tighten.

Change oil at the planetary drives



CAUTION

Risk of burns when emptying hot gear lubricant oil!

Can cause serious injury.

- Wear protective gloves!
- Use suitable tools, e.g. to unscrew the oil drain plug!



Environment

Use a suitable container to collect the gearbox oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Fit new sealing rings! Drain oil only after running the machine for a longer period of time!

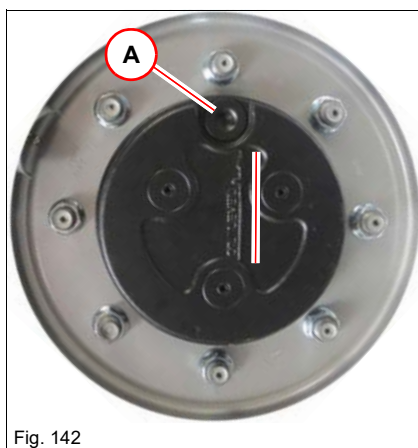


Fig. 142

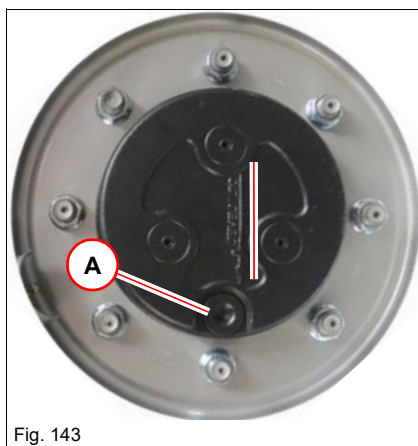


Fig. 143

1. Park the vehicle on firm and level ground with the planetary drive at operating temperature.
 2. Lower the telescopic boom fully.
 3. Stop the engine.
 4. Switch off the starter and remove the starting key.
 5. Open the engine cover – see *"Engine cover" on page 1-23*.
 6. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
 7. Place a suitable container under the respective planetary drive.
 8. Bring the plug **A** into the position as shown above *Fig. 142* (plug **A** must be at the top).
 9. Clean and loosen plug **A** (any overpressure can be released).
- Never** raise the machine on one side only for the following work!
10. Bring plug **A** into position as shown *Fig. 143* (plug must be at the bottom).
 11. Unscrew plugs **A**.
 12. Completely drain the old oil.

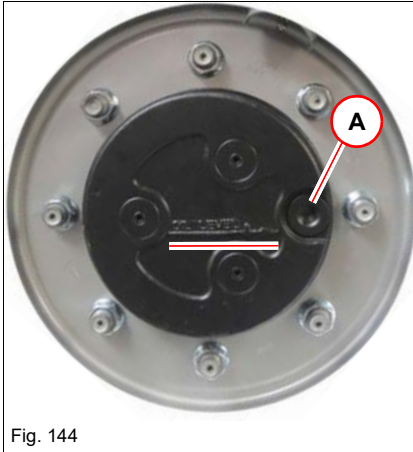


Fig. 144

13. Bring the opening **A** into position as shown in [Fig. 144](#) (screw must be horizontal).

14. Add fresh oil through opening **A** until it runs out of the filler opening

If the oil level in the differential remains constant:

➡ Screw in plug **A** with a new seal ring and tighten.

15. Perform a test run.

After performing a test run:

16. Check the oil level again after about 5 minutes, and add oil if necessary— see ["Checking/refilling oil at the planetary drives" on page 1-124](#).

1.19 Brake system

Important safety instructions



Fig. 145

The brakes are a safety part of the first level; improper maintenance can cause the brakes to fail.



WARNING

Malfunctioning brake lines or hoses carry an accident hazard!

Can cause serious injury or death.

- Defective brake lines or hoses have to be replaced immediately.

All repair work on the brakes may only be conducted by trained personnel.

An exception to this are the following checks that must be performed by the operator/user:

- Daily check of the brake lines.
- Daily check of the level in the brake fluid reservoir – see ["Checking/adding brake fluid" on page 1-128](#).



Information

Maintenance intervals – see ["Maintenance plan" on page 1-7](#).
Specifications and capacities – see ["Fluids and lubricants" on page 1-18](#).

Checking/adding brake fluid

The brake-fluid reservoir is located on the left underneath the instrument panel trim.

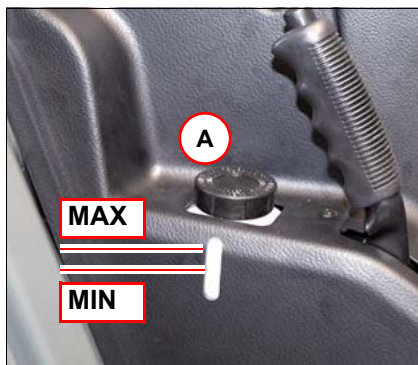


Fig. 146



DANGER

An incorrect brake fluid grade or an insufficient brake fluid level can impair the safety of the braking system.

- ▶ Check the brake fluid in the tank at regular intervals.
- ▶ The brake fluid must comply with the SAE specification (**ATF Suffix A**) – see *"Fluids and lubricants" on page 1-18*.
- ▶ If the brake fluid goes down considerably (below MIN) the brake system needs to be checked for leakage.
- ▶ Brake fluid has to be changed every 2 years.

If the fluid level is below the **MAX mark**, this needs to be topped up:

1. Clean the area around the tank cover **A**.
2. Open tank cover **A**.
3. Add brake fluid up to the **MAX** mark.
4. Close reservoir cover **A**.
5. Check the braking system for leaks and correct function.

Change and vent the brake fluid

The brake-fluid reservoir is located on the left underneath the instrument panel trim.

DANGER

An incorrect brake fluid grade or an insufficient brake fluid level can impair the safety of the braking system.

- ▶ Check the brake fluid in the tank at regular intervals.
- ▶ The brake fluid must comply with the SAE specification (**ATF Suffix A**) – see *"Fluids and lubricants"* on page 1-18.
- ▶ If the brake fluid goes down considerably (below MIN) the brake system needs to be checked for leakage.
- ▶ Brake fluid has to be changed every 2 years.

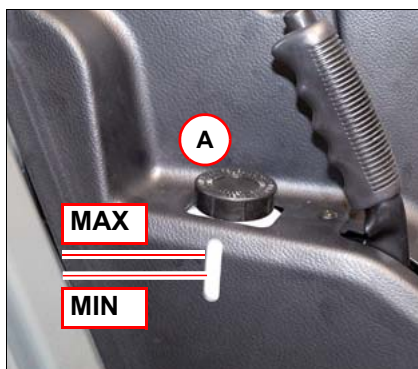


Fig. 147

1. Park the vehicle on firm ground.
2. Apply the parking brake.
3. Secure the machine to prevent it from rolling away.
4. Clean the area around the tank cover **A**.
5. Open tank cover **A**.
6. Connect the brake-ventilation unit.

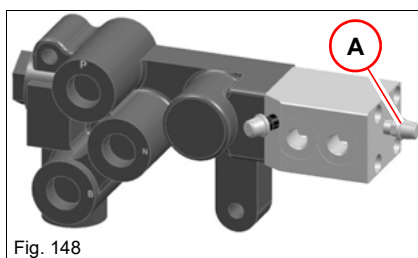


Fig. 148

In vehicles with hydraulic trailer brake valve (opt)

7. Connect a bleeder hose to vent valve **A**.
8. Open vent valve **A** until clean brake fluid flows out of the bleeder hose without any bubbles.
9. Close the vent valve **A** and remove the vent hose.
10. Connect a bleeder hose to the vent valve **A** of the rear axle.
11. Open vent valve **A** until clean brake fluid flows out of the bleeder hose without any bubbles.
12. Close the vent valve **A** and remove the vent hose.

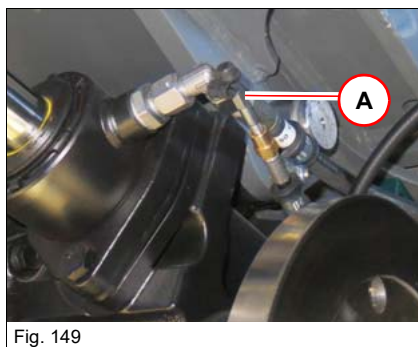


Fig. 149

1.20 Pressure accumulator

Safety instructions for the pressure accumulator



Information

The hydraulic accumulators may not be subjected to any welding or mechanical operations whatsoever!
It is recommended to have the pilot control pressure inspected annually. This inspection may only be carried out by a skilled person with the respective qualification!



DANGER

If the hydraulic accumulator is not filled correctly there is a risk of explosion!

If hydraulic accumulators are filled with oxygen or air, they explode. This will lead to serious injuries or death.

► Hydraulic accumulators may only be filled with nitrogen.



DANGER

Risk of suffocation!

Inhaling nitrogen can lead to serious injuries and even death.

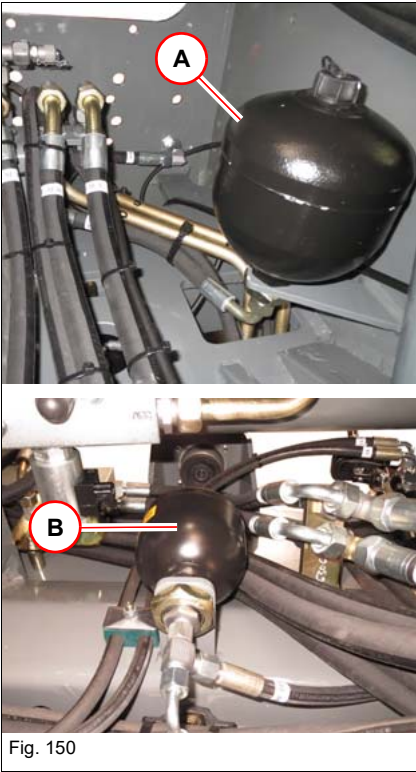
► Refill and drain hydraulic accumulators of nitrogen only outdoors or in rooms that are sufficiently ventilated.



Information

It is important to read and observe the operating manual for the commercially available filling and testing device that is in use!

Pre-charge pressure of pressure accumulator



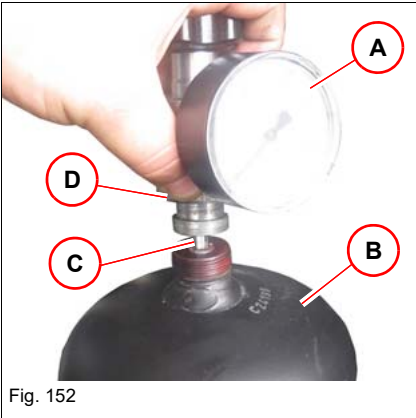
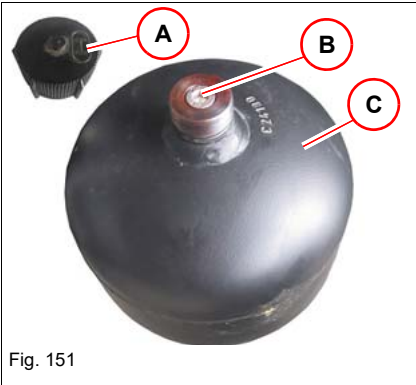
Pos.	Description	Pilot control pressure
A	Pressure accumulator 080 - load stabilizer	35 bar (508 psi)
B	Pressure accumulator 077 - emergency lowering	10 bar (145 psi)

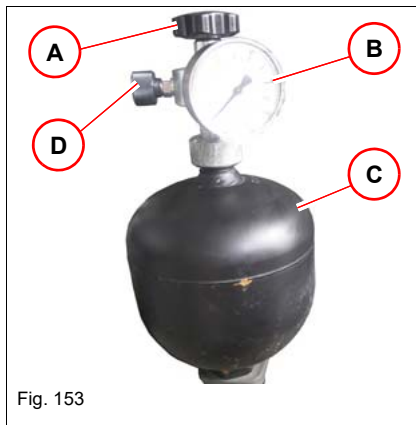
i Information

The pressure accumulator **077** is maintenance free. The pressure level cannot be adjusted. In the event of an error, the pressure accumulator has to be replaced.

Connecting the filling and testing device

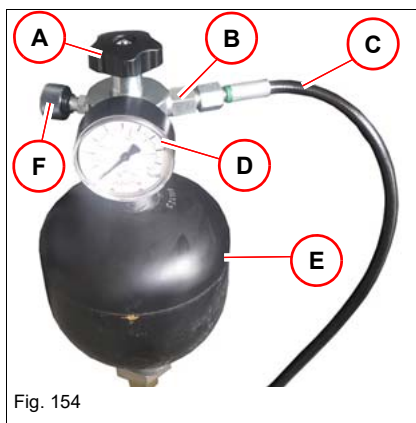
1. Unscrew sealing cap **A** from pressure accumulator **C**.
2. Loosen Allen screw **B** by approx. 1/2 rotation.
3. Put the hexagon screw **C** for the spindle in the Allen screw of the pressure accumulator **B**.
4. Screw the sleeve nut **D** from the filling and testing unit **A** to the pressure accumulator **B**.





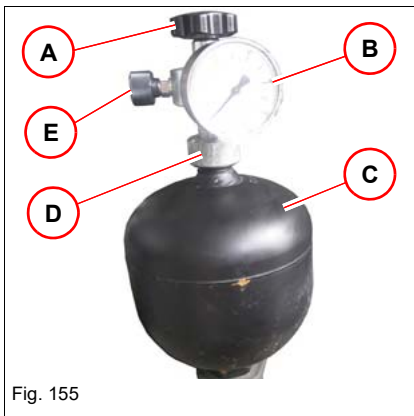
Checking the pressure level

1. Close the vent valve **D** on the filling and testing device tightly.
2. Turn the spindle **A** in an anti-clockwise direction until the indicator on the pressure gauge **B** starts to move.
3. If the pressure in the accumulator **C** is too high, slowly open the vent valve **D** to allow nitrogen to escape!



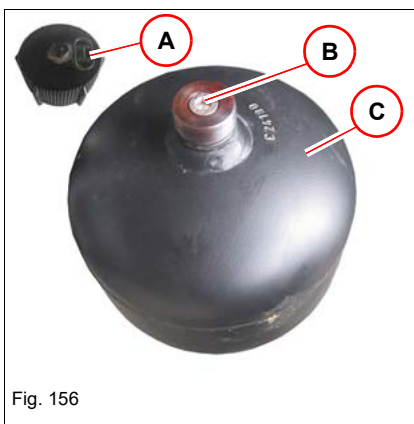
Adjusting the pressure level

1. Connect the fill-hose **C** to the stop cock or pressure reducing valve on the nitrogen bottle.
2. Connect the sleeve nut on the fill-hose **C** to the non-return valve **B** on the filling and testing device.
3. Carefully open the stop cock on the nitrogen bottle and, if available, adjust the pressure reducing valve to the pilot control pressure.
4. From time to time, stop the process and check the pilot control pressure level at the pressure gauge **D**.
5. Repeat the procedure until the stipulated pilot control pressure has been attained.
6. If the pressure in the accumulator **E** is too high, slowly open the vent valve **F** to allow nitrogen to escape!
7. Close the stop cock or pressure reducing valve on the nitrogen bottle.
8. Remove the sleeve nut on the fill-hose **C** on the non-return valve **B** from the filling and testing device.



Removing the filling and testing device

1. Turn the spindle **A** in a clockwise direction to close the pressure accumulator **B**.
2. Open the vent valve **E** on the filling and testing device **B**.
3. Unscrew the sleeve nut **D** on the filling and testing unit **B** from the pressure accumulator **C**.



4. Tighten Allen head screw **B** to 20 Nm (15 lbf ft).
5. Screw the sealing cap **A** to the pressure accumulator **C** and tighten to 20 Nm (14.75 lbf ft).
6. Check the seal-tightness of the pressure accumulator with a leak detection spray.

1.21 Tyres

Safety instructions for tires



WARNING

Accident hazard if wheels are used that have not been released for the machine!

Can result in fatal or serious injury.

► Install only released tires/wheels.



Information

Maintenance work to tires and rims may only be carried out by trained personnel.

Tire check



WARNING

Risk of tires bursting during inflation!

Risk of serious or fatal injury.

- Wear gloves and safety glasses.
- Check the tires and rims for damage before inflating the tires.
- Stay clear of the tires when checking the inflation pressure and/or inflating the tires.
- Observe the prescribed inflation pressure.



Information

Maintenance intervals – [see "Maintenance plan" on page 1-7.](#)

- Check tire pressure.
- Check tires and rims for damage (cracks, aging, etc.) – also on the inside.
- Remove foreign bodies from the tire tread.
- Remove traces of oil and grease from the tires.
- Change the wheels.
- Check the wheel nuts for correct seating and retighten them if necessary.

Removing the wheels



WARNING

Crushing hazard when raising the machine!

Can result in fatal or serious injury.

- ▶ Park the machine on firm, level and horizontal ground.
- ▶ Use suitable lifting gear under all circumstances with a corresponding lift capacity.
- ▶ Use one or more trestles instead of a jack to stabilize the machine.
- ▶ Never start the engine if the machine is on trestles or if it is raised with a jack.

1. Park the machine on level and firm ground and prevent it from rolling away.
2. Lower the loader unit to the ground.
3. Apply the parking brake.
4. Stop the engine and remove the starting key.
5. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
6. Loosen the wheel nuts a little of the wheel you want to remove.
7. Place a jack under the axle body, making sure it is standing firmly.
8. Raise the side of the axle from which you want to remove the wheel.
9. Secure the raised axle with a suitable trestle.

NOTICE

The trestle must be positioned so as to avoid machine damage.

10. Completely remove the wheel nuts.
11. Remove the wheel with a suitable means.

Mounting wheels



WARNING

Crushing hazard when raising the machine!

Can result in fatal or serious injury.

- ▶ Park the machine on firm, level and horizontal ground.
- ▶ Use suitable lifting gear under all circumstances with a corresponding lift capacity.
- ▶ Use one or more trestles instead of a jack to stabilize the machine.
- ▶ Never start the engine if the machine is on trestles or if it is raised with a jack.

NOTICE

The threads on the wheel bolts can be damaged when fitting the heavy wheels!

- ▶ Use suitable assembly tools, such as covering sleeves for the wheel bolts.



Fig. 157

1. Clean the flange surfaces of the wheels and axles.
2. Do not oil wheel nuts and bolts!
3. Place the covering sleeves onto the wheel bolts.
4. Place the wheel onto the wheel bolts with a suitable means.
5. Remove the covering sleeves.
6. Fit all the wheel nuts and tighten them part-way.
7. Lower the raised axle.
8. Tighten the wheel nuts with stipulated torque of $400 \text{ Nm} \pm 20$.
9. Retighten the wheel nuts to the specified torque the first time after one operating hour.
10. Re-tighten the wheel nuts to the specified torque every 10 operating hours (5 times to 50 operating hours since the last wheel change).



Information

When changing to a different tyre size, the software has to be adjusted to the new tyre size. The maximum speed of the machine is modified by the tire size.

1.22 Trailer coupling

Automatic trailer coupling (option)

Cleaning and lubricating the trailer coupling

NOTICE

In order to ensure the full functionality of the trailer coupling, close the coupling pin in the trailer coupling before cleaning with high-pressure cleaning equipment!

Information

Maintenance intervals – see *"Maintenance plan" on page 1-7*.
Specifications and capacities – see *"Fluids and lubricants" on page 1-18*.

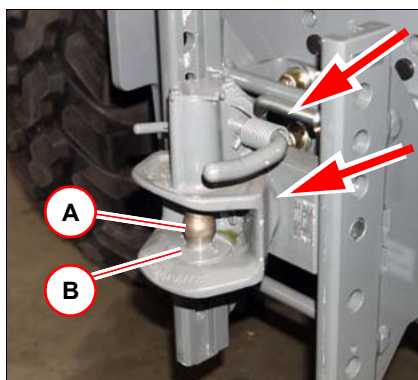


Fig. 158

1. Close the trailer coupling.
2. After cleaning, apply tough water-proof grease (EP3) to coupling pin **A**, base ring **B** and the drawbar eye.
3. Apply tough waterproof grease (EP3) to the lower coupling bearing.
4. Apply grease to the grease zerk on the joint.
5. Lubricate all moving parts of the height adjustment.

Check the trailer coupling for wear

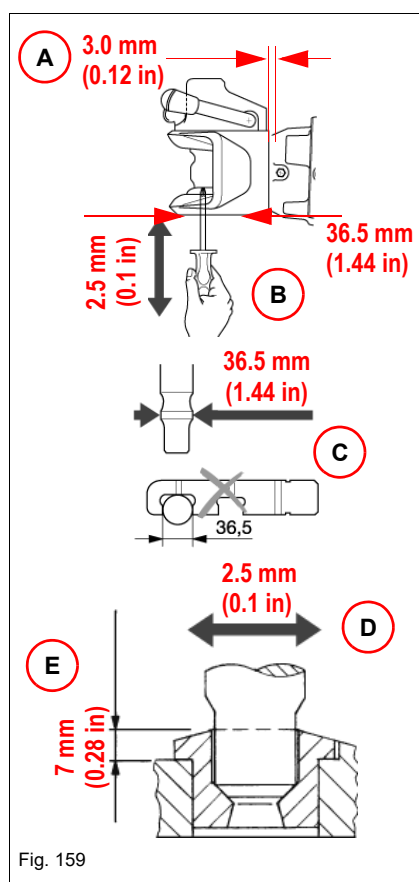


WARNING

Accident hazard in case of worn coupling pins, too much play in the bearing or a worn base ring!

Can cause injury.

- ▶ Check the trailer coupling once a day for wear and play
- ▶ Apply grease to the base ring
- ▶ Replace a malfunctioning trailer coupling with a new one



Check the bearing and **longitudinal play A** of the coupling head:

- Move the uncoupled coupling head with force in travel direction.

Check the **height-wise play** of the coupling head:

- Open the coupling.
- Move the coupling head up and down with a suitable tool (mounting lever).

➔ Play **A** in the centre axis of the coupling head = **max. 3 mm (0.12 in)**

Check coupling pin **C/D**:

- Measure wear by means of a slide gage on the thickest section of the coupling pin **C**.

➔ Diameter **C** may **not drop below 36.5 mm (1.44 in)**.

➔ Height-wise play **B** **max. 2.5 mm (0.1 in)**.

- Check pin play **D** in the base ring and thickness **E** of the base ring.

➔ Pin play **D** **max. 2.5 mm (0.10 in)**

➔ Thickness of the base ring **min. 7 mm (0.28 in)**.

Ball trailer coupling ø 80 mm (3.15 in) (option)

Cleaning and lubricating the trailer coupling

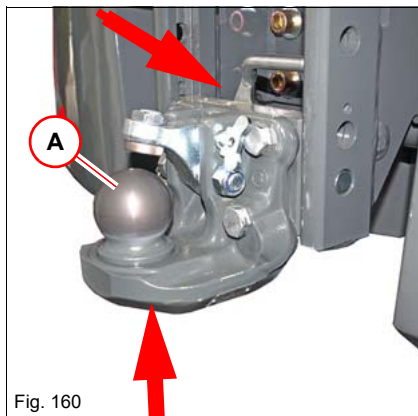


Fig. 160

i Information

Maintenance intervals – see *"Maintenance plan" on page 1-7*.
Specifications and capacities – see *"Fluids and lubricants" on page 1-18*.

1. After cleaning, apply tough water-proof grease (EP3) to trailer ball **A** and the trailer cap.
2. Apply grease to the grease nipple under the trailer ball.
3. Lubricate all moving parts of the height adjustment.

Autohitch trailer coupling (option)

Cleaning and lubricating the trailer coupling



Fig. 161

i Information

Maintenance intervals – see *"Maintenance plan" on page 1-7*.
Specifications and capacities – see *"Fluids and lubricants" on page 1-18*.

1. Apply grease to the grease nipple.
2. Lubricate all moving parts of the auto hitch.

1.23 Camera system

Notes on the camera system

NOTICE

Improper cleaning of monitor and camera leads to damage to the equipment.

- ▶ Never clean the screen and camera with solvents, cleaning agents or other chemical products.
 - ▶ Use a soft, dry cloth or a soft brush for cleaning.
-

NOTICE

Using a high pressure cleaner may result in damage to components or electronics.

- ▶ Observe the Operator's Manual of the high-pressure cleaner.
 - ▶ Ensure a minimum distance of at least 70 cm between the high-pressure nozzle and the object to be cleaned.
 - ▶ Keep moving the water jet during cleaning.
 - ▶ Do not point the jet directly at electronic components, plug-and-socket connections, seals or hoses.
-

Cleaning the screen

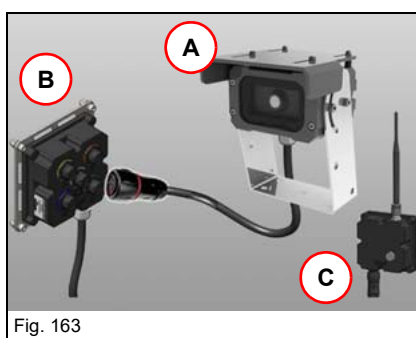
1. Park the machine safely.
2. Carefully clean the monitor **A** with a soft and dry cloth or with a soft brush.



Cleaning the camera/switch box/transmission receiver

An optimal image is achieved by checking the front glass of the camera regularly for cleanliness and by cleaning it if necessary.

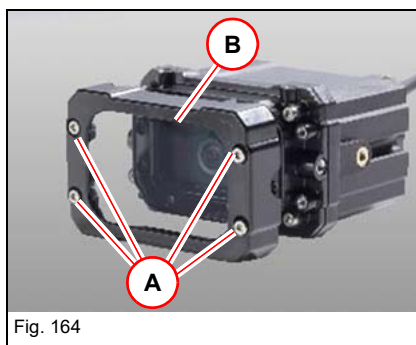
1. Park the machine safely.
2. Remove dirt from camera **A**, switch box **B** and video receiver **C** with water.
Add a commercially available cleaning agent to the water if necessary.
3. Dry the front screen of the camera with a soft cloth or use a soft brush to remove dust. – See also [Replacing the front glass of the camera on page 1-141](#).



Replacing the front glass of the camera

Replace the front glass of the camera if the image is of a poor quality due to dirt on the camera:

1. Park the machine safely.
2. Completely remove the 4 hexagon socket bolts **A** at the front of the camera.
➡ Circlips prevent the bolts from falling.
3. Take out dirty front windscreen **B** using a movement to the front.
4. Install a clean front glass.
5. Re-tighten the 4 hexagon socket bolts **A**.



1.24 Machine preservation

Important information on anticorrosion protection (option)

The machine is specially protected against corrosion for work with "aggressive media" (e.g. in a saline environment).

However, this anti-corrosion protection is affected by external factors, for example dirt, cleaning, etc. This is why it only has ongoing effect if checked at regular intervals and renewed or reapplied as required.

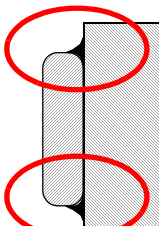
If the vehicle, depending on how it is used (e.g. exposed to salt) has not already been fitted with corrosion protection, we recommend the "Aggressive Media" option.

The following anticorrosive wax has been used in the factory:

Name: ELASKON 2000 ML, ELASKON UBS light
ELASKON Aero 46 special, ELASKON Multi 80

Manufacturer: ELASKON Sachsen GmbH & Co. KG, Dresden
(Germany)

Components coated with anticorrosive wax

Component	Remarks
All electric plug-and-socket, grounding and crimp connections	Before applying the wax: • Apply contact spray to contact surfaces and connect the plug-and-socket connections again. • Provide an especially thick layer of protection against corrosion for the connecting parts of the fuel tank sensor B001.
All parts of the machine, for example Axles, gearbox, trim panels, servicing lids, loader unit, quickhitch	with the exception of: • Piston rods (chromium coating) • Cabin, cabin bearings • Engine cover, engine mounting • Air filter • Counterweight • Fastening surfaces for installing parts on chassis • Radiator and insulating mat • Mudguards, rubber and plastic parts • Light elements
Flange surfaces 	for example axles, diesel engine and cabin bearing: • Seal gaps with anticorrosion wax after assembly

Measures for maintaining anticorrosive protection



WARNING

Special hazards during anti-corrosion protection!

Can cause serious injury or death.

- ▶ When handling chemical substances of any kind, such as solvents, wax, etc., observe the specific product-related safety regulations (safety data sheet)!
- ▶ Ensure sufficient room ventilation!
- ▶ Do not use unprotected lights or open flames!
- ▶ Do not smoke!
- ▶ Corrosion on electric connections or components can cause hazardous operating malfunctions.
- ▶ Perform work on the electrical system only with the battery disconnected and the diesel engine stopped!



Information

Maintenance intervals – [see "Maintenance plan" on page 1-7](#).
Specifications and capacities – [see "Fluids and lubricants" on page 1-18](#).

Cleaning

NOTICE

Contrary to the instructions given in Chapter “General service work” in the Operator’s Manual of the machine, neither clean the machine with a bristle brush nor with a steam jet or a high-pressure cleaner!

- ▶ If cleaning the machine with these means cannot be avoided, check the wax coating very carefully and have it renewed or reapplied as required.
- ▶ If you replace components, check whether they are classified as in the table “Components coated with anti-corrosive wax” and whether they are subject to special treatment before assembly.
- ▶ Have the sealing checked, and repaired if necessary, at least once a year by ELASKON – see the ELASKON servicing pass supplied with the machine.

-
- If the machine is used in corrosive environment over a longer period of time, remove the floor mat in the cabin to avoid the accumulation of corrosive humidity.
 - Thoroughly clean machines that are put out of operation over a longer period of time.
 - Clean the machine at least once a week. In particular, remove corrosive deposits (such as salt crusts) as fast as possible.
 - Clean the machine with cold running water preferably.

Applying the protective anticorrosion coating

Bear in mind the following instructions as you apply the anti-corrosive protection:

- Carefully cover removed components and fastening surfaces
— see *"Components coated with anticorrosive wax" on page 1-142!*
- Apply ELASKON products with a brush or commercially available spray equipment.
- The protective ELASKON coating can be removed with an ELASKON cleanser if necessary.
- Spots are difficult to remove from clothing.
- Affix a "Wet paint!" or a similar sign to newly coated machines.

Treatment of oxidized surfaces

If in spite of all precautionary measures some components should be affected by corrosion (oxidized), treat the oxidized area follows:

Electric connections

- Remove the remaining protective wax at the oxidized area using an ELASKON cleanser for example.
- Apply an oxide solvent (e.g. ELASKON Multi 80) to the affected area.
- Treat the contact surfaces of the connection with for example ELASKON Multi 80.
- Establish the connection.
- Apply/spray anticorrosion wax onto the electric connection from all sides.

For sheet metal parts

- Remove the remaining protective wax at the oxidized area with an ELASKON cleanser.
- Make all affected areas "blank", i.e. remove all remaining corrosion and paint coating from the affected area down to the bare material. otherwise the protective coating will not adhere properly.
- Clean the affected area with a cleaning solvent, and apply a 2-component prime coating and then a 2-component paint coating to it.
- Then preserve the area with the anti-corrosion protection.

2 Engine

2.1 Diesel engine

Safety instructions for diesel engine



CAUTION

Risk of injury due to hot and moving engine parts!

Hot and moving engine parts can cause injury.

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



CAUTION

Health hazard due to diesel fuel!

Diesel fuel and fuel vapors are harmful to health!

- ▶ Avoid contact with the skin, eyes and mouth!
 - ▶ Seek medical attention immediately in case of accidents with diesel fuel!
 - ▶ Wear protective equipment.
-



WARNING

Risk of injury lifting heavy components.

Death or serious injury.

- ▶ Use lifting gear of sufficient lifting capacity.
 - ▶ Use functionally safe lifting gear.
 - ▶ Use lifting gear on firm and level ground.
 - ▶ Move the lifting tackle to predefined or suitable position on the component.
-



CAUTION

Health risk from urea solution!

Urea solutions and their vapors are harmful to health! Incorrect handling can cause injury.

- ▶ Avoid contact with the skin, eyes and mouth.
 - ▶ Ensure there is good ventilation.
 - ▶ Ensure cleanliness.
 - ▶ Wear protective equipment.
 - ▶ Seek medical attention immediately in case of accidents with urea solutions.
-



Environment

Use a suitable container to collect the fuel and coolant as they drain and dispose of them in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

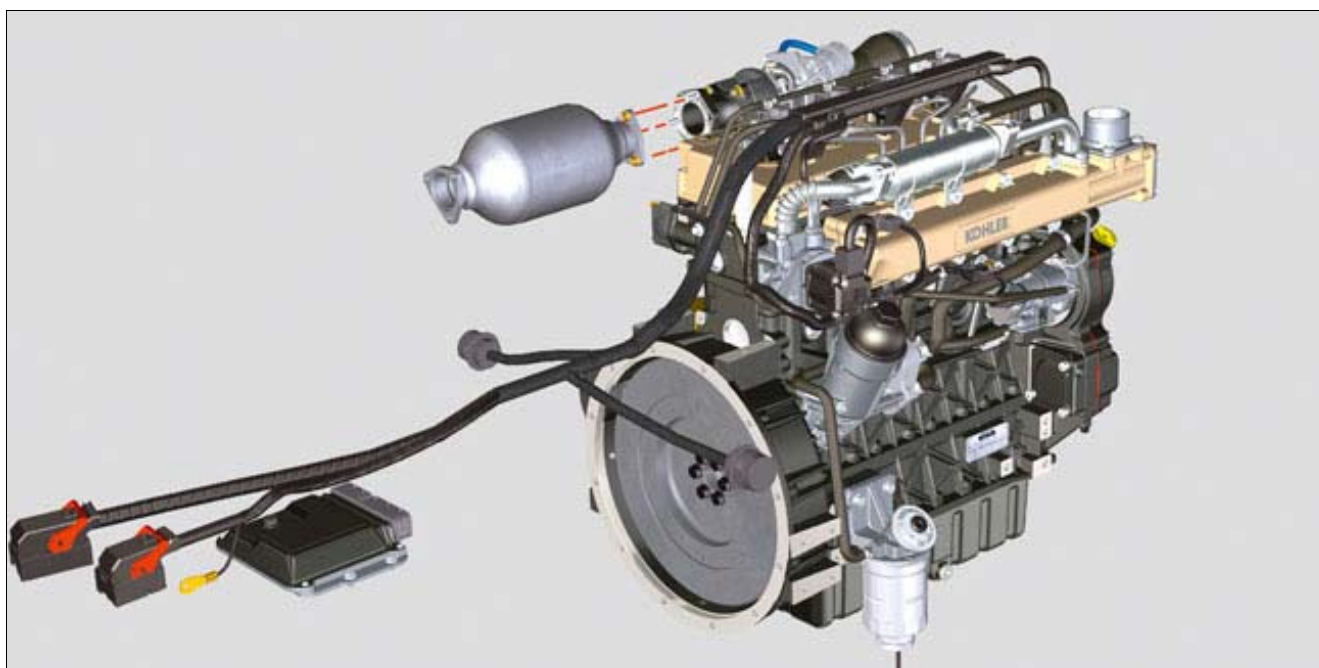
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Removing / installing the engine

Tools:

- Suitable lifting gear, Load-bearing capacity min. 500 kg (1100 lb)
- Suitable slings (cables and shackles) with corresponding load-bearing capacity
- Vacuum pump
- Container for collecting hydraulic oil [capacity of min. 55 l (15 gal)]
- Container for collecting coolant [capacity of min. 15 l (4 gal)]
- Plugs (different sizes) for closing the oil lines
- Standard tools

Technical data



Weight	BMK	Description	Remarks
274 kg (604 lb)	–	Diesel engine	–
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove diesel engine

1. Let the diesel engine cool down.
2. If possible, take gears to the right.
3. Open the engine cover – see ["Engine cover" on page 1-23](#).
4. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
5. Remove the engine cover – see ["Removing/installing the engine cover" on page 12-2](#).
6. Remove maintenance access **A** to engine bay rear – see ["Engine vat" on page 1-24](#).
7. Remove battery – see ["Removing the battery" on page 1-102](#).
8. Remove maintenance access to engine bay bottom – see ["Engine vat" on page 1-24](#).
9. Remove maintenance access to engine bay front – see ["Engine vat" on page 1-24](#).
10. Drain off coolant – see ["Draining coolant" on page 1-71](#).
11. Completely siphon off or drain the hydraulic oil – see ["Changing hydraulic oil" on page 1-93](#).
12. Remove V-belt cover – see ["Remove the V-belt \(alternator/water pump\)" on page 1-82](#).
13. Completely remove air filter with bracket – see ["Remove/install air filter" on page 2-46](#).

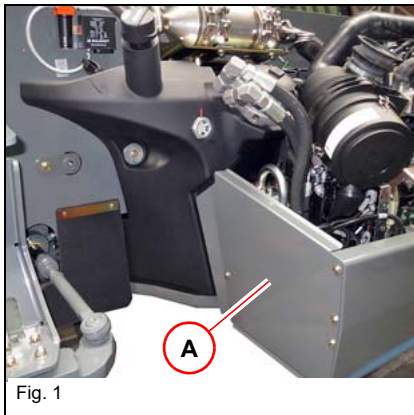


Fig. 1

If air conditioning system is available

14. Evacuate the air conditioning – see ["Emptying/filling the air conditioning system" on page 1-115](#).

Main fuse box

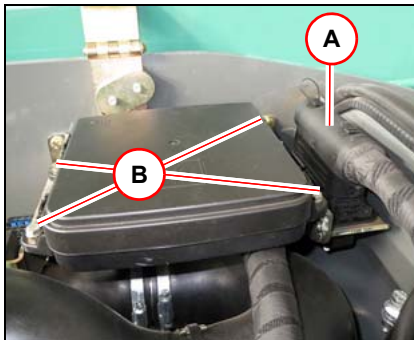


Fig. 2

- 15.Unlock plug **A** next to the main fuse box and remove.
- 16.Remove fastening screws **B** on the main fuse box.

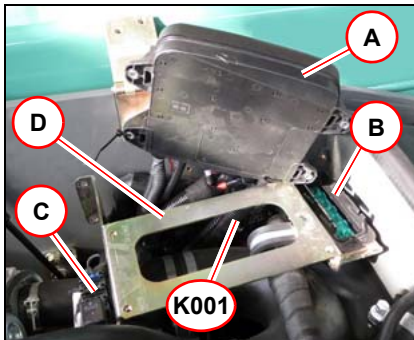


Fig. 3

- 17.Fold main fuse box **A** upwards and fix with cable ties.
- 18.Unscrew circuit breaker **C** on the fixing plate **D** and unhook it.
- 19.Unscrew relays **K001** on the fixing plate **D**.
- 20.Unscrew and remove fixing plate **D** from frame.

Air intake

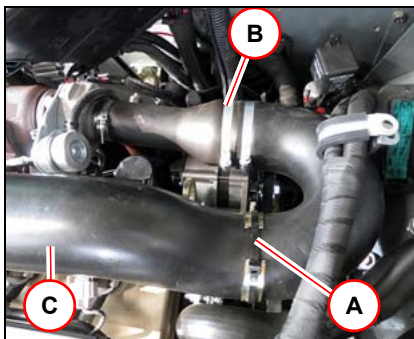


Fig. 4

- 21.Completely remove air filter with bracket – see ["Remove air filter" on page 2-47](#).
- 22.Remove cable tie **A**.
- 23.Release hose strap **B**.
- 24.Remove vacuum hose **C**.

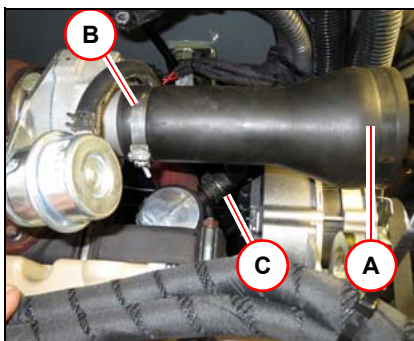


Fig. 5

- 25.Release hose clip **B**.
- 26.Release hose clip **C**.
- 27.Pull the air vacuum hose **A** on the turbocharger and oil-vapor cutter off.
- 28.Secure turbocharger against contaminants.

Remove radiator

29. Entirely remove radiator with mount – see ["Remove radiator" on page 3-4.](#)

Alternator

30. Disconnect electrical connections **D+** and **B+** to the light machine.

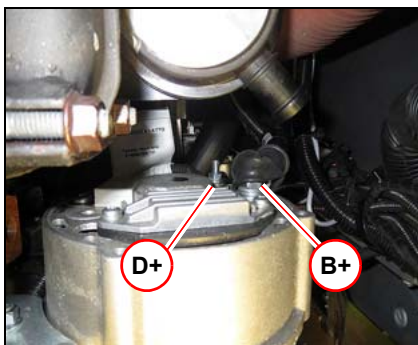


Fig. 6

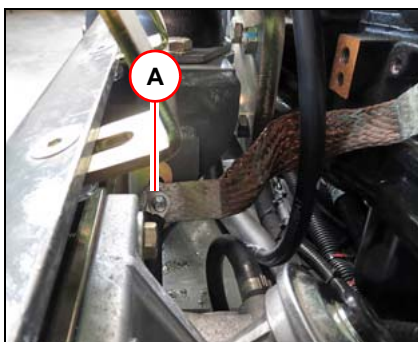


Fig. 7

31. Disconnect ground strap **A** on the engine bay.

Separate wiring harness

32. Remove cable ties **B** of the engine wiring harness **A** on the protective plate.

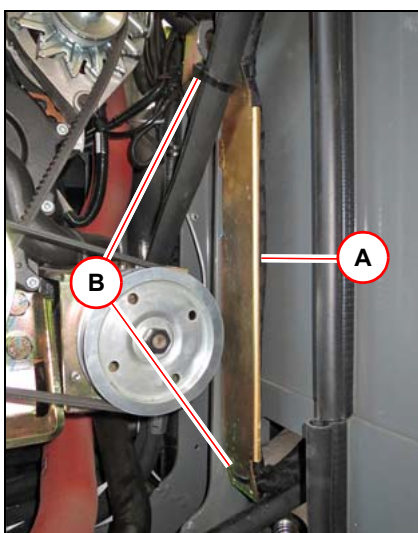


Fig. 8

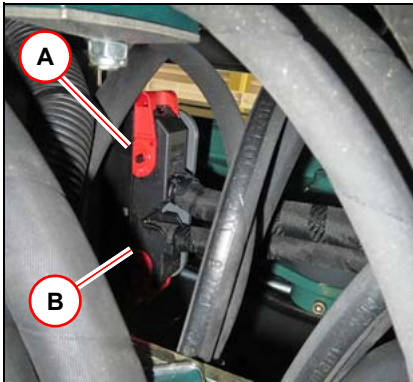


Fig. 9

33. Release plugs **A** and **B** of the engine wiring harness in the tunnel center and unplug.

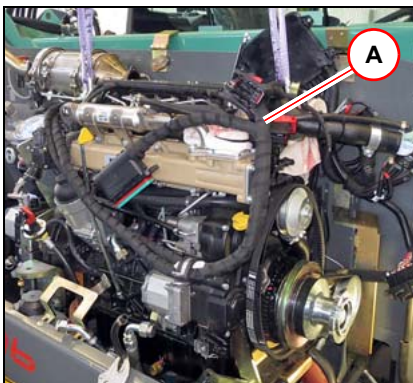


Fig. 10

34. Pull engine wiring harness out from top **A** and place on the engine.

Air conditioning compressor

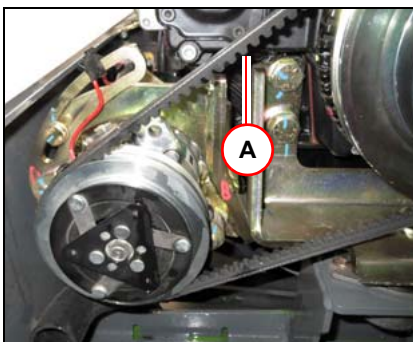


Fig. 11

35. Loosen V-belt **A** of the climate compressor – see *"Checking/re-tensioning the V-belt air conditioning (opt)" on page 1-87.*

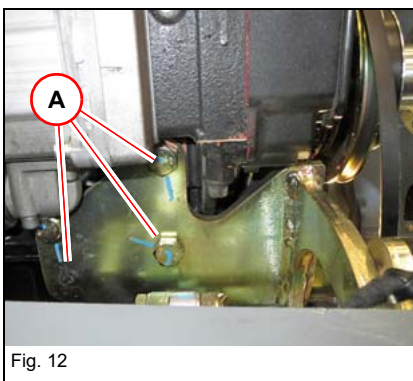


Fig. 12

36. Remove the fastening screws **A** from the climate compressor mount.
37. Discard the climate compressor with mount in the bottom of the engine bay.

Fuel lines

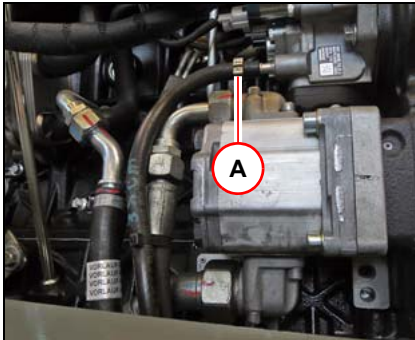


Fig. 13

38. Disconnect fuel lines (inflow) and pull the fuel lines **A** off of the high pressure pump.

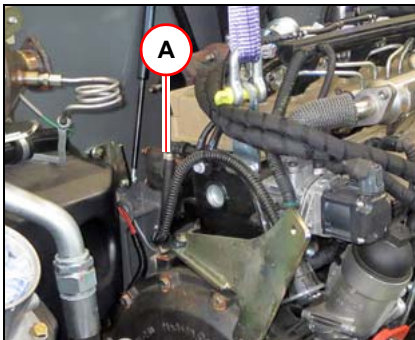


Fig. 14

39. Disconnect fuel line **A** (return flow) and pull off fuel line **A**.

Hydraulic hoses on the reversible fan pump

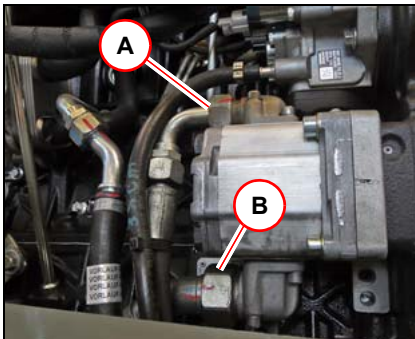


Fig. 15

40. Loosen sleeve nut **A** and remove hydraulic hose.

41. Loosen sleeve nut **B** and remove hydraulic hose.

42. Close and seal the openings.

Heating flow

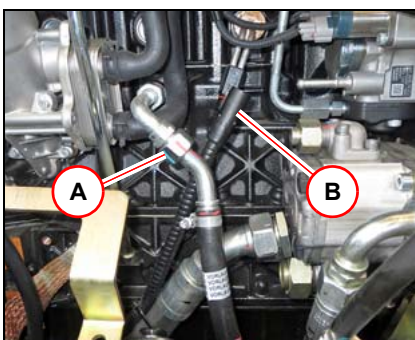


Fig. 16

43. Loosen sleeve nut **A** and remove hose.

44. Close and seal the openings.

45. If present, unplug cable **B** from engine pre-heating.

Hydraulic hoses of the reversible fan motor

- 46. Loosen sleeve nut **A** and remove hydraulic hose.
- 47. Loosen sleeve nut **B** and remove hydraulic hose.
- 48. Close and seal the openings.

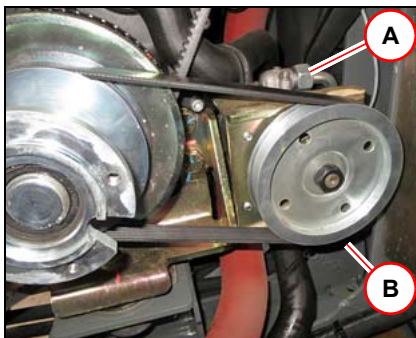


Fig. 17

- 49. Loosen sleeve nut **A** and remove hydraulic hose.
- 50. Close and seal the openings.

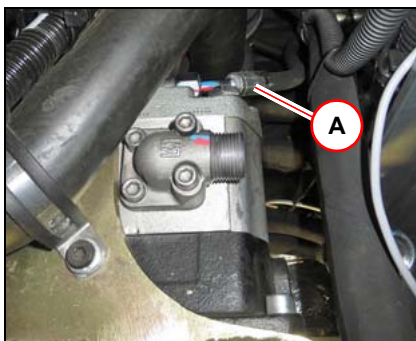


Fig. 18

Exhaust pipe

- 51. Remove exhaust pipe **A**.

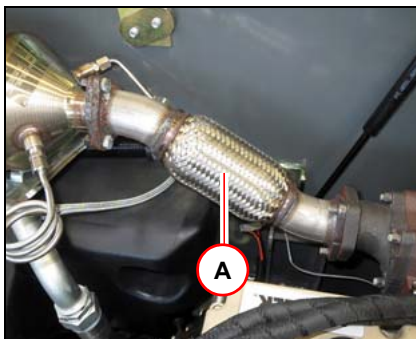


Fig. 19

Battery cable

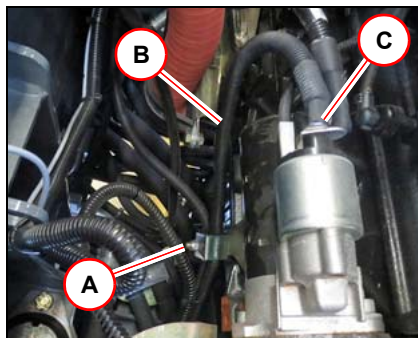


Fig. 20

- 52. Unscrew mount **A** for battery cable **B**.
- 53. Remove nuts **C** on starter motor.
- 54. Remove battery cable **B**.

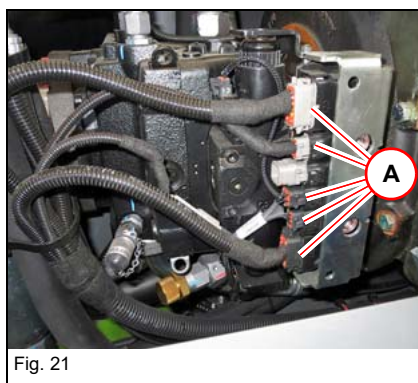


Fig. 21

- 55. Mark positions of the cable connectors **A**.
- 56. Unplug cable connectors **A**.

Return filter hydraulic oil tank

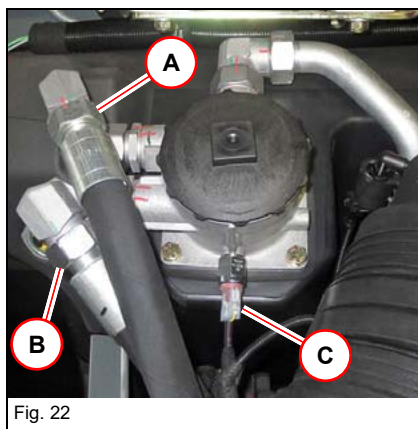


Fig. 22

- 57. Loosen sleeve nut **A** and remove hydraulic hose.
- 58. Loosen sleeve nut **B** and remove hydraulic hose.
- 59. Close and seal the openings.
- 60. Unplug cable connectors **C**.

Hydraulic lines on gear pump work hydraulics

61. Remove fastening screws **B** on the half-shells and remove pipeline **A**.
62. Close and seal the openings.

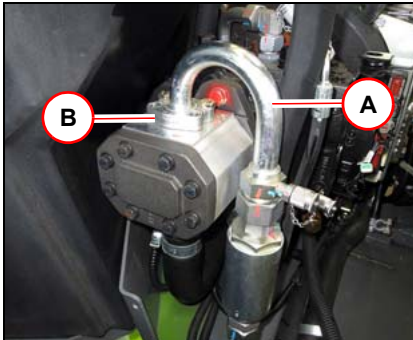


Fig. 23

63. Remove fastening screws **A** and take off vacuum line.
64. Close and seal the openings.

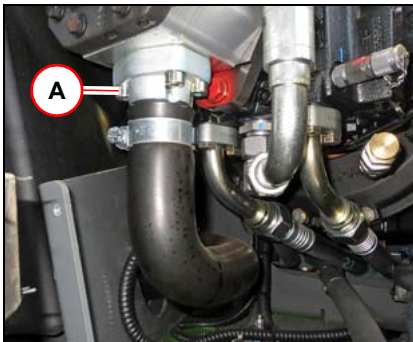


Fig. 24

65. Loosen sleeve nut **A** and remove hydraulic hose.
66. Loosen sleeve nut **B** and remove hydraulic hose.
67. Close and seal the openings.

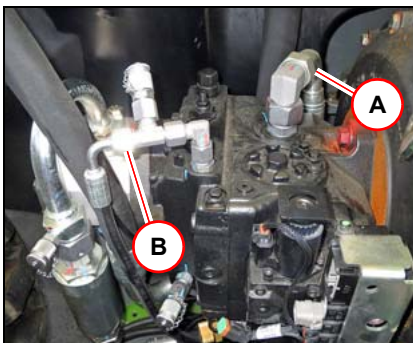


Fig. 25

68. Loosen sleeve nut **A** and remove hydraulic hose.
69. Close and seal the openings.

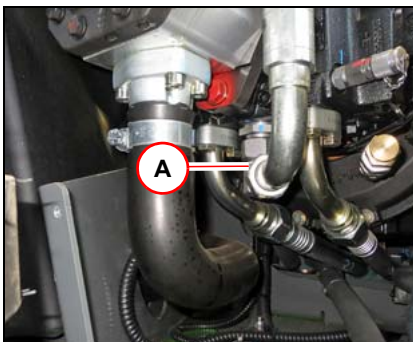


Fig. 26

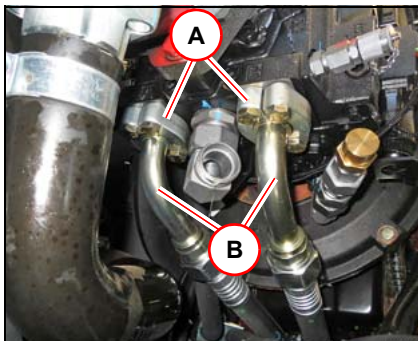


Fig. 27

70. Remove fastening screws **A** of half-shells and remove high-pressure lines **B**.

71. Close and seal the openings.

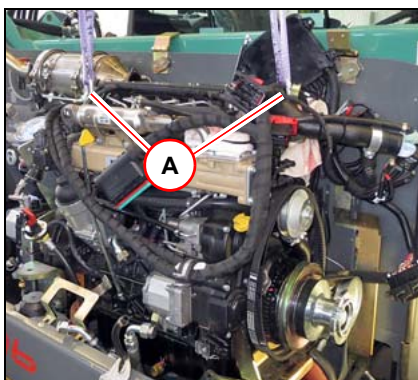


Fig. 28

72. Affix suitable eyelets **A** to the intended locations.

73. Secure the engine with suitable lifting gear.

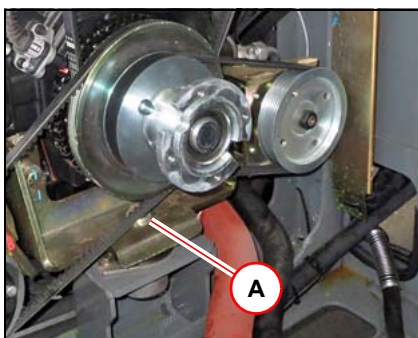


Fig. 29

74. Remove screw **A** on the engine mount front right.

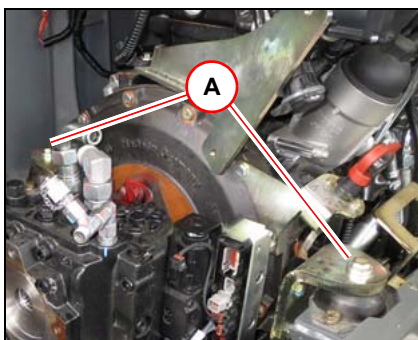
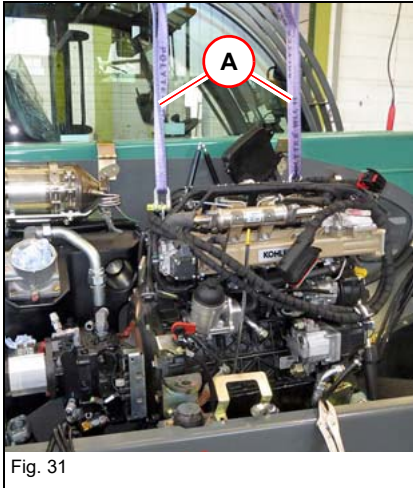


Fig. 30

75. Remove screws **A** on the engine mount rear.



WARNING

Risk of injury lifting heavy components.

Death or serious injury.

- ▶ Use lifting gear of sufficient lifting capacity.
- ▶ Use functionally safe lifting gear.
- ▶ Use lifting gear on firm and level ground.
- ▶ Move the lifting tackle to predefined or suitable position on the component.

76. Carefully lift the engine out of the engine bay using suitable lifting gear

A .

77. Secure adjusting discs on the engine bearings against loss using screws.

78. Remove the Centaflex-coupling . – see ["Remove/install Centaflex coupling" on page 2-34](#).

Install diesel engine



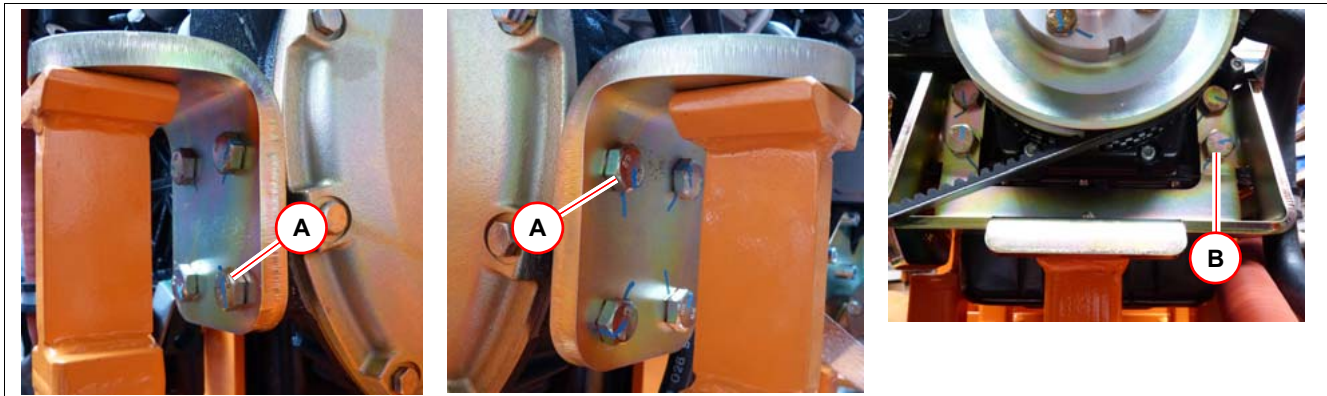
WARNING

Risk of injury lifting heavy components.

Death or serious injury.

- Use lifting gear of sufficient lifting capacity.
- Use functionally safe lifting gear.
- Use lifting gear on firm and level ground.
- Move the lifting tackle to predefined or suitable position on the component.

Install engine mounts



Pos.	Tightening torque	Remarks
A	79 Nm (58 lbf ft)	Using Loctite®243
B	195 Nm (144 lbf ft)	Using Loctite®243

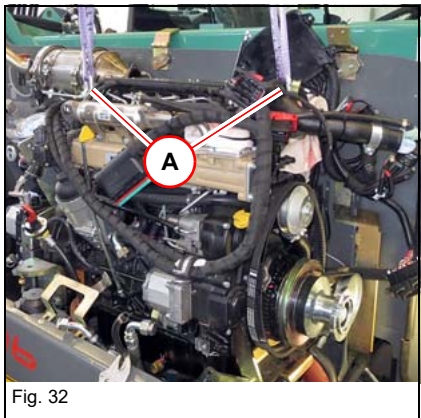


Fig. 32

1. Install the Centaflex-coupling – see *"Remove/install Centaflex coupling" on page 2-34*.
2. Affix suitable eyelets **A** to the intended locations.
3. Clean the engine bay before installing the engine.
4. Put aside all hose pipes and cables.

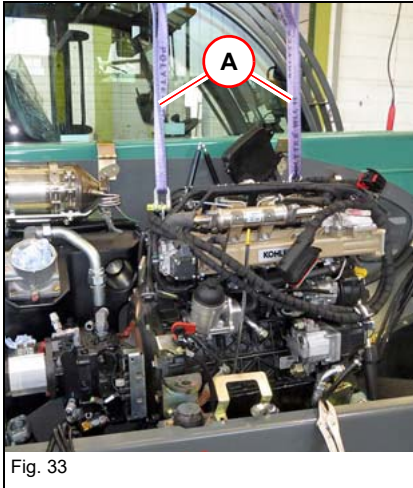


Fig. 33

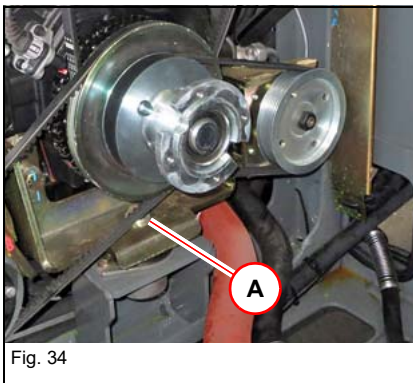


Fig. 34

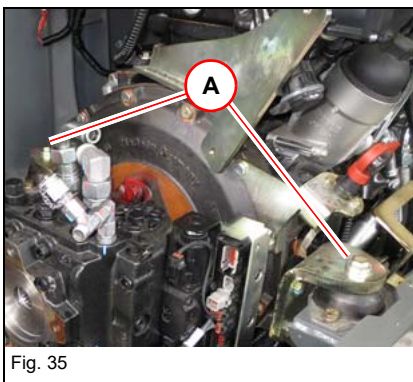


Fig. 35

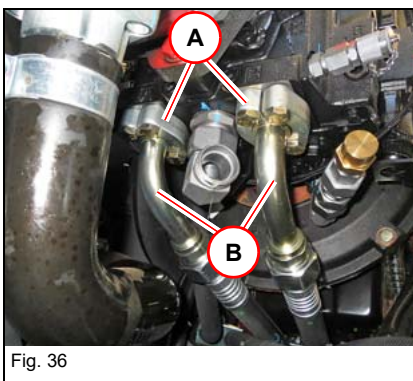


Fig. 36

5. Ensure that the correct adjusting discs are positioned on the engine bearings.
6. Carefully lift the engine into the engine vat using lifting gear **A** and align on the engine bearings and position.

7. Loosely install screw **A** on the engine mount front.

8. Loosely install screws **A** on the engine mounts rear.
9. Tighten all fastening screws **A** on the engine mounts to 79 Nm (58 lbf ft).

10. Position high pressure lines **B** with new O-rings.
11. Insert half-shells **A** and tighten to 46 Nm (34 lbf ft).

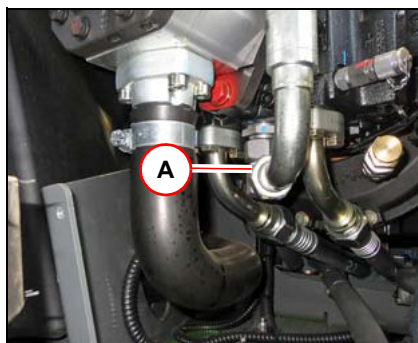


Fig. 37

12. Position the hydraulic hose and tighten the union nut **A** to 160 Nm (118 lbf ft).

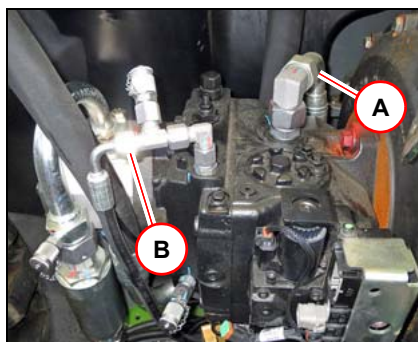


Fig. 38

13. Position the hydraulic hose and tighten the union nut **A** with 110 Nm (81 lbf ft).

14. Position the hydraulic hose and tighten the union nut **B** with 28 Nm (21 lbf ft).

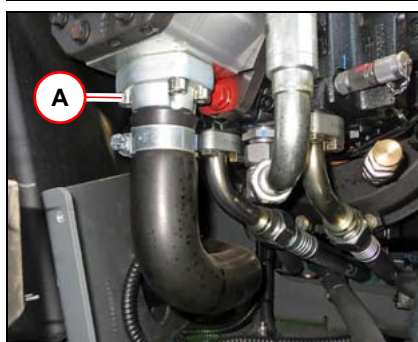


Fig. 39

15. Position suction hose with new O-ring.

16. Fit flange with screws **A** and tighten to 46 Nm (34 lbf ft).

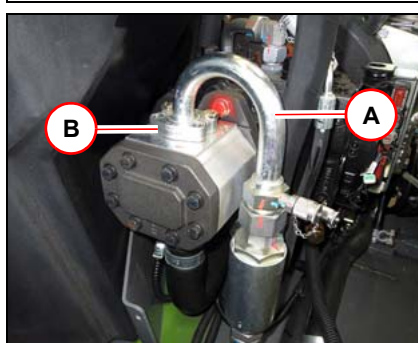


Fig. 40

17. Position pipeline **A** with new O-ring.

18. Insert half-shells **B** and tighten to 46 Nm (34 lbf ft).

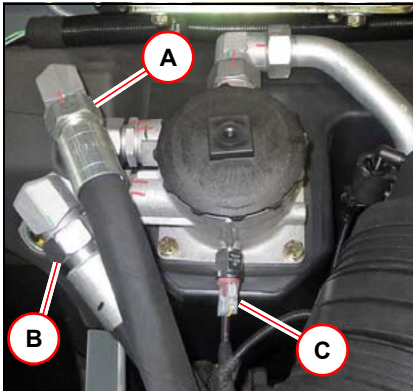


Fig. 41

19. Position the hydraulic hose and tighten the union nut **B** with 160 Nm (118 lbf ft).
20. Position the hydraulic hose and tighten the union nut **A** with 160 Nm (118 lbf ft).
21. Connect pressure accumulator **C**.

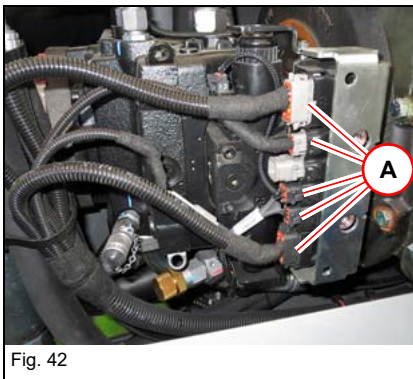


Fig. 42

22. Insert cable plug **A** at the corresponding position.

- Plug **XE05** on connection **CC1**
- Plug **XE13** on connection **CAN**
- Dummy plug on connection **PPC**
- Plug **PSC** on connection **PSC**
- Plug **PPU** on connection **PPU**
- Plug **XE09** on connection **CC2**

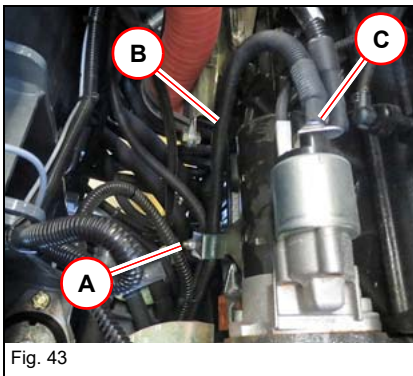


Fig. 43

23. Screw in battery cable **B** to the starter motor with nuts **C**.
24. Affix battery cable **B** to the mount **A**.

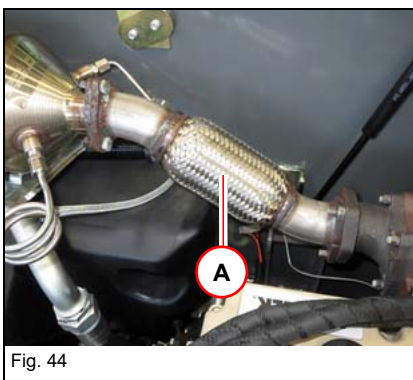


Fig. 44

25. Position exhaust pipe **A** with new seals and tighten.

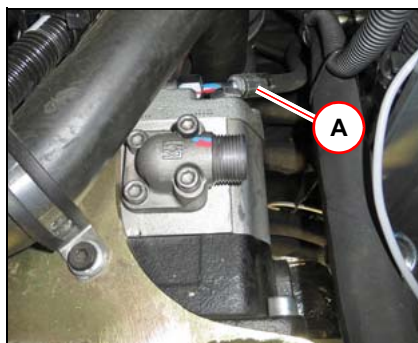


Fig. 45

26. Position the leak oil line and tighten the union nut **A** with 28 Nm (21 lbf ft).

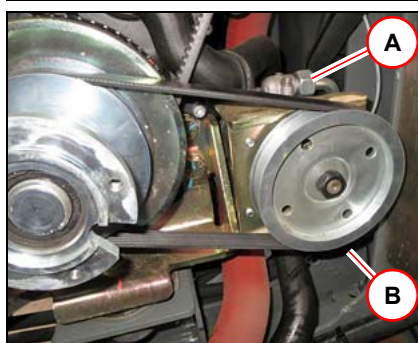


Fig. 46

27. Position the hydraulic hose and tighten the sleeve nut **A** to 60 Nm (44 lbf ft).

28. Position the hydraulic hose and tighten the sleeve nut **B** to 60 Nm (44 lbf ft).

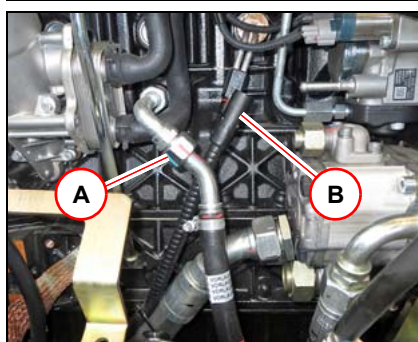


Fig. 47

29. Position the heating hose and tighten the union nut **A** to 50 Nm (37 lbf ft).

30. If present, plug in cable **B** from engine pre-heating.

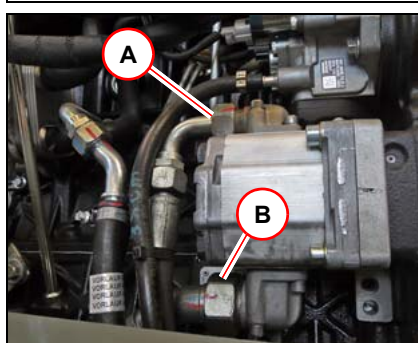


Fig. 48

31. Position the hydraulic hose and tighten the sleeve nut **A** to 60 Nm (44 lbf ft).

32. Position the hydraulic hose and tighten the sleeve nut **B** to 60 Nm (44 lbf ft).

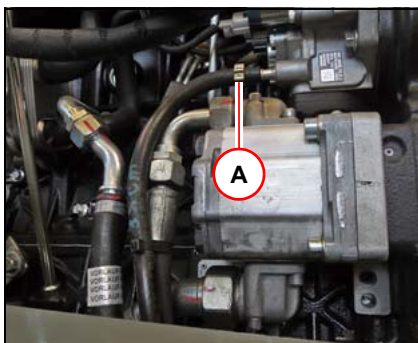


Fig. 49

33. Position fuel line **A** (inflow) and install hose clip.

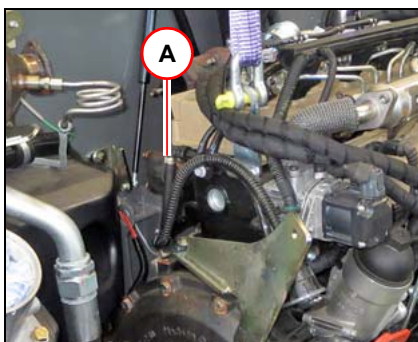


Fig. 50

34. Position fuel line **A** (return flow) and install hose clip.

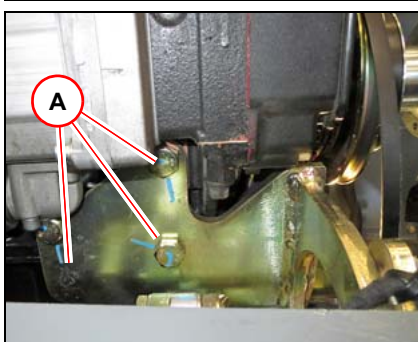


Fig. 51

35. Position climate compressor with mount on the engine.

36. Tighten fastening screws **A** to 79 Nm (58 lbf ft).

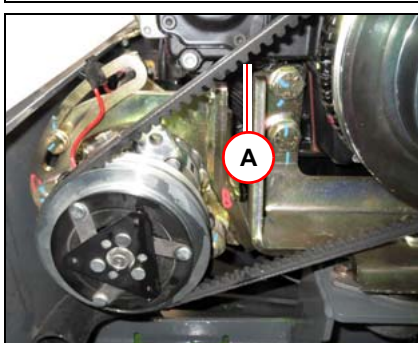


Fig. 52

37. Apply V-belt **A** and tension climate compressor. – see ["Checking/re-tensioning the V-belt air conditioning \(opt\)"](#) on page 1-87.

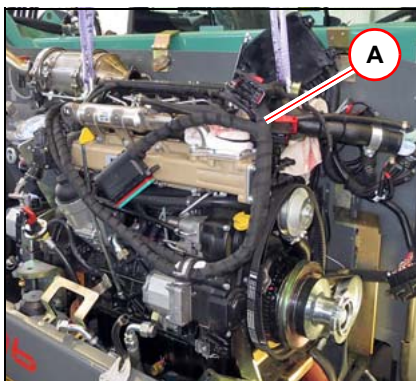


Fig. 53

38. Pull engine cable harness **A** down through the frame.

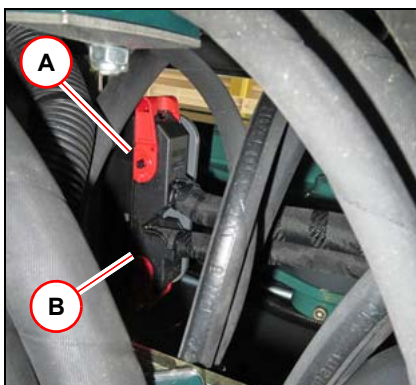


Fig. 54

39. Insert plug **A** and plug **B** of the engine wiring harness in the tunnel center on the engine control unit and secure.

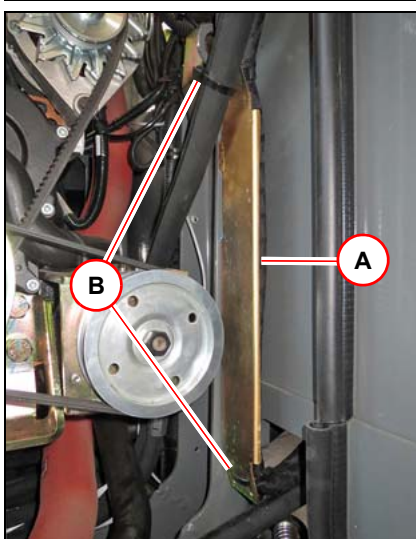


Fig. 55

40. Secure engine wiring harness **A** in the tunnel center with cable ties **B** on the protective plate.

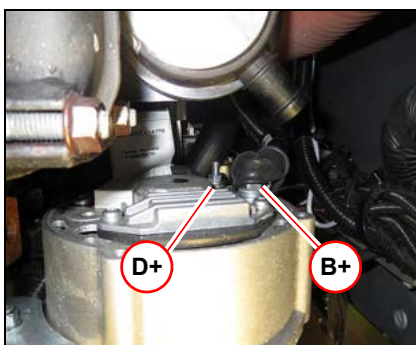


Fig. 56

41. Connect electrical connections **D+** and **B+** to the light machine.

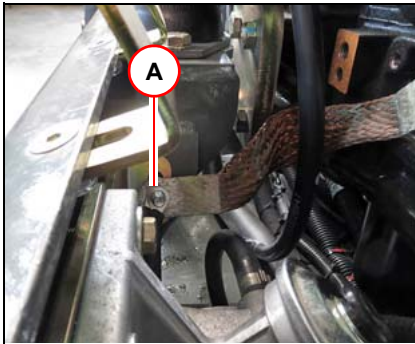


Fig. 57

42. Connect ground strap **A** on the engine bay.

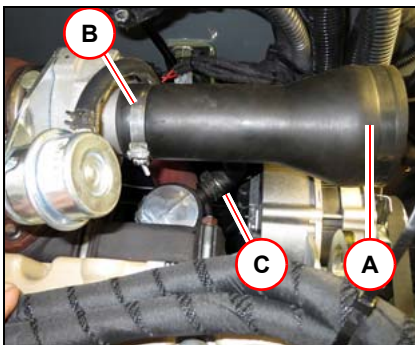


Fig. 58

43. Entirely insert radiator with mount – see *"Removing/installing the radiator" on page 3-3*.

44. Push on the air vacuum hose **A** on the turbocharger and oil-vapor cutter.

45. Tighten hose clip **B**.

46. Tighten hose clamp **C**.

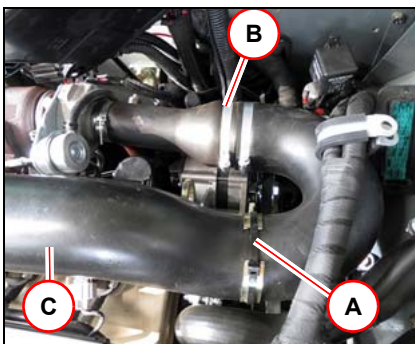


Fig. 59

47. Push air vacuum hose **C** onto air vacuum hose.

48. Tighten hose clip **B**.

49. Affix cable ties **A**.

50. Completely install air filter with bracket – see *"Remove/install air filter" on page 2-46*.

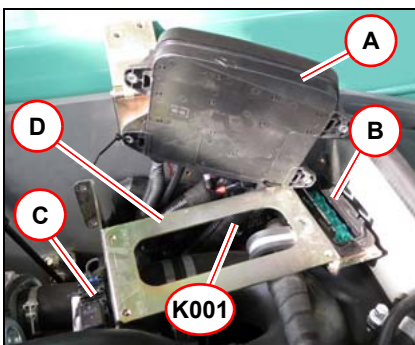


Fig. 60

51. Screw on relays **K001** on the fixing plate **D**.

52. Mount plug **B** onto fixing plate **D** and screw on

53. Screw on circuit breaker **C** on the fixing plate **D**.

54. Fold main fuse box **A** downwards.

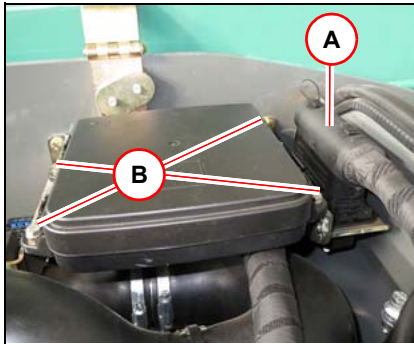


Fig. 61

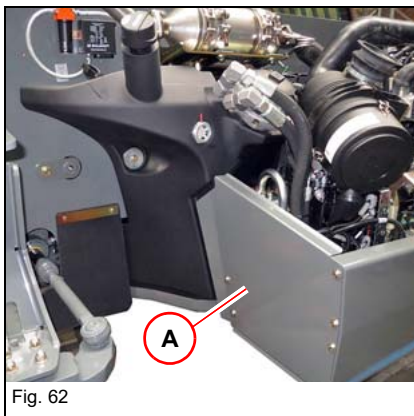


Fig. 62

55. Screw down the main fuse box with screws **B**.
56. Plug in the plug **A** to the main fuse box and lock.
57. Fill the air conditioning system. – see *"Emptying/filling the air conditioning system" on page 1-115*.
58. Install V-belt cover . – see *"Checking the V-belt (alternator/water pump)" on page 1-81*.
59. Top up hydraulic oil .. – see *"Adding hydraulic oil" on page 1-92*.
60. Fill up coolant. – see *"Adding coolant" on page 1-69*
61. Mount maintenance access to engine bay bottom . – see *"Engine vat" on page 1-24*.
62. Install maintenance access to engine bay front . – see *"Engine vat" on page 1-24*.
63. Install and connect the battery. – see *"Checking/replacing the battery" on page 1-101*.
64. Install maintenance access **A** to the engine bay rear. – see *"Engine vat" on page 1-24*.
65. Install engine cover . – see *"Removing/installing the engine cover" on page 12-2*.
66. Switch on battery isolator switch **S008** . – see *"Battery master switch S008" on page 1-3*.

2.2 Starter M001

Safety instructions for starter motor



CAUTION

Risk of injury due to hot and moving engine parts!

Hot and moving engine parts can cause injury.

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



Information

Before starting work, read the safety and preparation instructions carefully

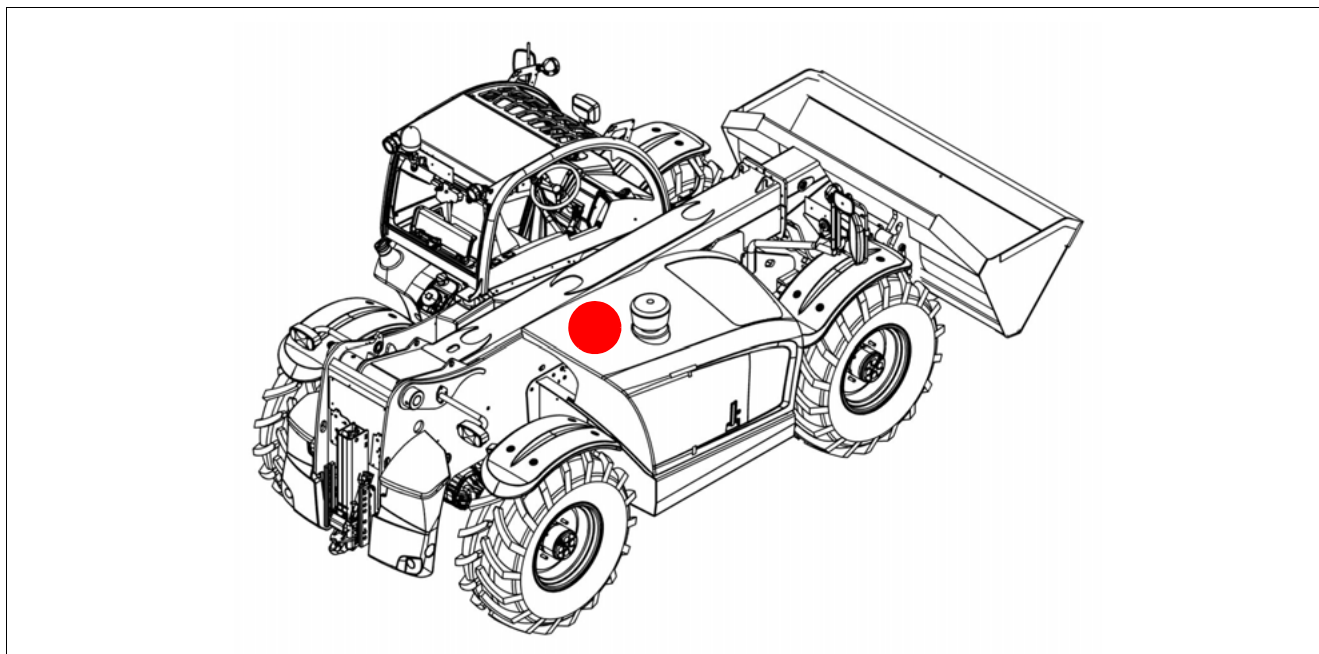
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Remove / install motor starter

Tools:

- Standard tools

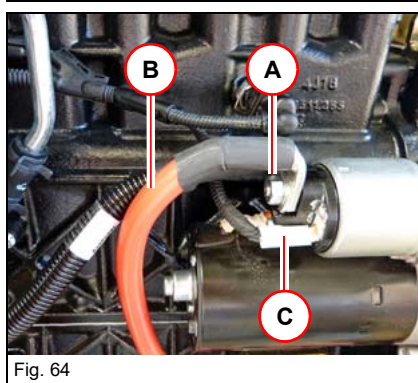
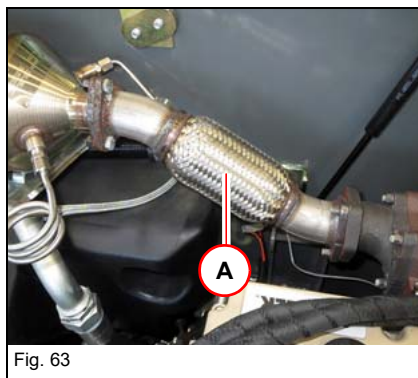
Technical data



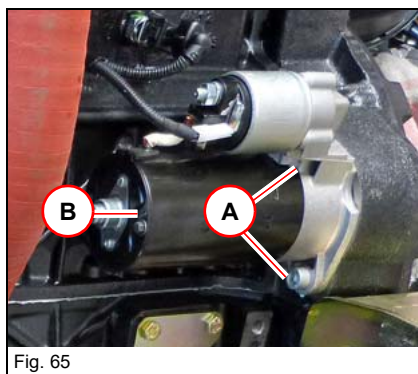
Weight	BMK	Description	Remarks
4.0 kg (8.9 lb)	M001	Starter	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Dismount the motor starter

1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
2. Remove exhaust pipe **A**.



3. Remove screw **A** on starter motor **C M001**.
4. Remove cable **B**.
5. Disconnect the connector **C**.



6. Remove screws **A** (3x) on the starter motor **B M001**.
7. Take out the starter motor **B M001**.

Install motor starter

1. Position the motor starter **B M001**.
2. Tighten screws **A** on the starter motor **B M001**.

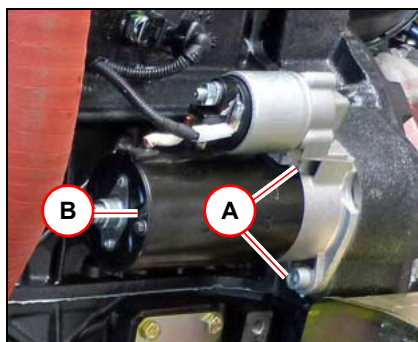


Fig. 66

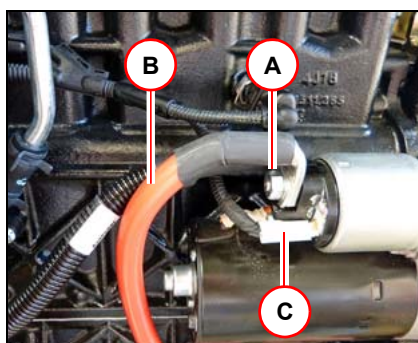


Fig. 67

3. Insert the connector **C**.
4. Position cable **B**.
5. Tighten nut **A** on starter motor **C M001**.

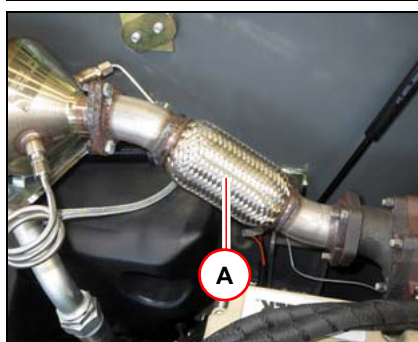


Fig. 68

6. Position exhaust pipe **A** with new seals and tighten.
7. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
8. Close the engine cover – see ["Engine cover" on page 1-23](#).

2.3 Generator G001

Safety instructions for generator



CAUTION

Risk of injury due to hot and moving engine parts!

Hot and moving engine parts can cause injury.

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



Information

Before starting work, read the safety and preparation instructions carefully

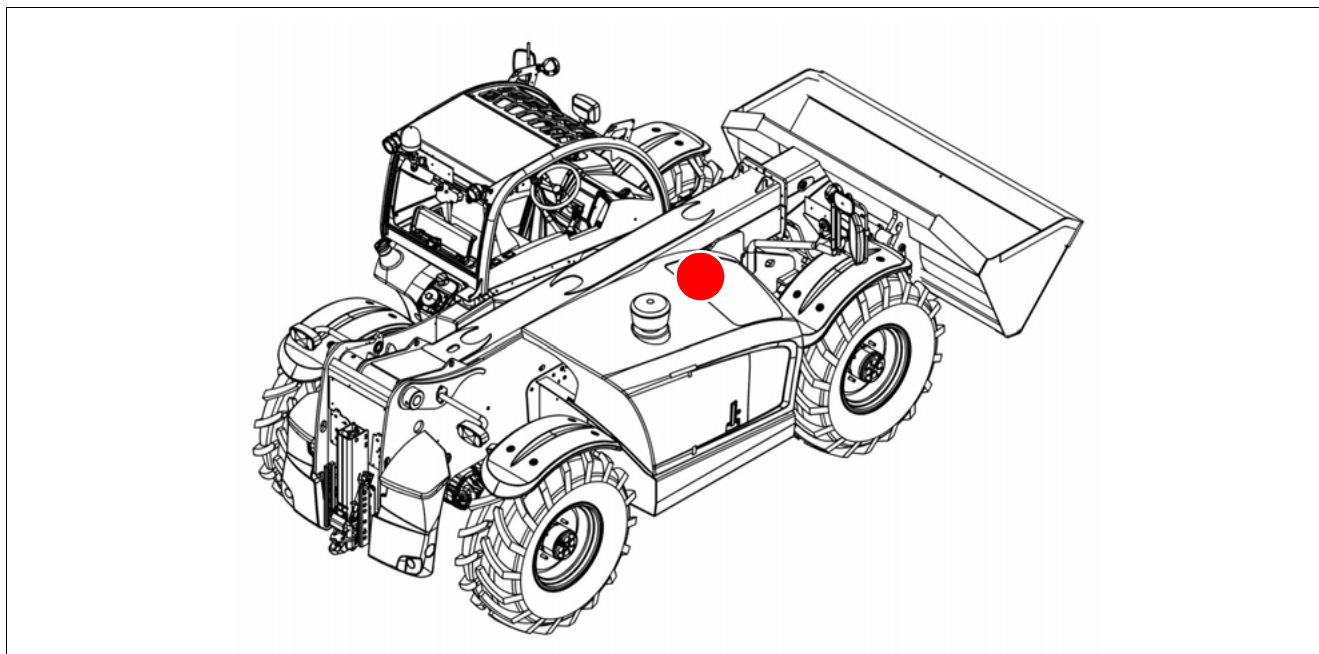
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Remove / install alternator

Tools:

- Standard tools

Technical data



Weight	BMK	Description	Remarks
5.6 kg (8.9 lb)	G001	Generator	—
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove light machine

1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
2. Remove the V-belt cover.
3. Unlock plug **A** next to the main fuse box and remove.
4. Remove fastening screws **B** on the main fuse box.

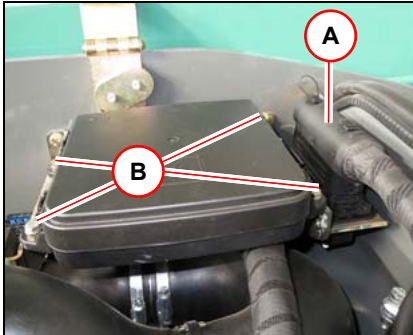


Fig. 69

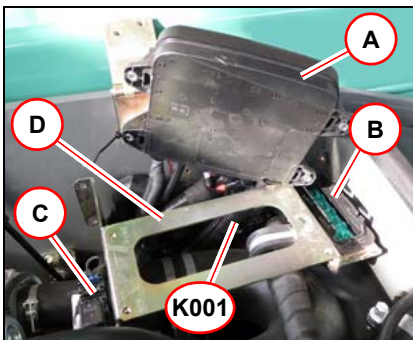


Fig. 70

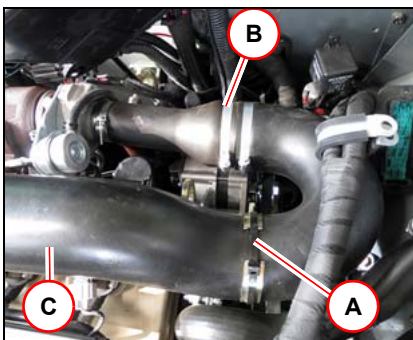


Fig. 71

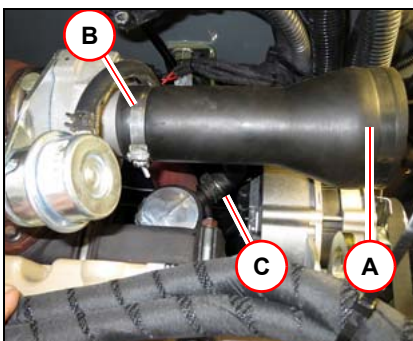


Fig. 72

5. Fold main fuse box **A** upwards and fix with cable ties.
6. Unscrew circuit breaker **C** on the fixing plate **D** and unhook it.
7. Unscrew relays **K001** on the fixing plate **D**.
8. Unscrew and remove fixing plate **D** from frame.
9. Completely remove air filter with bracket – see *"Remove/install air filter" on page 2-46*.
10. Remove cable tie **A**.
11. Release hose strap **B**.
12. Remove vacuum hose **C**.
13. Release hose clip **B**.
14. Release hose clip **C**.
15. Pull the air vacuum hose **A** on the turbocharger and oil-vapor cutter off.
16. Secure turbocharger against contaminants.

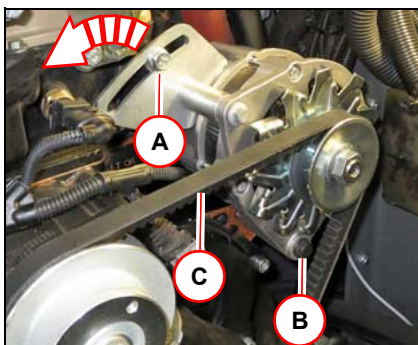


Fig. 73

17. Somewhat loosen the screw **A** on the tensioning device.
18. Loosen screw **B** on the generator.
19. Loosen generator.
20. Remove the V-ribbed belt.
21. Remove screw **A**.
22. Remove screw **B** with nut and washer.
23. Remove alternator.

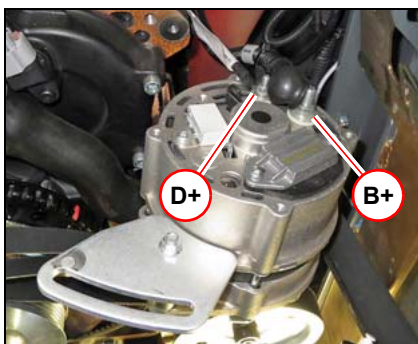


Fig. 74

24. Remove nut **B+** and cable on generator.
25. Remove nut **D+** and cable on generator.

Install light machine

1. Tighten cable with nut **D+** on the generator.
2. Tighten cable with nut **B+** on the generator.

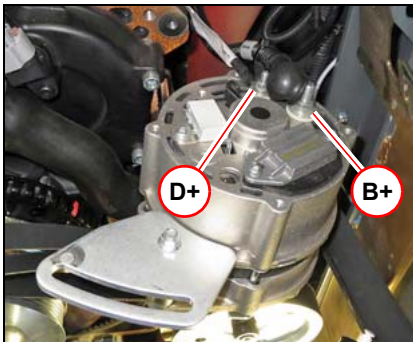


Fig. 75

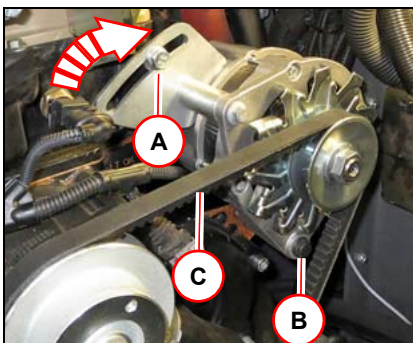


Fig. 76

3. Position generator with screw **B**, affix washer and nut.
4. Mount the screws **A** on the tensioning device.
5. Place V-ribbed belt **C**.
6. Tension V-ribbed belt **C** and tighten screw **A**. – see ["Checking/re-tensioning the V-belt \(alternator/water pump\)" on page 1-81](#).
7. Tighten screw **B** on the generator.
8. Mount the V-belt cover.

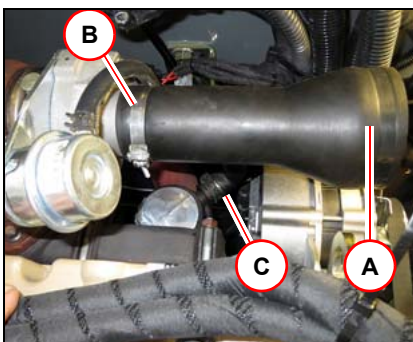


Fig. 77

9. Push on the air vacuum hose **A** on the turbocharger and oil-vapor cutter.
10. Tighten hose clip **B**.
11. Tighten hose clamp **C**.

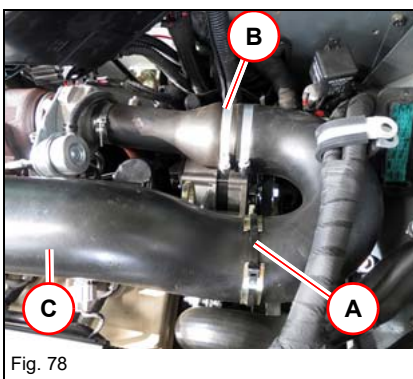


Fig. 78

12. Push air vacuum hose **C** onto air vacuum hose.
13. Tighten hose clip **B**.
14. Affix cable ties **A**.

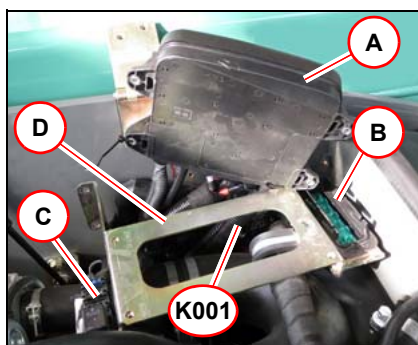


Fig. 79

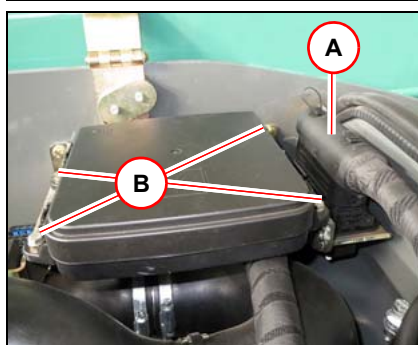


Fig. 80

15. Screw on relays **K001** on the fixing plate **D**.
16. Mount plug **B** onto fixing plate **D** and screw on
17. Screw on circuit breaker **C** on the fixing plate **D**.
18. Fold main fuse box **A** downwards.

19. Screw down the main fuse box with screws **B**.
20. Plug in the plug **A** to the main fuse box and lock.
21. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
22. Make a test run.

2.4 Centaflex-coupling

Safety instructions for Centaflex coupling



CAUTION

Risk of injury due to hot and moving engine parts!

Hot and moving engine parts can cause injury.

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



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

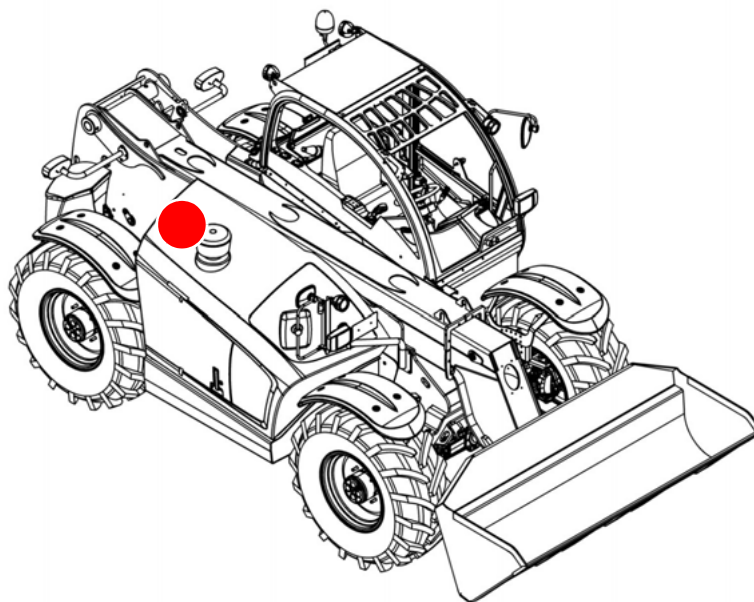
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Remove/install Centaflex coupling

Tools:

- Standard tools
- C-form spanner 3/8"
- C-form spanner 5/16"

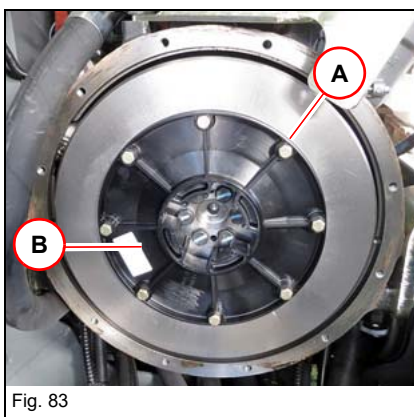
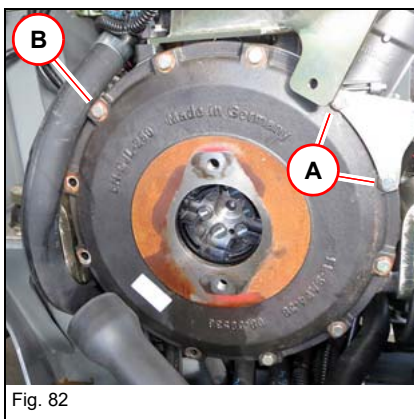
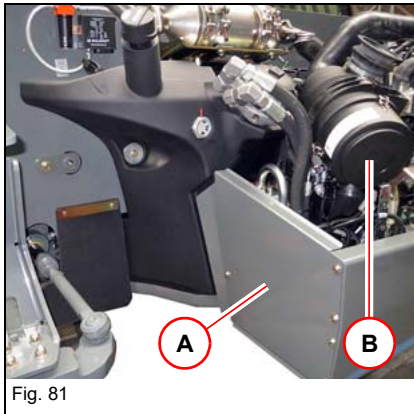
Technical data



Weight	BMK	Description	Remarks
2 kg (4 lb)	–	Centaflex-coupling	–
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove centraflex coupling

1. If possible, take gears to the right.
2. Switch off battery master switch **S008** . – see *"Battery master switch S008" on page 1-3*.
3. Remove maintenance access **A** to engine bay rear. – see *"Engine vat" on page 1-24*.
4. Remove the battery. – see *"Removing the battery" on page 1-102*.
5. Drain all hydraulic oil. – see *"Changing hydraulic oil" on page 1-93*.
6. Completely remove air filter **B** with mount. – see *"Remove/install air filter" on page 2-46*.
7. Dismantle gear pump **001**. – see *"Removing / installing work hydraulics gear pump" on page 8-23*.
8. Remove variable displacement pump . – see *"Removing/installing the variable displacement pump" on page 8-52*.



9. Remove 2x screws **A** (3/8"-16 UNCx1 1/4"-8.8).
10. Remove 10x screws **B** (3/8"-16 UNCx38 -8.8).
11. Remove clutch case.
12. Remove 8x screws **A** (5/16"-18 UNCx1"-8.8).
13. Remove drive disc **B**.

Install centraflex coupling

1. Clean all thread holes for clutch case and drive disc.
2. Clean ring surface.
3. Sprinkle all thread holes **A** for drive disc with **Loctite® 243**.

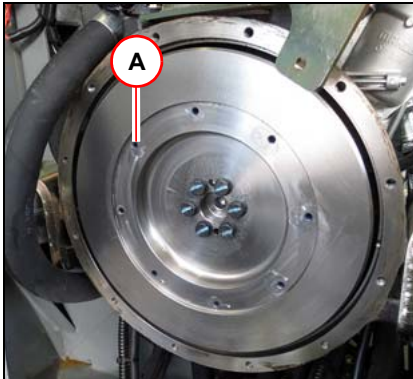


Fig. 84

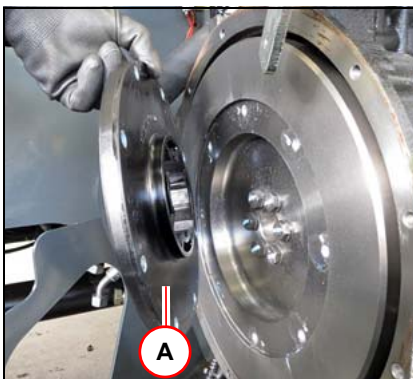


Fig. 85

i Information

When installing the drive disc **A**, make sure the installation position is correct.

Smooth side faces inwards, webbed side faces outwards!

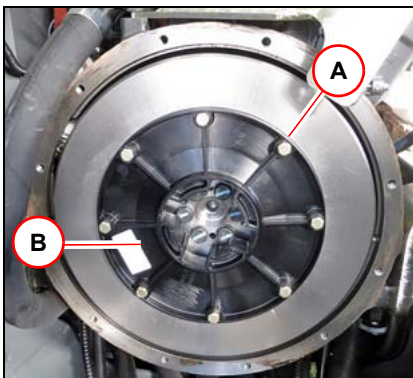


Fig. 86

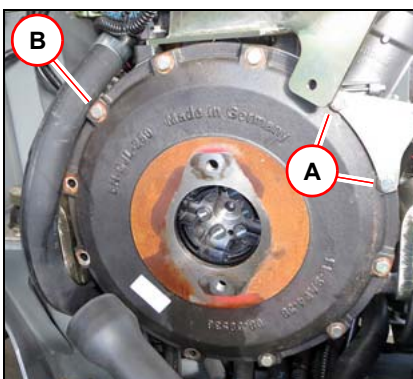
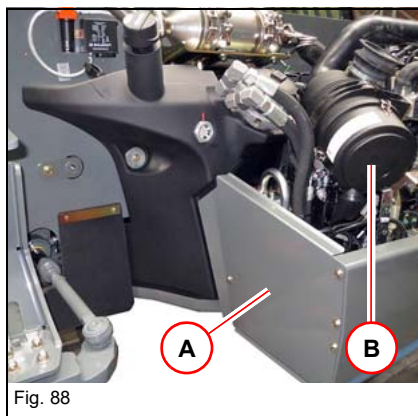


Fig. 87

4. Position drive disc **B**.
5. Tighten 8x screws **A** (5/16"-18 UNCx1"-8.8) to 25 Nm (18 lbf ft) cross-wise.
6. Position clutch case.
7. Tighten 10x screws **B** (3/8"-16 UNCx38-8.8) to 46 Nm (34 lbf ft).
8. Tighten 2x screws **A** (3/8"-16 UNCx1 1/4"-8.8) to 46 Nm (34 lbf ft).
9. Install variable displacement pump . – see ["Removing/installing the variable displacement pump" on page 8-52](#).
10. Affix gear pump **001**. – see ["Removing / installing work hydraulics gear pump" on page 8-23](#).
11. Install and connect the battery. – see ["Checking/replacing the battery" on page 1-101](#).



12. Install air filter **B** complete with mount. – see *"Remove/install air filter" on page 2-46.*
13. Top up hydraulic oil .. – see *"Adding hydraulic oil" on page 1-92.*
14. Install and connect the battery. – see *"Install the battery" on page 1-103.*
15. Install maintenance access **A** to the engine bay rear. – see *"Engine vat" on page 1-24.*
16. Switch on battery master switch **S008** . – see *"Battery master switch S008" on page 1-3.*
17. Carry out test run and check the system for function and leaks.

2.5 Fuel tank

Safety instructions for fuel tank



CAUTION

Risk of injury due to hot and moving engine parts!

Hot and moving engine parts can cause injury.

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



Environment

Use a suitable container to collect the fuel as it drains off and dispose of it in an environmentally friendly manner!



CAUTION

Health hazard due to diesel fuel!

Diesel fuel and fuel vapors are harmful to health!

- ▶ Avoid contact with the skin, eyes and mouth!
 - ▶ Seek medical attention immediately in case of accidents with diesel fuel!
 - ▶ Wear protective equipment.
-



Information

Before starting work, read the safety and preparation instructions carefully

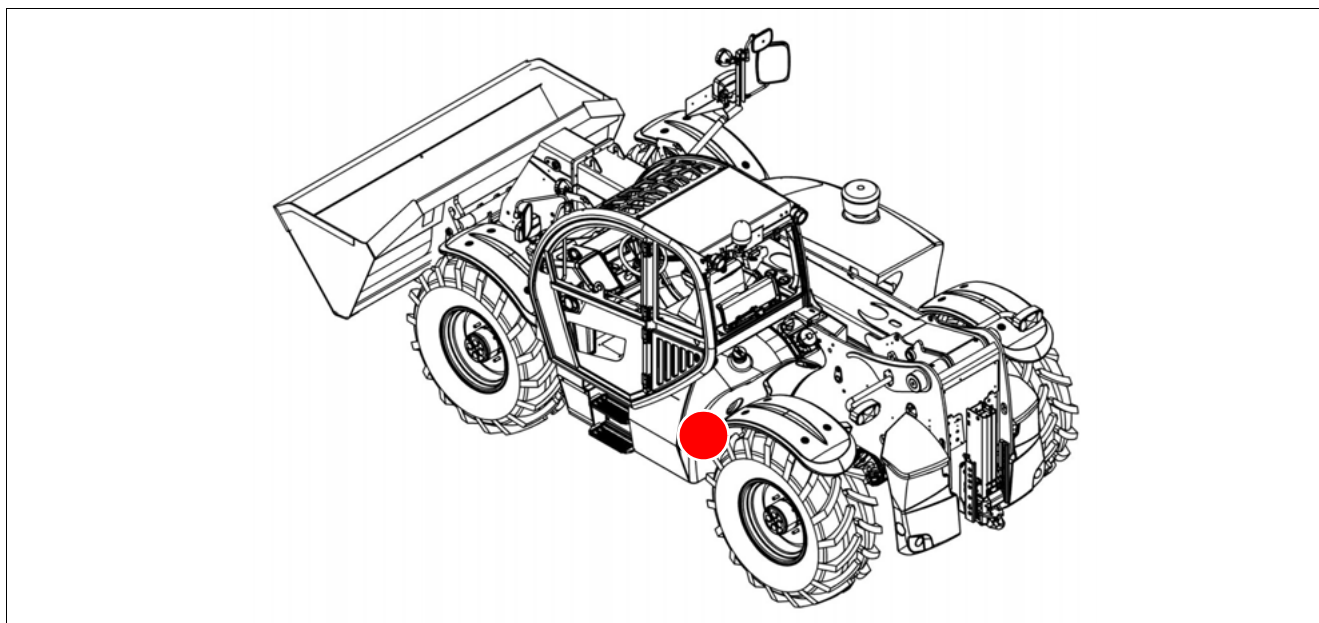
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Remove / install fuel tank

Tools:

- Suitable collecting vessel for fuel [100 l (26.42 gal)]
- Suitable car jack, load-bearing capacity minimum 5000 kg (11023 lb)
- Support blocks, load-bearing capacity minimum 5000 kg (11023 lb)

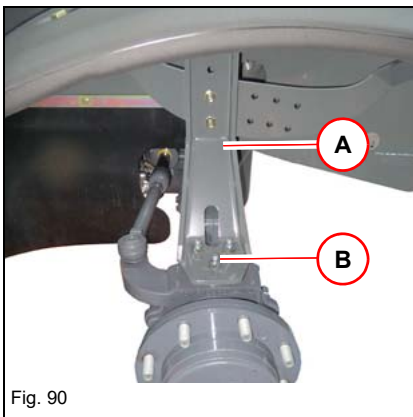
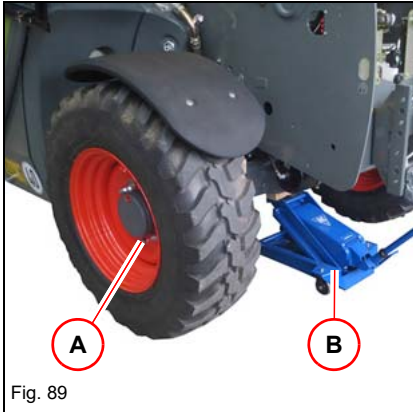
Technical data



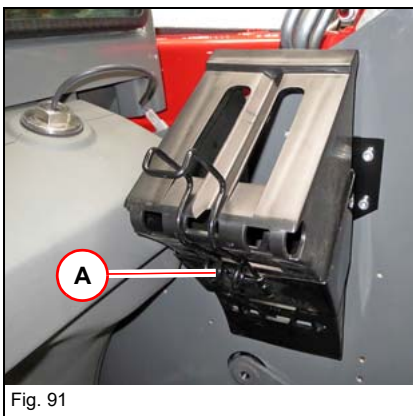
Weight	BMK	Description	Remarks
12 kg (26 lb)	–	Fuel tank	–
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove the fuel tank

1. Switch off battery master switch **S008** . – see *"Switch off the battery master switch S008" on page 1-3.*
2. Dismount underride protection . – see *"Remove/install underride protection (standard)" on page 12-8.* – see *"Remove/install underride protection (closed)" on page 12-11.*
3. Completely empty the fuel tank . – see *"Drain fuel" on page 1-50.*
4. Position the jack **B** underneath the rear axle and raise the vehicle. – see *"Jack up the machine" on page 1-3.*
5. Position a suitable trestle under the left half of the rear axle.
6. Remove the wheel nuts **A** on the rear wheel.
7. Take the rear wheel off the axle.



8. Remove fixing nuts **B** from the fender bracket.
9. Remove fender and support **A**.



10. Remove mount **A** with chock.

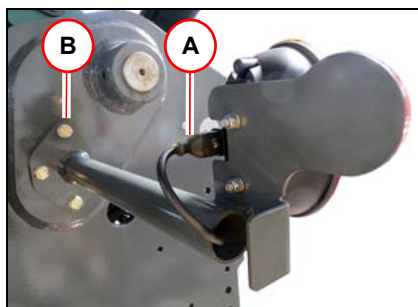


Fig. 92

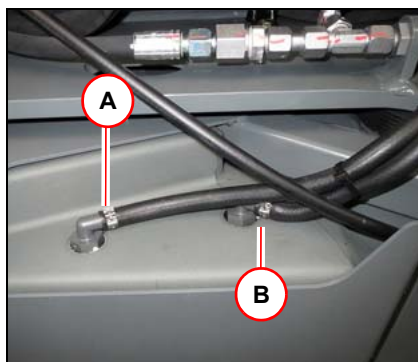


Fig. 93

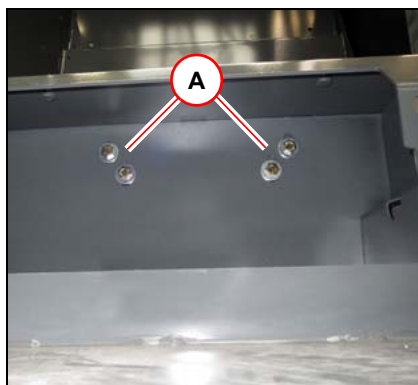


Fig. 94

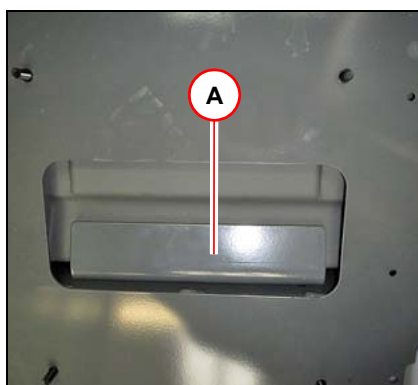


Fig. 95

11. Disconnect the connector **A**.

12. Remove fastening screws from mount of rear lights **B** and take off mount.

13. Release clip **A** and pull off vacuum hose from fuel tank.

14. Loosen clip and remove return flow hose from fuel tank.

15. Remove the operator seat. – see ["Seat" on page 14-1](#).

16. Remove screws **A** in the toolbox (underneath the operator seat).

17. Take off fixing strip **A**.

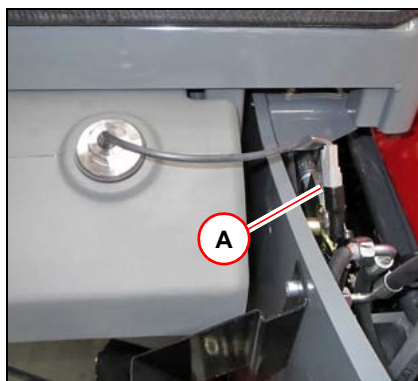


Fig. 96

18. Unplug plug **A** on the tank encoder **B001**.

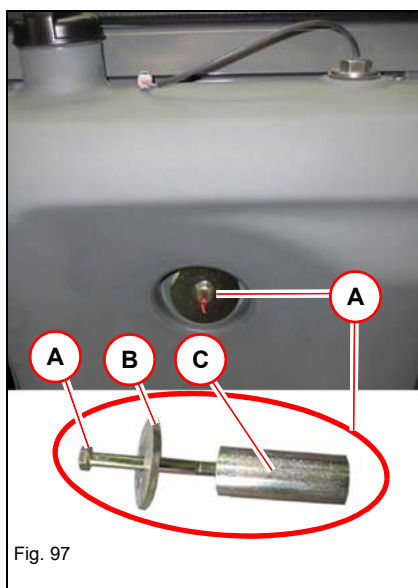


Fig. 97

19. Loosen the fastening screws **A** on the tank fixture.

20. Remove the fastening screws **A**, washers **B** and sleeves **C**.

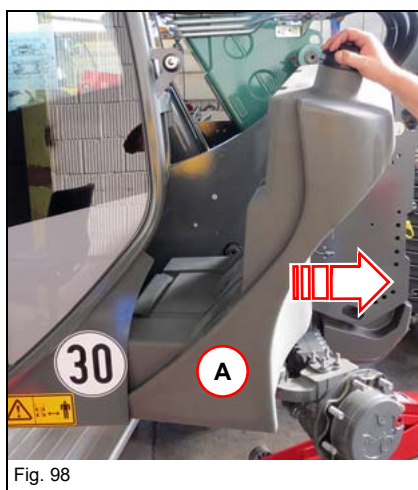


Fig. 98

21. Pull out the fuel tank **A** slightly towards the rear axle.

Insert fuel tank

1. Push the fuel tank **A** under the driver's cab as far as it will go.

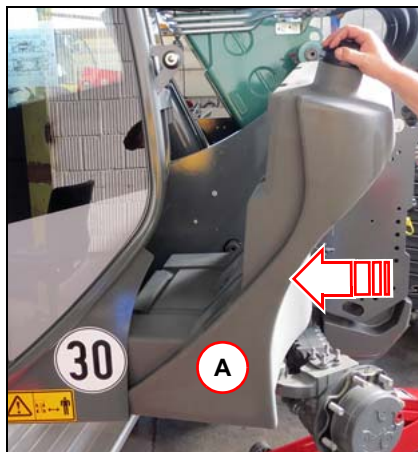


Fig. 99

2. Position the fastening screws **A**, washers **B** and sleeves **C**.
3. Tighten fastening screws **A** to 195 Nm (144 lbf ft).

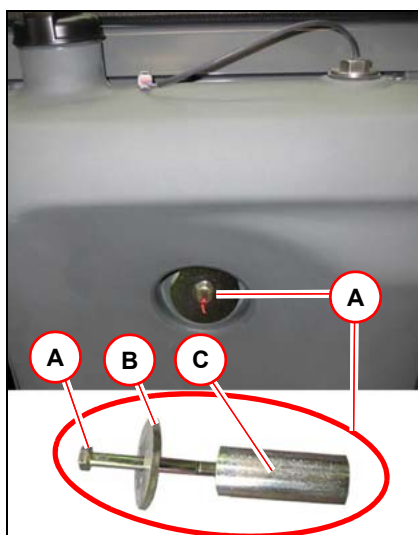


Fig. 100

4. Position strip **A** on fuel tank **B**.

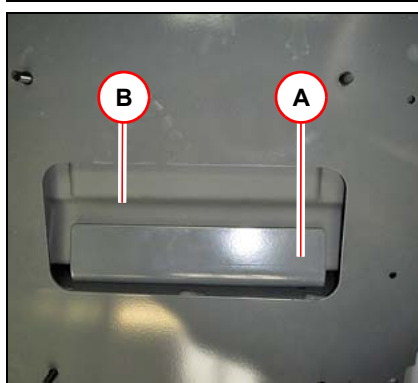
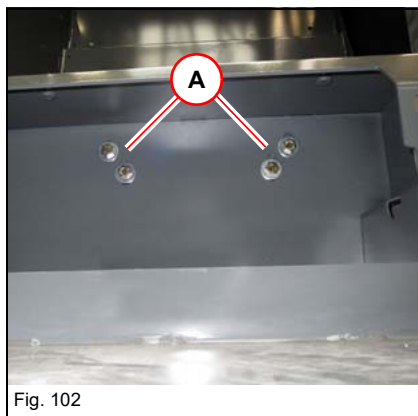
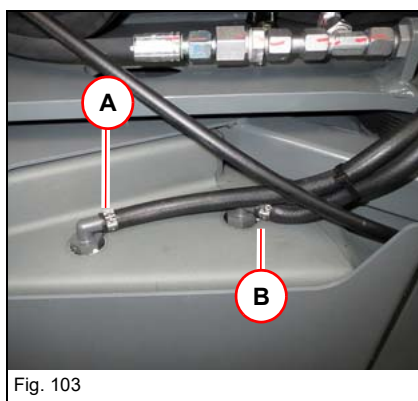


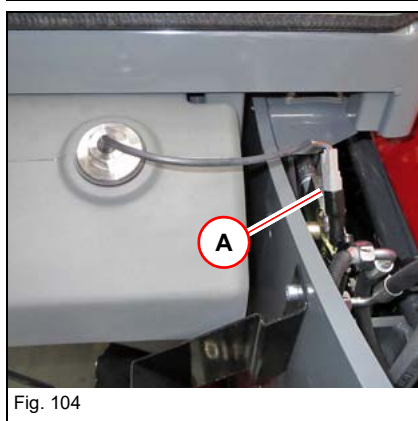
Fig. 101



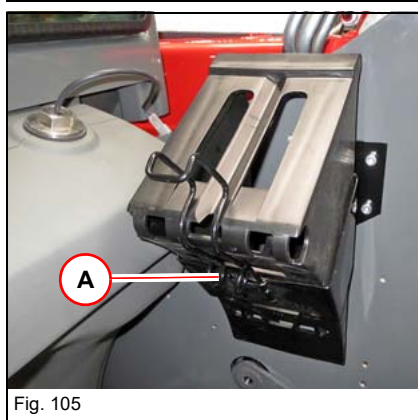
5. Tighten fastening screws **A**.
6. Install driver's seat – see "Seat" on page 14-1.



7. Put vacuum hose **B** on the fuel tank and tighten clip.
8. Put return flow hose **A** on the fuel tank and tighten clip.



9. Insert plug **A** on the tank encoder **B001**.



10. Mount wheel chock **A** with bracket.

2.6 Air filter

Safety instructions for air filter



CAUTION

Risk of injury due to hot and moving engine parts!

Hot and moving engine parts can cause injury.

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



Information

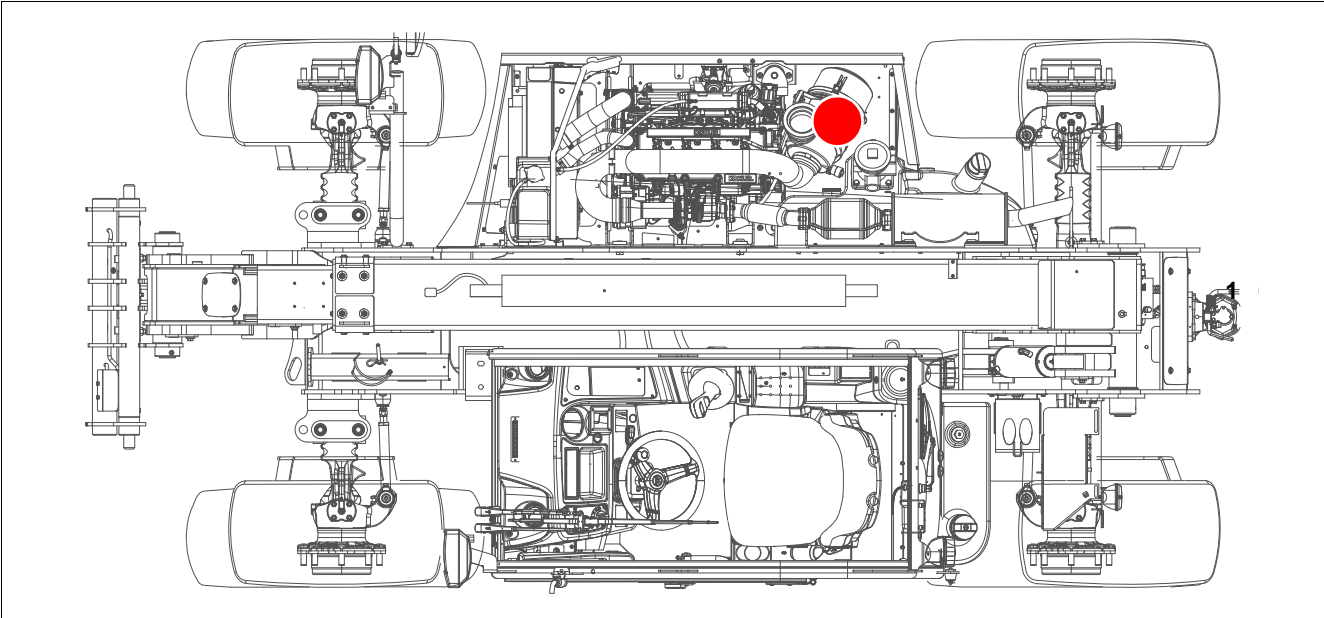
Before starting work, read the safety and preparation instructions carefully

- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Remove/install air filter

- Tools:**
- Standard tools

Technical data



Weight	BMK	Description	Remarks
2.1 kg (4.6 lb)	–	Air filter	–
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove air filter

1. Switch off battery master switch **S008** . – see *"Battery master switch S008" on page 1-3*.
2. Open the engine cover – see *"Engine cover" on page 1-23*.
3. Remove plug **A** to vacuum sensor **S004**.
4. Release clips **B** and pull off vacuum hose **C**.

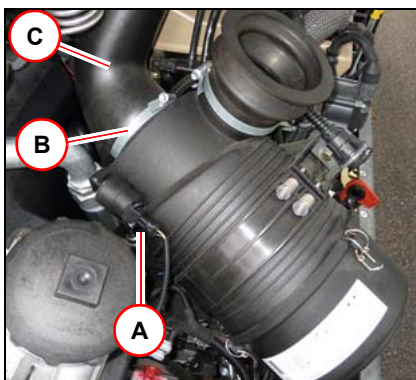


Fig. 106

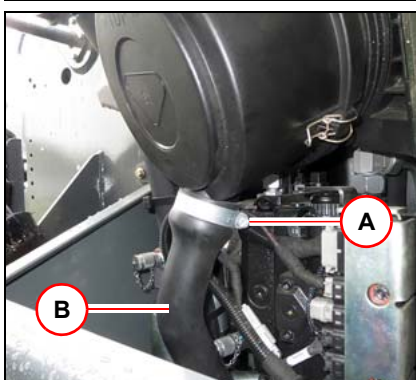


Fig. 107

5. For vacuum separator option:
➔ Loosen clamp **A** and remove hose **B**.

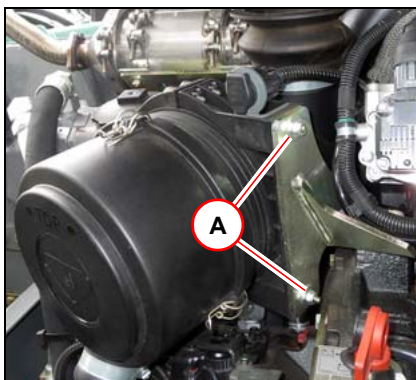


Fig. 108

6. Remove screws **A** and take out air filter.

Install air filter

1. Position air filter and tighten the fastening screws **A**.

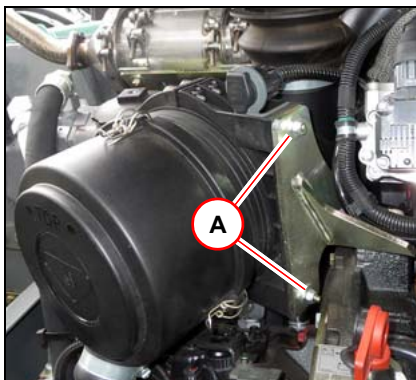


Fig. 109

2. With the vacuum separator option:
➡ Position hose **B** and tighten clamps **A**.

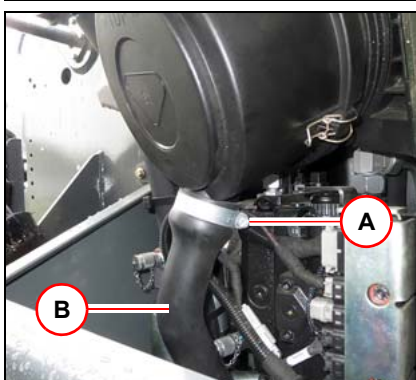


Fig. 110

3. Attach the intake hose **C** with clip **B**.
4. Insert plug **A** of the vacuum sensor **S004**.
5. Switch on battery master switch **S008**. – see *"Battery master switch S008" on page 1-3*.

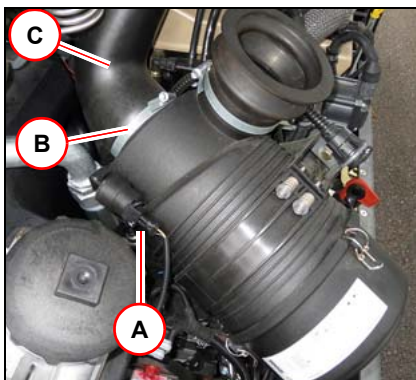


Fig. 111

2.7 Accelerator pedal R011

Safety instructions for accelerator pedal



Information

Before starting work, read the safety and preparation instructions carefully

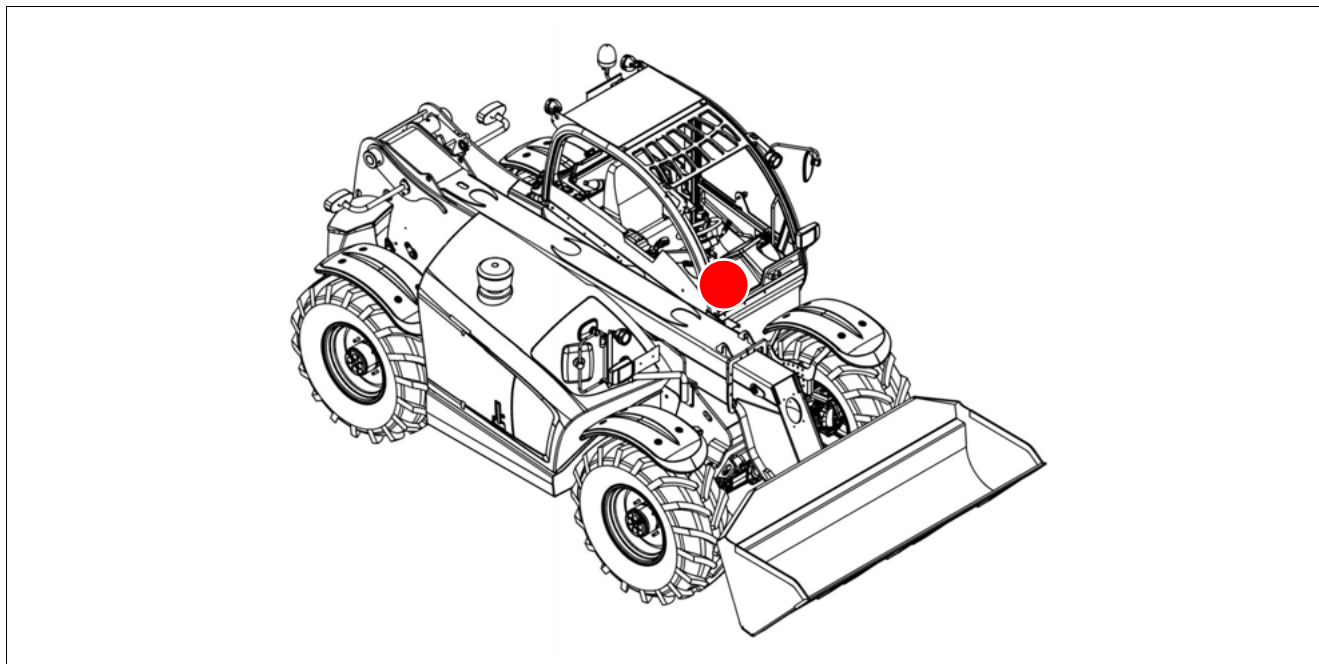
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove / install accelerator pedal

Tools

- Standard tools
- Diagnosis tool

Technical data



Weight	BMK	Description	Remarks
0.3 kg (0.6 lb)	R011	Accelerator pedal	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove accelerator pedal

1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
2. Remove foot mat.
3. Remove trim underneath the steering wheel – see *"Install/remove trim in the cab" on page 12-19*
4. Disconnect the connector **A**.
5. Remove fastening screws **B**.
6. Remove accelerator pedal **R011**.

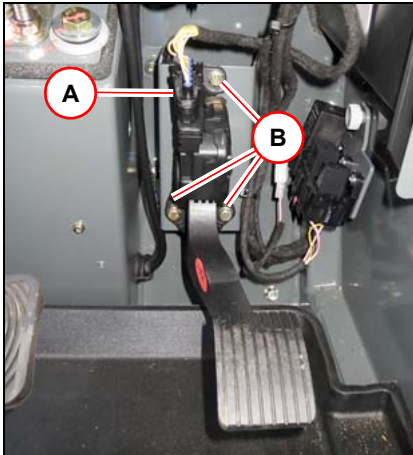


Fig. 112

Install accelerator pedal

1. Position accelerator pedal **R011**.
2. Tighten fastening screws **B**.
3. Insert connector **A**.
4. Insert trim underneath the steering wheel – see *"Install/remove trim in the cab" on page 12-19*
5. Place the foot mat on the floor of the driver's cab.
6. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
7. Calibrate the accelerator pedal with the diagnosis tool.

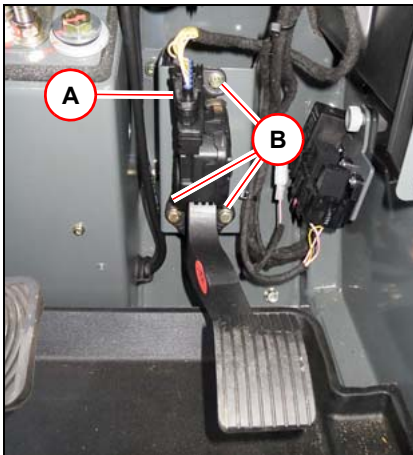


Fig. 113

Calibrate accelerator pedal R011

To ensure fault-free and safe functioning of accelerator pedal **R011**, accelerator pedal **R011** must be calibrated after it is replaced.

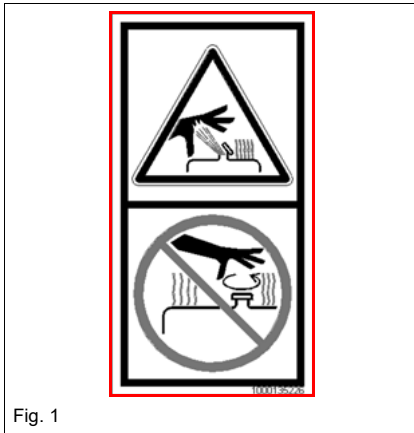
Calibration

1. Connect diagnosis tool
2. Engage the starter.
3. Open the "Settings" menu in the diagnosis tool.
4. Open the "Traction drive" sub-menu.
5. Open the "Drive pedal" sub-menu.
6. Click on the Start button and follow the steps in the diagnostics tool.

3 Cooling

3.1 Combined radiator

Safety instructions for combi-radiator



The combined water, oil and charge air cooler is located in the engine compartment. It cools the diesel engine coolant, the hydraulic oil of the drive and operating hydraulics and the charge air.



WARNING

Burn hazard! The cooling system is hot and under high pressure! Never open the coolant reservoir or drain coolant if the diesel engine is hot!

Failure to observe this can cause serious injury or death!

- ▶ Wear protective gloves and eye protection.
- ▶ Wait at least 10 minutes after stopping the diesel engine, then open the filler cap of the radiator to the first notch and release the pressure.



WARNING

Caustic injury hazard! Risk of swallowing antifreeze when handling it!

Can cause serious injury or death!

- ▶ Seek medical attention immediately if antifreeze has been swallowed!
- ▶ Keep antifreeze compound out of reach of children!



Environment

Use a suitable container to collect the coolant as it drains off and dispose of it in an environmentally friendly manner!



CAUTION

Burn hazard due to hot hydraulic oil!

Hot hydraulic oil can cause burns to the skin.

- ▶ Release the residual pressure in the hydraulic system.
- ▶ Let the engine cool down.
- ▶ Wear protective equipment.



CAUTION

Risk of injury from maintenance work!

Injury hazard.

- ▶ Secure the raised telescopic boom on the lift cylinder with a safety prop to prevent unintentional lowering.
- ▶ Release the pressure in all lines carrying hydraulic oil prior to any maintenance and repair work. To do this:
- ▶ Lower the attachments to the ground.
- ▶ Stop the engine and remove the starting key.
- ▶ Apply the parking brake.
- ▶ Actuate all control levers of the hydraulic controller several times for pressure relief.
- ▶ Only work on the hydraulic system when the engine is switched off.

NOTICE

Contaminated hydraulic oil, lack of oil or wrong hydraulic oil poses a risk of serious damage to the hydraulic system!

- ▶ Take care to avoid dirt when working!
- ▶ Always add hydraulic oil using the filling screen!
- ▶ Only use authorized oils of the same type.
- ▶ Always add hydraulic oil before the level gets too low.
- ▶ If the hydraulic system is filled with biodegradable oil, then only use biodegradable oil of the same type for adding oil – observe the sticker on the hydraulic oil reservoir.
- ▶ Have the hydraulic oil replaced by an authorized service center only.



WARNING

Contact with hot liquids and machine components!

May lead to death or serious injury due to burning of the skin!

- ▶ Wear suitable protective clothing.
- ▶ Let liquids and the diesel engine cool down!
- ▶ Observe instructions.



Information

Before starting work, read the safety and preparation instructions carefully

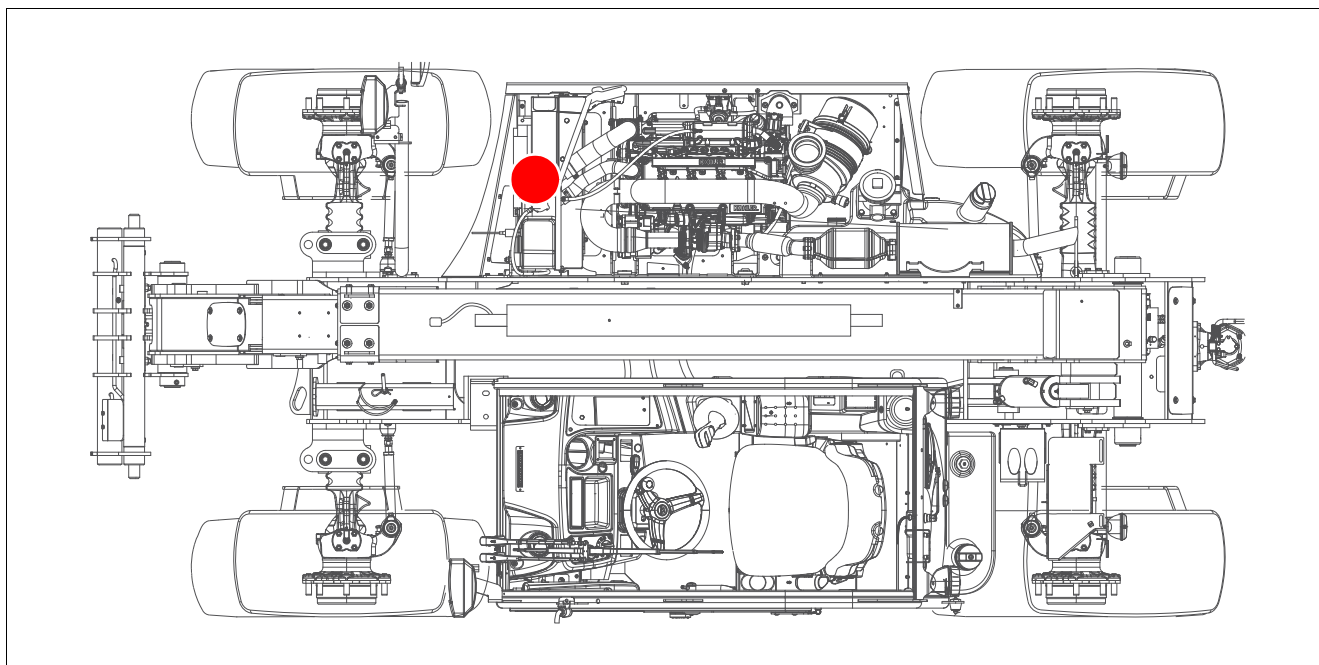
- see *"Notes on the repair manual"* on page E-1,
- see *"Safety instructions"* on page E-6,
- see *"Maintenance preparations, instructions"* on page 1-1!

Removing/installing the radiator

Tools:

- Suitable lifting device.
Load-bearing capacity minimum 100 kg (220 lb).
- Suitable slings (cables and shackles) with corresponding load-bearing capacity.
- Vacuum pump.
- Container for collecting coolant [capacity of min. 15 l (3.96 gal)].
- Collecting container for hydraulic oil.
- Plugs (different sizes) for closing the oil lines.
- Loctite®511
- Standard tools

Technical data



Weight	BMK	Description	Remarks
45 kg (99 lb)	—	Combined radiator	—
5 kg (11 lb)	—	Air-conditioning system condenser	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove radiator

1. Let the diesel engine cool down.
2. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
3. Remove the engine cover – see *"Removing/installing the engine cover" on page 12-2*.
4. Remove maintenance access to engine bay bottom – see *"Engine vat" on page 1-24*.
5. Remove maintenance access to engine bay front – see *"Engine vat" on page 1-24*.
6. Drain off coolant – see *"Draining coolant" on page 1-71*.
7. Remove the V-belt cover.
8. If present, evacuate air conditioning system – see *"Emptying/filling the air conditioning system" on page 1-115*.
9. Unscrew cover of the ventilation filter, attach vacuum pump and switch it on – see *"Vent filter/vacuum pump" on page 1-6*.

Radiator top

10. Release union nut **A** and remove hose and seal.
11. Release clips **B** and pull off charge-air hose.
12. Loosen terminal **C** and remove hose.
13. Release clip **B** and pull off coolant hose.

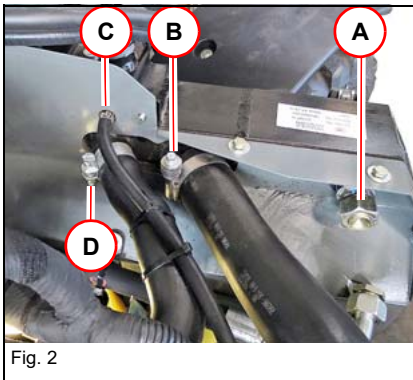
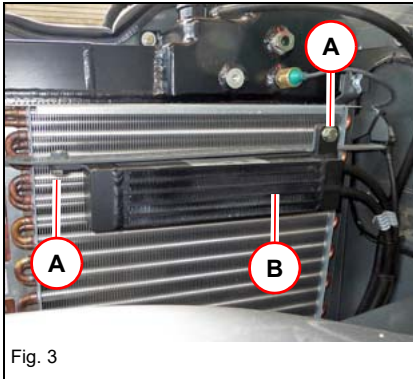


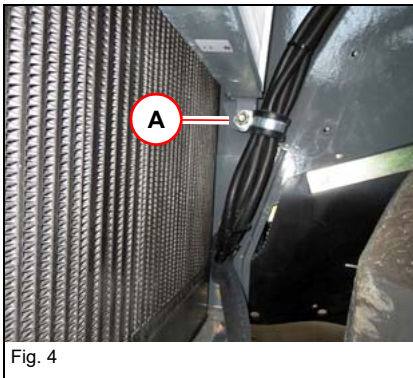
Fig. 2

Radiator front

14. Remove fastening screws **A** on the fuel cooler **B**.

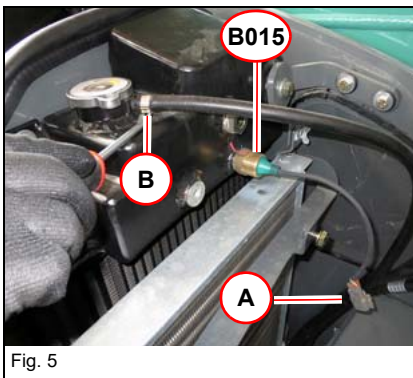


15. Remove fixing nut **A** and take off fuel cooler, and carefully put down on front axle.



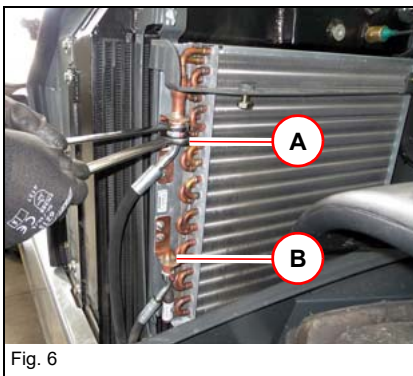
16. Separate plugs **A** from coolant level sensor **B015**.

17. Loosen terminal **C** and remove overflow protection.

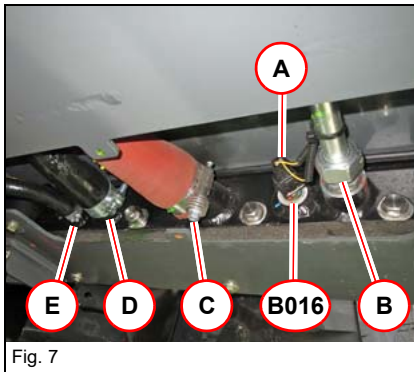


18. If present, evacuate air conditioning system – see ["Emptying/filling the air conditioning system" on page 1-115](#).

19. If present, remove hose pipes **A** and **B** on the air conditioning system condenser and seal tightly.

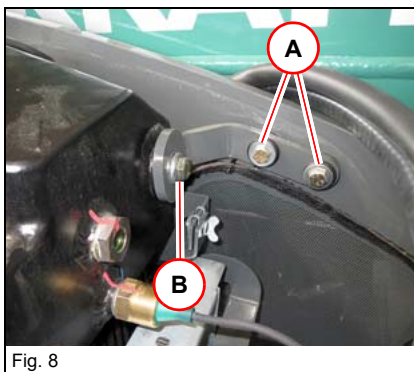


Radiator bottom

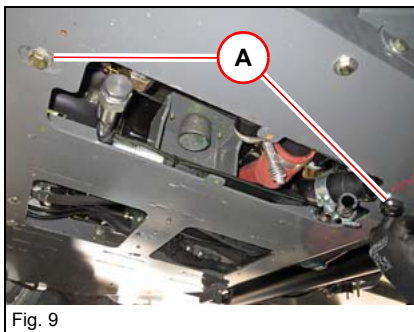


20. Unplug plug **A** on the temperature sensor **B016**.
21. Loosen sleeve nut **B** and remove hydraulic hose.
22. Close and seal the openings.
23. Release clip **C** and pull off exhaust turbocharger hose.
24. Release clip **D** and pull off coolant hose.
25. Release clip **E** and pull off hose.

Radiator mounting top and bottom

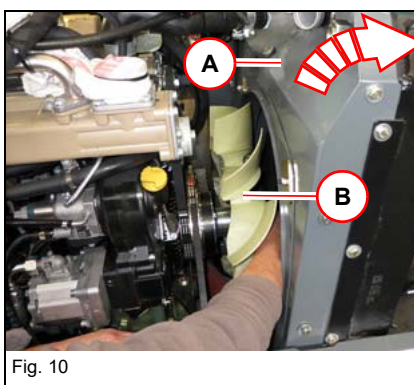


26. Remove fastening screws **A**.
27. Release screw **B** twist mount with rubber bearing upwards.



28. Remove screws **A** on radiator bottom.

Remove fan blades



29. Tip radiator **A** forwards.
30. Remove screws **B** on fan blades.
31. Remove fan blades.

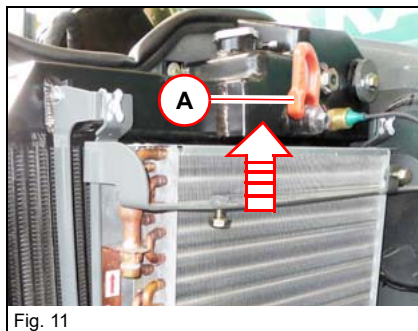


Fig. 11

Lift out radiator

32. Mount ring eyelets **A** at the front of the radiator.



WARNING

Injury hazard when lifting heavy components!

Death or serious injury.

- ▶ Use lifting gear of sufficient lifting capacity.
- ▶ Use functionally safe lifting gear.
- ▶ Use lifting gear on firm and level ground.
- ▶ Move the lifting tackle to predefined or suitable position on the component.

33. Hook suitable hoisting gear into the eyelet.

34. Carefully lift the radiator out upwards using the lifting gear.

Convert radiator

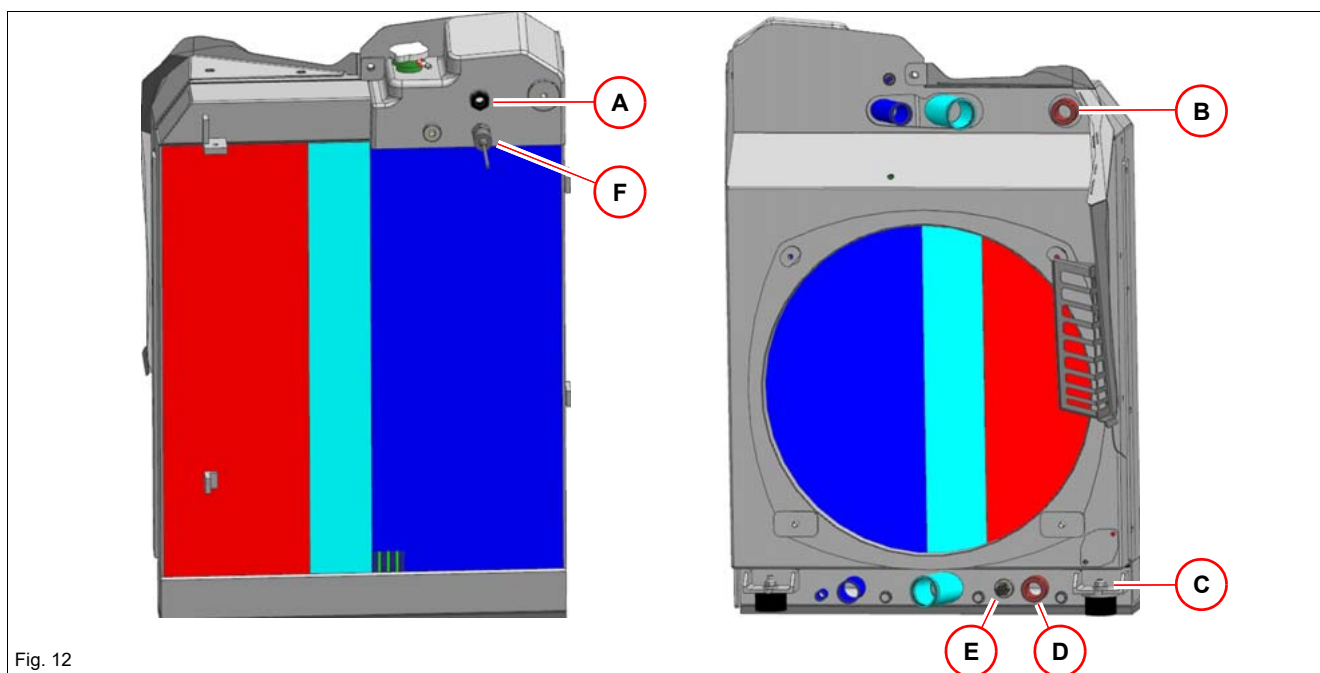


Fig. 12

Pos.	Description	Tightening torque
A	Oil level suction	20 Nm (15 lbf ft)
B	Screw connection	85 Nm (63 lbf ft) with Loctite®511
C	Nut (radiator bearing)	46 Nm (34 lbf ft)
D	Screw connection	85 Nm (63 lbf ft) with Loctite®511
E	Temperature sensor	20 Nm (15 lbf ft) with Loctite®511
F	Coolant level sensor	25 Nm (18 lbf ft) with Loctite®511

Install radiator



WARNING

Injury hazard when lifting heavy components!

Death or serious injury.

- ▶ Use lifting gear of sufficient lifting capacity.
- ▶ Use functionally safe lifting gear.
- ▶ Use lifting gear on firm and level ground.
- ▶ Move the lifting tackle to predefined or suitable position on the component.

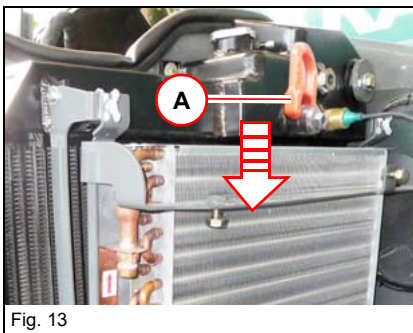


Fig. 13

1. Carefully position the radiator with lifting gear in the engine bay.
2. Remove ring eyelets **A** on the radiator.

Mount fan blades

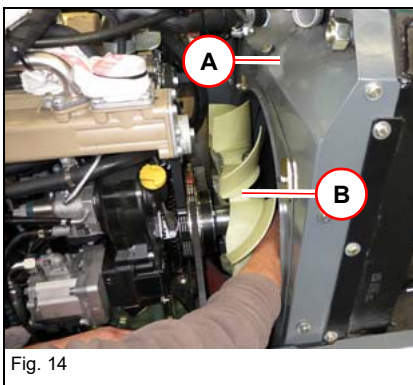


Fig. 14

3. Tip radiator **A** forwards.
4. Insert fan blades.
5. Position fan blade with screws **B** and Loctite® 243 on the hub and tighten to 23 Nm (17 lbf ft).
6. Position the radiator vertically in the engine bay.

NOTICE

Ensure there is sufficient distance for the fan blades to the heat shield on all sides!

Radiator mounting top and bottom

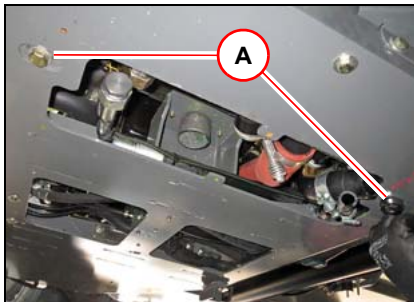


Fig. 15

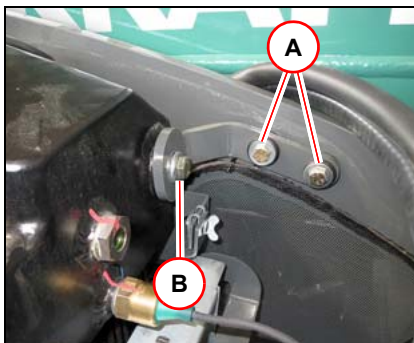


Fig. 16

7. Tighten fastening screws **A** on the radiator bottom to 46 Nm (34 lbf ft).

8. Position radiator mount and tighten fastening screws **A** and **B**.

Hose pipes on radiator bottom

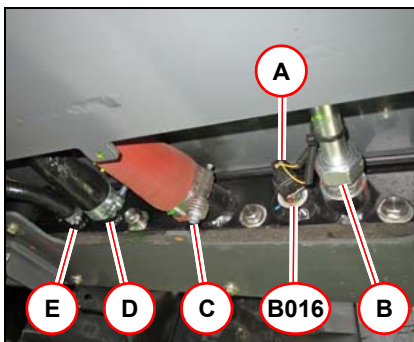


Fig. 17

9. Affix hose and tighten clip **B**.

10. Affix coolant hose and tighten clip **D**.

11. Affix exhaust turbocharger hose and tighten clip **C** to 12 Nm (9 lbf ft).

12. Affix hydraulic oil line and the union nut **B** to 85 Nm (63 lbf ft).

13. Insert plug **A** on the temperature sensor **B016**.

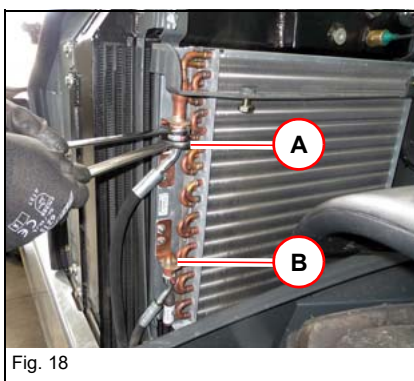
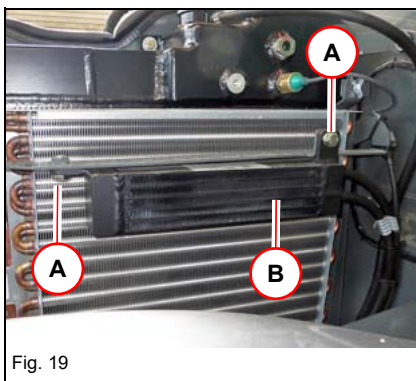
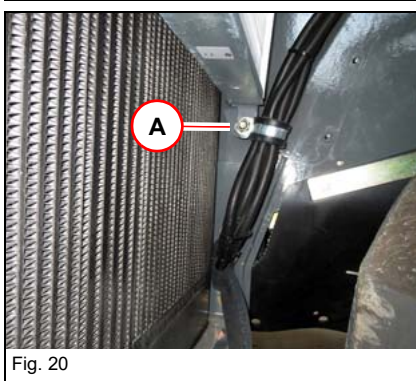


Fig. 18

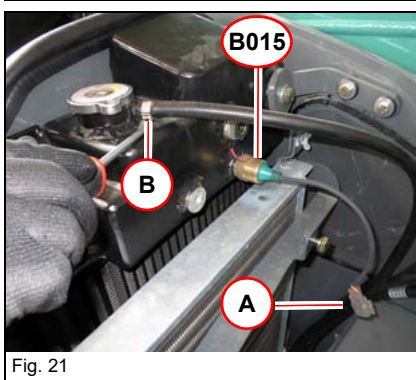
14. If present, connect hose pipes **A** and **B** to the air conditioning system condenser and tighten.



15. Position fuel cooler **B** and tighten fastening screws **A**.

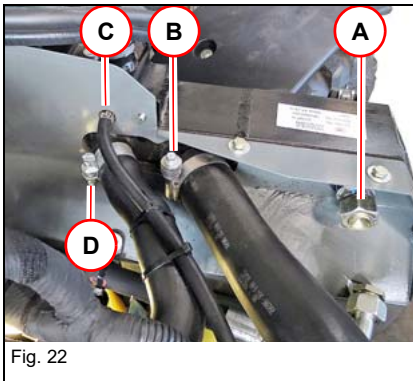


16. Mount clip **A**.



17. Connect plug **A** from coolant level sensor **B015**.

18. Affix overflow protection and tighten hose clip **B**.



On radiator at top

19. Affix coolant hose and tighten clip **D**.
20. Affix hose and tighten terminal **C**.
21. Affix charge-air hose and tighten clips **C** to 12 Nm (9 lbf ft) .
22. Position hydraulic hose and tighten union nut **A** to 85 Nm (63 lbf ft).
23. Remove vacuum pump and screw on cover for breather filter.
24. Fill air conditioning, if available – see *"Emptying/filling the air conditioning system" on page 1-115*.
25. Top up hydraulic oil .. – see *"Changing hydraulic oil" on page 1-93*.
26. Fill coolant – see *"Adding coolant" on page 1-69*.
27. Mount the V-belt cover.
28. Fit the maintenance access (engine vat, bottom) – see *"Engine vat" on page 1-24*.
29. Install maintenance access to engine bay front – see *"Engine vat" on page 1-24*.
30. Install engine cover – see *"Removing/installing the engine cover" on page 12-2*.
31. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.

3.2 Fan blades / fan bearings

Safety instructions for fan blades / fan bearings



WARNING

Contact with hot liquids and machine components!

Death or serious injury due to skin burns.

- ▶ Wear suitable protective clothing.
- ▶ Let liquids and the diesel engine cool down.
- ▶ Observe instructions.



Environment

Use a suitable container to collect the coolant as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

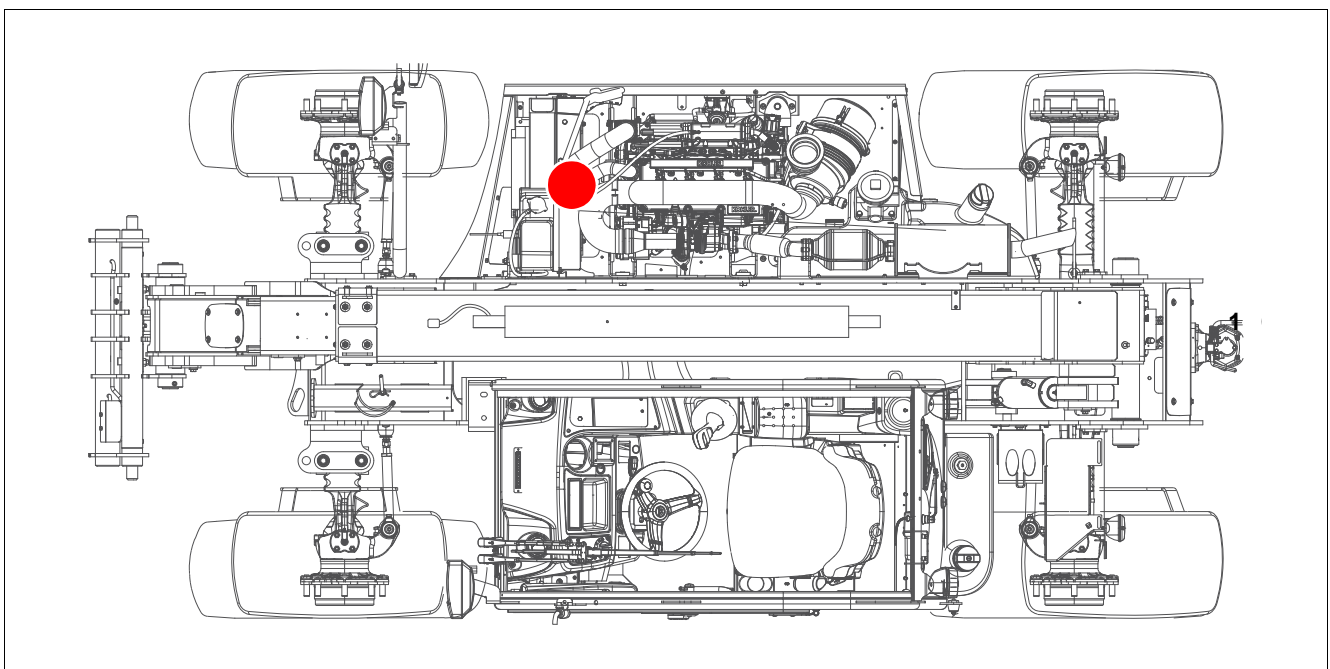
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Remove / install fan wheel / fan bearings

Tools:

- Suitable lifting gear
Load-bearing capacity minimum 100 kg (220 lb)
- Suitable slings (cables and shackles) with corresponding load-bearing capacity
- Vacuum pump
- Container for collecting coolant [capacity of min. 15 l (3.96 gal)]
- Collecting container for hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

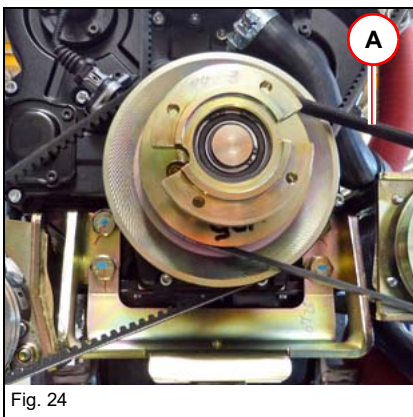
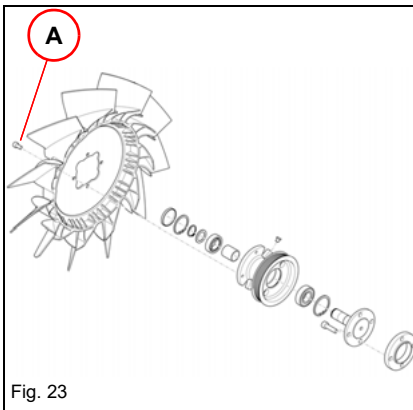
Technical data



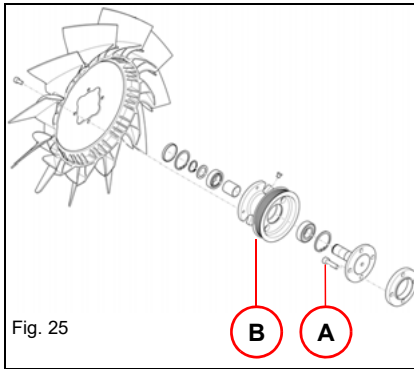
Weight	BMK	Description	Remarks
4.7 kg (10.4 lb)	—	Fan impeller	—
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove fan blades

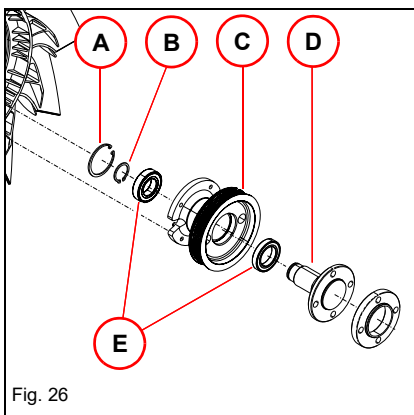
1. Let the diesel engine cool down.
2. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
3. Remove the engine cover – see *"Removing/installing the engine cover" on page 12-2.*
4. Remove maintenance access to engine bay bottom – see *"Engine vat" on page 1-24.*
5. Remove maintenance access to engine bay front – see *"Engine vat" on page 1-24.*
6. Drain off coolant – see *"Draining coolant" on page 1-71.*
7. Remove the V-belt cover.
8. If present, evacuate air conditioning system – see *"Emptying/filling the air conditioning system" on page 1-115.*
9. Unscrew cover of the ventilation filter, attach vacuum pump and switch it on – see *"Vent filter/vacuum pump" on page 1-6.*
10. Remove combi-radiator completely – see *"Removing/installing the radiator" on page 3-3.*
11. Remove 4x screws **A** on the fan blades **B** and take out the fan blades.



12. Remove V-belt **A** – see *"Changing the reversing fan V-belt (optional)" on page 1-84.*

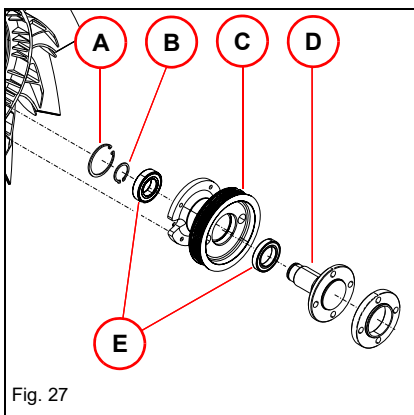


13. Remove 4x screws **A** on the fan bearings **B** and take out completely.



Remove fan bearings

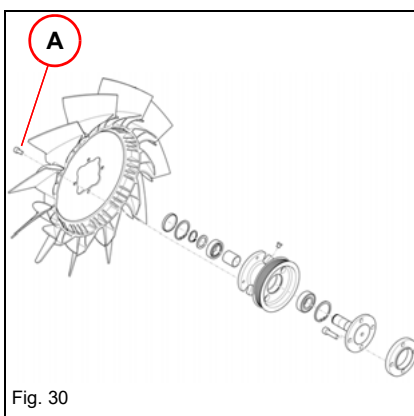
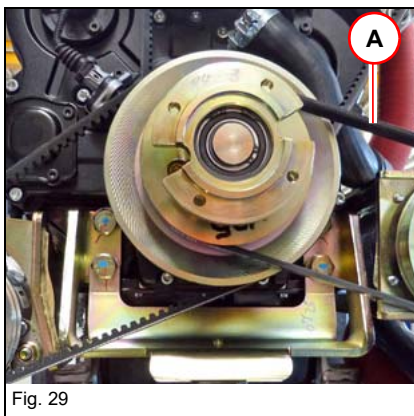
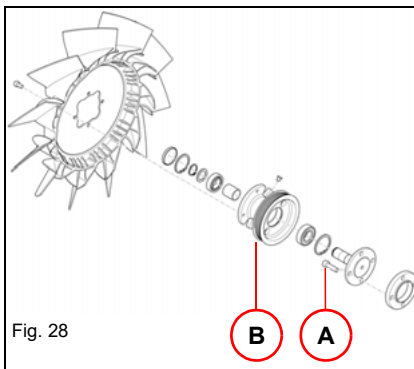
1. Remove circlip **A** on the fan bearings **C**.
2. Remove circlip **B** on the bearing shaft **D**.
3. Press out bearing shaft **D** with suitable pressing tool.
4. Pull ball bearing **E** off of the bearing shaft **D**.



Install fan bearings

1. Press new ball bearings **E** onto the bearing shaft **D**.
2. Press bearing shaft in **D** with suitable pressing tools.
3. Install circlip **B** on the bearing shaft **D**.
4. Install circlip **A** on the fan bearings **C**.

Install fan blades



1. Position fan bearings **B** and mount 4x screws **A** using Loctite®243.
2. Tighten 4x screws **A** to 46 Nm (34 lbf ft).
3. Mount V-belt **A** – see *"Changing the reversing fan flat belt (optional)" on page 1-85.*
4. Mount 4x screws **A** on the fan blades with Loctite®243.
5. Tighten 4x screws **A** to 23 Nm (17 lbf ft).
6. Install combi-radiator completely – see *"Removing/installing the radiator" on page 3-3.*
7. Remove vacuum pump and screw on cover for breather filter.
8. Fill air conditioning, if available – see *"Emptying/filling the air conditioning system" on page 1-115.*
9. Fit the maintenance access (engine vat, bottom) – see *"Engine vat" on page 1-24.*
10. Install maintenance access to engine bay front – see *"Engine vat" on page 1-24.*
11. Mount the V-belt cover.
12. Install engine cover – see *"Removing/installing the engine cover" on page 12-2.*
13. Fill coolant – see *"Adding coolant" on page 1-69.*
14. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
15. Carry out functional check and leak test.

3.3 Fan motor 014

Safety instructions for fan motor



CAUTION

Burn hazard due to hot hydraulic oil!

Hot hydraulic oil can cause burns to the skin.

- ▶ Release the residual pressure in the hydraulic system.
 - ▶ Let the engine cool down.
 - ▶ Wear protective equipment.
-



CAUTION

Risk of injury from maintenance work!

Injury hazard.

- ▶ Secure the raised telescopic boom on the lift cylinder with a safety prop to prevent unintentional lowering.
 - ▶ Release the pressure in all lines carrying hydraulic oil prior to any maintenance and repair work. To do this:
 - ▶ Lower the attachments to the ground.
 - ▶ Stop the engine and remove the starting key.
 - ▶ Apply the parking brake.
 - ▶ Actuate all control levers of the hydraulic controller several times for pressure relief.
 - ▶ Only work on the hydraulic system when the engine is switched off.
-

NOTICE

Contaminated hydraulic oil, lack of oil or wrong hydraulic oil poses a risk of serious damage to the hydraulic system!

- ▶ Take care to avoid dirt when working!
 - ▶ Always add hydraulic oil using the filling screen!
 - ▶ Only use authorized oils of the same type.
 - ▶ Always add hydraulic oil before the level gets too low.
 - ▶ If the hydraulic system is filled with biodegradable oil, then only use biodegradable oil of the same type for adding oil – observe the sticker on the hydraulic oil reservoir.
 - ▶ Have the hydraulic oil replaced by an authorized service center only.
-



WARNING

Contact with hot liquids and machine components!

May lead to death or serious injury due to burning of the skin!

- ▶ Wear suitable protective clothing.
- ▶ Let liquids and the diesel engine cool down!
- ▶ Observe instructions.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

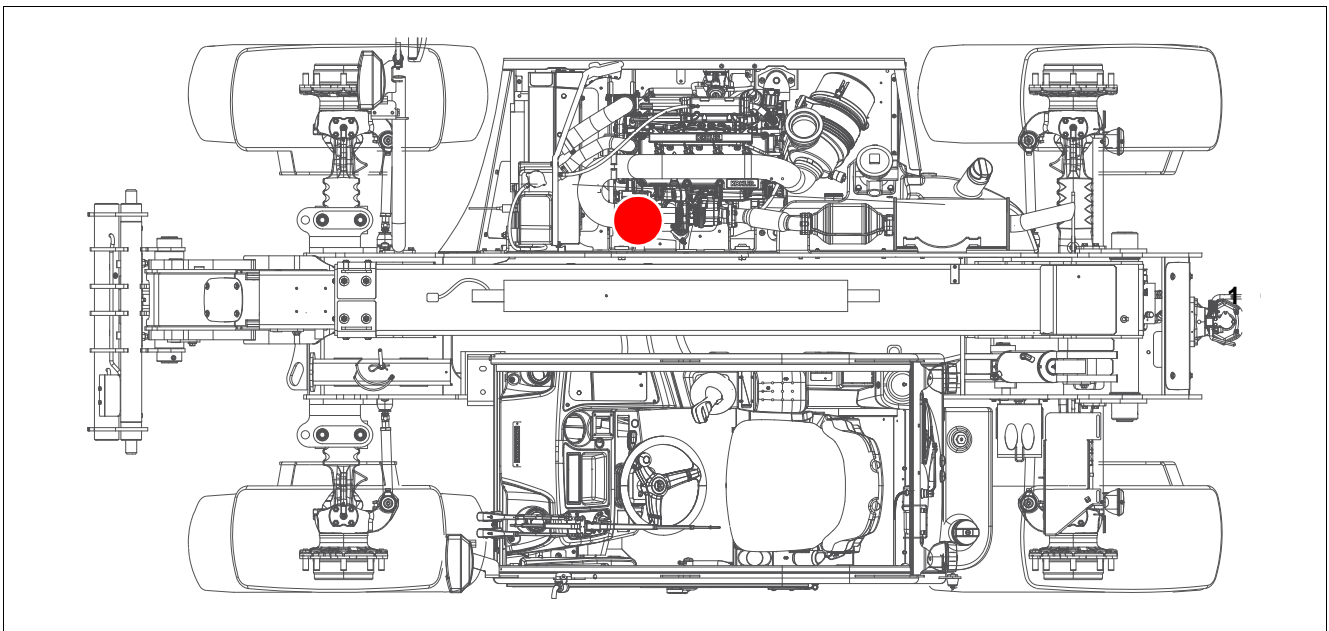
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Removing/installing the fan motor

Tools:

- Suitable lifting device, load-bearing capacity min. 500 kg (1100 lb)
- Suitable slings (cables and shackles) with corresponding load-bearing capacity
- Vacuum pump
- Container for collecting hydraulic oil [capacity of min. 55 l (15 gal)]
- Container for collecting coolant [capacity of min. 15 l (4 gal)]
- Plugs (different sizes) for closing the oil lines
- Standard tools

Technical data



Weight	BMK	Description	Remarks
2.9 kg (6.4 lb)	014	Reversible fan hydraulic motor	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove fan motor

1. Let the diesel engine cool down.
2. If possible, take gears to the right.
3. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
4. Remove the engine cover – see *"Removing/installing the engine cover" on page 12-2.*
5. Remove motor completely – see *"Removing / installing the engine" on page 2-3.*
6. Remove hose clip **A** of coolant hose.
7. Remove fastening screws **B** and take off fan motor with mount **C**.

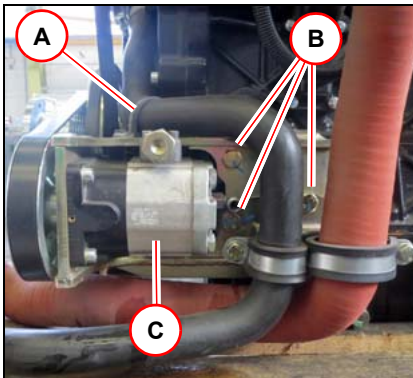


Fig. 31

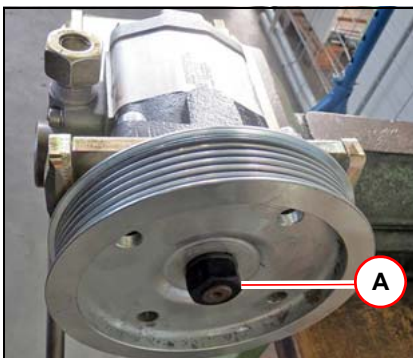


Fig. 32

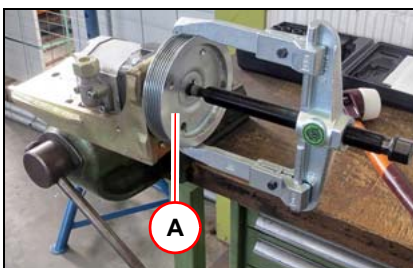


Fig. 33

8. Clamp fan motor with mount in the vice.
9. Remove fastening nut **A**.

10. Pull off pulley **A** with suitable puller.

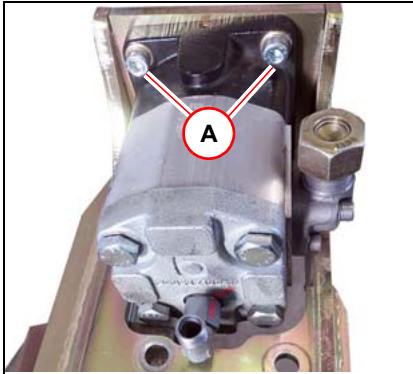


Fig. 34

11. Remove the fastening screws **A** and take out the fan motor.

Install fan motor

1. Position fan motor on the mount.
2. Insert fastening screws **B** using Loctite®243 and tighten to 23 Nm (17 lbf ft).

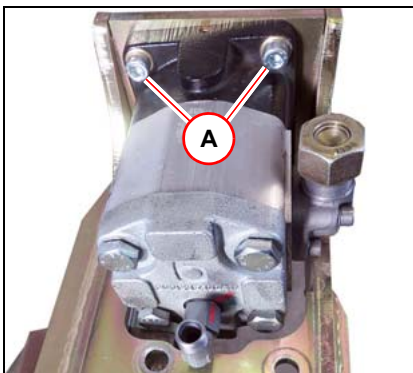


Fig. 35

3. Please ensure that Woodruff key **A** is correctly inserted in the pump shaft.

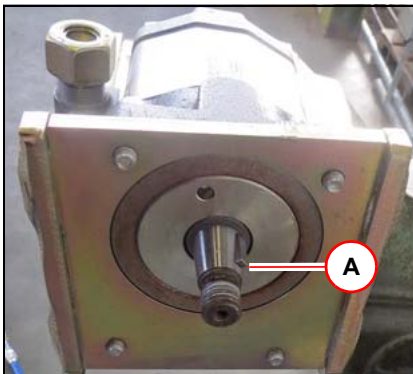


Fig. 36

4. Insert fastening nut **B** using Loctite®243 and tighten to 50 Nm (37 lbf ft).



Fig. 37

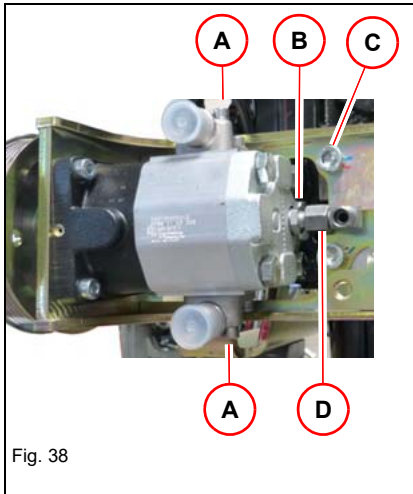


Fig. 38

5. Position mount with fan motor and fastening screws **B** using Loctite®243 tighten to 79 Nm (58 lbf ft).
6. Mount connection piece with new O-rings and tighten fastening screws **A** to 10 Nm (7 lbf ft).
7. Mount screw connection **B** and tighten to 30 Nm (22 lbf ft).
8. Mount screw connection **D** and tighten to 23 Nm (17 lbf ft).
9. Insert flat belt – see *"Changing the reversing fan V-belt (optional)" on page 1-84.*
10. Insert motor completely – see *"Removing / installing the engine" on page 2-3.*
11. Install engine cover – see *"Removing/installing the engine cover" on page 12-2.*
12. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
13. Carry out functional check and leak test.

3.4 Air pump 012 / pump bearing

Safety instructions for air pump / pump bearing



CAUTION

Burn hazard due to hot hydraulic oil!

Hot hydraulic oil can cause burns to the skin.

- ▶ Release the residual pressure in the hydraulic system.
 - ▶ Let the engine cool down.
 - ▶ Wear protective equipment.
-



CAUTION

Risk of injury from maintenance work!

Injury hazard.

- ▶ Secure the raised telescopic boom on the lift cylinder with a safety prop to prevent unintentional lowering.
 - ▶ Release the pressure in all lines carrying hydraulic oil prior to any maintenance and repair work. To do this:
 - ▶ Lower the attachments to the ground.
 - ▶ Stop the engine and remove the starting key.
 - ▶ Apply the parking brake.
 - ▶ Actuate all control levers of the hydraulic controller several times for pressure relief.
 - ▶ Only work on the hydraulic system when the engine is switched off.
-

NOTICE

Contaminated hydraulic oil, lack of oil or wrong hydraulic oil poses a risk of serious damage to the hydraulic system!

- ▶ Take care to avoid dirt when working!
 - ▶ Always add hydraulic oil using the filling screen!
 - ▶ Only use authorized oils of the same type.
 - ▶ Always add hydraulic oil before the level gets too low.
 - ▶ If the hydraulic system is filled with biodegradable oil, then only use biodegradable oil of the same type for adding oil – observe the sticker on the hydraulic oil reservoir.
 - ▶ Have the hydraulic oil replaced by an authorized service center only.
-



WARNING

Contact with hot liquids and machine components!

May lead to death or serious injury due to burning of the skin!

- ▶ Wear suitable protective clothing.
- ▶ Let liquids and the diesel engine cool down!
- ▶ Observe instructions.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

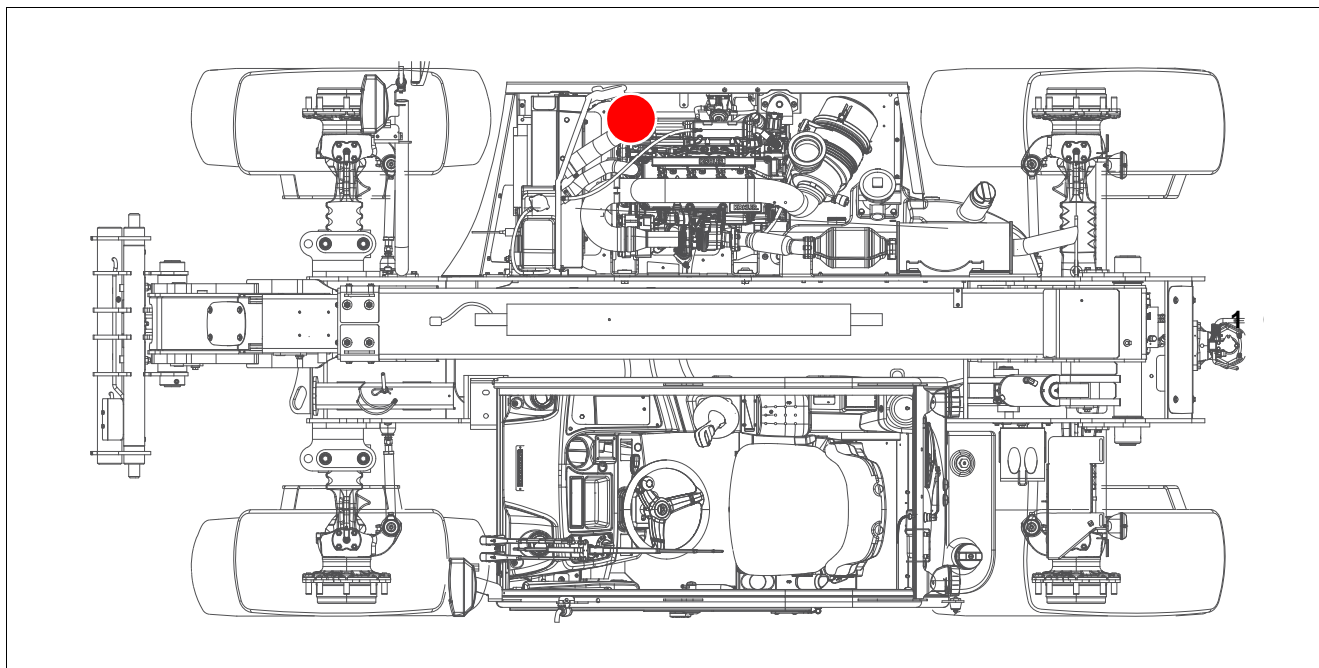
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install air pump

Tools:

- Vacuum pump
- Collecting container for hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

Technical data



Weight	BMK	Description	Remarks
2.7 kg (5.9 lb)	012	Reversing fan hydraulic pump	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove air pump

1. Let the diesel engine cool down.
2. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
3. Unscrew cover of the ventilation filter, attach vacuum pump and switch it on – see *"Vent filter/vacuum pump" on page 1-6*.
4. Loosen sleeve nut **A** and remove hydraulic hose.
5. Loosen sleeve nut **B** and remove hydraulic hose.
6. Close and seal the openings.

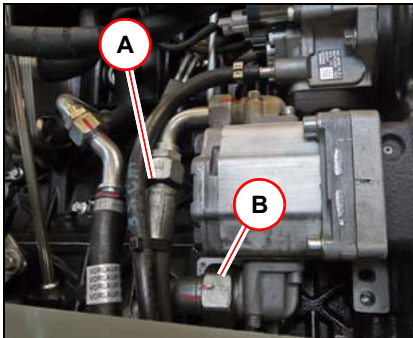


Fig. 39

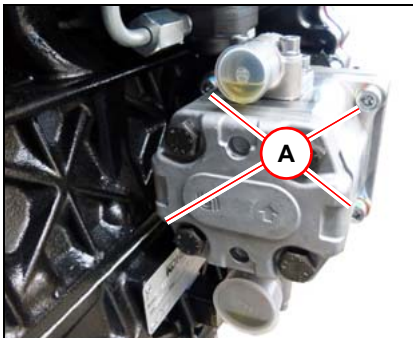


Fig. 40

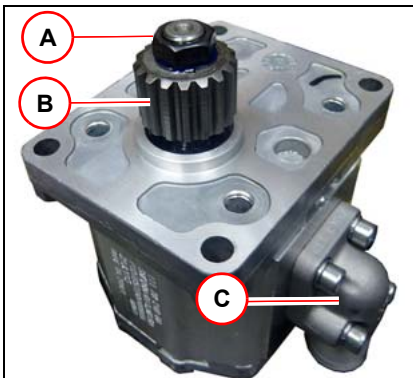


Fig. 41

7. Remove fastening screws **A** and take gear pump off of diesel engine.
8. Remove fastening nut **A**.
9. Pull gear wheel **B** from the pump shaft using a suitable tool.
10. Remove connections **C** from the pump.

Remove air pump bearing

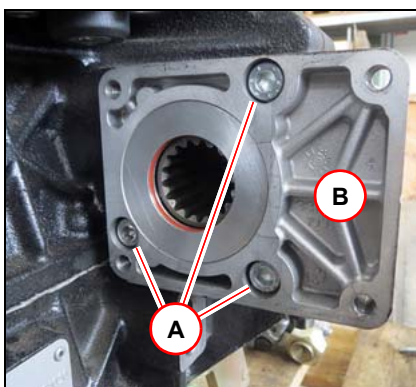
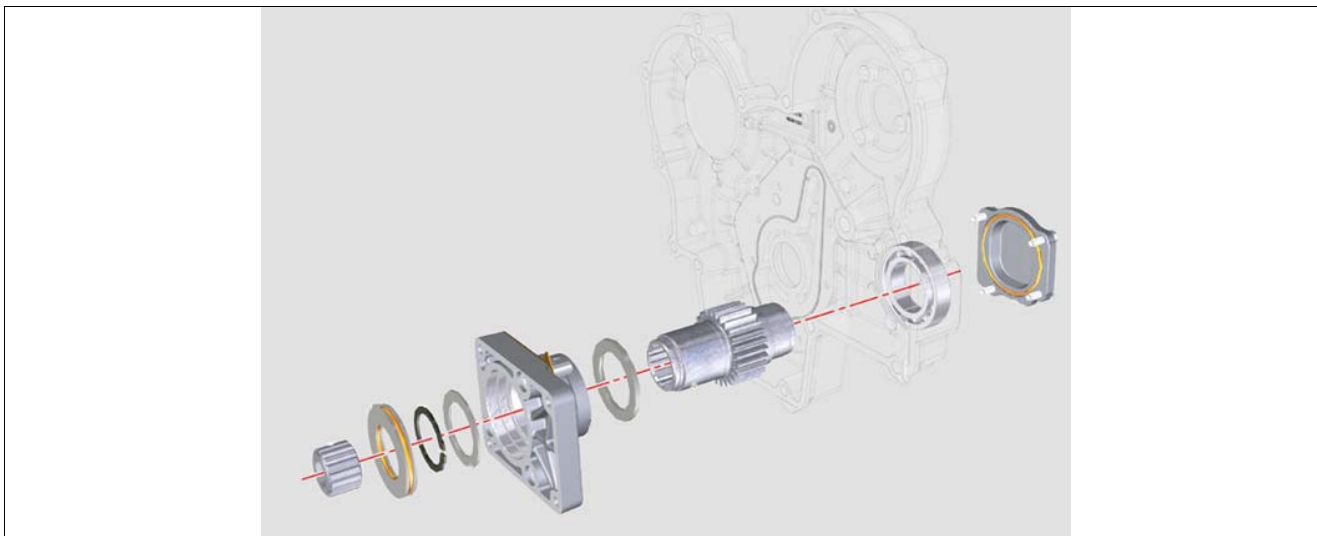


Fig. 42

1. Remove fastening screws **A** and pull of bearing flange **B** from the diesel engine.

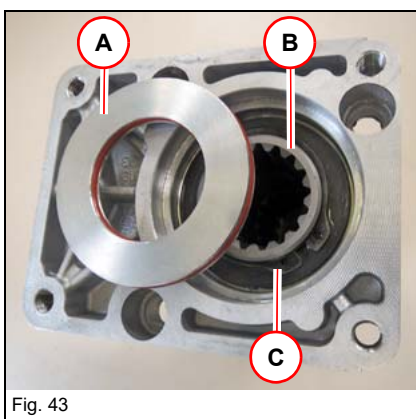
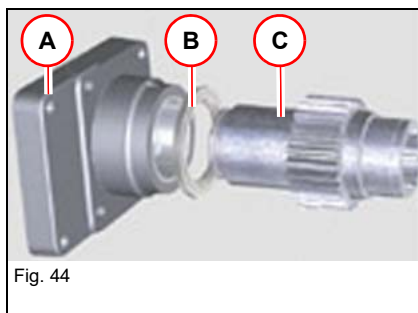


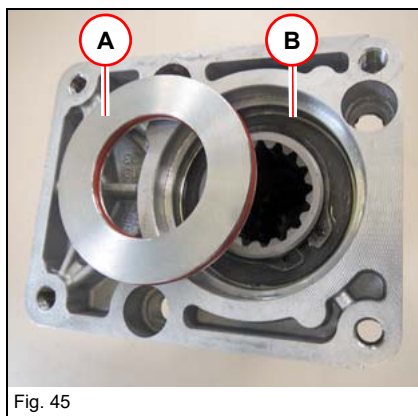
Fig. 43

2. Insert bearing flange into the vice.
3. Lift out seal **A**.
4. Remove circlip **C**.
5. Pull shaft **B** downwards.

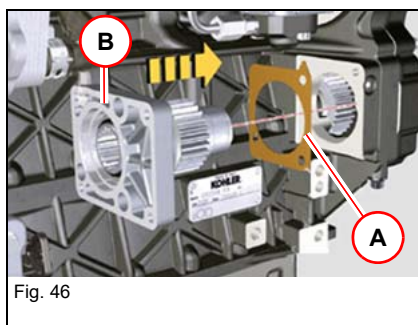
Install air pump bearing



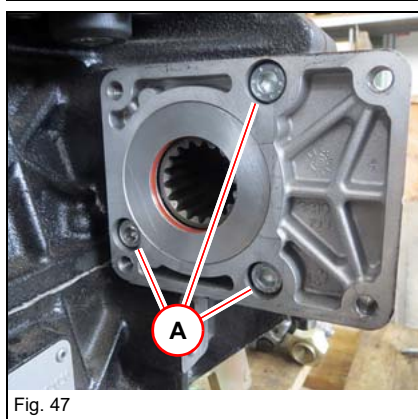
1. Insert thrust washer **B** with the bevel to the gear shaft **C** and insert into the bearing flange **A**.



2. Fit retaining ring **B**.
3. Insert seal ring **A** with new O-rings.



4. Position bearing flange **B** with new seal **A** on the diesel engine.



5. Mount fastening screws **A** with Loctite® 2701 and tighten to 25 Nm (18 lbf ft).

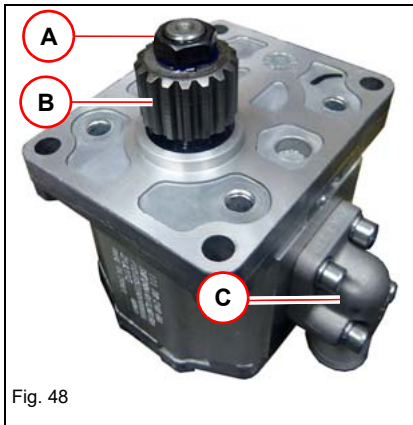


Fig. 48

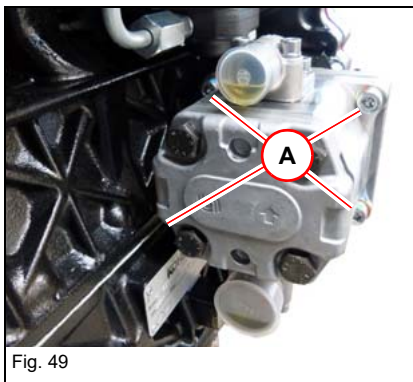


Fig. 49

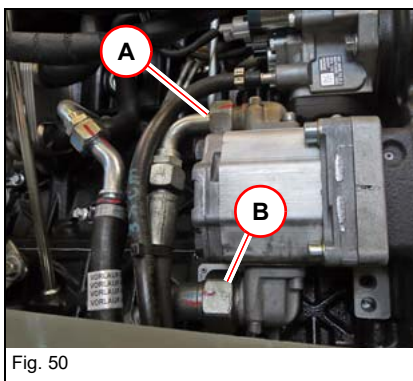


Fig. 50

Install air pump

1. Insert parallel key into the pump shaft and push gear wheel **B** on.
2. Lubricate thread with Loctite® 243.
3. Tighten fixing nut **A** to 50 Nm (37 lbf ft).
4. Position connection flange **C** with new O-rings and screw tight the fastening screws to 10 Nm (7 lbf ft) festschrauben.
5. Insert the gear pump and tighten the fastening screws **A** to 25 Nm (18 lbf ft).
6. Position hoses and tighten union nuts **A** and **B** to 60 Nm (44 lbf ft).
7. Take off vacuum pump and screw on cover for breather filter.
8. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
9. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
10. Check hydraulics – see ["Checking the hydraulic oil level" on page 1-91](#).
11. Carry out functional check and leak test.

4 Cardan shafts

4.1 Cardan shaft

Safety instructions for cardan shafts



CAUTION

There is a risk of injury if the cardan shafts are not installed correctly!

If the joints of the cardan shaft are not aligned to each other, the shaft can be destroyed. Persons standing in immediate proximity can be severely injured. The machine can be damaged.

- ▶ Align the cardan shaft on the mark.
- ▶ Flange surfaces must be clean!



Information

Before starting work, read the safety and preparation instructions carefully

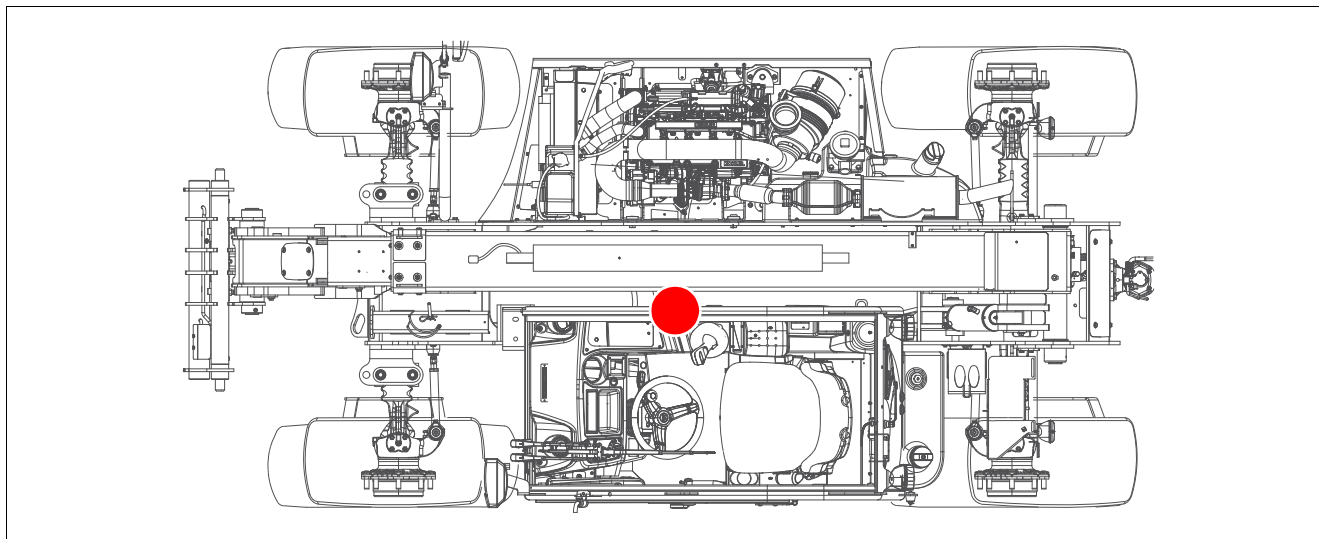
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Removing/installing the cardan shaft

Tools:

- Standard tools
- Torque wrench

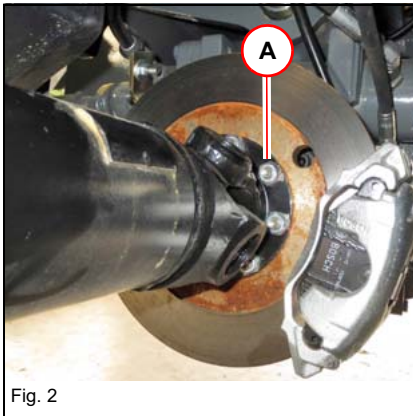
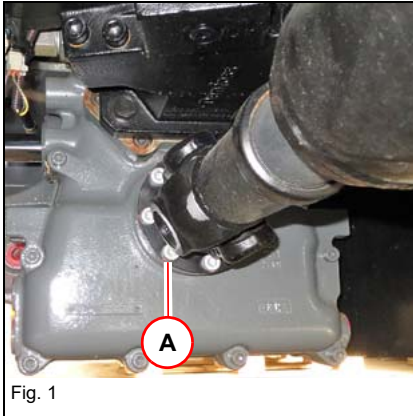
Technical data



Weight	BMK	Description	Remarks
21.5 kg (47 lb)	–	Cardan shaft	–
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

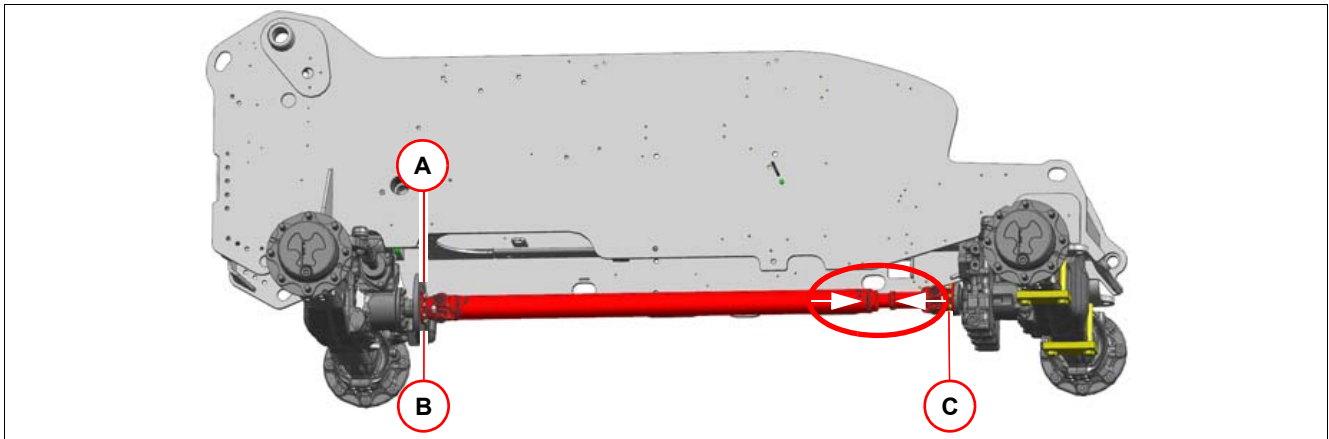
Remove cardan shaft

1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
2. Dismount underride protection – see *"Remove/install underride protection (standard)" on page 12-8.*
3. Remove fastening screws **A** on the cardan shaft front axle.



4. Remove fixing nuts **A** on the cardan shaft rear axle.
5. Push together cardan shaft and take out.

Install cardan shaft



Pos.	Tightening torque	Remarks
A	Pre-tighten 15 Nm (133 lbf ft) Re-tighten 45° – 55°	Self-locking nuts
B	–	Secure stud bolt M10x35 - 10.9 A2C using Loctite®243
C	Pre-tighten 15 Nm (133 lbf ft) Re-tighten 45° – 55°	Secure cheese-head screw M10x20 - 10.9 A2C using Loctite®243



CAUTION

There is a risk of injury if the cardan shafts are not installed correctly!

If the joints of the cardan shaft are not aligned to each other, the shaft can be destroyed. Persons standing in immediate proximity can be severely injured. The machine can be damaged.

- ▶ Align the cardan shaft on the mark.
- ▶ Flange surfaces must be clean!

1. Position the front cardan shaft paying attention to both marks.
2. Replace the fastening screws and nuts and tighten according to the specified weights. See table
3. Mount the underride protection – see *"Remove/install underride protection (standard)" on page 12-8.* – see *"Remove/install underride protection (closed)" on page 12-11.*
4. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*

5 Axles

5.1 Front axle

Safety instructions for front axle



WARNING

Risk of injury lifting heavy components.

Death or serious injury.

- ▶ Use lifting gear of sufficient lifting capacity.
- ▶ Use functionally safe lifting gear.
- ▶ Use lifting gear on firm and level ground.
- ▶ Move the lifting tackle to predefined or suitable position on the component.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
- ▶ Wear protective gloves

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- ▶ Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

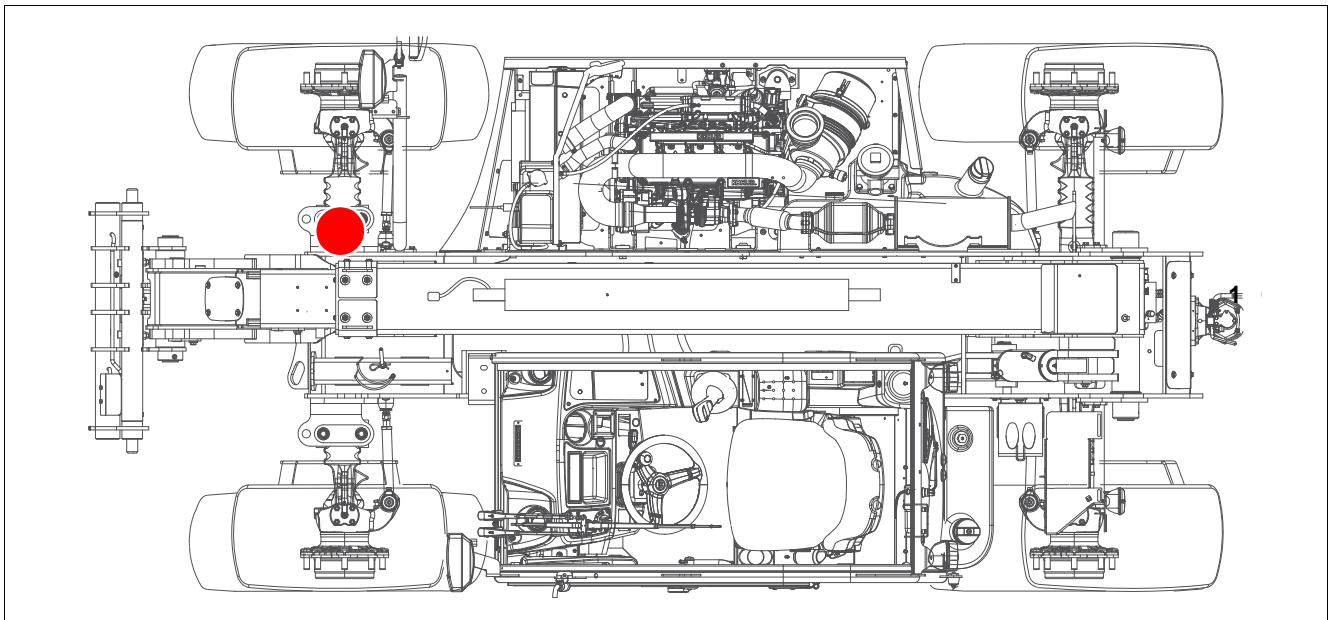
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Completely remove/install front axle

Tools:

- Standard tools
- Movable car jack, load-bearing capacity min. 5000 kg (11,023 lb)
- 2x axle stands, load-bearing capacity of min. 5000 kg (11,023 lb)
- Suitable lifting gear, minimum load-bearing capacity 5000 kg (11020 lb.)
- Suitable slings (cables and shackles) with corresponding load-bearing capacity
- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines

Technical data



Weight	BMK	Description	Remarks
328 kg (723 lb)	–	Front axle	–
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove front axle

1. Park the machine on firm, level and dry ground.
2. Apply the parking brake.
3. Turn the machine off and remove the ignition key.
4. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
5. Dismount underride protection – see *"Remove/install underride protection (closed)" on page 12-11.*
6. Remove cardan shaft from front axle – see *"Removing/installing the cardan shaft" on page 4-2.*
7. Dismantle variable displacement motor on the front axle – see *"Removing/installing the variable displacement motor" on page 8-60.*
8. Remove nuts on each side **B** of the wheel covers **A** and take off wheel covers **A**.

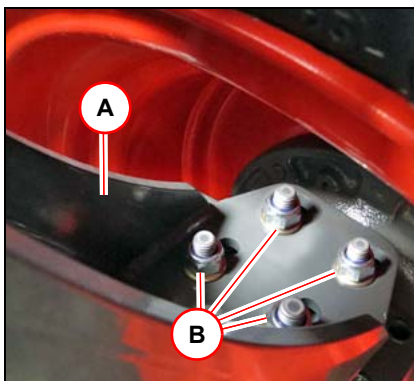


Fig. 1

For option central lubrication:

9. Remove hoses **A** on both planetary carriers.
10. Remove screws from clips **B** on the planetary drive.
11. Remove screws from clips **C** on the axle.

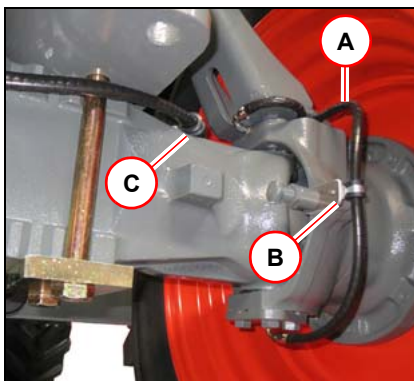


Fig. 2

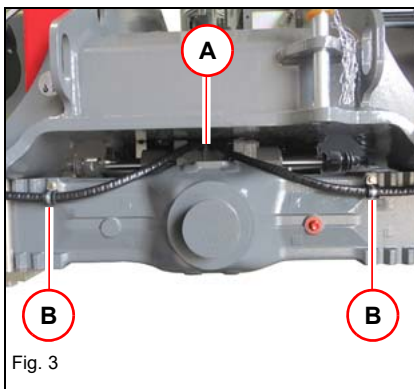


Fig. 3

12. Remove screws from clips **B** on the axle.
13. Pull the hoses **A** of the central lubrication backwards via the front axle.

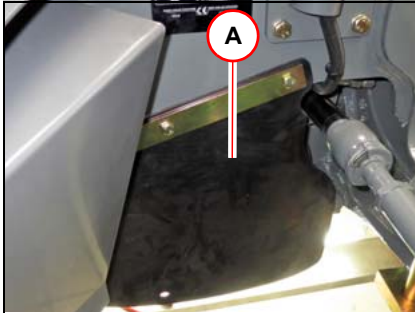


Fig. 4

14. Remove the front right cover **A**.

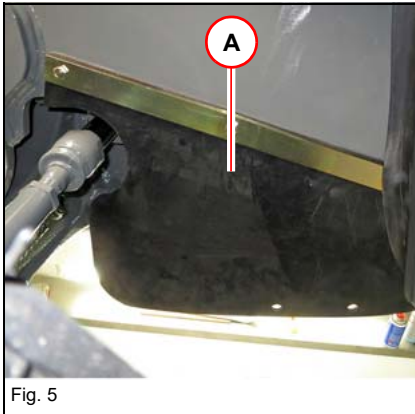


Fig. 5

15. Remove cover **A** front left.

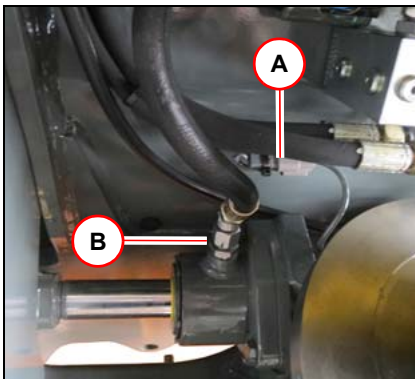


Fig. 6

16. Disconnect steering sensor **A B004**.

17. Remove hydraulic hose **B** on the steering cylinder left.

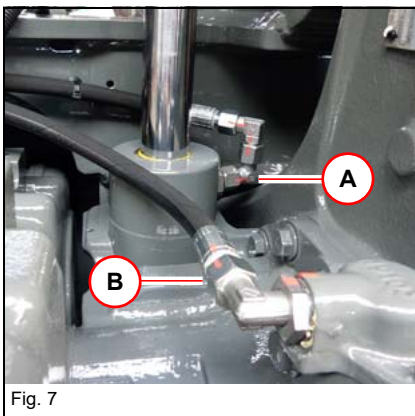


Fig. 7

18. Remove hydraulic hose **A** on the steering cylinder right.

19. Remove hydraulic hose **B** on the differential lock.

20. Tightly seal lines.

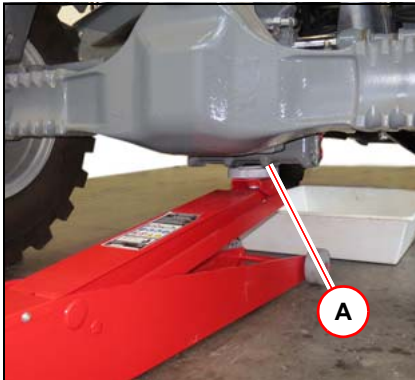


Fig. 8

21. Position suitable car jack under the intermediate gearbox **A**.

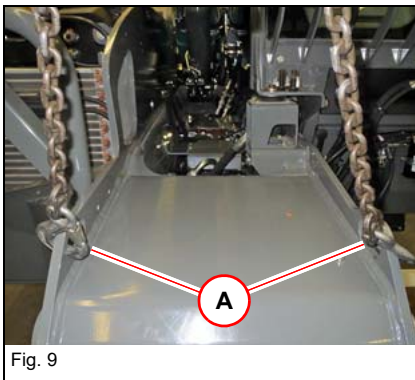


Fig. 9

22. Secure vehicle with suitable lifting gear and sling on the lifting lugs **A** on the frame.

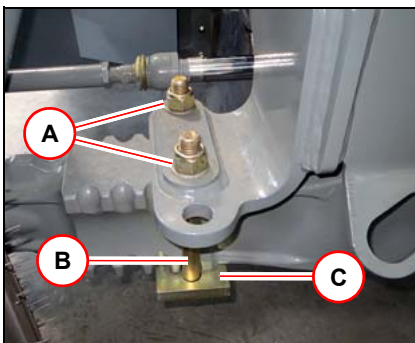


Fig. 10

23. Remove axle fastening nuts on both sides **A** and remove the axle screws **B** with plates **C**.

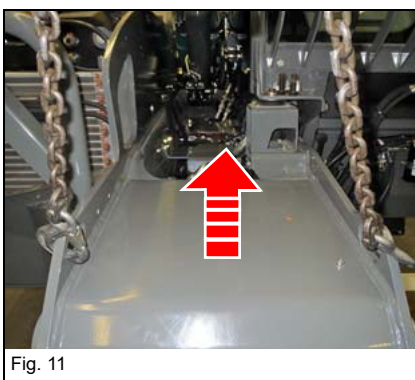
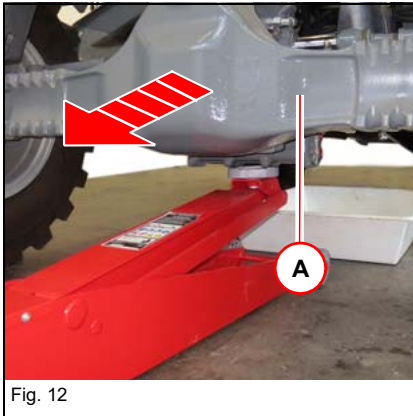


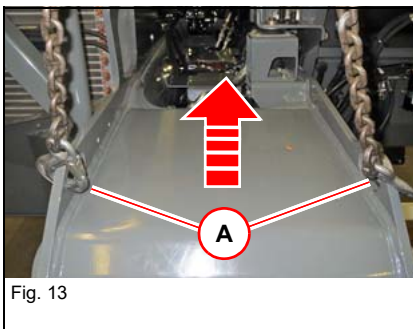
Fig. 11

24. Carefully lift vehicle front.

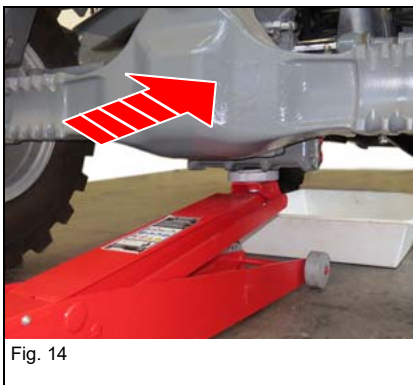


25. Roll out the front axle **A** on wheel under the vehicle.
26. Support vehicle securely with support blocks.

Install front axle



1. Carefully lift vehicle with suitable lifting gear and sling on the lifting lugs **A** on the frame.
2. Remove support blocks.



3. Front axle on wheel and roll and position with vehicle lifting under the frame.
4. Carefully lower vehicle and position on axle.

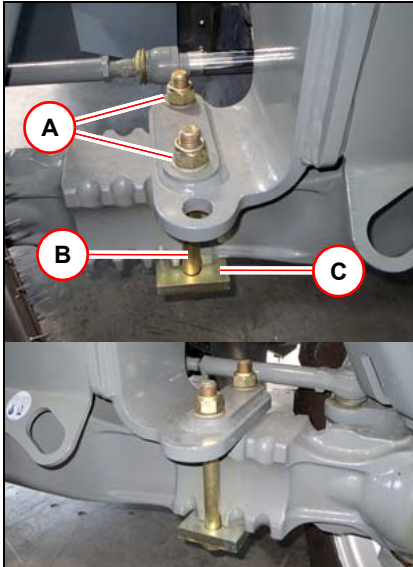


Fig. 15



Fig. 16

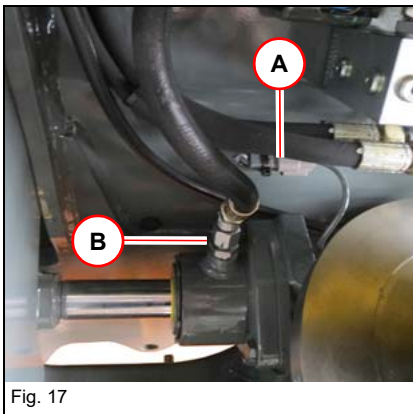


Fig. 17

5. Position plates **C**.
6. Mount axle screws on both sides **B** and insert new locking nuts **A** and tighten to 680 Nm (502 lbf ft).

7. Lower vehicle lifter and remove.
8. Lower lifting gear and remove sling.

9. Insert steering sensor plug **A B004**.
10. Position hydraulic hose **B** on steering cylinder left and tighten with 40 Nm (30 lbf. ft).

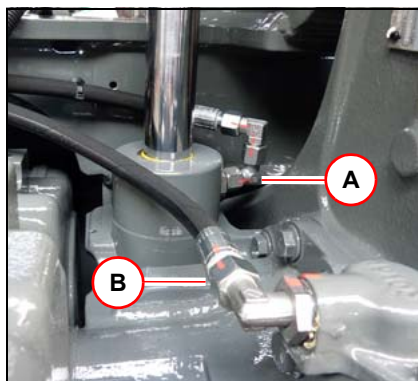


Fig. 18

11. Position hydraulic hose **A** on steering cylinder right and tighten with 40 Nm (30 lbf. ft).
12. Position the hydraulic hose **B** of the differential lock and tighten with 40 Nm (30 lbf ft).
13. Install variable displacement motor on the front axle – see *"Removing/installing the variable displacement motor" on page 8-60.*
14. Mount cardan shaft – see *"Removing/installing the cardan shaft" on page 4-2.*

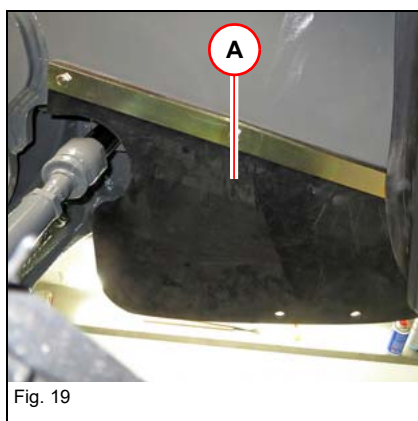


Fig. 19

15. Tighten cover **A** front left.

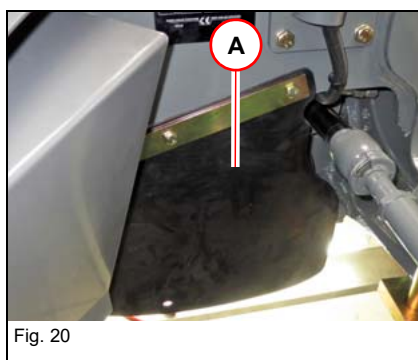


Fig. 20

16. Tighten cover **A** front right.

For option central lubrication:

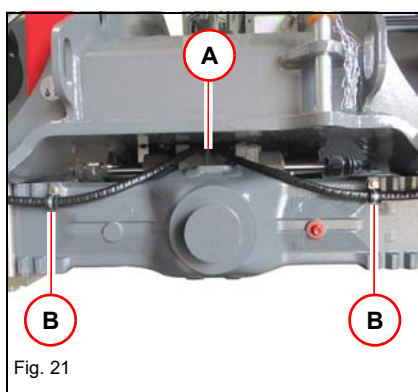


Fig. 21

17. Position hoses **A** and mount clips **B** on the axle.

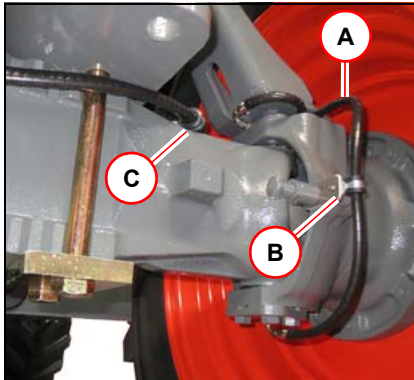


Fig. 22

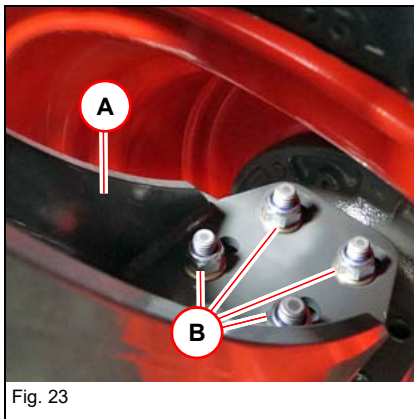


Fig. 23

18. Install the clips **A** left and right.
19. Install the clips **B** left and right on the planetary drive.
20. Attach hoses **A** to both planetary carriers.
21. Position wheel covers **A** with mount.
22. Tighten nuts on both sides **B**.
23. Fill axle with oil – see *"Check/top-up oil on differential lock (front axle)" on page 1-122.* – see *"Check/top-up oil on differential lock (rear axle)" on page 1-120*
24. Mount the underride protection – see *"Remove/install underride protection (closed)" on page 12-11.*
25. Check hydraulics – see *"Checking the hydraulic oil level" on page 1-91.*
26. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
27. Carry out functional check and leak test.

Synchronizing the steering system



Information

Ensure that there is no air in the steering circuit otherwise synchronization cannot be checked or set correctly!

1. Bleed and synchronize steering system; to do so, turn the 4 wheel steering all the way to the **left** or **right** at low driving speed and try to briefly continue turning against the pressure at the end position in each direction; see system manual.
2. Synchronization of front axle and diagonal steering, see system manual.

5.2 Rear axle

Safety instructions for rear axle



WARNING

Risk of injury lifting heavy components.

Death or serious injury.

- ▶ Use lifting gear of sufficient lifting capacity.
- ▶ Use functionally safe lifting gear.
- ▶ Use lifting gear on firm and level ground.
- ▶ Move the lifting tackle to predefined or suitable position on the component.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
- ▶ Wear protective gloves

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- ▶ Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

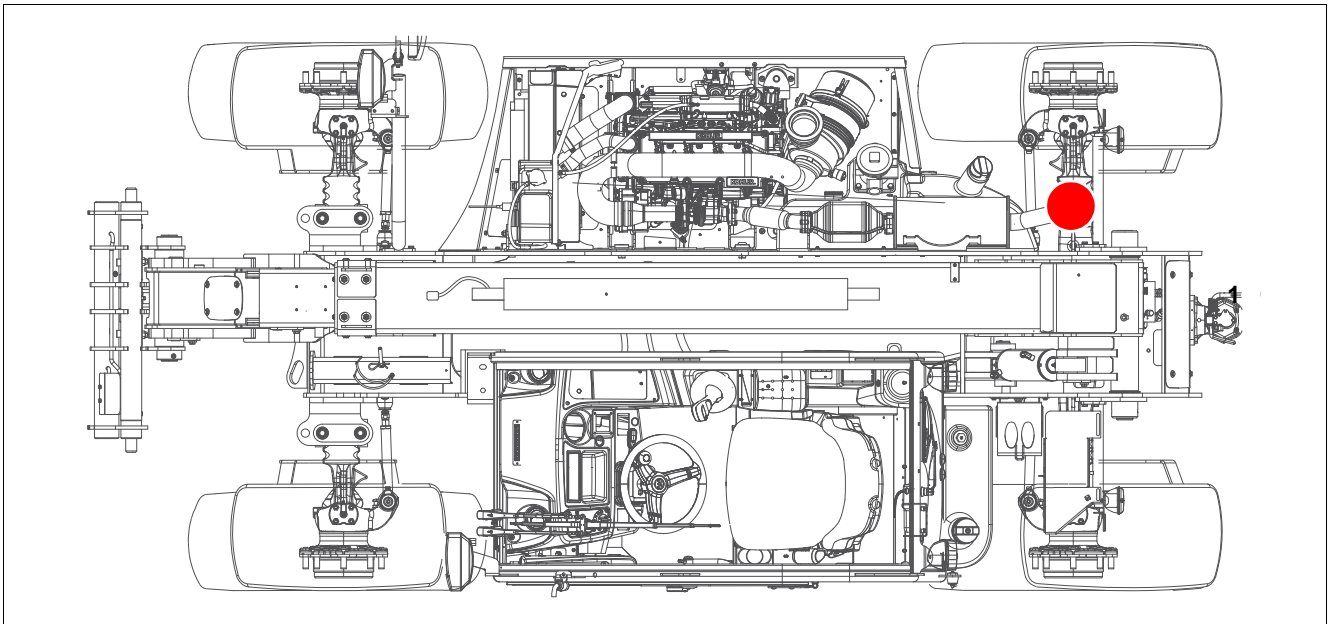
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Removing/installing the rear axle

Tools:

- Standard tools
- Movable car jack, load-bearing capacity min. 5000 kg (11,023 lb)
- 2x axle stands, load-bearing capacity of min. 5000 kg (11,023 lb)
- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines

Technical data



Weight	BMK	Description	Remarks
294 kg (648 lb)	—	Rear axle	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove rear axle

1. Park the machine on firm, level and dry ground.
2. Apply the parking brake.
3. Turn the machine off and remove the ignition key.
4. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
5. Dismount underride protection – see ["Remove/install underride protection \(closed\)" on page 12-11](#).
6. Remove cardan shaft from rear axle – see ["Removing/installing the cardan shaft" on page 4-2](#).
7. Remove autohitch – see ["Removing/installing the autohitch" on page 17-2](#).
8. Secure ballast weight **A** with a suitable car jack centrally under the ballast weight **A**.
9. Remove nuts on the ballast weight **A**.
10. Carefully lower car jack and remove ballast weight with suitable lifting gear.

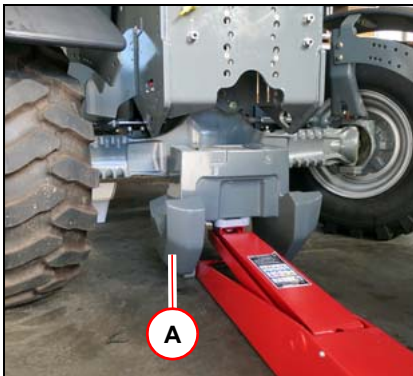


Fig. 24

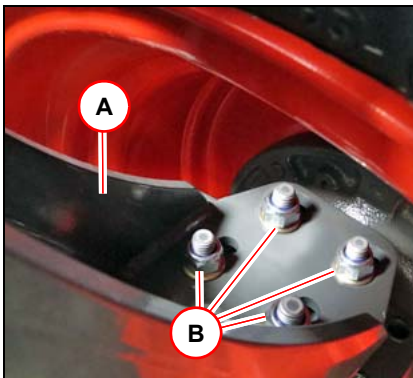


Fig. 25



Fig. 26

11. Remove nuts on each side **B** of the wheel covers **A** and take off wheel covers **A**.

12. Remove cover **A** rear right.

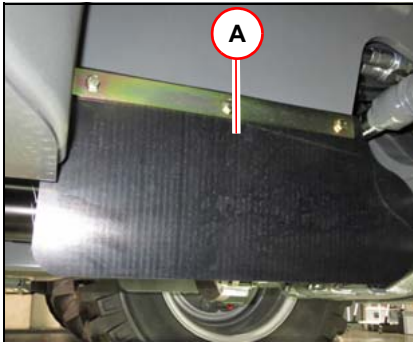


Fig. 27

13. Remove cover **A** rear left.

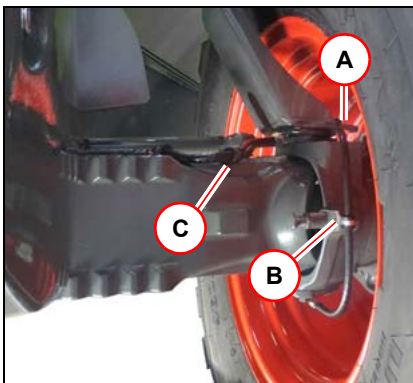


Fig. 28

14. Remove lubrication lines **A** on both planetary carriers.

15. Remove screws from clips **B** on the planetary drive.

16. Remove screws from clips **C** on the axle.

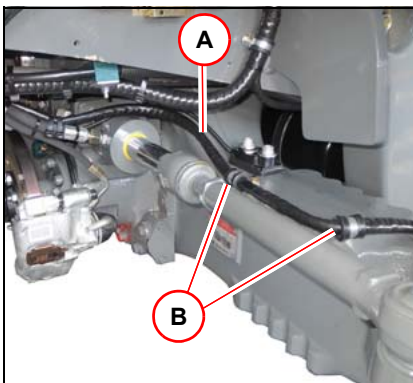


Fig. 29

17. Remove screws from clips **A** on the axle.

18. Remove hose **B** of the central lubrication on the rear axle.

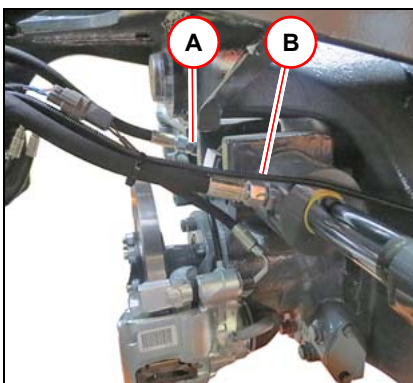
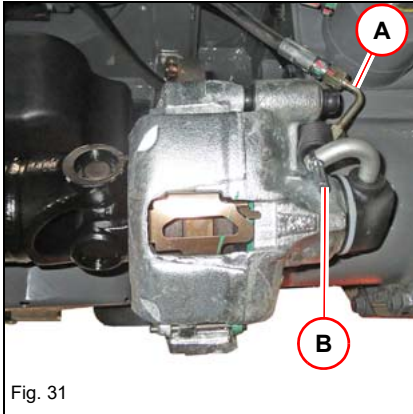


Fig. 30

19. Remove hydraulic hose **A** on the steering cylinder.

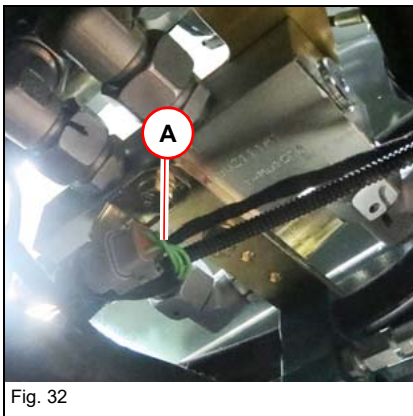
20. Remove hydraulic hose **B** on the steering cylinder.



21. Remove the brake hose **A**.

22. Detach the wire pull **B** at the brake calliper.

If applicable, first release brake wire pull on hand brake lever –
[see "Adjusting the parking brake" on page 6-29.](#)

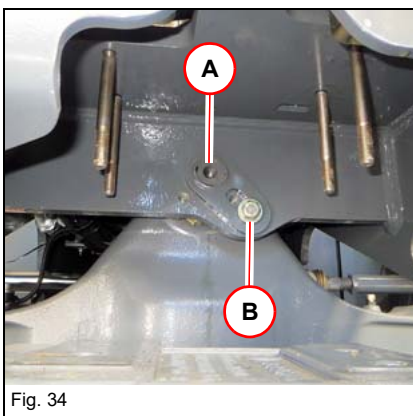


23. Disconnect plug **A** for sensor **B066** of the safe load indicator.



24. Lift vehicle with a suitable car jack centrally under the rear axle.

25. Carefully lift vehicle with suitable lifting gear and sling on the lifting lugs on the frame.



26. Remove lock screw **B**.

27. Drive out pins **A** using an impact puller.

28. Slowly lower the front axle with the hydraulic jack.

29. Roll the rear axle away on wheels.

Install rear axle

1. If the rear axle is going to be re-installed:
replace bushing **B** on the axle suspension **A** with a new one.
2. Grease bushing **B**.

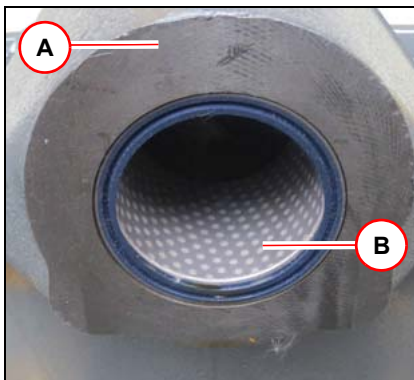


Fig. 35

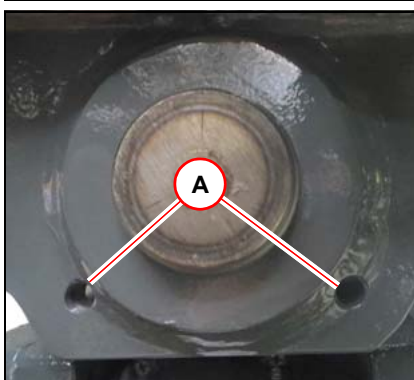


Fig. 36

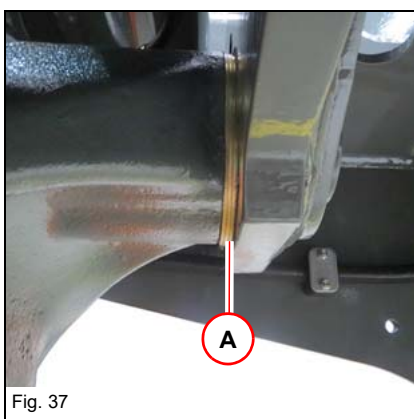


Fig. 37

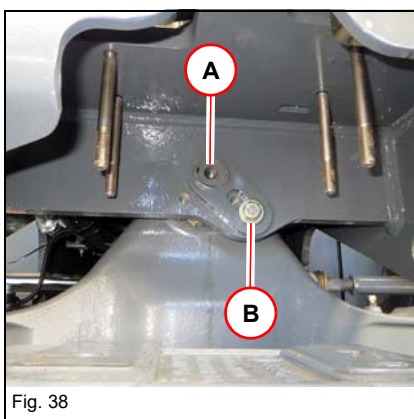


Fig. 38

3. Carefully lift vehicle with suitable lifting gear and sling on the lifting lugs on the frame.
4. Roll the rear axle underneath the vehicle on wheels.
5. Slowly raise the rear axle with the hydraulic jack.
6. Hammer the centering bolt into place.
7. Screw the screws into the bores **A** in order to push the axle to the back.
8. Check whether there is a gap between the rear axle and the frame of the vehicle.
9. If there is a gap, hammer the centering bolt back even further until one or more compensation disks **A** fit into the gap.
10. Hammer bolt **A** into place.
11. Tighten lock screws **B** using Loctite®243 to 79 Nm (58 lbf ft).

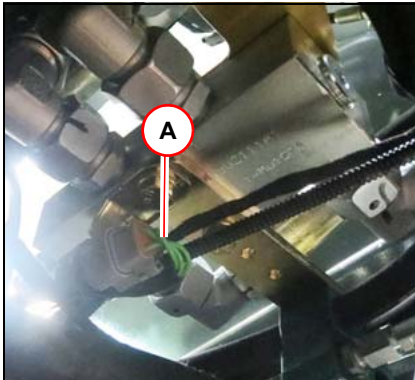


Fig. 39

12. Put together plugs **A** from sensor **B066** of the safe load indicator.

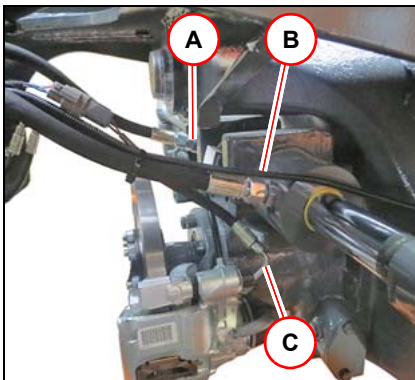


Fig. 40

13. Position hydraulic hose **A** on steering cylinder and tighten with 40 Nm (30 lbf. ft).

14. Position hydraulic hose **B** on steering cylinder and tighten with 40 Nm (30 lbf. ft).

15. Position hydraulic hose **C** of the brake and tighten to 23 Nm (17 lbf ft).

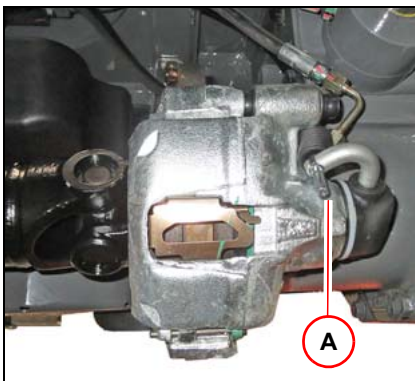


Fig. 41

16. Mount hand brake cable **A**.

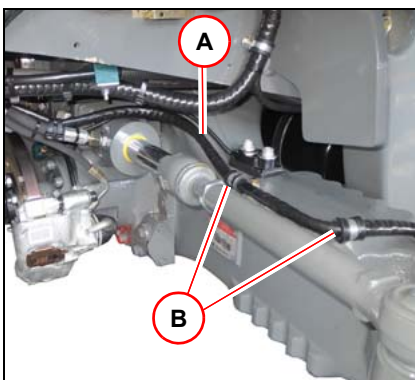
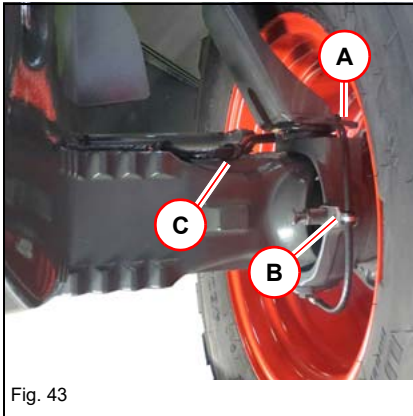


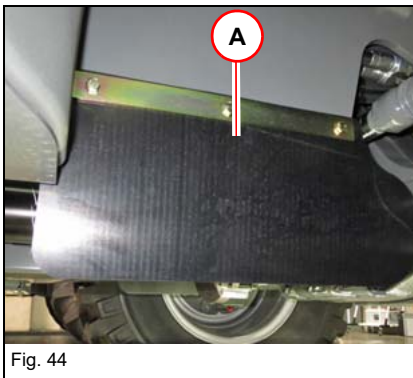
Fig. 42

17. Position hose **A** of the central lubrication on the rear axle.

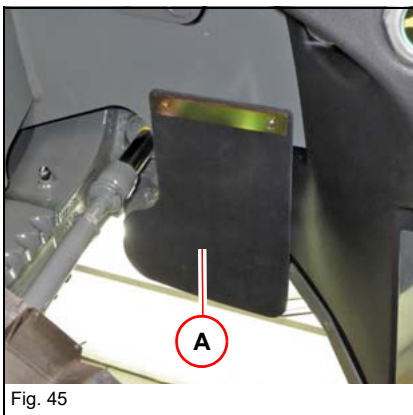
18. Tighten clips **B** on the axle.



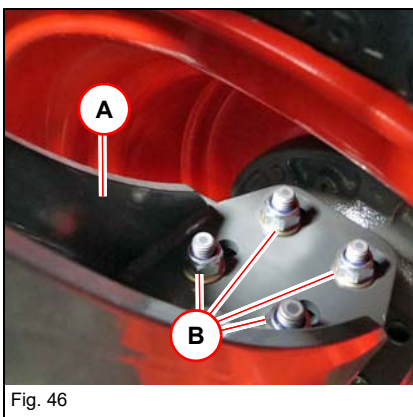
19. Tighten screws from clips **C** on the axle.
20. Attach hoses **A** to both planetary carriers.
21. Tighten clips **B** on the planetary carrier.



22. Pull cover tight **A** rear left.



23. Pull cover tight **A** rear right.



24. Position wheel covers **A** with mount and tighten fastening nuts **B**.

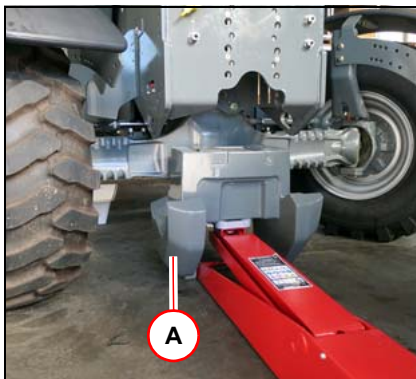


Fig. 47

25. Lift ballast weight **A** with a suitable car jack centrally under the frame.

Execution 1

26. Tighten fastening nuts M12 to 79 Nm (58 lbf ft).

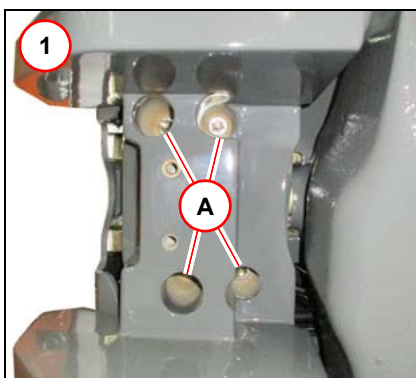


Fig. 48

Execution 2

27. Tighten fastening nuts M16 to 195 Nm (144 lbf ft).

28. Install autohitch – see *"Removing/installing the autohitch" on page 17-2.*

29. Fill axle with oil – see *"Check/top-up oil on differential lock (rear axle)" on page 1-120.* – see *"Check/top-up oil on differential lock (front axle)" on page 1-122*

30. Mount cardan shaft – see *"Removing/installing the cardan shaft" on page 4-2.*

31. Mount the underride protection – see *"Remove/install underride protection (closed)" on page 12-11.*

32. Check hydraulics – see *"Checking the hydraulic oil level" on page 1-91.*

33. Vent brake – see *"Change and vent the brake fluid" on page 1-129.*

34. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*

35. Carry out functional check and leak test.

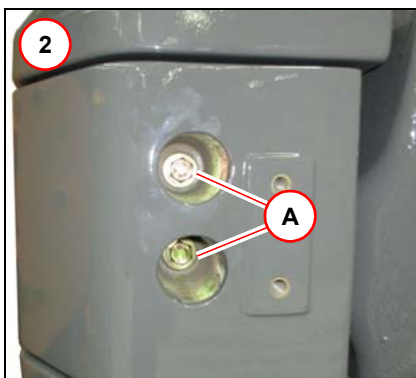


Fig. 49

Synchronizing the steering system



Information

Ensure that there is no air in the steering circuit otherwise synchronization cannot be checked or set correctly!

1. Bleed and synchronize steering system; to do so, turn the 4 wheel steering all the way to the **left** or **right** at low driving speed and try to briefly continue turning against the pressure at the end position in *each direction; see system manual!*
2. Synchronization with front axle and diagonal steering – *see System Handbook!*

5 Axles

Screw connections and tightening torques

5.3 Screw connections and tightening torques

General screw connections

	N	daN	kN	kg	lbs
1N	1	0,1	0,001	0,102	0,225
1daN	10	1	0,01	1,02	2,25
1kN	1000	100	1	102	225
1kg	9,81	0,981	0,00981	1	2,205

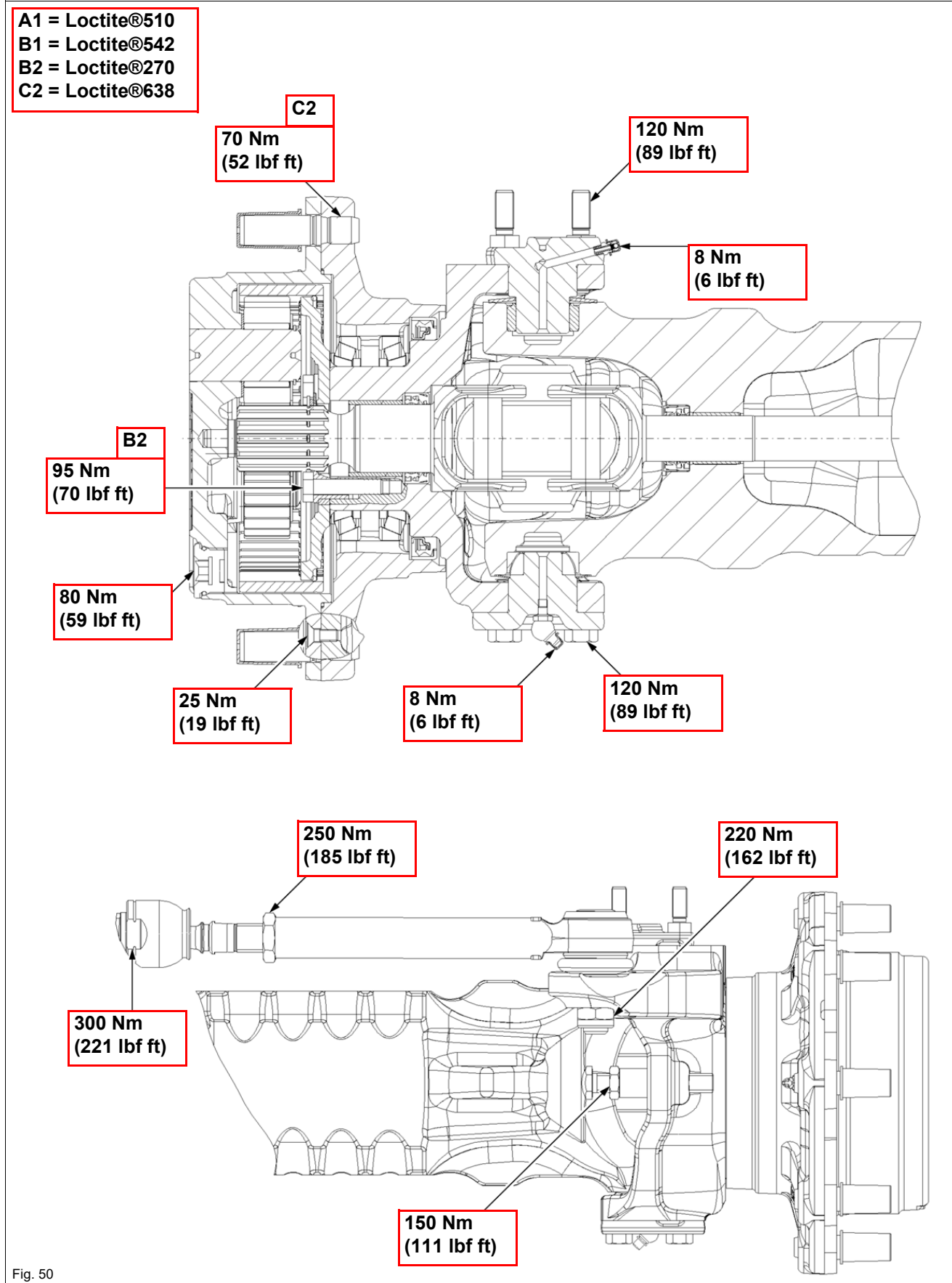
	Nm	daNm	kNm	kgm	lb-in
1Nm	1	0,1	0,001	0,102	8,854
1daNm	10	1	0,01	1,02	88,54
1kNm	1000	100	1	102	8854
1kgm	9,81	0,981	0,00981	1	86,8
1lb-in	0,1129	0,01129	0,0001129	0,01152	1

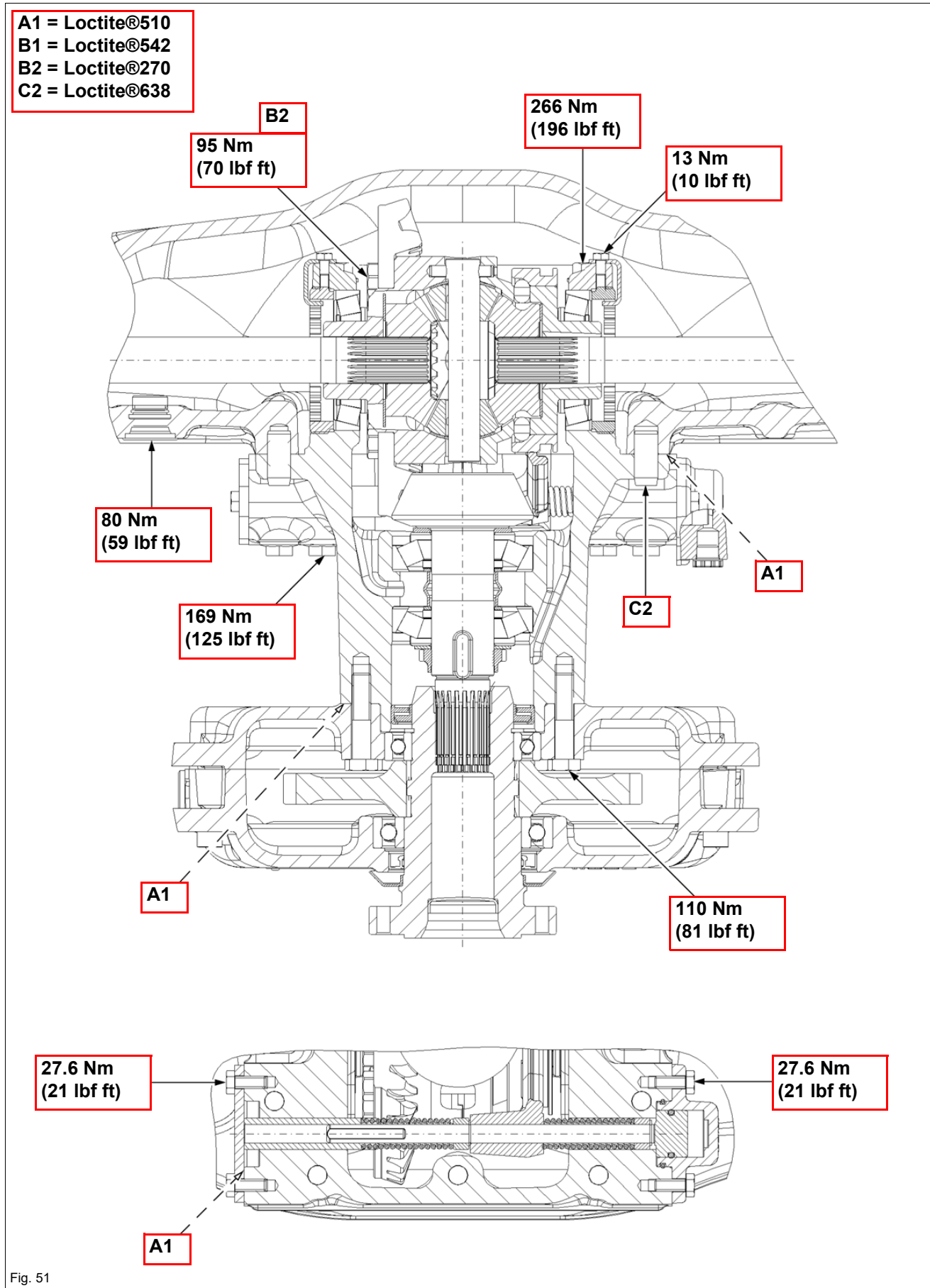
TIGHTENING TORQUES - COPPIE DI SERRAGGIO - ANZIEHDREHMOMENTE PARES DE TORSION - COUPLES DE SERRAGE

Unit - Unità di misura - Maßeinheiten - Unidad de medida - Unités de mesure: Nm

SIZE OF BOLT MISURA VITE SCHRAUBENMASS TAMANO TORNILLO MESURE VIS		TYPE OF BOLT - TIPO VITE - GEWINDE - TIPO DE TORNILLO - TYPE DE VIS					
		8.8		10.9		12.9	
		Normali	Normali + Loctite 270	Normali	Normali + Loctite 270	Normali	Normali + Loctite 270
COARSE PITCH - PASSO GROSSO - GROBER SCHRITT - PASO GRUESO - GROS PAS	M6 x 1	9,5-10,5	10,5-11,5	14,3-15,7	15,2-16,8	16,2-17,8	18,1-20,0
	M8 x 1,25	23,8-26,2	25,6-28,4	34,2-37,8	36,7-40,5	39,0-43,0	43,7-48,3
	M10 x 1,5	48-53	52-58	68-75	73-81	80-88	88-97
	M12 x 1,75	82-91	90-100	116-128	126-139	139-153	152-168
	M14 x 2	129-143	143-158	182-202	200-221	221-244	238-263
	M16 x 2	200-221	219-242	283-312	309-341	337-373	371-410
	M18 x 2,5	276-305	299-331	390-431	428-473	466-515	509-562
	M20 x 2,5	390-431	428-473	553-611	603-667	660-730	722-798
	M22 x 2,5	523-578	575-635	746-824	817-903	893-987	974-1076
	M24 x 3	675-746	732-809	950-1050	1040-1150	1140-1260	1240-1370
	M27 x 3	998-1103	1088-1202	1411-1559	1539-1701	1710-1890	1838-2032
	M30 x 3,5	1378-1523	1473-1628	1914-2115	2085-2305	2280-2520	2494-2757
FINE PITCH - PASSO FINE - KLEINER SCHRITT PASO FINO - PAS FIN	M8 x 1	25,7-28,3	27,5-30,5	36,2-39,8	40,0-44,0	42,8-47,2	47,5-52,5
	M10 x 1,25	49,4-54,6	55,2-61,0	71,5-78,5	78,0-86,0	86,0-94,0	93,0-103,0
	M12 x 1,25	90-100	98-109	128-142	139-154	152-168	166-184
	M12 x 1,5	86-95	94-104	120-132	133-147	143-158	159-175
	M14 x 1,5	143-158	157-173	200-222	219-242	238-263	261-289
	M16 x 1,5	214-236	233-257	302-334	333-368	361-399	394-436
	M18 x 1,5	312-345	342-378	442-489	485-536	527-583	580-641
	M20 x 1,5	437-483	475-525	613-677	674-745	736-814	808-893
	M22 x 1,5	581-642	637-704	822-908	903-998	998-1103	1078-1191
	M24 x 2	741-819	808-893	1045-1155	1140-1260	1235-1365	1363-1507
	M27 x 2	1083-1197	1178-1302	1520-1680	1672-1848	1834-2027	2000-2210
	M30 x 2	1511-1670	1648-1822	2138-2363	2332-2577	2565-2835	2788-3082

Tightening torques





5 Axles

Screw connections and tightening torques



KRAMER
on the safe side

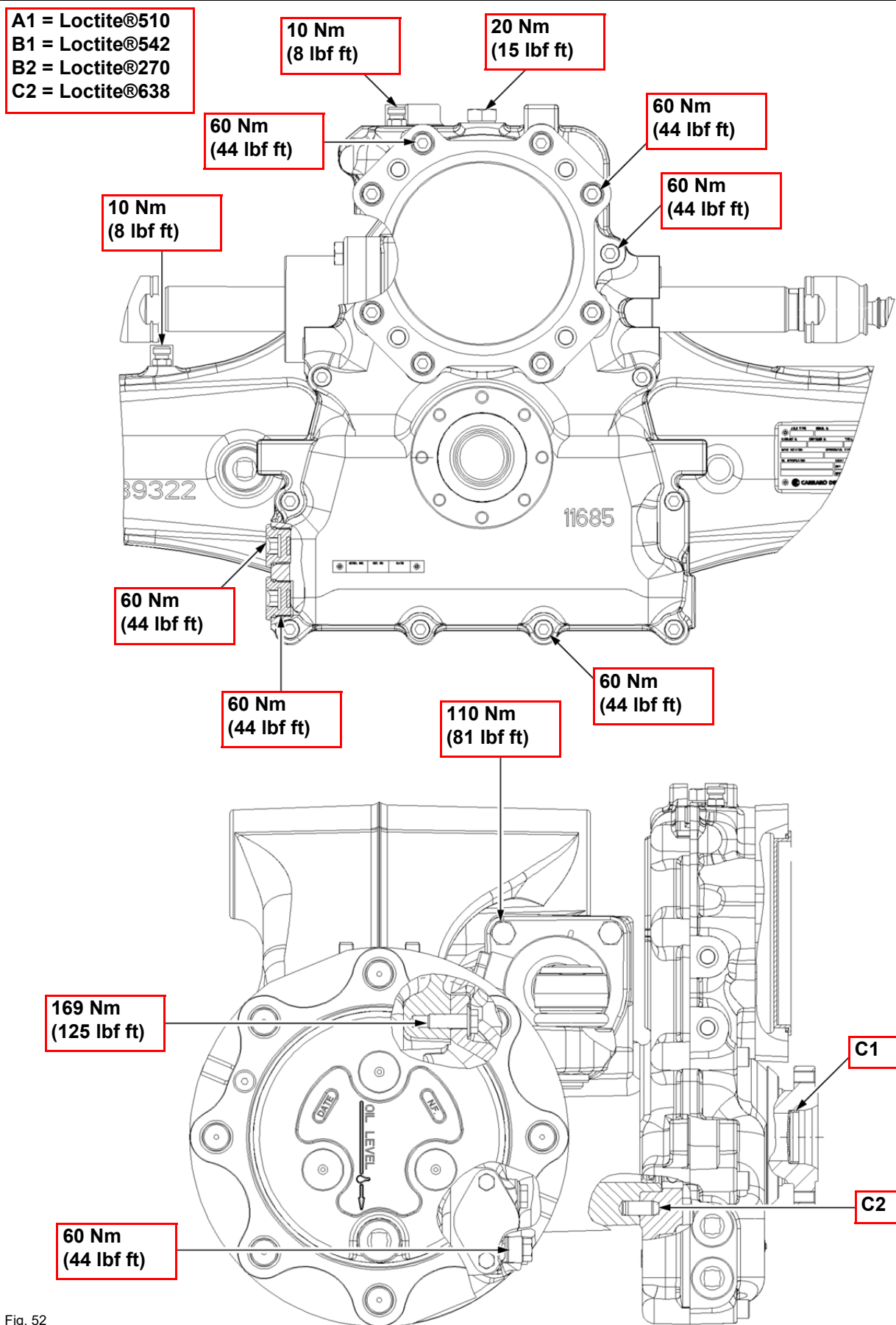
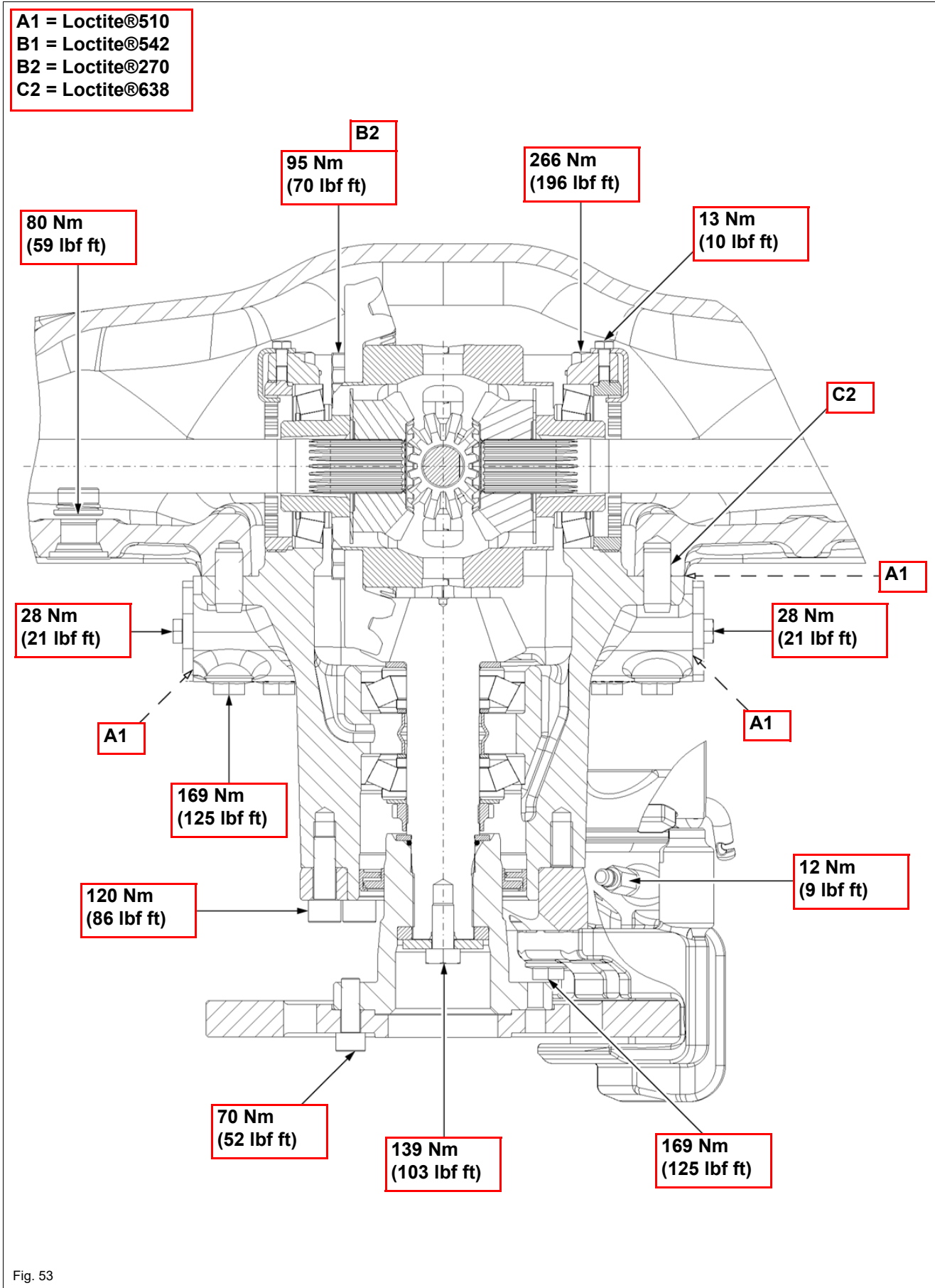


Fig. 52



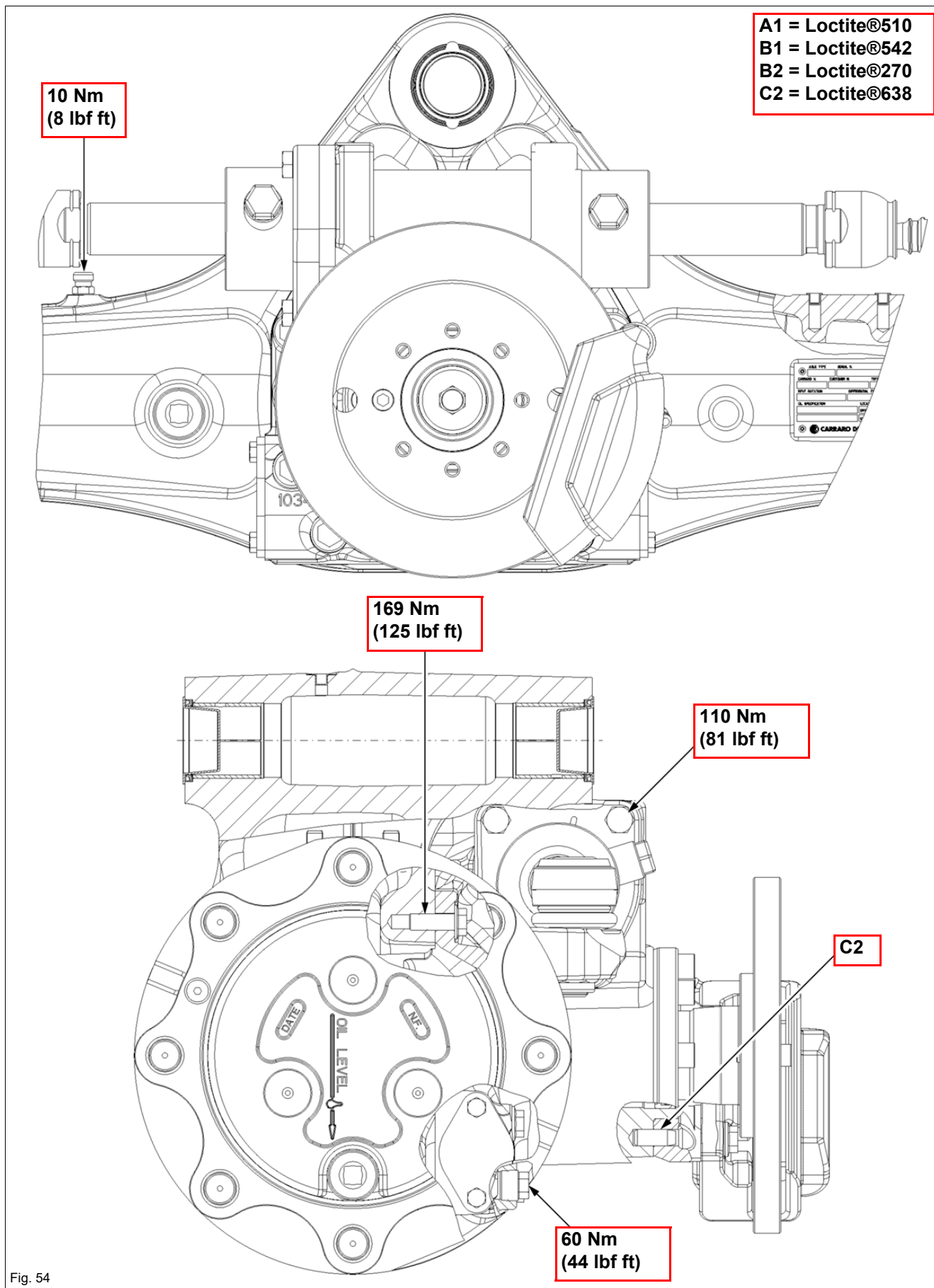


Fig. 54

5.4 Planetary drive

Safety instructions for planetary drive



WARNING

Risk of injury lifting heavy components.

Death or serious injury.

- ▶ Use lifting gear of sufficient lifting capacity.
- ▶ Use functionally safe lifting gear.
- ▶ Use lifting gear on firm and level ground.
- ▶ Move the lifting tackle to predefined or suitable position on the component.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
- ▶ Wear protective gloves

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- ▶ Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

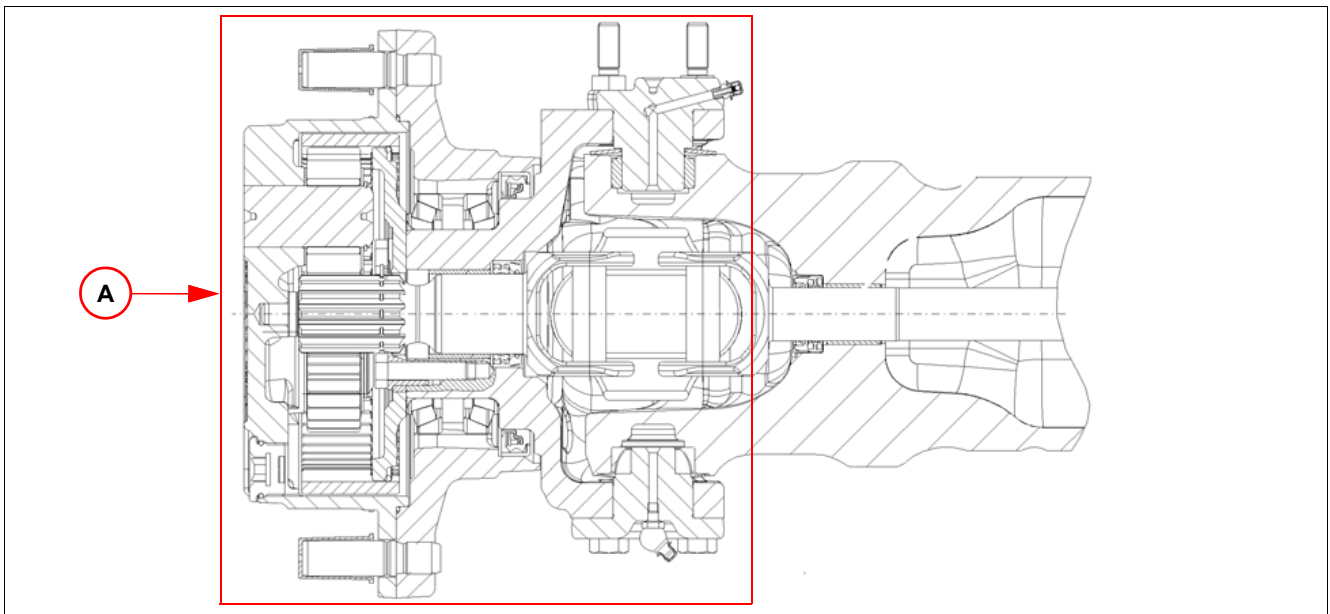
Before starting work, read the safety and preparation instructions carefully

- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install planetary drive

Tools:

- Movable car jack, load-bearing capacity min. 5000 kg (11,023 lb)
- 2x axle stands, load-bearing capacity of min. 5000 kg (11,023 lb)
- Suitable lifting gear, minimum load-bearing capacity 500 kg (1102 lb.)
- Suitable slings (cables and shackles) with corresponding load-bearing capacity
- Suitable receptacle for the gearbox oil
- Special tools
- Standard tools



Pos.	Description
A	Complete planetary drive

Remove planetary drive

1. Park the machine on firm, level and dry ground in the vicinity of the charging station or a power source.
2. Apply the parking brake.
3. Turn the machine off and remove the ignition key.
4. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
5. Dismount the corresponding wheel – see ["Removing the wheels" on page 1-135](#).



Fig. 55

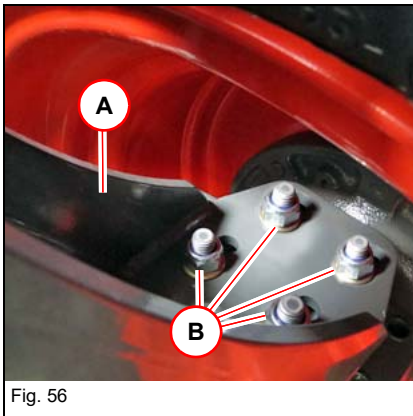


Fig. 56

6. Remove the fastening nuts **B** of the wheel cover **A** and remove wheel cover **A**.

For option central lubrication:

7. Remove hose **A** on planetary carrier.
8. Remove screw of shaft **B** on the planetary drive.
9. Remove screw of shaft **C** on the axle.

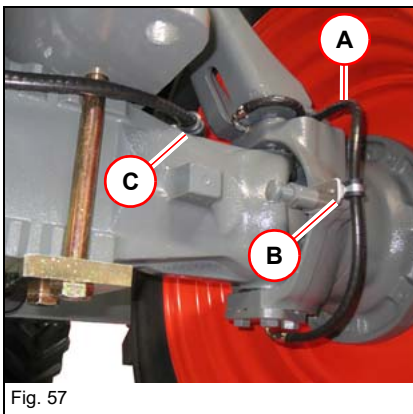
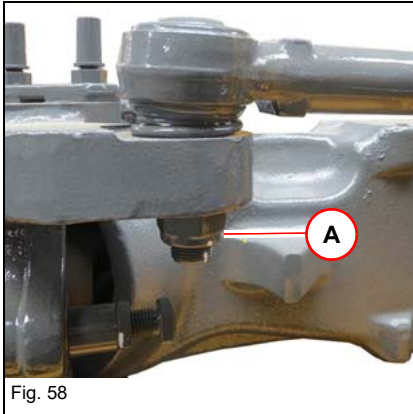
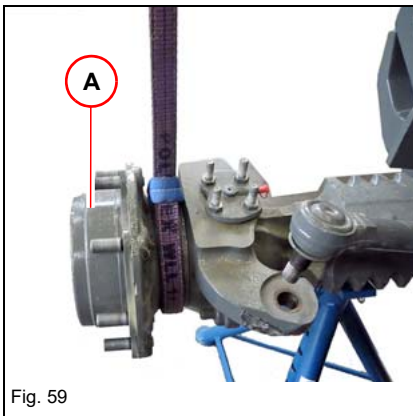


Fig. 57

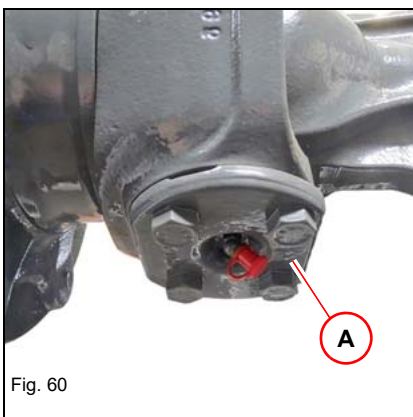


10. Remove locking nut **A** track rod.

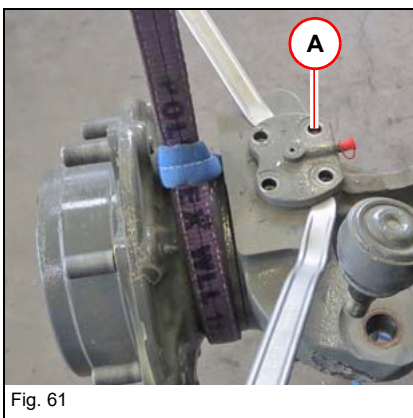
11. Dismantle track rod from planetary drive with suitable tool.



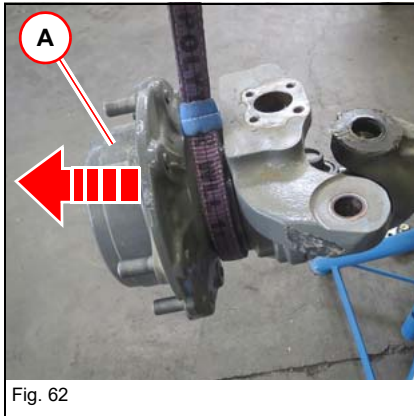
12. Secure the planetary drive **A** with suitable lifting gear.



13. Remove the fastening screws **A** from the bearing pins below.



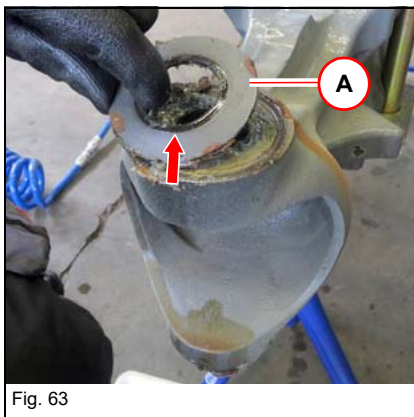
14. Remove the fastening screws **A** from the bearing pin above.



15. Carefully pull out planetary drive **A** with double drive shaft, preferably horizontal, from the axle carrier.

Install planetary drive

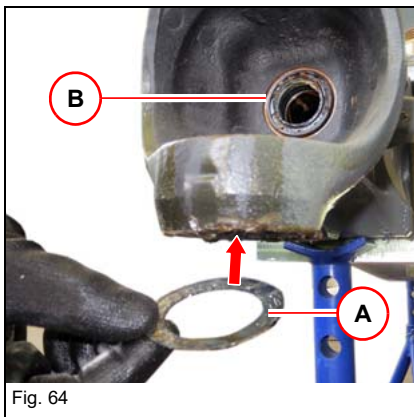
1. Position spring above **A** (thick) with grease.



2. Position cup spring below **A** (thin) with grease.

3. Monitor radial seal ring **B** for damage, where necessary replace – see ["Replace shaft sealing ring on axle tube" on page 5-53](#).

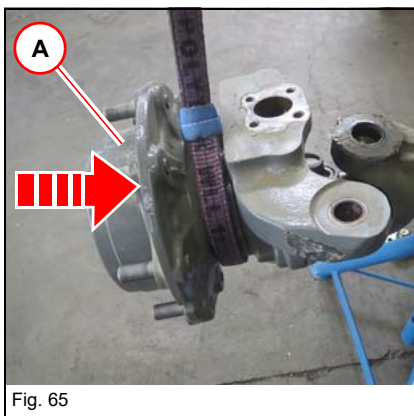
4. Lubricate radial seal ring **B** with grease.



5. Carefully push in planetary drive with double drive shaft into the axle beam.

6. Lightly turn planetary drive **A** on the wheel pins to guarantee the position of the double drive shaft in the differential.

7. Completely push in planetary drive **A**.



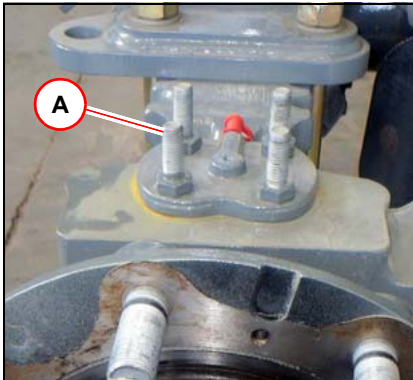


Fig. 66

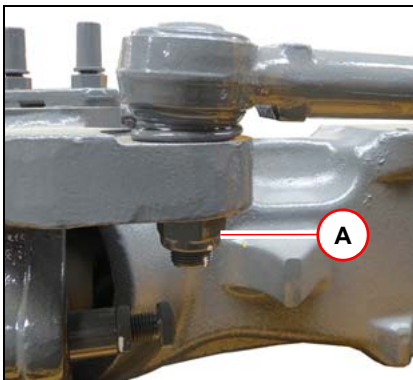


Fig. 67

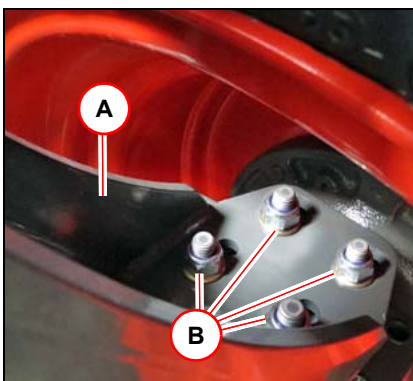


Fig. 68

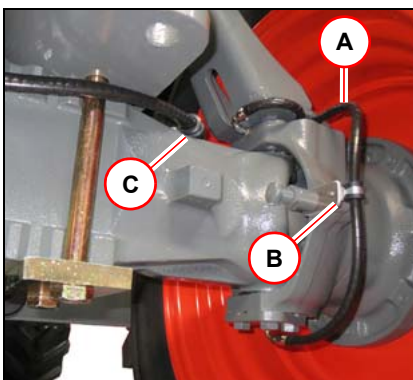


Fig. 69

8. Attach the upper and lower bearing bolts.
9. Tighten fastening screws **A** to 120 Nm (89 lbf ft).

10. Mount track rod end and tighten new self-locking nut **A** to 220 Nm (162 lbf ft).

11. Position wheel cover **A** with mount.
12. Tighten fastening nuts **B**.

13. Mount clamp **C**.
14. Mount shaft **B** to planetary carrier.
15. Mount hose **A** on planetary carrier.



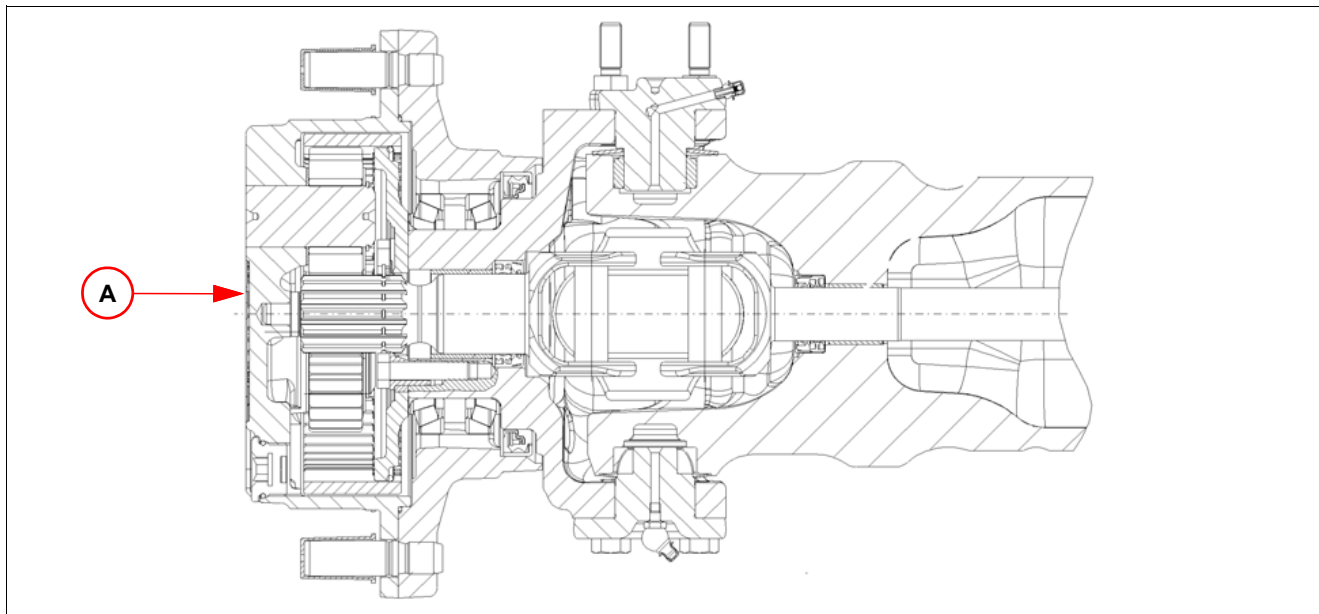
Fig. 70

16. Mount wheel – see *"Mounting wheels" on page 1-136.*
17. Fill axle with oil – see *"Check/top-up oil on differential lock (front axle)" on page 1-122.* – see *"Check/top-up oil on differential lock (rear axle)" on page 1-120*
18. Lubricate bearing pins top and bottom on planetary drive.
19. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*

Remove/install planetary drive

Tools:

- Standard tools



Pos.	Description
A	Planetary drive cover

Remove planetary drive cover

1. Dismount the corresponding wheel – see *"Removing the wheels" on page 1-135*.



Fig. 71

2. Drain transmission oil from planetary drive.
➡ Pull out drain plug **A** and drain oil – see *"Change oil at the planetary drives" on page 1-125*.
3. Unscrew locking pins **B**.

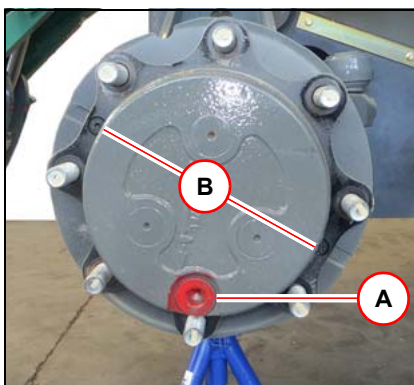


Fig. 72

Release cover **A** using suitable tools and pull off.

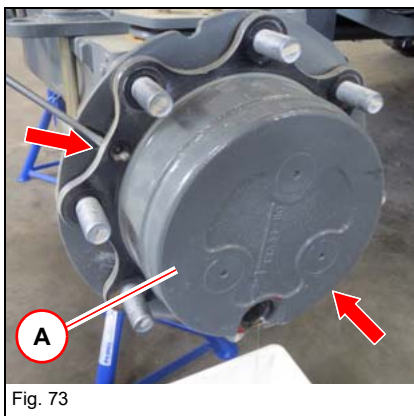
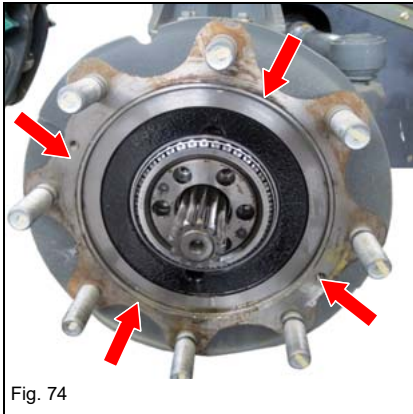


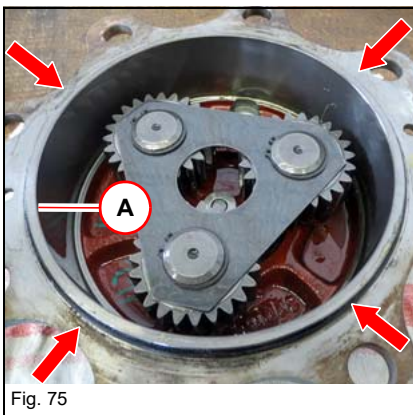
Fig. 73

Install planetary drive cover

1. Clean flange surfaces on cover and planetary drive.



2. Replace O-ring **A** and lightly grease.



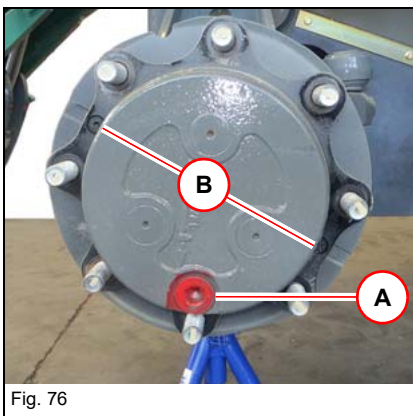
3. Put lid on.

4. Tighten lock screws **B** to 25 Nm (18 lbf ft).

5. Fill planetary drive with oil – see ["Checking/refilling oil at the planetary drives" on page 1-124.](#)

6. Tighten drain plugs **A** to 80 Nm (59 lbf ft).

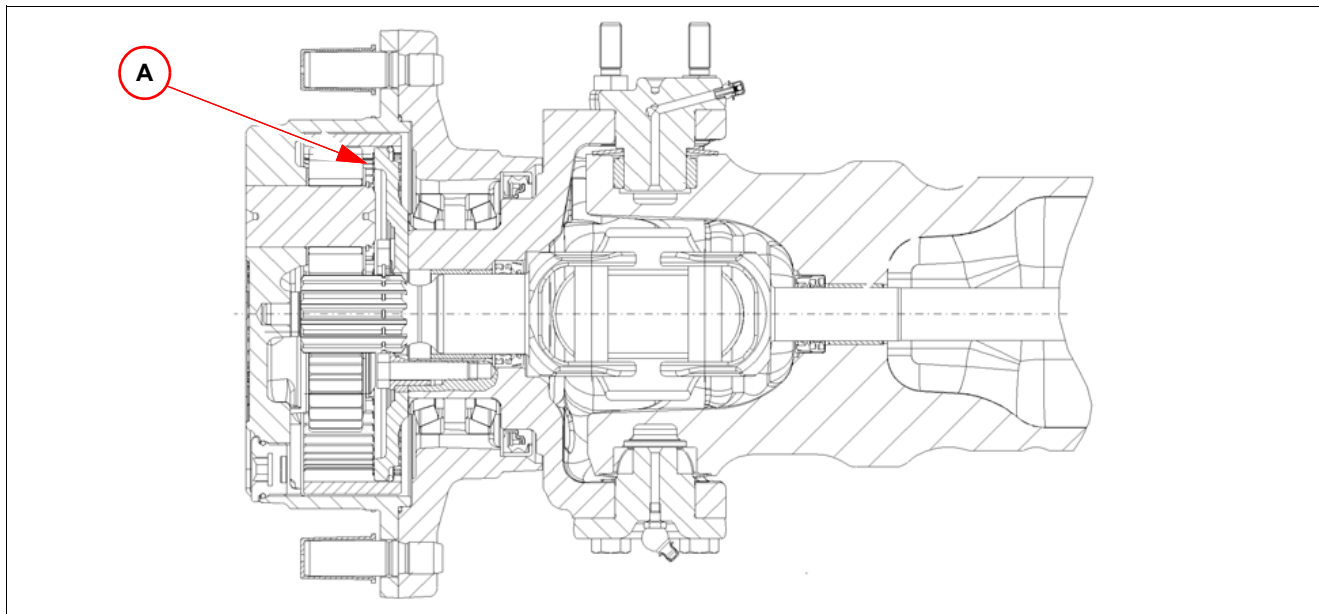
7. Mount wheel – see ["Mounting wheels" on page 1-136.](#)



Replace needle bearing in the cover

Tools:

- Standard tools



Pos.	Description
A	Needle bearing

Remove needle bearing

1. Remove cover [Remove/install planetary drive on page 5-34](#).
2. Remove circlips **A**.
3. Take out thrust washer **B**.

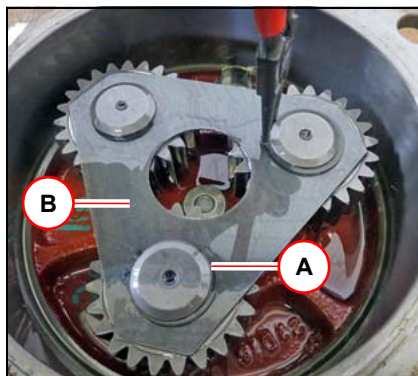


Fig. 77

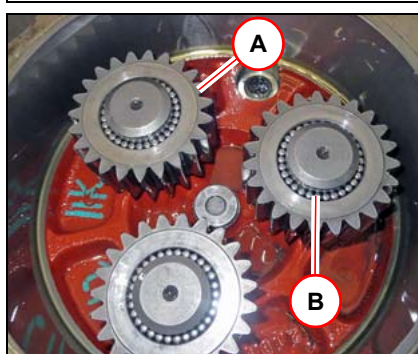


Fig. 78

4. Take out gear wheels **A**.
5. Take off needle bearing **B** (30 single needles per gear wheel).
6. Clean housing and all individual parts.

Install needle bearing

1. Clean housing and all individual parts.
2. Insert gear wheels **A**.
3. Insert new needle bearing **B** (30 single needles per gear wheel) between gear wheel and shaft with grease.

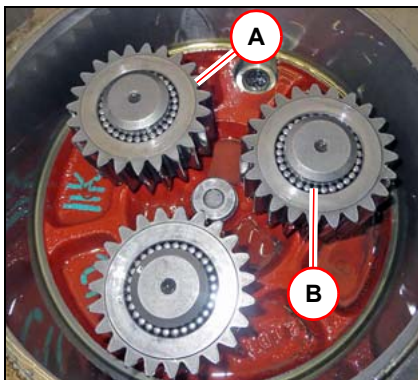


Fig. 79

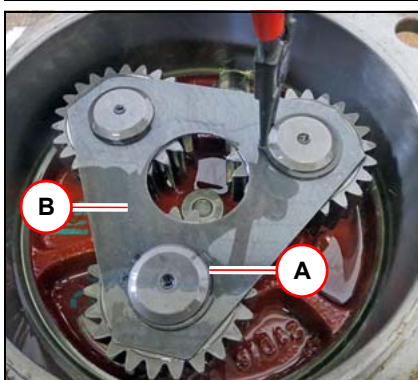


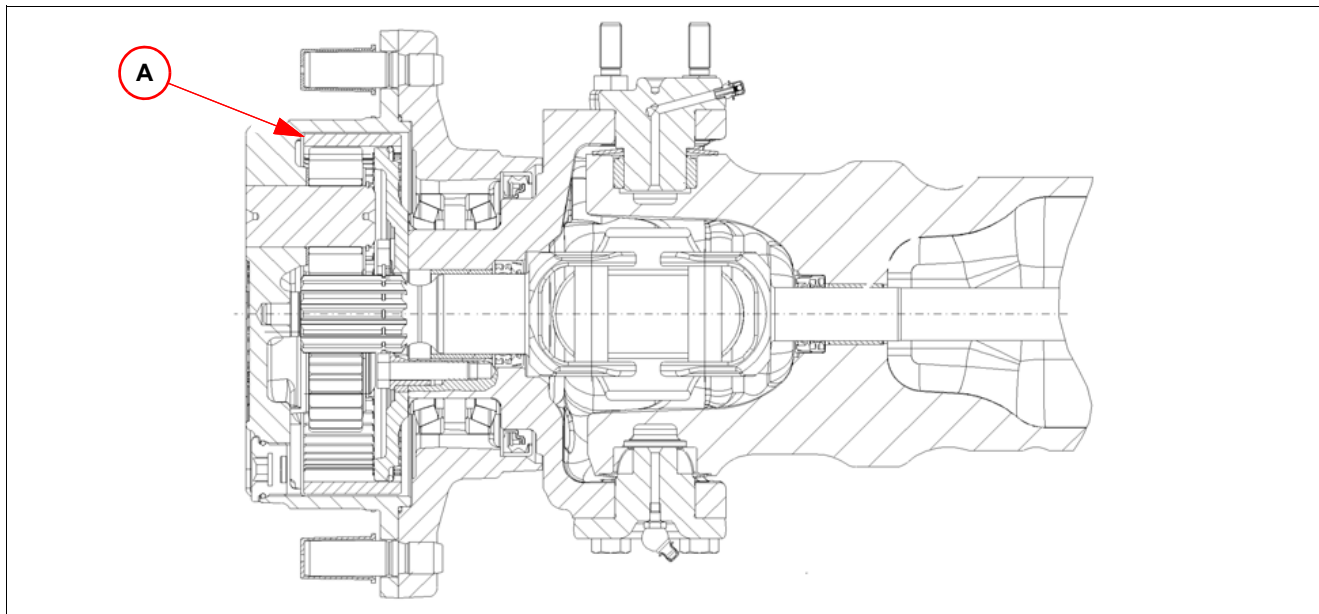
Fig. 80

4. Mount thrust washer **B** and circlips **A**.
5. Install cover [Remove/install planetary drive on page 5-34](#).

Remove/install ring gear

Tools:

- Standard tools



Pos.	Description
A	Internal-geared wheel

Remove ring gear

1. Remove cover [Remove/install planetary drive on page 5-34](#).
2. Remove circlip **A**.
3. Take out thrust washer **B**.
4. Remove the circlip **C**.

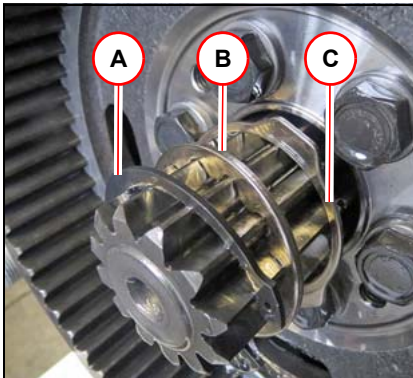


Fig. 81

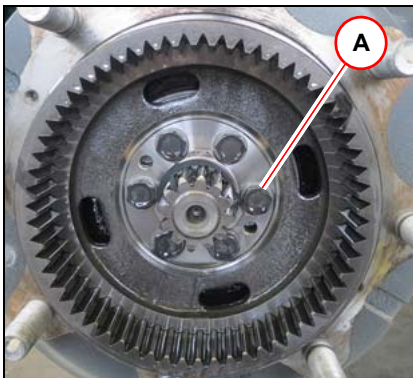


Fig. 82

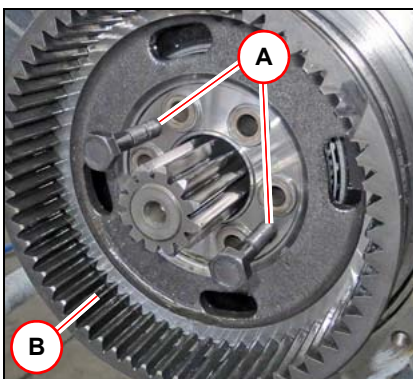


Fig. 83

5. Remove fastening screws **A**.
6. Screw in puller screws **A** into the threaded holes of the ring gear.
7. Evenly imprint the ring gear **B** with the puller screws **A**.

Install ring gear

1. Clean all individual parts.
2. Press all guide bushes **A** to 3 - 4 mm (0.12 - 0.16 in) overhang.

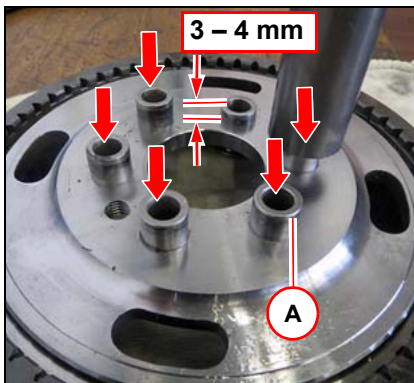


Fig. 84

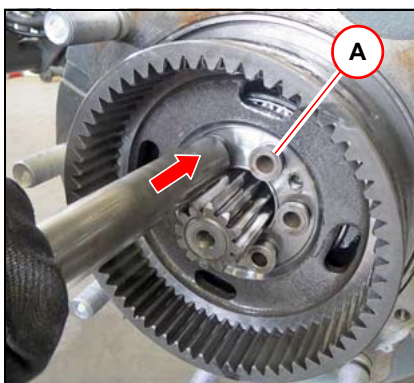


Fig. 85

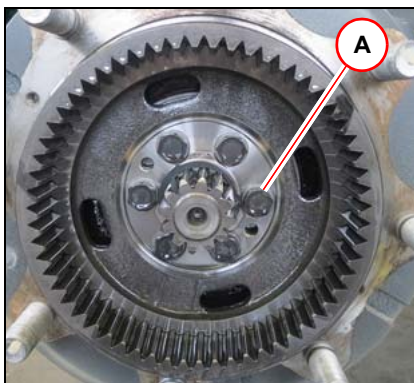


Fig. 86

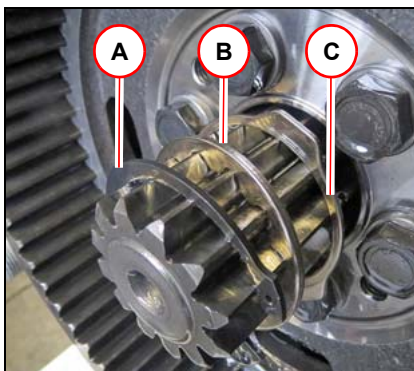


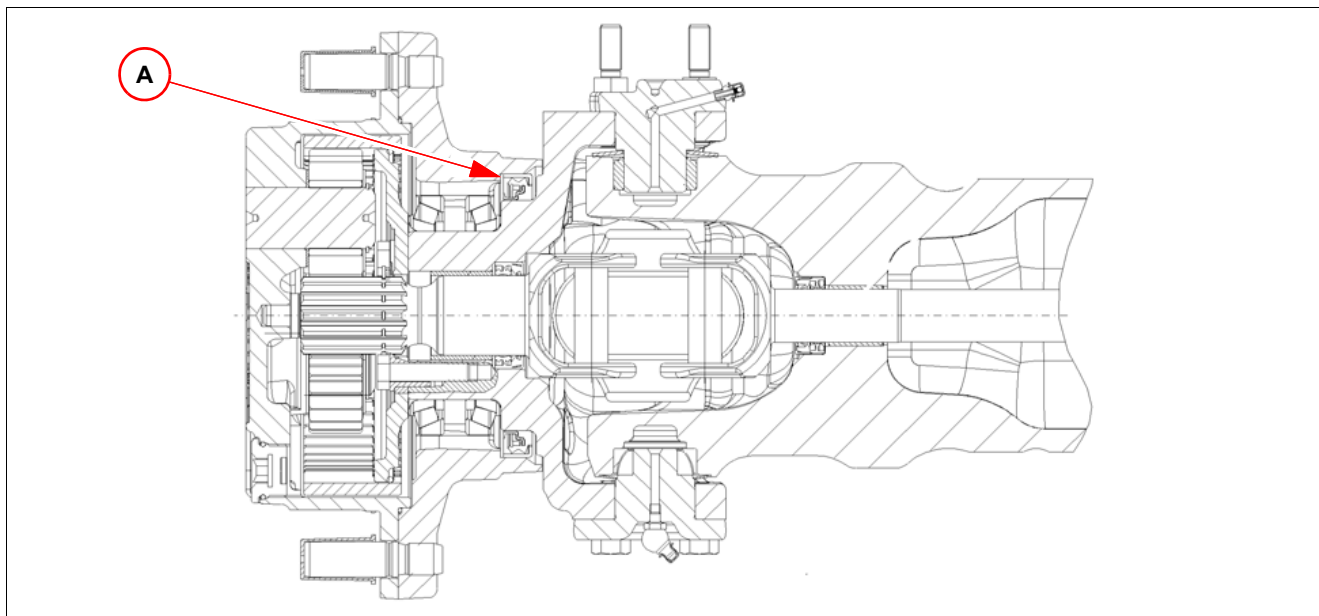
Fig. 87

3. Position ring gear.
4. Drive in all guide bushes **A** with an appropriate attachment.
5. Mount screws **A** with Loctite® 270 and tighten evenly to 95 Nm (70 lbf ft).
6. Insert the circlip **C**.
7. Insert thrust washer **B**.
8. Attach circlip **A**.
9. Insert cover [Remove/install planetary drive on page 5-34](#).

Changing the cassette sealing ring of the wheel hub

Tools:

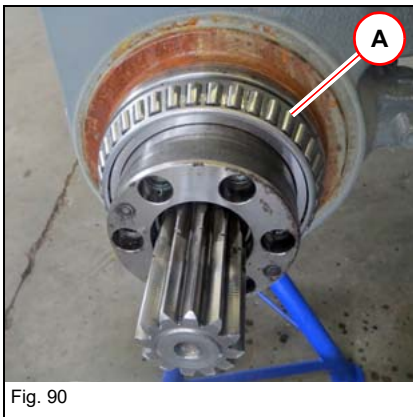
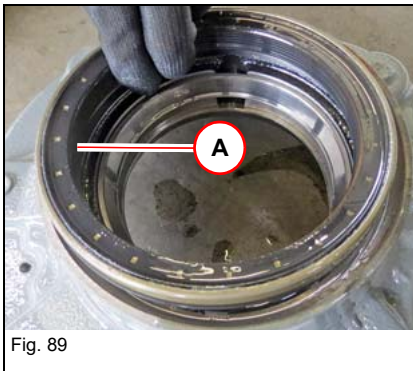
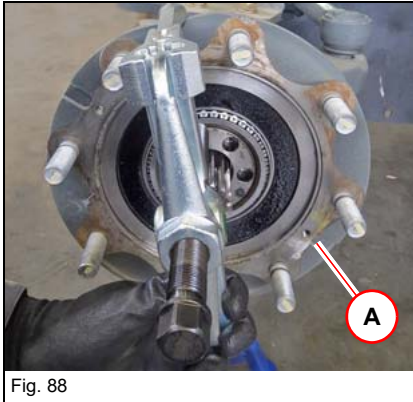
- Standard tools
- Special tools



Pos.	Description
A	Cassette sealing ring of the wheel hub

Remove sealing ring

1. Remove cover [Remove/install planetary drive on page 5-34](#).
2. Remove ring gear [Remove/install ring gear on page 5-40](#).
3. Pull off wheel hub **A** with suitable puller.



4. Remove seal ring **A** from the wheel hub.
5. Check bearing **A** and, if necessary replace.

Install cassette sealing ring

1. Clean all individual parts and bearing position.

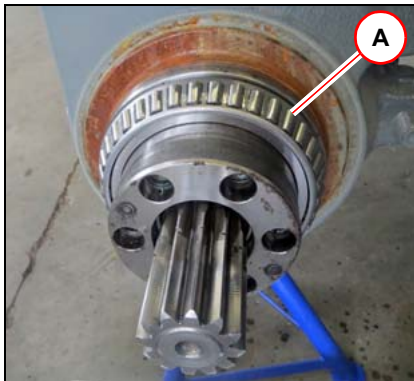


Fig. 91

2. Press in new sealing ring **A** with special tool free of oil and grease.

NOTICE

Only mount the sealing ring together with the attachment.
Insert sealing ring dry (internal and external).



Fig. 92

3. Position wheel hub **A**.

4. Clean bearing **B** and lightly grease.

5. Press in bearing **B** with suitable attachment.

6. Remove ring gear [Remove/install ring gear on page 5-40](#).

7. Remove cover [Remove/install planetary drive on page 5-34](#).

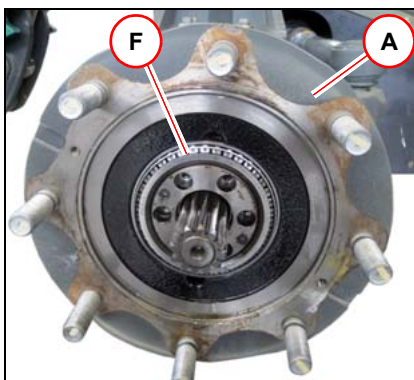
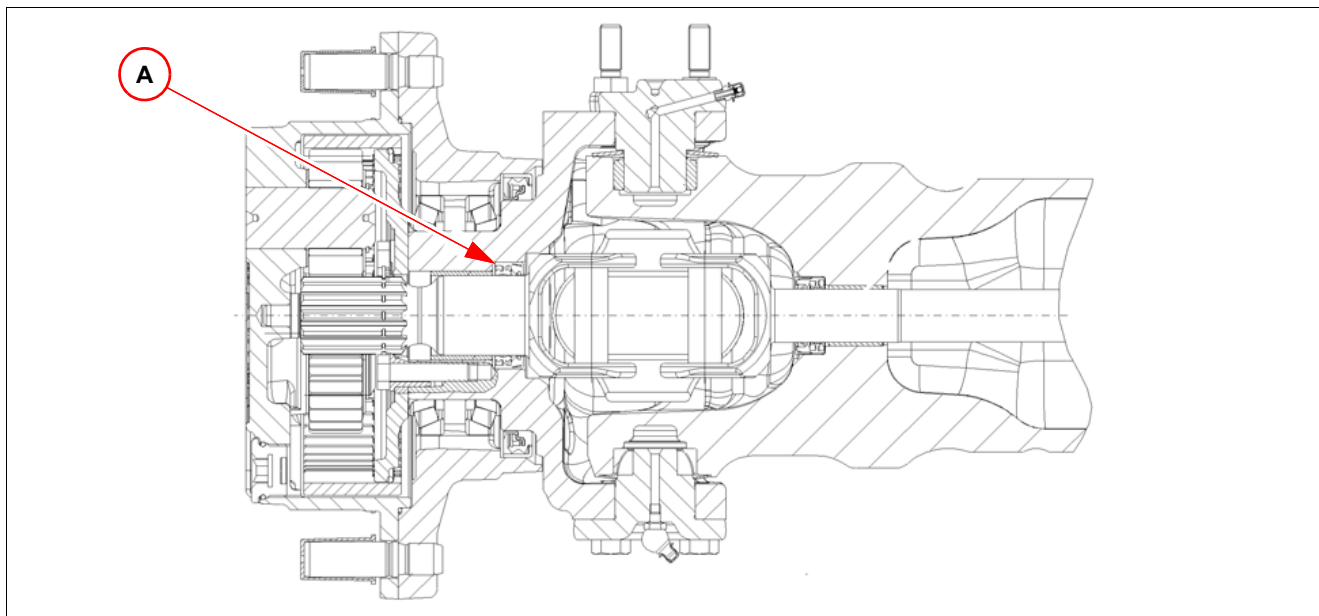


Fig. 93

Replace shaft sealing ring with joint housing

Tools:

- Standard tools
- Special tools



Pos.	Description
A	Shaft sealing ring joint housing

Remove planetary drive

1. Remove planetary drive cover [Remove/install planetary drive on page 5-34](#).
2. Remove circlip **A**.
3. Take out thrust washer **B**.
4. Remove the circlip **C**.

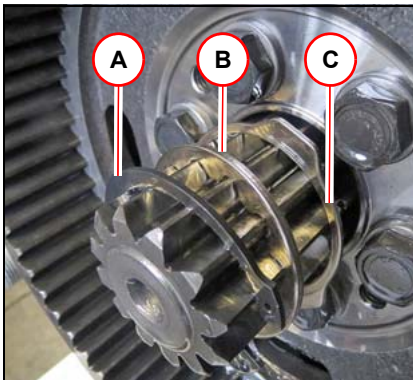


Fig. 94

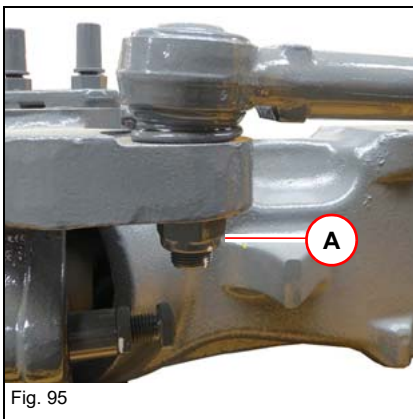


Fig. 95

5. Remove locking nut **B** on track rod.
6. Dismantle track rod from planetary drive with suitable tool.

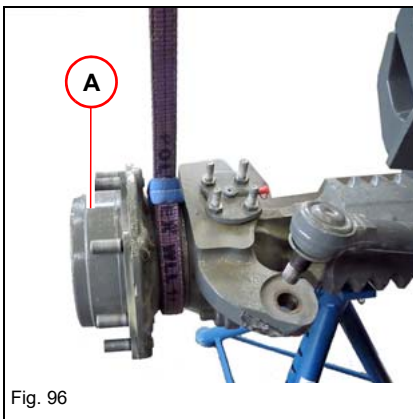
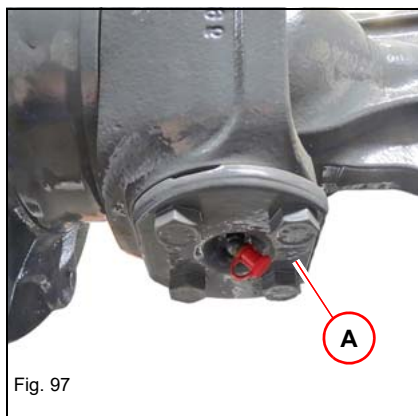
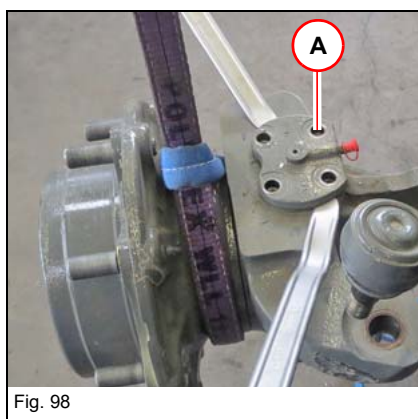


Fig. 96

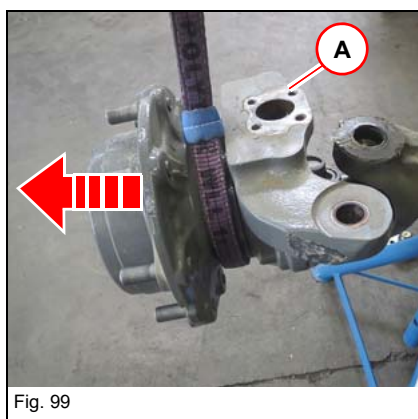
7. Secure the planetary drive **A** with suitable lifting sling.



8. Remove the fastening screws **A** from the bearing pins below.



9. Remove the fastening screws **A** from the bearing pin above.



10. Remove planetary drive **A** from axle carrier .

Replace shaft sealing ring

1. Remove shaft sealing ring **A** with suitable tool (internal puller).

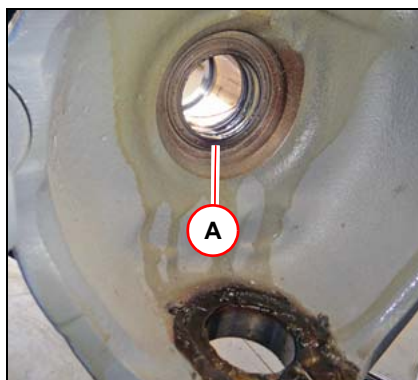


Fig. 100

2. Press in new shaft seal ring **A** using specialist tool.

3. Lightly grease the radial sealing ring **A**.

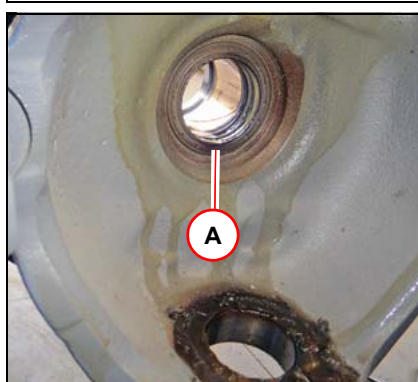


Fig. 101

Install planetary drive

1. Position spring above **A** (thick) with grease.

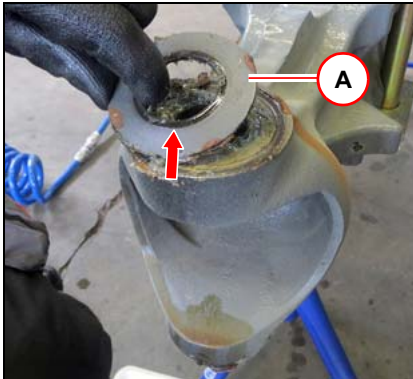


Fig. 102

2. Position cup spring below **A** (thin) with grease.
3. Monitor radial seal ring **B** for damage, where necessary replace – [see "Replace shaft sealing ring on axle tube" on page 5-53.](#)
4. Lubricate radial seal ring **B** with grease.

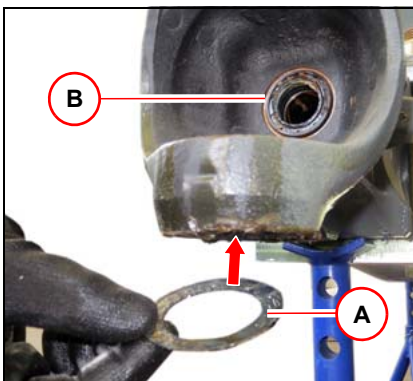


Fig. 103

5. Insert double drive shaft **A** into axle tube.

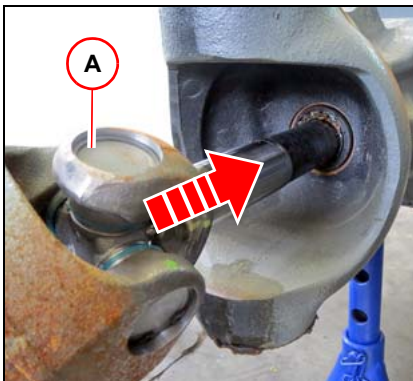


Fig. 104

6. Insert double drive shaft in the planetary drive **A**.
7. Position planetary drive **A** on the axle tube.

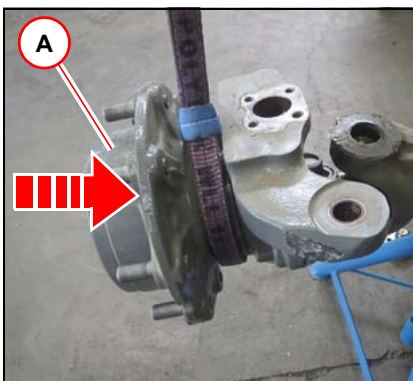


Fig. 105

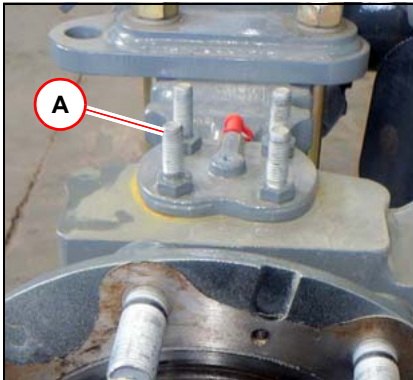


Fig. 106

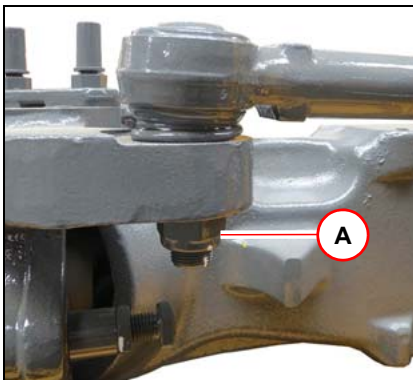


Fig. 107

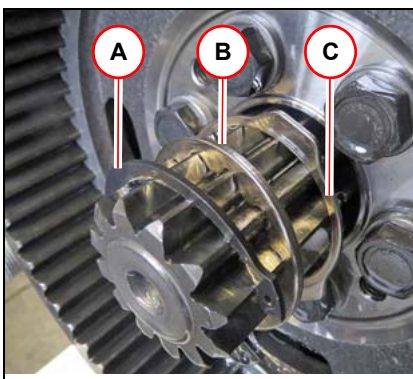


Fig. 108

8. Attach the upper and lower bearing bolts.
9. Tighten fastening screws **A** to 120 Nm (89 lbf ft).

10. Mount track rod end and tighten new self-locking nut **A** to 220 Nm (162 lbf ft).

11. Insert the circlip **C**.
12. Insert thrust washer **B**.
13. Attach circlip **A**.
14. Insert cover [Remove/install planetary drive on page 5-34](#).
15. Lubricate bearing pins top and bottom on planetary drive.

5.5 Sealing work

Safety instructions for sealing work



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

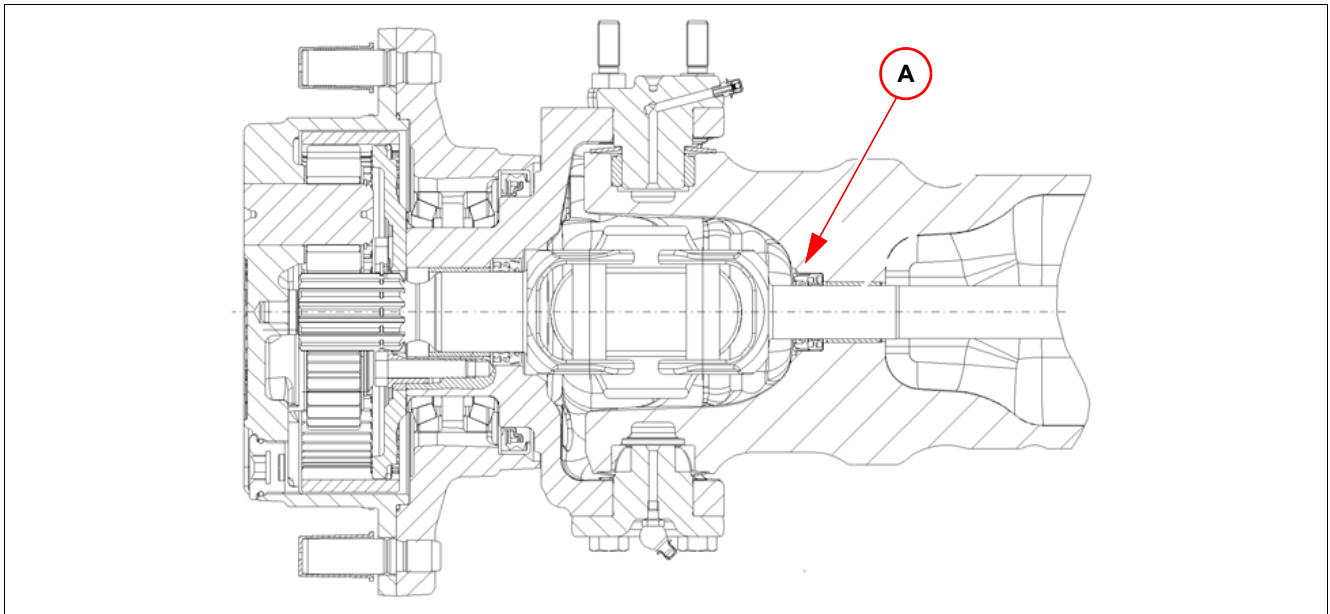
Before starting work, read the safety and preparation instructions carefully

- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Replace shaft sealing ring on axle tube

Tools:

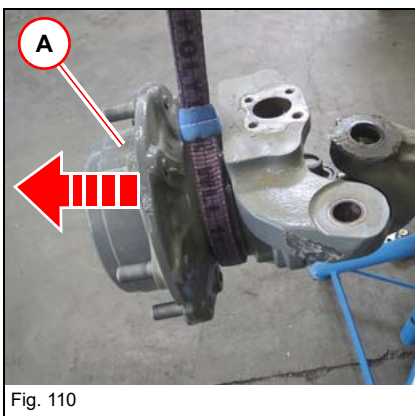
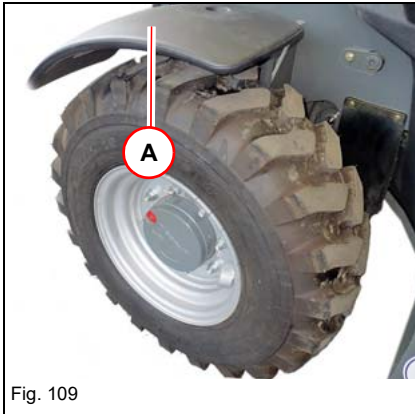
- Movable car jack, load-bearing capacity min. 5000 kg (11,023 lb)
- 2x axle stands, load-bearing capacity of min. 5000 kg (11,023 lb)
- Suitable lifting gear, minimum load-bearing capacity 500 kg (1102 lb.)
- Suitable slings (cables and shackles) with corresponding load-bearing capacity
- Suitable receptacle for the gearbox oil
- Special tools
- Standard tools



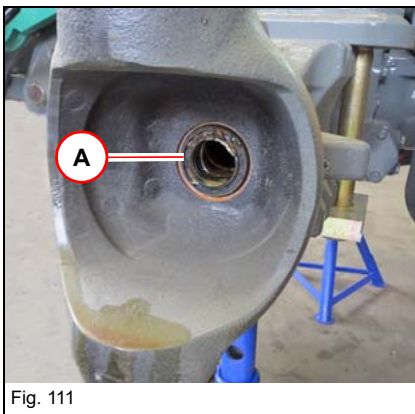
Pos.	Description
A	Shaft sealing ring axle tube

Remove shaft sealing ring

1. Park the vehicle on level and dry ground.
2. Apply the parking brake.
3. Turn the machine off and remove the ignition key.
4. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
5. Dismount the corresponding wheel – see *"Removing the wheels" on page 1-135*.
6. Remove wheel cover **A**.



7. Remove planetary drive **A**– see *"Remove/install planetary drive" on page 5-28*.



8. Remove the shaft sealing ring **A** with a suitable tool.

Insert shaft sealing ring

1. Press in new shaft seal ring **A** using specialist tool.
2. Lightly grease the radial sealing ring **A**.

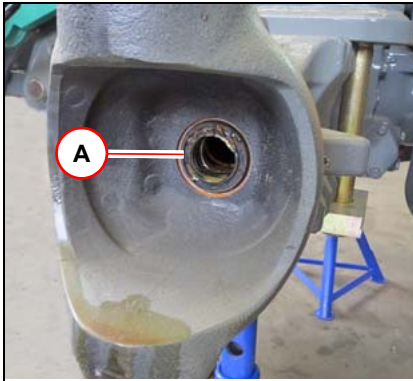


Fig. 112

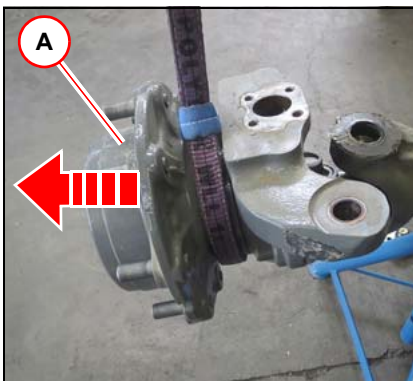


Fig. 113

3. Install planetary drive **A** – see *"Remove/install planetary drive" on page 5-28.*



Fig. 114

4. Mount wheel cover **A**.
5. Mount corresponding wheel – see *"Mounting wheels" on page 1-136.*
6. Slowly lower the vehicle with the hydraulic jack.
7. Fill axle with oil – see *"Check/top-up oil on differential lock (front axle)" on page 1-122.* – see *"Check/top-up oil on differential lock (rear axle)" on page 1-120*
8. Lubricate bearing pins top and bottom on planetary drive.
9. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*

5.6 Intermediate gearbox

Safety instructions for intermediate gearbox



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
- ▶ Wear protective gloves



DANGER

Injury hazard when lifting heavy components!

Death or serious injury.

- ▶ Use lifting gear of sufficient lifting capacity.
- ▶ Use functionally safe lifting gear.
- ▶ Use lifting gear on firm and level ground.
- ▶ Move the lifting tackle to predefined or suitable position on the component.

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- ▶ Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

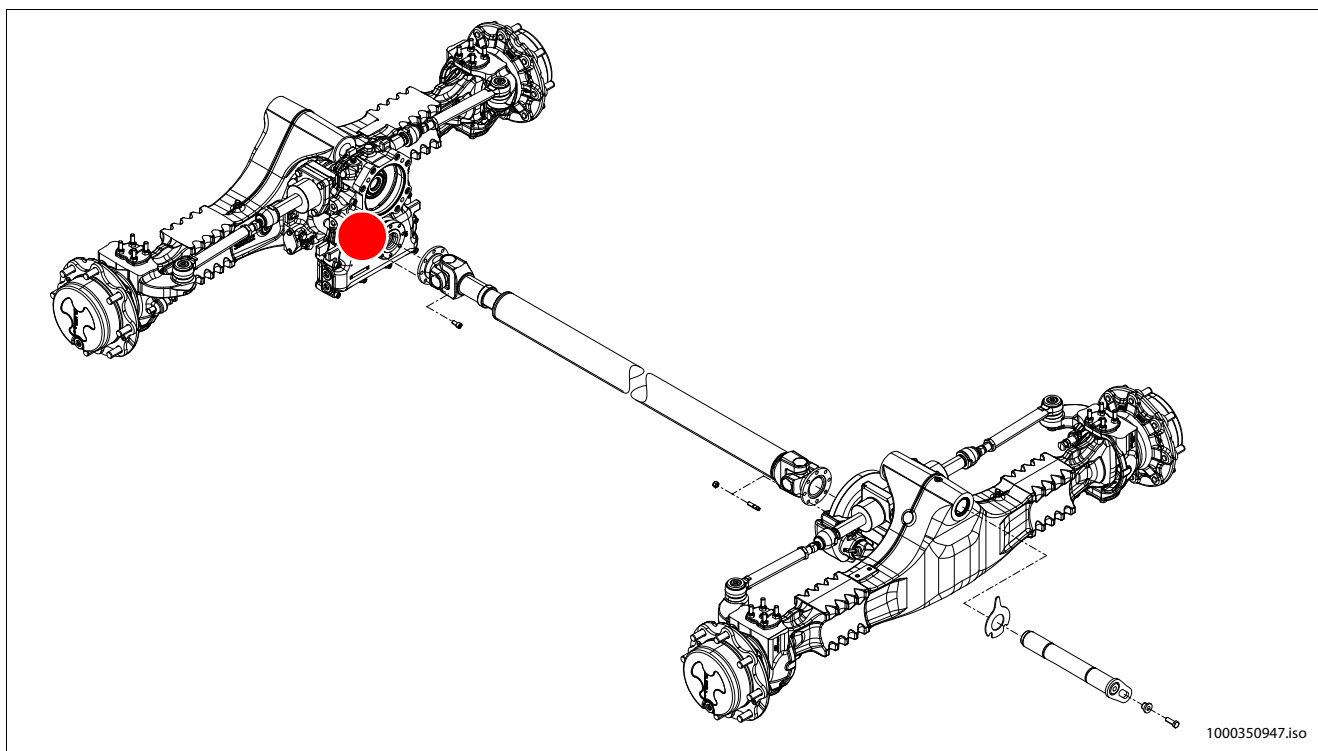
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install intermediate gearbox

Tools:

- Movable car jack, load-bearing capacity min. 5000 kg (11,023 lb)
- 2x axle stands, load-bearing capacity of min. 5000 kg (11,023 lb)
- Suitable lifting gear, minimum load-bearing capacity 5000 kg (11020 lb.)
- Suitable slings (cables and shackles) with corresponding load-bearing capacity
- Suitable collection vessel for hydraulic oil/transmission oil
- Plugs (different sizes) for closing the oil lines
- Special tools
- Standard tools

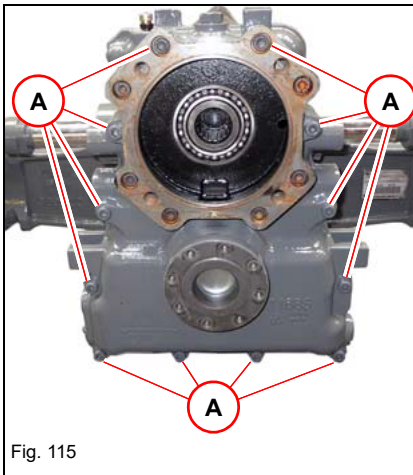
Technical data



Weight	BMK	Description	Remarks
14.3 kg (31.5 lb)	–	Gearbox housing (on cardan shaft)	–
16.1 kg (35.4 lb)	–	Gearbox housing (on axle)	–
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

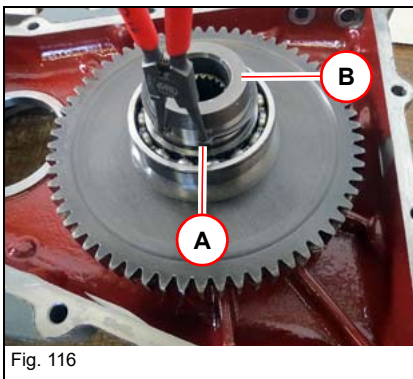
Remove intermediate gearbox

1. Remove front axle *Completely remove/install front axle on page 5-2.*
2. Remove screws **A** on gearbox cover.
3. Release and remove gearbox cover from housing.

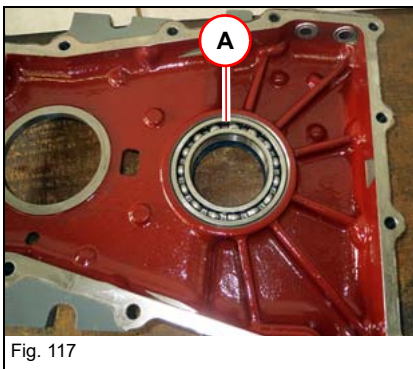


Commission gearbox cover

1. Remove circlip **A**.
2. Press shaft **B** out of gear wheel and housing cover.



3. Dismantle ball bearing **A** with an internal puller.



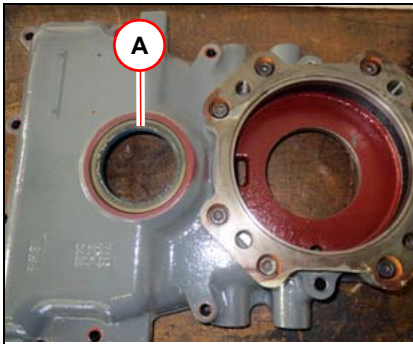


Fig. 118

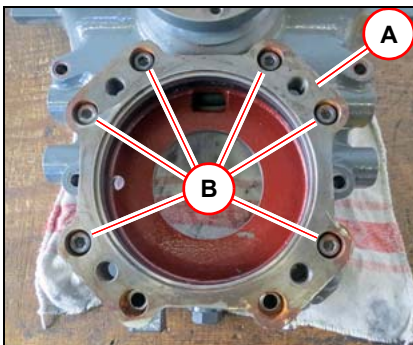


Fig. 119

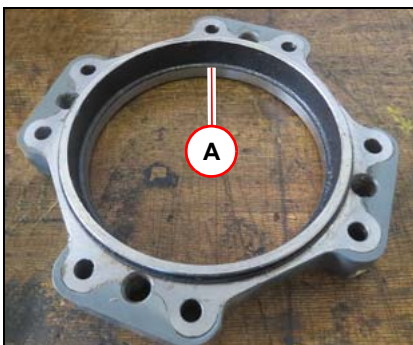


Fig. 120

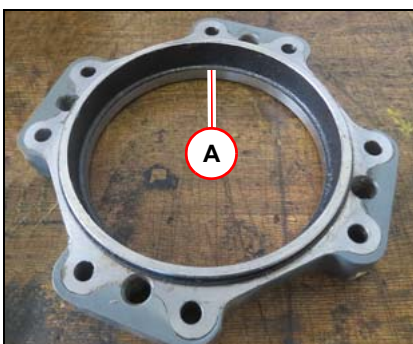


Fig. 121

4. Turn gearbox and dismantle shaft seal **A**.

5. Remove screws **B** on intermediate flange **A**.

6. Take off intermediate flange **B** from gearbox cover.

7. Carefully remove O-ring **A** on intermediate flange.

8. Carefully clean all individual parts.

9. Clean all sealed areas on axle housing and on both gearbox housings (oil and grease-free).

10. Mount new seal ring **A** on intermediate flange and lighting lubricate with grease.

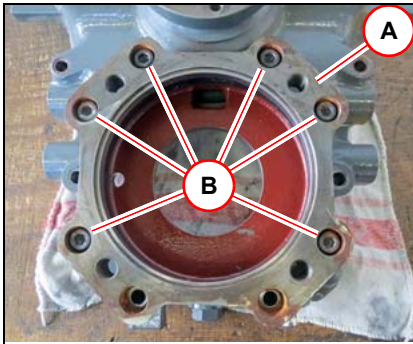


Fig. 122

11. Place intermediate flange **A** on the gearbox cover.

12. Mount intermediate flange **A** with screws **B** and tighten to 60 Nm (44 lbf ft).

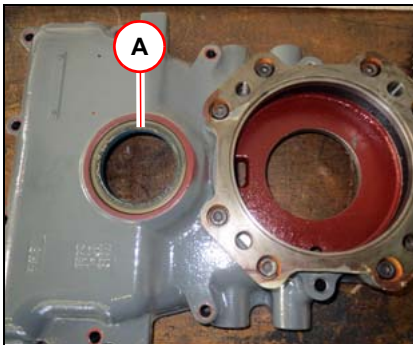


Fig. 123

13. Mount new shaft seal ring **A** with appropriate attachment.

14. Lightly grease the shaft seal **A**.

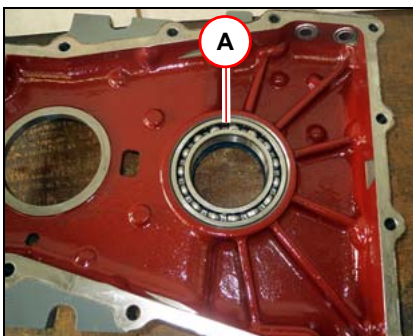


Fig. 124

15. Mount new ball bearing **A**.

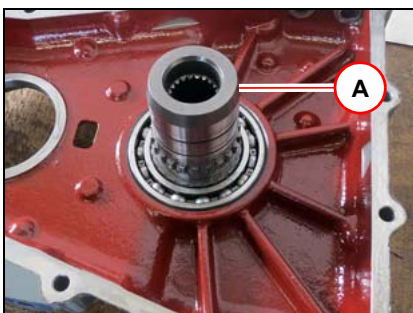
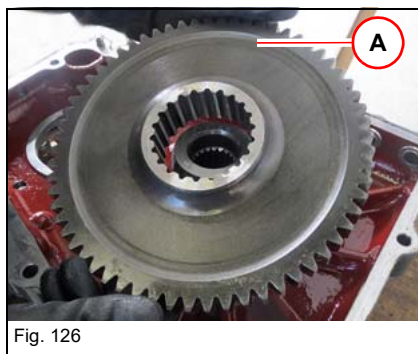


Fig. 125

16. Mount shaft **A** in the housing cover.

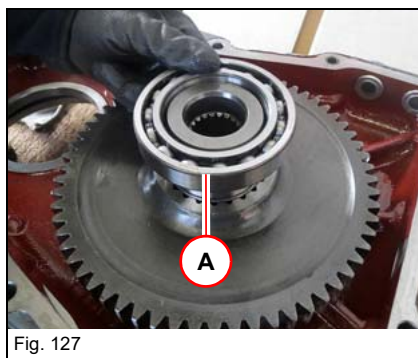


17. Place gear wheel **A** on the shaft.

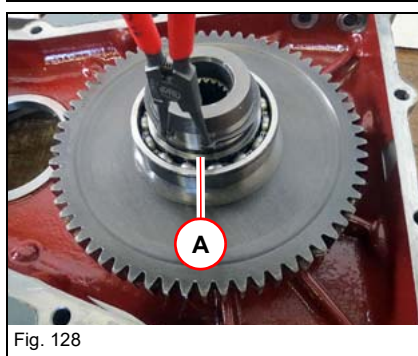
NOTICE

Observe the installation position of the gear wheel **A**.

► Mount the smooth side as in the **Fig. 126**.



18. Mount new bearing **A**.



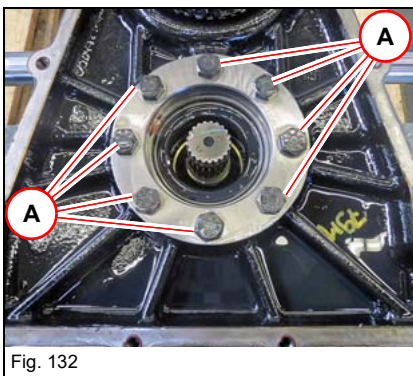
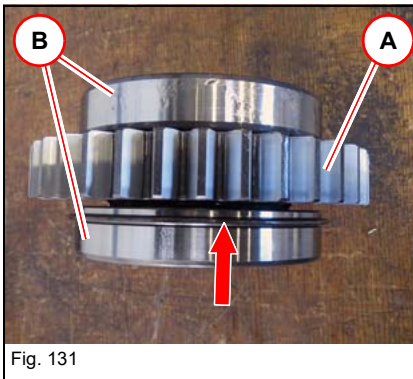
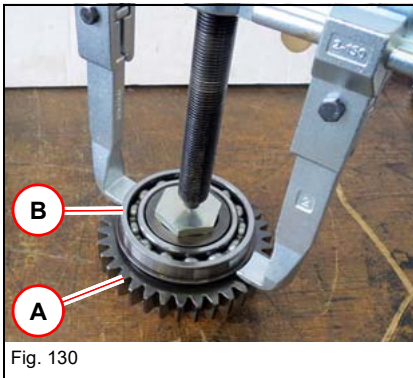
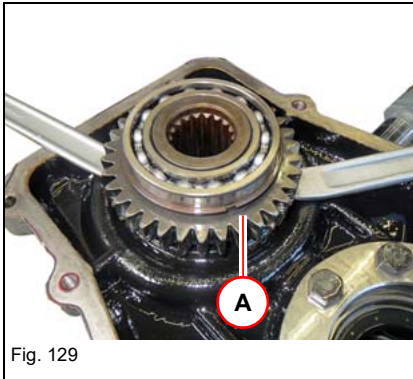
19. Attach circlip **A**.

Commission transmission

1. Pull drive shaft **A** out of the transmission.

Information

When removing the drive shaft, pay attention to the installation system.



2. Pull bearing **B** from the drive shaft **A** using a suitable tool.
3. Clean all components (oil and grease-free).

4. Mount new bearing **B** on the drive shaft **A**.
➔ When installing observe the installation system!

5. Remove the fastening screws **A** from the transmission.
6. Remove transmission from axle carrier.

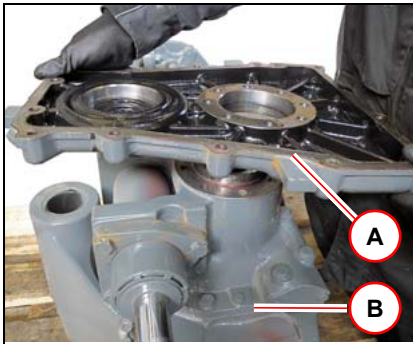


Fig. 133

7. Remove transmission housing **A** from axle carrier **B**.

Assemble and install transmission

1. Clean all sealed areas on axle housing and on both gearbox housings (oil and grease-free).
2. Remove shaft seal ring **A** on axle carrier.
3. Press in new shaft seal ring **A** using specialist tool.
4. Clean shaft **B** and lightly grease.

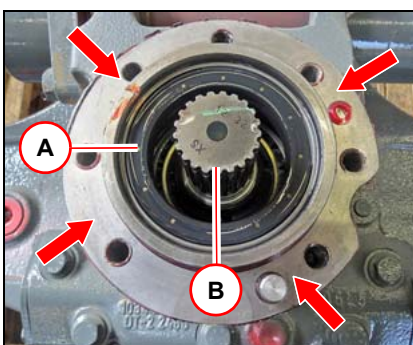


Fig. 134

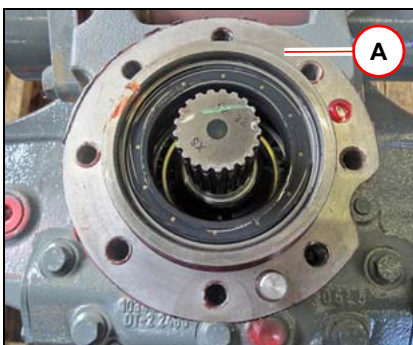


Fig. 135

5. Lubricate sealed surface **A** with Loctite®510.

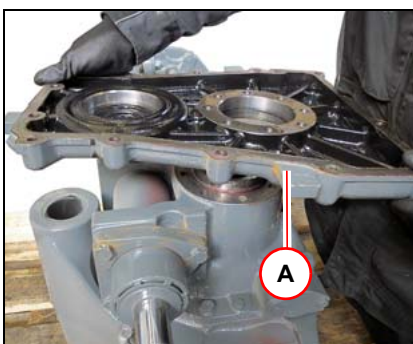
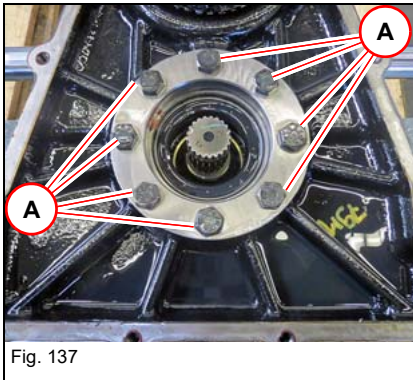
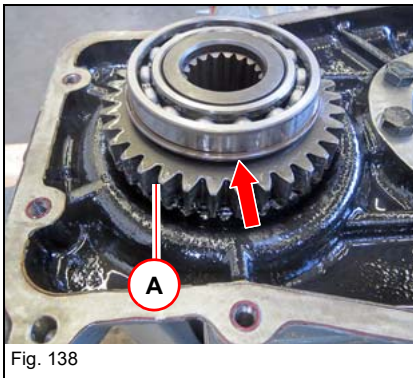


Fig. 136

6. Position transmission housing **A** on the axle carrier.



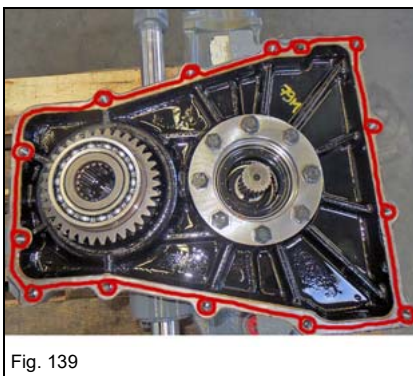
7. Mount screw **A** with Loctite®510 and tighten to 110 Nm (81 lbf ft).



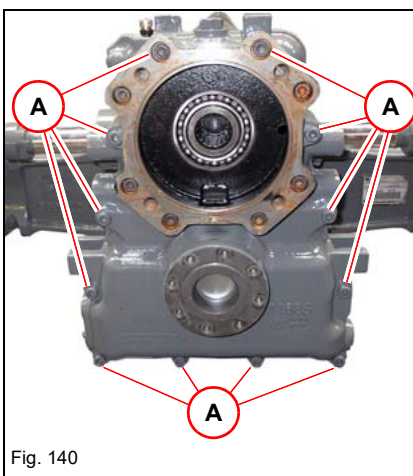
Information

When installing the drive shaft, **A** pay attention to the installation system.

8. Mount drive shaft **A** in the transmission cover.



9. Lubricate the sealed area on the transmission cover with sealant Loctite®510.



10. Position the transmission cover and tighten the screws **A** to 60 Nm (44 lbf ft).

11. Install front axle – see *"Completely remove/install front axle" on page 5-2.*

5.7 Front axle differential

Safety instructions for differential front axle



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
- ▶ Wear protective gloves



DANGER

Injury hazard when lifting heavy components!

Death or serious injury.

- ▶ Use lifting gear of sufficient lifting capacity.
- ▶ Use functionally safe lifting gear.
- ▶ Use lifting gear on firm and level ground.
- ▶ Move the lifting tackle to predefined or suitable position on the component.

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- ▶ Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

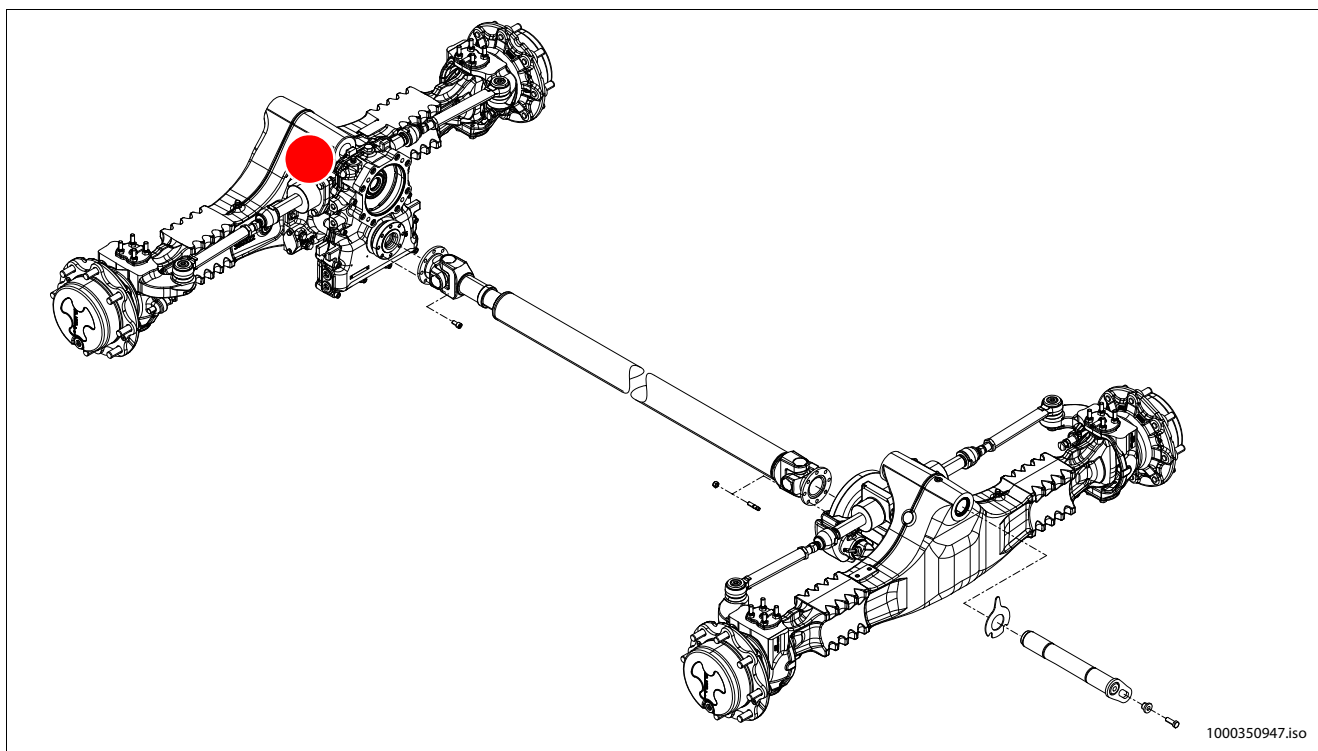
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install differential front axle

Tools:

- Movable car jack, load-bearing capacity min. 5000 kg (11,023 lb)
- 2x axle stands, load-bearing capacity of min. 5000 kg (11,023 lb)
- Suitable lifting gear, minimum load-bearing capacity 5000 kg (11020 lb.)
- Suitable slings (cables and shackles) with corresponding load-bearing capacity
- Suitable collection vessel for hydraulic oil/transmission oil
- Plugs (different sizes) for closing the oil lines
- Special tools
- Standard tools

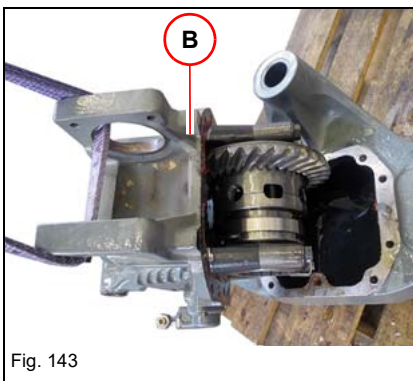
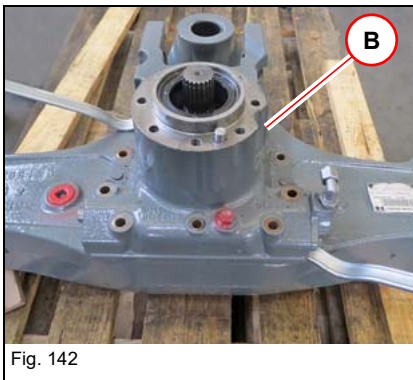
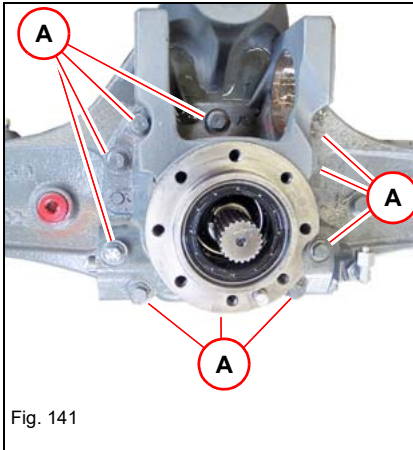
Technical data



Weight	BMK	Description	Remarks
–	–	Differential housing	–
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove differential front axle

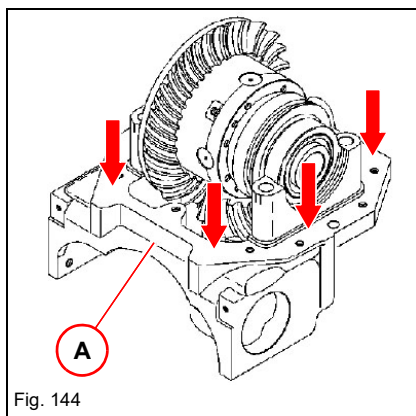
1. Remove front axle – see *"Completely remove/install front axle" on page 5-2.*
2. Remove the intermediate gearbox – see *"Remove/install intermediate gearbox" on page 5-57.*
3. Remove planetary drive left and right – see *"Remove/install planetary drive" on page 5-28.*
4. Removing the steering cylinder – see *"Remove/install steering cylinder" on page 7-13.*
5. Remove screws **A** on differential.



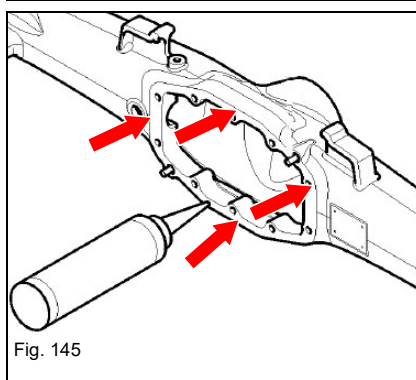
6. Imprint differential **B** from axle carrier.
7. Lift differential **A** out with suitable lifting gear from the axle.

Install differential.

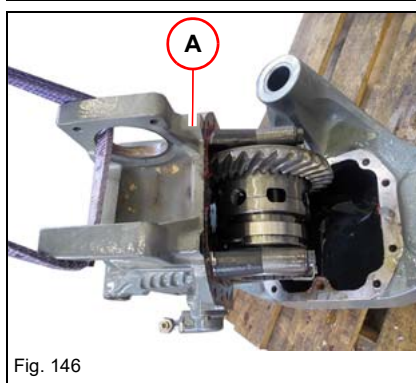
1. Clean the sealing surface at the differential housing **A** (oil and grease-free).



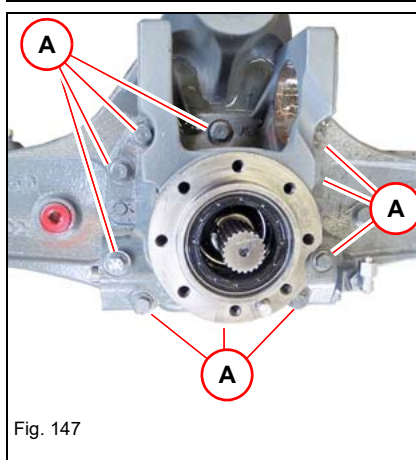
2. Clean sealed area on axle carrier (oil and grease-free).
3. Lubricate the sealed area on the axle carrier with sealant Loctite®510.



4. Position differential **A** with suitable lifting gear into axle carrier.



5. Tighten all fastening screws **A** on the differential with the use of Loctite®510 evenly to 169 Nm (125 lbf ft).
6. Removing the steering cylinder – see ["Remove/install steering cylinder" on page 7-13](#).
7. Remove planetary drive left and right – see ["Remove/install planetary drive" on page 5-28](#).
8. Remove the intermediate gearbox – see ["Remove/install intermediate gearbox" on page 5-57](#).
9. Remove front axle– see ["Completely remove/install front axle" on page 5-2](#).



5.8 Differential repairs

Safety instructions for differential commissioning



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
- ▶ Wear protective gloves



DANGER

Injury hazard when lifting heavy components!

Death or serious injury.

- ▶ Use lifting gear of sufficient lifting capacity.
- ▶ Use functionally safe lifting gear.
- ▶ Use lifting gear on firm and level ground.
- ▶ Move the lifting tackle to predefined or suitable position on the component.

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- ▶ Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

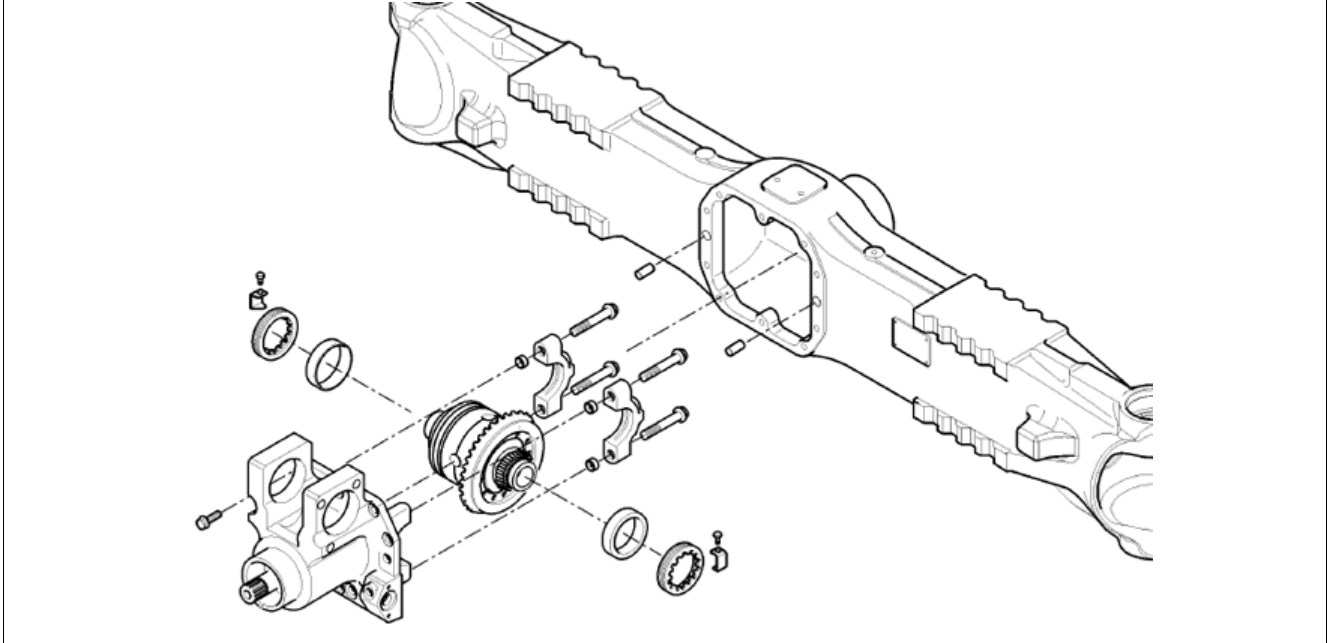
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Removing/mounting balance weight

Tools:

- Standard tools
- Meter with magnetic foot

Remove the differential cage



1. Remove the differential [Remove/install differential front axle on page 5-66](#).
2. Mark bearing shells **A** with center punch.

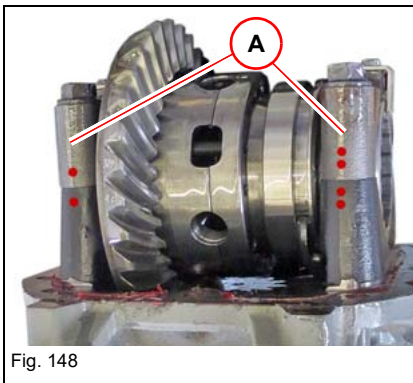


Fig. 148

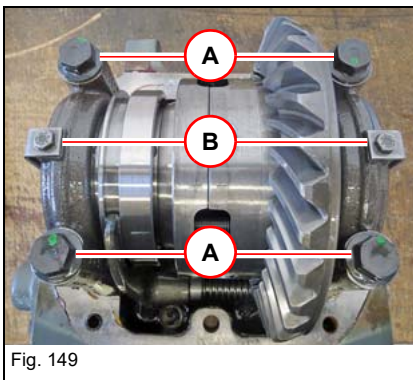


Fig. 149

3. Remove fuses **B** of the adjusting nuts.
4. Remove fastening screws **A** of the bearing shells.

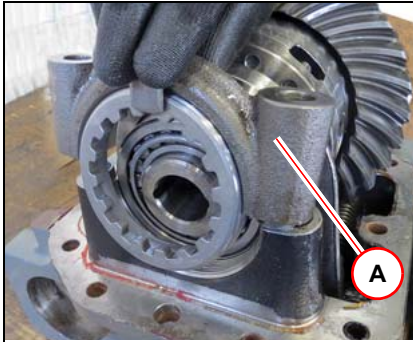


Fig. 150

5. Remove bearing shell and adjusting nut **A**.

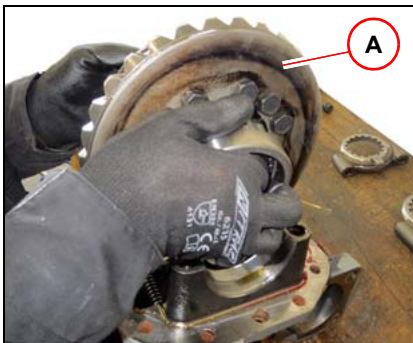


Fig. 151

6. Remove the differential cage from the differential housing with the crown wheel **A**.



Fig. 152

7. Take shift collar **A** off of differential lock.

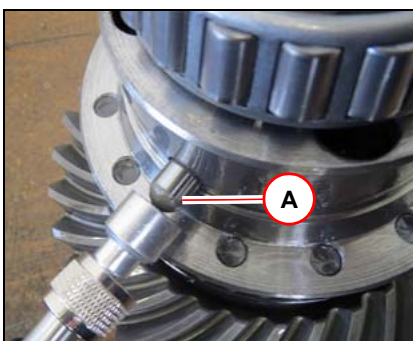


Fig. 153

8. Pull pins **A** out of the balance weight with a magnetic rod and discard.

9. Carefully clean all individual parts.

Dismantle balance weight

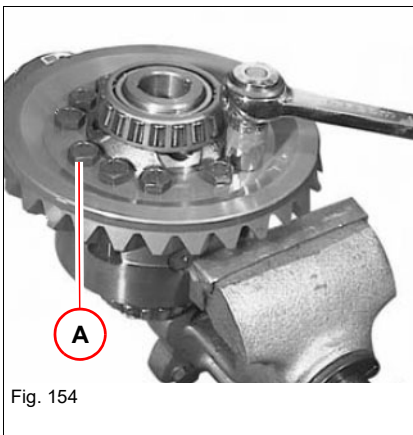
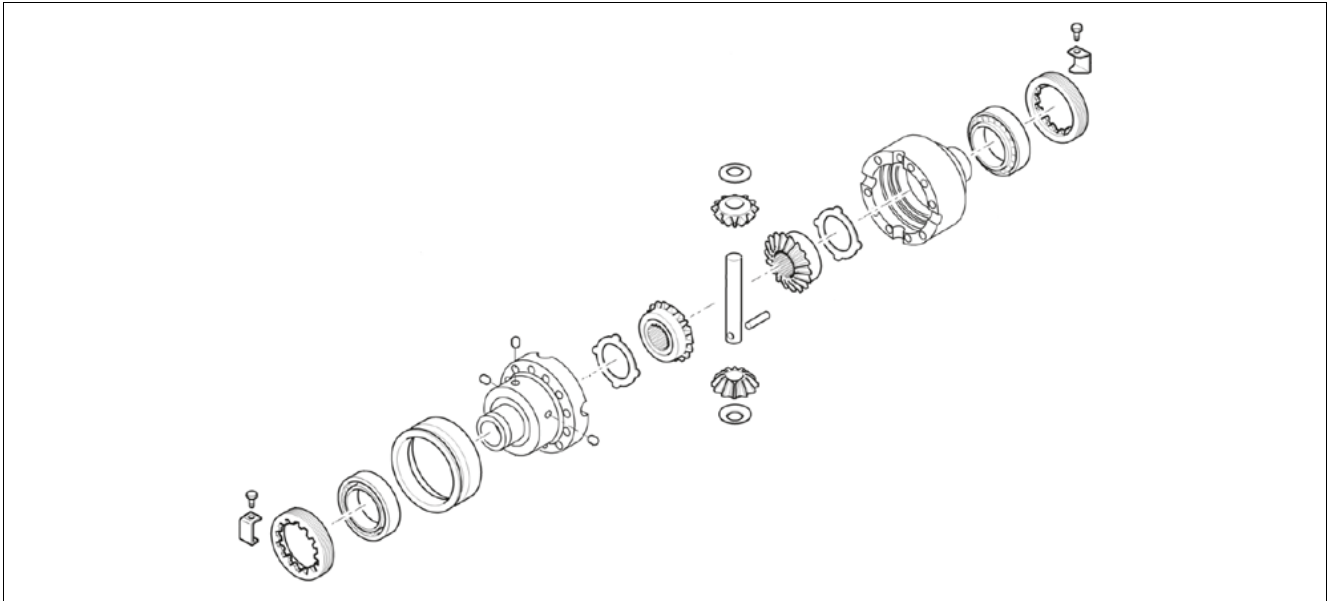


Fig. 154

1. Tighten the differential cage into a vice and remove the fastening screws **A**.
2. Take off the crown gear.



Fig. 155

3. Pull the differential cage apart.
4. Clean all individual parts carefully and check for damages, or replace.
5. Clean the sealing surface at the differential housing (oil and grease-free).

Mount balance weight

1. Insert pins **A** with some grease into the balance weight.

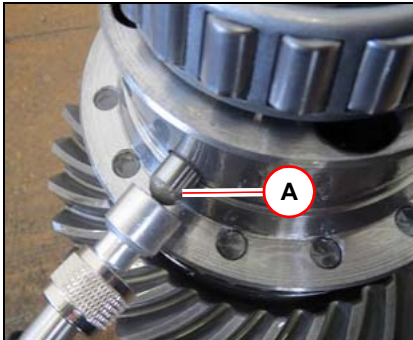


Fig. 156

2. Push on shift collar **A** of differential lock.



Fig. 157

3. Attach new bearings **A** to the housing halves.

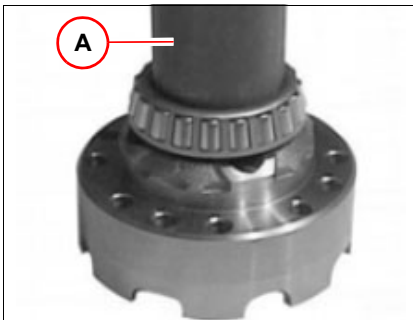


Fig. 158

4. Renew thrust washers **A** and **B**.
5. Check bevel wheels, satellites and compensation axles for damage.
6. Insert bevel wheels, satellites and compensation axles with grease.
7. Put together the differential cage.

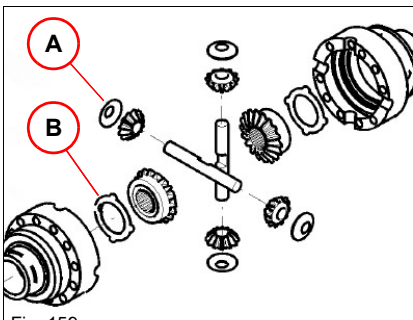
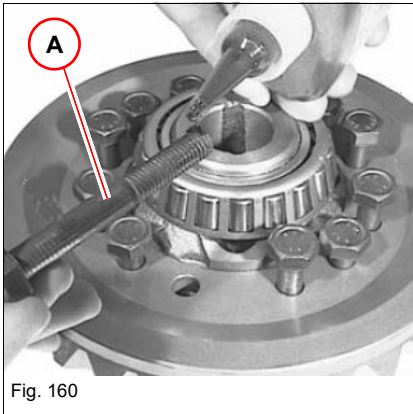
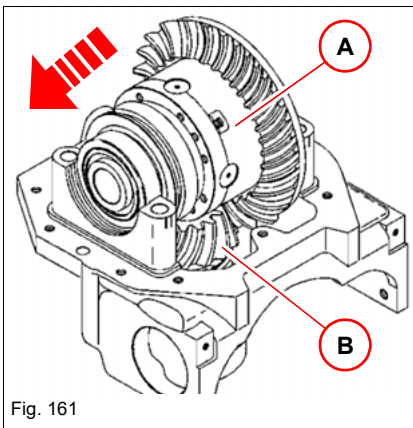


Fig. 159

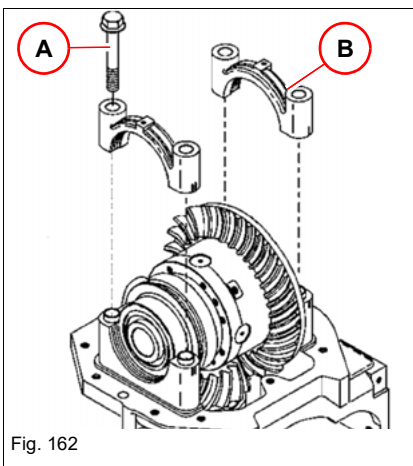


Dampen fastening screws **A** with Loctite®270 and tighten with 95 Nm (70 lbf ft).

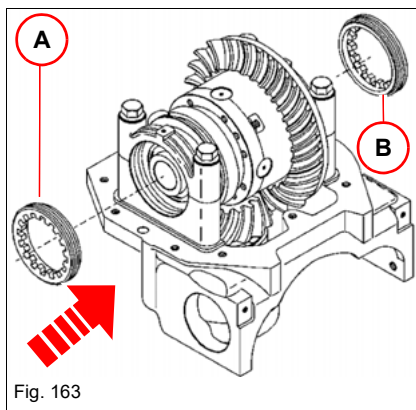


Install balance weight

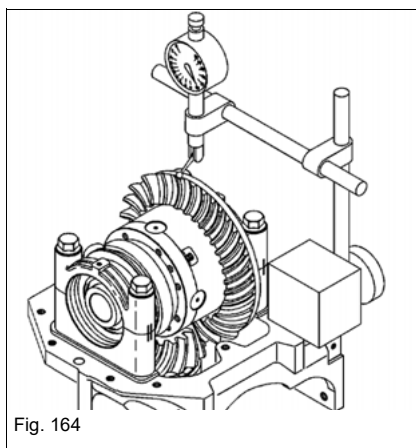
1. Insert the balance weight **A** into the differential housing and push fully on the drive bevel gear **B**.



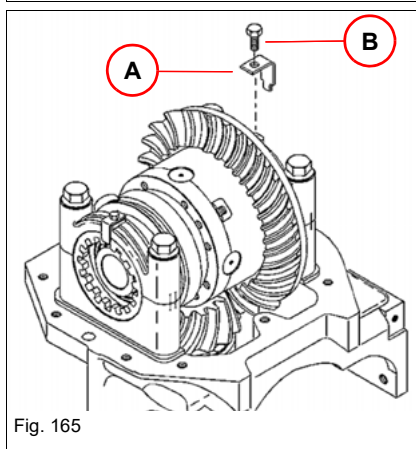
2. Attach the bearing shells **B**, pay attention to the marking.
3. Tighten fastening screws **A** with 266 Nm (196 lbf ft).



4. Screw in the setting screws **A** and **B** until at the bearing, making sure that the differential cage is right up against the input bevel gear (without flank play).
5. Screw in adjusting screws **A** further until there is little play between the crown wheel and input bevel gear.



6. Attach dial gage with magnetic foot to the differential housing and adjust to the tooth flank at an angle of about 90°.
7. Adjust the flank play through both the adjusting screws.
 - The flank play is 0.12 -0.16 mm (4.72 – 6.30 mil).
 - Pay attention to the bearing tension of the differential cage (bearing must have some initial stress; at any rate, the bearing must be free of play).

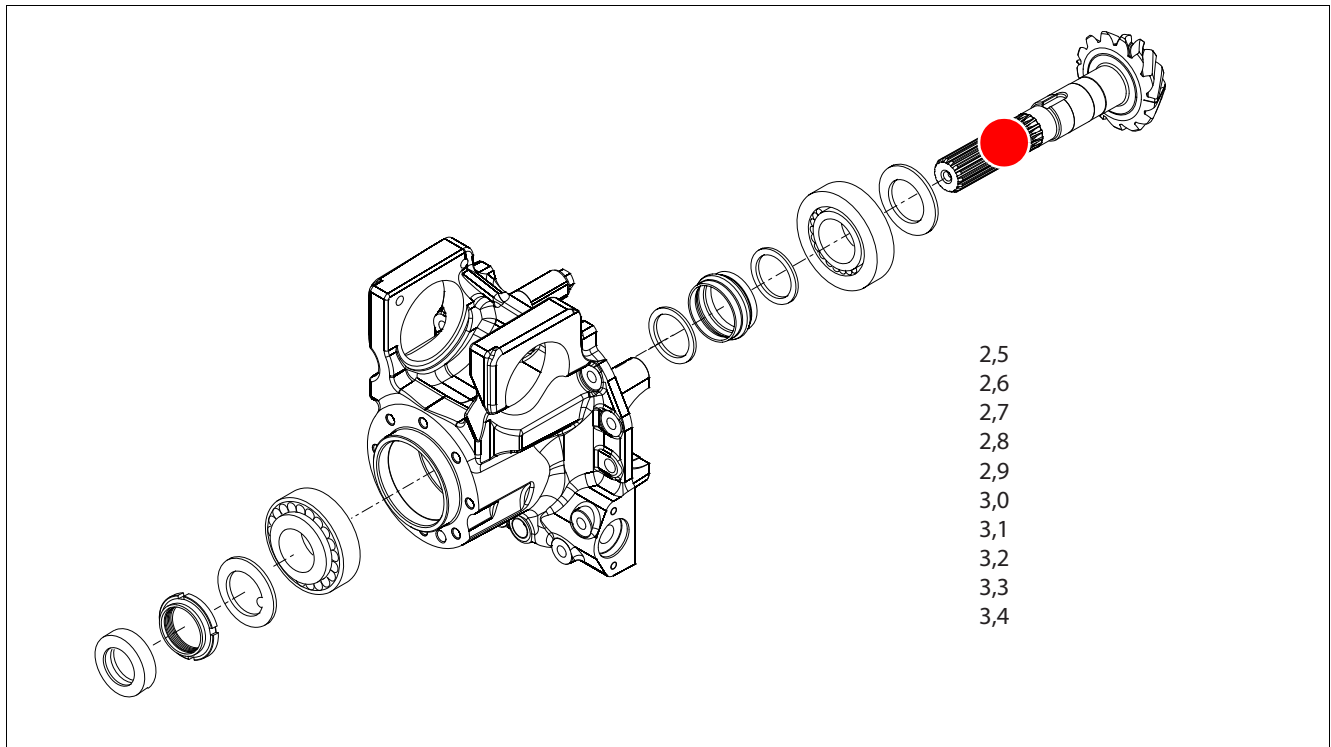


8. Secure the adjusting screws using the safety clamps **A**.
9. Tighten fastening screws **B** to 13 Nm (10 lbf ft).
10. Install the differential in the axle carrier [Remove/install differential front axle on page 5-66](#).

Remove/install drive bevel gear

Tools:

- Standard tools
- Specialist tools
- Depth gage
- Rolling torque meter
- Surface paste



1. Remove differential **A**– see ["Remove/install differential front axle" on page 5-66.](#)
2. Remove angle drive **B**– see ["Removing/mounting balance weight" on page 5-70.](#)
3. Pull out the shaft sealing ring **A** with a suitable tool.

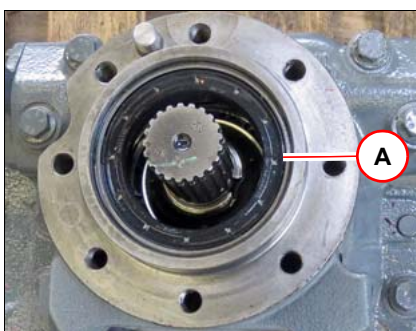
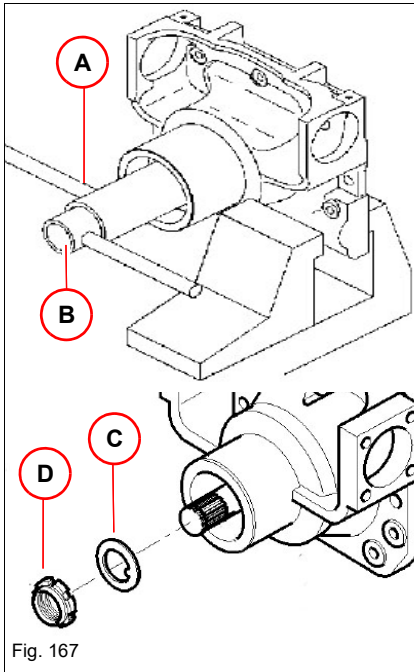
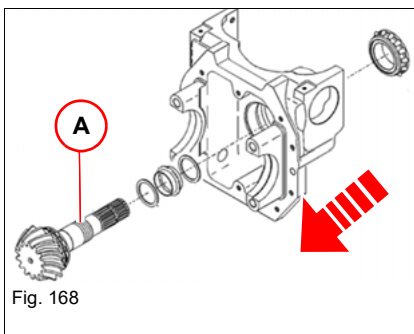


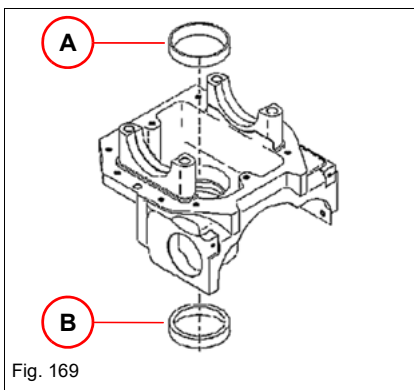
Fig. 166



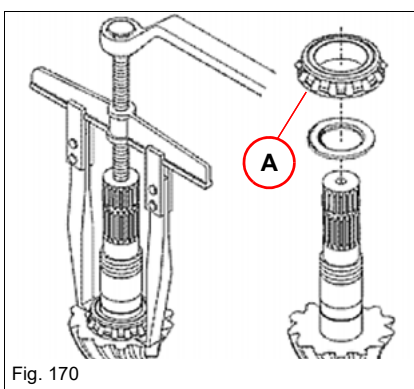
4. Loosen groove nut **D** from the input bevel gear using a special tool **A** and **B**.
5. Take out groove nut **D** and lock washer **C**.



6. Push out the input bevel gear **A** using a soft mandrel.



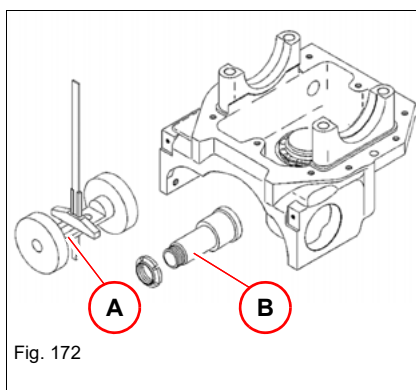
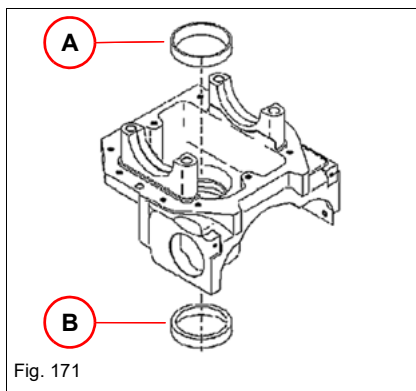
7. Remove bearing shells **A** and **B** from the differential housing with an inner extractor tool.



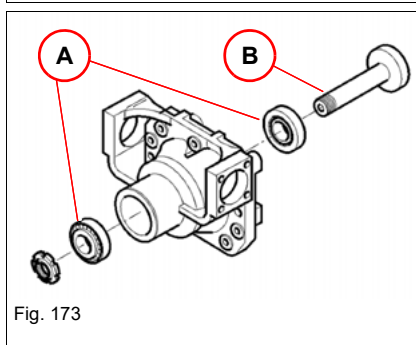
8. Pull out the taper roller bearing **A** from the input bevel gear.

Install the input bevel gear in the differential housing

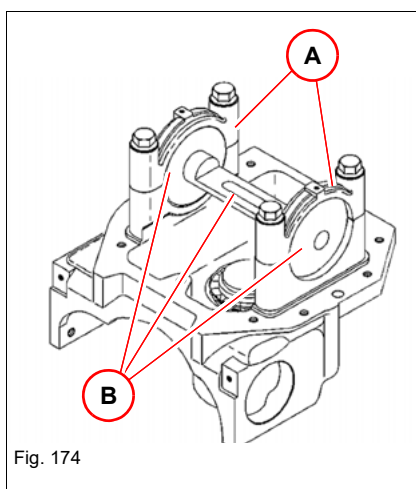
1. Mount new bearing shells **A** and **B**, and pay attention to the bearing combinations as you do so.



2. Ascertain the zero-mark of the housing.
 - Measuring shaft **A** for determining the height from the differential housing to the bearing of the drive shaft.
 - Pretension measuring shaft **B** round the taper roller bearing.



3. Insert both taper roller bearings **A**.
4. Insert the measuring shaft **B** and using the groove nut, pretension the taper roller bearing **A**.



5. Insert the measuring shaft with the bearing plates **B** in the differential housing and fix with the bearing shells **A**.
 - While mounting the bearing shells **A**, pay attention to the marking.

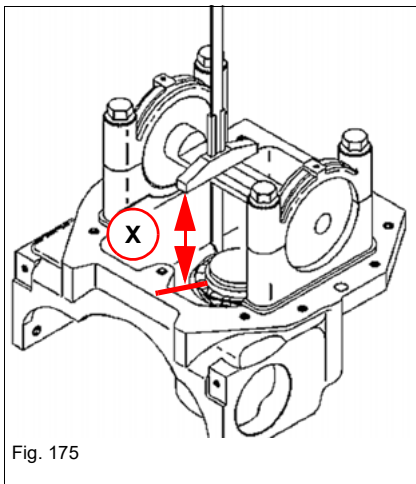


Fig. 175

With the depth gage, measure on the bearing shell (not on the auxiliary spindle). See [Fig. 175](#)

6. Measure and note down dimension **X**.



Fig. 176

7. Read the engraved dimension **V** of the input bevel gear on the front surface and note this (example = 107.25).

8. Calculate the thickness **S** of the new setting disk:

$$S = X - V$$

9. Look for the calculated spacer and provide it.

Spacers are available in the following thicknesses 2.50– 3.40 mm (98.43– 133.86 mil) in steps of 0.1 mm (3.94 mil).

10. Remove measuring device.

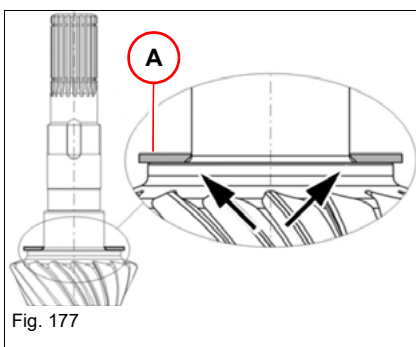


Fig. 177

11. Put the setting disk **A** on the input bevel gear.

- Observe the bevel in the bevel wheel.

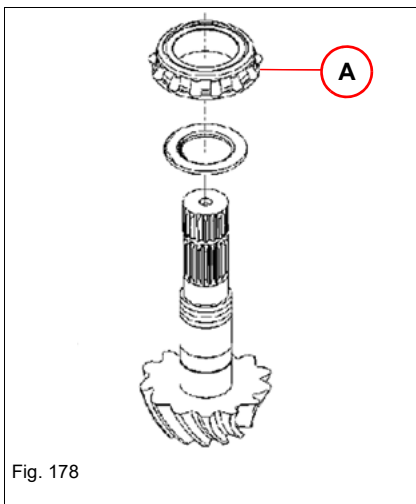
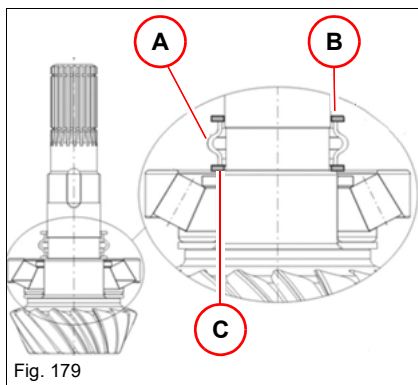


Fig. 178

12. Mount the taper roller bearing **A** on the input bevel gear.

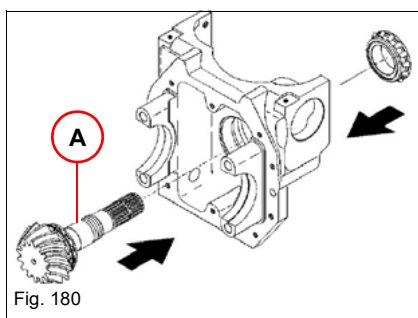


13. Mounting sequence: thrust washer **C**, squeeze bushing **A**, thrust washer **B**.

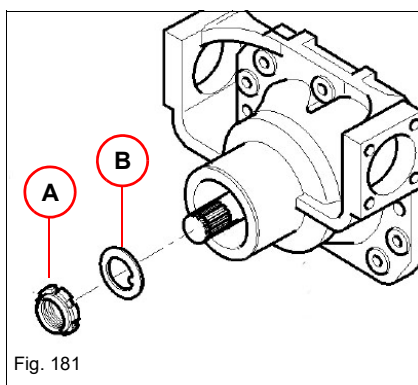


Information

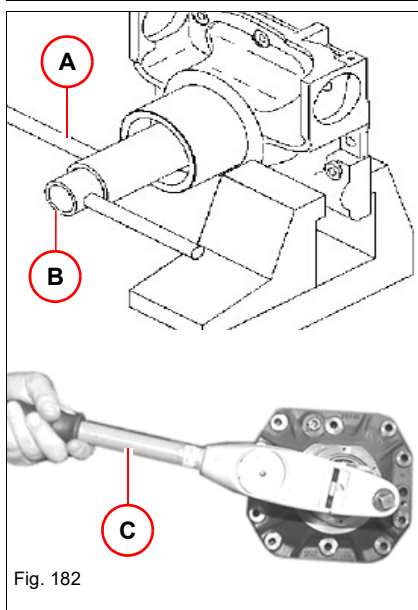
Always replace the squeeze bushing **A**.



14. Position the taper roller bearing **A** in the differential housing.



15. Position the circlip **B** and groove nut **A** on the taper roller bearing.



16. Tighten bearing from the taper roller bearing with special tool **A** and **B** until a rolling torque of 93.3 – 139.9 N is reached.

➔ Checking with a torque sensor **C**.



Information

If the specified rolling torque is exceeded, then replace the squeeze bushing.

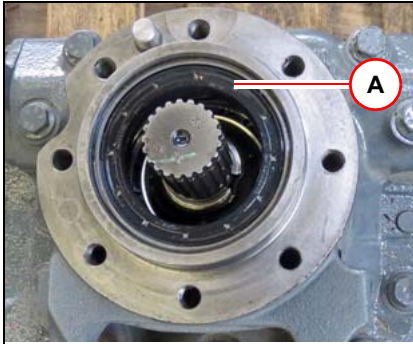


Fig. 183

17. Mount the shaft sealing ring **A** and flange with circlip.

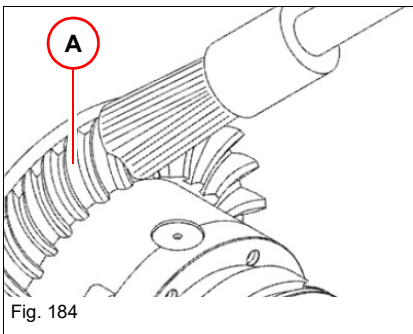


Fig. 184

Check contact pattern

18. With the paste, layer the tooth flanks of the crown wheel **A**.

19. Turn the crown wheel **A** several times in both directions.

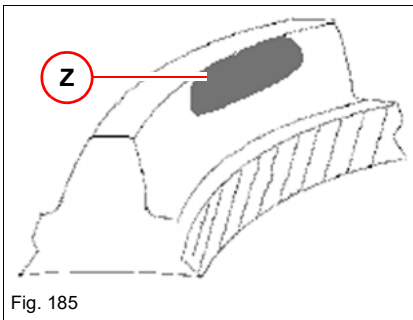


Fig. 185

- If the contact pattern **Z** is too wide above on the crown wheel, then the taper roller bearing must be corrected via the setting disk.
➔ Thinner setting disk

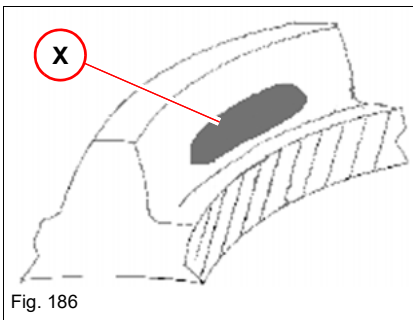
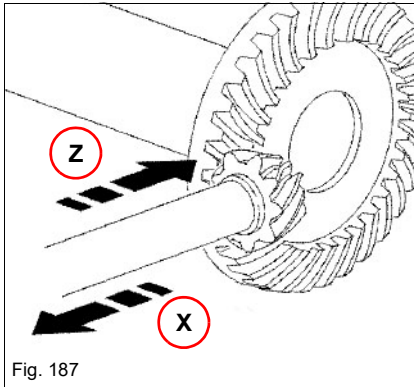
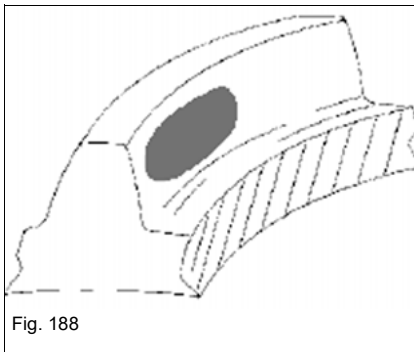


Fig. 186

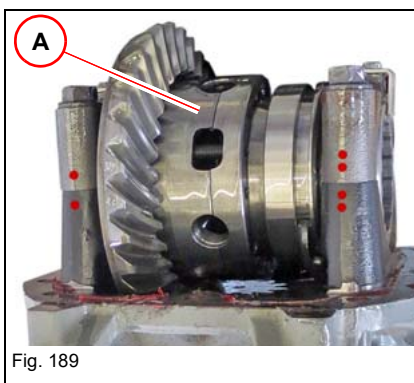
- If the contact pattern **X** is too wide below on the crown wheel, then the taper roller bearing must be corrected via the setting disk.
➔ Stronger setting disk



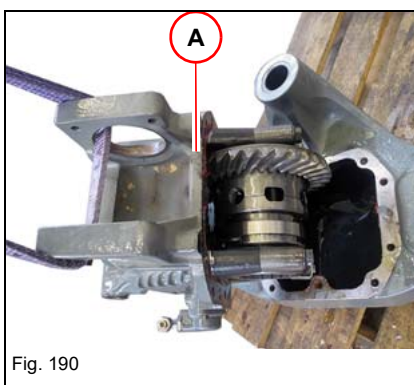
- Towards **Z** – thinner setting disk
- Towards **X** – thicker setting disk



20. If the impression is in the centre of the tooth flank, then the contact pattern is OK.



21. Install balance weight **A**– see ["Removing/mounting balance weight" on page 5-70.](#)



22. Install differential **A**– see ["Remove/install differential front axle" on page 5-66.](#)

5.9 Shift fork differential

Safety instructions for shift fork differential



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
 - ▶ Wear protective gloves
-



DANGER

Injury hazard when lifting heavy components!

Death or serious injury.

- ▶ Use lifting gear of sufficient lifting capacity.
 - ▶ Use functionally safe lifting gear.
 - ▶ Use lifting gear on firm and level ground.
 - ▶ Move the lifting tackle to predefined or suitable position on the component.
-

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
 - ▶ Clean all the hydraulic screw connections and ports before disassembly.
-



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

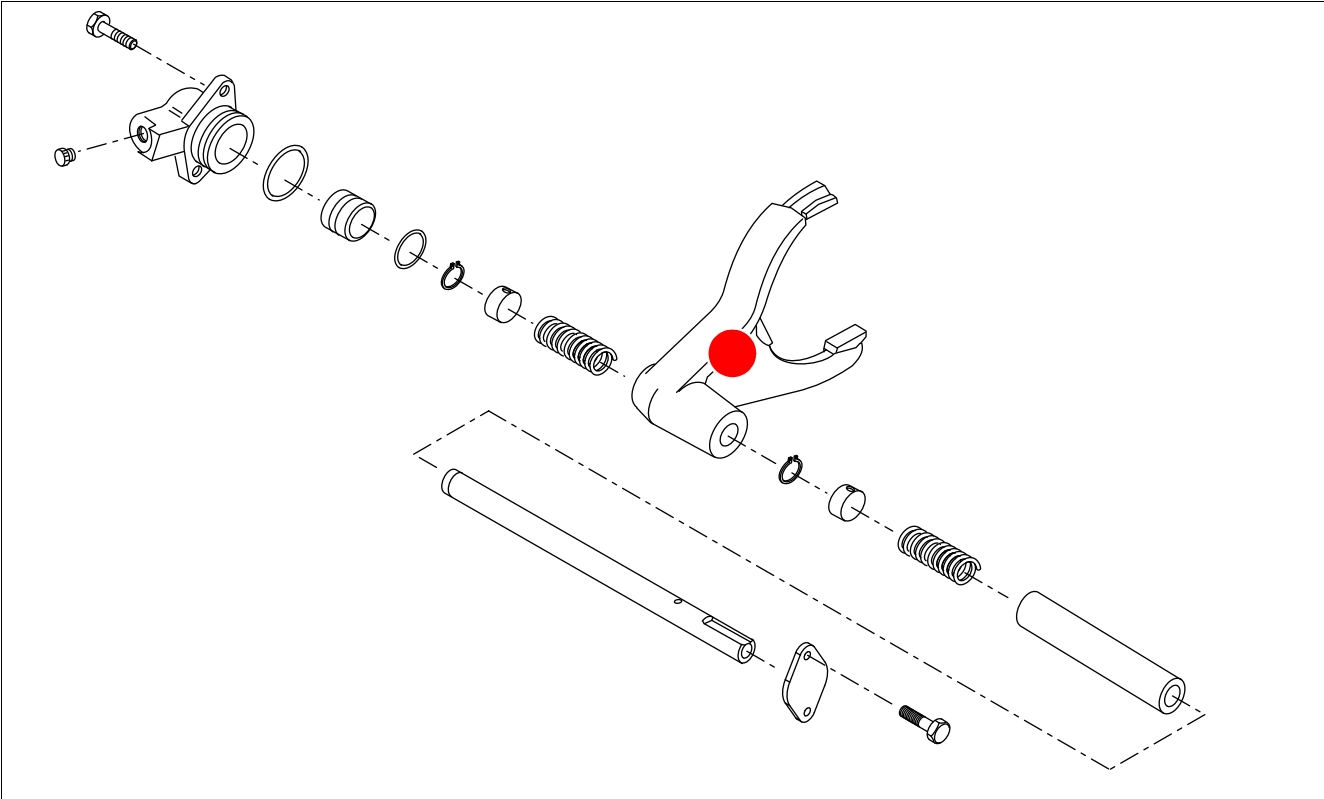
Before starting work, read the safety and preparation instructions carefully

- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Remove/install shift fork differential

- Tools:
- Standard tools

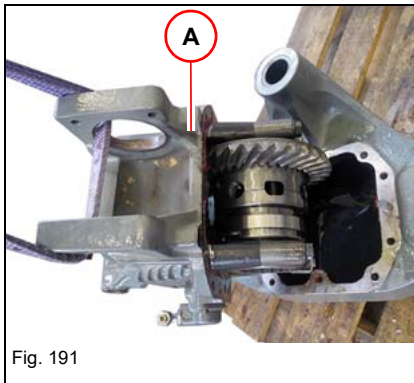
Technical data



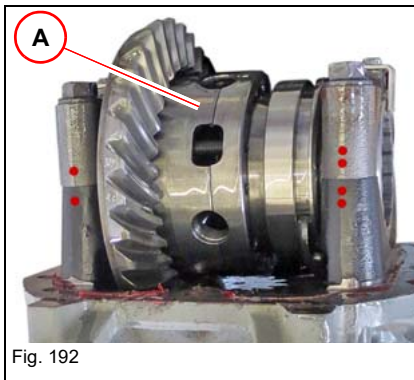
Weight	BMK	Description	Remarks
–	–	Shift fork	–
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove shift fork

1. Remove differential **A**– see *"Remove/install differential front axle" on page 5-66.*

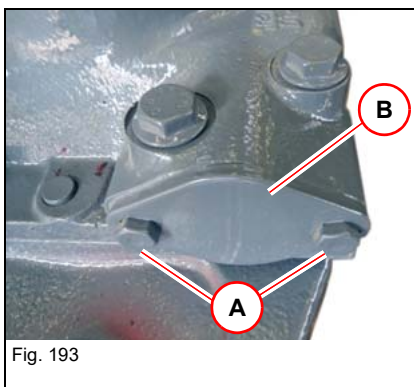


2. Remove balance weight **A**– see *"Removing/mounting balance weight" on page 5-70.*



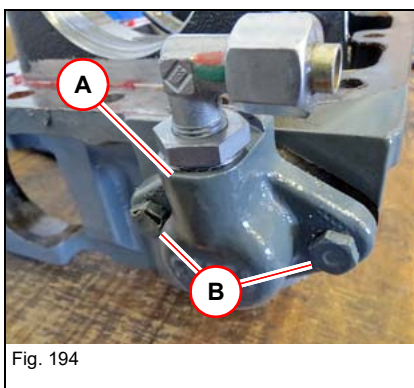
On differential housing right

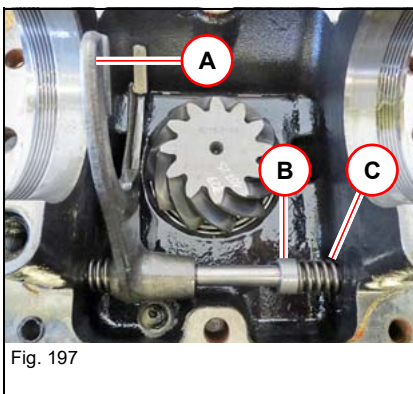
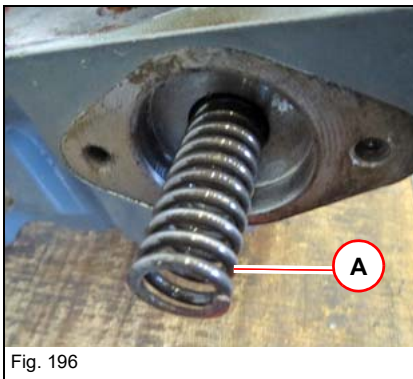
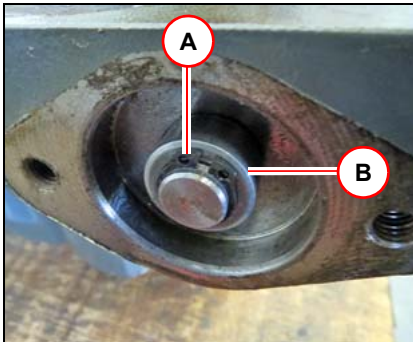
3. Remove screws **A** and remove cover **B**.



On differential housing left

4. Remove screws **B** and release and remove cylinder **A**.





5. Remove circlip **A**.



CAUTION

Danger of injury as a result of vehicle parts under tension!

Spring is under tension

► Carefully remove circlip **A**.

6. Remove spacer ring **B**.

7. Push shift fork left and remove spring **A**.

8. Push shift fork **A** to right spring plate **B**, remove spring **C** and sleeve from shaft.

9. Take out shaft.

10. Carefully clean all individual parts.

Install shift fork

1. Install circlip **B** on the shaft **A**.

NOTICE

Circlip **B** not yet snapped into the nut.

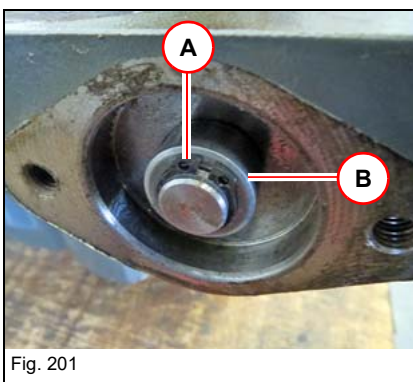
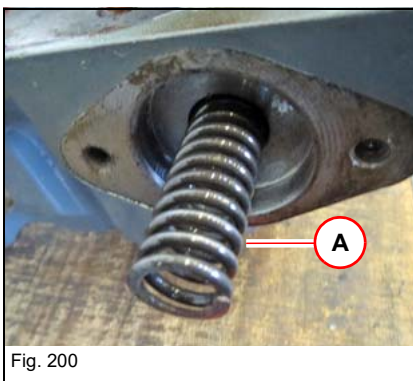
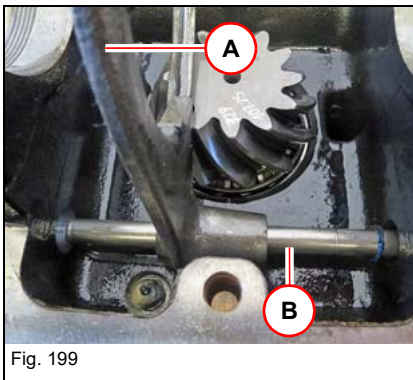
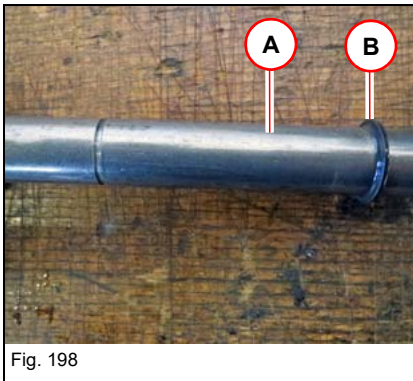
2. Push the shift fork onto the shaft **A**.

3. Apply shift fork **A** with shaft **B** in the differential housing.

From the left side (cylinder side):

4. Push in spring **A**.

5. Mount spacer ring **B** and circlip **A**.



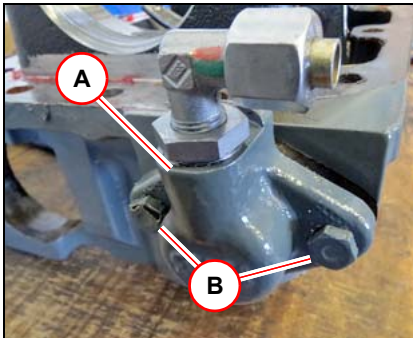


Fig. 202

6. Place cylinder **A** with new seals.
7. Fit fastening screws **B** and tighten to 27.6 Nm (20 lbf ft).

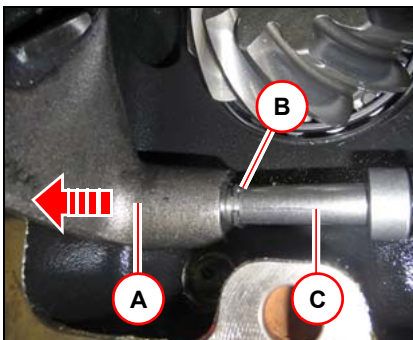


Fig. 203

8. Push shift fork **A** to the left and mount circlip **B** in the nut of the shift shaft **C**.

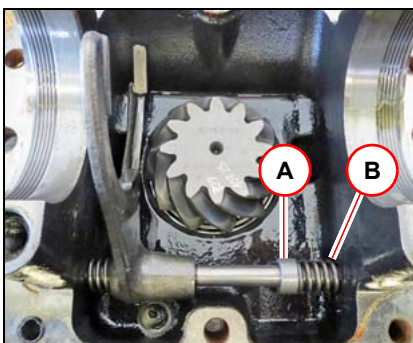


Fig. 204

9. Push the spring plate **A** and spring **B** with sleeve onto the shaft.

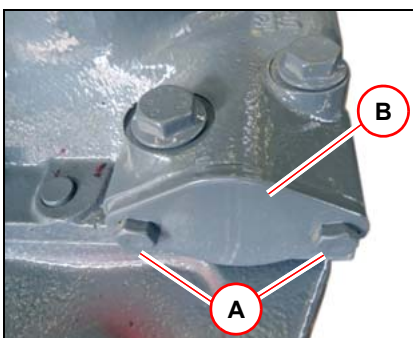


Fig. 205

10. Lubricate differential housing with sealant.
11. Position the cover **B** and insert the fastening screws **A** and tighten to 27.6 Nm (20 lbf ft).

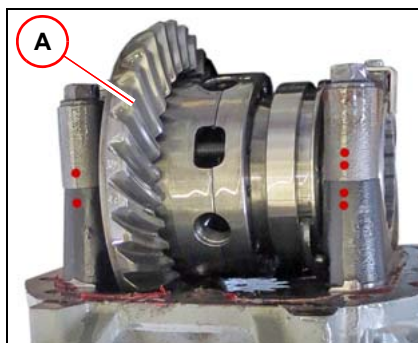


Fig. 206

12. Install balance weight **A**– see *"Removing/mounting balance weight" on page 5-70.*

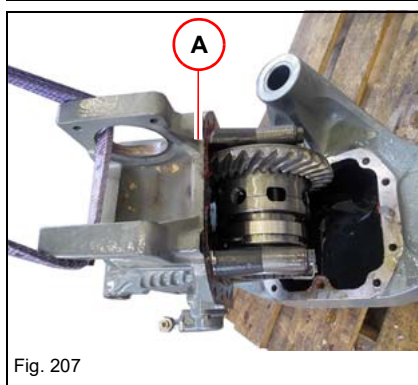


Fig. 207

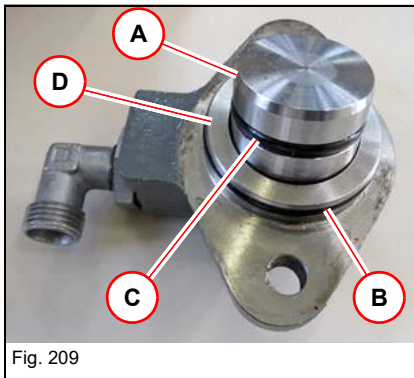
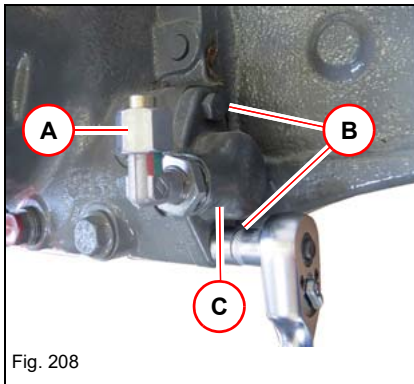
13. Install differential **A**– see *"Remove/install differential front axle" on page 5-66.*

Remove/install cylinder differential lock

Seal cylinder

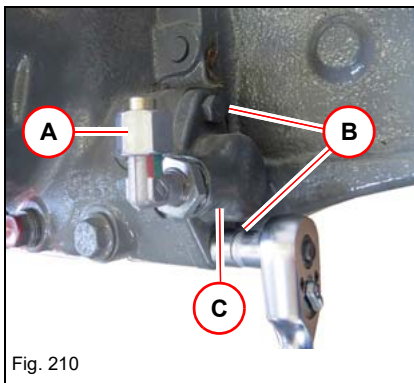
On differential housing right (viewed in travel direction):

1. Remove hose pipe **A** and seal tightly.
2. Remove fastening screws **B** and take off cylinder **C**.



3. Pull pistons **A** out of cylinder **D**.
4. Replace the circlip **B** and lightly grease.
5. Replace the circlip **C** and lightly grease.
6. Insert pistons **A** into cylinder **D**.

7. Position the cylinder **C** and insert the fastening screws **B** and tighten to 27.6 Nm (20 lbf ft).
8. Mount and tighten hose pipe **A**.



5.10 Rear axle differential

Safety instructions for differential rear axle



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
- ▶ Wear protective gloves



DANGER

Injury hazard when lifting heavy components!

Death or serious injury.

- ▶ Use lifting gear of sufficient lifting capacity.
- ▶ Use functionally safe lifting gear.
- ▶ Use lifting gear on firm and level ground.
- ▶ Move the lifting tackle to predefined or suitable position on the component.

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- ▶ Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

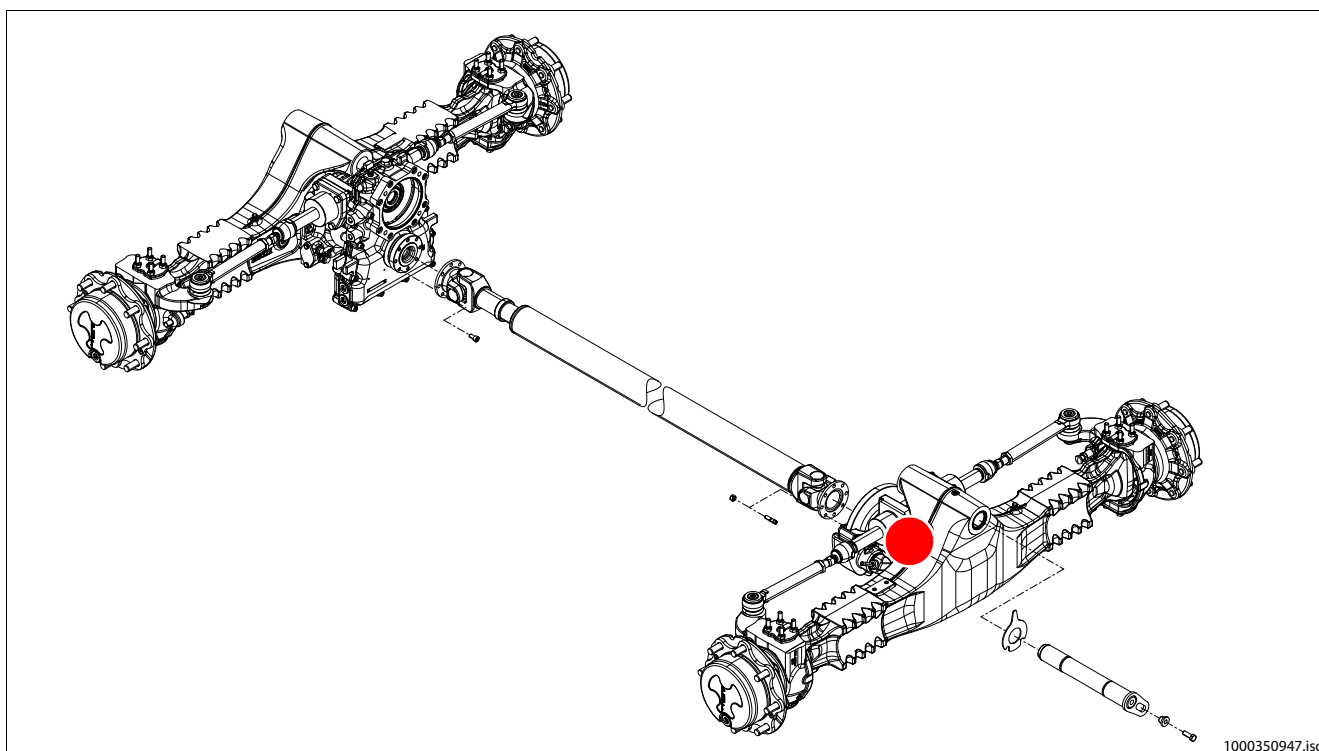
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install differential rear axle

Tools:

- Movable car jack, load-bearing capacity min. 5000 kg (11,023 lb)
- 2x axle stands, load-bearing capacity of min. 5000 kg (11,023 lb)
- Suitable lifting gear, minimum load-bearing capacity 500 kg (1102 lb.)
- Suitable slings (cables and shackles) with corresponding load-bearing capacity
- Suitable receptacle for the gearbox oil
- Special tools
- Standard tools

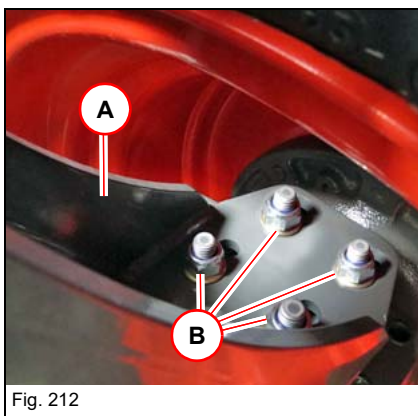
Technical data



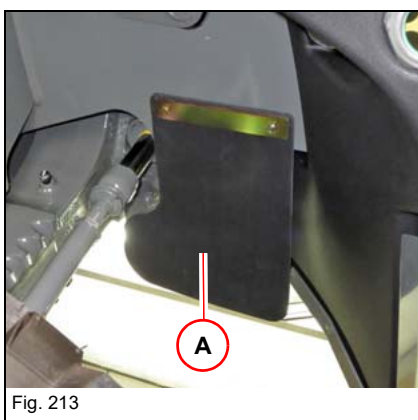
Weight	BMK	Description	Remarks
—	—	Differential housing	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove differential

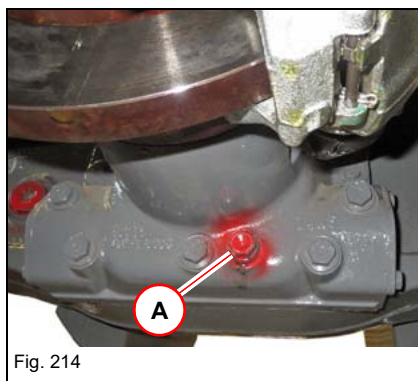
1. Park the machine on firm, level and dry ground.
2. Apply the parking brake.
3. Turn the machine off and remove the ignition key.
4. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
5. Dismount underride protection – see *"Remove/install underride protection (closed)" on page 12-11.*
6. Remove cardan shaft from rear axle – see *"Removing/installing the cardan shaft" on page 4-2.*
7. Jack vehicle up on rear axle.
8. Remove wheels from rear axle – see *"Removing the wheels" on page 1-135.*



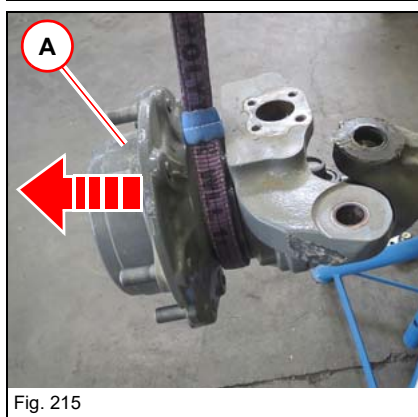
9. Remove nuts on each side **B** of the wheel covers **A** and take off wheel covers **A**.



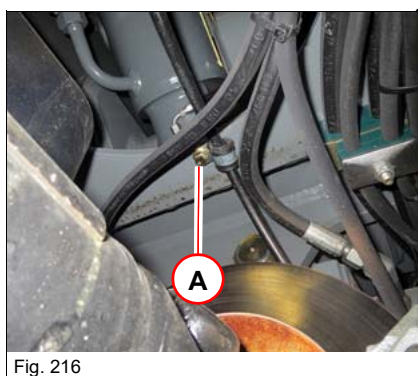
10. Remove cover **A** rear left and right.



11. Completely drain gearbox oil from rear axle at the plug **A** – see *"Check/top-up oil on differential lock (rear axle)" on page 1-120.* – see *"Check/top-up oil on differential lock (front axle)" on page 1-122*

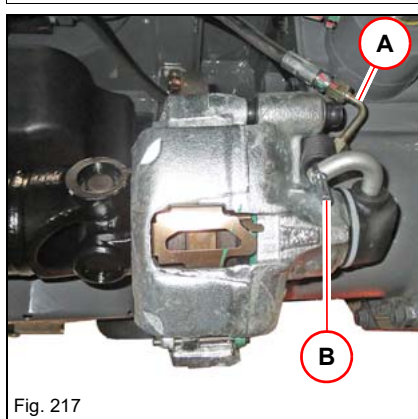


12. Remove planetary drive **A** left and right – see *"Remove/install planetary drive" on page 5-28.*



13. Release the parking brake.

14. Dismount the clamp **A** of the hand brake cable via the brake disc at the frame.



15. Remove the brake hose **A**.

16. Detach the wire pull **B** at the brake calliper.

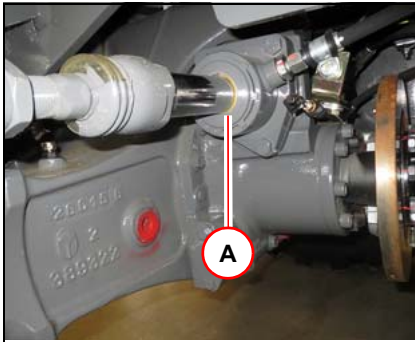


Fig. 218

17. Remove steering cylinder **A** of the rear axle – see *"Remove/install steering cylinder" on page 7-13.*

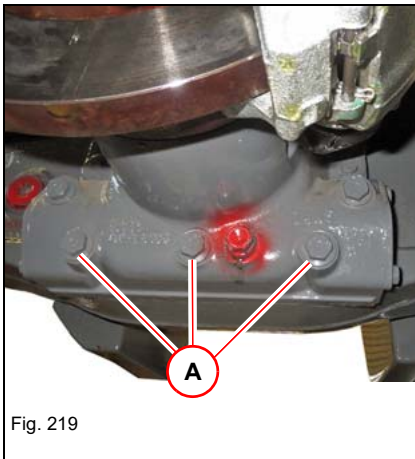


Fig. 219

18. Remove fastening screws **A** below on the differential.

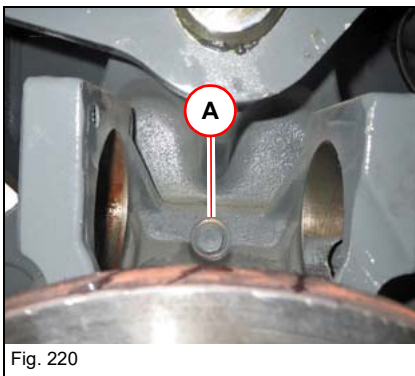


Fig. 220

19. Remove fastening screw **A** at the top of the differential.

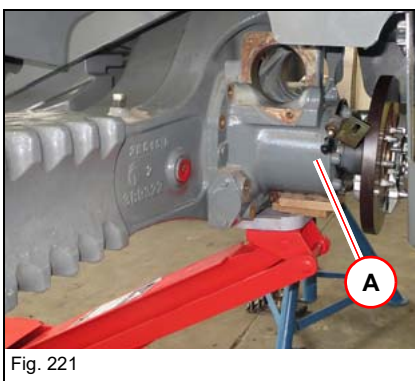


Fig. 221

20. Securely support differential housing **A** with mobile jack.

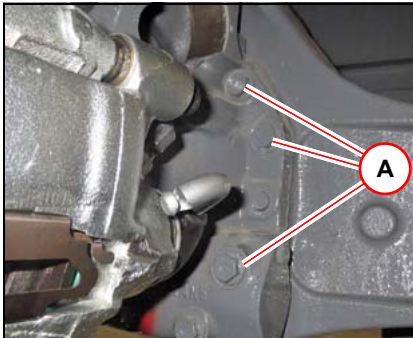


Fig. 222

21. Remove fastening screws **A** left on the differential.

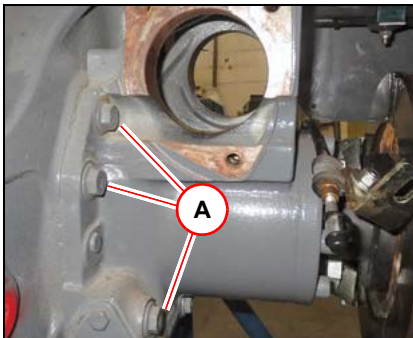


Fig. 223

22. Remove fastening screws **A** right on the differential.

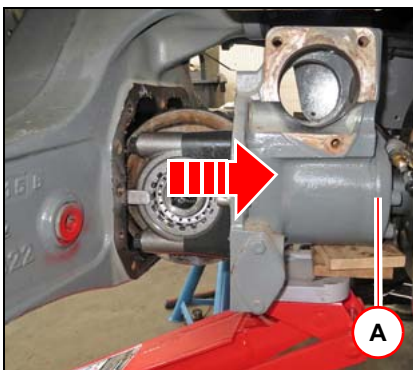


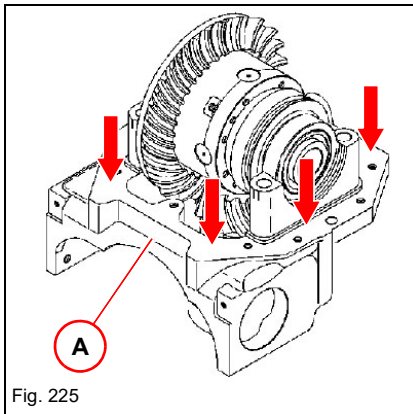
Fig. 224

23. Release differential housing **A** with a rubber hammer and drive out forwards.

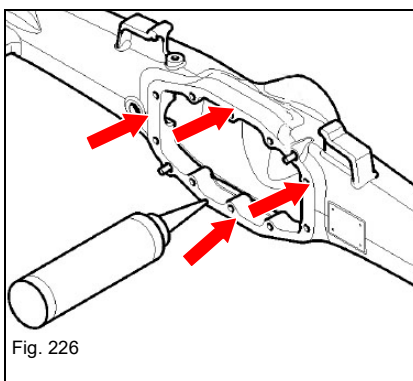
24. Lower differential housing **A** and discard securely.

Install differential housing

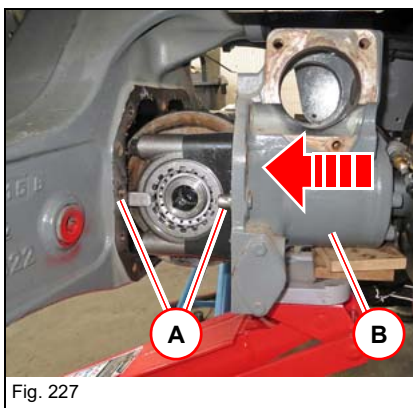
1. Clean the sealing surface at the differential housing **A** (oil and grease-free).



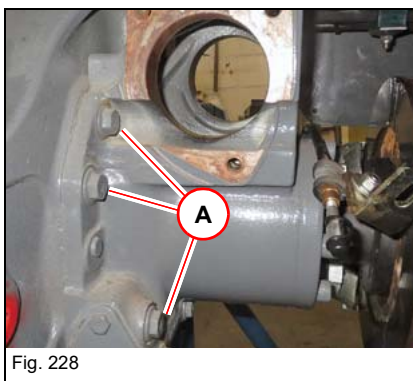
2. Clean sealed area on axle carrier (oil and grease-free).
3. Lubricate the sealed area on the axle carrier with sealant Loctite®510.

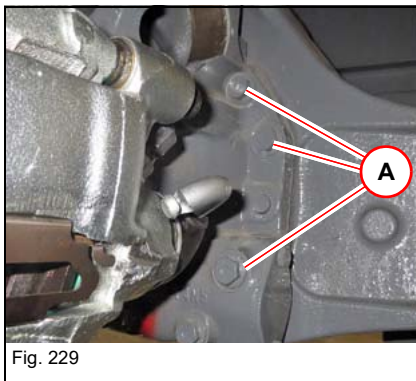


4. Mount differential **B** onto mobile jack and lift to assembly height.
5. Carefully retract differential **B**.
6. Ensure that the dowel pins **A** align with the holes **A** in the axle body.

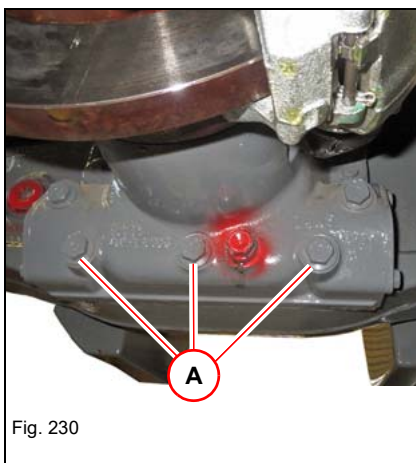


7. Apply the fastening screws **A** to the left at the differential and hand-tighten.

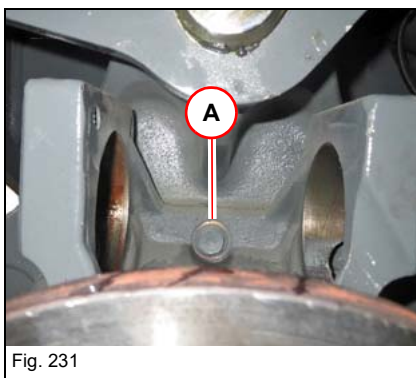




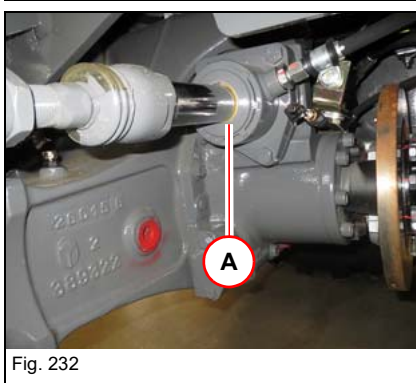
8. Apply the fastening screws **A** to the right at the differential and hand-tighten.
9. Lower the jack below the differential and remove.



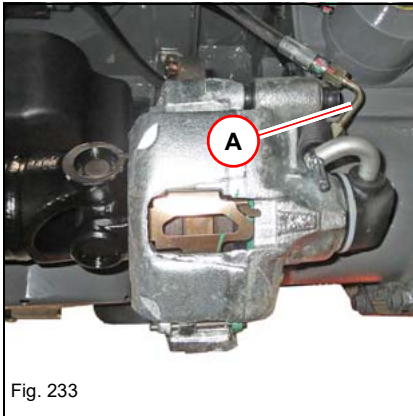
10. Apply the fastening screws **A** below at the differential and hand-tighten.



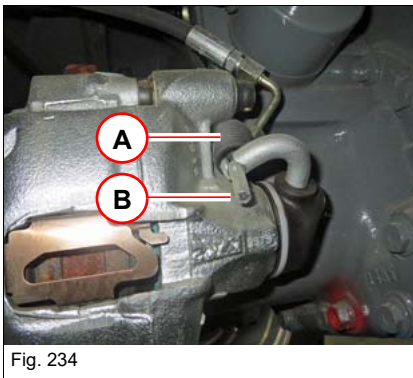
11. Apply the fastening screws **A** at the top at the differential and hand-tighten.
12. Tighten all fastening screws **A** on the differential evenly to 169 Nm (125 lbf ft).



13. Install steering cylinder **A** of the rear axle – see ["Remove/install steering cylinder" on page 7-13](#).



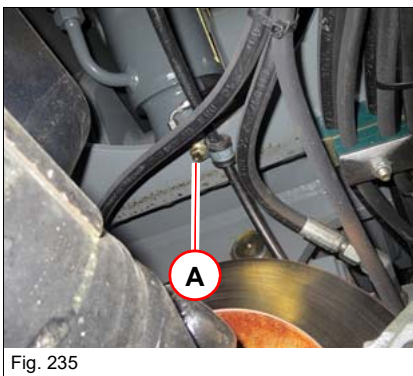
14. Position hydraulic hose **A** of the brake and tighten with 23 Nm (17 lbf ft).



15. Push hand brake line **B** into the brake caliper.

16. Push rubber grommets **A** via the hand brake line **B**.

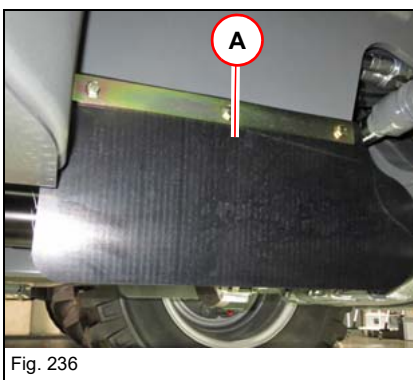
17. Hook up the hand brake cable **B** at the brake caliper.



18. Mount the clamp **A** of the hand brake cable via the brake disc at the frame.

19. Install the planetary drive – see ["Remove/install planetary drive" on page 5-28](#).

20. Mount cardan shaft from rear axle – see ["Removing/installing the cardan shaft" on page 4-2](#).



21. Pull cover tight **A** rear left.

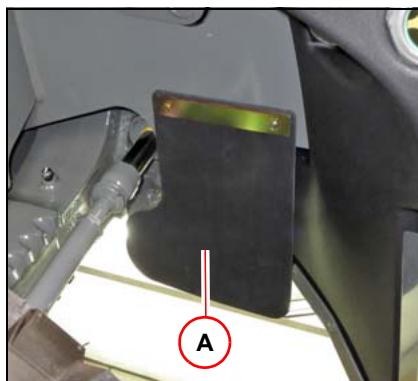


Fig. 237

22. Pull cover tight **A** rear right.

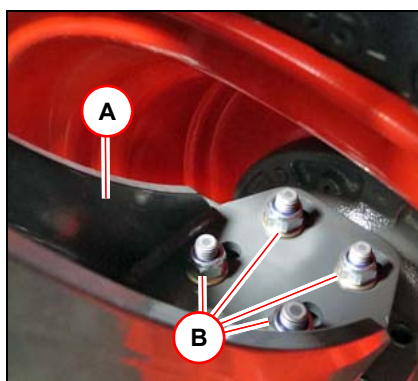


Fig. 238

23. Position wheel covers **A** with mount and tighten fastening nuts **B**.



Fig. 239

24. Mount cardan shaft from rear axle – see ["Removing/installing the cardan shaft" on page 4-2](#).

25. Mount corresponding wheel – see ["Mounting wheels" on page 1-136](#).

26. Fill axle with oil – see ["Check/top-up oil on differential lock \(front axle\)" on page 1-122](#)

27. Adjust the parking brake [Adjusting the parking brake on page 6-29](#).

28. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).

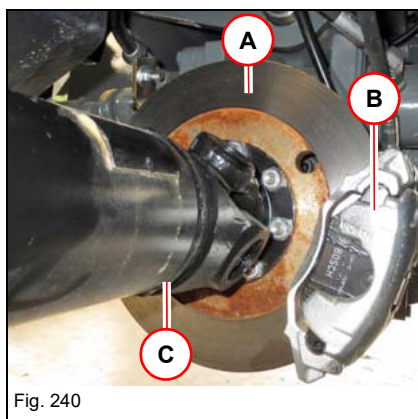
29. Bleed the braking system and check for proper functioning and tightness – see ["Change and vent the brake fluid" on page 1-129](#).

30. Make a test run.

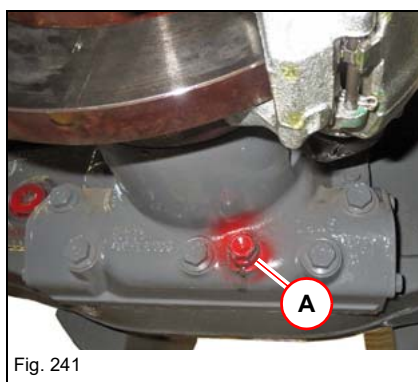
31. Mount the underride protection – see ["Remove/install underride protection \(closed\)" on page 12-11](#).

Replace shaft sealing ring on differential

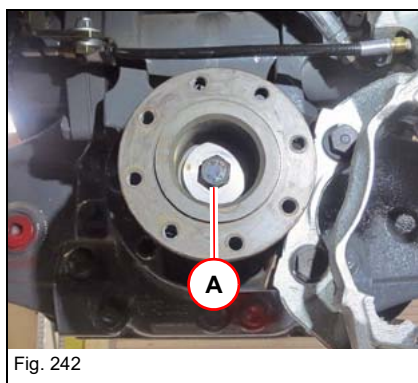
Remove shaft sealing ring



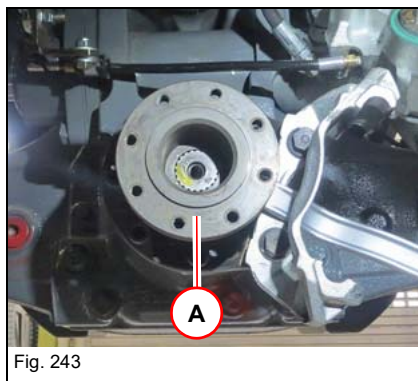
1. Remove the cardan shaft **C** on the rear axle – see *"Removing/ installing the cardan shaft" on page 4-2.*
2. Remove brake caliper **B** and affix laterally with cable ties – see *"Remove/install the brake caliper" on page 6-10.*
3. Remove brake disc **A**– see *"Remove/install the brake disc" on page 6-17.*



4. Completely drain gearbox oil from rear axle from at the plug **A**– see *"Check/top-up oil on differential lock (rear axle)" on page 1-120.*



5. Remove central screw **A**.



6. Carefully pull flange **A** off using suitable tools.

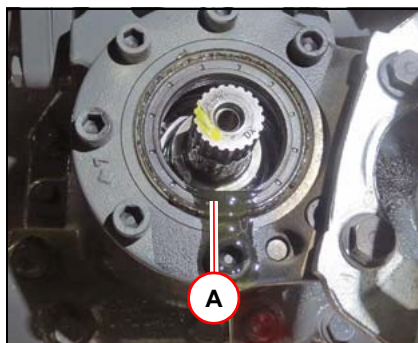


Fig. 244

7. Remove shaft sealing ring **A** with an internal puller.

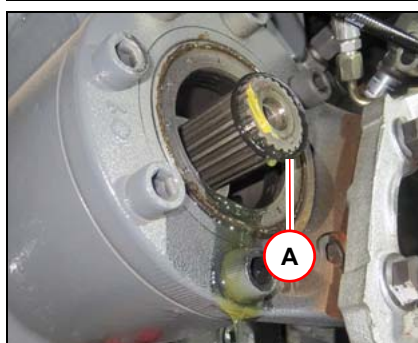


Fig. 245

8. Take out sealing ring **A**.

Insert shaft sealing ring

1. Clean the sealing surface at the differential housing (oil and grease-free).
2. Clean shaft and lightly grease.
3. Lightly grease new sealing ring **A** and push onto the shaft.

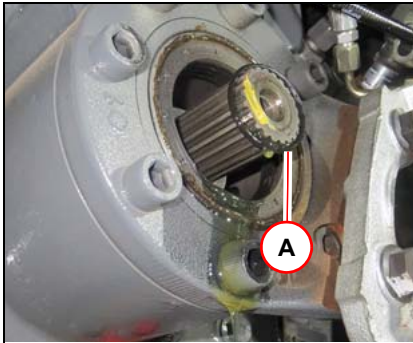


Fig. 246

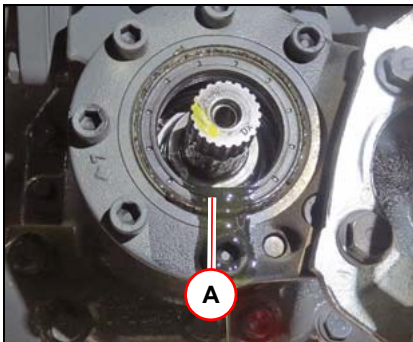


Fig. 247

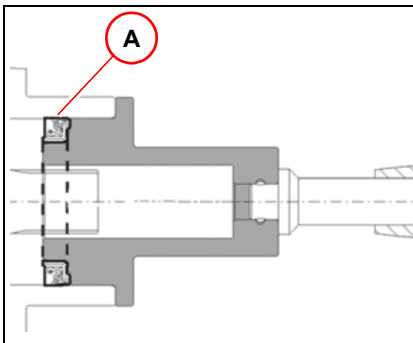


Fig. 248

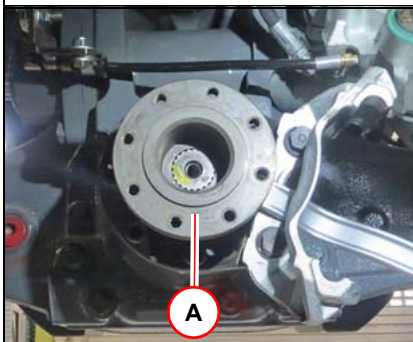


Fig. 249

4. Install shaft seal ring **A** using specialist tool.
5. Lightly grease the shaft seal **A**.

6. Clean flange **A** and push onto shaft.

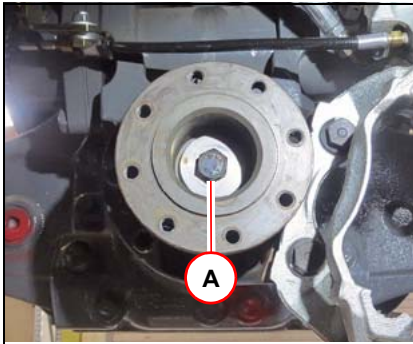


Fig. 250

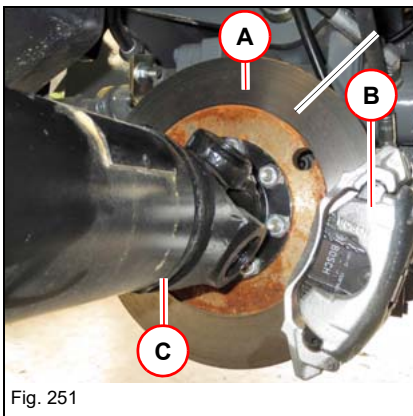


Fig. 251

7. Insert central screw **A** and tighten to 139 Nm (52 lbf ft).

8. Install brake disc **A**– see *"Remove/install the brake disc" on page 6-17.*

9. Install brake caliper **B**– see *"Remove/install the brake caliper" on page 6-10.*

10. Install the cardan shaft **C** on the rear axle – see *"Removing/installing the cardan shaft" on page 4-2.*

11. Fill axle with oil – see *"Check/top-up oil on differential lock (front axle)" on page 1-122*

12. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*

13. Make a test run.

5.11 Track setting

Safety instructions for wheel alignment



Information

Before starting work, read the safety and preparation instructions carefully

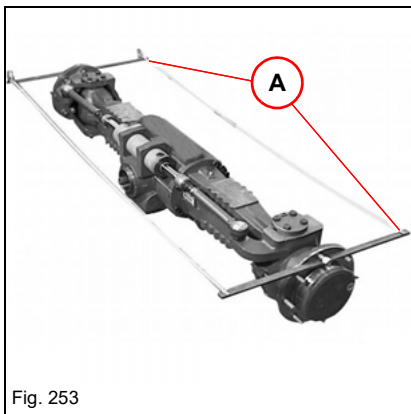
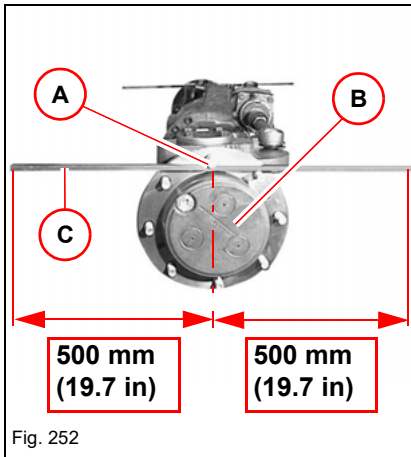
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Tools:

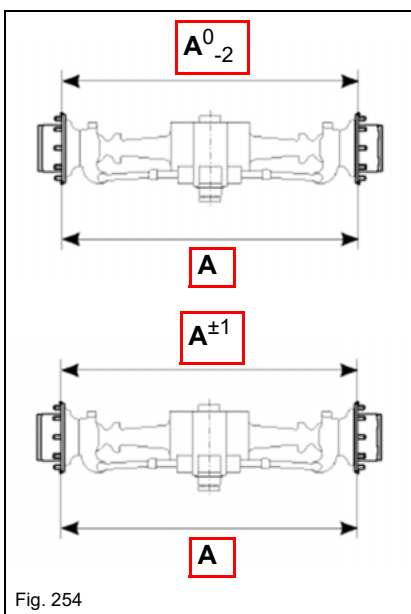
- 2x 1 m (3.28 ft) long metal bars

Adjusting the track

1. Affix 2 metal bars **C** as presented parallel to one another on the planetary drive **B**.
2. Fix metal bars **C** with nuts **A** to the planetary drives **B**.

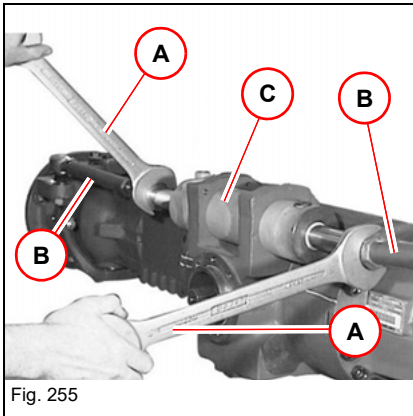


3. Measure the distance between the ends of the metal bars **A**.

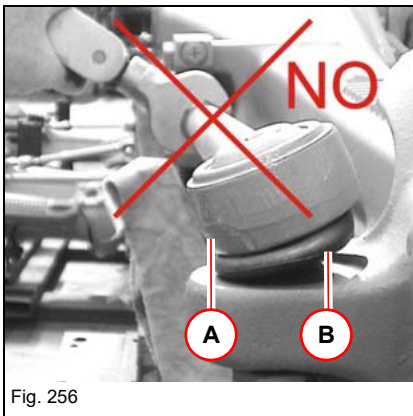


4. Check whether the different in wheel alignment is within the tolerance:

- Front axle: deviation for track rod side - 2 mm (- 0.08 in)
- Rear axle: deviation for track rod side ± 1 mm (± 0.04 in)



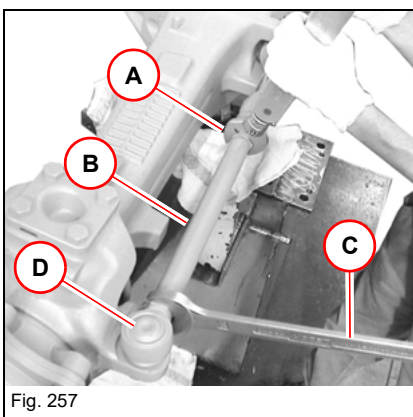
5. In the event that the wheel alignment is incorrect:
using 2 spanners **A** on the steering cylinder **C** turn the track rods **B** as far in or out until the wheel alignment is correct.



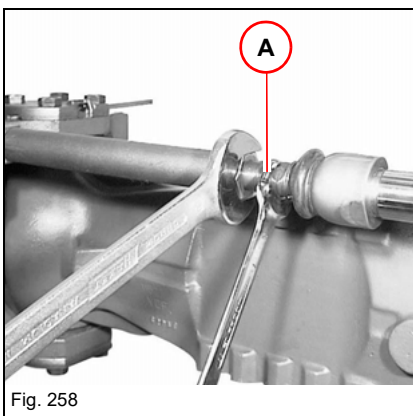
NOTICE

Damage to the seal **B** on the track rod end **A** due to incorrect installation!

- Hold the track rod end **A** in position using a spanner.



6. Hold the track rod end **D** in position with a spanner **C** against twisting.
7. Tighten nut **A** on the track rod **B**.



8. After setting the wheel alignment, tighten the locking nut **A** to 250 Nm (184 lbf ft).

6 Brakes

6.1 Brake pedal

Safety instructions for brake pedal



Environment

Use a suitable container to collect the brake fluid as it drains and dispose of it in an environmentally friendly manner!



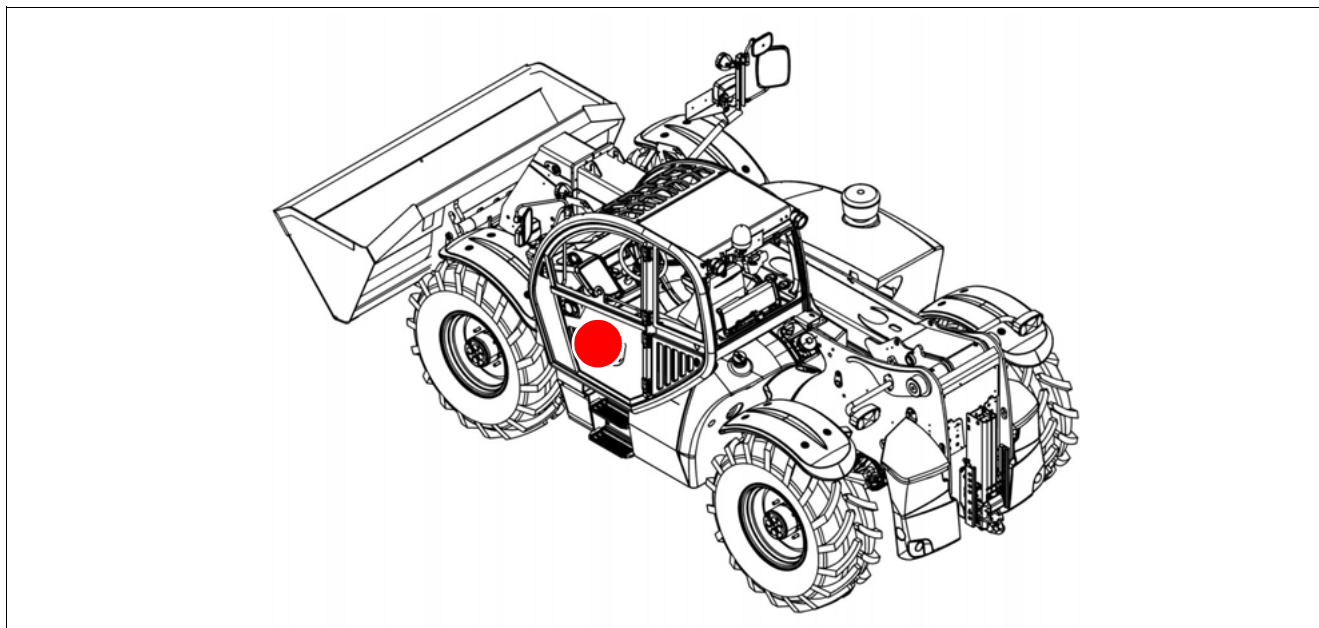
Information

Before starting work, read the safety and preparation instructions carefully

- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Adjust brake pedal

Technical data



Weight	BMK	Description	Remarks
–	–	Brake pedal	–
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

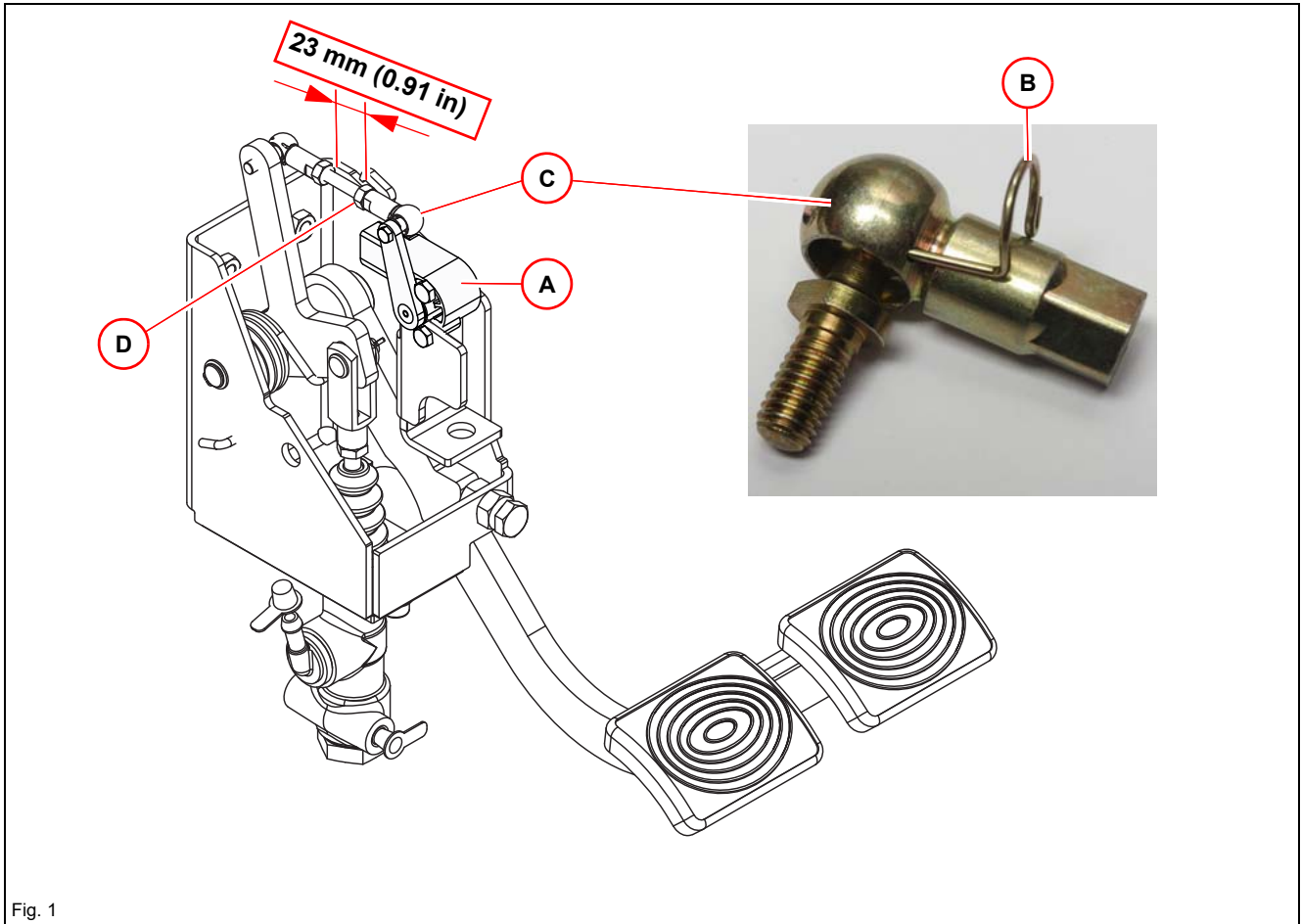


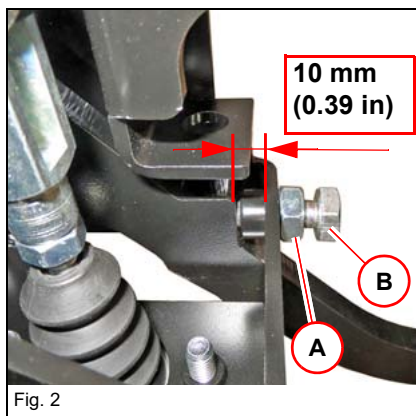
Fig. 1

Adjusting rod assembly to inch potentiometer

1. Check dimension 23 mm (0.91 in) (from nut to nut).
 - ➡ Dimension ok, then continue with [Adjust brake pedal on page 6-2](#).
 - ➡ Dimension not ok, so continue with the next step.
2. Unhook nut retention **B** on ball head **C**.
3. Unhook ball head **C** on potentiometer **A**.
4. Loosen locknut **D**.
5. Adjust and check the dimension of 23 mm (0.91 in) (from nut to nut) by turning the ball head **C**.
6. Hook ball head **C** on potentiometer **A**.
7. Hook nut retention **B** on ball head **C**.
8. [Adjust brake pedal on page 6-2](#).

Adjusting brake pedal stop screw

1. Check size 10 mm (0.39 in).
 - ➡ If dimension is OK, install pedal
 - ➡ If dimension is not OK, continue with next step
2. Loosen locknut **A**.
3. Adjust and check the dimension 10 mm (0.39 in) by turning the screw **B**.
4. Recalibrate inch potentiometer **R002** using the diagnostics tool.



6.2 Replacing brake linings

Safety instructions for changing brake pads



Information

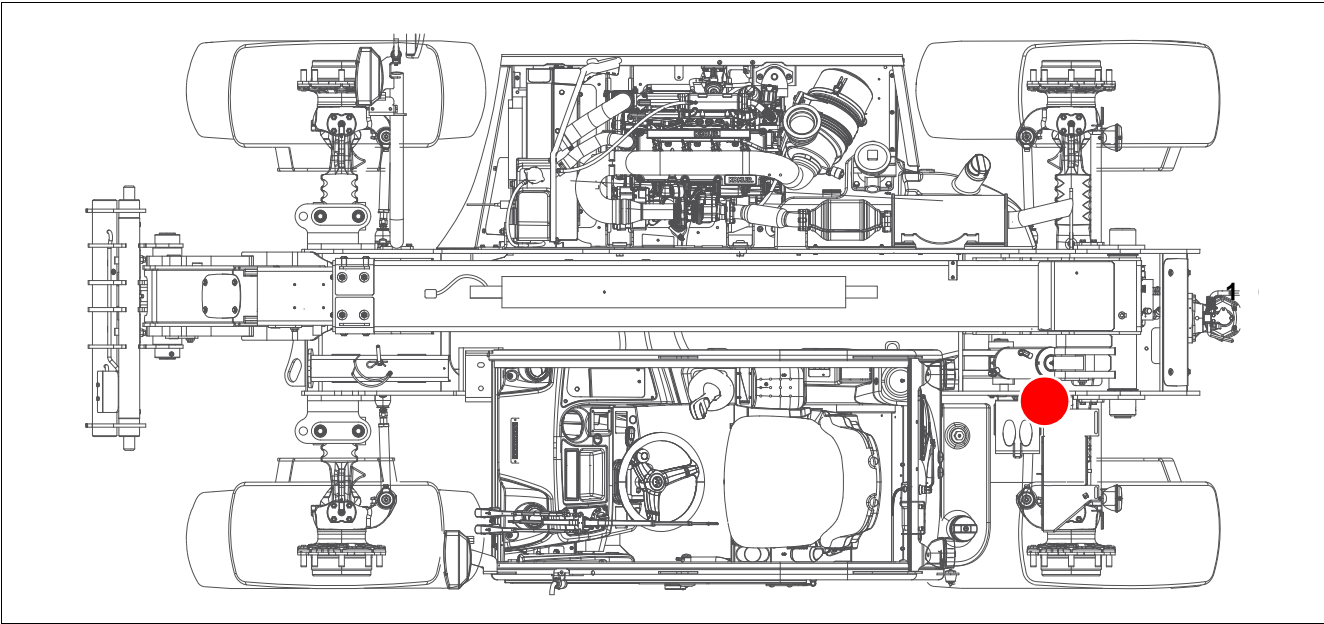
Before starting work, read the safety and preparation instructions carefully

- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Replacing brake linings

- Tools:
- Standard tools
 - Customary brake adjustment tool

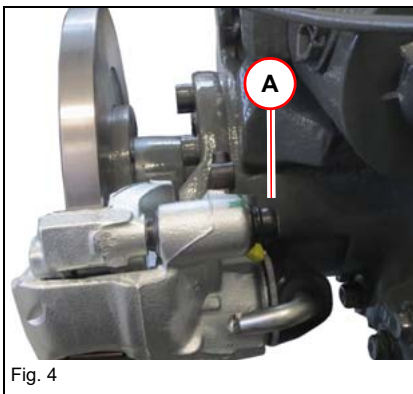
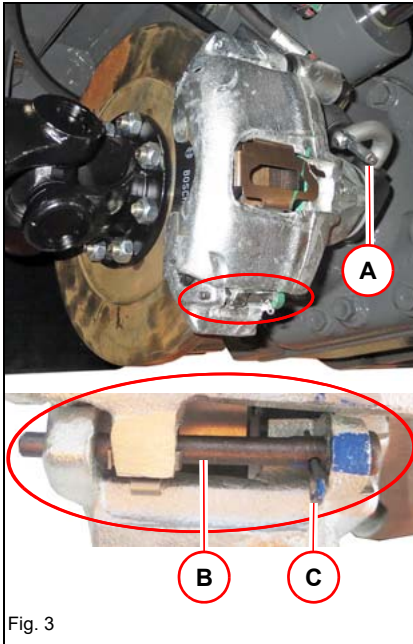
Technical data



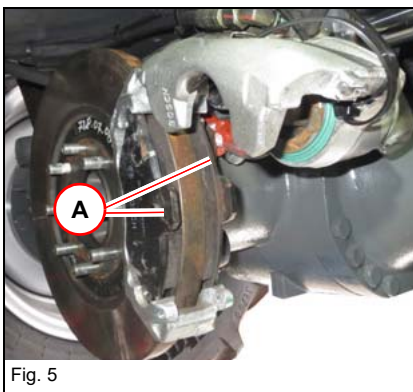
Weight	BMK	Description	Remarks
—	—	Brake pads	—
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Replacing brake linings

1. Unhook wire pull **A** at the brake caliper and pull out the wire pull **B** completely from the brake caliper.
2. Remove lock pin **C**.
3. Drive out the bearing pin **B** with a punch.



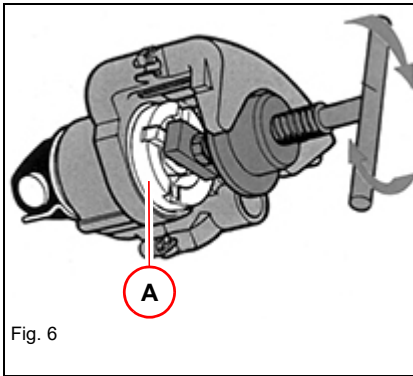
4. Unscrew the allen head screw **A** and take out the brake caliper.
5. Hang the brake caliper to the side.



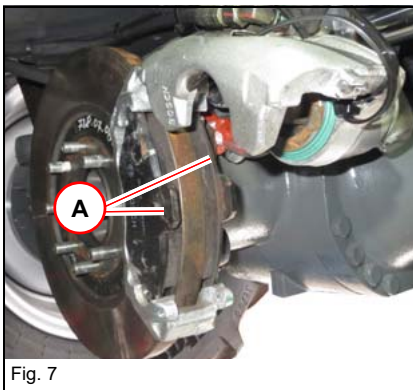
6. Take out the brake linings **A** from the brake caliper.

6 Brakes

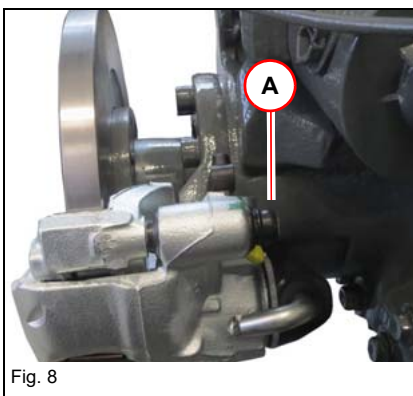
Replacing brake linings



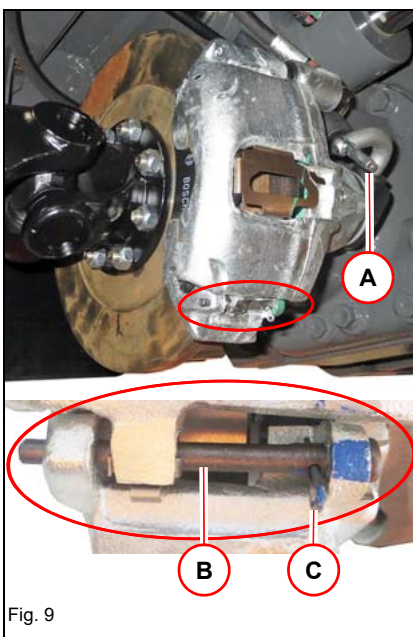
7. Push back the brake cylinder piston **A** by turning and pressing it.
8. Clean the contact areas of brake cylinder piston **A** and retainer.



9. Clean the contact area on the bulkhead for the brake linings.
10. Insert new brake linings **A**.



11. Position brake caliper on the bulkhead and tighten allen head screw **A**.



12. Insert bearing bolt **B**.
13. Attach lock pin **C**.
14. Hook up wire rope **A** on brake caliper.
15. Operate the brake several times until a noticeable resistance is reached on the brake pedal.
16. Check the brake fluid level in the brake-fluid reservoir – see ["Checking/adding brake fluid" on page 1-128](#).
17. Carry out functional check and leak test.

6.3 Brake caliper

Safety instructions for brake caliper



Environment

Use a suitable container to collect the brake fluid as it drains and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

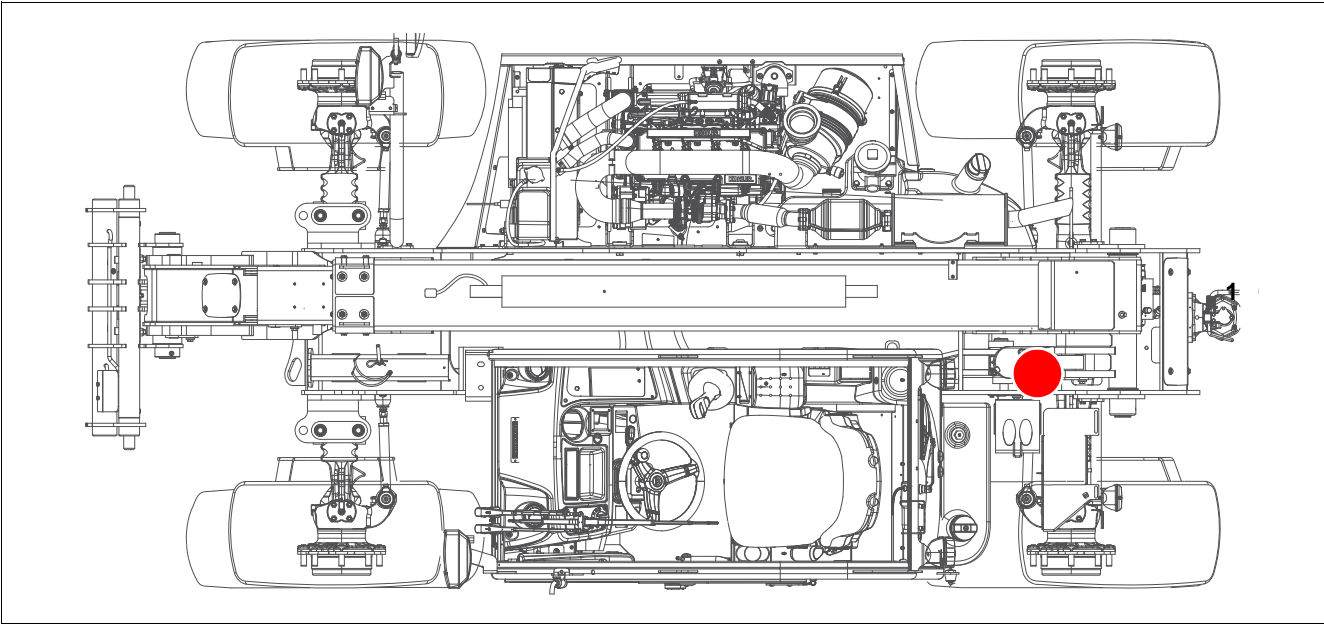
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Remove/install the brake caliper

Tools:

- Standard tools
- Suitable receptacle for collecting the brake fluid
- Plugs (different sizes) for closing the brake lines

Technical data



Weight	BMK	Description	Remarks
5.5 kg (12 lb)	161	Brake caliper	—
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Removing the brake calliper

1. Park the machine on firm, level and dry ground in the vicinity of the charging station or a power source.
2. Apply the parking brake.
3. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
4. Jack up the vehicle on the rear axle ensuring stability.
5. Release the parking brake.
6. Dismount the clamp **A** of the hand brake cable via the brake disc at the frame.

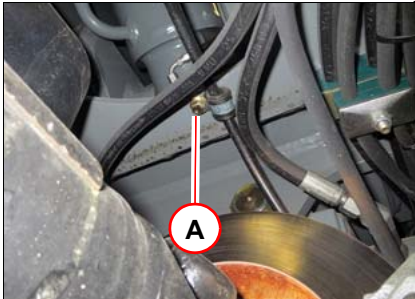


Fig. 10

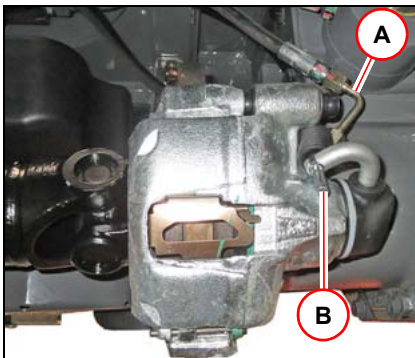


Fig. 11

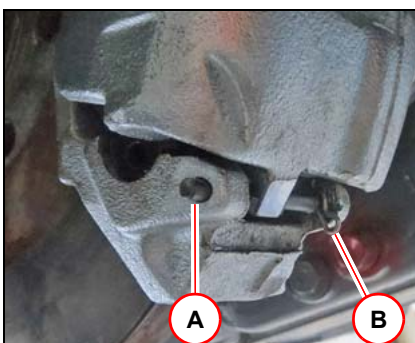


Fig. 12

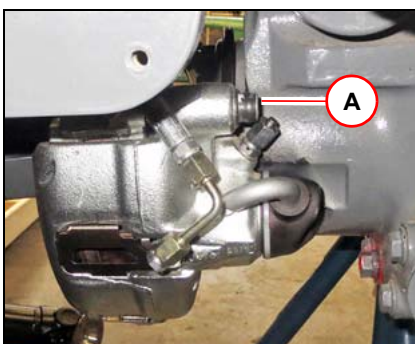


Fig. 13

7. Remove brake line **A** and seal oil-tight on both sides.
8. Detach the wire pull **B** at the brake caliper.
If applicable, first release brake wire pull on hand brake lever – see *"Parking brake" on page 6-25*.

9. Remove locking pin **B**.
10. Pull out bearing pins **A**.

11. Unscrew socket screw **A**.
12. Take out brake caliper.

Install the brake caliper

1. Position brake caliper.
2. Mount and tighten socket screw **A** using Loctite® 242.

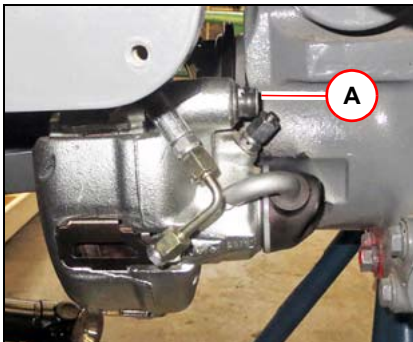


Fig. 14

3. Push in bearing pins **A**.
4. Install locking pin **B**.

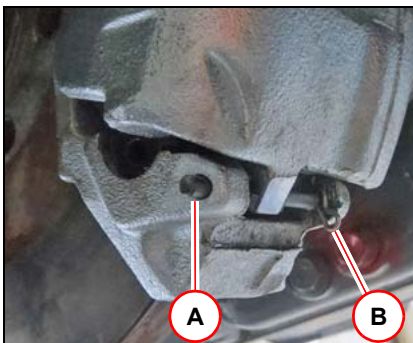


Fig. 15

5. Position hydraulic hose **A** of the brake and tighten with 23 Nm (17 lbf ft).

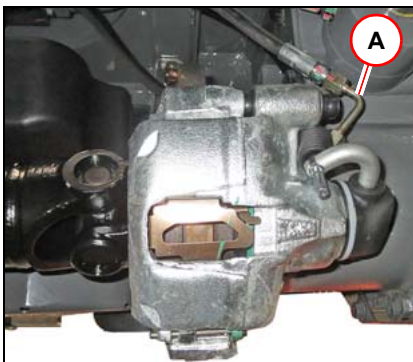


Fig. 16

6. Push hand brake line **B** into the brake caliper.
7. Push rubber grommets **A** via the hand brake line **B**.
8. Hook up the hand brake cable **B** at the brake caliper.

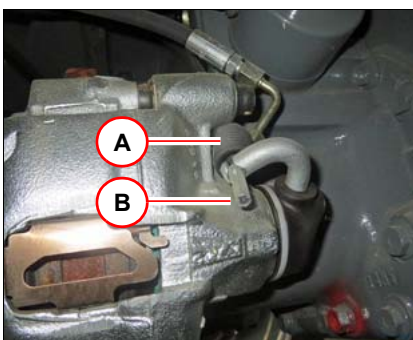


Fig. 17

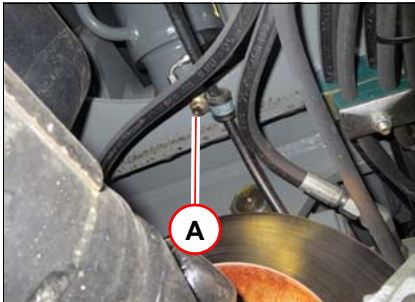


Fig. 18

9. Mount the clamp **A** of the hand brake cable via the brake disc at the frame.
10. [Adjusting the parking brake on page 6-29.](#)
11. Bleed the braking system and check for proper functioning and tightness – see ["Change and vent the brake fluid" on page 1-129.](#)
12. Carry out functional check and leak test.

Sealing the brake caliper

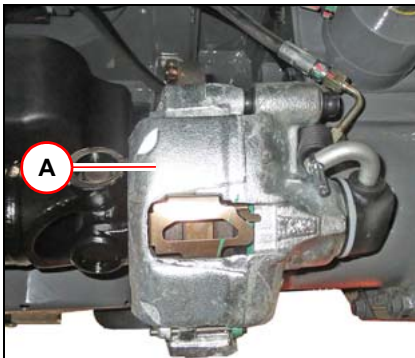


Fig. 19

1. Remove brake caliper **A** – see ["Remove/install the brake caliper" on page 6-10.](#)

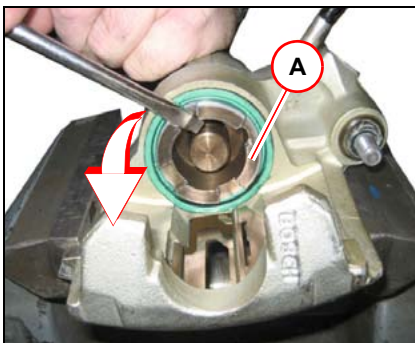


Fig. 20

2. Unscrew brake piston **A**.

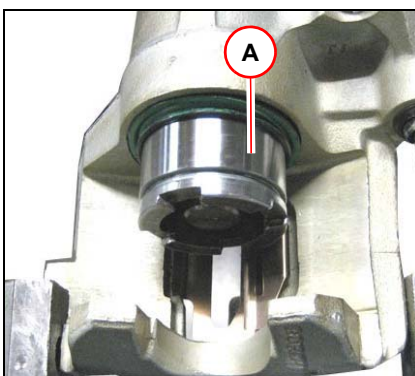
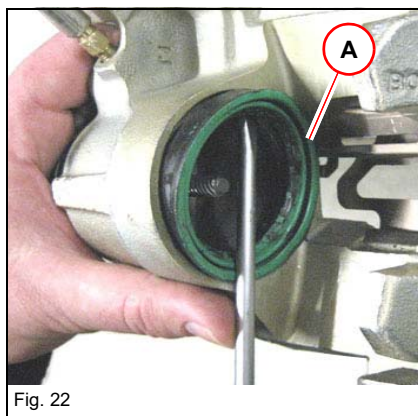
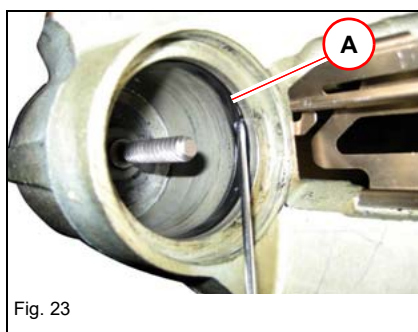


Fig. 21

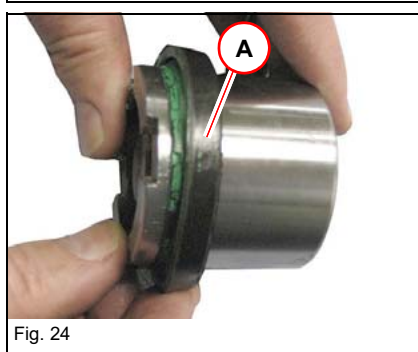
3. Remove brake piston **A**.



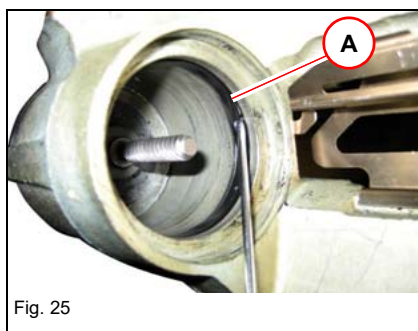
4. Carefully remove piston seal **A**.



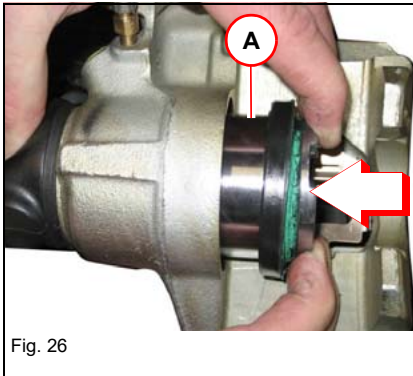
5. Carefully remove the seal ring **A**.



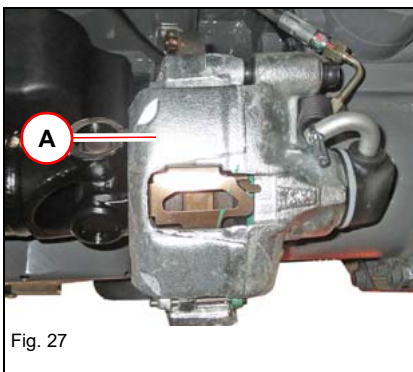
6. Push new seal **A** on to the brake piston before assembly.



7. Mount seal ring **A**



8. Insert brake piston **A** and press down lightly
9. Screw brake piston **A** back in completely and attach piston seal.



10. Install brake caliper **A** – see *"Remove/install the brake caliper" on page 6-10.*
11. Bleed the braking system and check for proper functioning and tightness – see *"Change and vent the brake fluid" on page 1-129.*
12. *Adjusting the parking brake on page 6-29.*
13. Carry out functional check and leak test.

6.4 Brake disk

Safety instructions for brake disk



Environment

Use a suitable container to collect the brake fluid as it drains and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

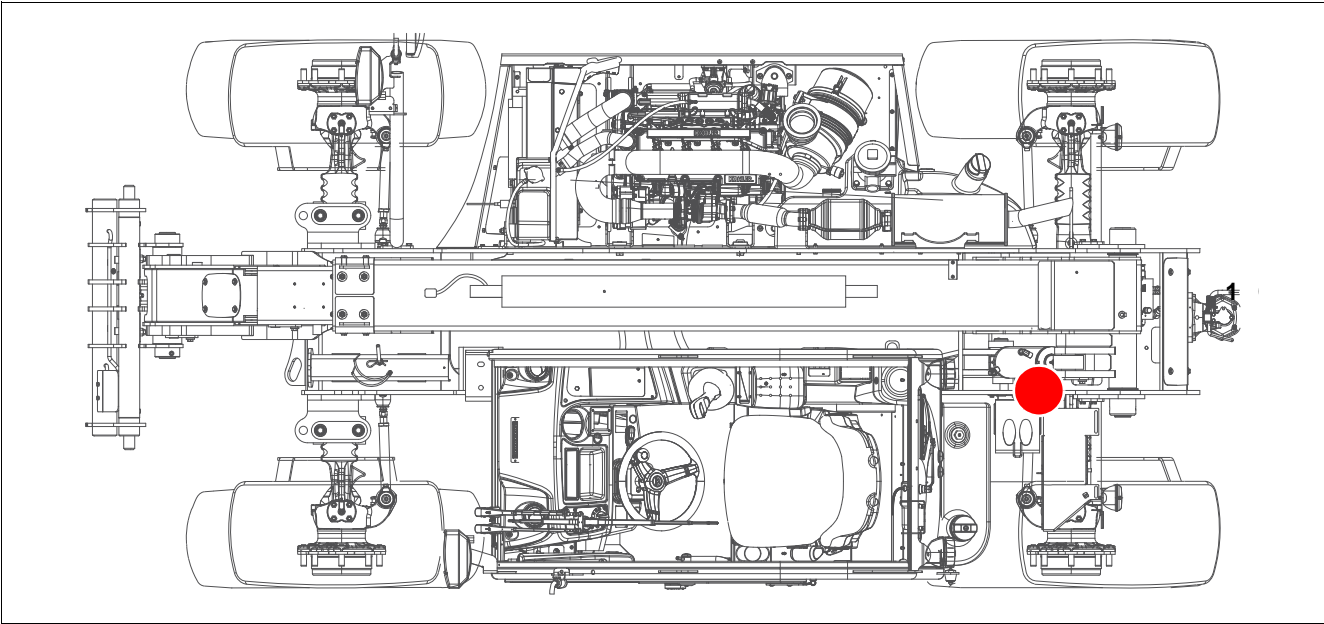
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Remove/install the brake disc

Tools:

- Standard tools
- Suitable receptacle for collecting the brake fluid
- Plugs (different sizes) for closing the brake lines

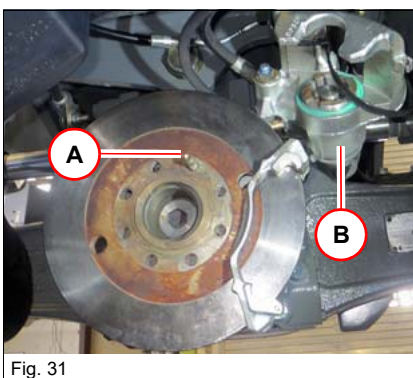
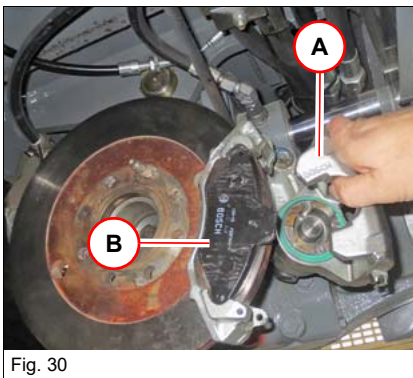
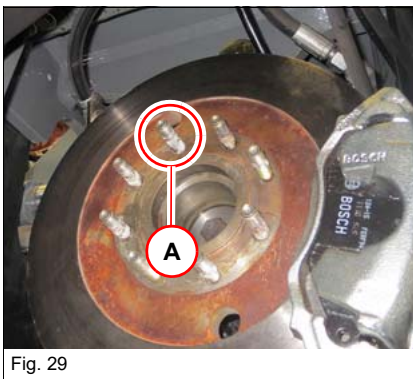
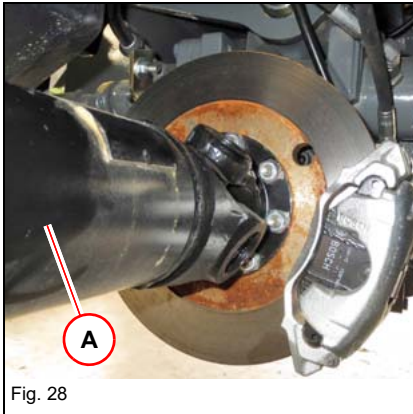
Technical data



Weight	BMK	Description	Remarks
—	—	Brake disk	—
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove the brake disk

1. Park the vehicle on firm and level ground.
2. Switch off the starter and remove the starting key.
3. Secure the machine with chocks to prevent it from rolling.
4. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
5. Uninstall the cardan shaft **A** at the rear axle – see *"Removing/installing the cardan shaft" on page 4-2*.



6. Remove socket pins **A** down to one.
7. Remove brake caliper **A**– see *"Remove/install the brake caliper" on page 6-10*.
8. Remove brake pads **B**.
9. Fix brake caliper **B** using cable ties.
10. Remove last socket pin **A**.

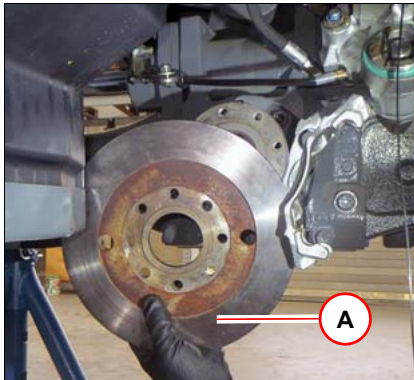


Fig. 32

11. Take out brake disc **A**.

Install the brake disk

1. Position new brake disc **A** on rear axle.

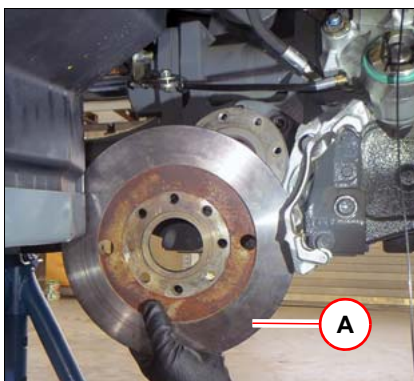


Fig. 33

2. Install a socket pin **A**.

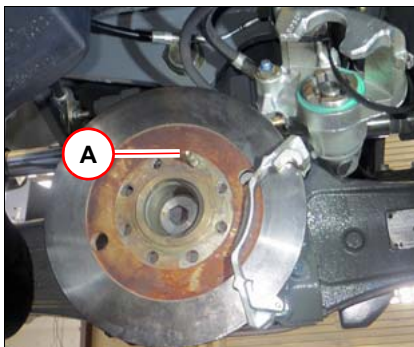


Fig. 34

3. Place braking pads **B**.

4. Install brake caliper **A** – see *"Remove/install the brake caliper" on page 6-10*.

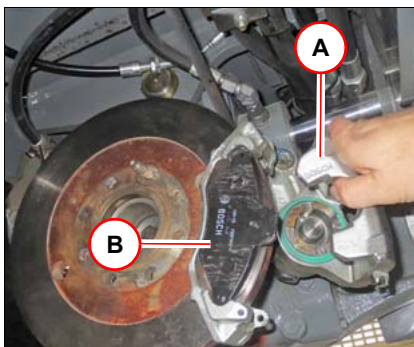


Fig. 35

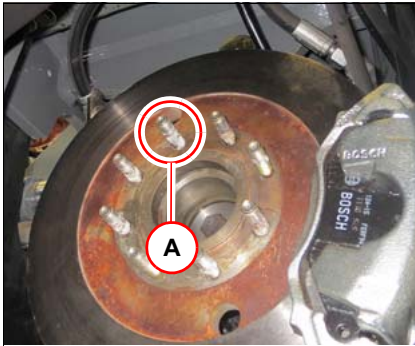


Fig. 36

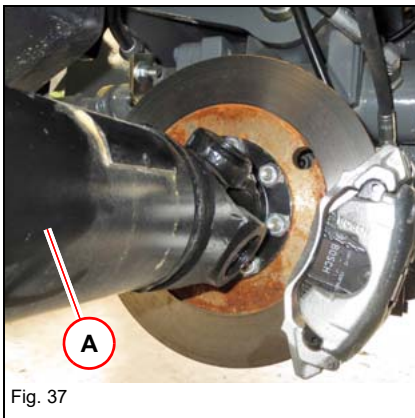


Fig. 37

5. Install all socket pins **A** using Loctite®243.

6. Mount the cardan shaft **A** on the rear axle – see *"Removing/installing the cardan shaft" on page 4-2.*
7. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
8. *Adjusting the parking brake on page 6-29.*
9. Bleed the braking system and check for proper functioning and tightness – see *"Change and vent the brake fluid" on page 1-129.*
10. Carry out functional check and leak test.

6.5 Main brake cylinder 030

Safety instructions for the main brake cylinder



Environment

Use a suitable container to collect the brake fluid as it drains and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

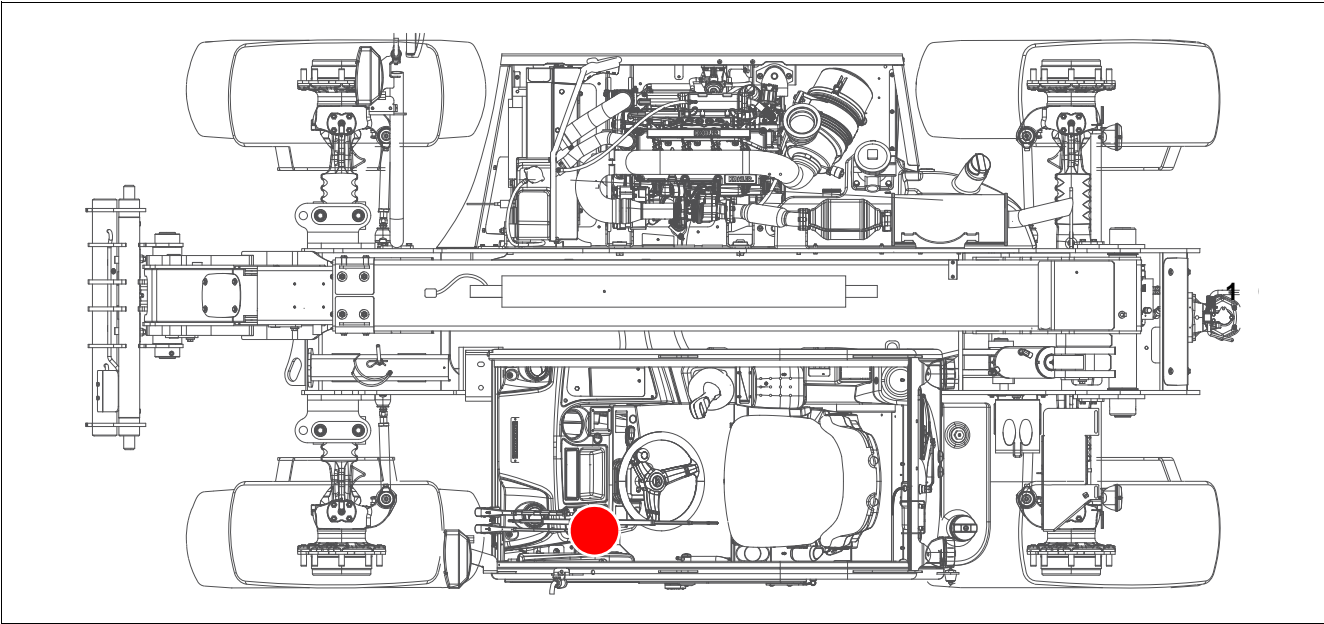
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Removing/installing the master brake cylinder

Tools:

- Standard tools
- Suitable receptacle for collecting the brake fluid
- Plugs (different sizes) for closing the brake lines

Technical data



Weight	BMK	Description	Remarks
—	030	Master brake cylinder	—
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove master brake cylinder

1. Park the vehicle on firm and level ground.
2. Switch off the starter and remove the starting key.
3. Secure the machine with chocks to prevent it from rolling.
4. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
5. Remove foot mat.
6. Remove trim from under steering wheel – see *"Remove trim in the cab" on page 12-20.*
7. Remove splint **A** on the fork head and pull out pins **B**.

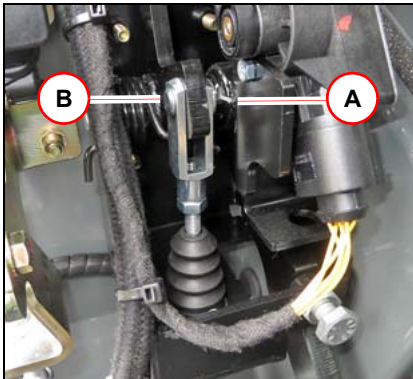


Fig. 38

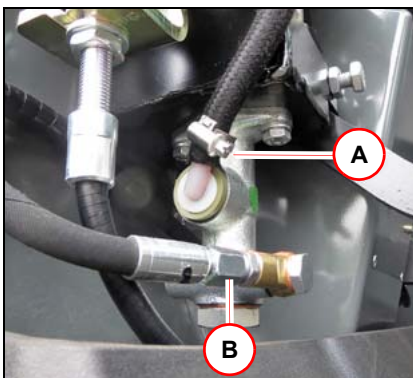


Fig. 39

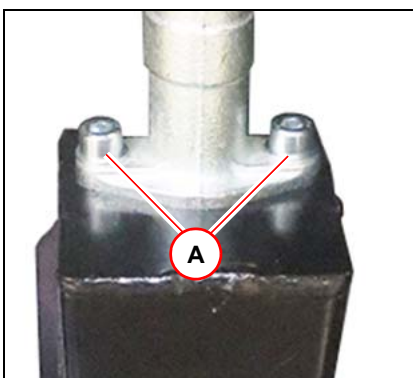


Fig. 40

8. Open hose clip **A** and remove brake hose.
9. Release union nut and remove brake hose **B**.
10. Close and seal the brake hoses.
11. Remove fastening screws **A** and take out the main brake cylinder.
12. Remove master brake cylinder.

Install master brake cylinder

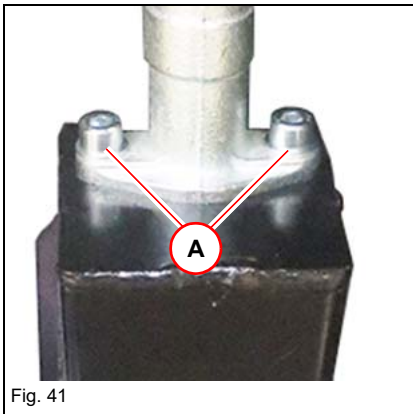


Fig. 41

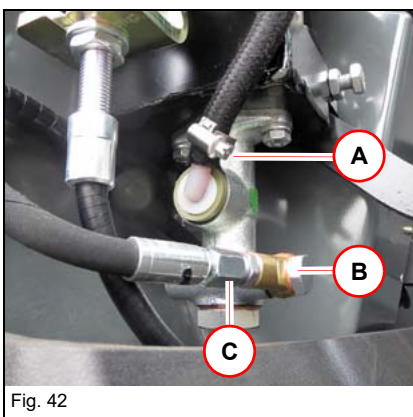


Fig. 42

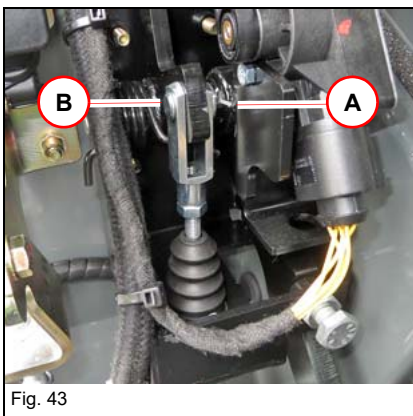


Fig. 43

1. Position main brake cylinder.
2. Tighten screws **A**.
3. Position brake hose and tighten the hose clip **A**.
4. Mount hollow screw **B** with new sealing rings and tighten to 40 Nm (30 lbf ft).
5. Position brake hose **C** and tighten union nut to 18 Nm (13 lbf ft).
6. Insert pins **B** on fork head.
7. Insert splint **A** and secure.
8. Install trim under steering wheel – see ["Install trim in the cab" on page 12-21](#).
9. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
10. Vent brake – see ["Change and vent the brake fluid" on page 1-129](#).
11. Add foot mat.
12. Carry out functional check and leak test.

6.6 Parking brake

Safety instructions for parking brake



Information

Before starting work, read the safety and preparation instructions carefully

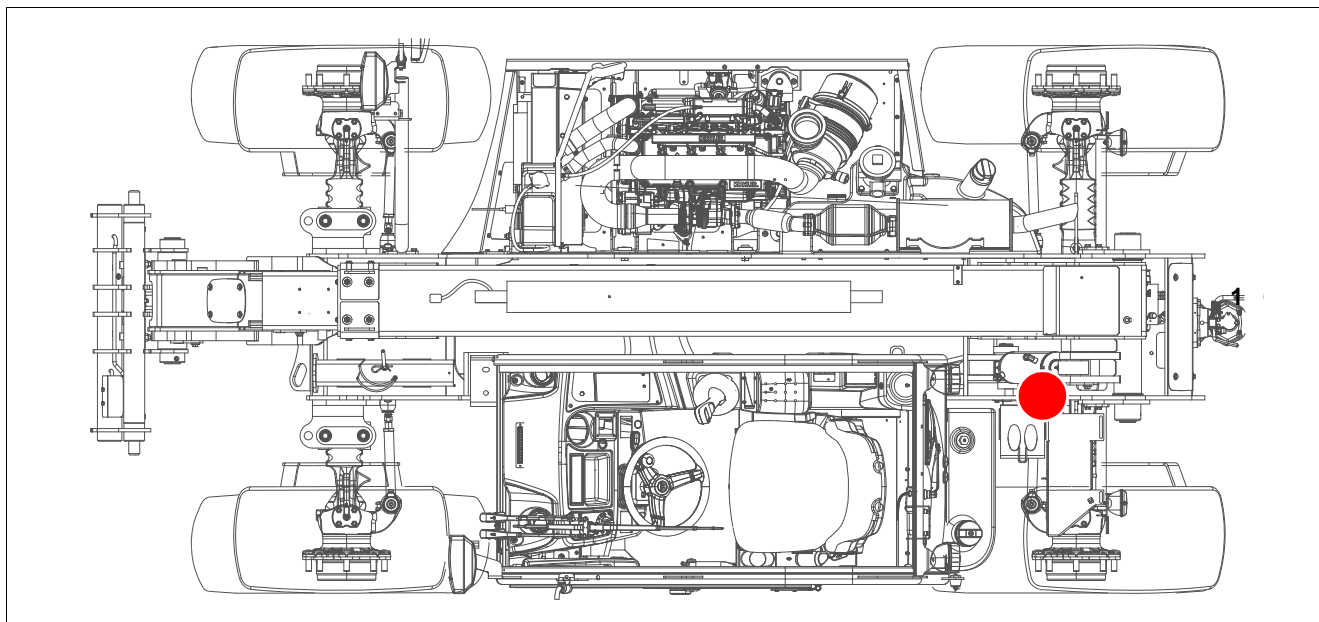
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install wire pull

Tools:

- Standard tools

Technical data



Weight	BMK	Description	Remarks
–	–	Cable pull	–
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove wire pull

1. Park the vehicle on firm and level ground.
2. Switch off the starter and remove the starting key.
3. Secure the machine with chocks to prevent it from rolling.
4. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
5. Remove foot mat.
6. Remove trim from under steering wheel – see *"Remove trim in the cab" on page 12-20.*
7. Release the parking brake.
8. Remove splint **A** and pull out pins.
9. Loosen locknuts **B** on wire pull .

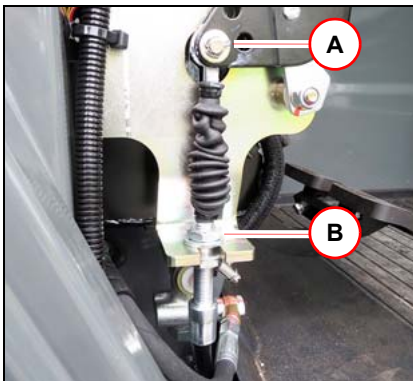


Fig. 44

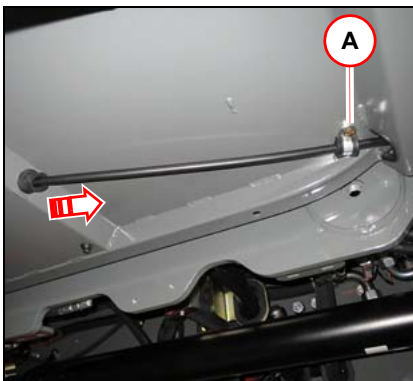


Fig. 45

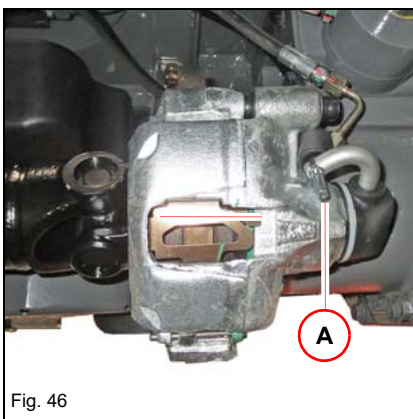


Fig. 46

10. Remove clips **A** on the cab floor.

11. Hook up wire pull **A** on brake caliper.

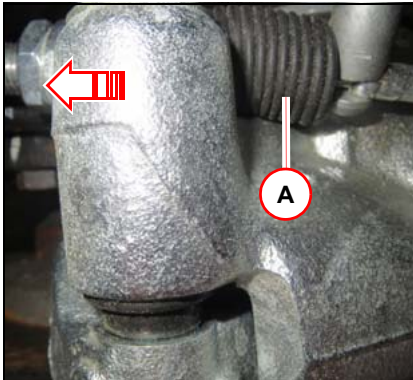


Fig. 47

12. Remove rubber grommets **A** from wire pull out of the brake caliper.
13. Completely remove the wire pull.

Install wire pull

1. Pull wire pull through the brake caliper.
2. Push on rubber grommets **A**.
3. Mount wire pull.

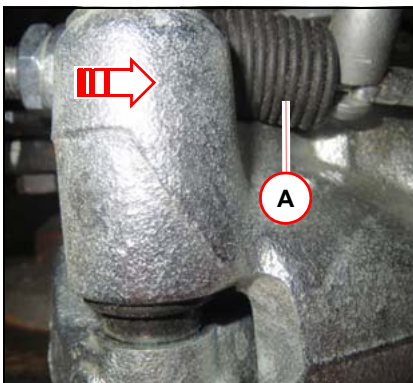


Fig. 48

4. Position wire pull underneath the cab with clip **A**.
5. Tighten clamp **A**.

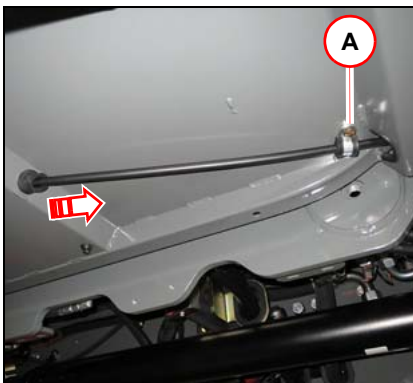


Fig. 49

6. Mount wire pull in mount.
7. Secure pins with new splint **A**.

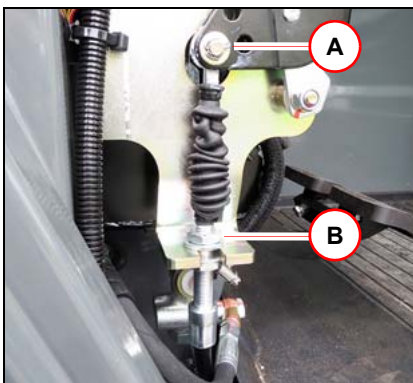


Fig. 50

Adjusting the parking brake

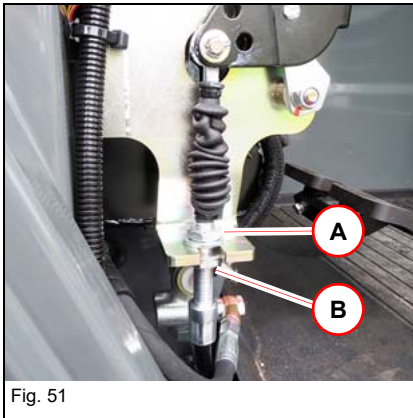


Fig. 51

1. Loosen locknut **A**.
2. Set wire pull length with nut **B** in such a way that the parking brake begins to close after 3 to 5 latched positions.
3. Tighten locknut **A**.
4. Insert trim under steering wheel – see *"Install trim in the cab" on page 12-21*.
5. Add foot mat.
6. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
7. Perform a functional check.

7 Steering system

7.1 Steering orbitrol IV

Safety instructions for steering orbitrol



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
 - ▶ Wear protective gloves
-

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
 - ▶ Clean all the hydraulic screw connections and ports before disassembly.
-



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

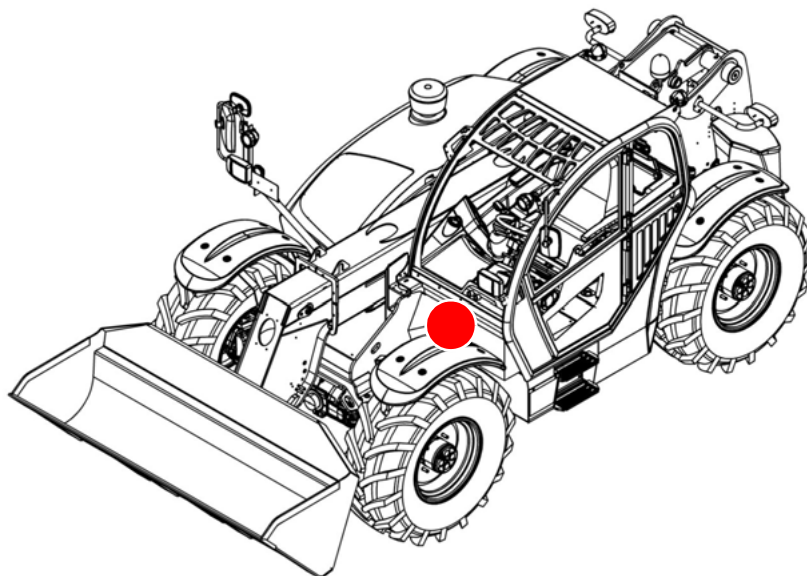
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Removing/installing the steering orbitrol

Tools:

- Standard tools
- Plugs (different sizes) for closing the oil lines

Technical data



Weight	BMK	Description	Remarks
6 kg (13 lb)	IV	Steering orbitrol	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove steering orbitrol

1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
2. Take cover off the front of the cab – see *"Remove trim from cab front" on page 12-17.*
3. Remove trim underneath the instrument panel – see *"Remove trim in the cab" on page 12-20.*
4. Remove all hose pipes from the steering system.
5. Tightly seal all hydraulic lines **A** and screw connections.

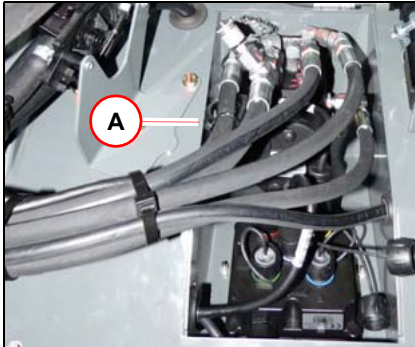


Fig. 1

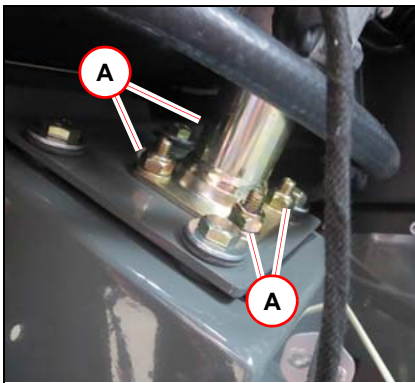


Fig. 2

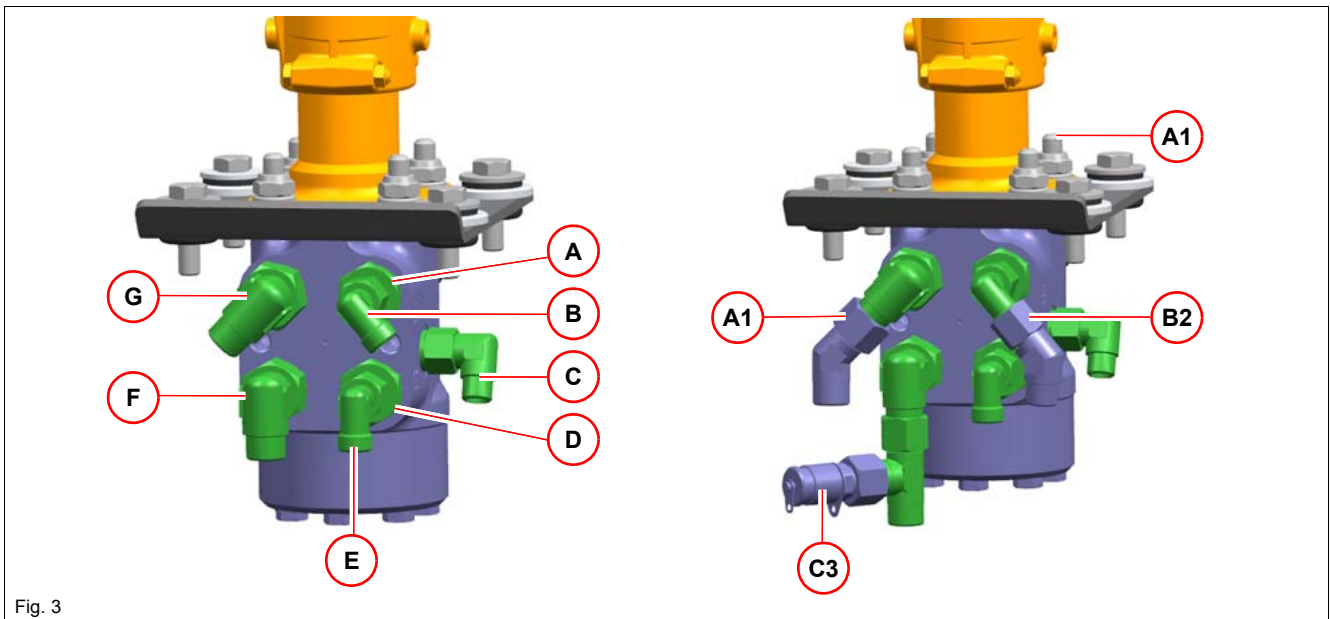
6. Remove fastening nuts **A** below on the steering column.

NOTICE

Damage to the steering orbitrol due to falling off
► Have a second person hold the steering orbitrol!

7. Take steering orbitrol off from outside the cab.

Install steering orbitrol



Pos.	Description	Tightening torque
A	Screw connections GE 10	28 Nm (21 lbf ft)
B	Screw connections EW 10	28 Nm (21 lbf ft)
C	Screw connections EWE 8	30 Nm (22 lbf ft)
D	Screw connections GE 10	95 Nm (70 lbf ft)
E	Screw connections EW 10	28 Nm (21 lbf ft)
F	Screw connections EWE 12	95 Nm (70 lbf ft)
G	Screw connections EWE 12	95 Nm (70 lbf ft)
A1	Stud bolt	46 Nm (34 lbf ft) Loctite®243
B2	Screw connections EW 10	28 Nm (21 lbf ft)
C3	12L test port	40 Nm (30 lbf ft)
D4	Screw connections EW 12	40 Nm (30 lbf ft)

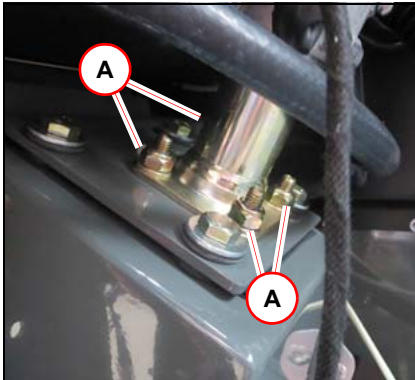


Fig. 4

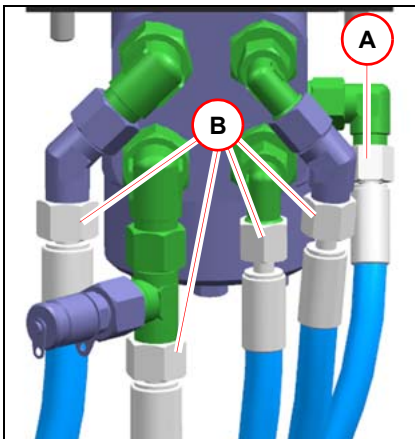


Fig. 5

1. Have a 2nd person position the steering orbitrol outside of the cab.
2. Tighten new fastening nuts **A** on the steering column to 46 Nm (34 lbf ft).
3. Position the hose and tighten the screw connection **A** to 23 Nm (17 lbf ft).
4. Position hose and tighten screw connection **B** to 40 Nm (30 lbf ft).
5. Bleed the steering and synchronize – [see "Bleed/synchronize steering system" on page 7-6.](#)
6. Check the hydraulic oil level – [see "Checking the hydraulic oil level" on page 1-91](#)
7. Check steering pressure. See system manual
8. Carry out a trial run and check the steering orbitrol for leaks.
9. Fit cladding under the instrument panel – [see "Install trim in the cab" on page 12-21.](#)
10. Attach cover to cabin front – [see "Install trim cab front" on page 12-17.](#)

Bleed/synchronize steering system

Due to internal leaks within the steering hydraulics, the position of the wheels of the front and rear axles can adjust to one another during longer vehicle operation. The front and rear axle wheels then no longer follow one track during straight-ahead travel. Synchronize the steering system in this case.

Synchronizing the steering system



Information

Steering synchronization is only possible in 4 wheel steering mode!

1. At low driving speed, turn the steering wheel to the left or right as far as it will go and try turning it even further in the end position against the pressure for a short while.
2. Turn steering system rapidly back to straight-ahead position.
3. During a test drive check whether the front and rear axle wheels run on one track when driving straight ahead.

7.2 Steering mode valve XXVI

Safety instructions for steering mode valve



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
 - ▶ Wear protective gloves
-

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
 - ▶ Clean all the hydraulic screw connections and ports before disassembly.
-



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

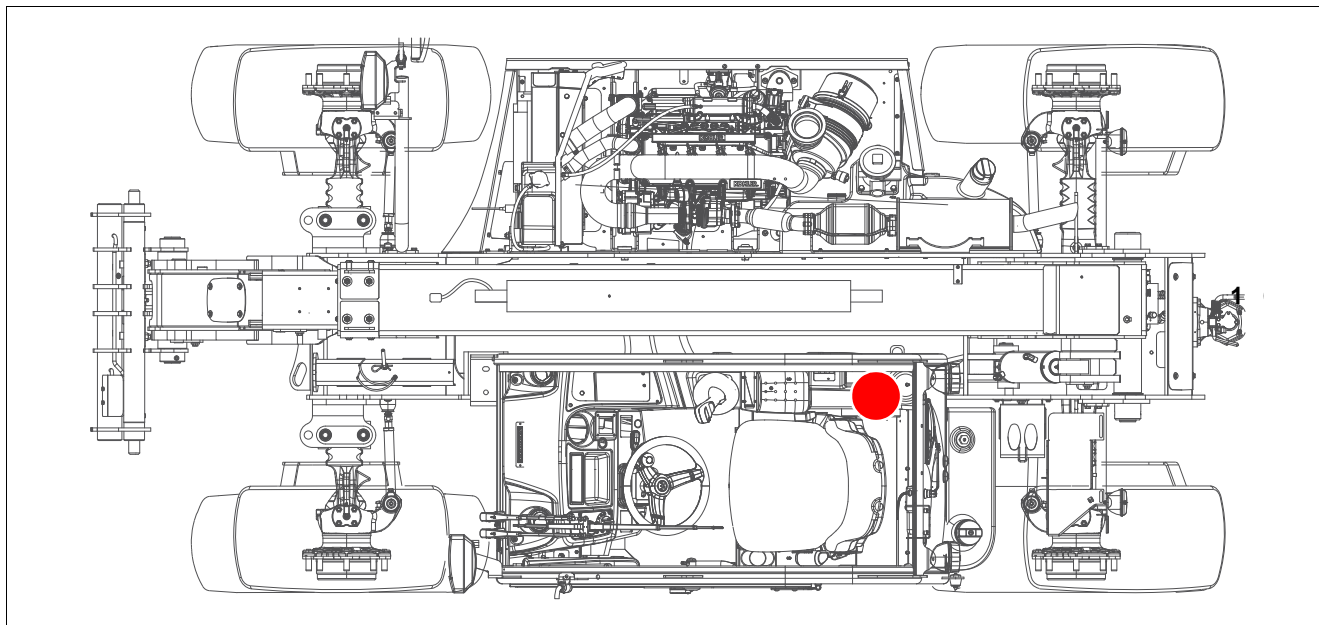
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Remove / install steering mode valve

Tools:

- Standard tools
- Plugs (different sizes) for closing the oil lines

Technical data



Weight	BMK	Description	Remarks
2.48 kg (5 lb)	XXVI	Steering mode valve	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Disassemble steering mode valve

1. Park the vehicle on firm and level ground.
2. Fully retract the telescopic boom.
3. Raise the telescopic boom.
4. Switch off the starter and remove the starting key.
5. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3.](#)
6. Secure the machine with chocks to prevent it from rolling.
7. Securely support the telescopic boom – see ["Safety prop for telescopic boom" on page 1-4.](#)
8. Take cover off transmission tunnel – see ["Remove/install cab cover" on page 12-5.](#)
9. Unlock plug **A** from the plunger switch **S172** and remove.

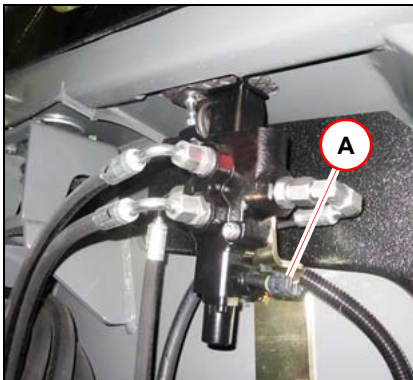


Fig. 6

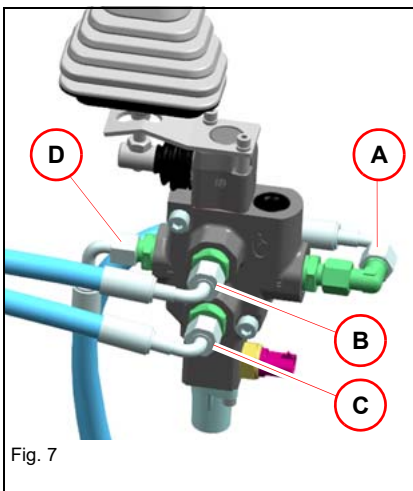


Fig. 7

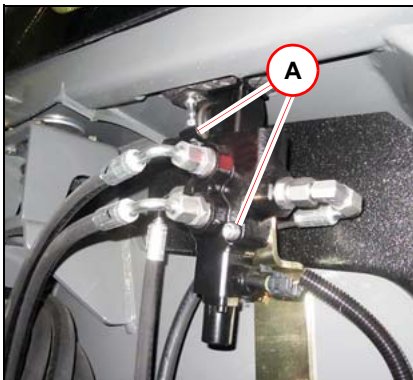
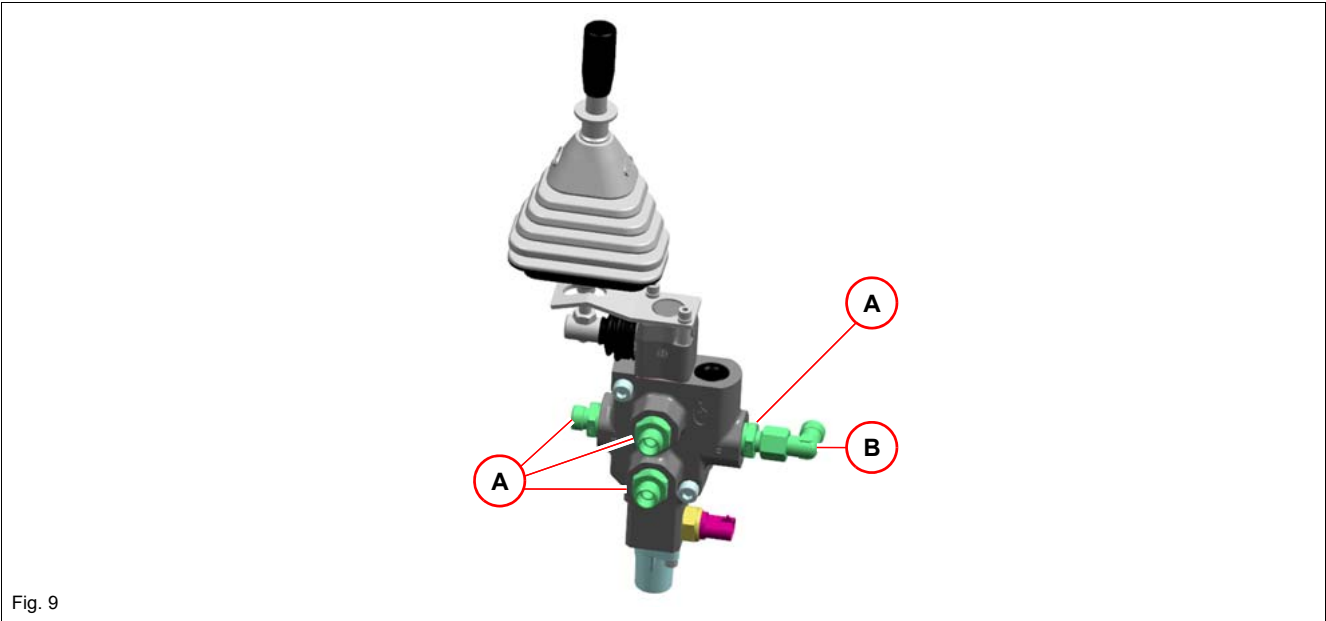


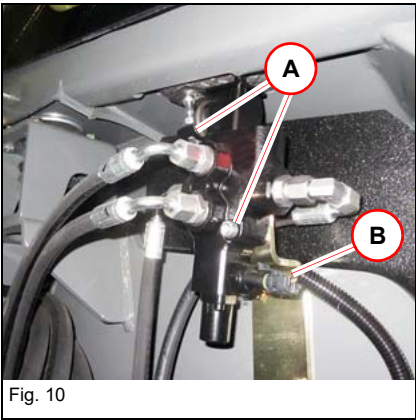
Fig. 8

10. Loosen screw connections **A** to **D** and remove hoses.
11. Tightly seal all hydraulic lines and screw connections.
12. Remove the fastening screws **A** and take out the steering mode valve.

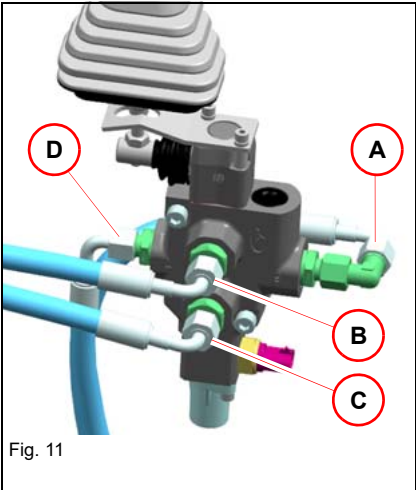
Install steering mode valve



Pos.	Description	Tightening torque
A	Screw connections GE 10	55 Nm (41 lbf ft)
B	Screw connections EW 10	28 Nm (21 lbf ft)



- 13.Position steering mode valve and mount using screws **A**.
14.Insert plug **B S172**



- 15.Position all hoses **A** to **D** and tighten to 28 Nm (21 lbf ft).
16.Bleed the steering and synchronize – see ["Bleed/synchronize steering system" on page 7-11](#).
17.Check the hydraulic oil level – see ["Checking the hydraulic oil level" on page 1-91](#)
18.Carry out a trial run and check the steering orbitrol for leaks.
19.Mount cover on transmission tunnel – see ["Remove/install cab cover" on page 12-5](#).
20.Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).

Bleed/synchronize steering system

Due to internal leaks within the steering hydraulics, the position of the wheels of the front and rear axles can adjust to one another during longer vehicle operation. The front and rear axle wheels then no longer follow one track during straight-ahead travel. Synchronize the steering system in this case.

Synchronizing the steering system



Information

Steering synchronization is only possible in 4 wheel steering mode!

1. At low driving speed, turn the steering wheel to the left or right as far as it will go and try turning it even further in the end position against the pressure for a short while.
2. Turn steering system rapidly back to straight-ahead position.
3. During a test drive check whether the front and rear axle wheels run on one track when driving straight ahead.

7.3 Steering cylinder 018/019

Safety instructions for steering cylinder



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
- ▶ Wear protective gloves

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- ▶ Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

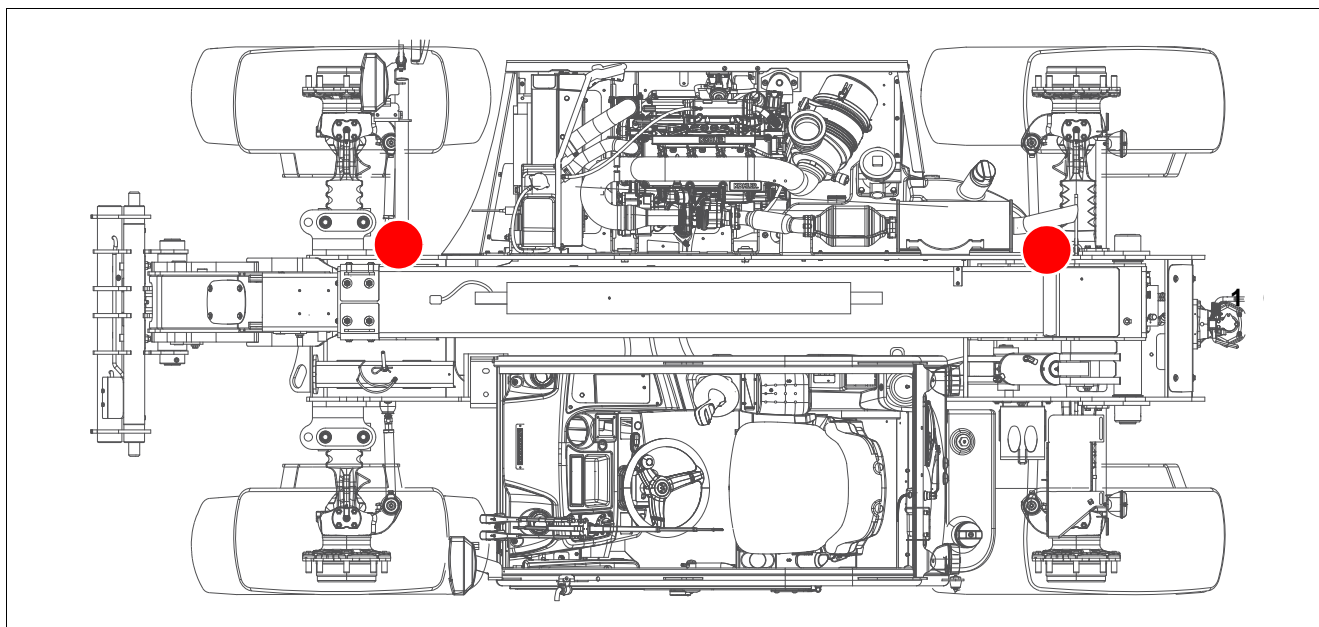
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install steering cylinder

Tools:

- Standard tools
- Plugs (different sizes) for closing the oil lines

Technical data



Weight	BMK	Description	Remarks
12.5 kg (28 lb)	018	Front axle steering cylinder	Front axle
	019	Rear axle steering cylinder	Rear axle
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove the steering ram

1. Park the vehicle on firm and level ground.
2. Switch off the starter and remove the starting key.
3. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
4. Remove hydraulic hose **A** on the steering cylinder.
5. Remove screw connection **B**.

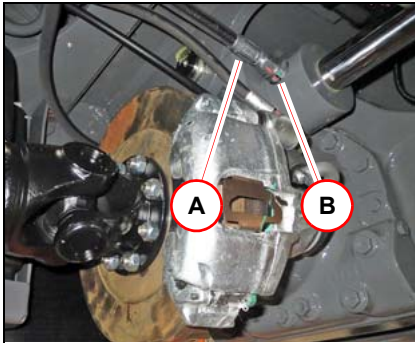


Fig. 12

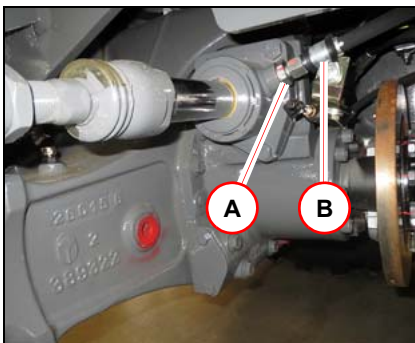


Fig. 13

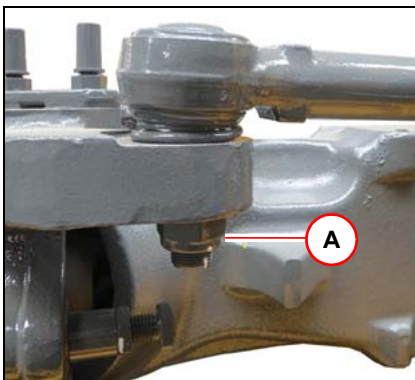
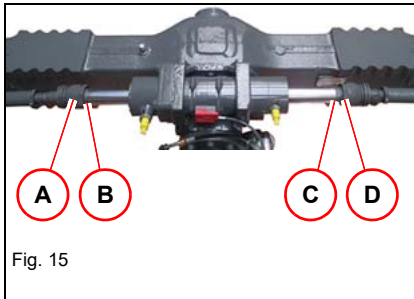


Fig. 14

6. Remove hydraulic hose **B** on the steering cylinder.
7. Remove screw connection **A**.
8. Tightly seal all hydraulic lines and screw connections.
9. Remove locking nut **A** track rod.
10. Dismantle track rod from planetary drive with suitable tool.

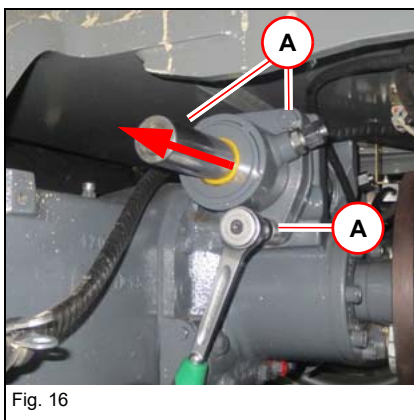


11. Heat piston rods at **B** and **C** with hot air gun.

NOTICE

Complete disassembly of the guide rod can damage the piston rod.

► First disconnect the intermediate joints before disassembling everything.



12. Hold piston rod **B** to counter any movement, then loosen the intermediate joint **A**.

13. Hold piston rod **C** to counter any movement, then loosen intermediate joint **D**.

14. Disassemble the intermediate joints **A** and **D** completely.

15. Dismount the fastening screws **A** on the steering cylinder.

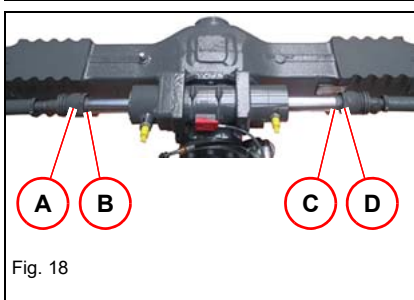
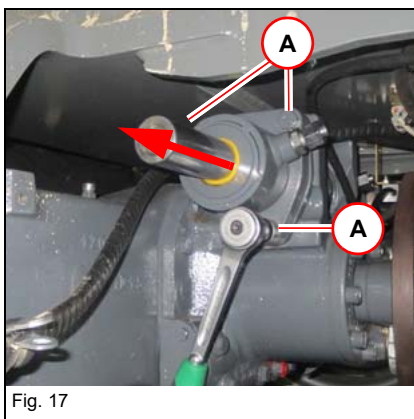
16. Use a plastic hammer to remove the steering cylinder, detaching it in the direction of the arrow.

17. Seal steering cylinder – see *"Sealing steering cylinders" on page 7-18*.

Install steering cylinder

1. Insert steering cylinder into the axle bridge.

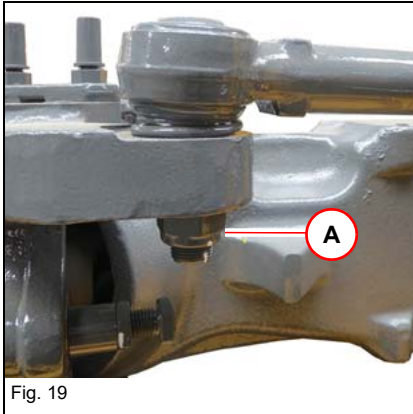
2. Tighten screws **A** with 110 Nm (81 lbf ft).



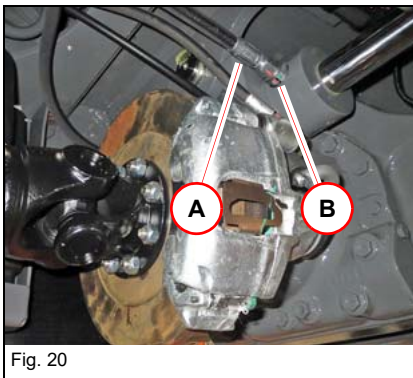
3. Smear both sides of the threaded spigots on the piston rod **B** and **C** with Loctite® 242.

4. Hold the piston rod **B** to counter any movement and tighten intermediate joint **A** with 300 Nm (221 lbf ft).

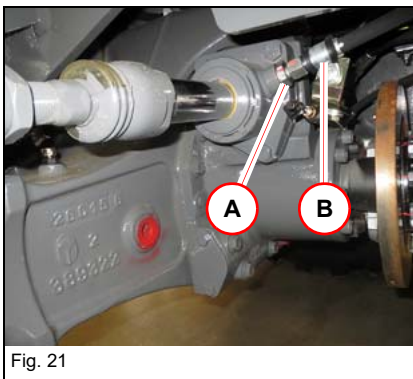
5. Hold the piston rod **C** to counter any movement and tighten the intermediate joint **D** with 300 Nm (221 lbf ft).



6. Mount track rod head **A** to planetary carrier **C**.
7. Tighten new self-locking nuts **B** with 220 Nm (162 lbf ft).



8. Tighten screw connection **B** to 55 Nm (41 lbf ft).
9. Position hydraulic hose **A** on steering cylinder and tighten sleeve nut with 28 Nm (21 lbf ft).



10. Tighten screw **A** to 55 Nm (41 lbf ft).
11. Position hydraulic hose **B** on steering cylinder and tighten sleeve nut with 28 Nm (21 lbf ft).
12. Check the hydraulic oil level – see ["Checking the hydraulic oil level" on page 1-91](#)
13. Bleed the steering and synchronize – see ["Bleed/synchronize steering system" on page 7-17](#).
14. Carry out a trial run and check the steering orbitrol for leaks.
15. Mount cover on transmission tunnel – see ["Remove/install cab cover" on page 12-5](#).
16. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).

Bleed/synchronize steering system

Due to internal leaks within the steering hydraulics, the position of the wheels of the front and rear axles can adjust to one another during longer vehicle operation. The front and rear axle wheels then no longer follow one track during straight-ahead travel. Synchronize the steering system in this case.

Synchronizing the steering system



Information

Steering synchronization is only possible in 4 wheel steering mode!

1. At low driving speed, turn the steering wheel to the left or right as far as it will go and try turning it even further in the end position against the pressure for a short while.
2. Turn steering system rapidly back to straight-ahead position.
3. During a test drive check whether the front and rear axle wheels run on one track when driving straight ahead.

Sealing steering cylinders

Remove the steering ram

1. Secure the steering cylinder in a clamp with aluminium cheek pieces.
2. Remove circlip **A**.

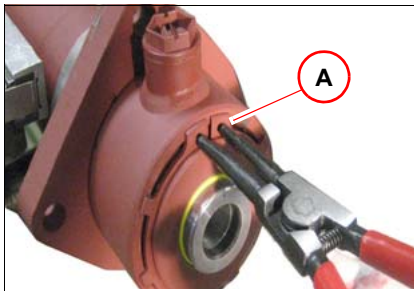


Fig. 22

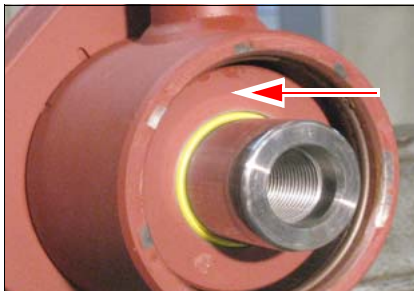


Fig. 23

3. Push the guide bushing into the cylinder jacket.

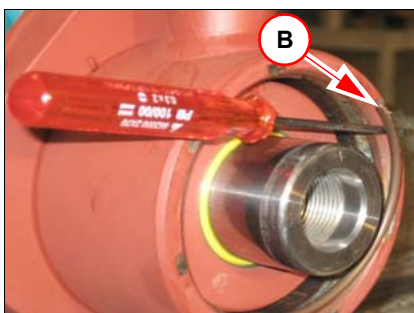
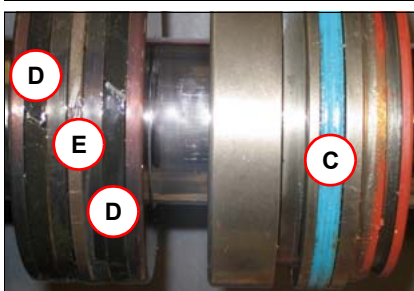


Fig. 24

4. Take out the circlip **B**.
5. Pull out piston rod with guide bushing.



6. Remove rubber seal **C** on guide bushing.
7. Remove guide straps **D** on piston rod.
8. Remove piston rod seal **E**.
- ➔ Piston rod seal must be warmed up in hot water before installing it.
9. Remove stripper **G**.
10. Remove piston rod seal **F**.

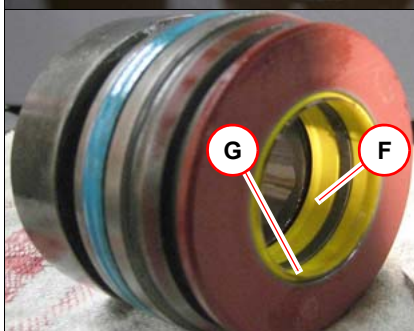
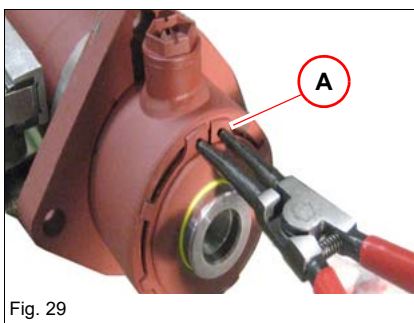
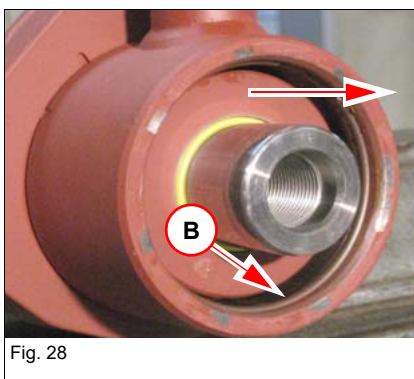
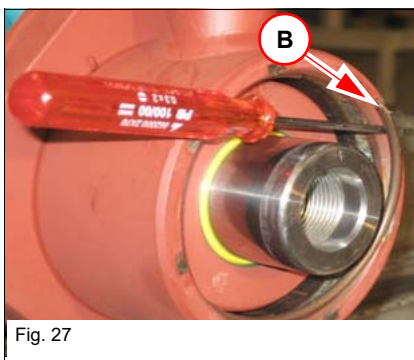
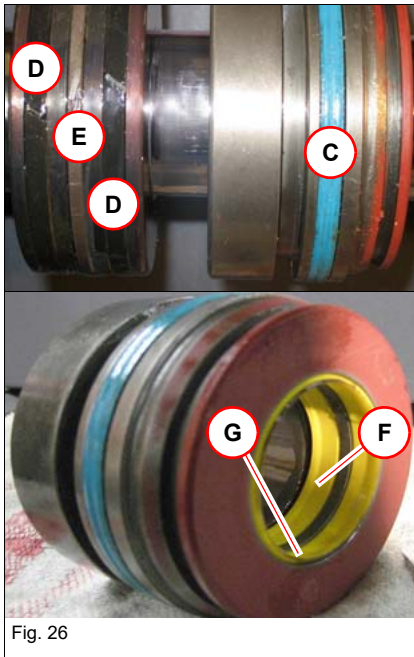


Fig. 25

Install the steering ram

Information

Bear in mind the installation position of piston rod!
Piston rod seal and gaskets on the guide bush to be replaced by new ones and oil in the cylinder pipe before assembly in the cylinder pipe.



1. Insert new piston rod seal **F** into the guide bushing with the higher part at the back.
2. Insert new stripper **G** into the guide bushing with the higher part at the front.
3. Heat new piston rod seal **E** in a water bath before installing.
4. Insert piston rod seal **E**.
5. Insert guide straps **D** for piston rod.
6. Insert rubber seal **C** for guide bushing.
7. Insert piston rod with guide bushing.
 - ➔ When inserting the piston rod, keep an eye on the installation position: the spanner flat of the piston rod is opposite the mounting surface of the cylinder jacket.
8. Insert circlip **B**.
9. Push the guide bushing outwards as far as it will go up to the retaining ring **B**.
10. Insert circlip **A**.

7.4 Steering column

Safety instructions for steering column



Information

Before starting work, read the safety and preparation instructions carefully

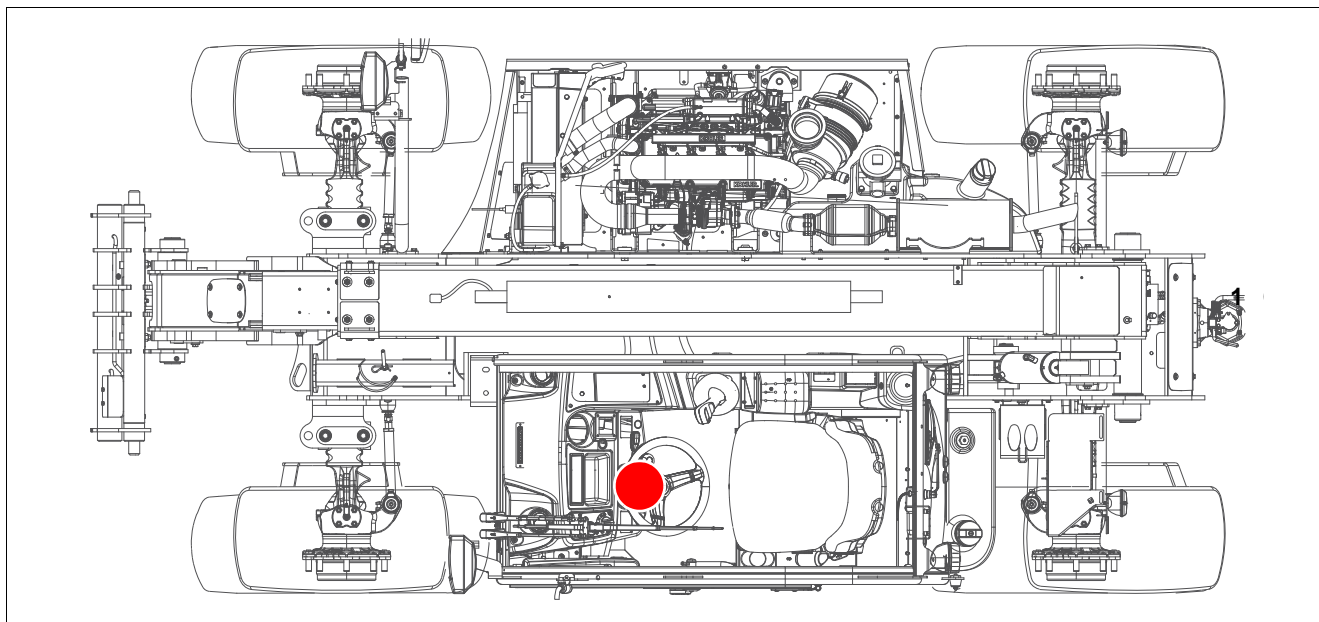
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install steering column

Tools:

- Standard tools

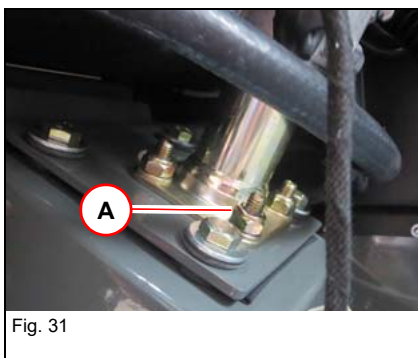
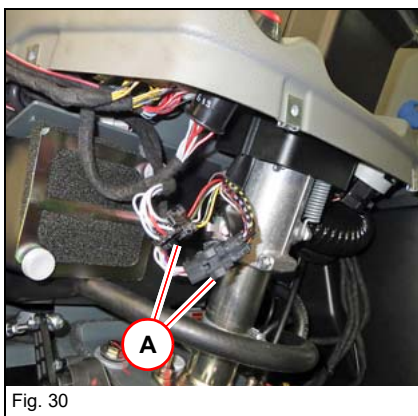
Technical data



Weight	BMK	Description	Remarks
1.8 kg (4 lb)	–	Steering wheel	–
2.5 kg (5.5 lb)	–	Steering column (rigid)	–
4.9 kg (10.8 lb)	–	Steering column (movable)	–
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove steering column

1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
2. Remove trim under the instrument panel – see *"Remove trim in the cab" on page 12-20*.
3. Unplug plug connections **A** of the steering column switch.



4. Remove all fastening nuts **A** below on the steering column.
5. Lift out steering column upwards.

Install steering column

1. Insert steering column from above.
2. Place steering column with light steering movement on the gears of the steering system.
3. Mount fastening nuts **A** below on the steering column **C** and tighten to 46 Nm (34 lbf ft).

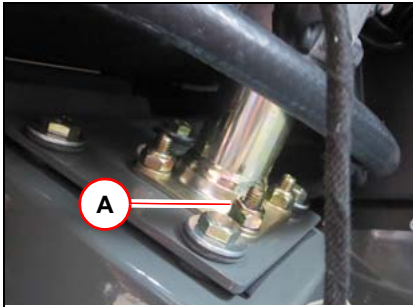


Fig. 32

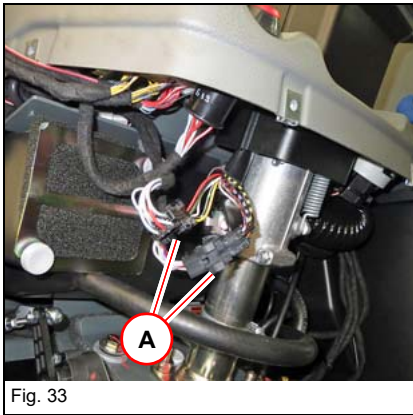


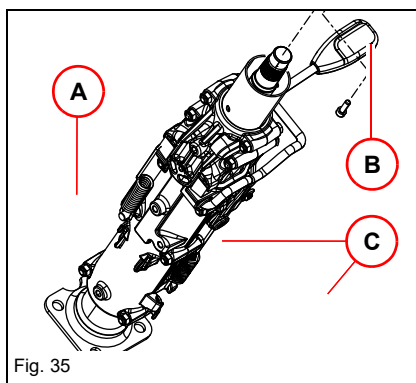
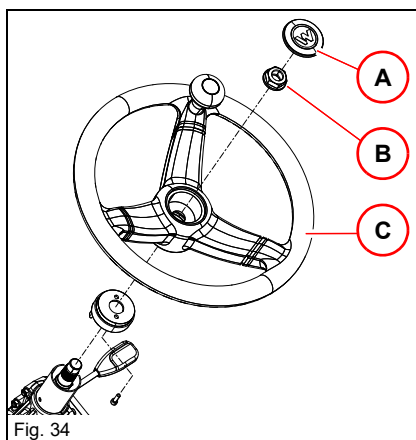
Fig. 33

4. Insert plug connections **A** of the steering column switch.
5. Fit cladding under the instrument panel – see ["Install trim in the cab" on page 12-21](#).
6. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).

Remove/install steering wheel

Remove the steering wheel

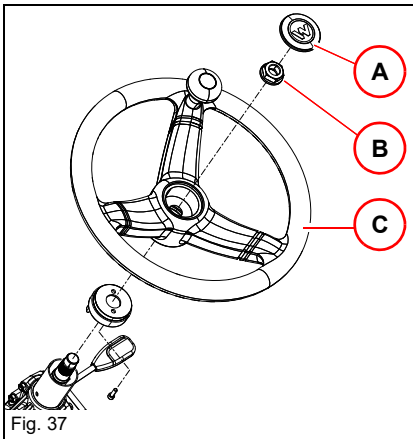
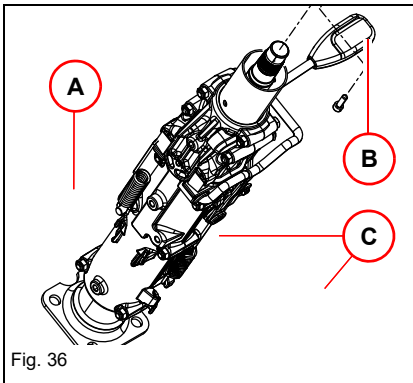
1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
2. Remove cap **A**.
3. Remove nut **B** (M18x1.5).
4. Pull steering wheel off **C** with puller.



5. Unplug plug connections **C** of the steering column switch **A**.
6. Remove steering column switch **A**.
7. Unscrew lever **B** for steering column adjustment.

Install steering wheel

1. Screw in lever **B** for steering column adjustment.
2. Screw on steering column switch **A**.
3. Plug in plug connections **C** of the steering column switch **A**.



4. Place steering wheel **C** on gears for steering column.
5. Mount nut **B** (M18x1.5).
6. Mount cap **A**.
7. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3.](#)

8 Hydraulic system

8.1 Hydraulic control unit XIII

Safety instructions for hydraulic control unit



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

- ▶ Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
- ▶ Wear protective gloves



WARNING

Risk of injury from the weight of the control unit!

Risk of serious injuries if control unit **XIII** presses down.

- ▶ Remove hydraulic control unit **XIII** only with another person.

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- ▶ Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

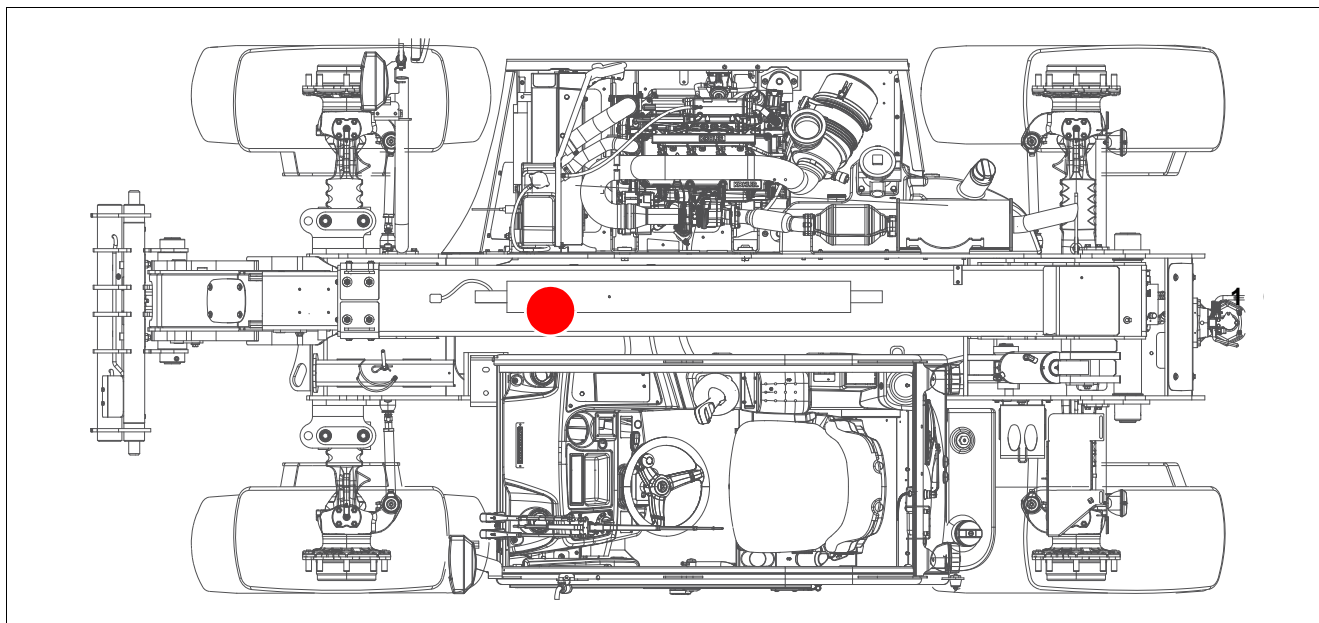
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Remove / install the hydraulic control unit

Tools:

- Standard tools
- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Vacuum pump

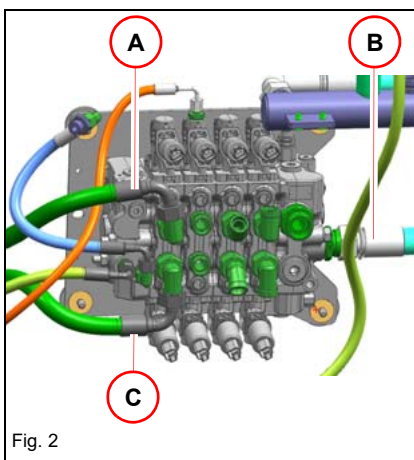
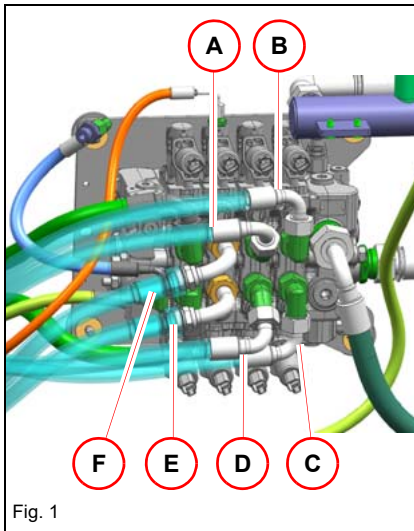
Technical data



Weight	BMK	Description	Remarks
20 kg (44 lb)	XIII	Hydraulic controller	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove hydraulic control unit

1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
2. Dismount underride protection – see *"Remove/install underride protection (closed)" on page 12-11*.
3. Remove cardan shaft – see *"Removing/installing the cardan shaft" on page 4-2*.
4. Unscrew cover of the ventilation filter, attach vacuum pump and switch it on – see *"Vent filter/vacuum pump" on page 1-6*.
5. Mark all the assembly positions of the hydraulic hose pipes on the control unit.
6. Remove all cable ties and hose clips on the hydraulic hose pipes.
7. Remove hydraulic hose pipes from **A** to **F** at the screw connections and seal tight.



8. Remove hydraulic hose pipes from **A** to **C** at the screw connections and seal tight.

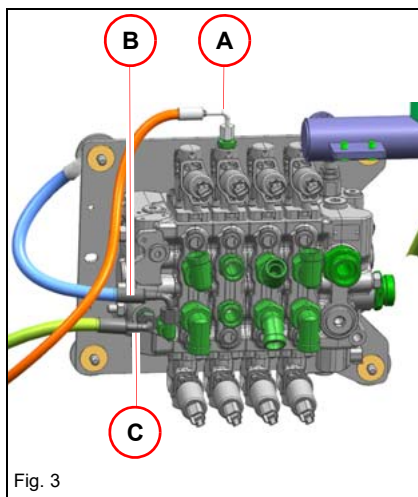


Fig. 3

9. Remove hydraulic hose pipes from **A** to **C** at the screw connections and seal tight.



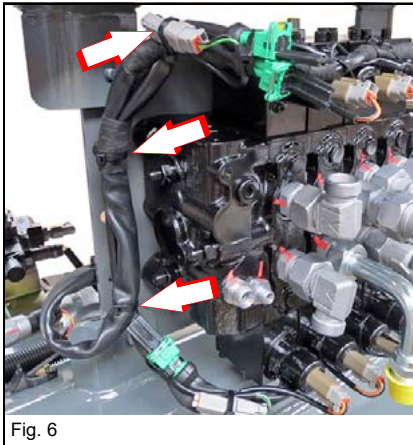
Fig. 4

10. Remove all cable ties (strain relief) on the plugs to the solenoid valve.

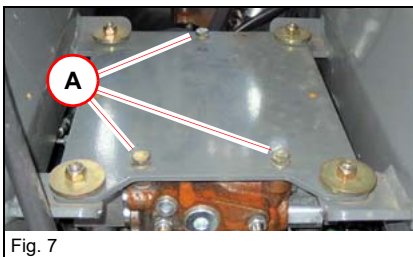


Fig. 5

11. Mark all mounting points of electrical lines on the control unit and pull out all plugs.



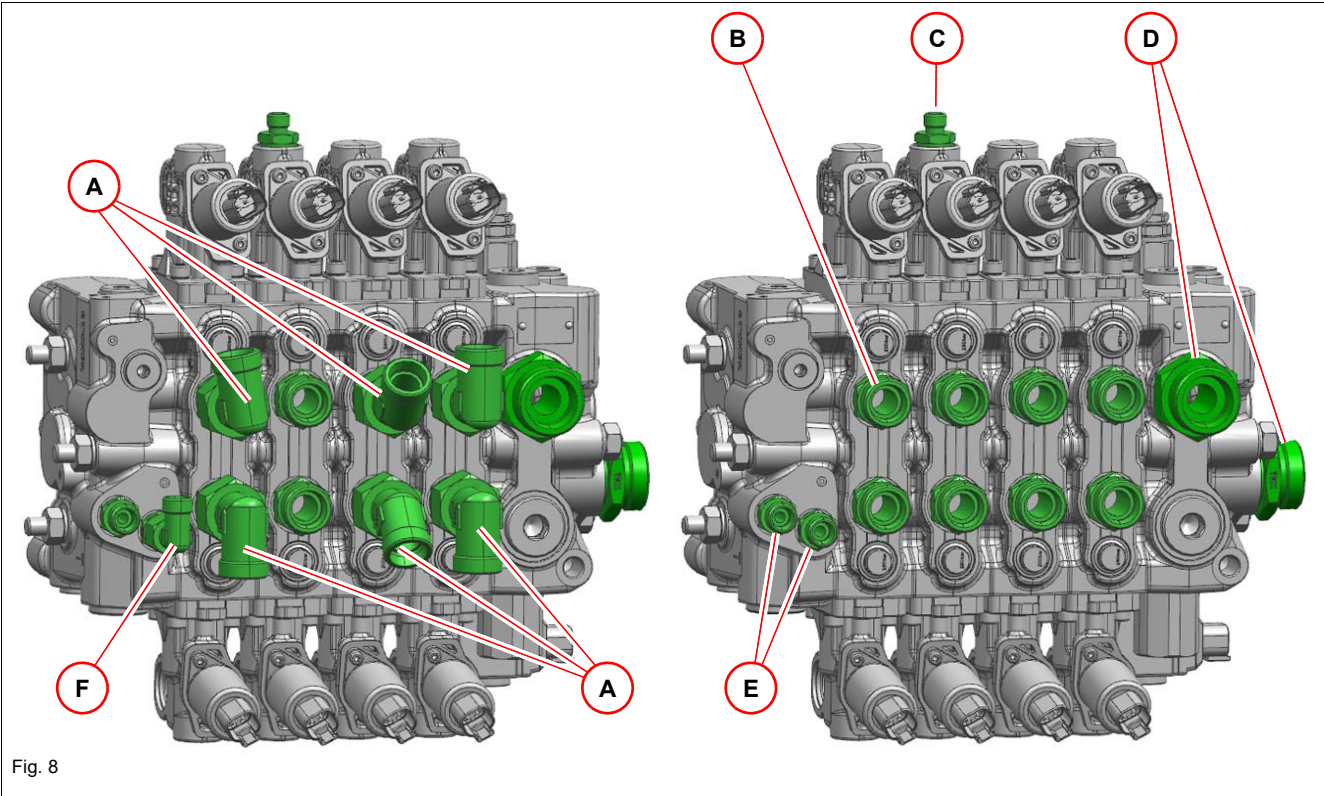
12. Remove all cable ties from the wiring harness.



13. Secure control unit from falling.

14. Remove fastening screw **A** on the control unit.

Install hydraulic control unit



Pos.	Description	Tightening torque
A	Screw connections EW18 18 L	80 Nm (59 lbf ft)
B	Screw connections GE18L	95 Nm (70 lbf ft)
C	Screw connections GE06	25 Nm (18 lbf ft)
D	Screw connections 18LR	170 Nm (125 lbf ft)
E	Screw connections GE10	35 Nm (26 lbf ft)
F	Screw connections EW10	28 Nm (21 lbf ft)

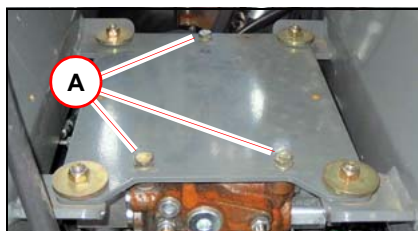


Fig. 9



Fig. 10

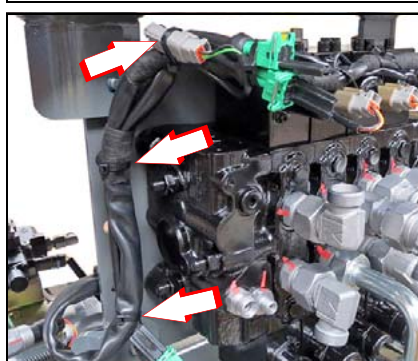


Fig. 11

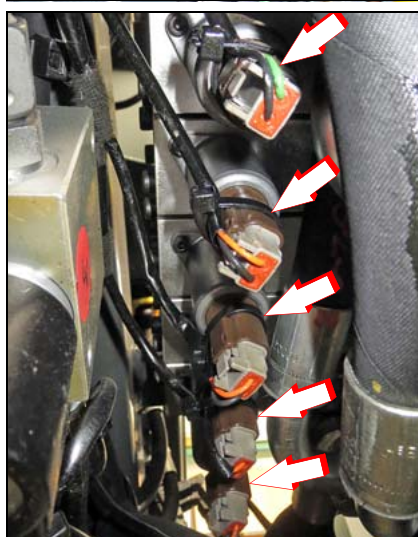


Fig. 12

1. Position control unit and tighten the fastening screws **A** of the control unit.

2. Insert all plugs into the marked mounting positions on the control unit.

3. Secure wiring harness with cable ties.

4. Affix strain relief to the plug of the solenoid valve.

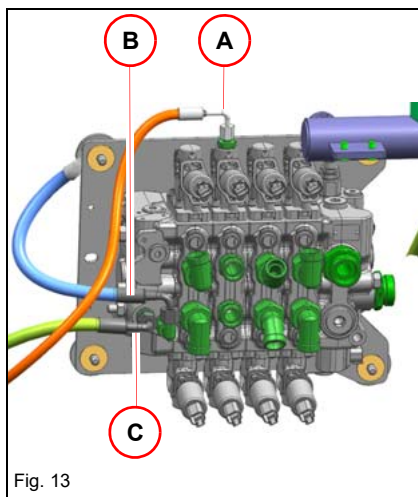


Fig. 13

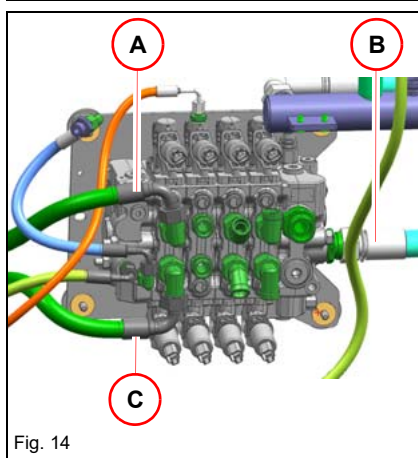


Fig. 14

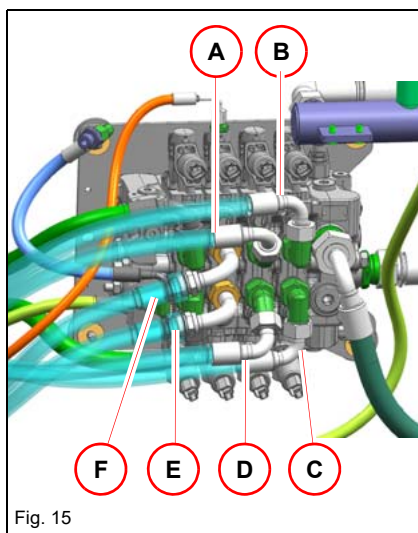


Fig. 15

5. Position the hose and tighten the screw connection **A** to 18 Nm (13 lbf ft).
6. Position hose and tighten screw connection **B** and **C** to 28 Nm (21 lbf ft).

7. Position hose and tighten screw connection **A** and **C** to 80 Nm (59 lbf ft).
8. Position hose and tighten screw connection **B** to 160 Nm (118 lbf ft).

9. Position hose and tighten screw connection **A** to **F** to 80 Nm (59 lbf ft).
10. Remove vacuum pump.
11. Mount cardan shaft – see ["Removing/installing the cardan shaft" on page 4-2](#).
12. Mount the underride protection – see ["Remove/install underride protection \(closed\)" on page 12-11](#).
13. Check oil level in hydraulic oil tank and top up if needed – see ["Adding hydraulic oil" on page 1-92](#).
14. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
15. Check the pressure settings of the control unit and adjust if necessary.
16. Carry out test run and check the system for leaks.

8.2 Hydraulic oil tank XX

Safety instructions for hydraulic oil tank



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

- ▶ Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
- ▶ Wear protective gloves



WARNING

Risk of injury from the weight of the control unit!

Risk of serious injuries if control unit **XIII** presses down.

- ▶ Remove hydraulic control unit **XIII** only with another person.

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- ▶ Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

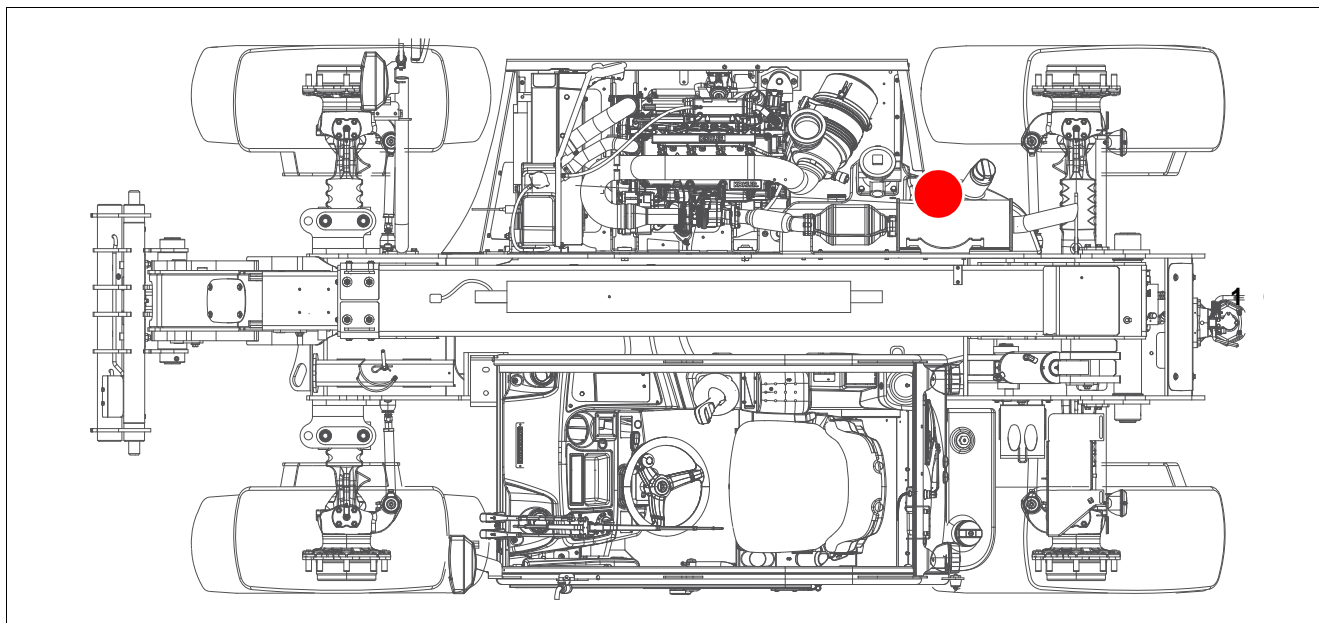
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Remove/install hydraulic oil tank

Tools:

- Wrench WS100 for suction filter in hydraulic oil tank
- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

Technical data



Weight	BMK	Description	Remarks
10.5 kg (23 lb)	XX	Hydraulic oil reservoir	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Take out the hydraulic oil reservoir

1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
2. Remove underride protection – see *"Remove/install underride protection (closed)" on page 12-11.*
3. Remove rear, right wheel – see *"Removing the wheels" on page 1-135.*
4. Remove maintenance access on the engine bay rear – see *"Engine vat" on page 1-24.*
5. Completely empty the hydraulic oil tank – see *"Changing hydraulic oil" on page 1-93, work steps 7 to 13.*
6. Take out air filter – see *"Remove/install air filter" on page 2-46*
7. Remove the fastening nuts **B** of the wheel cover **A** Remove wheel cover **A**.

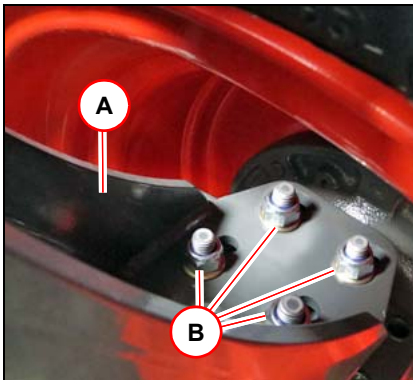


Fig. 16

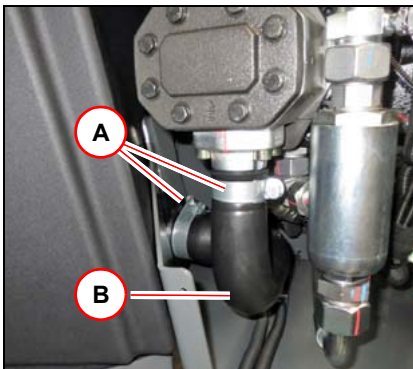


Fig. 17

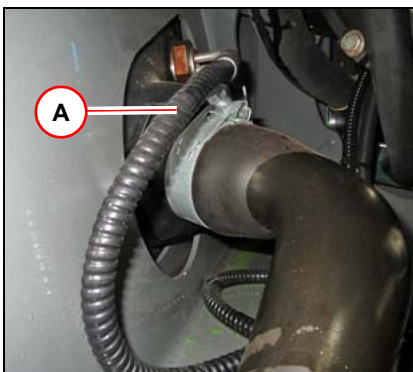
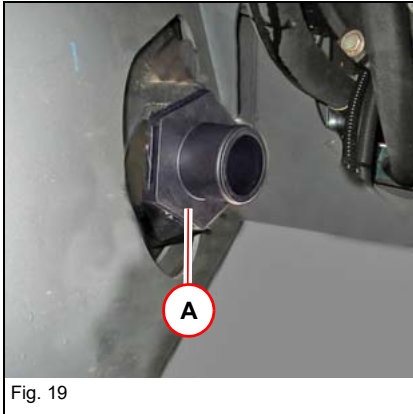


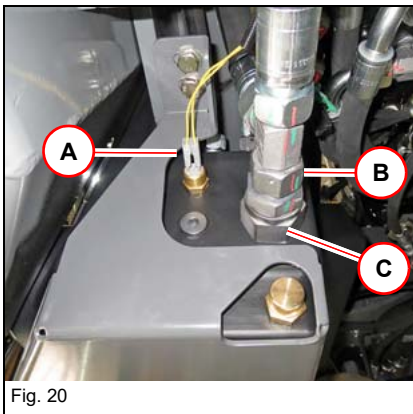
Fig. 18

8. Release clips **A** and pull suction hose **B** on the tank.

9. If present, unplug cable **A** from oil preheating.



10. Screw out suction filter **A** with key SW 100.



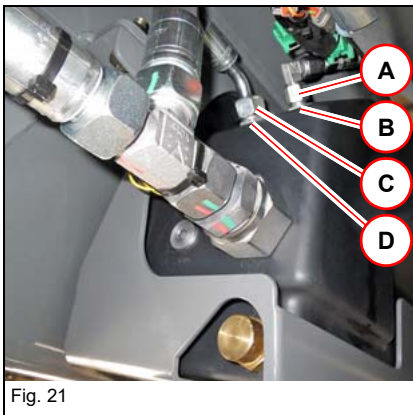
On hydraulic tank, rear:

11. Disconnect connector **A**.

12. Loosen sleeve nut **B** and remove hose.

13. Remove screw connection **C**.

14. Tightly seal hose pipes and screw connections.



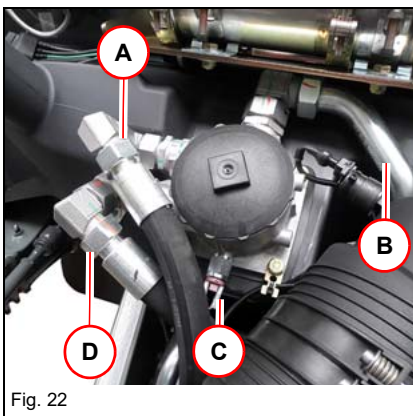
15. Loosen sleeve nut **A** and remove hose.

16. Remove screw connection **B**.

17. Loosen union nut **C** and remove hose.

18. Remove screw connection **D**.

19. Tightly seal hose pipes and screw connections.



On hydraulic tank, top:

20. Loosen sleeve nut **A** and remove hose.

21. Remove hose pipe **B** from filter housing.

22. Remove plug **C** on filter housing.

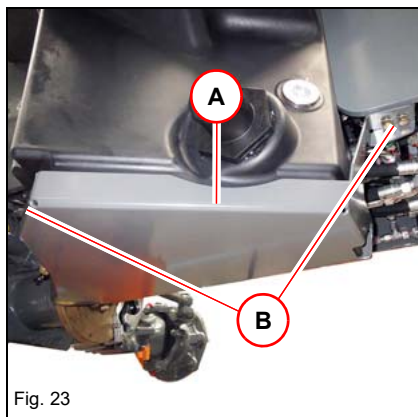
23. Loosen screw connection **C** and remove hose.

24. Tightly seal hose pipes and screw connections.

Hydraulic tank mounting:

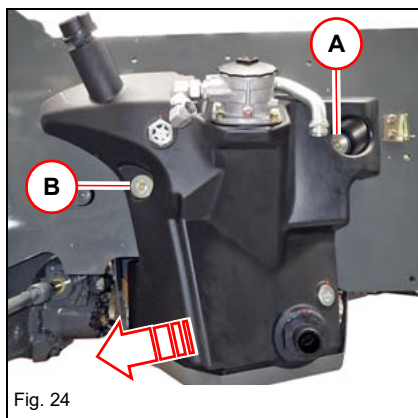
25. Remove fastening screws **B** of the hydraulic tank mounting **A**.

26. Remove hydraulic tank mounting **A**.

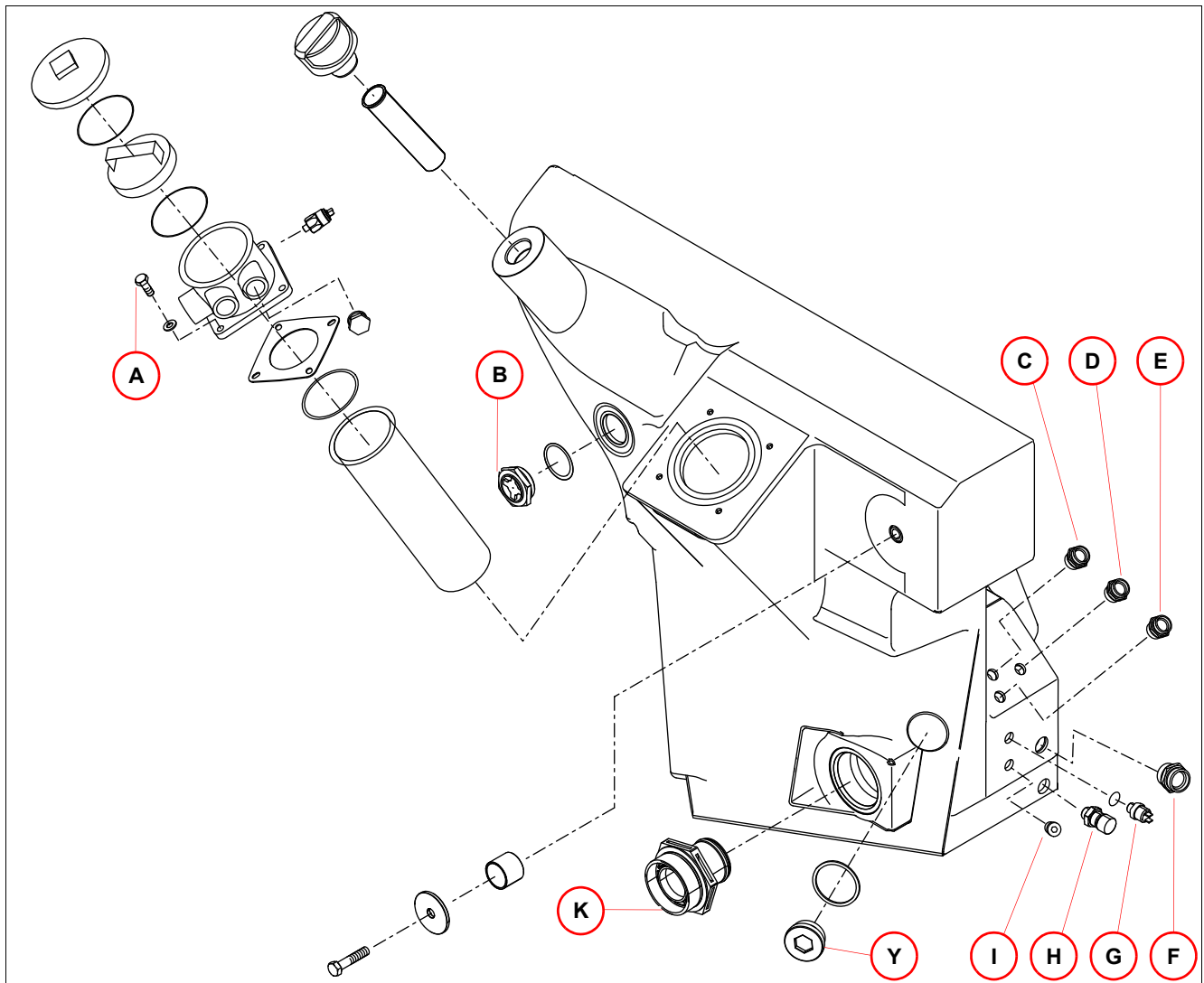


27. Remove fastening screws **A** and **B** with spacer sleeves.

28. Pull out hydraulic tank.

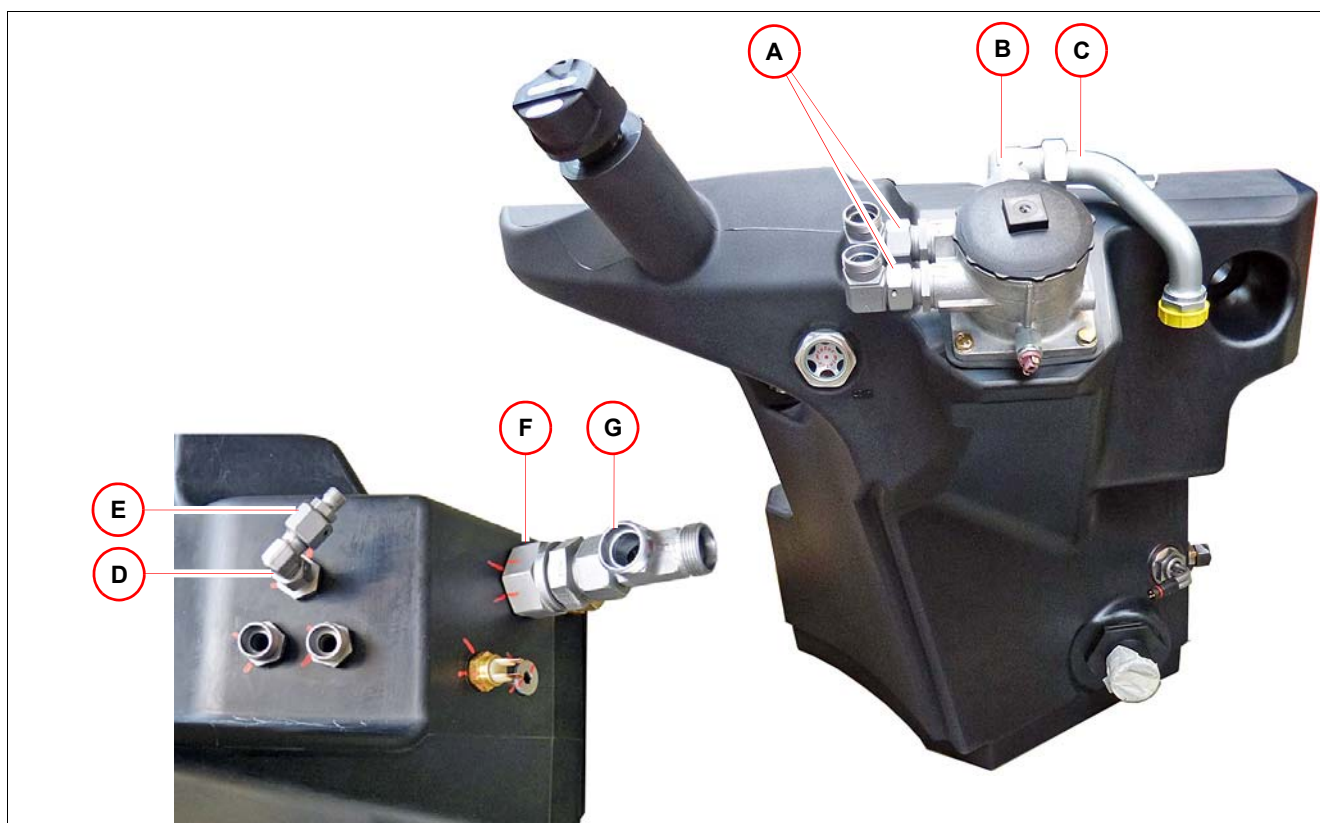


Install hydraulic oil reservoir

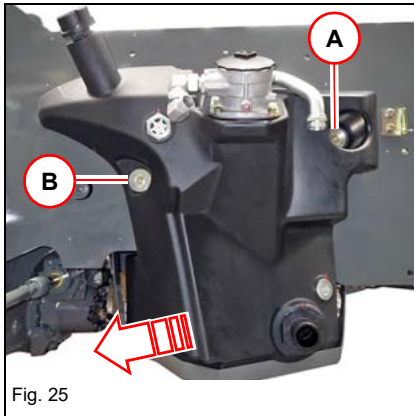


Pos.	Description	Tightening torque	Securing means
A	Screws M10x25	27 Nm (20 lbf ft)	–
B	Oil level sight glass M48x1.5	20 Nm (15 lbf ft)	Loctite® 511
C	Screw connection	35 Nm (26 lbf ft)	Do not pre-mount!
D	Screw connection	35 Nm (26 lbf ft)	Do not pre-mount!
E	Screw connection	35 Nm (26 lbf ft)	Do not pre-mount!
F	Non-return valve	60 Nm (44 lbf ft)	Do not pre-mount!
G	Temperature switch M14x1.5	25 Nm (18 lbf ft)	Loctite® 511
H	Drain coupling M18x1.5	35 Nm (26 lbf ft)	–
I	Locking screw M18x1.5	35 Nm (26 lbf ft)	–
Y	Locking screw M48x1.5	27 Nm (20 lbf ft)	Loctite® 511
K	Suction flange	60 Nm (44 lbf ft)	grease, do not mount in advance!

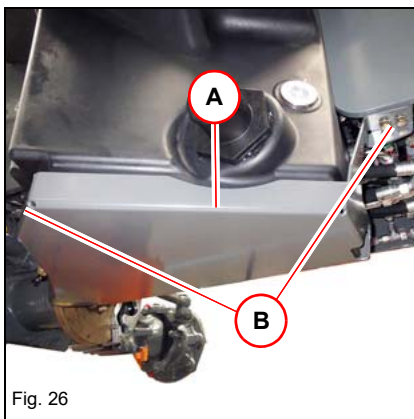
Return filter tightening torque



Pos.	Description	Tightening torque	Remarks
A	Screw connection	150 Nm (111 lbf ft)	–
B	Screw connection	150 Nm (111 lbf ft)	–
C	Connecting piece	150 Nm (111 lbf ft)	–
D	Screw connection	35 Nm (26 lbf ft)	Do not pre-mount!
E	Screw connection	35 Nm (26 lbf ft)	Do not pre-mount!
F	Screw connection	60 Nm (44 lbf ft)	Do not pre-mount!
G	Non-return valve	100 Nm (74 lbf ft)	Do not pre-mount!

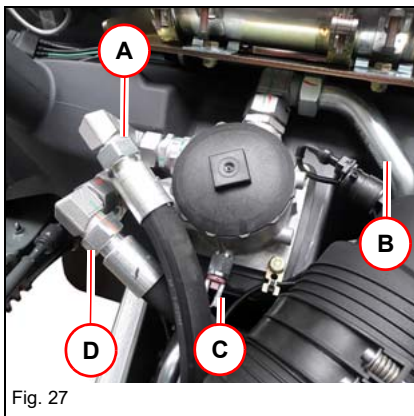


1. Position hydraulic tank on the frame.
2. Fit fastening screws **A** and **B** with washers and distance spacers and tighten to 195 Nm (144 lbf ft).



Hydraulic tank mounting:

3. Position hydraulic tank mounting **A**.
4. Insert fastening screws **B** of the hydraulic tank mounting **A**.



On hydraulic tank, top:

5. Position the hose and tighten the screw connection **A** to 150 Nm (111 lbf ft).
6. Position hose and tighten screw connection **B** to 150 Nm (111 lbf ft).
7. Position the hose and tighten the screw connection **C** with 150 Nm (111 lbf ft).
8. Insert plug **C** on filter housing.

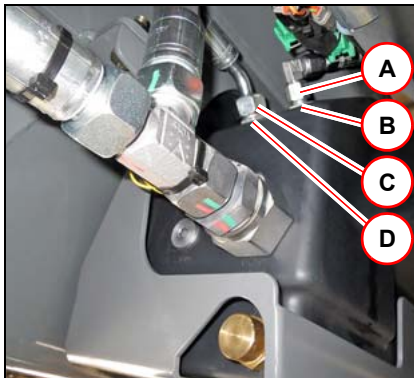


Fig. 28

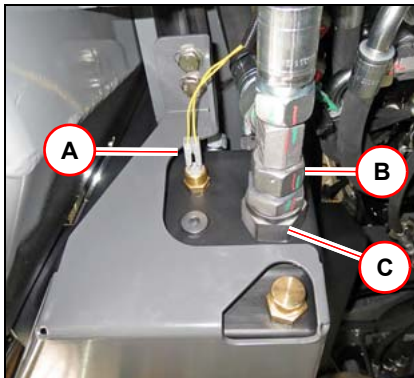


Fig. 29

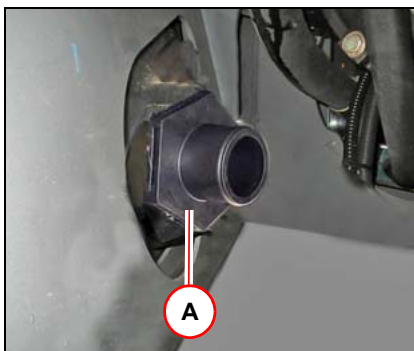


Fig. 30

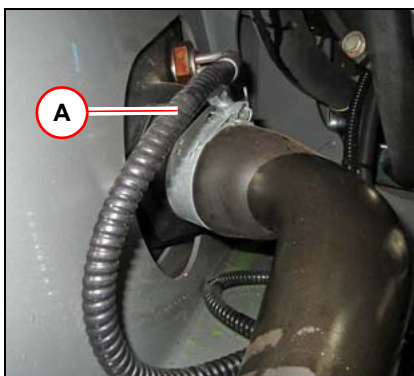


Fig. 31

On hydraulic tank below:

9. Fit screw connection **B** and tighten to 35 Nm (26 lbf ft).

10. Position the hose and tighten the screw connection **A** to 60 Nm (44 lbf ft).

➔ Place resistance on screw connection **B** when tightening.

11. Fit screw connection **D** and tighten to 35 Nm (26 lbf ft).

12. Position the hose and tighten the screw connection **C** with 35 Nm (26 lbf ft).

➔ Place resistance on screw connection **D** when tightening.

13. Fit screw connection **C** and tighten to 60 Nm (44 lbf ft).

14. Position hose and tighten screw connection **B** to 100 Nm (74 lbf ft).

➔ Place resistance on screw connection **C** when tightening.

15. Insert plug **A** on pressure accumulator.

16. Grease thread of suction filter **A** and screw in with special wrench SW 100 and tighten to 50 Nm (37 lbf ft).

17. If present, insert cable **A** from oil preheating.

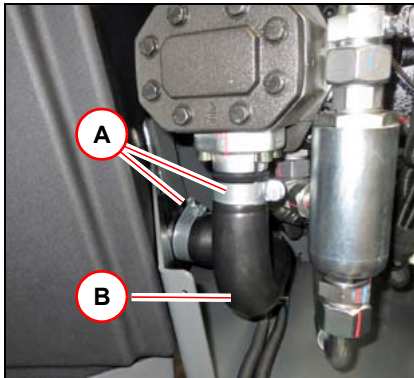


Fig. 32

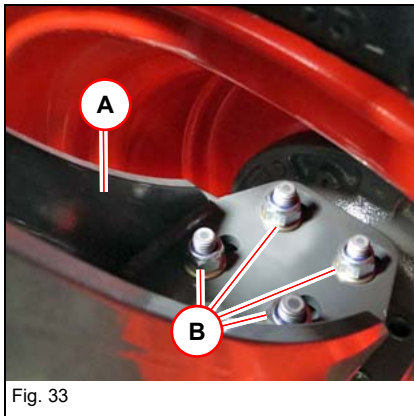


Fig. 33

18. Position suction hose **B** and tighten clips **A**.
19. Install underride protection – see *"Remove/install underride protection (closed)" on page 12-11.*
20. Position wheel cover **A** with mount.
21. Tighten fastening nuts **B**.
22. Install air filter **D** – see *"Remove/install air filter" on page 2-46.*
23. Install maintenance access **C** on the engine bay rear – see *"Engine vat" on page 1-24.*
24. Fill the hydraulic oil tank – see *"Adding hydraulic oil" on page 1-92.*
25. Install rear, right wheel – see *"Removing the wheels" on page 1-135.*
26. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
27. Carry out a trial run and check the steering orbitrol for leaks.

8.3 Gear pump work hydraulics I

Safety instructions for work hydraulics gear pump



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

- Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- Allow the hydraulic system to cool down before removing components
- Wear protective gloves



WARNING

Risk of injury from the weight of the control unit!

Risk of serious injuries if control unit **XIII** presses down.

- Remove hydraulic control unit **XIII** only with another person.

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

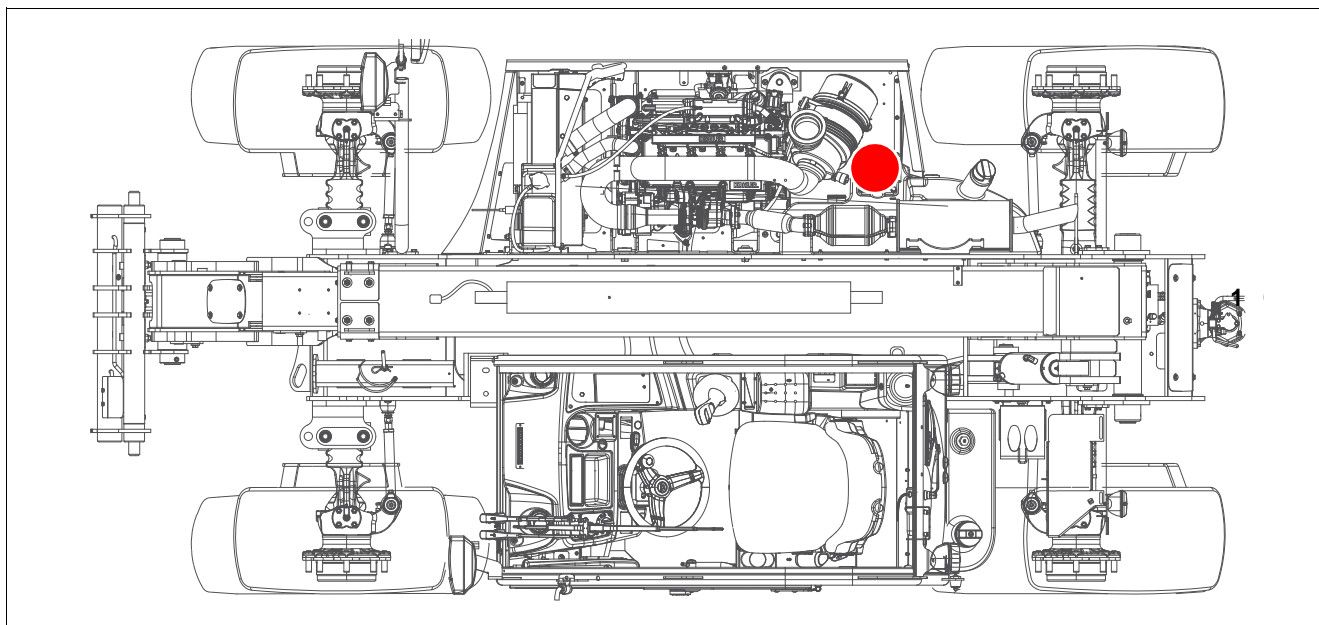
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Removing / installing work hydraulics gear pump

Tools:

- Container for collecting hydraulic oil [capacity of min. 55 l, (14.53 gal)]
- Plugs (different sizes) for closing the oil lines
- Standard tools

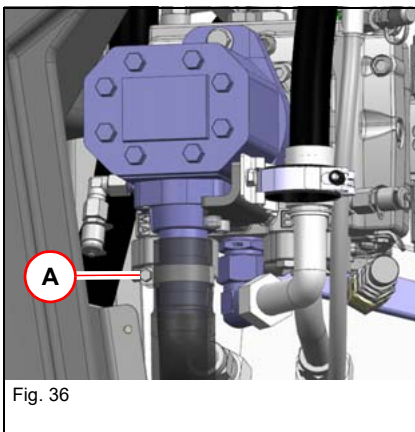
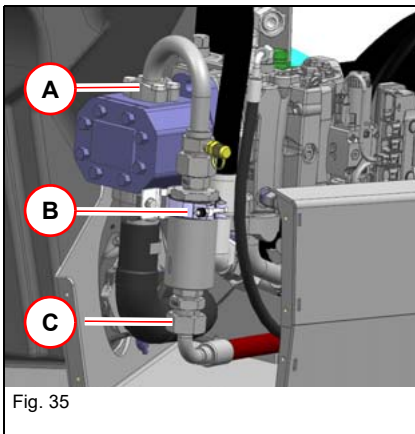
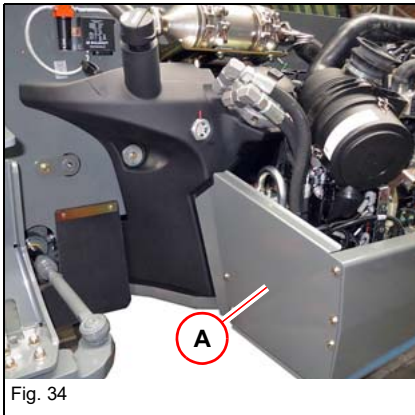
Technical data



Weight	BMK	Description	Remarks
5 kg (11 lb)	I	Gear pump working hydraulics	36 ccm/rev (2196 in ³)
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove gear pump

1. If possible, take gears to the right.
2. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
3. Completely siphon off or drain the hydraulic oil – see *"Changing hydraulic oil" on page 1-93.*
4. Remove maintenance access **A** to engine bay rear – see *"Engine vat" on page 1-24.*
5. Remove battery – see *"Removing the battery" on page 1-102.*



6. Remove the hydraulic hose **C** and seal off.
 7. Remove screws **A** from the half-shells.
 8. Open mounting element **B** and remove filter with the pipeline.
-
9. Open hose clip **A** and remove suction hose.

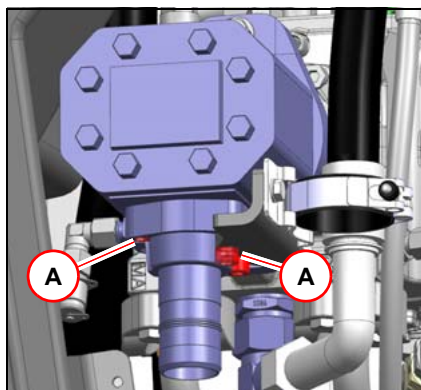


Fig. 37

10. Remove the fastening screws **A** from the connecting flange.

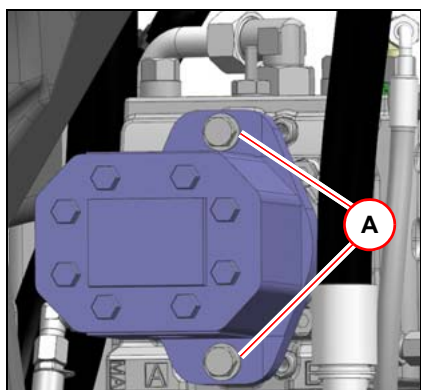


Fig. 38

11. Remove the fastening screws **A** and pull the hydraulic pump out of the variable displacement pump.

Install gear pump

On the variable displacement pump:

1. Clean tapped holes **A** and flange **B** for gear pump.

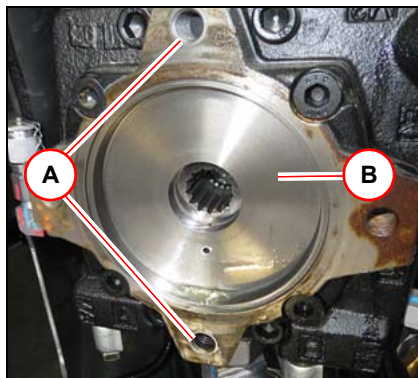


Fig. 39

Fastening working hydraulics gear pump:

2. Install new seal ring **A** onto the gear pump.

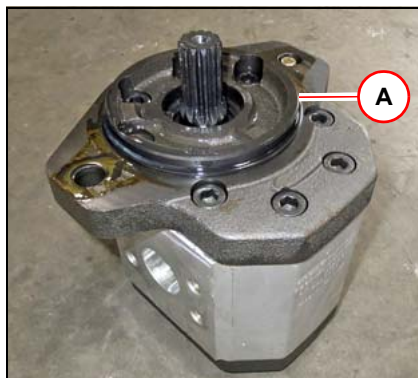


Fig. 40

3. Position the gear pump on the variable displacement pump and tighten the fastening screws **B** to 79 Nm (58 lbf ft).

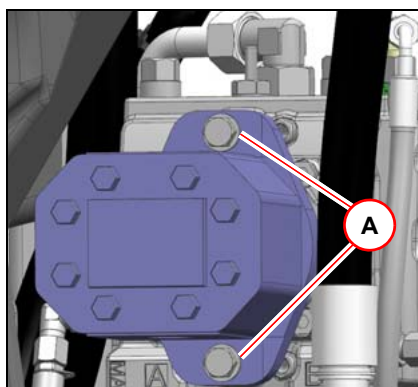


Fig. 41

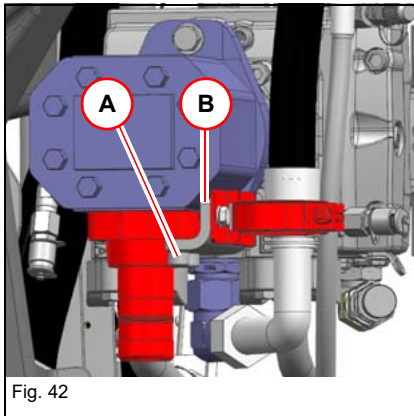


Fig. 42

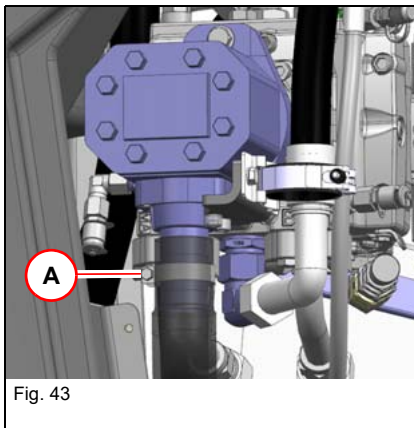


Fig. 43

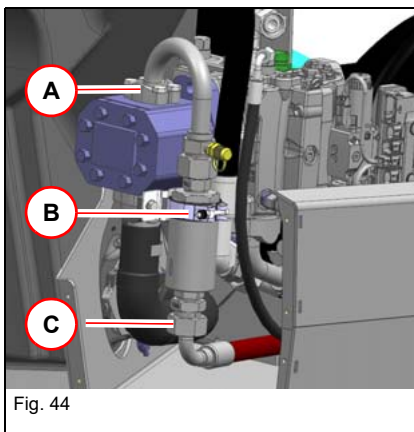


Fig. 44

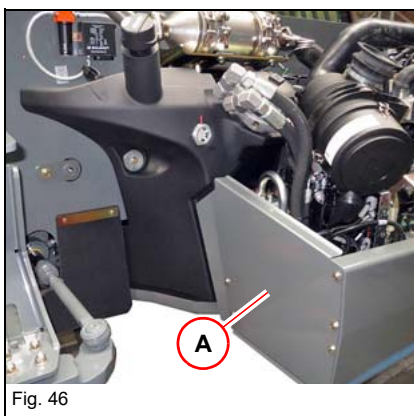


Fig. 46

Hydraulic hoses on work hydraulics gear pump:

4. Position mount **B** with fastening clip and connection flange on the pump.
- ➔ Replace seal ring on connection flange
5. Tighten fastening screws **A** of connection flange to 46 Nm (34 lbf ft).

6. Push suction line onto the connection flange.
7. Tighten hose clip **A**.

8. Position filter with pipeline in the mounting element **B** and install half-shells **A** on the pump and tighten to 46 Nm (34 lbf ft).
- ➔ Replace pipeline seal ring
9. Tighten mounting element **B**.
10. Position hydraulic hose **C** on filter and pull tight.

11. Fill the hydraulic oil tank – see ["Adding hydraulic oil" on page 1-92](#).
12. Install and connect the battery – see ["Install the battery" on page 1-103](#).
13. Install maintenance access **A** to the engine bay rear – see ["Engine vat" on page 1-24](#).
14. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
15. Carry out test run and check the system for leaks.

8.4 Load stabilizer pressure accumulator 080

Safety instructions for accumulator load stabilizer

Membrane and hydraulic accumulators are pressure tanks in accordance with the European Pressure Equipment Directive 97/23/EC. Hydraulic accumulators are exclusively for the purpose of accumulating and discharging hydraulic fluids. Membrane or hydraulic accumulators consist of a fluid and a gas section with a membrane as gas-tight separating element.



DANGER

If the pressure accumulator is not filled correctly there is a risk of explosion! If pressure accumulators are filled with oxygen or air, they can explode!

This can result in serious injuries or even death.

► Only fill pressure accumulators with nitrogen.



Information

No welding or mechanical work may be carried out on the pressure accumulator!

We recommend checking the pretensioning pressure annually. This inspection may only be carried out by a skilled person with the respective qualification!



WARNING

Pressurized components!

The pressure accumulator for emergency lowering is under pressure!

► Before disassembling, the pressure accumulator has to be depressurised.



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

► Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
 - ▶ Wear protective gloves
-

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
 - ▶ Clean all the hydraulic screw connections and ports before disassembly.
-



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

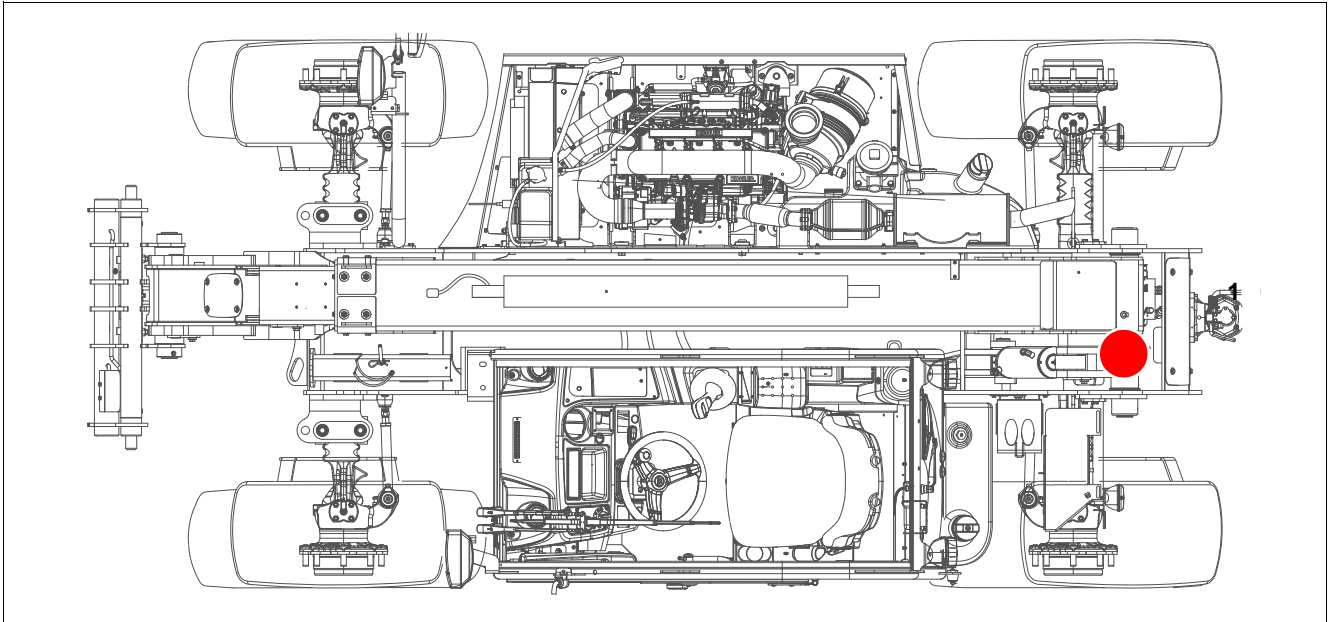
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Removing / installing pressure accumulator load stabiliser

Tools:

- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

Technical data



Weight	BMK	Description	Remarks
2 kg (4 lb)	080	Load stabilizer pressure accumulator	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove accumulator

1. Completely lift and secure the telescopic boom – see *"Safety prop for telescopic boom" on page 1-4*.
2. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
3. Remove cover **A** at the rear.

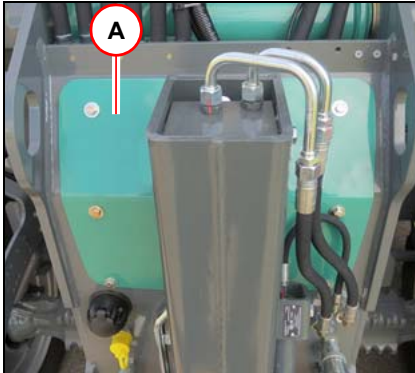


Fig. 47

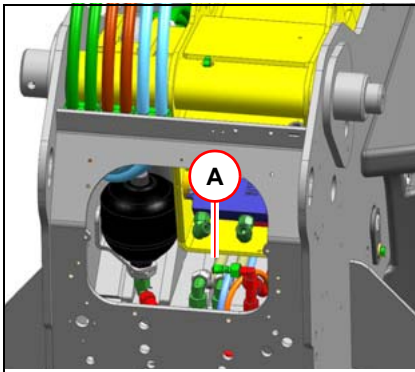


Fig. 48

4. De-pressurize the pressure accumulator over the Minimes connection **A**.

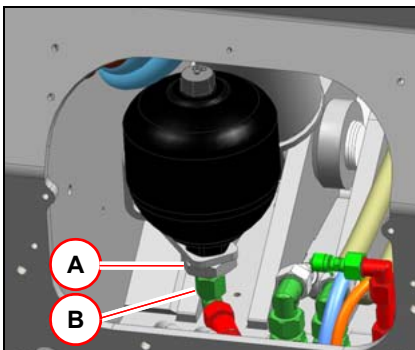


Fig. 49

5. Release union nut **B** and remove hose on accumulator and seal tightly.
6. Release mounting nut **A** and take pressure accumulator out upwards.

Install accumulator

1. Screw connection in accumulator to 95 Nm (70 lbf ft),
2. Position accumulator and tighten the mounting nut **A**.
3. Position the hose and tighten the union nut **B** to 60 Nm (44 lbf ft).

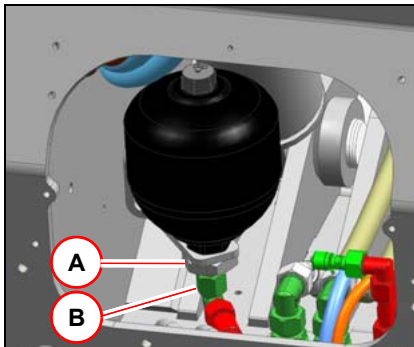


Fig. 50

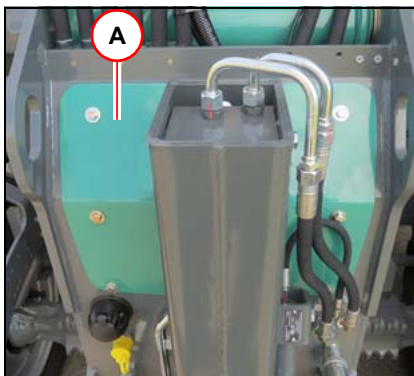


Fig. 51

4. Install cover **A**.
5. Add hydraulic oil – see ["Adding hydraulic oil" on page 1-92](#).
6. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
7. Check the system for correct function and sealing.

8.5 Emergency lowering pressure accumulator 077

Safety instructions for accumulator emergency lowering

Membrane and hydraulic accumulators are pressure tanks in accordance with the European Pressure Equipment Directive 97/23/EC. Hydraulic accumulators are exclusively for the purpose of accumulating and discharging hydraulic fluids. Membrane or hydraulic accumulators consist of a fluid and a gas section with a membrane as gas-tight separating element.



DANGER

If the pressure accumulator is not filled correctly there is a risk of explosion! If pressure accumulators are filled with oxygen or air, they can explode!

This can result in serious injuries or even death.

► Only fill pressure accumulators with nitrogen.



Information

No welding or mechanical work may be carried out on the pressure accumulator!

We recommend checking the pretensioning pressure annually. This inspection may only be carried out by a skilled person with the respective qualification!



WARNING

Pressurized components!

The pressure accumulator for emergency lowering is under pressure!

► Before disassembling, the pressure accumulator has to be depressurised.



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

► Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
 - ▶ Wear protective gloves
-

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
 - ▶ Clean all the hydraulic screw connections and ports before disassembly.
-



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

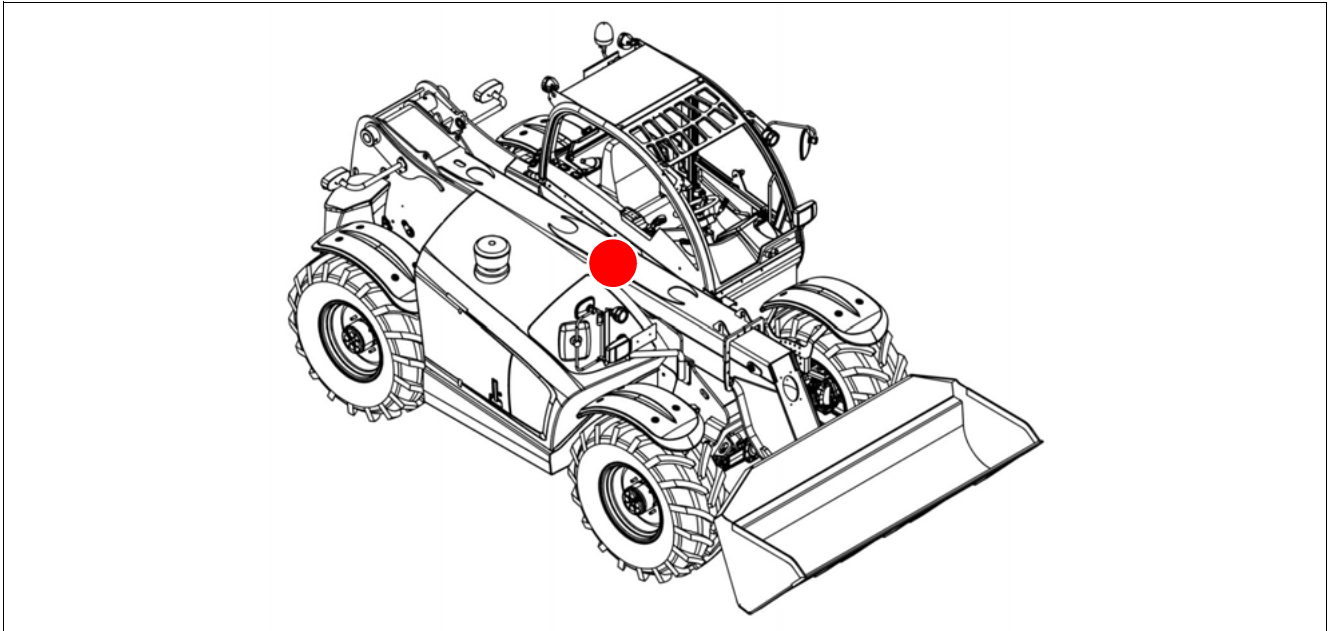
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Remove/install accumulator emergency lowering

Tools:

- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

Technical data



Weight	BMK	Description	Remarks
2 kg (4 lb)	077	Emergency lowering pressure accumulator	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove accumulator

1. Completely lift and secure the telescopic boom – see ["Safety prop for telescopic boom" on page 1-4](#).
2. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
3. Depressurize accumulator.
4. Release union nut **A** and remove hose on accumulator and seal tightly.
5. Release mounting nut **B** and take pressure accumulator out upwards.

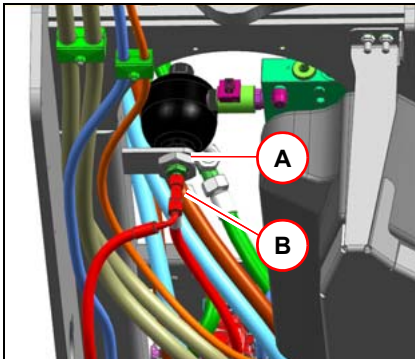


Fig. 52

Install accumulator

1. Screw connection in accumulator to 95 Nm (70 lbf ft)
2. Position accumulator and tighten the mounting nut **A**.
3. Position the hose and tighten the union nut **B** to 28 Nm (21 lbf ft).
4. Add hydraulic oil – see ["Adding hydraulic oil" on page 1-92](#).
5. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
6. Check the system for correct function and sealing.

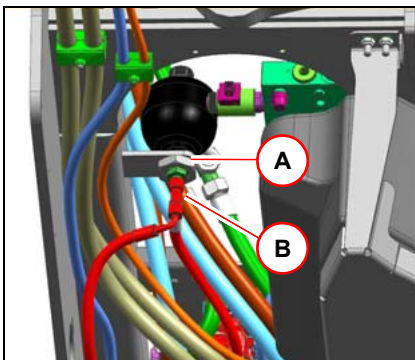


Fig. 53

8.6 Hose burst valve lifting cylinder XIV

Safety instructions for hose burst valve lifting cylinder



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

- Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- Allow the hydraulic system to cool down before removing components
- Wear protective gloves

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

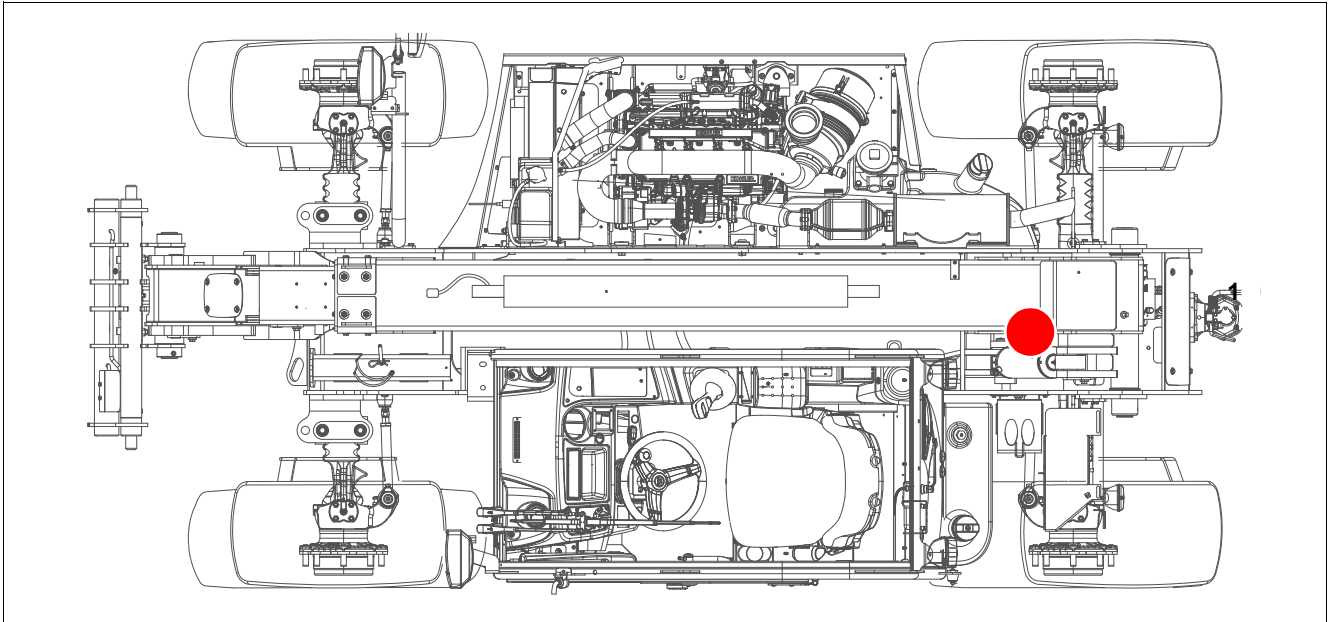
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install RBS lifting cylinder

Tools:

- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

Technical data



Weight	BMK	Description	Remarks
5.9 kg (13 lb)	XIV	Lift ram hose burst valve	With load stabilizer
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove hose burst valve lifting cylinder

1. Park the vehicle on firm and level ground.
2. Apply the parking brake.
3. Raise the telescopic boom.
4. Secure the lifting cylinder with safety props – see *"Safety prop for telescopic boom" on page 1-4.*
5. Switch off the starter and remove the starting key.
6. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
7. Loosen screw connection **A** and remove hose.
8. Loosen screw connection **C** and remove hose.
9. Tightly seal hose pipes and pipe lines.
10. Pull out connector **B** from the pressure switch **S045**.

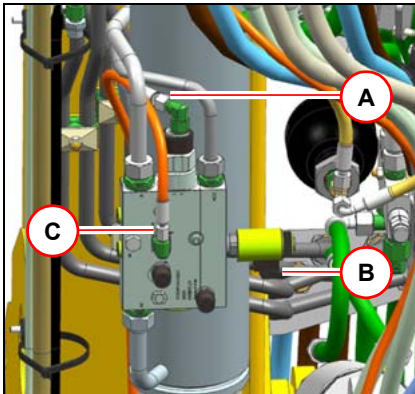


Fig. 54

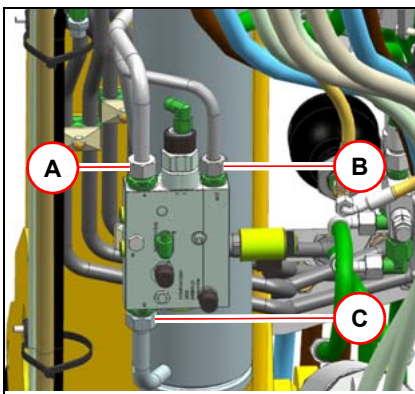


Fig. 55

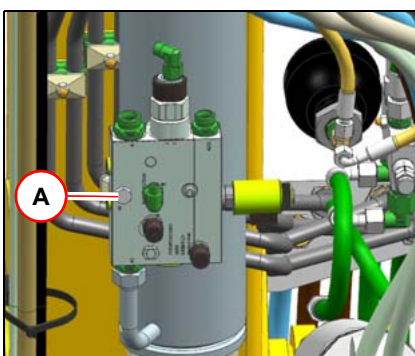


Fig. 56

11. Loosen the screw connection **A** and remove the pipe.
12. Release screw connections **B** and remove pipe.
13. Release screw connection **C**.
14. Tightly seal hose pipes and pipe lines.

15. Remove fastening screw **A** and take hose burst valve off of lifting cylinder.

Install hose burst valve lifting cylinder

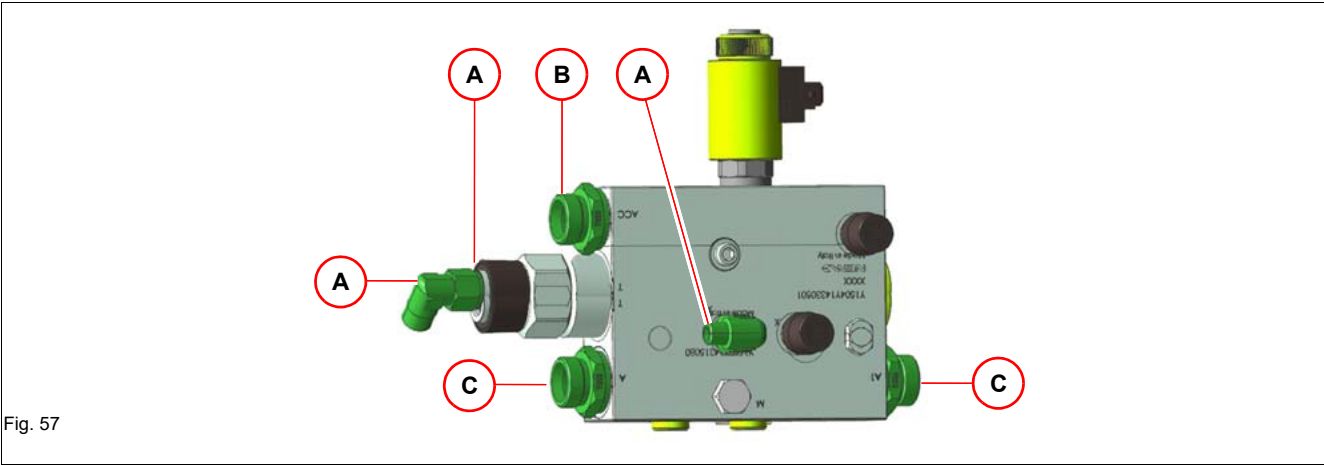


Fig. 57

Pos.	Tightening torque	Remarks
A	35 Nm (26 lbf ft)	EWE-10
B	95 Nm (70 lbf ft)	GE-15
C	170 Nm (125 lbf ft)	GE-18

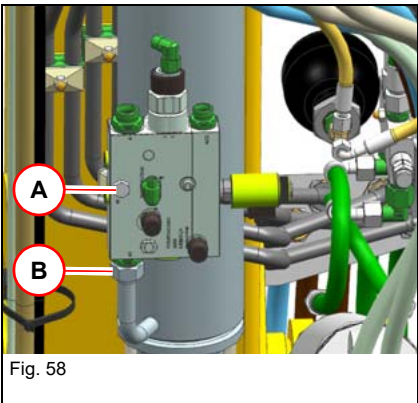


Fig. 58

1. Position the hose burst valve on the lifting cylinder on screw connection **B** and tighten fastening screw **A**.
2. Tighten the union nut **B** to 80 Nm (59 lbf ft).

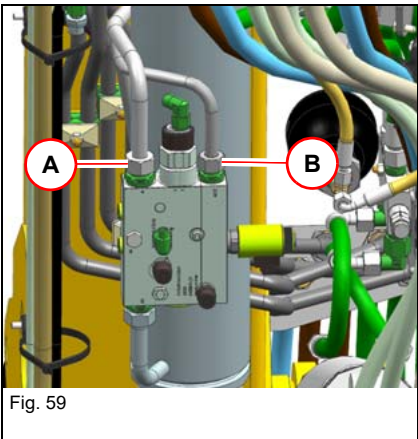


Fig. 59

3. Position the hose pipe and tighten the union nut **A** to 80 Nm (59 lbf ft).
4. Position the hose pipe and tighten the union nut **B** to 60 Nm (44 lbf ft).

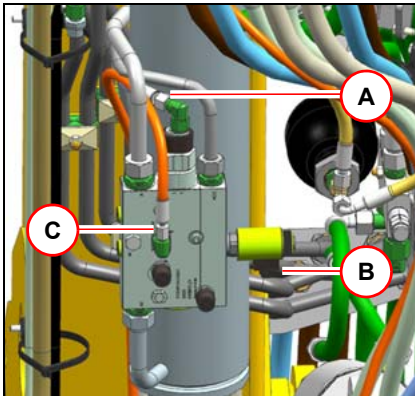


Fig. 60

5. Insert connector **B**.
6. Position the hose and tighten the screw connections **A** to 28 Nm (21 lbf ft) .
7. Position hose and tighten screw connection **C** to 18 Nm (13 lbf ft) .
8. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
9. Remove safety props from the lifting cylinder.
10. Check the system for correct function and sealing.
11. Add hydraulic oil – see ["Adding hydraulic oil" on page 1-92](#).

8.7 Hose burst valve for push-out ram 089

Safety instructions for hose burst valve extending cylinder



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

- Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- Allow the hydraulic system to cool down before removing components
- Wear protective gloves

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

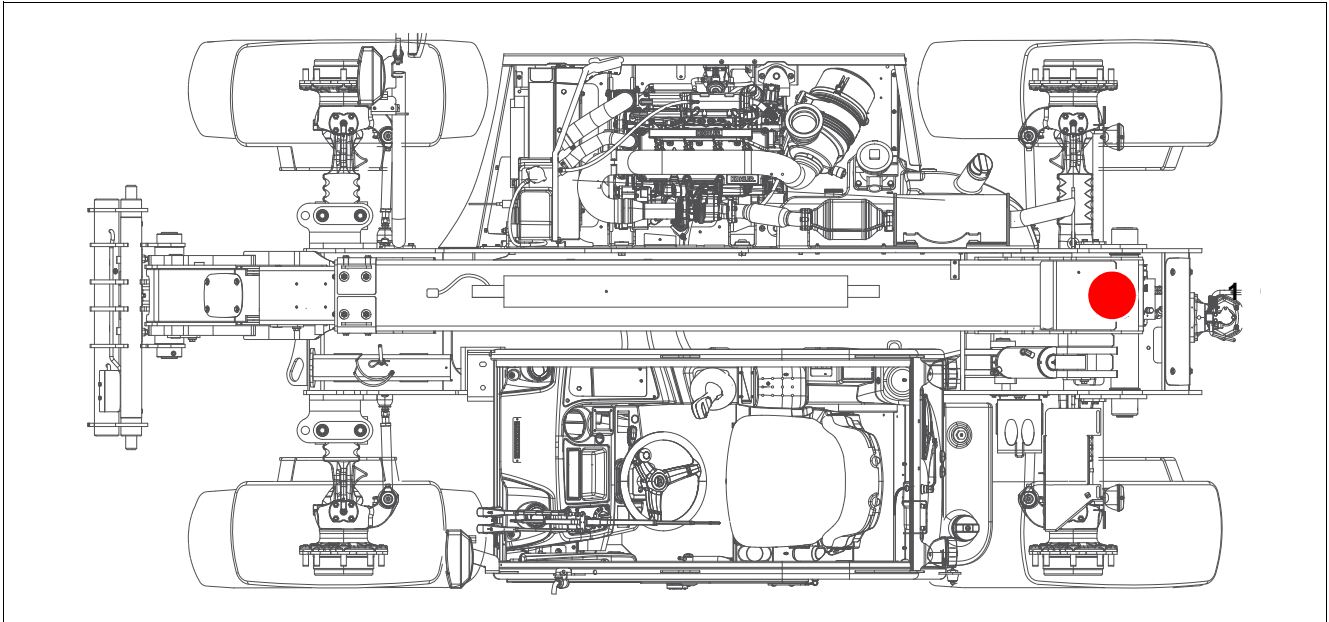
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install hose burst valve extending cylinder

Tools:

- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

Technical data



Weight	BMK	Description	Remarks
2 kg (4 lb)	089	Hose burst valve for push-out ram	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove hose burst valve extending cylinder

1. Extend telescopic boom to approx. 0.5 m (1.64 ft) and lower to the ground.
2. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
3. Open the cover – see *"Rear of machine" on page 1-25*.
4. If present, remove autohitch – see *"Removing/installing the autohitch" on page 17-2*.
5. Unhook and unplug screw connections **A** on the mount **B**.
6. Unscrew mount **B**.

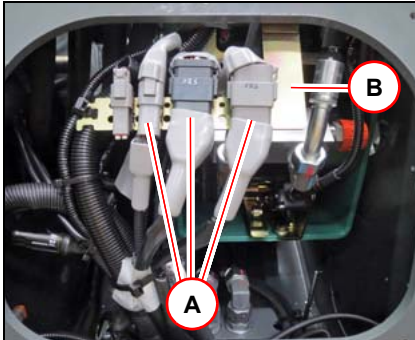


Fig. 61

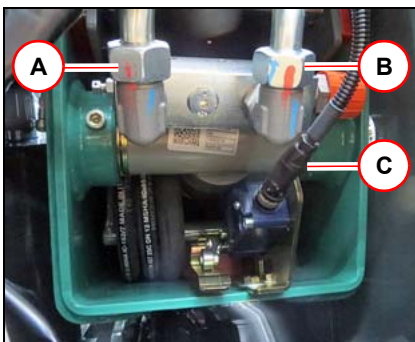


Fig. 62

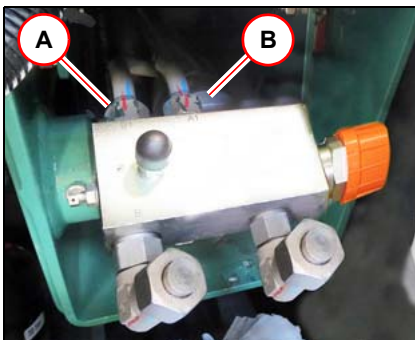
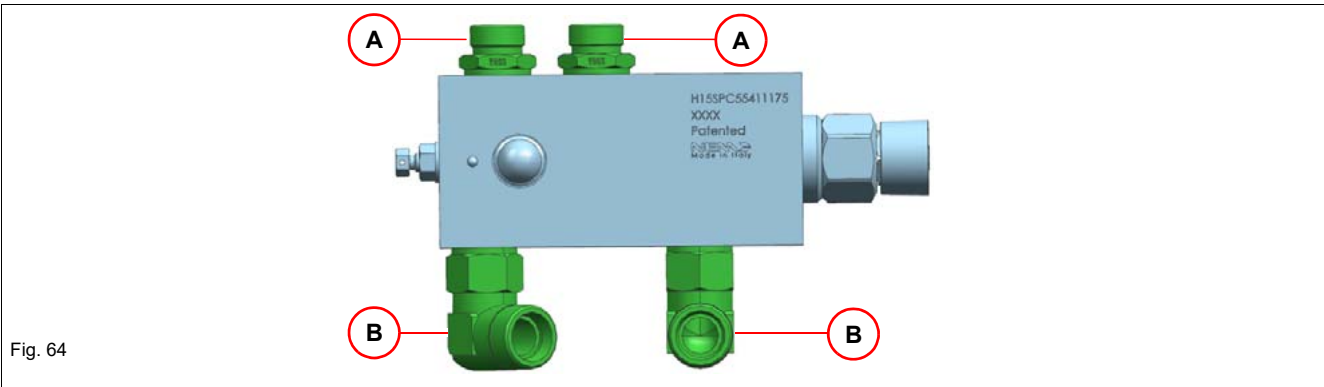


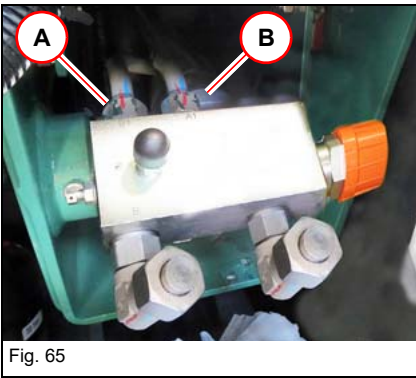
Fig. 63

7. Unplug plug **C** at the limit switch.
8. Loosen screw connection **A** and remove hose.
9. Loosen screw connection **B** and remove hose.
10. Tightly seal hose pipes and screw connections.
11. Loosen screw connection **A**.
12. Loosen screw connection **B**.
13. Remove hose burst valve from the extending cylinder.

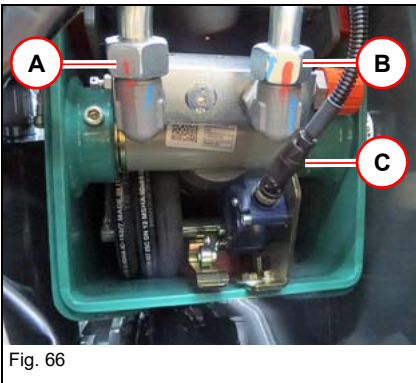
Install hose burst valve extending cylinder



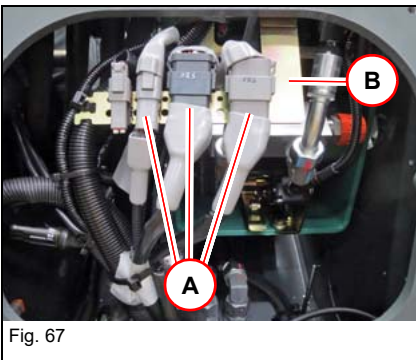
Pos.	Tightening torque	Remarks
A	55 Nm (41 lbf ft)	GE-15
B	95 Nm (70 lbf ft)	EWE-18



1. Position hose burst valve on the push-out cylinder.
2. Tighten screw **A** to 50 Nm (37 lbf ft).
3. Tighten screw connection **B** to 50 Nm (37 lbf ft).



4. Position the hose and tighten the screw connection **A** to 80 Nm (59 lbf ft).
5. Position hose and tighten screw connection **B** to 80 Nm (59 lbf ft).
6. Insert plug **C** on the limit switch.



7. Screw on mount **B**.
8. Insert screw connections **A** and hook up to mount **B**.
9. Mount cover – see *"Rear of machine" on page 1-25*
10. If present, mount autohitch – see *"Removing/installing the autohitch" on page 17-2*.
11. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
12. Check the system for correct function and sealing.
13. Add hydraulic oil – see *"Adding hydraulic oil" on page 1-92*.

8.8 Tilt ram hose burst valve 087

Safety instructions for hose burst valve tilt cylinder



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

- Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- Allow the hydraulic system to cool down before removing components
- Wear protective gloves

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

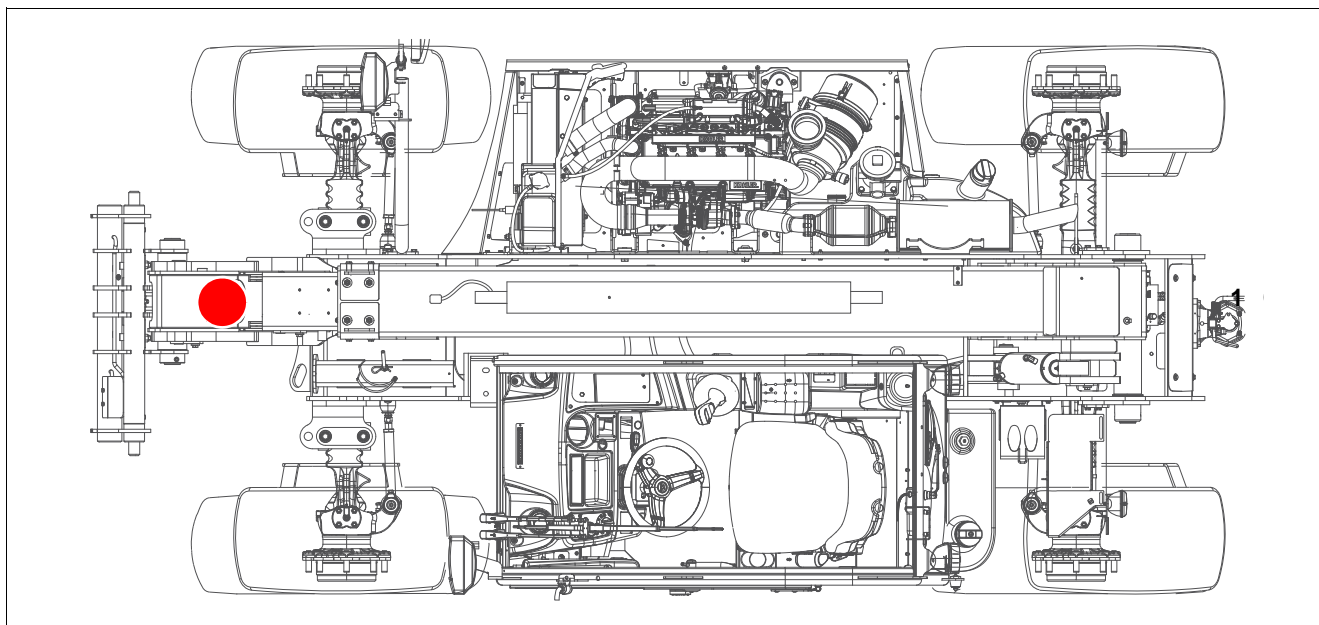
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Install/remove hose burst valve tilt cylinder

Tools:

- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

Technical data



Weight	BMK	Description	Remarks
2 kg (4 lb)	087	Hose burst valve (RBS) tilt cylinder	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

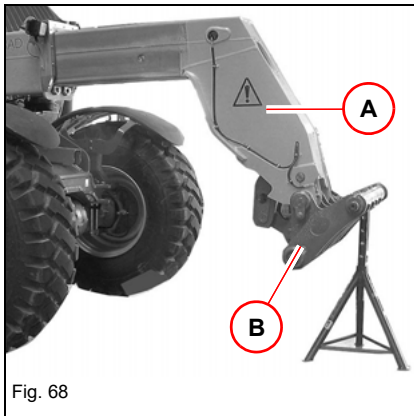


Fig. 68

Remove hose burst valve tilt cylinder

1. Place the telehandler on a firm and level surface
2. Apply the parking brake.
3. Extend the boom **A**, as shown.
4. Move the quickhitch facility **B** into the position shown.
5. Place telescopic boom on to a support making sure that no pressure is applied.
6. Release the pressure in the hydraulic system. To do this:
 - Stop the engine, but leave the ignition switched on.
 - Hold down the switch for emergency lowering.
 - Move the control lever (joystick) in all directions repeatedly.
7. Switch off the starter and remove the starting key.
8. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
9. Loosen sleeve nut **A** and remove hose pipe.
10. Release union nut **C** for the hose line.
11. Remove hose strap **B**.
12. Release union nut **D** for the hose line and remove hose burst valve.

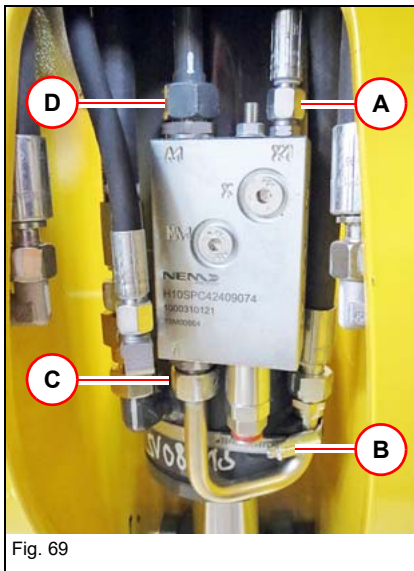
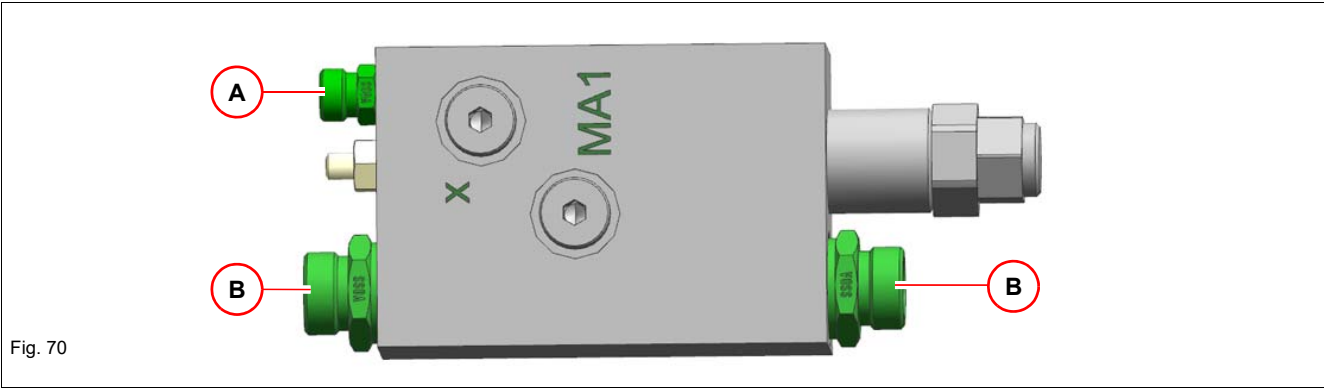
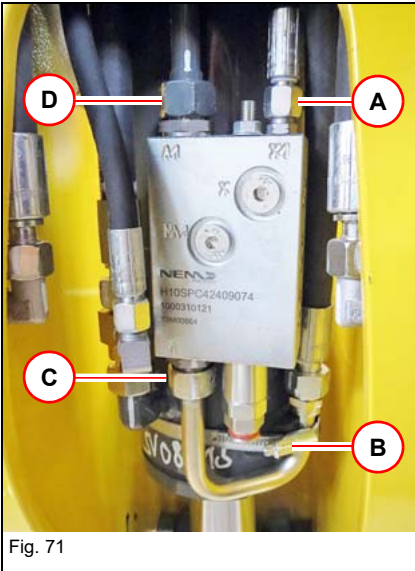


Fig. 69

Install hose burst valve tilt cylinder



Pos.	Tightening torque	Remarks
A	13 Nm (10 lbf ft)	GE-08
B	95 Nm (70 lbf ft)	GE-15



1. Position hose burst valve on the screw connection **D**.
2. Tighten union nut **D** to 60 Nm (44 lbf ft).
3. Position the hose pipe and tighten the union nut **A** to 23 Nm (17 lbf ft).
4. Tighten union nut **C** to 60 Nm (44 lbf ft).
5. Mount and tighten hose line **B**.
6. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
7. Tilt and dump out the tilt ram several times.
8. Check the system for correct function and sealing.
9. Add hydraulic oil – see ["Adding hydraulic oil" on page 1-92](#).

8.9 Variable displacement pump VII

Safety instructions for variable displacement pump



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

- Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- Allow the hydraulic system to cool down before removing components
- Wear protective gloves



WARNING

Risk of injury from the weight of the control unit!

Risk of serious injuries if control unit **XIII** presses down.

- Remove hydraulic control unit **XIII** only with another person.

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

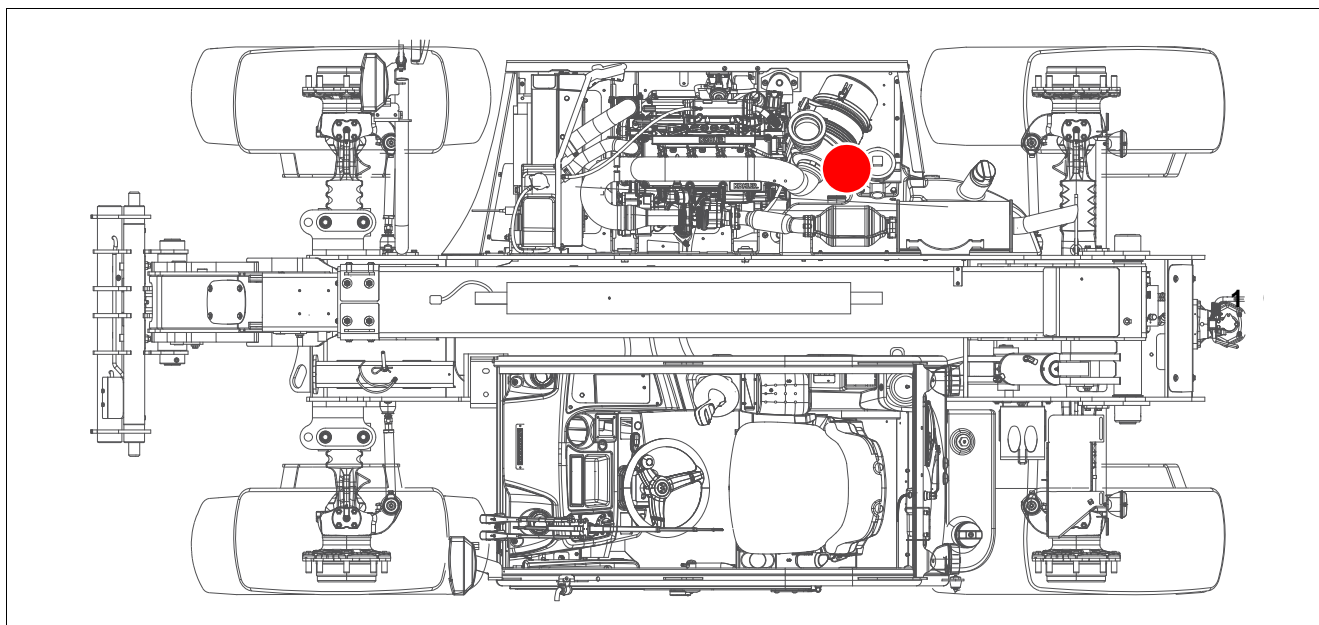
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Removing/installing the variable displacement pump

Aid:

- Ring spanner C-form (“obstruction spanner”) SW19
- Suitable lifting gear, load-bearing capacity min. 60 kg (132 lb)
- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

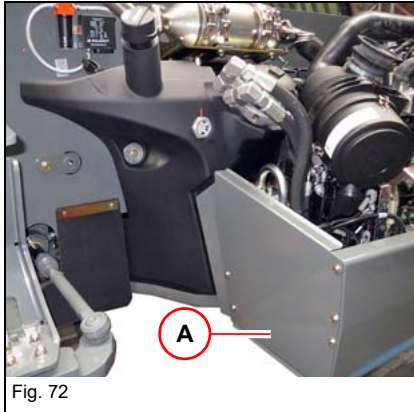
Technical data



Weight	BMK	Description	Remarks
40 kg (88.2 lb)	VII	Variable displacement pump	—
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

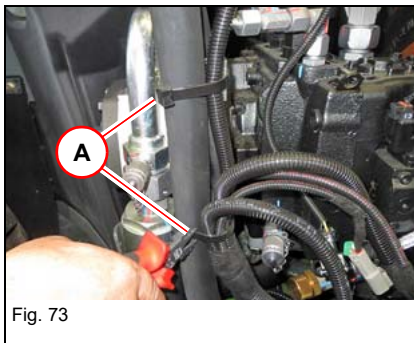
Remove variable displacement pump

1. If possible, take gears to the right.
2. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
3. Remove maintenance access **A** to engine bay rear – see *"Engine vat" on page 1-24*.
4. Remove battery – see *"Removing the battery" on page 1-102*.
5. Completely remove air filter with bracket – see *"Remove/install air filter" on page 2-46*.
6. Uninstall gear pump work hydraulics – see *"Removing / installing work hydraulics gear pump" on page 8-23*.



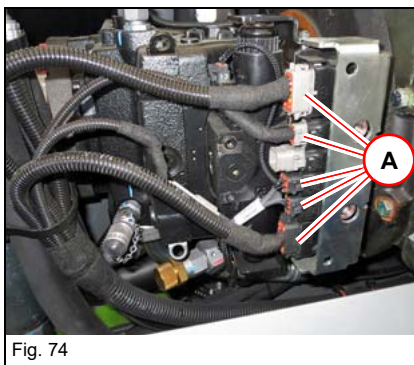
Information

If a C-form spanner ("obstruction spanner") SW19 is not available, the hydraulic tank must be removed if necessary.

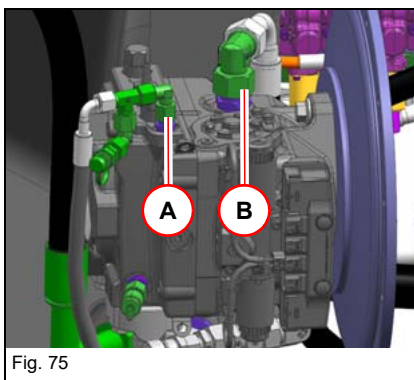


Cable to the variable displacement pump traction drive:

7. Remove cable tie **A**.

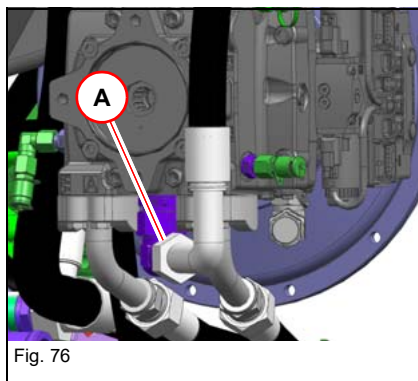


8. Mark positions of the plug **A** on the variable displacement pump and unplug.

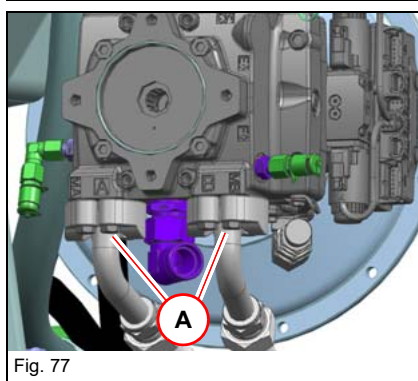


Hydraulic hose lines on the variable displacement traction drive:

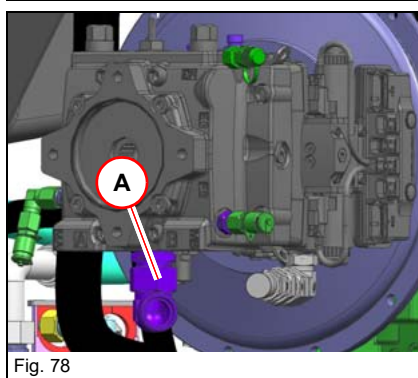
9. Release union nut **A** and remove hydraulic hose and seal tightly.
10. Release union nut **B** and remove hydraulic hose and seal tightly.



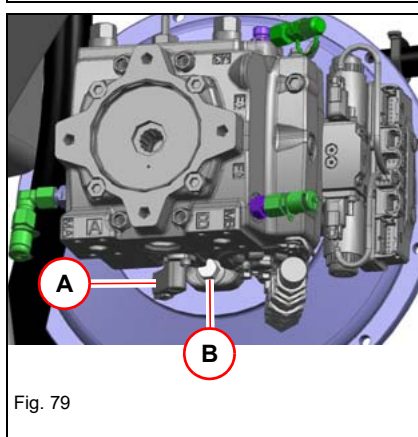
11. Release union nut **A** and remove hydraulic hose and seal tightly.



12. Remove fastening screws **A** and take off half-shells.

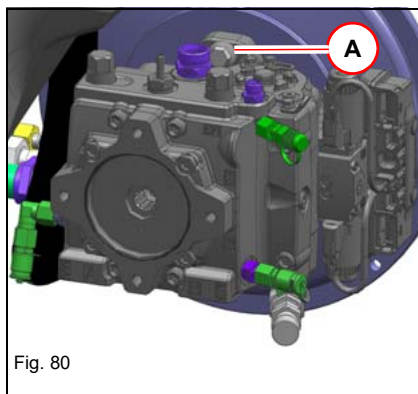


13. Remove screw connection **A**.



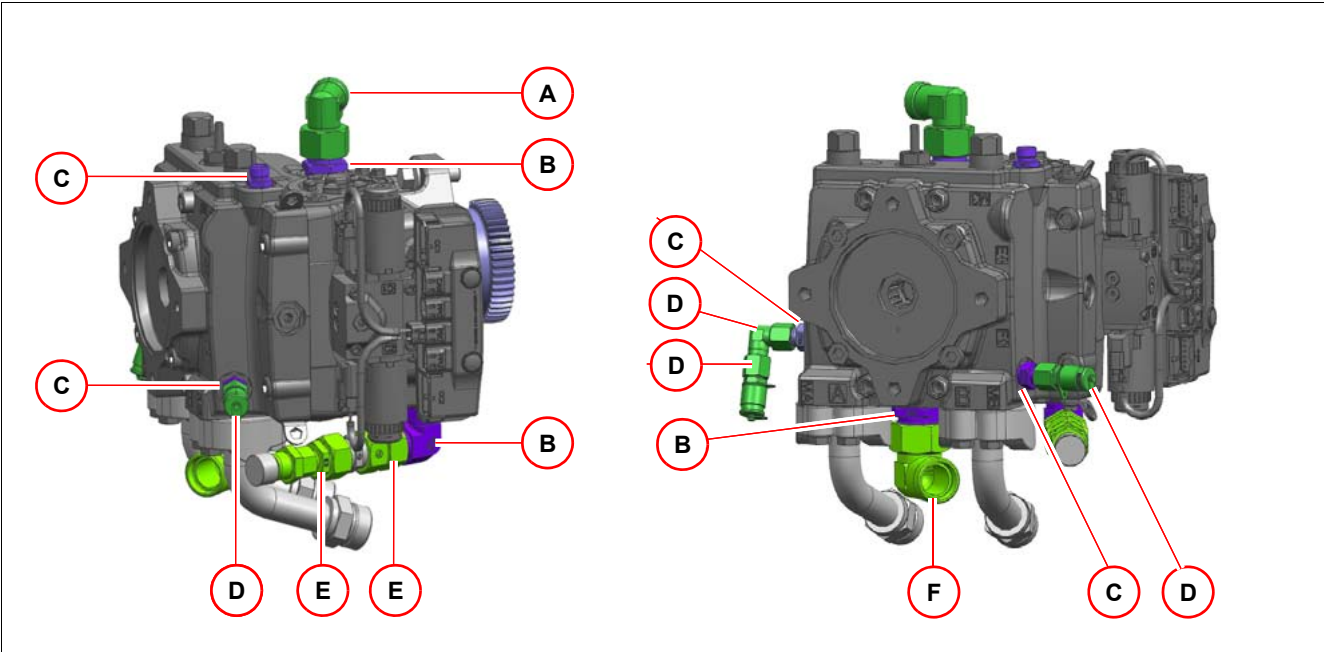
14. Unplug RPM sensor **A**.

15. Remove fastening screw **B** at the bottom of the displacement pump.



16. Affix suitable lifting gear to the displacement pump.
17. Remove fastening screw **A** at the top of the variable displacement pump.
18. Slowly extend the variable displacement pump out of the coupling housing using suitable lifting gear.

Screw connections tightening torques



Pos.	Tightening torque	Remarks
A	110 Nm (81 lbf ft)	–
B	180 Nm (133 lbf ft)	–
C	40 Nm (30 lbf ft)	–
D	28 Nm (21 lbf ft)	–
E	80 Nm (59 lbf ft)	–
F	160 Nm (118 lbf ft)	–

Install variable displacement pump

1. Push the drive **A** far enough for it to be flush with the pump drive shaft.
2. Insert fastening screw **B** using Loctite® 234 and tighten to 86 Nm (63 lbf ft).

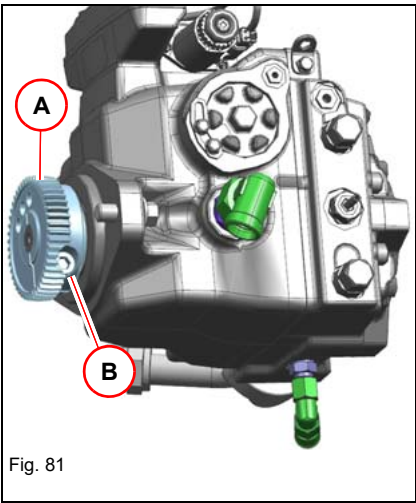
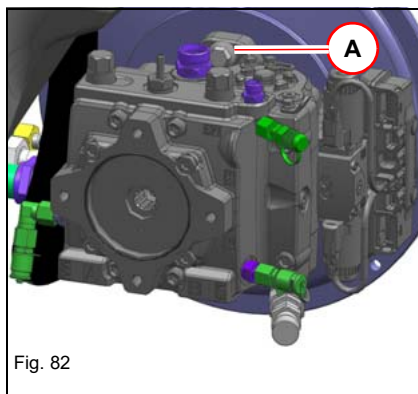
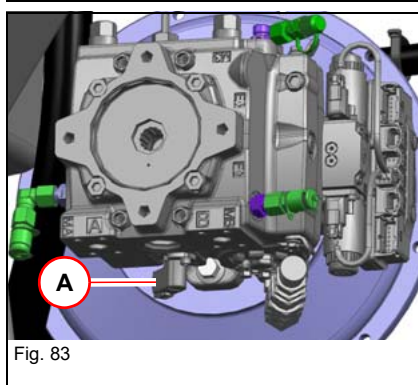


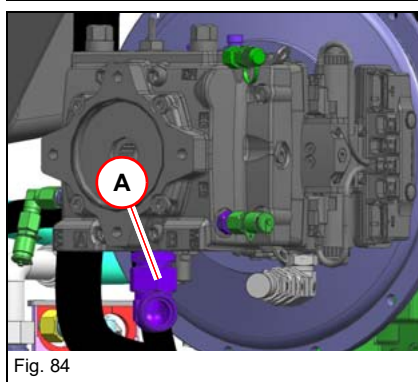
Fig. 81



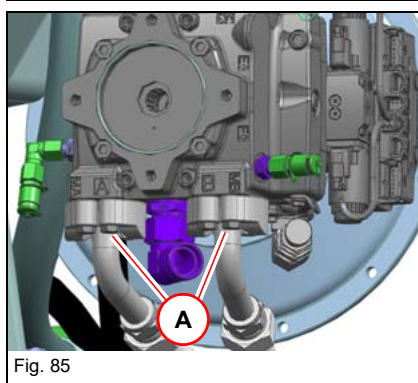
3. Position variable displacement pump on the coupling bell and while using Loctite® 243 tighten fastening screws **B** to 195 Nm (144 lbf ft).



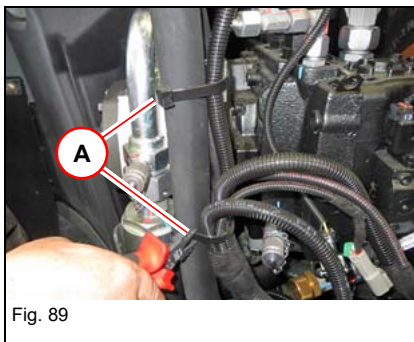
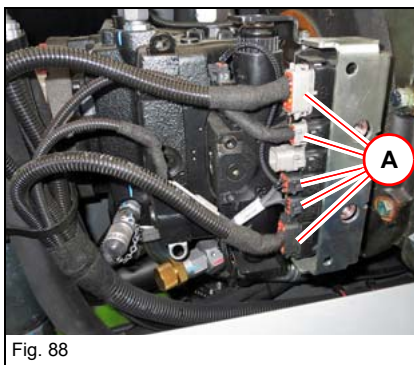
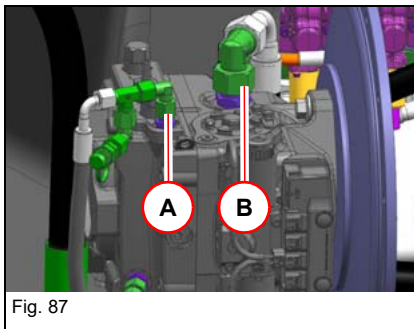
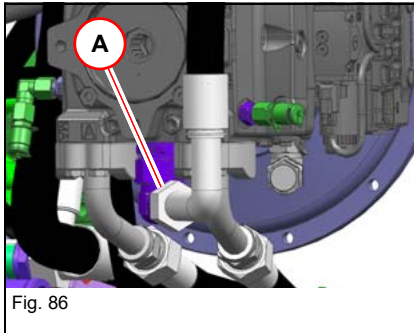
4. Insert RPM sensor **B**.



5. Fit screw connection **A** and tighten to 160 Nm (118 lbf ft).



6. Position high pressure lines with new seals.
7. Fit half-shells with screws **A** and tighten to 46 Nm (34 lbf ft).



8. Position the hydraulic hose and tighten the union nut **A** to 160 Nm (118 lbf ft).

9. Fill the variable displacement pump over the connection **B** with hydraulic oil.

10. Position the hydraulic hose and tighten the sleeve nut **B** to 110 Nm (81 lbf ft).

11. Position the hydraulic hose and tighten the sleeve nut **A** with 28 Nm (21 lbf ft).

12. Uninstall gear pump work hydraulics – see *"Removing / installing work hydraulics gear pump" on page 8-23*.

13. Insert cable plug **A** at the corresponding position.

- Plug **XE05** on connection **CC1**
- Plug **XE13** on connection **CAN**
- Dummy plug on connection **PPC**
- Plug **PSC** on connection **PSC**
- Plug **PPU** on connection **PPU**
- Plug **XE09** on connection **CC2**

14. Affix cable with cable tie **A** on the hose pipe.

15. Completely install air filter with bracket – see *"Remove/install air filter" on page 2-46*.

16. Fill the hydraulic oil tank – see *"Adding hydraulic oil" on page 1-92*.

17. Install and connect the battery – see *"Install the battery" on page 1-103*.

18. Mount the maintenance access (engine vat, rear) – see *"Engine vat" on page 1-24*.

19. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.

20. Start diesel engine and allow to run for approx. 2 minutes in idle.

21. Check oil level in hydraulic oil tank and top up if needed – see *"Adding hydraulic oil" on page 1-92*.

22. Carry out test run and check the system for leaks.

i Information

After installing a new displacement pump **VII** the test report on drive needs to be gone through; see system manual.

8.10 Variable displacement motor VIII

Safety instructions for variable displacement motor



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
- ▶ Wear protective gloves



DANGER

Injury hazard when lifting heavy components!

Death or serious injury.

- ▶ Use lifting gear of sufficient lifting capacity.
- ▶ Use functionally safe lifting gear.
- ▶ Use lifting gear on firm and level ground.
- ▶ Move the lifting tackle to predefined or suitable position on the component.

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- ▶ Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

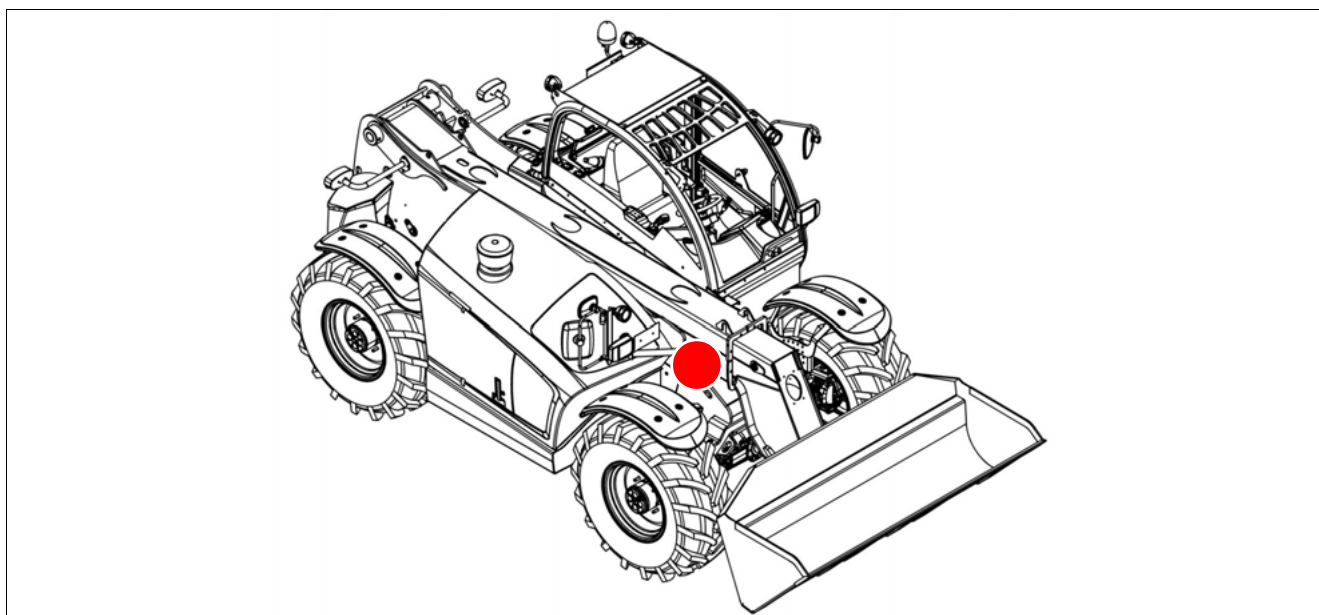
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Removing/installing the variable displacement motor

Tools:

- Suitable lifting gear, load-bearing capacity min. 60 kg (132 lb)
- Suitable slings (cables and shackles) with corresponding load-bearing capacity
- Vacuum pump
- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

Technical data



Weight	BMK	Description	Remarks
48 kg (106 lb)	VIII	Variable displacement motor	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove variable displacement motor

1. Completely lift and secure the telescopic boom – see *"Safety prop for telescopic boom" on page 1-4*.
2. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
3. Dismount underride protection – see *"Remove/install underride protection (closed)" on page 12-11*.
4. Remove cardan shaft – see *"Removing/installing the cardan shaft" on page 4-2*.
5. Unscrew cover of the ventilation filter, attach vacuum pump and switch it on – see *"Vent filter/vacuum pump" on page 1-6*.

Cable on variable displacement motor on rear front axle:

6. Mark the positions of the cable connectors.
7. Disconnect the cable connectors **Y002** (proportional valve).
8. Disconnect the cable connectors **Y010** (travel-direction detection).

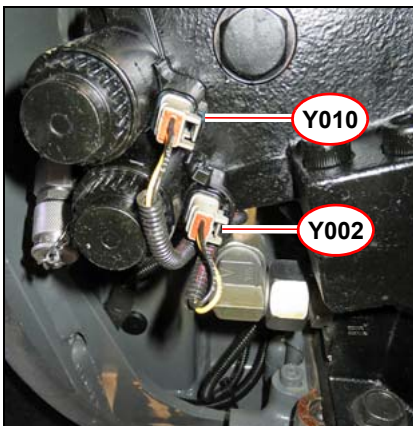


Fig. 90

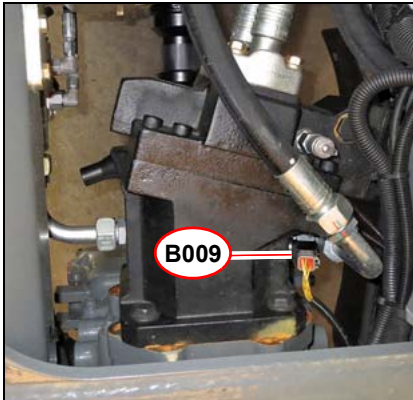


Fig. 91

9. Disconnect the cable connectors **B009** (speed sensor).

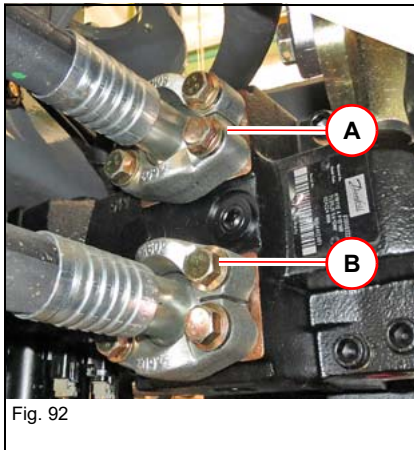


Fig. 92

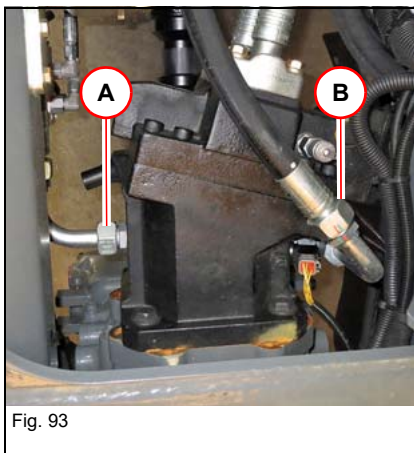


Fig. 93

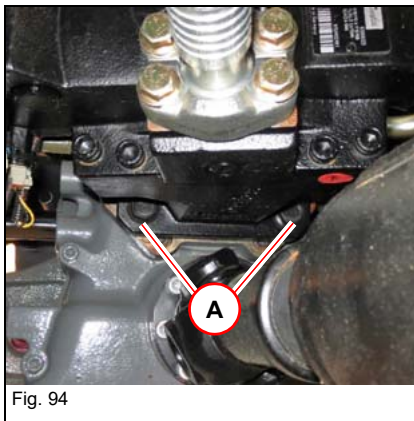


Fig. 94

High-pressure lines on variable displacement motor:

10. Remove screws **A** and remove half-bearings.

11. Remove screws **B** and take off half-shells.

12. Release union nut **A** and remove hydraulic hose and seal tightly.

13. Release union nut **B** and remove hydraulic hose and seal tightly.

Fitting the variable displacement motor:

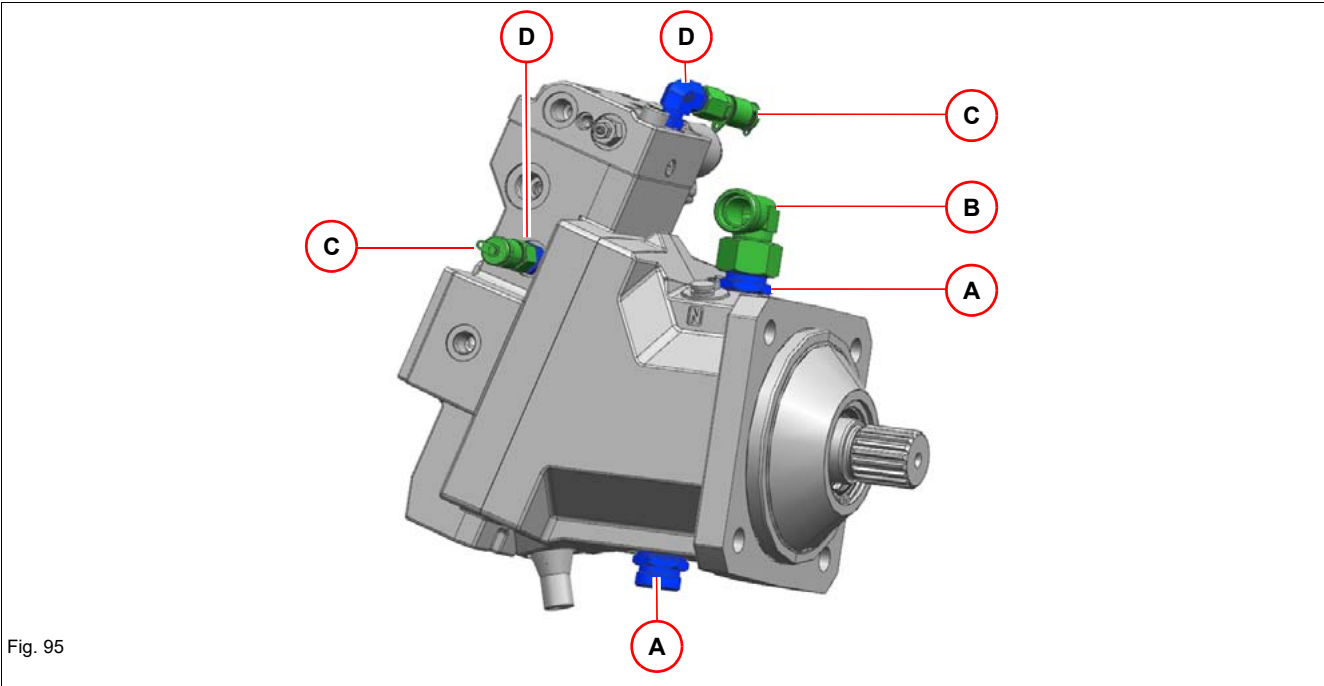
14. Affix suitable lifting gear to the variable displacement motor.

15. Remove the fastening screws **A** at the top and bottom on the variable displacement motor.

16. Slowly extend the variable displacement motor out of the axle housing using suitable lifting gear.

17. Turn variable displacement motor by 90° and lower downwards.

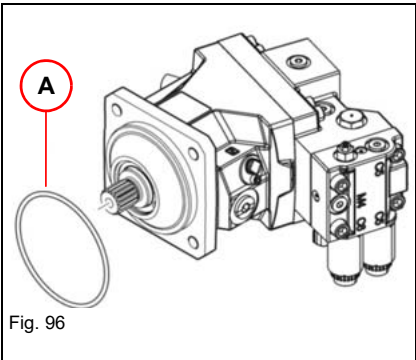
Screw connections tightening torques



Pos.	Tightening torque	Remarks
A	180 Nm (133 lbf ft)	GE-22
B	100 Nm (74 lbf ft)	EW-22
C	28 Nm (21 lbf ft)	8-S
D	40 Nm (30 lbf ft)	GE-8

Install variable displacement motor

1. Insert new sealing ring A.



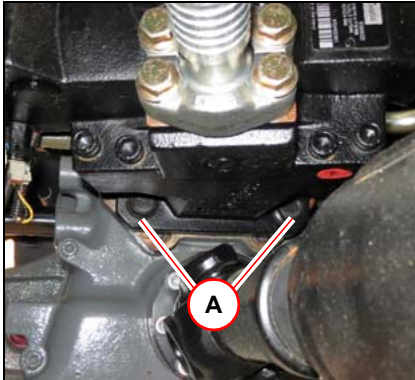


Fig. 97

2. Lift variable displacement motor with suitable lifting gear and turn by 90°.
3. Carefully drive variable displacement motor into axle housing and position variable displacement motor.
4. Fit fastening screws **A** above and below and tighten to 195 Nm (144 lbf ft).

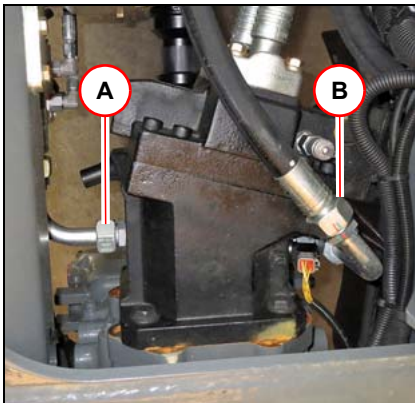


Fig. 98

Hydraulic hose lines on the variable displacement motor traction drive:

5. Tighten union nut **A** of the hydraulic line on the variable displacement motor to 110 Nm (81 lbf ft.) .
6. Tighten union nut **B** of the hydraulic line on the variable displacement motor to 110 Nm (81 lbf ft) festziehen.

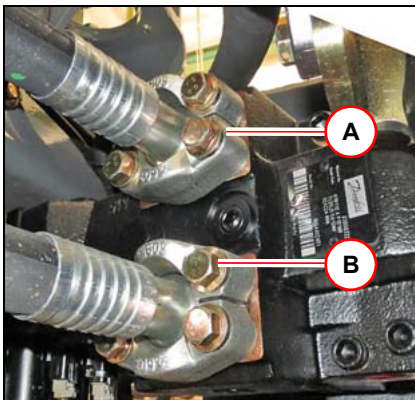


Fig. 99

7. Position high pressure lines with new seals.
8. Fit half-shells with screws **A** and tighten to 46 Nm (34 lbf ft).

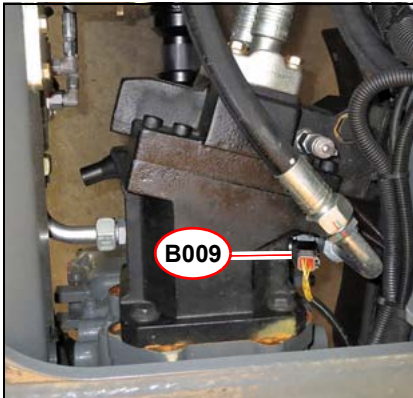


Fig. 100

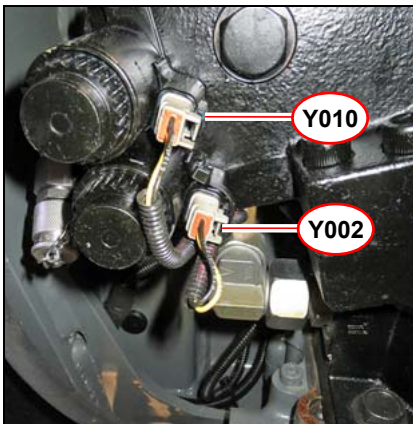


Fig. 101

9. Insert plug **B009** (speed sensor).

10. Insert plug **Y010** (driving direction recognition).

11. Insert plug **Y002** (proportional valve).

12. Remove vacuum pump.

13. Mount cardan shaft – see *"Removing/installing the cardan shaft" on page 4-2.*

14. Mount the underride protection – see *"Remove/install underride protection (closed)" on page 12-11.*

15. Check oil level in hydraulic oil tank and top up if needed – see *"Adding hydraulic oil" on page 1-92.*

16. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*

17. Start diesel engine and allow to run for approx. 2 minutes in idle.

18. Check oil level in hydraulic oil tank and top up if needed – see *"Adding hydraulic oil" on page 1-92.*

19. Carry out test run and check the system for leaks.

Information

After installing a new variable displacement motor **VIII** the test report on drive needs to be gone through; see system manual.

8.11 Lifting cylinder 085

Safety instructions for lifting cylinder



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

- Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- Allow the hydraulic system to cool down before removing components
- Wear protective gloves

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

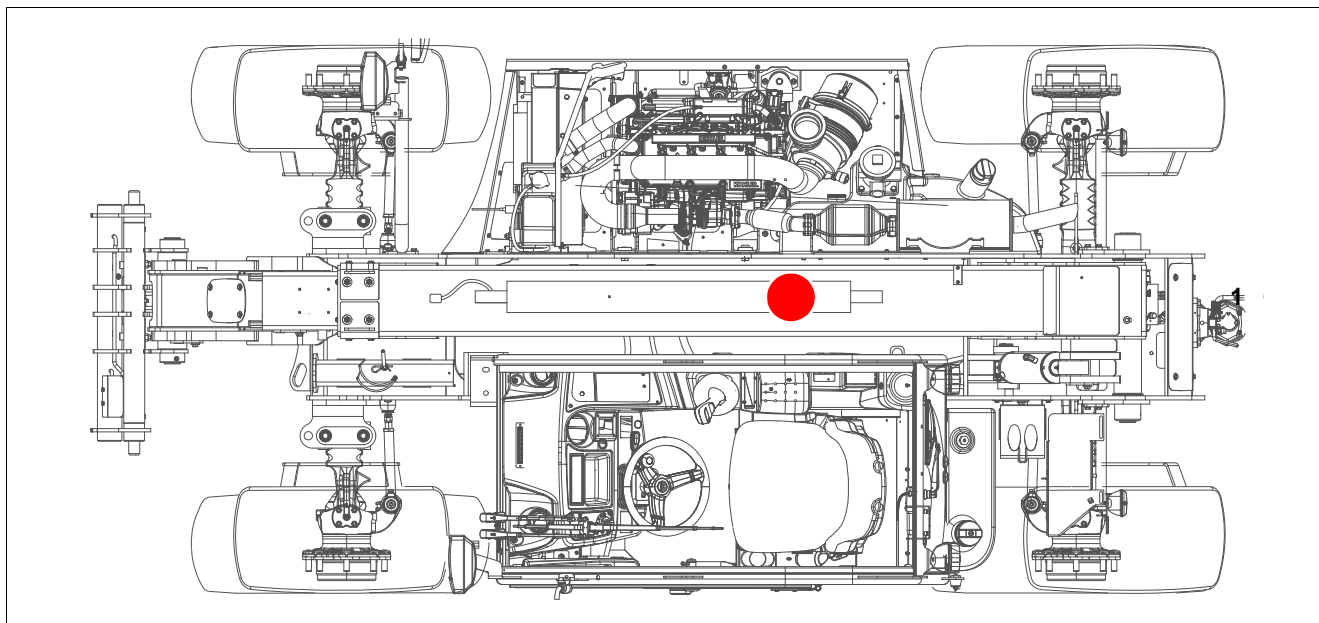
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Removing/installing the lift cylinder

Tools:

- Suitable lifting gear, load-bearing capacity min. 100 kg (220 lb)
- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

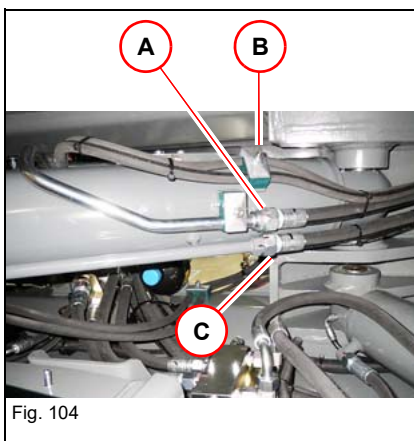
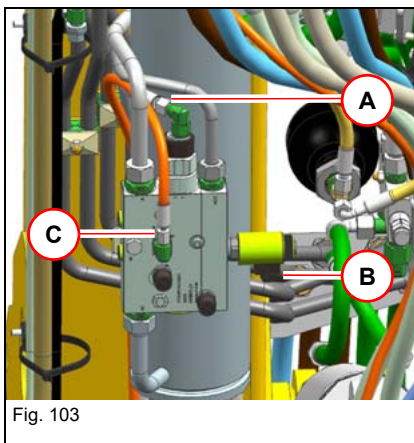
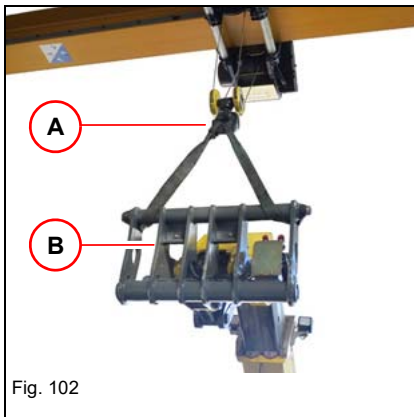
Technical data



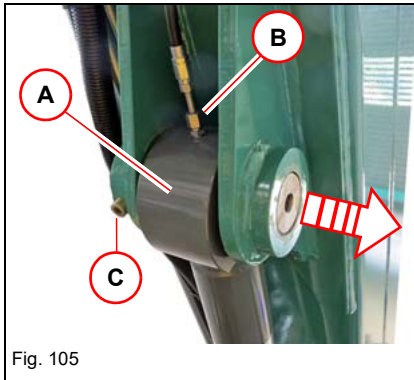
Weight	BMK	Description	Remarks
84 kg (185 lb)	085	Lifting cylinder	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove lifting cylinder

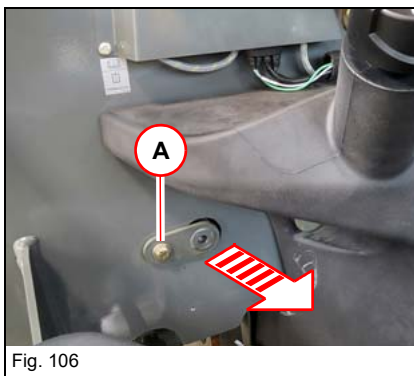
1. Set steering to four-wheel steering.
2. Turn steering wheel to the right until the wheels have turned completely.
3. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
4. Raise the boom **B** and secure it to a crane **A**.



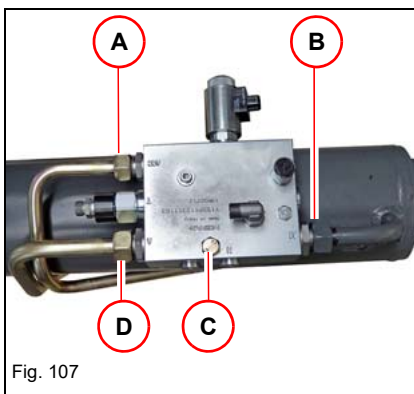
5. Loosen screw connection **A** and remove hose.
6. Loosen screw connection **C** and remove hose.
7. Tightly seal hose pipes and pipe lines.
8. Pull out connector **B** from the pressure switch **S045**.
9. Remove hose clip **C**.
10. Loosen screw connection **A** and remove hose.
11. Loosen screw connection **C** and remove hose.
12. Tightly seal hose pipes and pipe lines.



13. Hook up lifting cylinder **A** to suitable lifting gear.
14. Loosen screw connection **B** and remove lubricating line.
15. Remove lock screw **C**.
16. Drive out pins on the telescopic boom with an impact puller.



17. Remove lock screw **A** and bushing.
18. Drive out pins on the vehicle frame with an impact puller.
19. Lift lifting cylinder out of the frame using suitable lifting gear.



20. Loosen the screw connection **A** and remove the pipe.
21. Loosen screw connection **D** and remove pipe.
22. Loosen screw connection **B**.
23. Remove fastening screw **A** and take RBS lifting cylinder off.

Install lifting cylinder

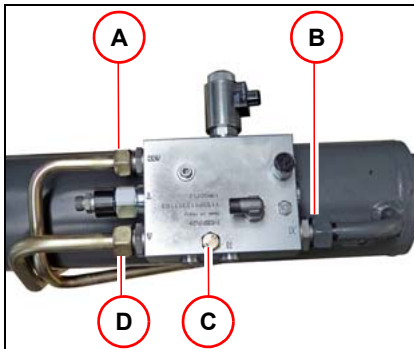


Fig. 108

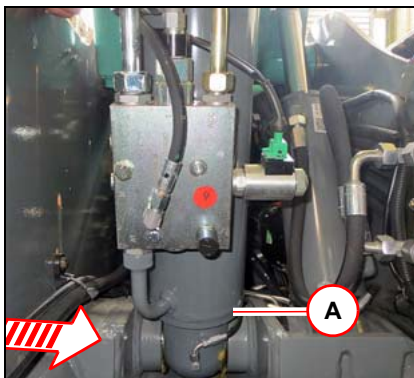


Fig. 109

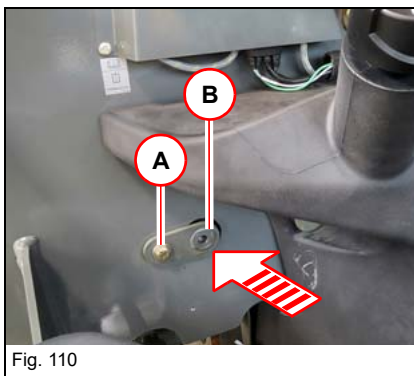


Fig. 110

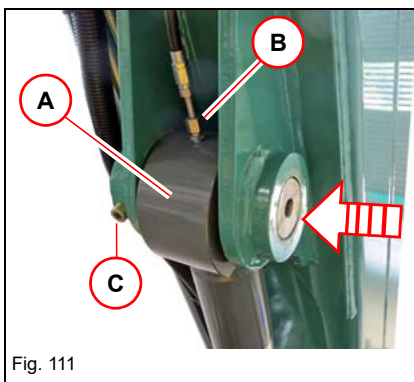


Fig. 111

1. Position the hose burst valve on the lifting cylinder on screw connection **B** and tighten fastening screw **C**.
2. Tighten the union nut **B** to 80 Nm (59 lbf ft).
3. Position the hose pipe and tighten the union nut **A** to 60 Nm (44 lbf ft).
4. Position the hose pipe and tighten the union nut **D** to 80 Nm (59 lbf ft).
5. Lubricate bearing pins and bushes with grease
6. Position lifting cylinder **A** in the frame.
7. Mount center pins through the frame.
8. Mount bearing pins instead of center pins.
9. Drive in the bearing pins **B** until stop.
10. Insert sleeve and tighten retaining screw **A** to 79 Nm (58 lbf ft).
11. Lubricate bearing pins and bushes with grease
12. Move lifting cylinder **A** into position.
13. Mount bearing pins.
14. Mount fastening screws **C** and tighten.
15. Position lubrication line and tighten screws **B**.

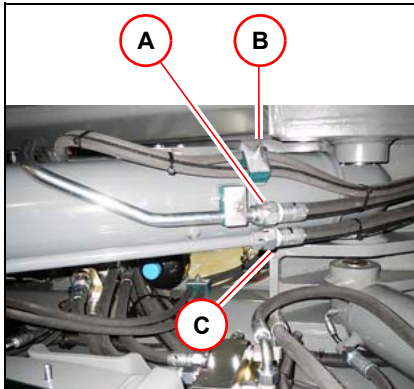


Fig. 112

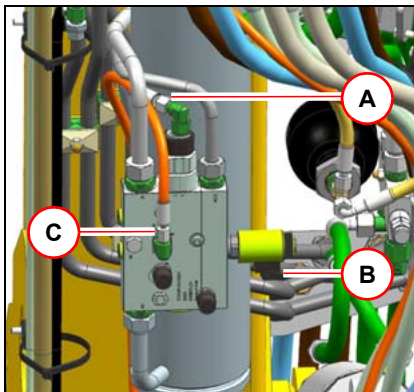


Fig. 113

16. Position the hose and tighten the screw connection **A** to 80 Nm (59 lbf ft).

17. Position the hose and tighten the screw connection **C** to 80 Nm (59 lbf ft).

18. Mount hose clip **C**.

19. Position the hose and tighten the screw connection **A** to 28 Nm (21 lbf ft).

20. Position hose and tighten screw connection **B** to 18 Nm (13 lbf ft).

21. Insert plug **B** on pressure accumulator **S045**.

22. Lubricate bearing pins.

23. Lower telescopic boom and remove lifting gear.

24. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).

25. Check the system for correct function and sealing.

26. Add hydraulic oil – see ["Adding hydraulic oil" on page 1-92](#).

Sealing the lift cylinder

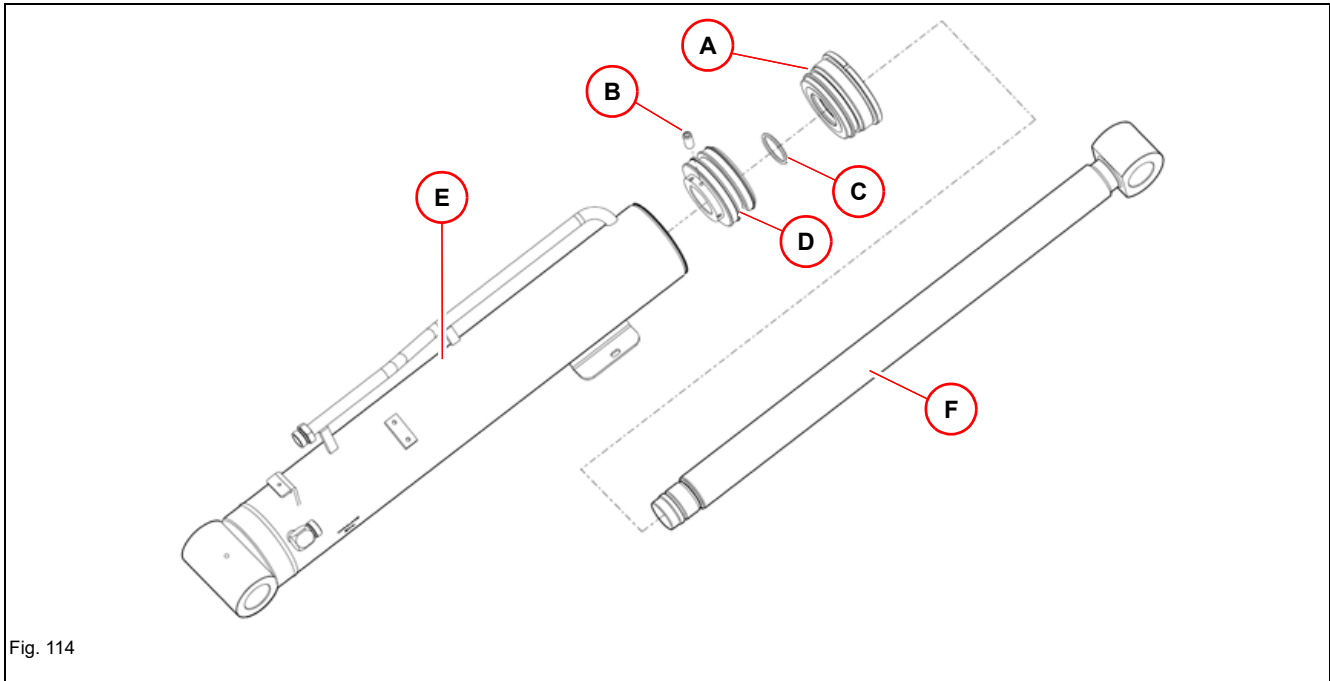


Fig. 114

Pos.	Description	Tightening torque
A	Guide bushing	400 Nm (295 lbf ft)
D	Piston	2000 ^{±200} Nm (1476 ^{±148} lbf ft)

Unmount lifting cylinder

1. Unscrew guide bushing **A** with hooked wrench.
2. Pull piston rod **F** out of the cylinder jacket **E**.
3. Remove headless screw **B**.
4. Unscrew piston **D** from piston rod **F**.
5. Remove ring **C** and guide bushing **A** from the piston rod **F**.

Mount lifting cylinder

1. Replace old seals with new ones.
2. Mount ring **C** and guide bushing **A** on the piston rod **F**.
3. Lightly grease seals with oil.
4. Tighten pistons **D** to the prescribed tightening torque on the piston rod **F**.
5. Insert headless screw **B** using Loctite®270 extremely securely and tighten to 10 Nm (7 lbf ft).
6. Push piston rod **F** into the cylinder jacket **E**.
7. Tighten guide bushing **A** with the hooked wrench to the prescribed tightening torque.

8.12 Boom cylinder 089

Safety instructions for push-out ram



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

- Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- Allow the hydraulic system to cool down before removing components
- Wear protective gloves

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

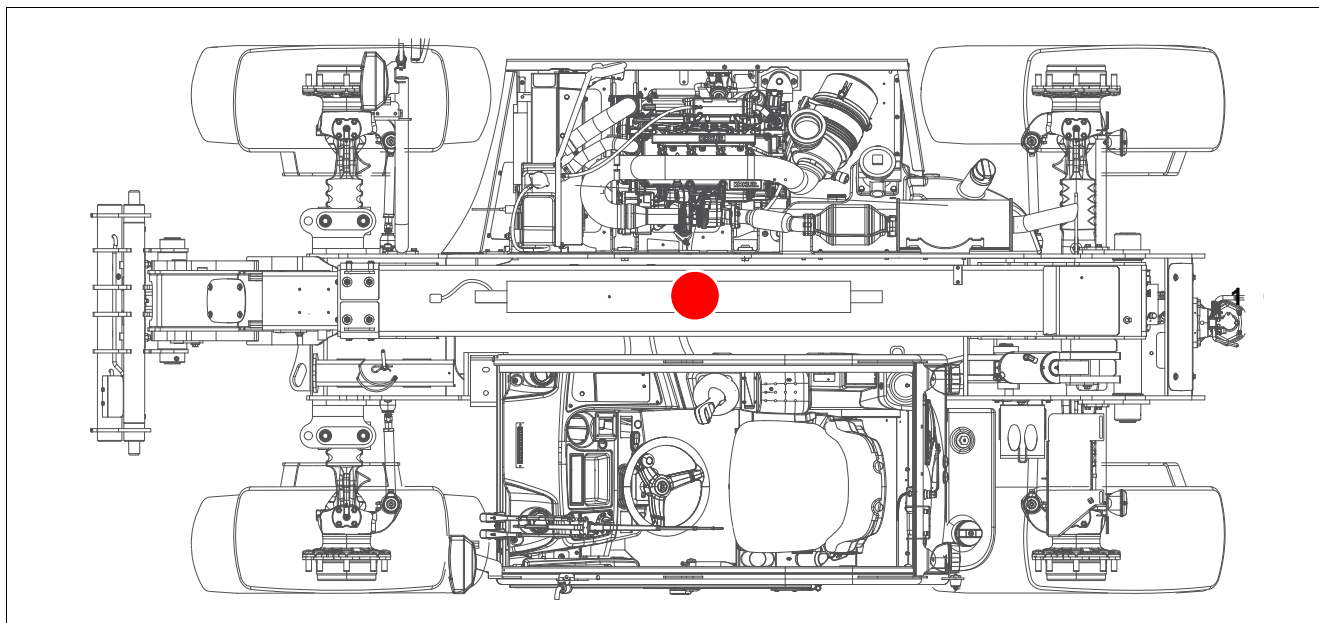
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install push-out cylinder

Tools:

- Suitable lifting gear, load-bearing capacity min. 100 kg (220 lb)
- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

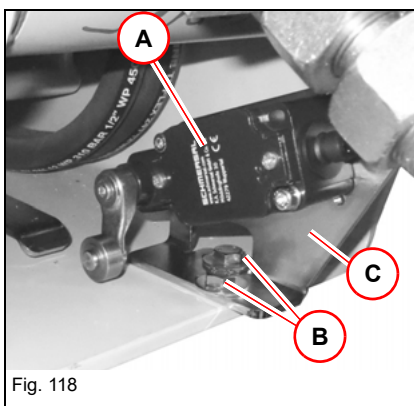
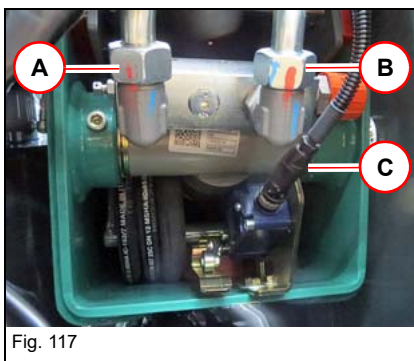
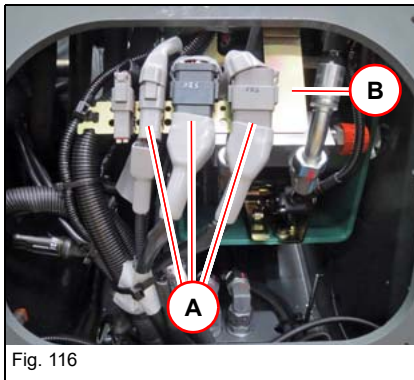
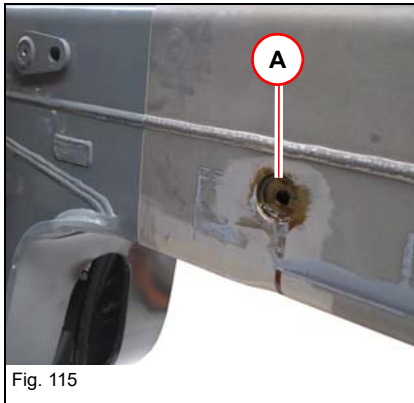
Technical data



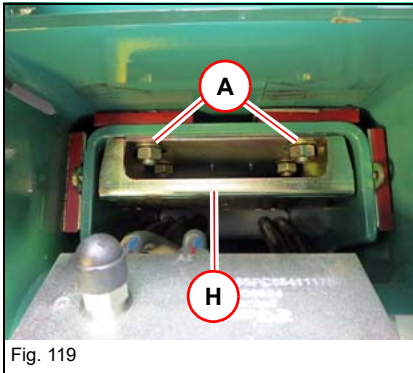
Weight	BMK	Description	Remarks
78 kg (172 lb)	089	Lifting cylinder	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove push-out ram

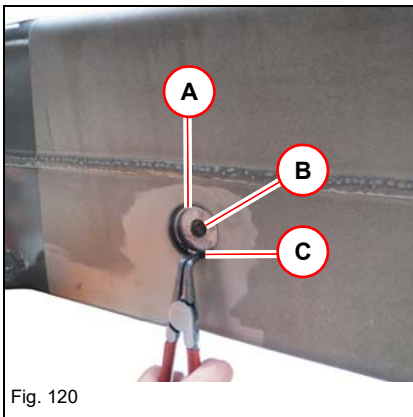
1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
2. If present, remove autohitch – see *"Removing/installing the autohitch" on page 17-2.*
3. Open the cover – see *"Rear of machine" on page 1-25.*
4. Extend telescopic boom until pin **A** in the push-out cylinder is visible.
5. Release the pressure in the hydraulic system. To do this:
 - Stop the engine, but leave the ignition switched on.
 - Hold down the switch for emergency lowering.
 - Move the control lever (joystick) in all directions repeatedly.
6. Switch off the starter and remove the starting key.



7. Unhook and unplug screw connections **A** on the mount **B**.
8. Unscrew mount **B**.
9. Unplug plug **C** at the limit switch.
10. Loosen screw connection **A** and remove hose.
11. Loosen screw connection **B** and remove hose.
12. Tightly seal hose pipes and screw connections.
13. Release fastening screws **B** and remove mount **C** with limit switch **A**.



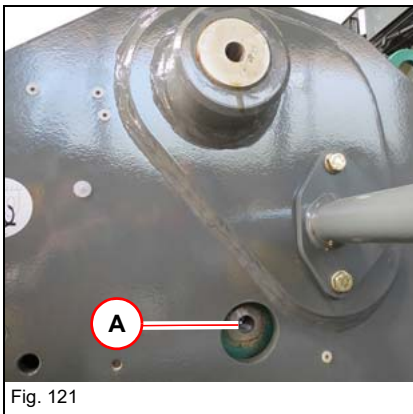
14. Remove mounting nuts **A** and take off deflector plate.



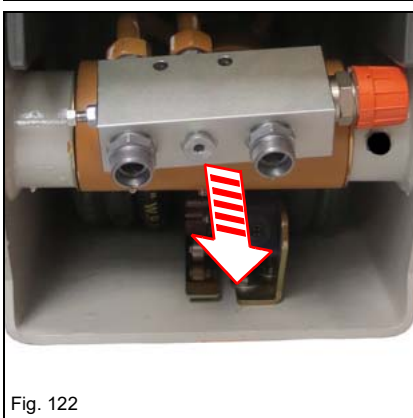
15. Remove the circlip on both sides **C**.

16. Remove the shim ring **A** on both sides.

17. Drive out pins **B** with a slide-hammer-puller.



18. Drive out bolts **A** with a slide-hammer-puller.



19. Pull the push-out cylinder out of the telescopic boom with the help of suitable lifting gear.

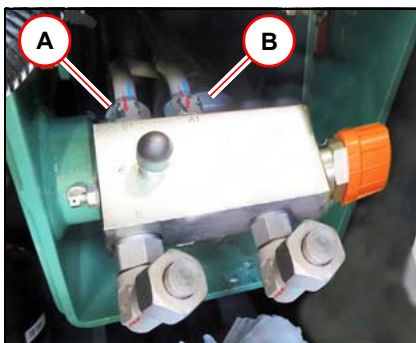


Fig. 123

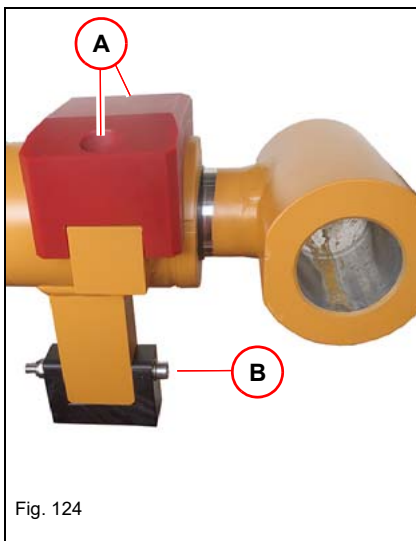


Fig. 124

20. Loosen screw connection **A**.

21. Loosen screw connection **B**.

22. Remove hose burst valve from the extending cylinder.

23. Remove fastening screw **A** and take sliding block off of push-out cylinder.

24. Remove fastening screw **B** and take sliding block off of push-out cylinder.

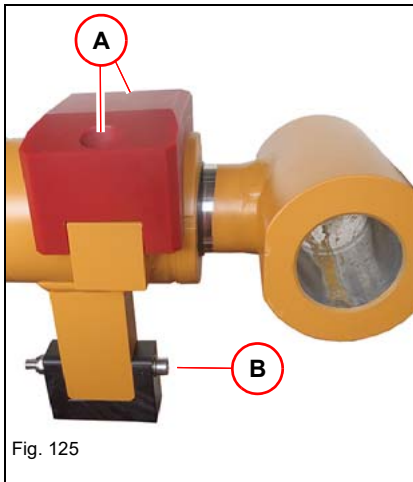


Fig. 125

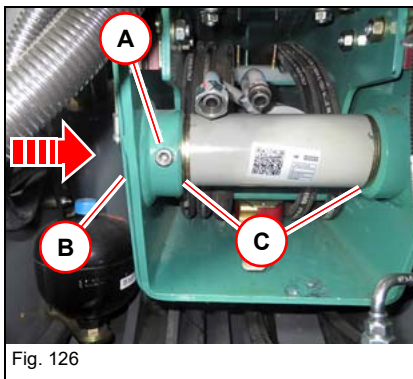


Fig. 126

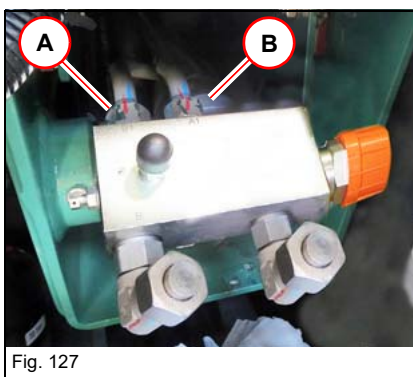


Fig. 127

Install push-out ram

1. Position sliding block on the push-out cylinder and mount fastening screws **A** with Loctite®243.
2. Position sliding block **B** on the push-out cylinder **D** and tighten screws **B**.
3. Guide the push-out cylinder in the telescopic boom with the help of suitable lifting gear.
4. Position the push-out cylinder in the telescopic boom.
5. Drive in the bearing pins **B** as far as possible so that the 1st adjustment disc **C** can be applied.
6. Drive the bearing pins in further **B** so that the 2nd adjustment disc **C** can be applied.
7. Mount the retaining screw **A**.



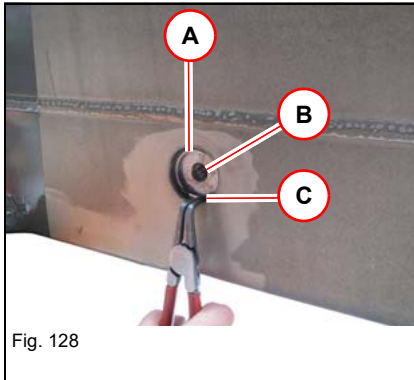
Information

When installing the bolt **position new** setting disks **A** and **B** between boom and bolt to make sure there is no play here!

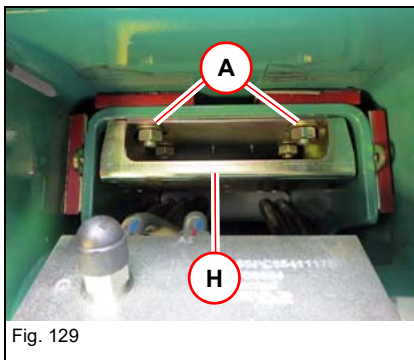
Use adjustment discs with 1 (0.04), 2 (0.08) or 3 mm (0.12 in)!

► Make sure that the bores **C** in the bolt and in the boom are in line with each other!

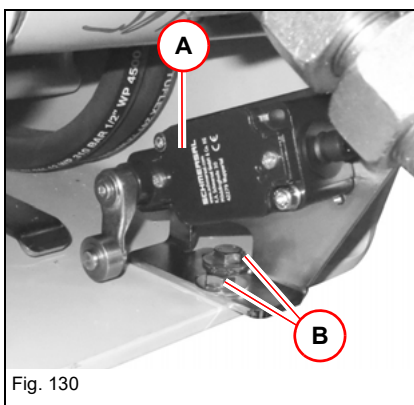
8. Position hose burst valve on the push-out cylinder.
9. Tighten screw **A** to 50 Nm (37 lbf ft).
10. Tighten screw connection **B** to 50 Nm (37 lbf ft).



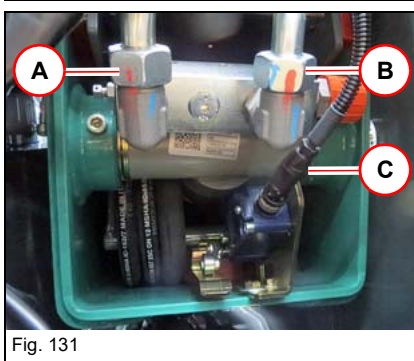
- 11.Center the push-out cylinder with the hole of the inner pipe.
- 12.Drive in bearing pins **B**.
- 13.Insert shim ring **A** on both sides
- 14.Mount circlip **C** on both sides.



- 15.Position the deflector plate **B** and tighten the mounting nuts **A** to 79 Nm (58 lbf ft).



- 16.Position limit switch **A** at the marking and tighten fastening screw **B**.



- 17.Position hose and tighten screw connection **E** to 80 Nm (59 lbf ft).
- 18.Position hose and tighten screw connection **D** to 80 Nm (59 lbf ft).
- 19.Insert plug **C** on the sensor.

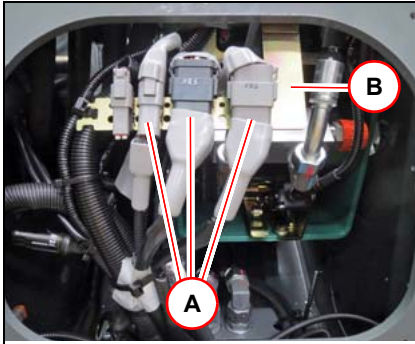


Fig. 132

20. Screw on mount **B**.
21. Insert screw connections **A** and hook up to mount **B**.
22. Mount the cover – see *"Rear of machine" on page 1-25*
23. If present, mount autohitch – see *"Removing/installing the autohitch" on page 17-2*.
24. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
25. Lubricate bearing pins.
26. Check the system for correct function and sealing.
27. Add hydraulic oil – see *"Adding hydraulic oil" on page 1-92*.

Seal-tighten push-out ram

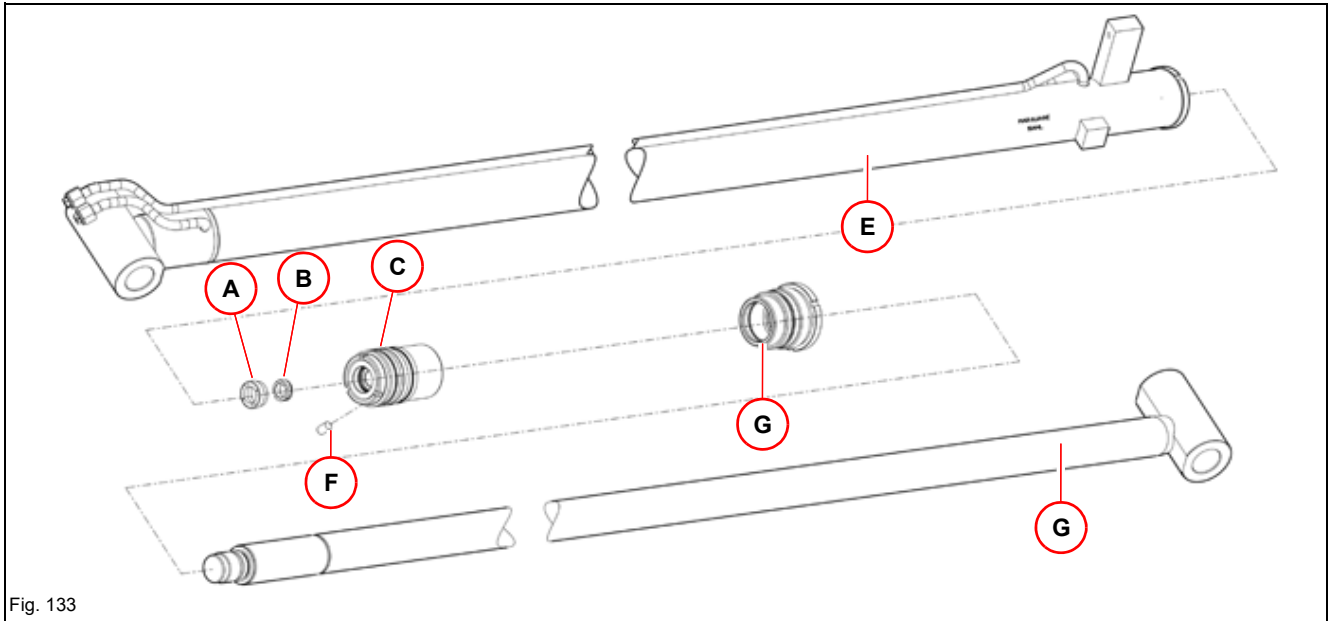


Fig. 133

Pos.	Description	Tightening torque
D	Guide bushing	400 Nm (295 lbf ft)
C	Piston	370 Nm (273 lbf ft)

Dismantle push-out cylinder

1. Unscrew guide bushing **D** with hooked wrench.
2. Pull piston rod **G** out of the cylinder jacket **E**.
3. Remove headless screw **F**.
4. Unscrew piston **C** from piston rod **G**.
5. Remove rings **A** and **B**.
6. Remove guide bushing **A** from the piston rod **G**.

Mount push-out cylinder

1. Replace old seals with new ones.
2. Insert rings **A** and **B**.
3. Attach the guide bushing **D** to the piston rod **G**.
4. Lightly grease seals with oil.
5. Tighten piston **C** to the prescribed tightening torque on the piston rod **G**.
6. Insert grub screw **F** with Loctite®270 high-strength and tighten to 5 Nm (4 lbf ft).
7. Push piston rod **G** into the cylinder jacket **E**.
8. Tighten guide bushing **D** with the hooked wrench to the prescribed tightening torque.

8.13 Tilt ram 087

Safety instructions for tilt cylinder



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

- Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- Allow the hydraulic system to cool down before removing components
- Wear protective gloves

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

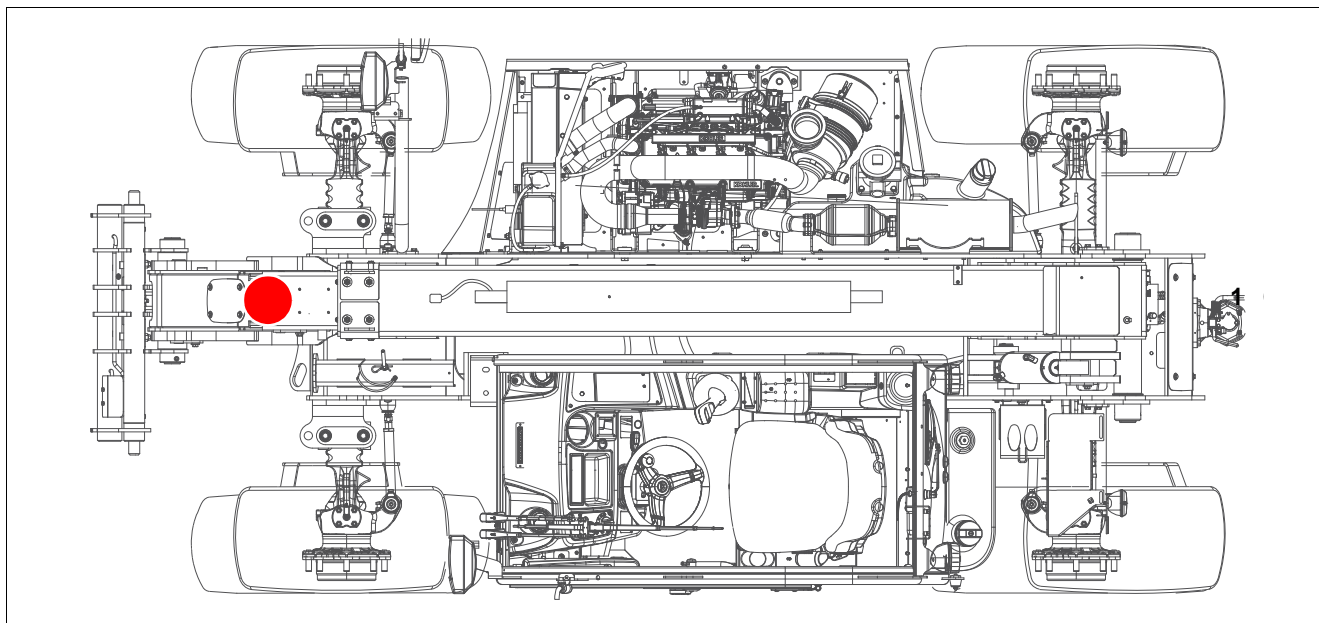
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Removing/installing the tilt cylinder

Tools:

- Suitable lifting gear, load-bearing capacity min. 50 kg (110 lb)
- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

Technical data



Weight	BMK	Description	Remarks
47 kg (104 lb)	087	Tilt cylinder	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove tilt ram

1. Place the telehandler on a firm and level surface
2. Apply the parking brake.
3. Extend the boom **A**, as shown.
4. Move the quickhitch facility **B** into the position shown.
5. Place telescopic boom on to a support making sure that no pressure is applied.
6. Release the pressure in the hydraulic system. To do this:
 - Stop the engine, but leave the ignition switched on.
 - Hold down the switch for emergency lowering.
 - Move the control lever (joystick) in all directions repeatedly.
7. Switch off the starter and remove the starting key.
8. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.

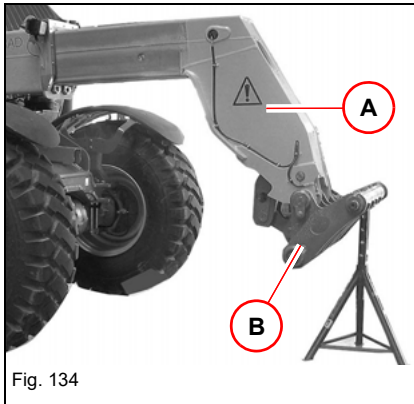


Fig. 134

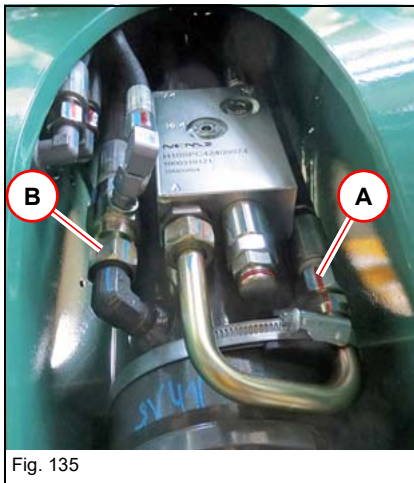


Fig. 135

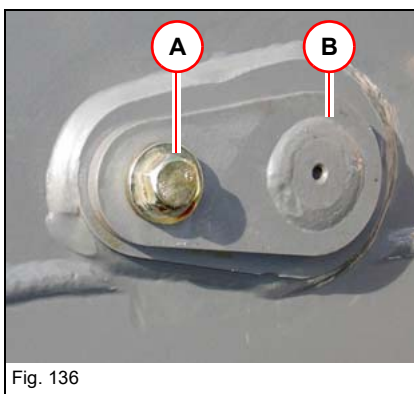


Fig. 136

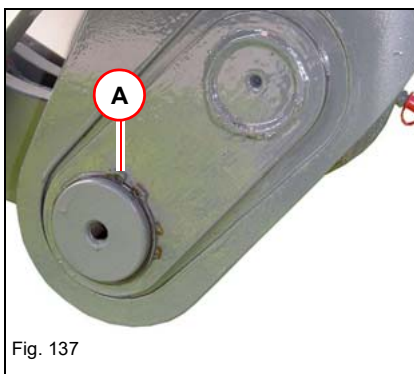
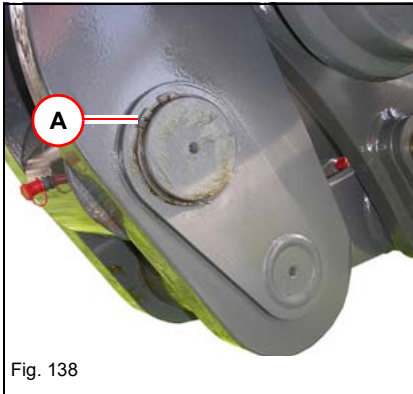


Fig. 137

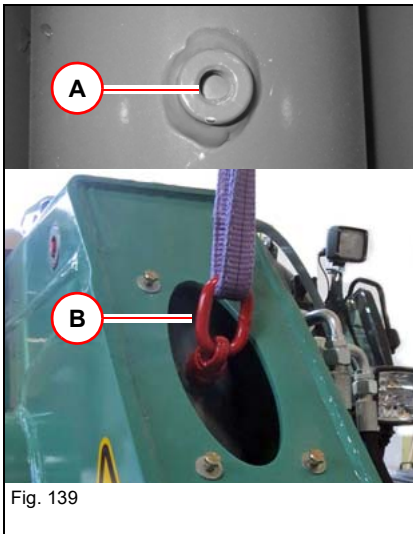
9. Loosen screw connection **A** on the tilt cylinder and remove hose.
10. Loosen screw connection **B** on the tilt cylinder and remove hose.
11. Seal hoses and connections with plugs.

12. Remove locking screw **A** from the pin **B**.

13. Remove circlip **A** from right-hand side.



14. Remove circlip **A** from left-hand side.



CAUTION

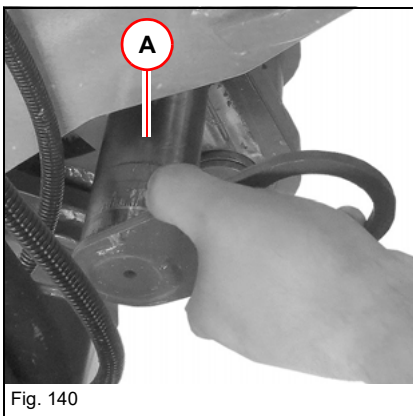
Risk of crushing when disassembling the tilt ram!

Can cause injury.

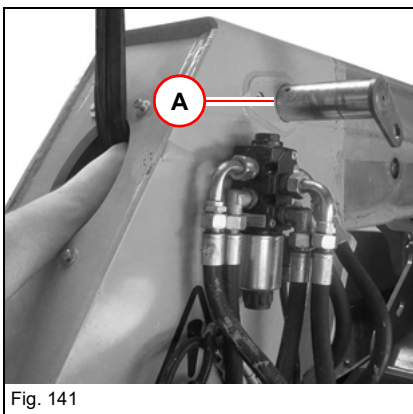
- Only dismantle the tilt cylinder with suitable lifting gear
- Wear protective gloves

15. Screw eye bolt **B** into thread **A** (M12x1.5) on tilt cylinder.

16. Secure lifting gear to screw eyelet **B**.

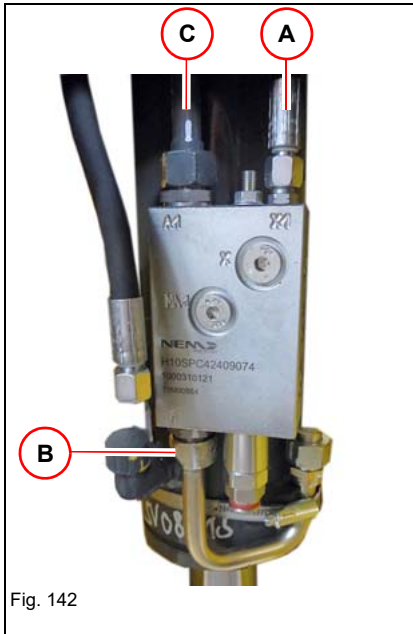


17. Remove lower pin **A**.



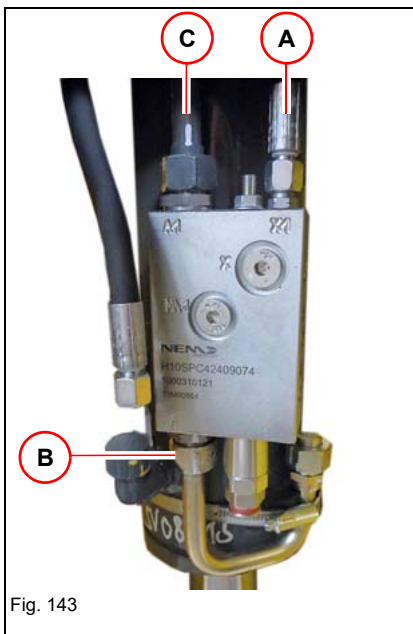
18. Remove upper pin **A**.

19. Slowly lower it with the hoisting gear.

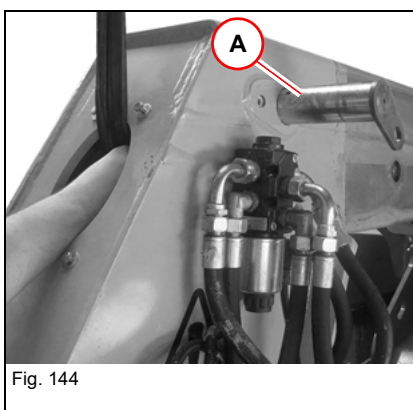


20. Loosen sleeve nut **A** and remove hose pipe.
21. Loosen union nut **A** and remove the hose pipe.
22. Release union nut **C** for the hose line and remove hose burst valve.

Install the tilt ram



1. Tighten union nut **C** to 80 Nm (59 lbf ft).
2. Tighten union nut **B** to 60 Nm (44 lbf ft).
3. Tighten union nut **A** to 28 Nm (21 lb ft).



4. Slowly raise the tilt cylinder with the lifting gear into the telescopic boom.
5. Lubricate bushes and bearing pins **A** with grease and install.

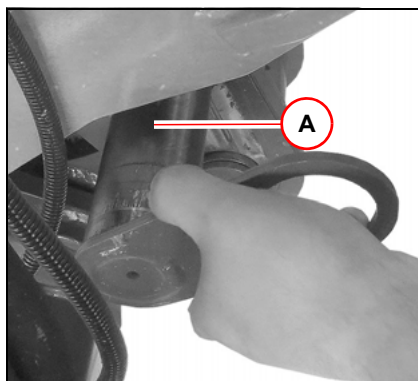


Fig. 145

6. Install lower pin **A**.

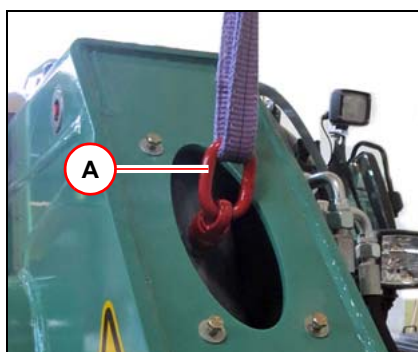


Fig. 146

7. Remove eye bolt **A**.

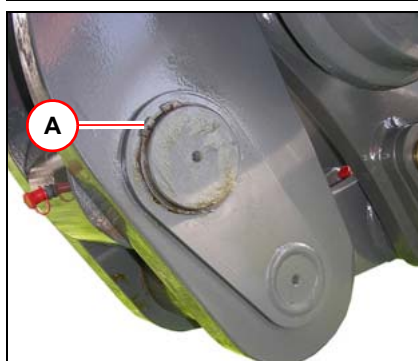


Fig. 147

8. Install circlip **A** on the left-hand side.

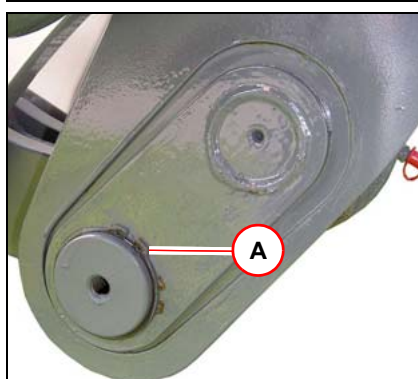
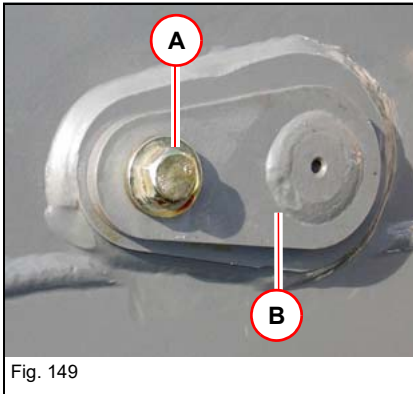
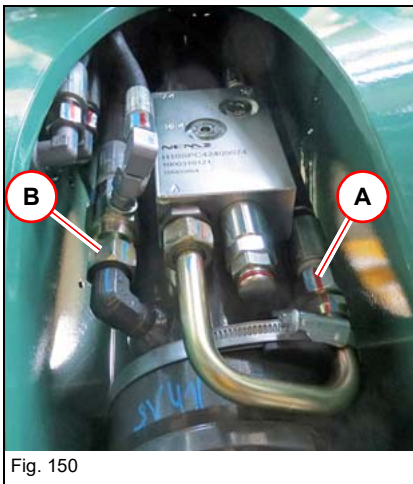


Fig. 148

9. Install circlip **A** on the right-hand side.

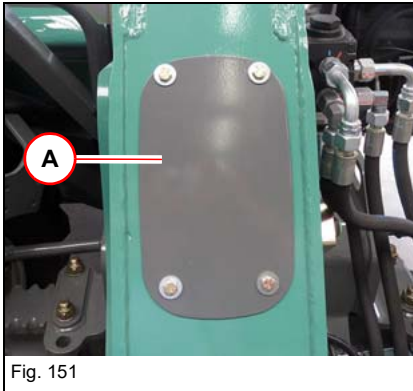


10. Tighten lock screw **A** at the upper pin **B** with 79 Nm (58 lbf ft).



11. Tighten union nut **A** of the hose pipe to 80 Nm (44 lb ft).

12. Tighten union nut **B** of the hose pipe to 60 Nm (44 lb ft).



13. Screw on maintenance cover **A** on the telescopic boom.

14. Lubricate bearing pins.

15. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).

16. Tilt and dump out the tilt ram several times.

17. Check oil level – see ["Checking the hydraulic oil level" on page 1-91](#) and top up if necessary – see ["Adding hydraulic oil" on page 1-92](#).

18. Check the system for correct function and sealing.

Sealing the tilt cylinder

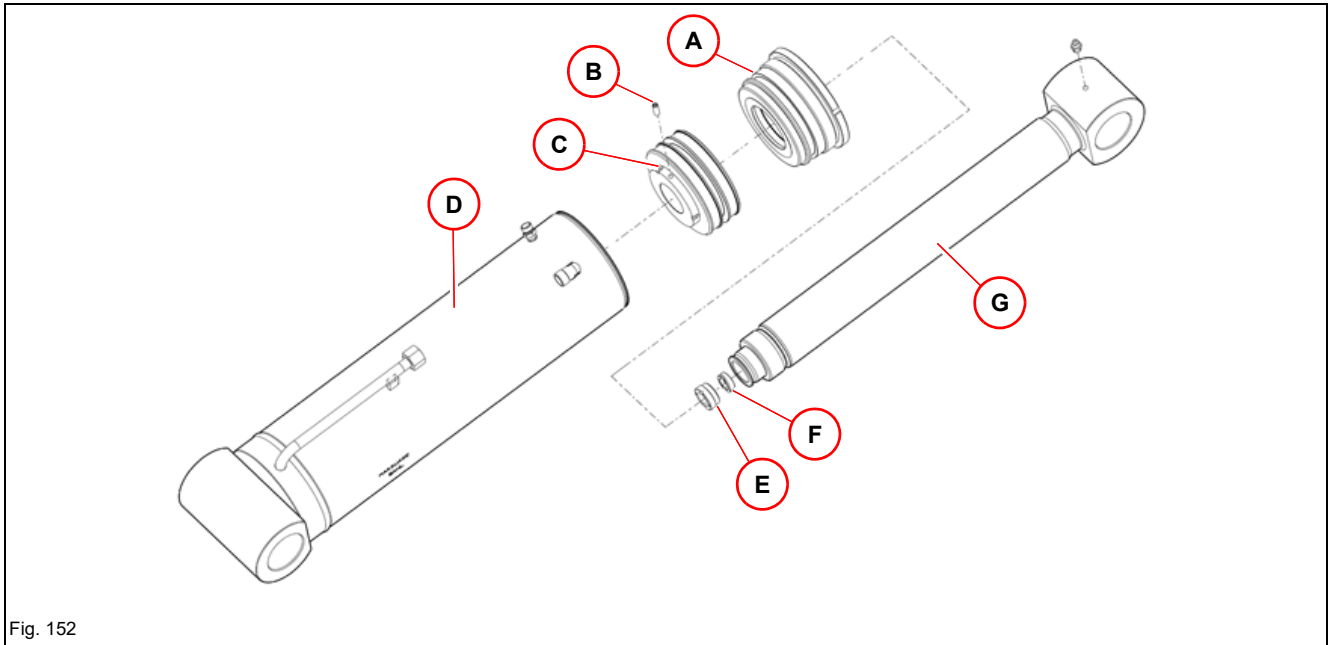


Fig. 152

Pos.	Description	Tightening torque
A	Guide bushing	400 Nm (295 lbf ft)
C	Piston	2000 ^{±200} Nm (1476 ^{±148} lbf ft)

Remove tilt cylinder

1. Unscrew guide bushing **A** with hooked wrench.
2. Pull piston rod **G** out of the cylinder jacket **D**.
3. Remove headless screw **B**.
4. Unscrew piston **C** from piston rod **G**.
5. Remove rings **E** and **F**.
6. Remove guide bushing **A** from the piston rod **G**.

Install tilt cylinder

1. Replace old seals with new ones.
2. Insert rings **E** and **F**.
3. Attach the guide bushing **A** to the piston rod **G**.
4. Lightly grease seals with oil.
5. Tighten piston **C** to the prescribed tightening torque on the piston rod **G**.
6. Insert headless screw **B** using Loctite®270 extremely securely and tighten to 10 Nm (7 lbf ft).
7. Push piston rod **G** into the cylinder jacket **D**.
8. Tighten guide bushing **A** with the hooked wrench to the prescribed tightening torque.

8.14 Compensation cylinder 086

Safety instructions about compensation cylinder



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

- Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- Allow the hydraulic system to cool down before removing components
- Wear protective gloves

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

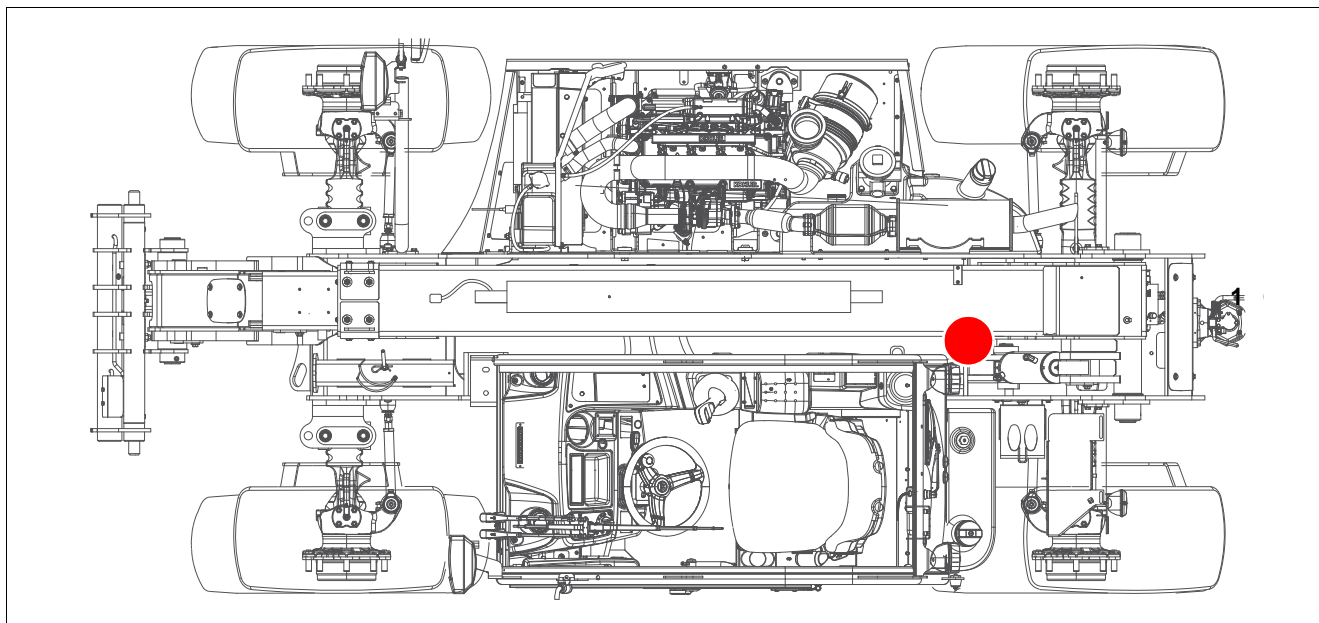
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install compensation cylinder

Tools:

- Suitable lifting gear, load-bearing capacity min. 50 kg (110 lb)
- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

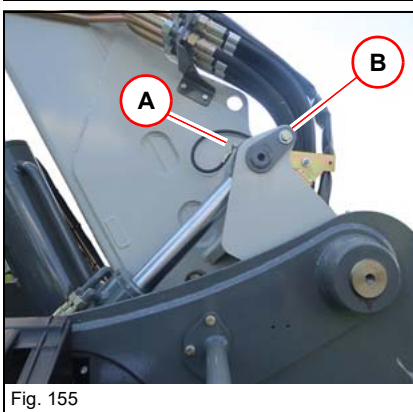
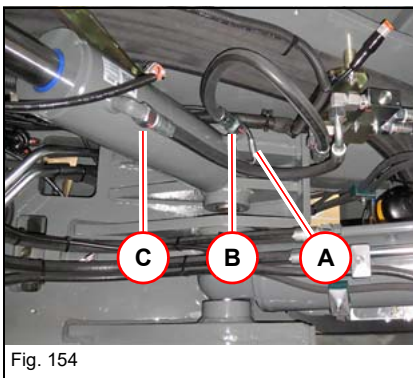
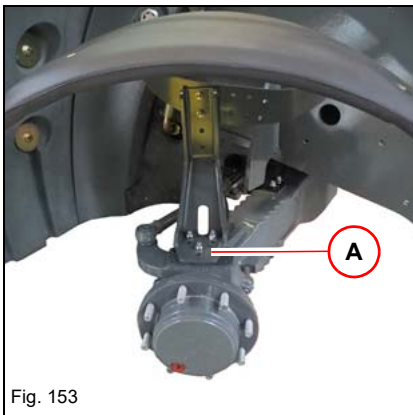
Technical data



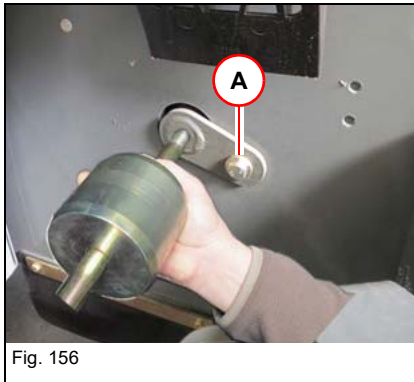
Weight	BMK	Description	Remarks
31 kg (68 lb)	086	Compensation cylinder	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove compensation cylinder

1. Lift telescopic boom and secure the lifting cylinder with safety struts – [see "Safety prop for telescopic boom" on page 1-4.](#)
2. Release the pressure in the hydraulic system. To do this:
 - Stop the engine, but leave the ignition switched on.
 - Hold down the switch for emergency lowering.
 - Move the control lever (joystick) in all directions repeatedly.
3. Switch off the starter and remove the starting key.
4. Switch off battery master switch **S008** – [see "Battery master switch S008" on page 1-3.](#)
5. Remove left rear wheel – [see "Removing the wheels" on page 1-135.](#)
6. Remove the fastening nuts **A** of the fender bracket.
7. Remove fender and support.

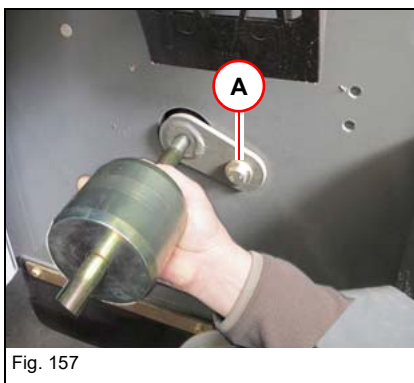


8. Loosen the screw connection **A** and remove the lubricating line.
9. Loosen screw connection **B** and remove hose.
10. Loosen screw connection **C** and remove hose.
11. Tightly seal hose pipes and pipe lines.
12. Loosen the screw connection **A** and remove the lubricating line.
13. Remove lock screw **B** with bushing and drive out pin with a slide hammer-puller.

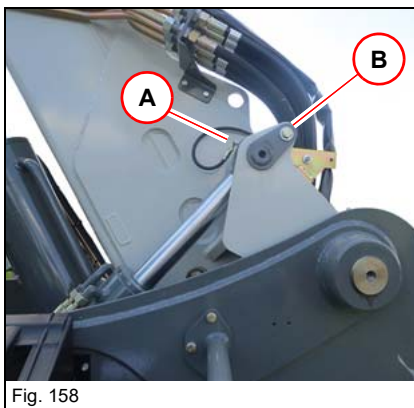


14. Remove lock screw **A** with bushing.
15. Drive out pin with a slide hammer-puller.
16. Lift the compensation cylinder out of the frame with lifting gear.

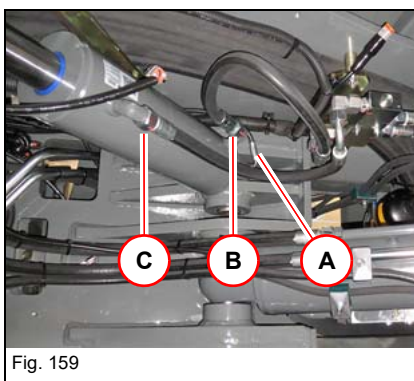
Install compensation cylinder



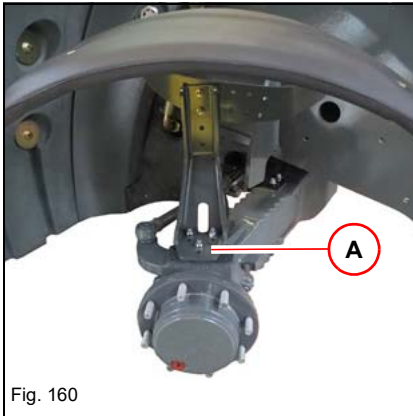
1. Lubricate bearing pins and bushes with grease
2. Position compensation cylinder and mount pins.
3. Mount securing screw **A** with bushing and tighten to 79 Nm (58 lbf ft).



4. Lubricate bearing pins and bushes with grease
5. Position compensation cylinder and mount pins.
6. Mount securing screw **B** with bushing and tighten to 79 Nm (58 lbf ft).
7. Position lubricating line and tighten screw connection **A**.



8. Position lubricating line and tighten screw connection **A**.
9. Position hose and tighten screw connection **B** to 80 Nm (59 lbf ft).
10. Position the hose and tighten the screw connection **C** to 80 Nm (59 lbf ft).



11. Position fender with support and tighten the nuts **A** to 195 Nm (144 lbf ft).
12. Mount left rear wheel – see *"Mounting wheels" on page 1-136*.
13. Remove safety prop at the lifting cylinder and lower the telescopic boom.
14. Check the oil level – see *"Checking the hydraulic oil level" on page 1-91*
15. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
16. Lubricate bearing pins.
17. Check the system for correct function and sealing.

Seal tighten compensation cylinder

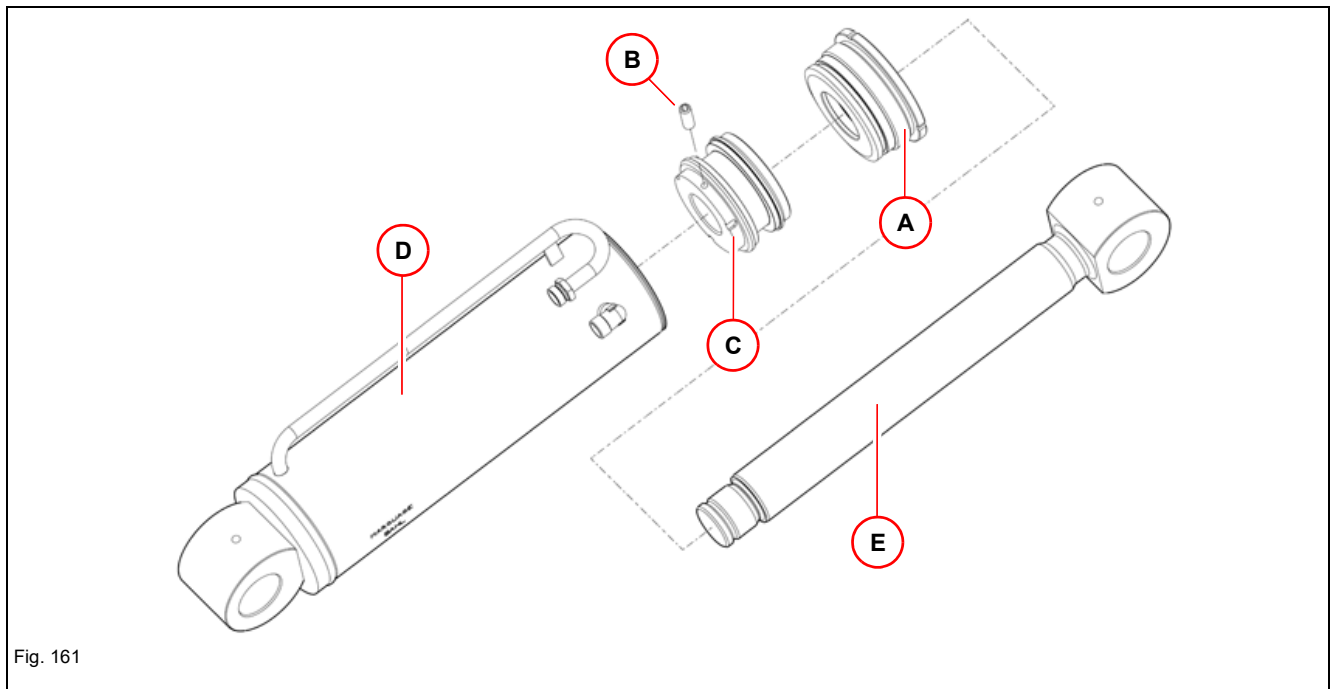


Fig. 161

Pos.	Description	Tightening torque
A	Guide bushing	400 Nm (295 lbf ft)
C	Piston	2000 $\pm$ 200 Nm (1476 $\pm$ 148 lbf ft)

Dismantle compensating cylinder

1. Unscrew guide bushing **A** with hooked wrench.
2. Pull piston rod **E** out of the cylinder jacket **D**.
3. Remove headless screw **B**.
4. Unscrew piston **C** from piston rod **E**.
5. Remove guide bushing **A** from the piston rod **E**.

Mount compensating cylinder

1. Replace old seals with new ones.
2. Attach the guide bushing **A** to the piston rod **E**.
3. Lightly grease seals with oil.
4. Tighten piston **C** to the prescribed tightening torque on the piston rod **E**.
5. Insert headless screw **B** using Loctite®270 extremely securely and tighten to 10 Nm (7 lbf ft).
6. Push piston rod **E** into the cylinder jacket **D**.
7. Tighten guide bushing **A** with the hooked wrench to the prescribed tightening torque.

8.15 locking cylinder 091

Safety instructions for locking cylinder



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

- ▶ Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
- ▶ Wear protective gloves

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- ▶ Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

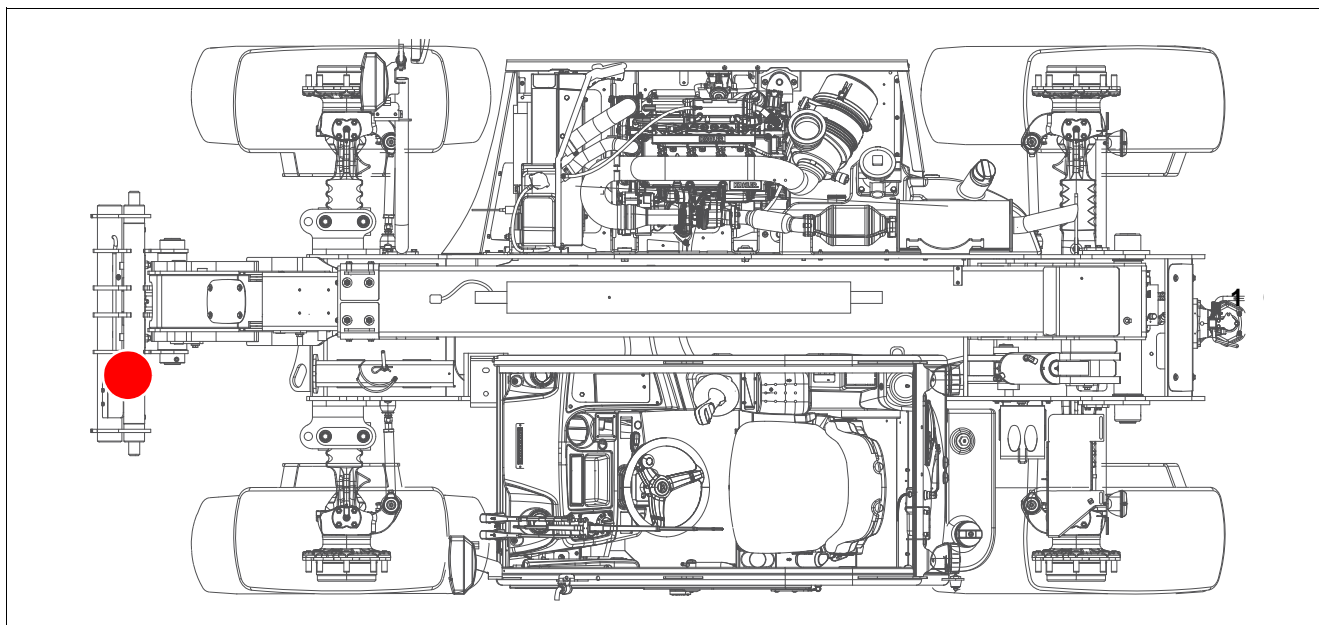
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Removing/installing lock cylinder

Tools:

- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

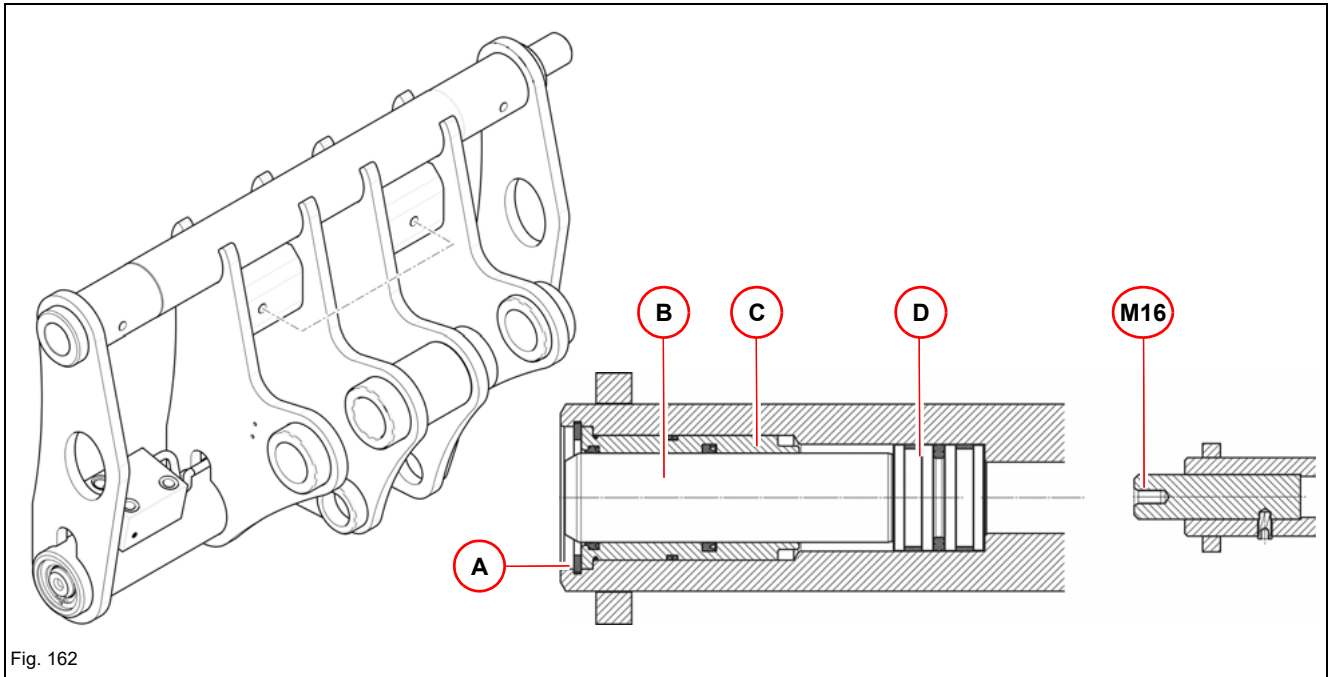
Technical data



Weight	BMK	Description	Remarks
116 kg (256 lb)	091	Quickhitch	—
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove locking cylinder

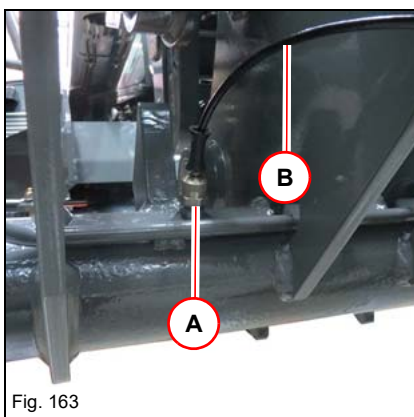
1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*



2. De-pressurize control circuit for quickhitch cylinder.
3. Remove circlip **A**.
4. Hammer out piston rod **B** with the help of a slide hammer-puller M16.

Install locking cylinder

1. Replace old seals on pistons **D** and guide bushings **C** with new ones.
2. Lightly grease seals with oil.
3. Push piston **B** into place.
4. Attach circlip **A**.
5. Replace the screw plug (M12x1.5) with a test port **A**.
6. Connect hose **B** to test port.
7. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
8. Bleed quickhitch cylinder through moving.
9. Replace test port **A** again with screw plug (M12x1.5).
10. Add hydraulic oil – see *"Adding hydraulic oil" on page 1-92.*



8.16 Telescopic boom inner pipe

Safety instructions for the telescopic boom - inner pipe



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

- Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- Allow the hydraulic system to cool down before removing components
- Wear protective gloves



WARNING

Risk of injury from the weight of the control unit!

Risk of serious injuries if control unit **XIII** presses down.

- Remove hydraulic control unit **XIII** only with another person.

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

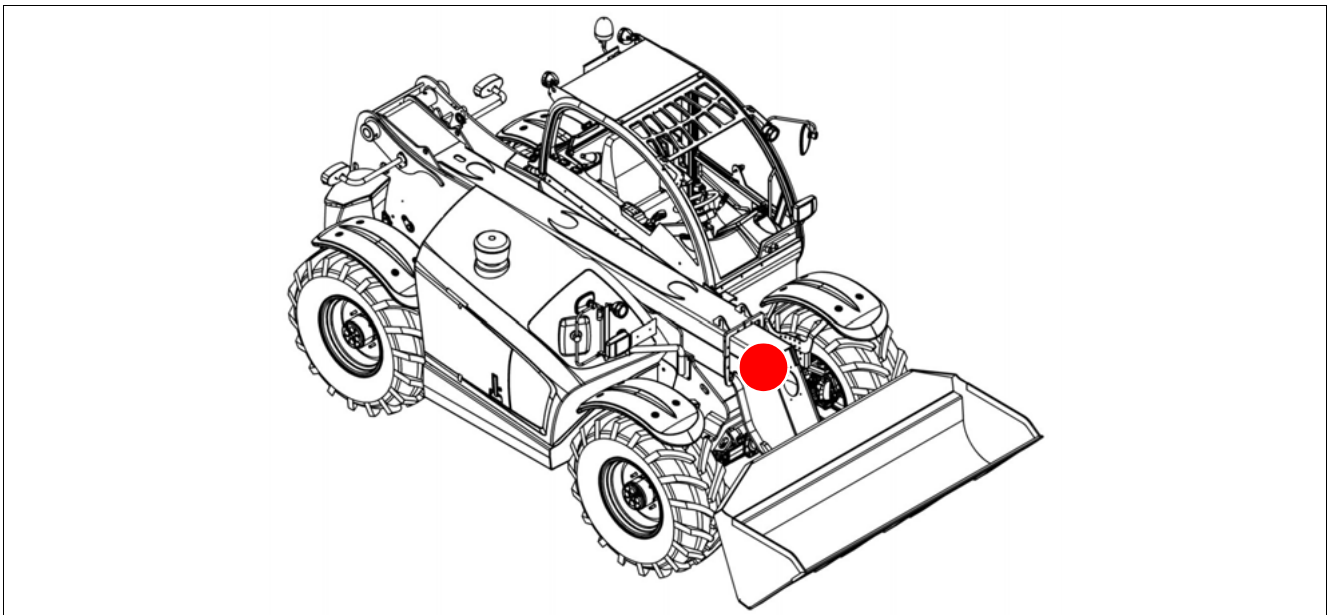
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install telescopic boom inner pipe

Tools:

- Suitable lifting gear, minimum load-bearing capacity 1000 kg (2200 lb.)
- Suitable slings (cables and shackles) with corresponding load-bearing capacity
- Jack stands
- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

Technical data



Weight	BMK	Description	Remarks
310 kg (682.8 lb)	–	Telescopic boom inner pipe	–
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove telescopic boom inner pipe

1. Park the machine on firm, level and dry ground.
2. Apply the parking brake.
3. Expand telescopic boom by about 20 cm (7.87 in).
4. Lift the boom so that the pins **A** of the rear extending cylinder coordinates with the holes in the frame.
5. Turn the machine off and remove the ignition key.
6. Securely support the boom.
7. Release the pressure in the hydraulic system. To do this:
 - Stop the engine, but leave the ignition switched on.
 - Hold down the switch for emergency lowering.
 - Move the control lever (joystick) in all directions repeatedly.
8. Switch off the starter and remove the starting key.
9. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
10. Open the cover – see ["Rear of machine" on page 1-25](#).
11. If present, remove autohitch – see ["Removing/installing the autohitch" on page 17-2](#).
12. Hose burst valve extending cylinder [Remove/install hose burst valve extending cylinder on page 8-43](#).
13. Remove all rear slide plates – see ["Replace rear top slide plates" on page 1-46](#), – see ["Replace rear lateral slide plates" on page 1-47](#). – see ["Replace rear bottom slide plate" on page 1-47](#).
14. Remove all front slide plates – see ["Replace front slide plates" on page 1-45](#).
15. Release rods **A** from the lift angle encoder **B072** on both sides and remove.
16. Release all hose clips **A** (top) on the frame and mount with the lift angle encoder.

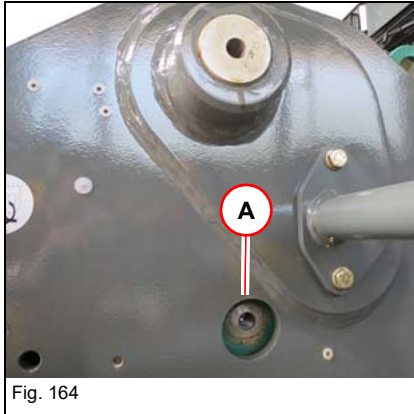


Fig. 164

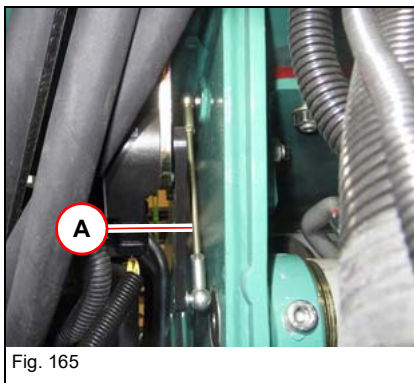


Fig. 165

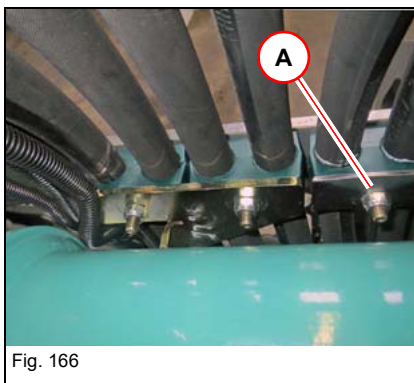


Fig. 166

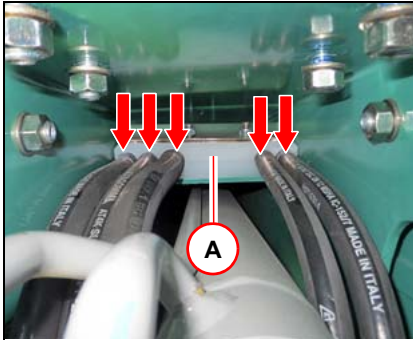


Fig. 167

17. Marks the hose pipes' positions on the hose clip **A**.

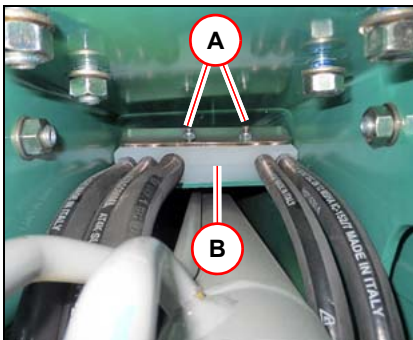


Fig. 168

18. Remove fixing nuts **A** on the host clip **B**.

19. Take the hose clip **B** off with the cover plate.

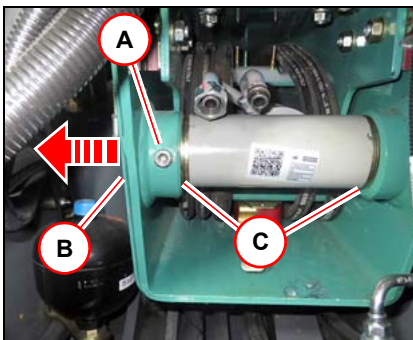


Fig. 169

20. Remove the locking screw **A** and drive the pins **B** out to the left.

21. Remove the adjustment discs **C**.

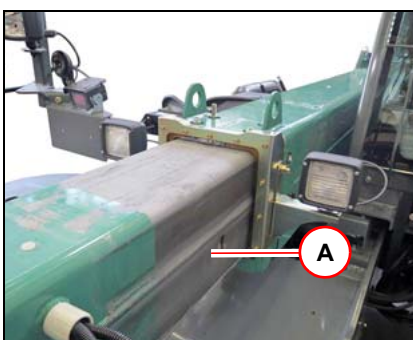
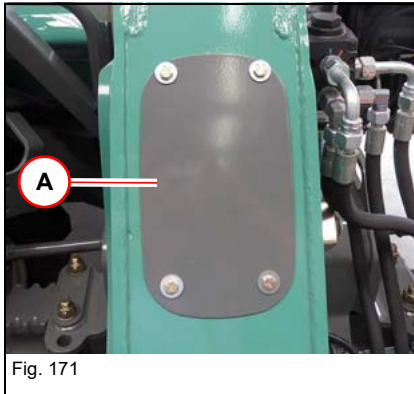


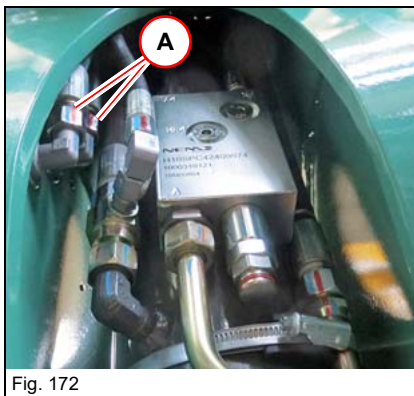
Fig. 170

22. Pull out the inner pipe **A** to approx. 0.5 m (1.64 ft).



23. Unscrew maintenance cover **A** on the telescopic boom.

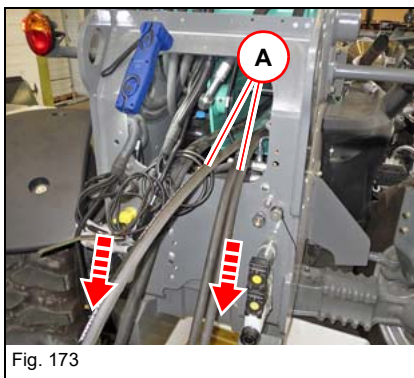
24. Remove tilt cylinder – see ["Removing/installing the tilt cylinder" on page 8-83](#).



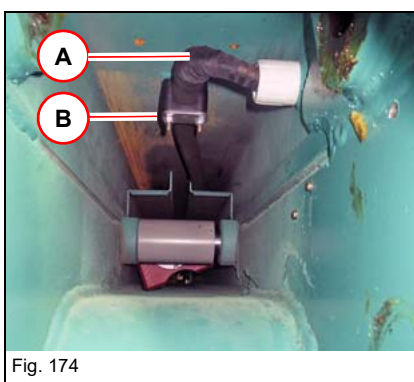
Hose pipes to quickhitch plate:

25. Loosen union nuts **A** remove the hose pipes.

26. Tightly seal hose pipes.

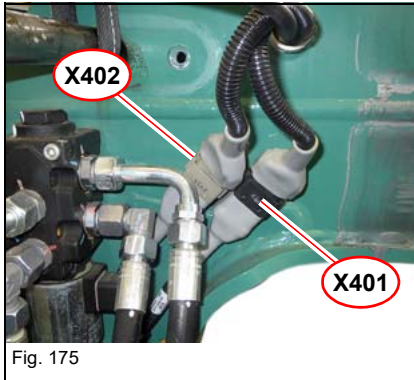


27. Pull all hose pipes **A** out to the rear from the telescopic boom.

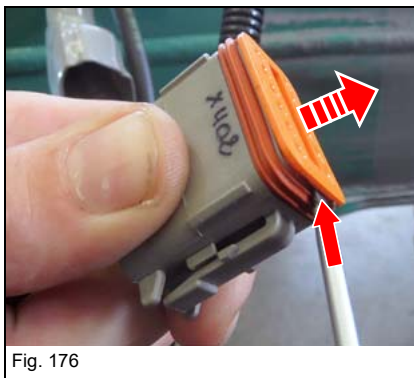


Remove wiring harness **A**:

28. Mark wiring harness **A** on the mount **B** and remove mount **B**.



29. Unplug the plug connection **X401** (black).
30. Unplug the plug connection **X402** (gray).

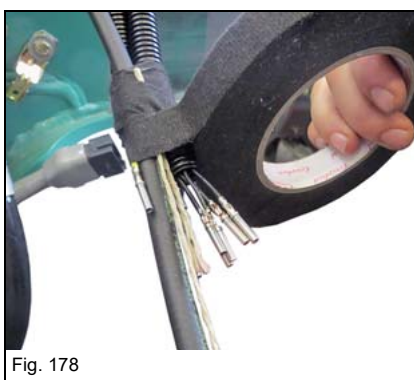


31. Lift the cover with a suitable tool on both plug connections.

On both plug connections:



32. Crimp cable individually and note plug position, cable color and cable number.



33. Connect wiring harness with an insertion tool.

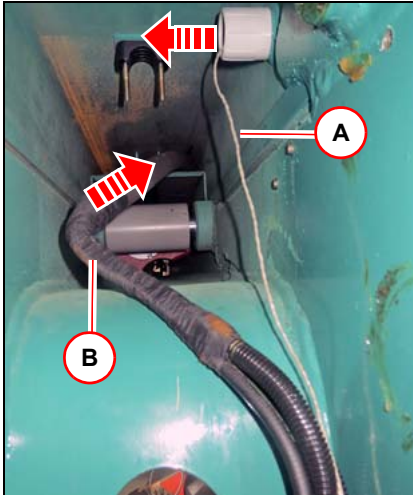


Fig. 179

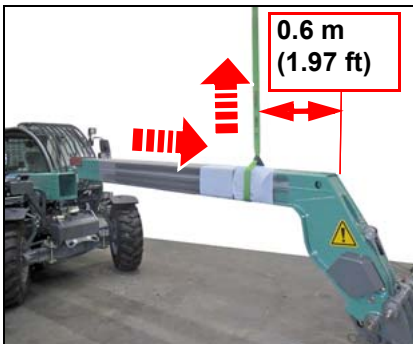


Fig. 180

34. Pull wiring harness **B** using an insertion tool **A** inwards into the telescopic cantilever and from there to the back out of the telescopic boom.

35. Fasten the sling approx. 0.6 m (1.97 ft) from the edge.

36. Carefully lift the telescopic cantilever and pull out of the telescopic boom.

37. Put down the telescopic cantilever.

Install telescopic boom inner pipe

1. Fasten the lifting tackle approx. 0.6 m (1.97 ft) from the edge.
2. Do not lubricate the inner pipe with grease on the unpainted pad tracks – see ["Overview of vehicle fluids and lubricants" on page 1-18](#).
3. Carefully lift the telescopic cantilever and push into the telescopic boom.

NOTICE

Damage to the hose pipes

- When pushing in the inner pipe ensure that the inner pipe is not on the external pipe's hose pipes.

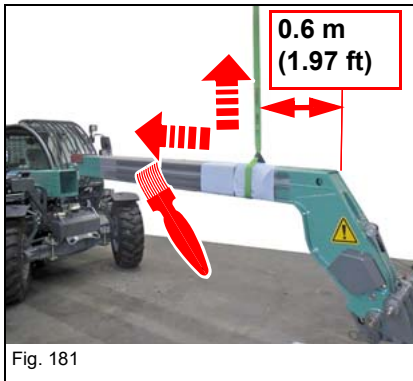


Fig. 181

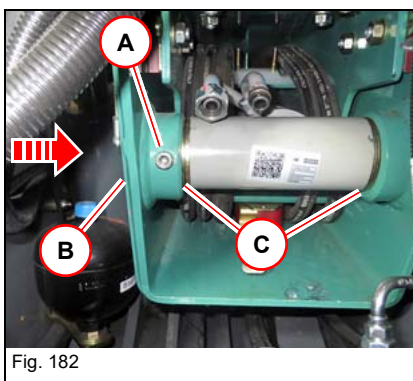


Fig. 182

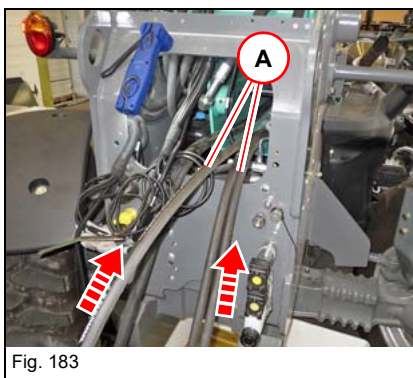


Fig. 183

4. Install the slide at the back – see ["Replace rear bottom slide plate" on page 1-47](#).
 5. Position the extending cylinder and discs **C**.
 6. Drive in the pin **B**.
 7. Mount the retaining screw **A**.
-
8. Push all hose pipes **A** into the telescopic cantilever from the back.

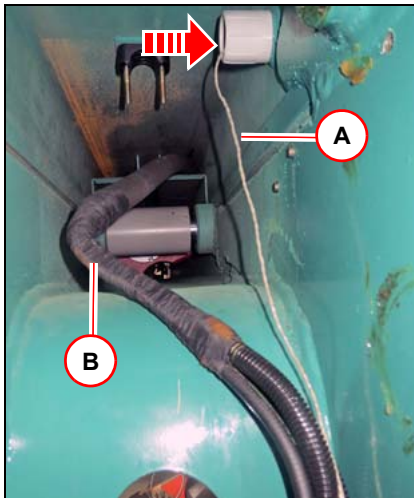


Fig. 184

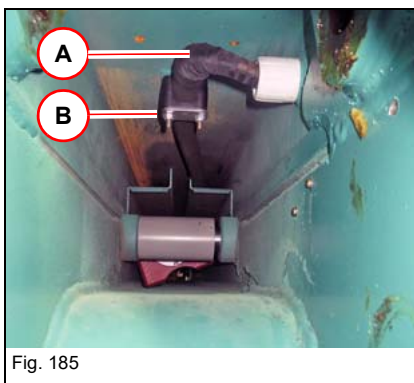


Fig. 185

Mount wiring harness **B**:

9. Pull the wiring harness **B** from the front with the insertion tool **A** into the telescopic cantilever.

10. Pull the wiring harness **B** with the insertion tool **A** outwards.

11. Mount the wiring harness **A** at the position marked on the mounting **B**.

Both plugs:

12. Individually crimp the cables (slot, cable color and cable number see list) until they audibly lock into place.

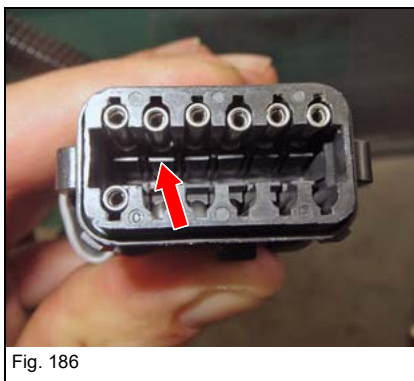
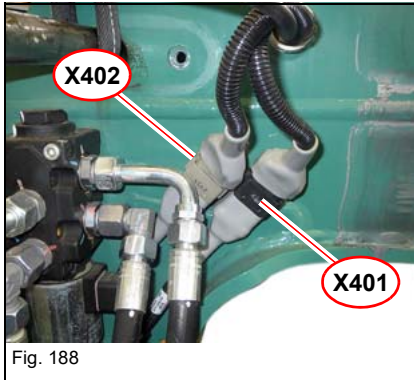


Fig. 186



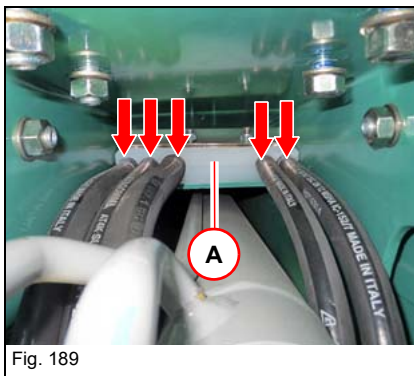
Fig. 187

13. Mount the cover on both plugs.

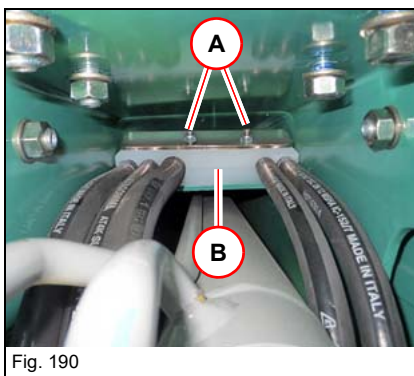


14. Insert plug **X401** (black).

15. Insert plug **X402** (gray).



16. Insert hose pipes at the markets position in the hose mount **A**.



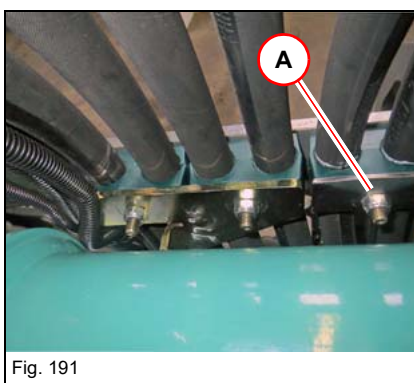
17. Put on cover plate and tighten fixing nuts **A**.

NOTICE

Attention! Ensure the correct position of the hose mount **B** and cover plate.

► Mount the fold to the front.

18. Insert all rear slide plates – see ["Replace rear top slide plates" on page 1-46](#), – see ["Replace rear lateral slide plates" on page 1-47](#). – see ["Replace rear bottom slide plate" on page 1-47](#)



19. Top on frame:

20. Position and mount hose clips **A**.

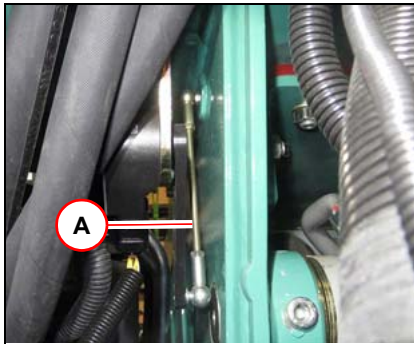


Fig. 192

21. Mount and secure rods **A** from the lift angle encoder **B072** on both sides.
22. Open the cover – see ["Rear of machine" on page 1-25](#).



Fig. 193

Hose pipes to quickhitch plate:

23. Position the hose and tighten the sleeve nut **A** to 60 Nm (44 lbf ft).
24. Install the tilt cylinder – see ["Removing/installing the tilt cylinder" on page 8-83](#).

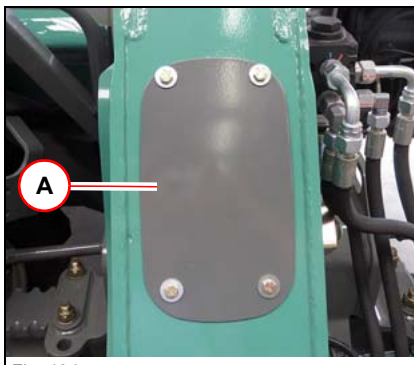


Fig. 194

25. Screw on maintenance cover **A** on the telescopic boom.
26. Insert all front slide plates – see ["Replace front slide plates" on page 1-45](#).
27. If present, mount autohitch – see ["Removing/installing the autohitch" on page 17-2](#).
28. Lubricate telescopic boom – see ["Lubricating the telescopic boom" on page 1-35](#).
29. Recalibrate lift angle encoder **B072** with Kadias.
30. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
31. Check the system for correct function and sealing.
32. Check oil level – see ["Checking the hydraulic oil level" on page 1-91](#) and top up if necessary – see ["Adding hydraulic oil" on page 1-92](#).

8.17 Telescopic boom outer pipe

Safety instructions for the telescopic boom - outer pipe



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

- Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- Allow the hydraulic system to cool down before removing components
- Wear protective gloves



WARNING

Risk of injury from the weight of the control unit!

Risk of serious injuries if control unit **XIII** presses down.

- Remove hydraulic control unit **XIII** only with another person.

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

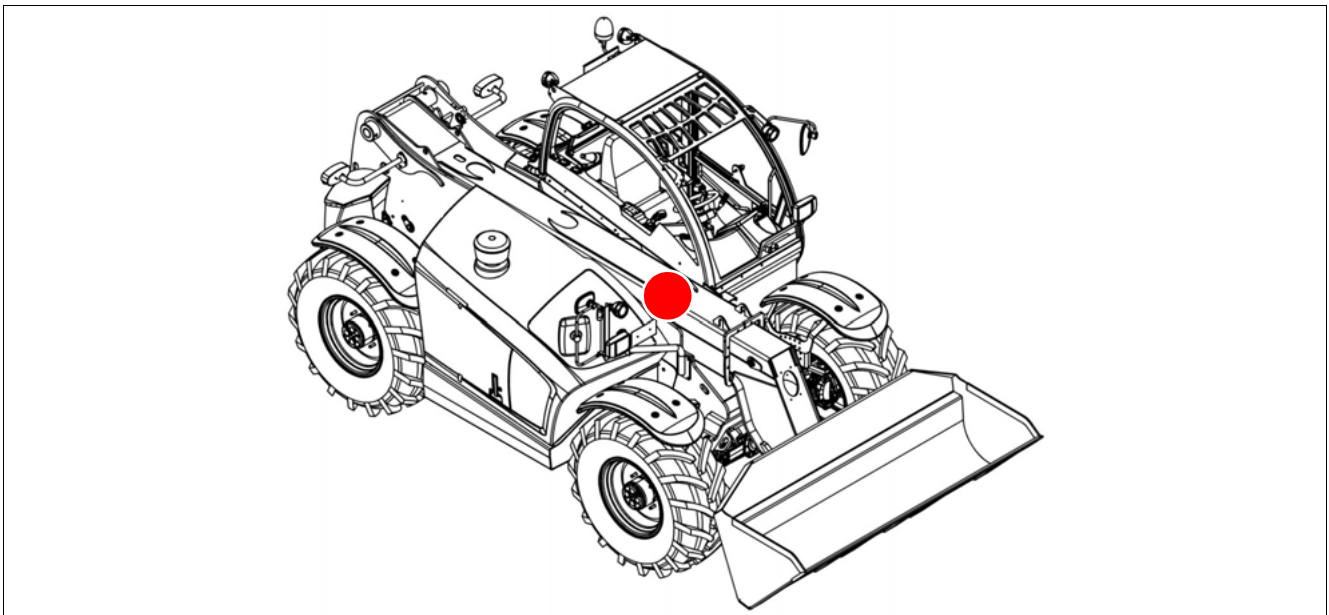
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Remove/install telescopic boom outer pipe

Tools:

- Suitable lifting gear, minimum load-bearing capacity 1000 kg (2200 lb.)
- Suitable slings (cables and shackles) with corresponding load-bearing capacity
- Jack stands
- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

Technical data



Weight	BMK	Description	Remarks
336 kg (740.7 lb)	–	Telescopic boom outer pipe	–
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove outer pipe

1. Park the machine on firm, level and dry ground.
2. Apply the parking brake.
3. Switch off the starter and remove the starting key.
4. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
5. Disassemble inner pipe – see *"Remove/install telescopic boom inner pipe" on page 8-101*.

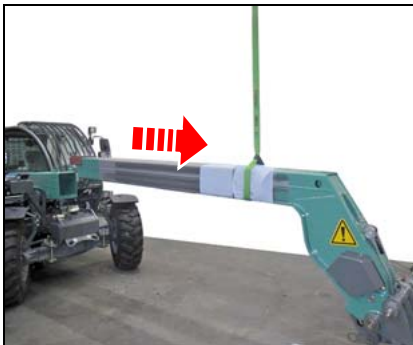


Fig. 195

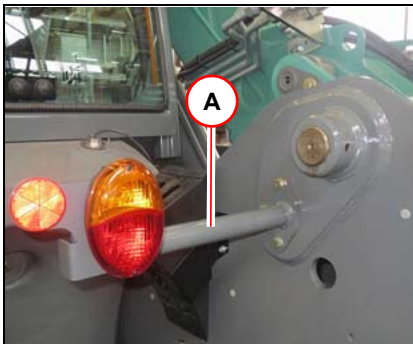


Fig. 196

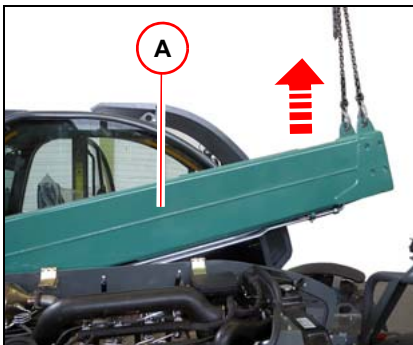


Fig. 197

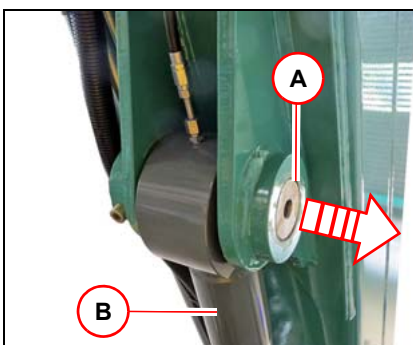


Fig. 198

6. Unscrew the light carriers **A** left and right.
7. Separate the plug connection on the light carriers.



CAUTION

Danger of crushing when working on the telescopic boom!

Can cause injury.

- Only remove telescopic boom **A** with suitable lifting gear and slings.
- Wear protective gloves.

8. Clip the sling on the front of the telescopic boom.
9. Carefully lift the telescopic boom front.
10. Remove pins **A** of the lifting cylinder **B** on the boom – see *"Removing/ installing the lift cylinder" on page 8-67*.

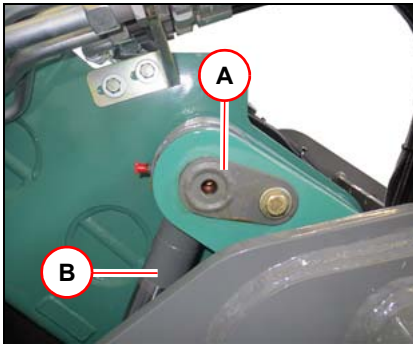


Fig. 199

11. Remove pins **A** of the balancing cylinder **B** on the boom –
see "Remove/install compensation cylinder" on page 8-91.



Fig. 200

12. Separate all electrical plug connections to the headlights front right on the telescopic boom rear.

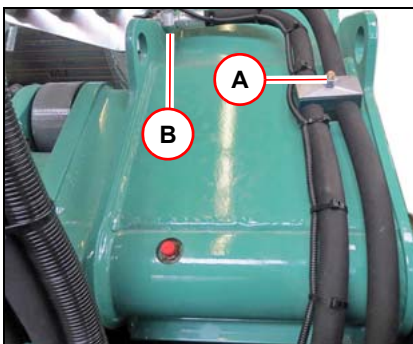


Fig. 201

13. Remove hose clip **A**.
14. Remove hose pipes **B** and seal both sides with a stopper.

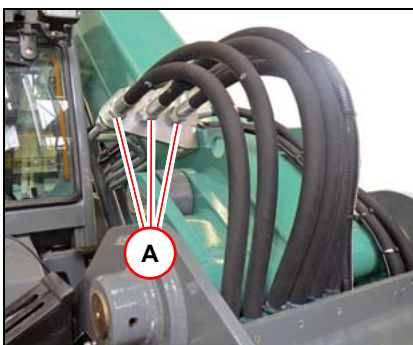


Fig. 202

15. Remove hose pipes **B** on the mount and seal both sides with a stopper.
16. Move hose pipes to the back.

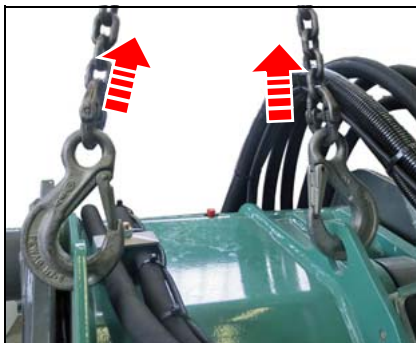


Fig. 203

17. Secure the telescopic boom to the back.

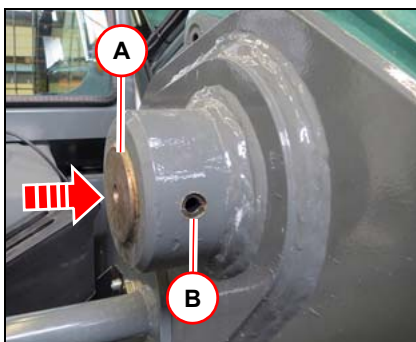


Fig. 204

18. Drive out coil spring pin **B**.

19. Drive out pins **A** on the right-hand side with an impact puller.

20. Lift boom out of the vehicle.

21. Remove the boom and set aside.

Install outer pipe

1. Fix sling to the back of the boom.

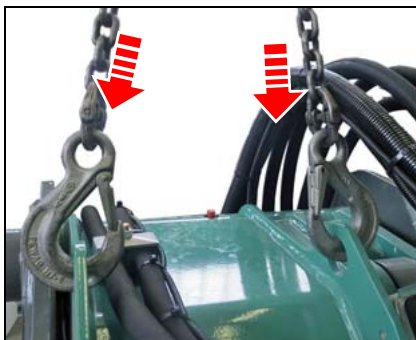


Fig. 205

2. Fix sling to the front of the boom.

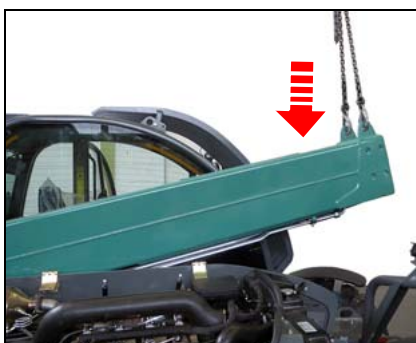


Fig. 206

3. Carefully lift the boom and position on the vehicle.

4. Drive in bearing pins **A**.

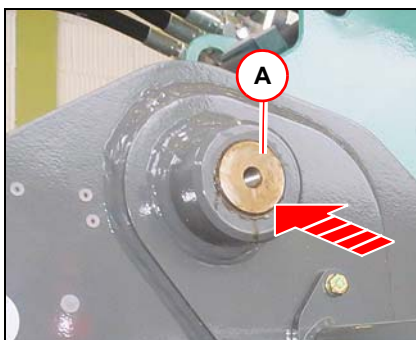


Fig. 207

5. Mount coiled spring pin **A**.

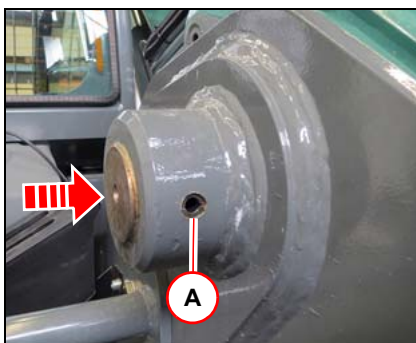


Fig. 208

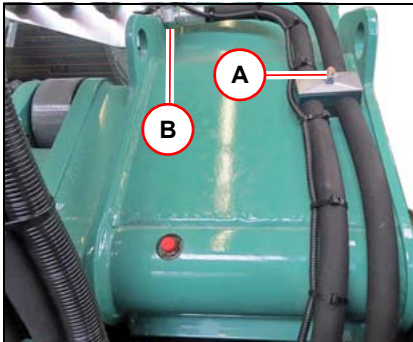


Fig. 209

6. Position hose pipes **B** and tighten screw connections to 80 Nm (59 lbf ft).
7. Install hose clip **A**.

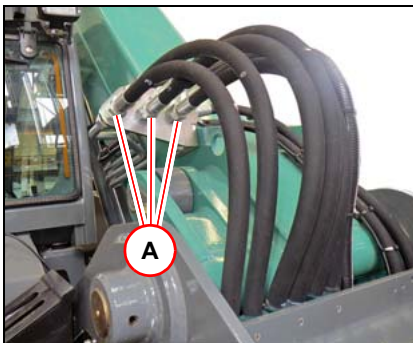


Fig. 210

8. Position hydraulic hose pipes **A** on the mount and tighten screw connections to 80 Nm (59 lbf ft).

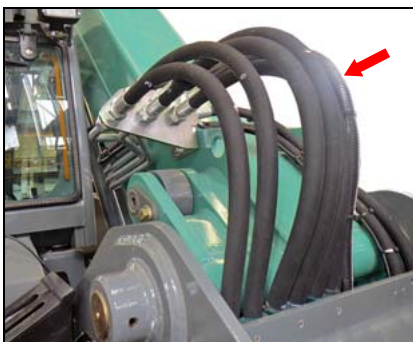


Fig. 211

9. Connect all electrical plug connections to the headlights front right on the telescopic boom rear.
10. Install the cable binder.

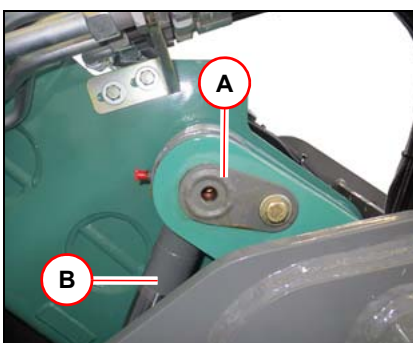
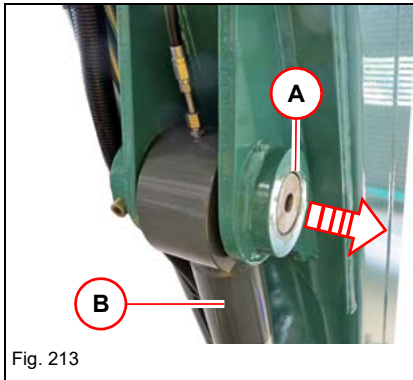
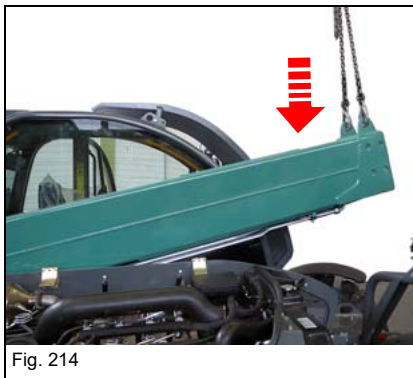


Fig. 212

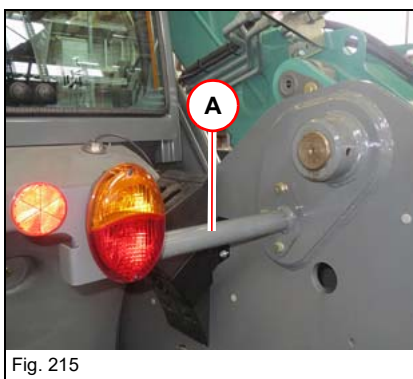
11. Insert pins **A** of the balancing cylinder **B** on the boom – see ["Remove/install compensation cylinder" on page 8-91](#).



12. Install pins **A** of the lifting cylinder **B** on the boom – see *"Removing/ installing the lift cylinder" on page 8-67.*

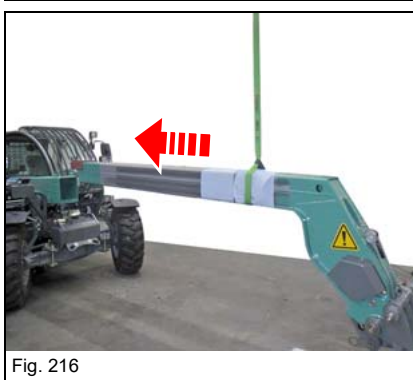


13. Carefully lower the telescopic boom front.



14. Install the light carriers **A** left and right.

15. Insert the plug connections on the light carrier.



16. Install inner pipe – see *"Remove/install telescopic boom inner pipe" on page 8-101.*

17. Check oil level – see *"Checking the hydraulic oil level" on page 1-91* and top up if necessary – see *"Adding hydraulic oil" on page 1-92.*

18. Lubricate telescopic cantilever – see *"Lubricating the telescopic boom" on page 1-35.*

19. Recalibrate lift angle encoder **B072** with Kadias.

20. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*

21. Check the system for correct function and sealing.

8.18 Hose pipes in telescopic boom

Safety instructions for hose pipe in telescopic boom



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

- Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- Allow the hydraulic system to cool down before removing components
- Wear protective gloves

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, read the safety and preparation instructions carefully

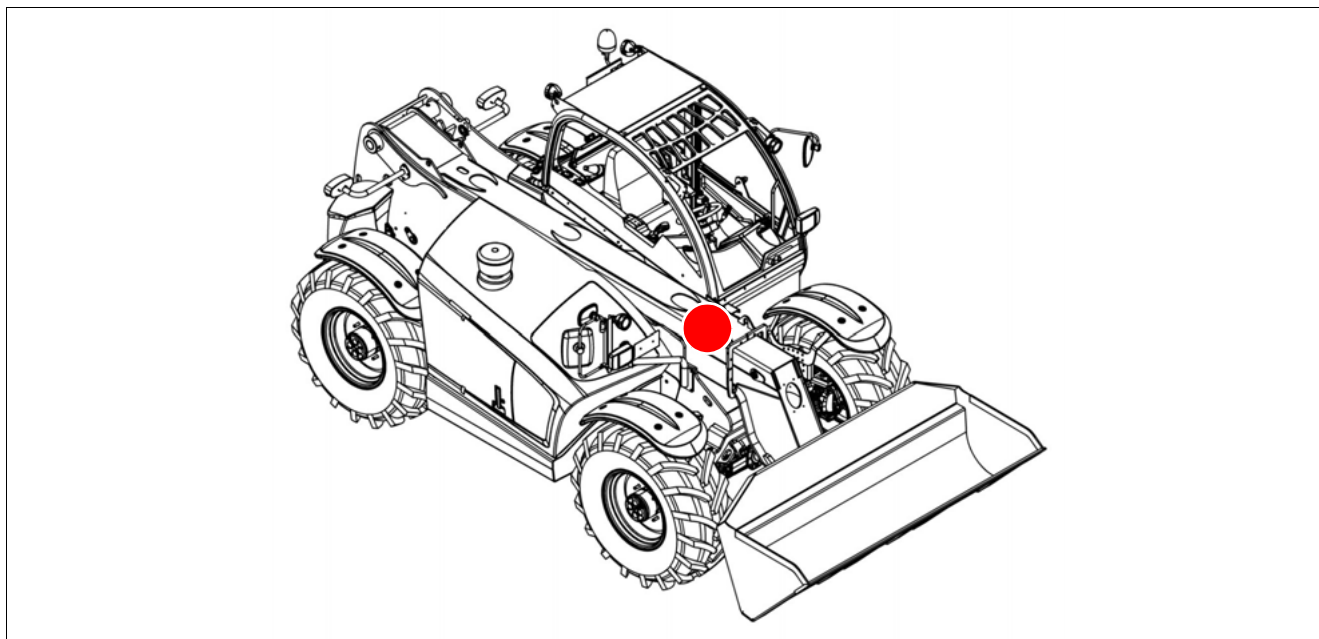
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install hose pipes in telescopic boom

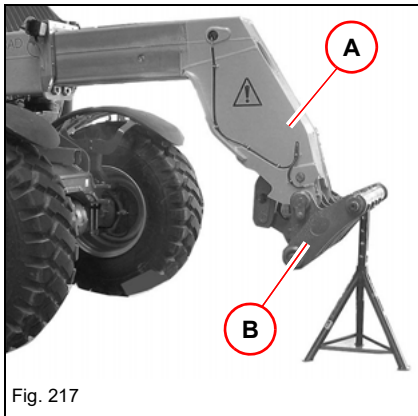
Tools:

- Jack stands
- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

Technical data

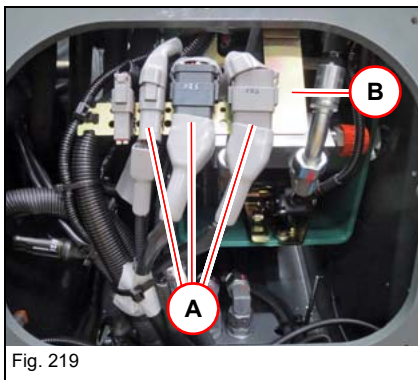
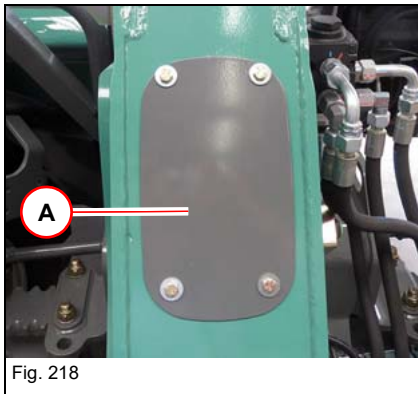


Weight	BMK	Description	Remarks
—	—	Flexible lines	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

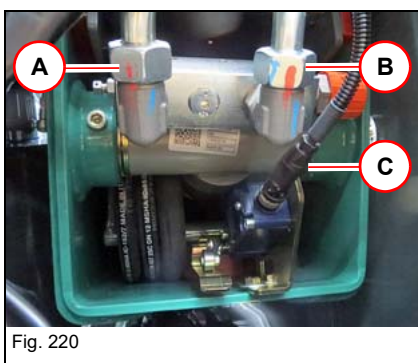


Remove hose pipes

1. Place the telehandler on a firm and level surface
2. Apply the parking brake.
3. Extend telescopic boom **A** by about 200 mm (7.87 in).
4. Move the quickhitch facility **B** into the position shown.
5. Place telescopic boom on to a support making sure that no pressure is applied.
6. Release the pressure in the hydraulic system. To do this:
 - Stop the engine, but leave the ignition switched on.
 - Hold down the switch for emergency lowering.
 - Move the control lever (joystick) in all directions repeatedly.
7. Switch off the starter and remove the starting key.
8. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
9. Open the cover – see *"Rear of machine" on page 1-25*.
10. Unscrew maintenance cover **A** on the telescopic boom.



11. Unhook and unplug screw connections **A** on the mount **B**.
12. Unscrew mount **B**.



13. Unplug plug **C** at the limit switch.
14. Loosen screw connection **A** and remove hose.
15. Loosen screw connection **B** and remove hose.
16. Tightly seal hose pipes and screw connections.

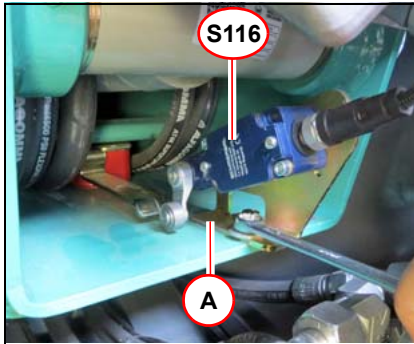


Fig. 221

17. Mark the precise position of the mount **A** with limit switches **S116**.

18. Unscrew mount **A** with limit switches **S116**.

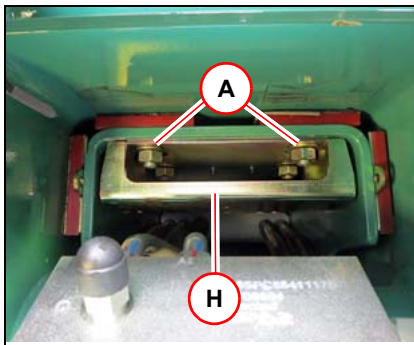


Fig. 222

19. Remove mounting nuts **A** and take off deflector plate.

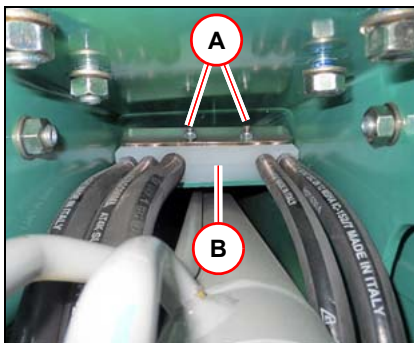


Fig. 223

20. Remove fixing nuts **A** on the host clip **B**.

21. Take the hose clip **B** off with the cover plate.

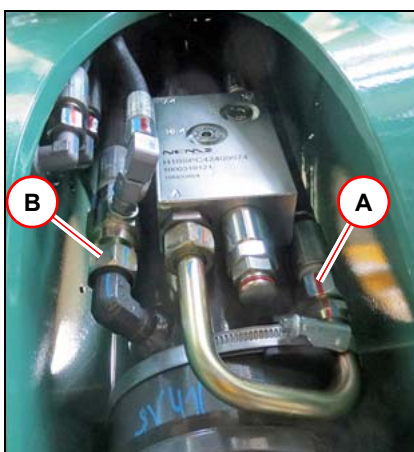


Fig. 224

22. Loosen screw connection **A** on the tilt cylinder and remove hose.

23. Loosen screw connection **B** on the tilt cylinder and remove hose.

24. Seal hoses and connections with plugs.

Hose pipes to quickhitch plate:

25. Loosen union nuts **A** remove the hose pipes.

26. Tightly seal hose pipes.

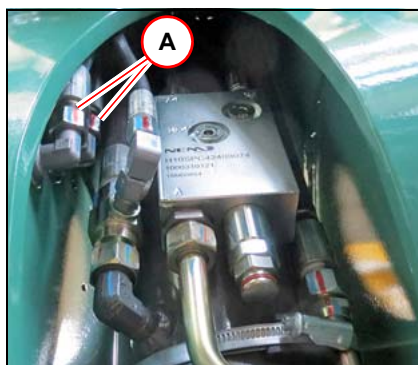


Fig. 225

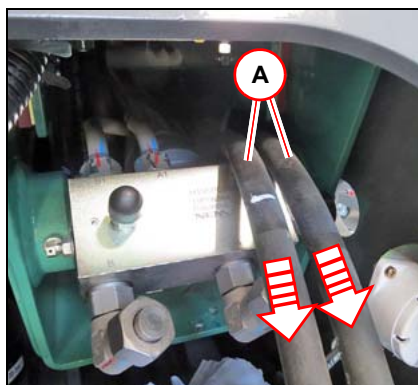


Fig. 226

27. Pull the corresponding hose pipes **A** out toward the back.

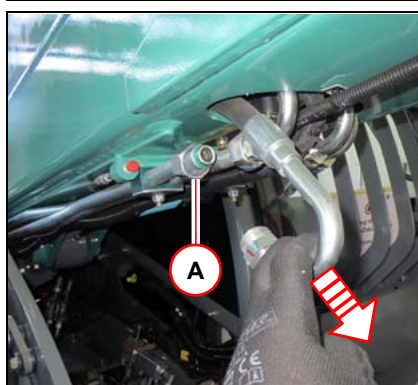


Fig. 227

28. Release union nut **A** of the corresponding hose pipe on the underside of the telescopic boom and pull the hose pipe out to the front.

Install hose pipes

1. Push through the hose pipe on the underside of the telescopic boom with the straight side towards the back.



Fig. 228

2. Pull the corresponding hose pipes **A** out toward the back.

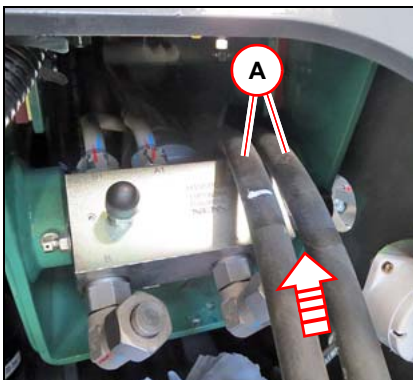


Fig. 229

3. Position hose pipe on the hydraulic pipe in such a way that the pipe is not placed in line with the telescopic boom.
4. Tighten sleeve nut **A** to 60 Nm (44 lbf ft.).

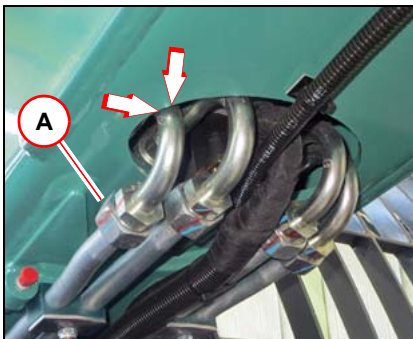


Fig. 230

5. Push the corresponding hose pipes **A** one after another to the front again through the hose clip.

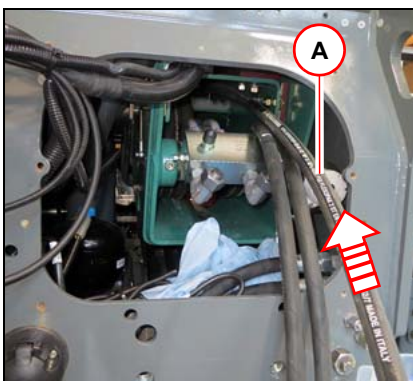


Fig. 231

Hose pipes to quickhitch plate:

6. Position the hose and tighten the sleeve nut **A** to 60 Nm (44 lbf ft).

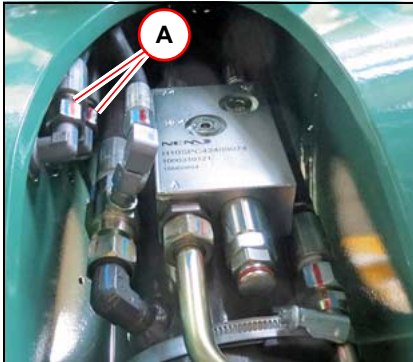


Fig. 232

7. Tighten union nut **A** of the hose pipe to 80 Nm (59 lb ft).

8. Tighten union nut **B** of the hose pipe to 60 Nm (44 lb ft).

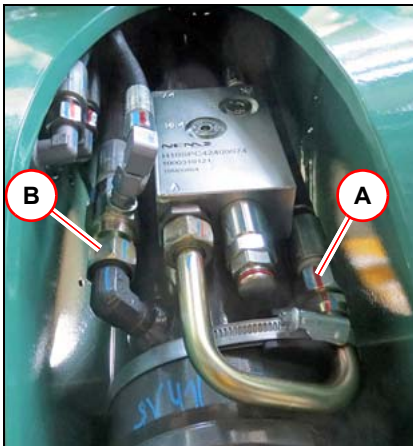


Fig. 233

9. Insert hose pipes at the markets position in the hose mount **A**.

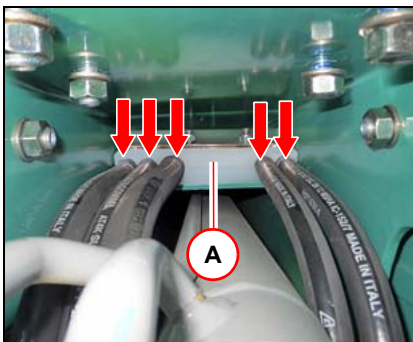


Fig. 234

10. Put on cover plate and tighten fixing nuts **A**.

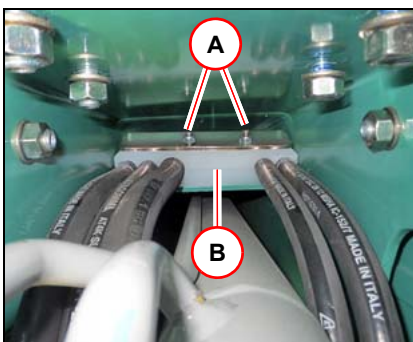


Fig. 235

NOTICE

Attention! Ensure the correct position of the hose mount **B** and cover plate.

► Mount the fold to the front.

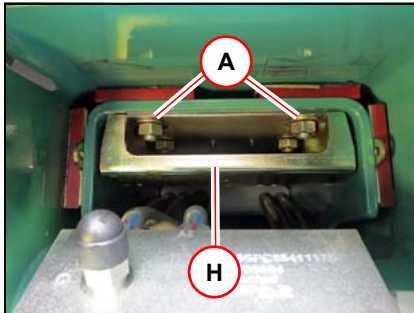


Fig. 236

11. Position the deflector plate **B** and tighten the mounting nuts **A** to 79 Nm (58 lbf ft).

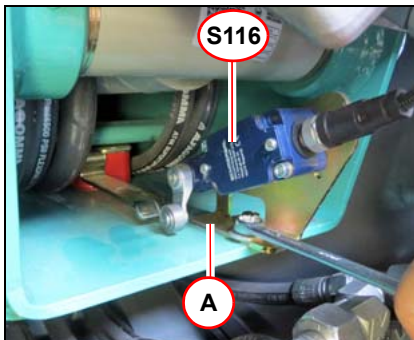


Fig. 237

12. Mark the precise position of the mount **A** with limit switches **S116**.

13. Unscrew mount **A** with limit switches **S116**.

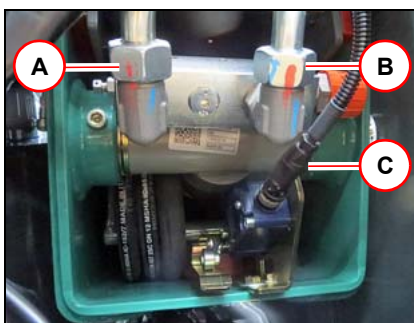


Fig. 238

14. Position the hose and tighten the screw connection **A** to 80 Nm (59 lbf ft).

15. Position hose and tighten screw connection **B** to 80 Nm (59 lbf ft).

16. Insert plug **C** on the sensor.

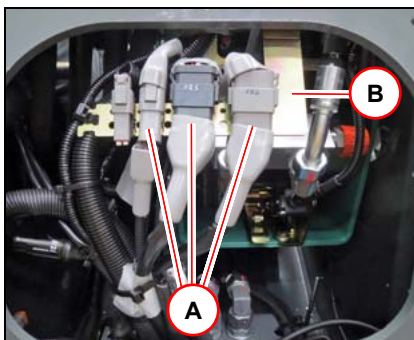
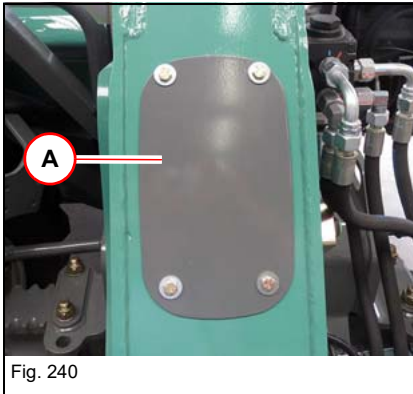


Fig. 239

17. Screw on mount **B**.

18. Insert screw connections **A** and hook up to mount **B**.



19. Screw on maintenance cover **A** on the telescopic boom.
20. If present, mount autohitch – see *"Removing/installing the autohitch" on page 17-2*.
21. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
22. Check oil level – see *"Checking the hydraulic oil level" on page 1-91* and top up if necessary – see *"Adding hydraulic oil" on page 1-92*.
23. Check the system for correct function and sealing.
24. Mount the cover – see *"Rear of machine" on page 1-25*

9 Electrics

9.1 Printed circuit boards N033, N034

Safety instructions for Printed circuit boards



Information

Before starting work, read the safety and preparation instructions carefully

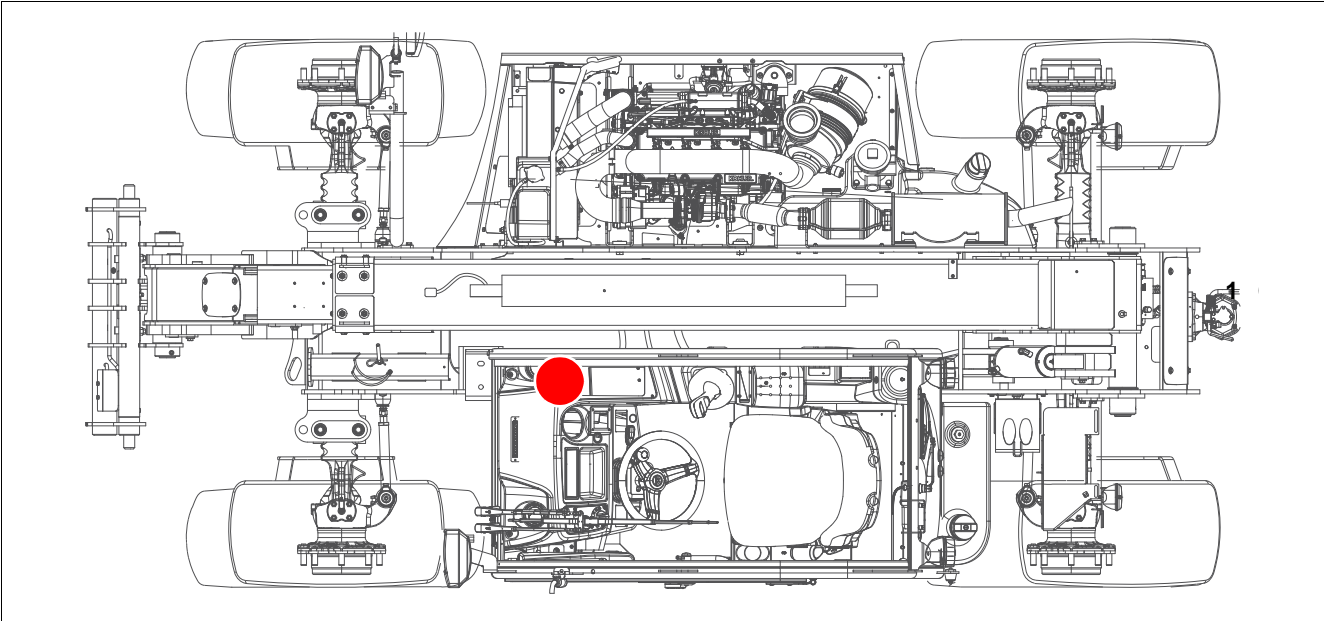
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Removing / installing printed circuit boards

Tools

- Standard tools

Technical data



Weight	BMK	Description	Remarks
—	N033	Fuse board	—
—	N034	Relay board	—
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove printed circuit boards

1. Switch off battery master switch **S008** – see ["Switch off the battery master switch S008" on page 1-3.](#)
2. Remove knurled screws **A** take instrument panel off to the side.



Fig. 1



Fig. 2

3. Remove plug **N023** (oil volume adjustment).
4. Remove plug **D003** (keypad - standard).
5. Remove plug **D004** (keypad - options).
6. Remove instrument panel.

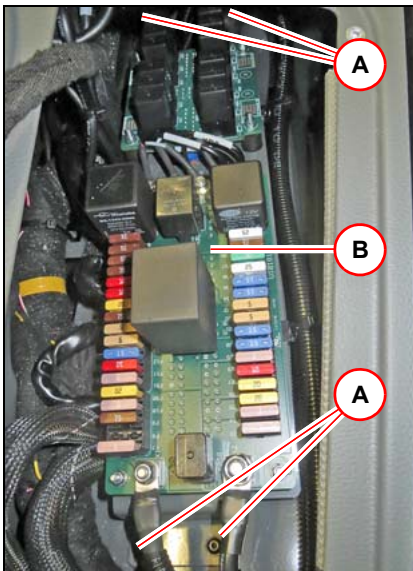


Fig. 3

7. Remove fastening screws **A**.
8. Lift and turn **B** printed circuit boards with mounting.

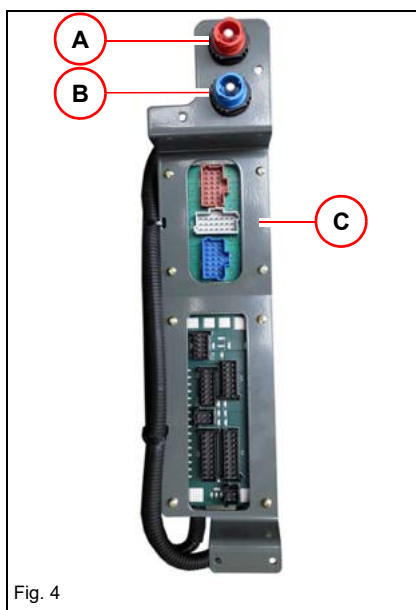
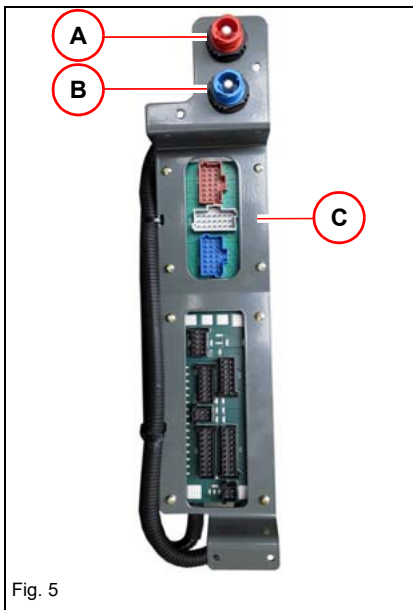


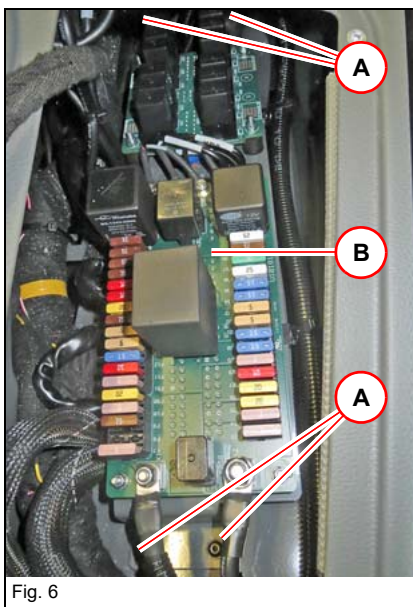
Fig. 4

9. Mark all plug positions on the rear of the printed circuit board **C**.
10. Take off all plugs.
11. Remove plug **A** (power supply + bayonet lock).
12. Remove plug **B** (mass + bayonet lock).
13. Take out printed circuit boards with mounting **C**.

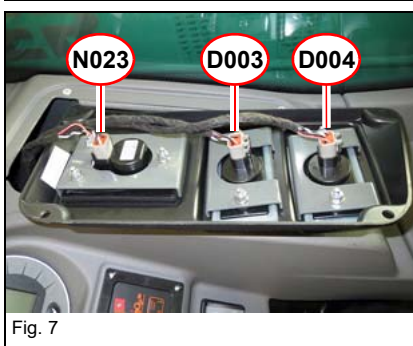
Install printed circuit boards



1. Position printed circuit boards with mounting **C**.
2. Insert plug **A** (power supply + bayonet lock).
3. Insert plug **B** (mass + bayonet lock).
4. Insert all connections into the positions marked on the back.



5. Turn printed board circuits with mounting **B** around.
6. Attach **A** screws.



7. Insert plug **N023** (oil volume adjustment).
8. Insert plug **D003** (keypad - standard).
9. Insert plug **D004** (keypad - options).



10. Put control unit **B** on.
11. Tighten knurled screws **A**.
12. Switch on battery master switch **S008** – see *"Switch on battery master switch S008" on page 1-3*.

9.2 Joystick D002

Safety instructions for joystick



Information

Before starting work, read the safety and preparation instructions carefully

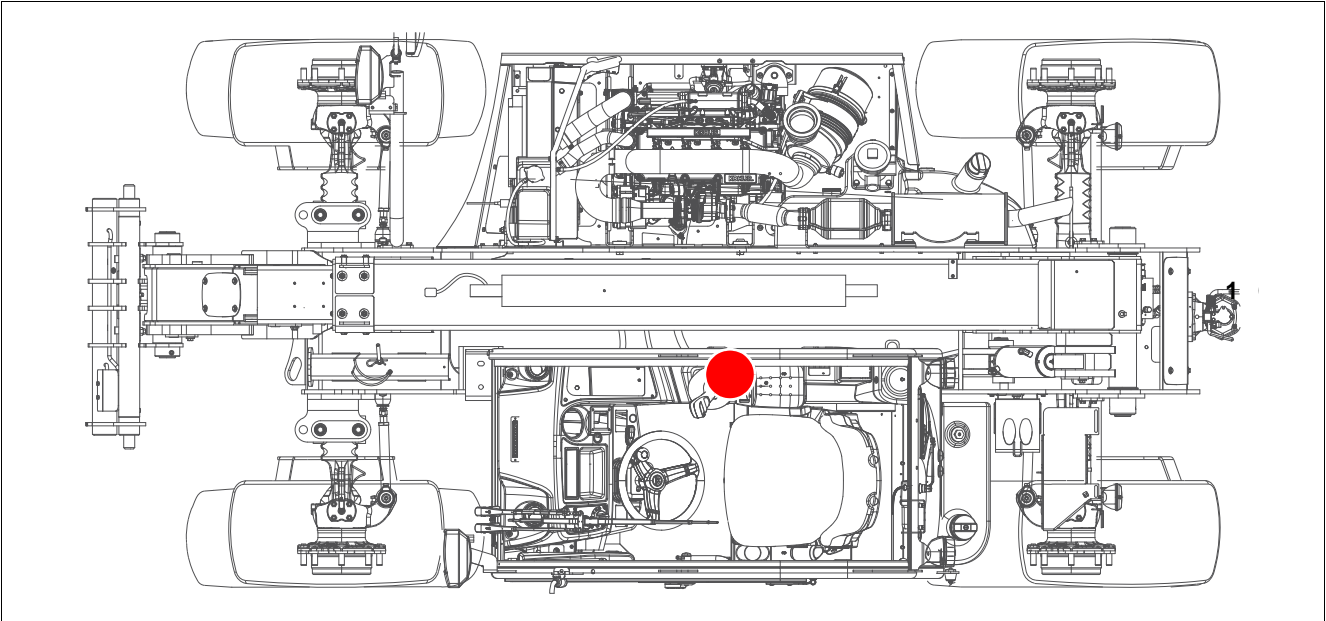
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Removing / installing joystick

Tools

- Standard tools

Technical data



Weight	BMK	Description	Remarks
1.96 kg (4 lb)	D002	Joystick	—
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove the joystick

1. Switch off battery master switch **S008** – see *"Switch off the battery master switch S008" on page 1-3.*
2. Pull cover upwards and remove fastening screws **A** .



Fig. 9

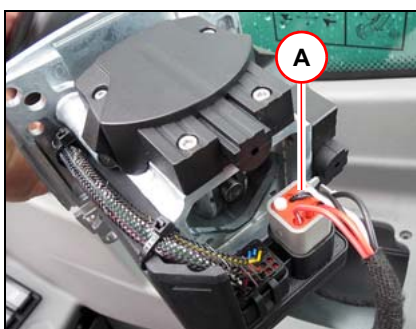


Fig. 10

3. Separate plug **A** from joystick.

Installing the joystick

1. Insert plug **A** from joystick.

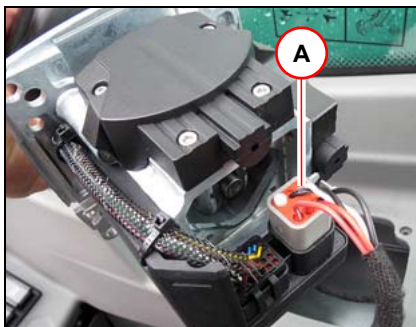


Fig. 11

2. Position joystick and tighten the fastening screws **A** .
3. Pull cover downwards.
4. Switch on battery master switch **S008** – see *"Switch on battery master switch S008" on page 1-3.*



Fig. 12

9.3 Instrument panel

Safety instructions for instrument panel



Information

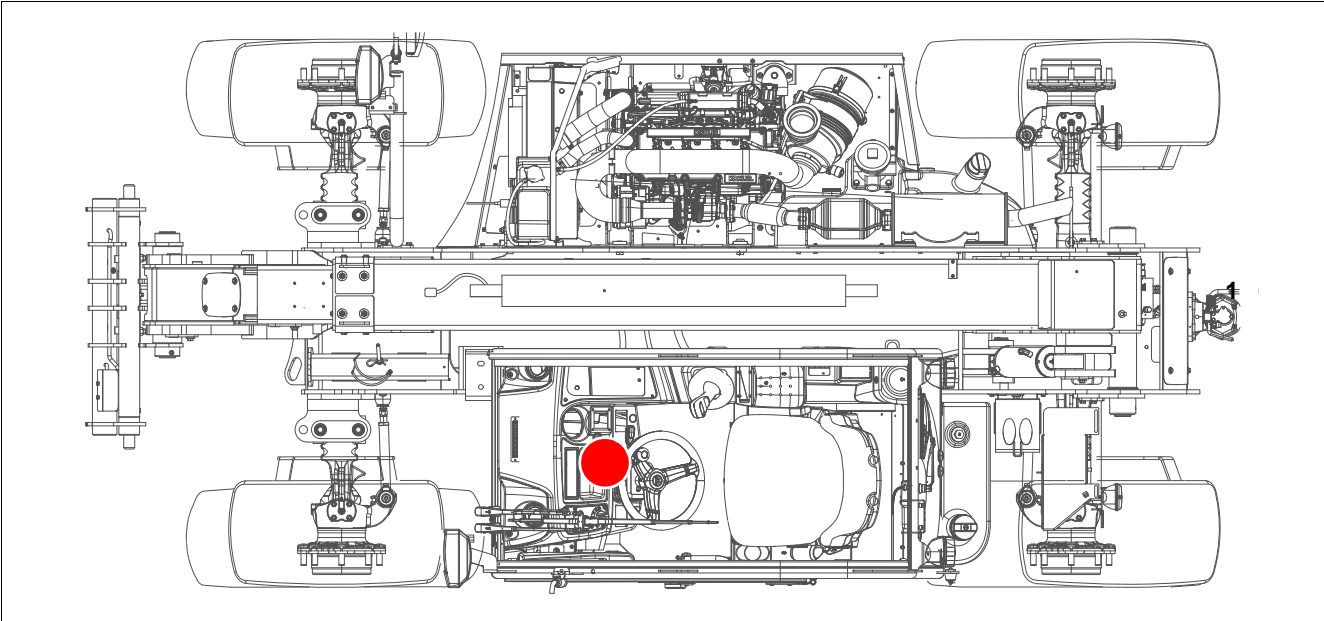
Before starting work, read the safety and preparation instructions carefully

- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install front instrument panel

- Tools**
- Standard tools

Technical data



Weight	BMK	Description	Remarks
–	–	Instrument panel	Front trim
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove front instrument panel

1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
2. Remove trim under the instrument panel – see *"Install trim in the cab" on page 12-21*.
3. Remove steering column completely – see *"Remove/install steering column" on page 7-21*.
4. Remove the joystick – see *"Removing / installing joystick" on page 9-8*.
5. Remove knurled screws **A** take instrument panel off to the side.



Fig. 13

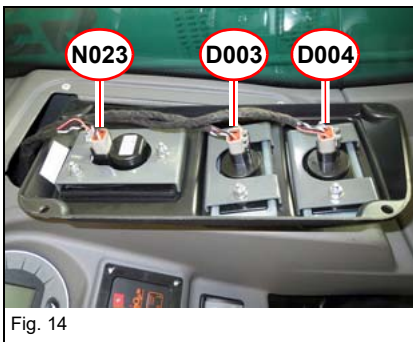


Fig. 14

6. Remove plug **N023** (oil volume adjustment).
7. Remove plug **D003** (keypad - standard).
8. Remove plug **D004** (keypad - options).
9. Remove instrument panel.

Heater nozzles:

10. Lift out heater nozzles left and right from the trim using a suitable tool.
11. Remove clip **A** from the heater hoses.
12. Pull heater hoses off of the heater nozzles.



Fig. 15



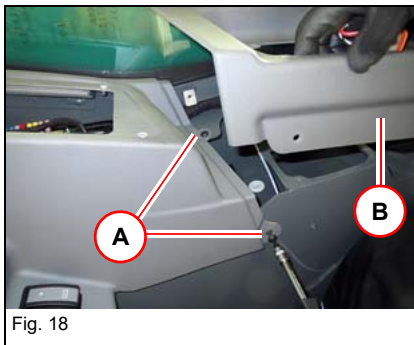
13. Pull off rotary switch **A**.

14. Remove nut on the rotary switch **A** of the cab heater and remove the rotary switch on the underside of the instrument panel.



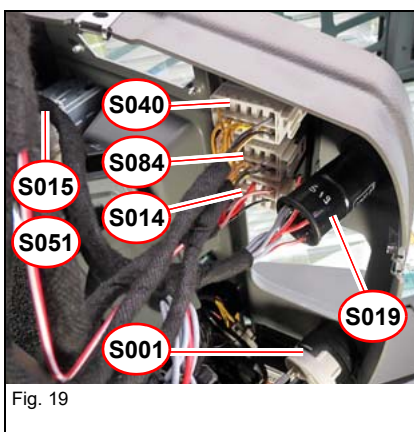
Instrument panel mounting:

15. Remove the screws **A** from the front of the instrument panel.



16. Lift the side of the instrument panel **B** a bit.

17. Remove the screws **A** from the instrument panel.



Electrical plug connections:

18. Unplug plug **S001** from the ignition switch.

19. Unplug plug **S019** from the indicator switch.

20. Unplug plug **S040** from the enabling switch.

21. Unplug plug **S084** from the locking switch.

22. Unplug plug **S014** from the light switch.

23. Unplug plug **S015** from the air-blower switch.

24. Unplug plug **S051** from the air-conditioning switch.

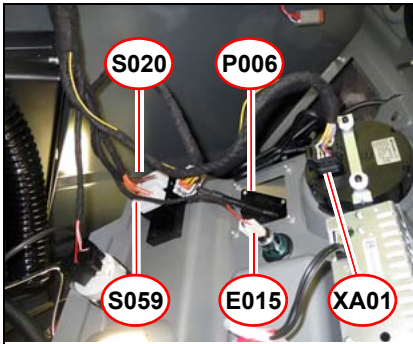


Fig. 20

25. Unplug plug **XA01** from the indicating instrument.
26. Unplug plug **E015** from the plug receptacle.
27. Unplug plug **P006** from the safe load indicator.
28. Unplug plug **S084** from the locking switch.
29. Unplug plug **S059** from the windscreen heater switch.
30. Unplug plug **S015** from the rear windscreen wiper switch.

If present:

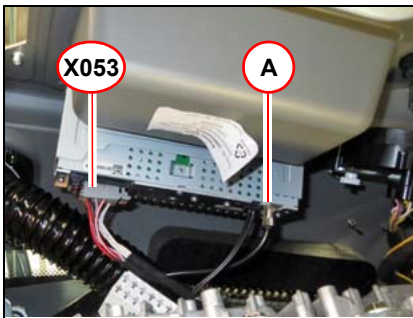


Fig. 21

31. Unplug plug **X053** from the radio.
32. Unplug aerial **A** from the radio.
33. Lift out instrument panel from top.
34. Unplug camera system.

Install instrument panel

1. Insert instrument panel from above.

If present:

2. Insert plug **X053** to the radio.

3. Insert aerial **A** to the radio.

4. Insert camera system.

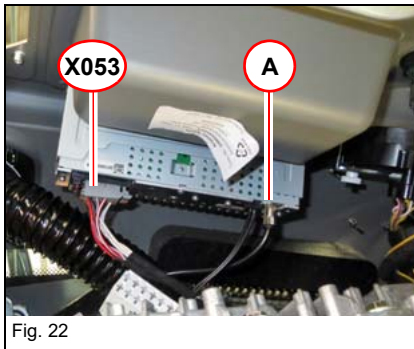


Fig. 22

Electrical plug connections:

5. Insert plug **XA01** to the indicating instrument.

6. Insert plug **E015** to the plug receptacle.

7. Insert plug **P006** to the safe load indicator.

8. Insert plug **S084** to the locking switch.

9. Insert plug **S059** to the windscreen heating switch.

10. Insert plug **S015** to the rear windscreen wiper switch.

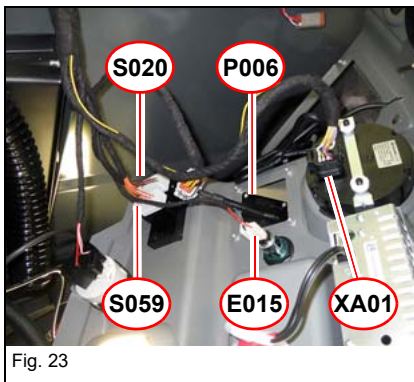


Fig. 23

11. Insert plug **S001** to the ignition switch.

12. Insert plug **S019** to the hazard warning switch.

13. Insert plug **S040** to the enabling switch.

14. Insert plug **S084** to the locking switch.

15. Insert plug **S014** to the light switch.

16. Insert plug **S015** to the air-blower switch.

17. Insert plug **S051** to the air-conditioning switch.

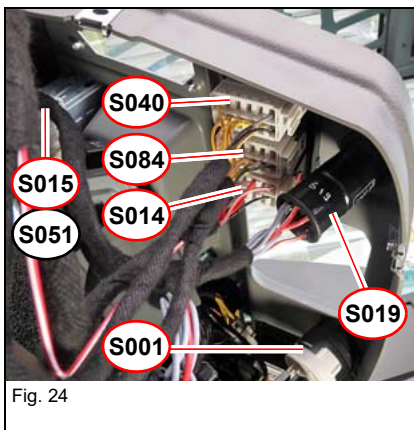


Fig. 24

Instrument panel mounting:

18. Lift the side of the instrument panel **B** a bit.

19. Insert the screws **A** to the rear of the instrument panel.

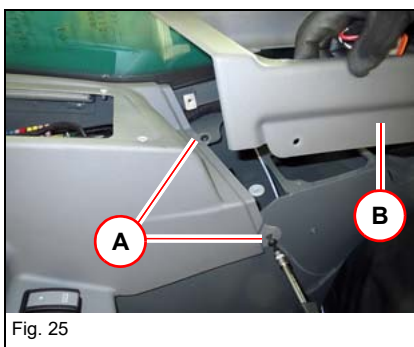


Fig. 25

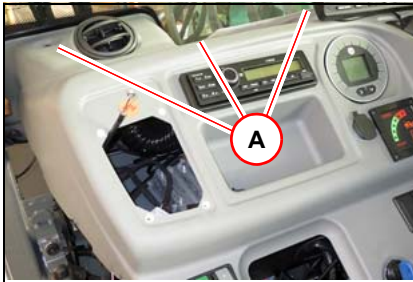


Fig. 26

20. Insert the screws **A** to the front of the instrument panel.

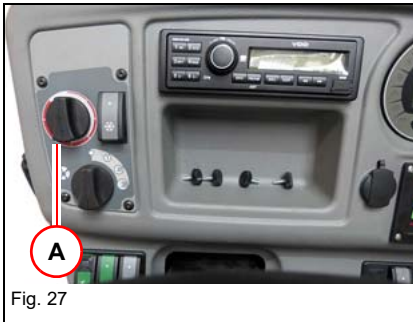


Fig. 27

21. Position the rotary switch of the cab heater on the rear-side of the instrument panel and tighten the nut on the rotary switch **A**.

22. Insert rotary switch **A**.

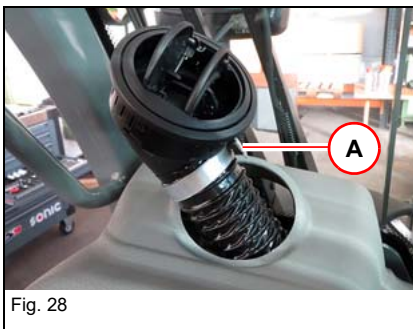


Fig. 28

Heater nozzles:

23. Push the heater hoses onto the heater nozzles.

24. Tighten hose strap **A** on the heater hoses.

25. Insert heater nozzles left and right.

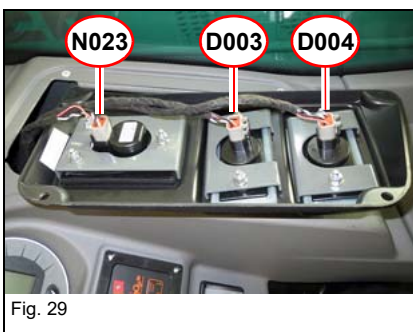


Fig. 29

Right control panel:

26. Insert plug **N023** (oil volume adjustment).

27. Insert plug **D003** (keypad - standard).

28. Insert plug **D004** (keypad - options).



Fig. 30

29. Position instrument panel and tighten knurled screws **A**.
30. Fasten the instrument panel on the right.
31. Install the joystick – see *"Removing / installing joystick" on page 9-8*.
32. Install steering column completely – see *"Remove/install steering column" on page 7-21*.
33. Fit cladding under the instrument panel – see *"Install trim in the cab" on page 12-21*.
34. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.

9.4 Inch potentiometer R002

Safety instructions for inch potentiometer



Information

Before starting work, read the safety and preparation instructions carefully

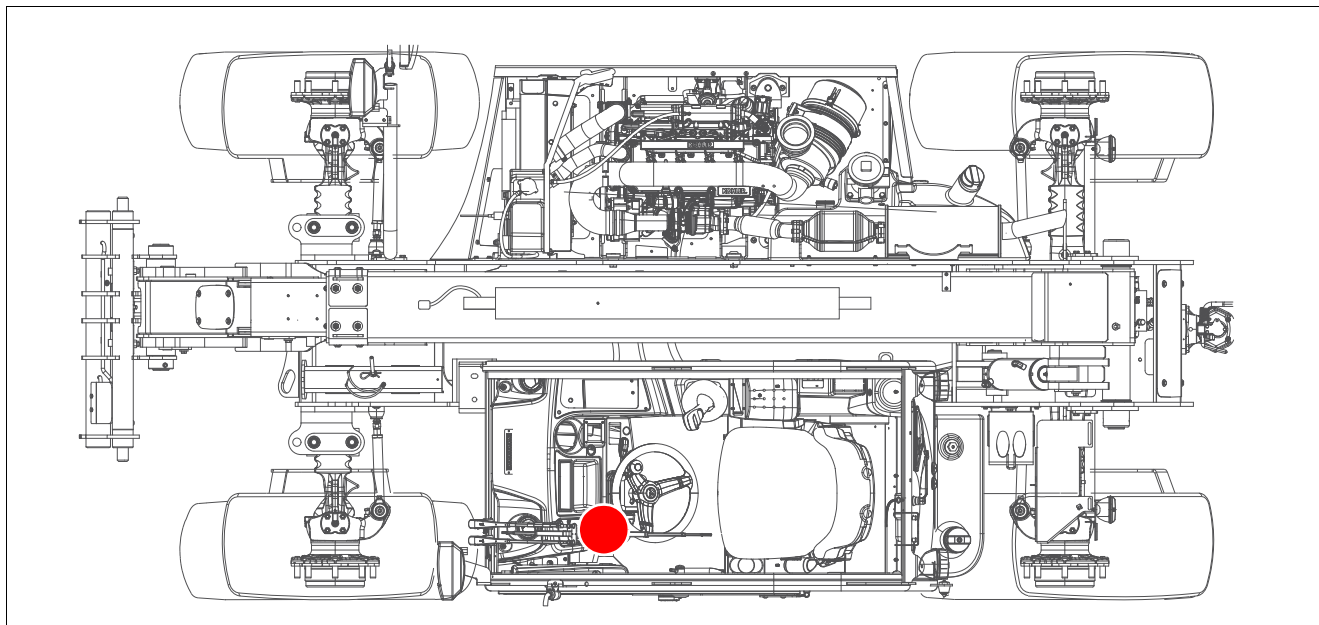
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove / install inch potentiometer

Tools

- Standard tools
- Diagnosis tool

Technical data



Weight	BMK	Description	Remarks
—	R002	Inching potentiometer	—
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove inch pedal sensor

1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
2. Remove trim from under steering wheel – see *"Install/remove trim in the cab" on page 12-19.*
3. Unplug plug **B** from inch potentiometer **A**.
 - Unlock plug **B** with a small screwdriver.
 - Disconnect connector **B**.

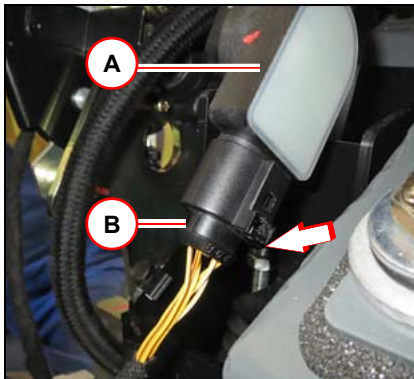


Fig. 31

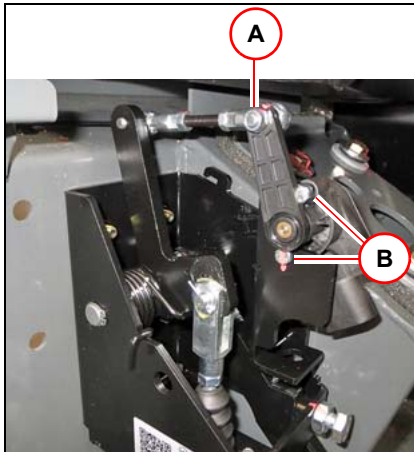


Fig. 32

4. Remove nut **A** from rod on inch potentiometer.
5. Remove fastening screws **B** and take off inch potentiometer.

Install inch pedal sensor

1. Position inch potentiometer and tighten the fastening screws **B**.
2. Position rods on inch potentiometer and tighten nut **A**.

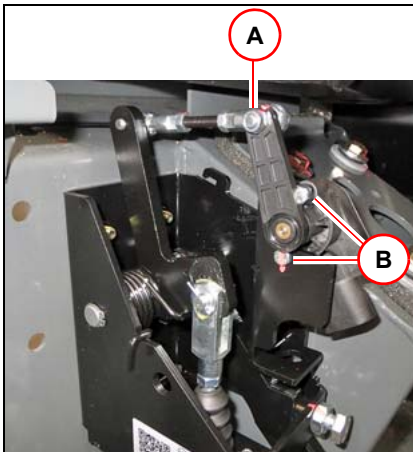


Fig. 33

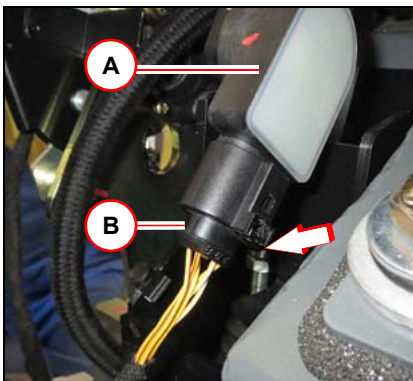


Fig. 34

3. Insert connector **B**.
4. Install trim under steering wheel – see *"Install/remove trim in the cab" on page 12-19*.
5. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
6. Read inch potentiometer **A** again using the diagnostics tool.

9.5 Rotary angle encoder Lifting arm R023

Safety instructions for rotation angle of boom



Information

Before starting work, read the safety and preparation instructions carefully

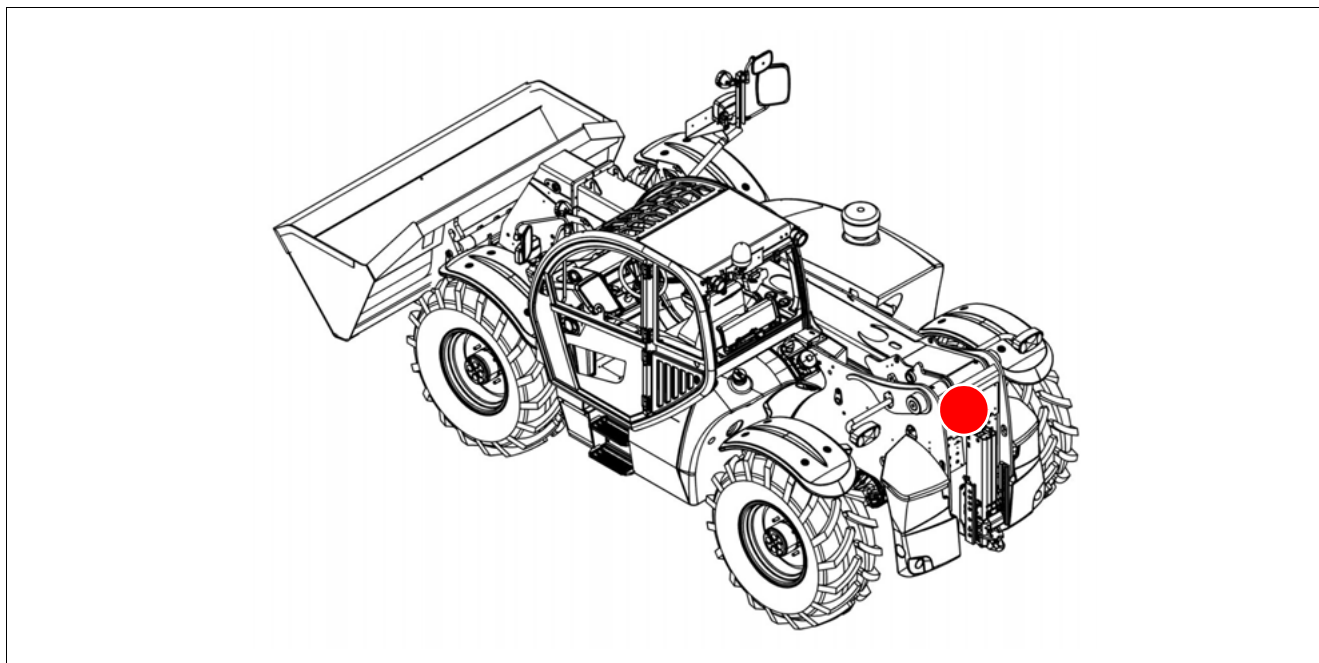
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Removing/installing the turning angle transmitter

Tools:

- Standard tools

Technical data



Weight	BMK	Description	Remarks
—	R023	Boom angle of rotation sensor	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove angle of rotation encoder boom

1. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
2. Open the cover – see ["Rear of machine" on page 1-25](#).
3. Disconnect connector **A**.
4. Detach the rod **B**.
5. Remove the fastening screws **C** and take out the angle of rotation encoder.

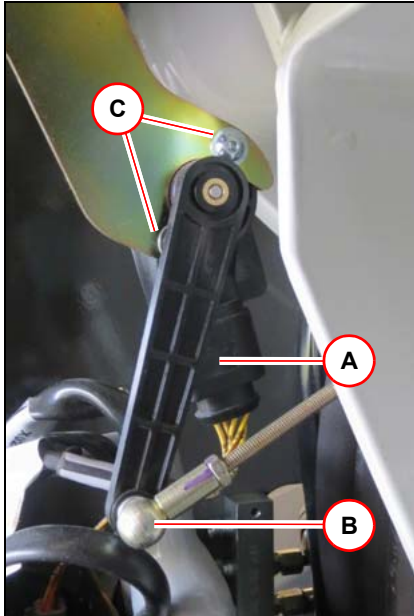


Fig. 35

Remove rotational angle encoder boom

1. Position angle of rotation encoder and tighten the fastening screws **B**.
2. Attach the rod **B**.
3. Insert connector **A**.
4. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
5. Install cover – see ["Rear of machine" on page 1-25](#).
6. Set angle of rotation sensor using the diagnosis tool .

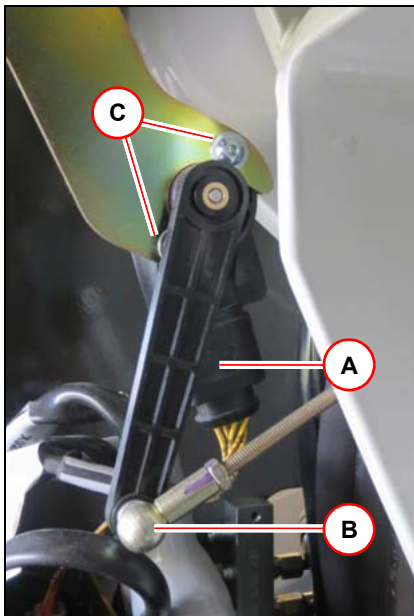


Fig. 36

Setting turning angle transmitter on lifting arm R023

To ensure fault-free and safe functioning of "smart handling", turning angle transmitter **R023** must be regulated after it is replaced.

Adjustment

1. When using a new threaded rod **A** [length: 115 mm (4.53 in)] fully turn the angle joints **B** and counter with nuts.
2. Connect diagnosis tool
3. Start the vehicle.
4. Open the "Settings" menu in the diagnosis tool.
5. Open the "Working hydraulics" sub-menu.
6. Open the "Angle sensor lift arm" sub-menu.
7. Click on the "Start" button and follow the steps in the diagnosis tool.

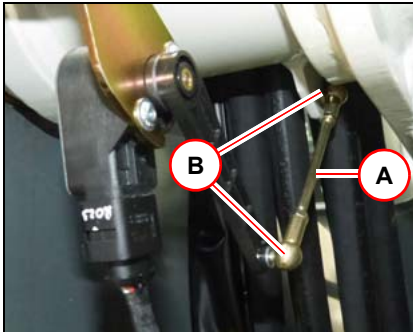


Fig. 37



9.6 Travel sensor for bucket repositioning B028

Safety instructions for automatic bucket reverse transducer



Information

Before starting work, read the safety and preparation instructions carefully

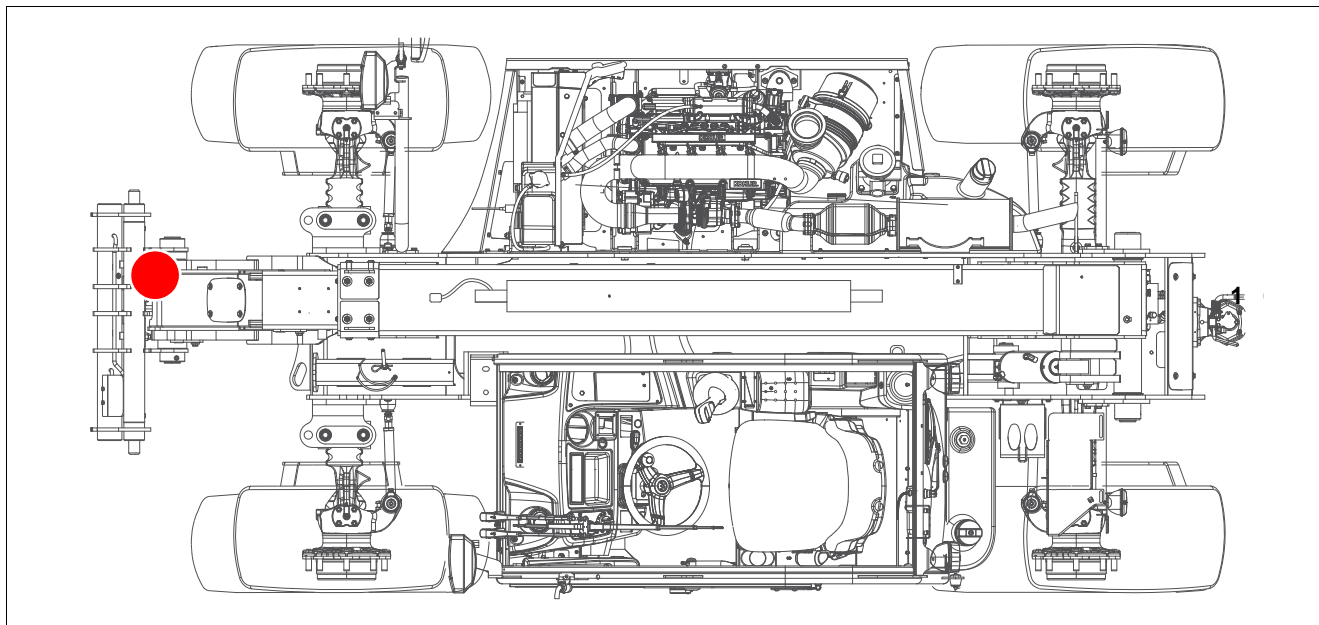
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install travel sensor with rod

Tools

- Standard tools
- Diagnosis tool

Technical data



Weight	BMK	Description	Remarks
—	B028	Position pickup for bucket repositioning	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove transducer

1. Switch off battery master switch **S008** – see *"Switch off the battery master switch S008" on page 1-3.*
2. Remove fastening screws **A** and take off cover.

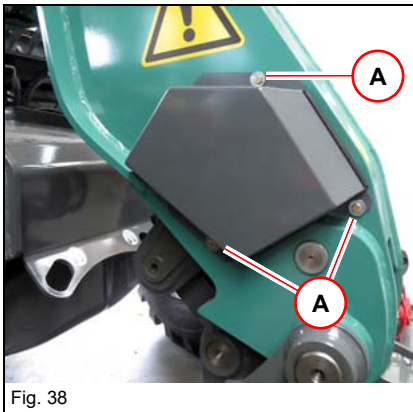


Fig. 38

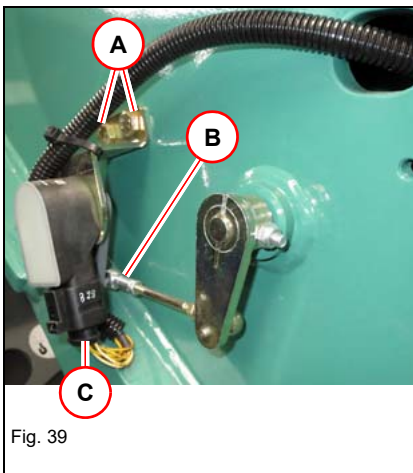


Fig. 39

3. Disconnect the connector **C**.
4. Decouple linkage **B** from transducer.
5. Remove fastening screws **A**.
6. Remove transducer with mount.

Linkage in the telescopic boom:

7. Remove fuse **A** from linkage **B**.

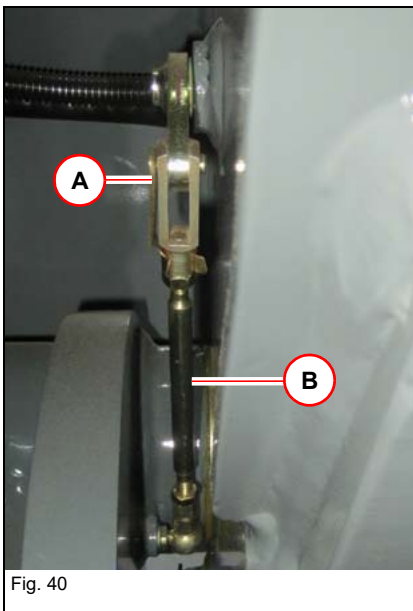


Fig. 40

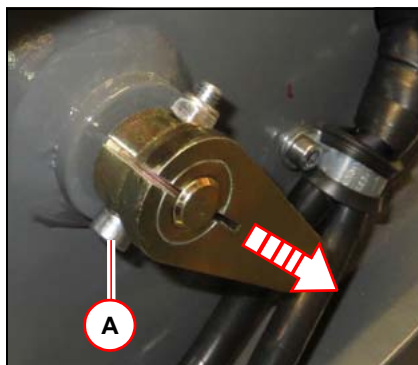


Fig. 41

8. Mark position of the lever with the shaft.

9. Remove locking screw **A** and lever **B**.

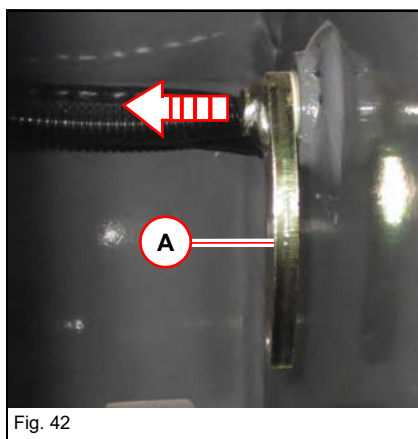
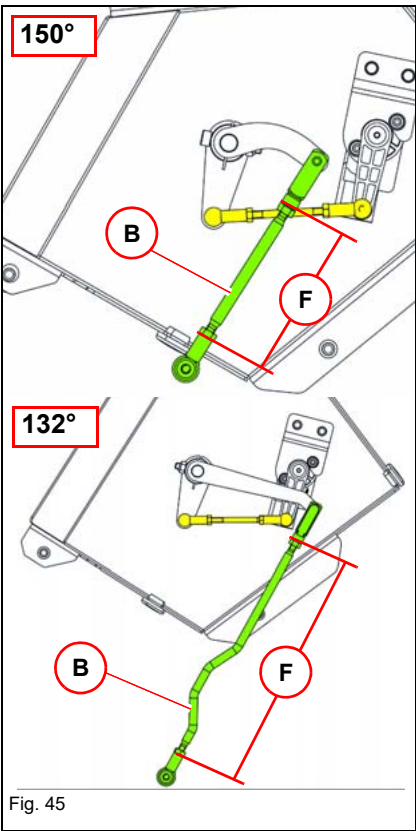
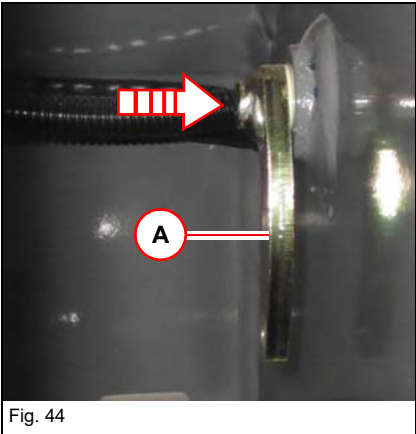
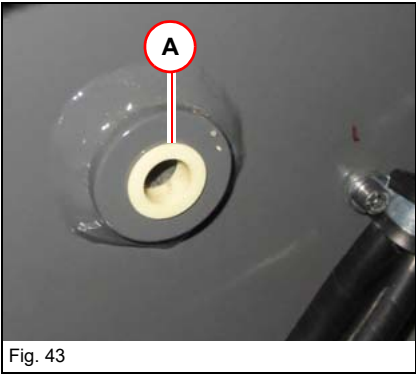


Fig. 42

10. Pull out reversing rod **A** from the telescopic boom.

Install transducer

1. If necessary, replace bush **A** both inside and outside the telescopic boom.
2. Position reversing lever **A** in the telescopic boom.



NOTICE

Before installing the rod **B**, rod **B** must be set to the correct size to avoid damage to the reversing lever.
► Dimensions with lock nut! – [see system manual!](#)

Loader unit	150°	132°
Rod B (size F)	102.7 mm (4.04 in)	239 mm (9.41 in)

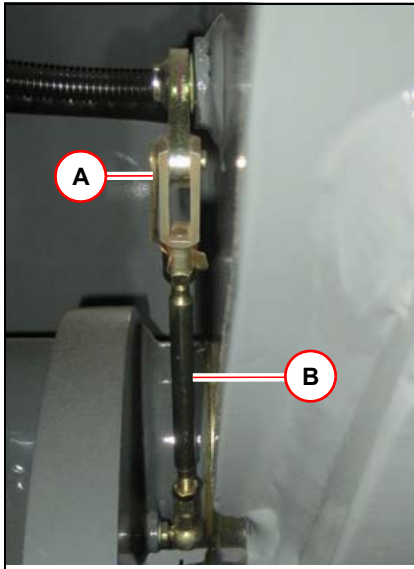


Fig. 46

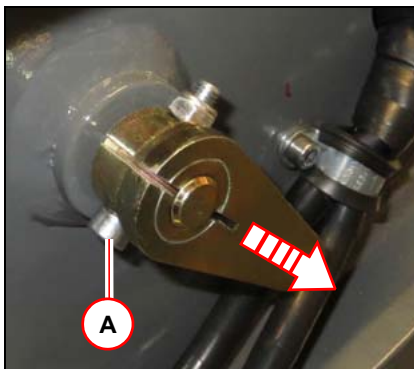


Fig. 47

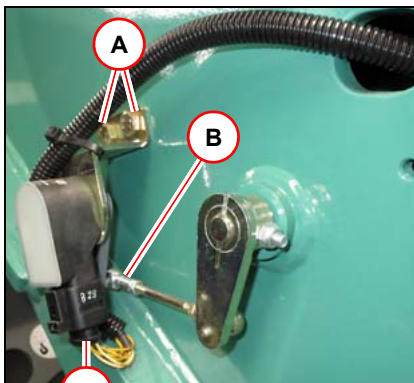


Fig. 48

3. Mount rod **B** on lever and insert fuse **A** .

4. Position reversing lever **B** externally on the telescopic boom on the marking.

5. Tighten fastening screw **A**.

6. Position transducer and pull the fixing screw **A** tight.

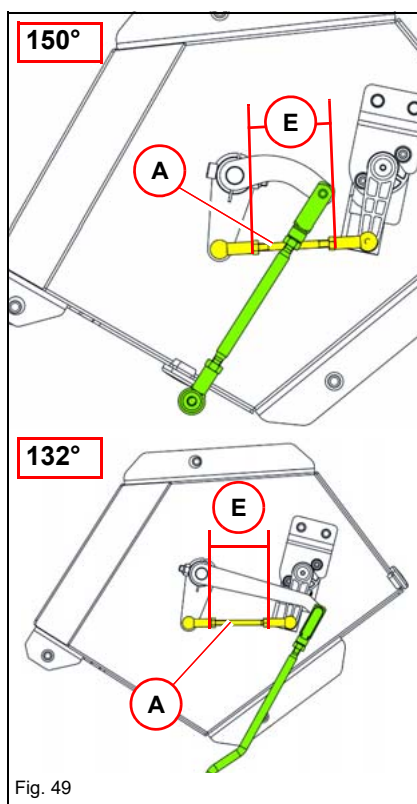
7. Insert the connector **C**.

8. Mount and secure rod **B**.

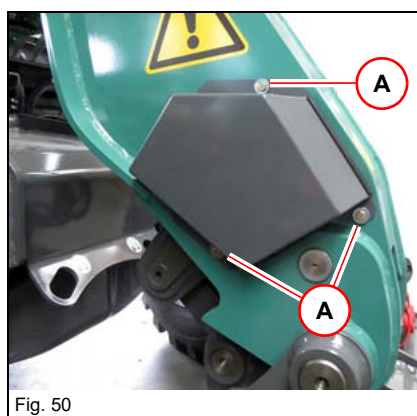
NOTICE

Before installing the rod **A**, rod **A** must be set to the correct size to avoid damage to the reversing lever.

► Dimensions with lock nut! – [see system manual!](#)



Loader unit	150°	132°
Rod A (size E)	55 mm (2.17 in)	



9. Position cover sheet, pull the fixing screws **A** tight.
10. Switch on battery master switch **S008** – see ["Switch on battery master switch S008" on page 1-3](#).
11. Set travel sensor **B028** using the diagnosis tool.



9.7 Crawler gear/hand throttle potentiometer R003/R012

Safety instructions for crawler gear/hand throttle potentiometer



Information

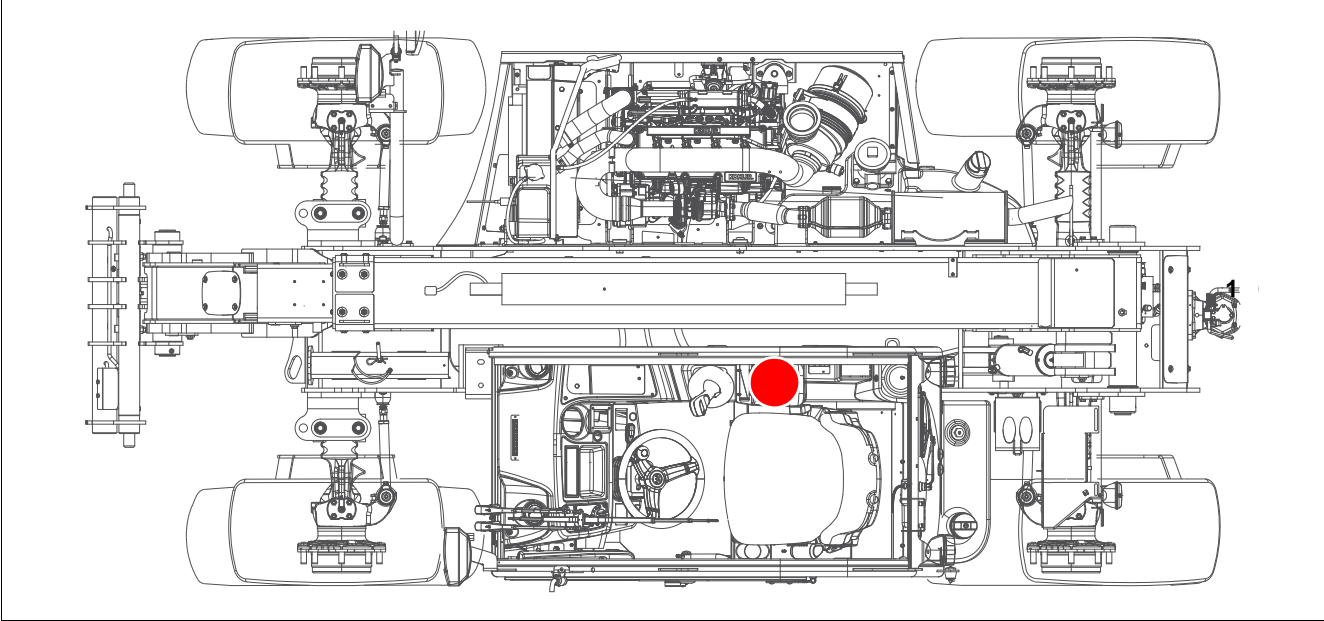
Before starting work, read the safety and preparation instructions carefully

- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install crawler gear/hand throttle potentiometer

- Tools:**
- Standard tools
 - Diagnosis tool

Technical data



Weight	BMK	Description	Remarks
—	R003	Creep gear potentiometer	—
—	R012	Manual throttle potentiometer	—
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove crawler gear/hand throttle potentiometer

1. Switch off battery master switch **S008** – see *"Switch off the battery master switch S008" on page 1-3.*
2. Remove fastening screws **A**.

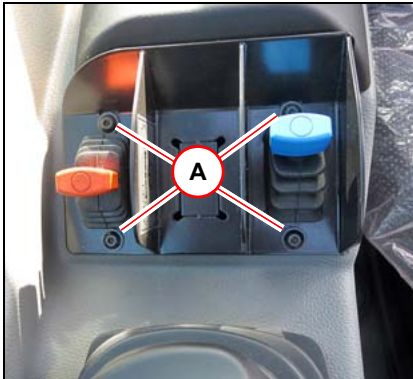


Fig. 51



Fig. 52

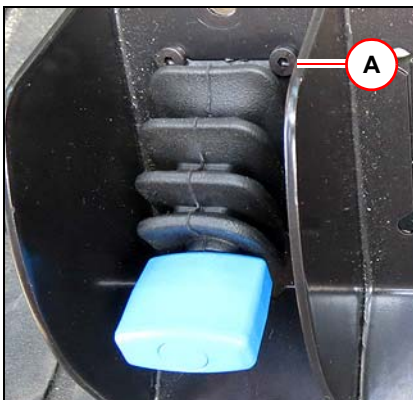


Fig. 53

3. Pull plug **A** from the potentiometer.

4. Remove the fastening screws **A** and take out the potentiometer.
5. Reverse steps to install
6. Switch on battery master switch **S008** – see *"Switch on battery master switch S008" on page 1-3.*
7. Calibrate crawler gear potentiometer **R003** with the diagnostic tool .



Calibrate crawler gear potentiometer R003

To ensure fault-free and safe functioning of crawler gear potentiometer **R003**, the crawler gear potentiometer **R003** must be calibrated after it is replaced.

Calibration

1. Connect diagnosis tool
2. Engage the starter.
3. Open the "Settings" menu in the diagnosis tool.
4. Open the "Traction drive" sub-menu.
5. Open the "crawler gear sensor" sub-menu.
6. Click on the Start button and follow the steps in the diagnostics tool.

9.8 Load sensor B008

Safety instructions on the load sensor



WARNING

Risk of injury due to incorrect functioning of load sensor!

If the load sensor is not installed properly this can lead to serious injuries!

- ▶ During assembly, basically always one new load sensor is used with new screws!
- ▶ During assembly use only the assembly components and cleaning agents as indicated!
- ▶ Observe information and expiry date on packaging or containers of assembly components and cleaning agents!
- ▶ Observe the instructions and safety measures of **Loctite® products**.
- ▶ The axle and sensor need to be at the same temperature for assembly (about 20°C (68°F))!

NOTICE

If the vehicle is moved immediately after installation of the load sensor, the load sensor can become loose!

- ▶ Do not move the vehicle for at least 6 hours at 20°C (68°F)!



Information

Before starting work, read the safety and preparation instructions carefully

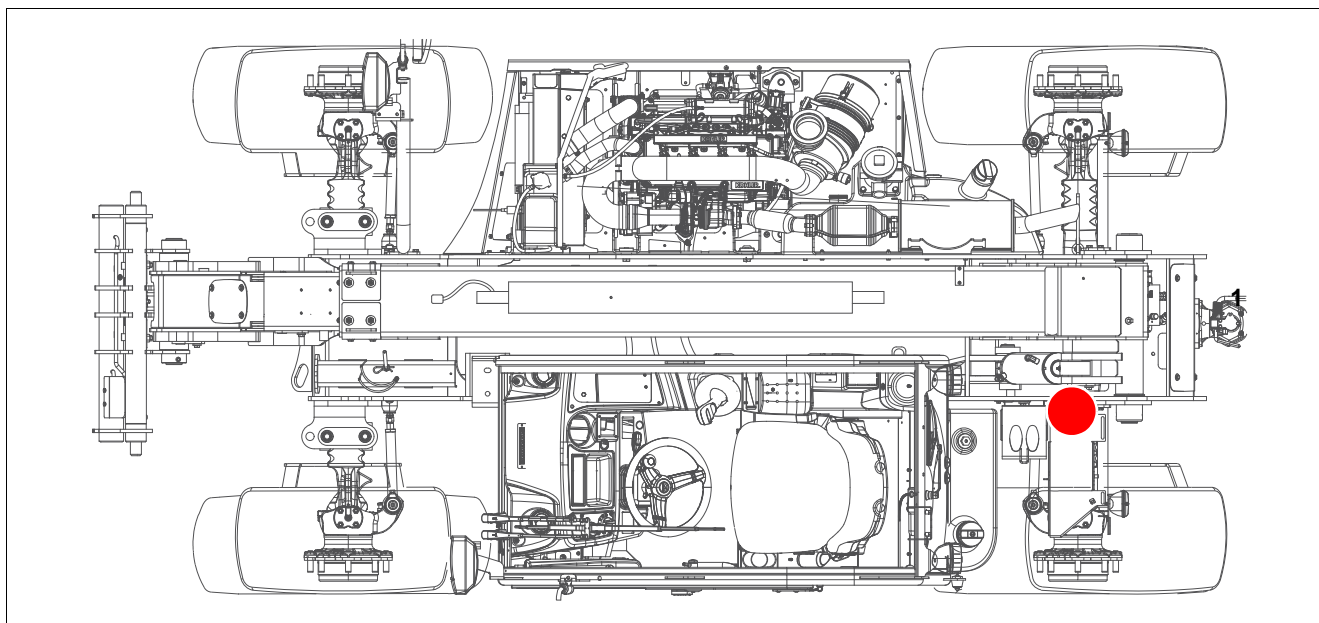
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install load sensor

Tools:

- Standard tools
- Diagnosis tool
- Loctite® 7063
- Loctite® 7471
- Loctite® 243
- Loctite® 638

Technical data



Weight	BMK	Description	Remarks
—	B008	Load sensor	—
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove load sensor

1. Switch off battery master switch **S008** – see *"Switch off the battery master switch S008" on page 1-3.*
2. Disconnect cable **A** from the wiring harness.

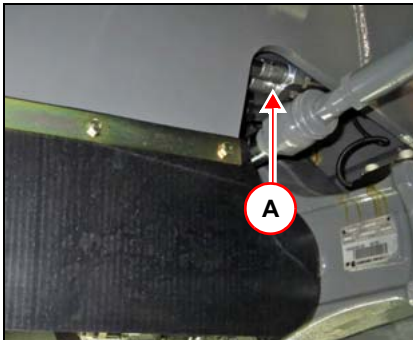


Fig. 54

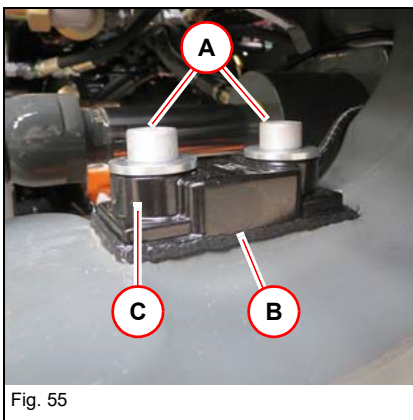


Fig. 55

3. Remove fastening screws **A**.
4. Cut open glue line **B**.
5. Carefully loosen load sensor **C** from the mounting surface.

Install load sensor



Information

Basically, a new load sensor **B008** has to be used with new screws!



WARNING

Risk of injury due to incorrect functioning of load sensor!

If the load sensor is not installed properly this can lead to serious injuries.

- ▶ During assembly, basically always one new load sensor is used with new screws.
- ▶ The bushings may not be taken out of the sensor
- ▶ During assembly use only the assembly components and cleaning agents as indicated.
- ▶ Observe information and expiry date on packaging or containers of assembly components and cleaning agents!
- ▶ Shaft and sensor need to be at the same temperature for assembly (min. 10°C) (50.0°F).



Fig. 56

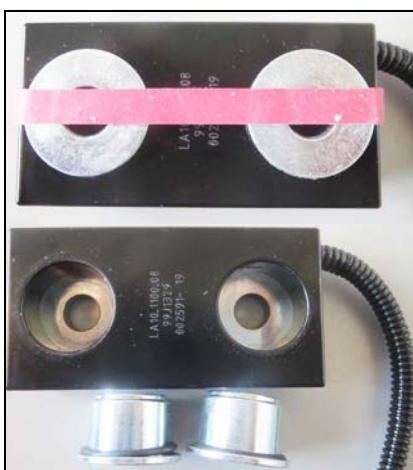
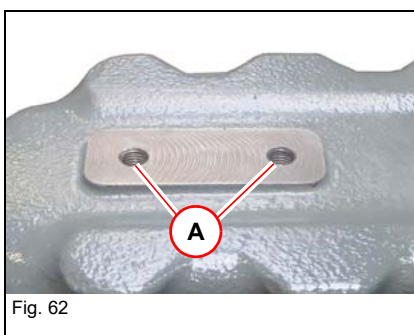
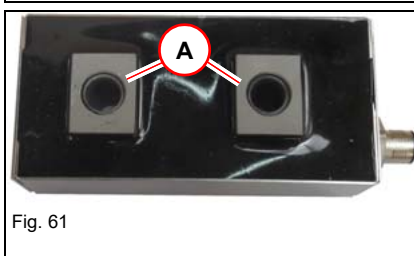
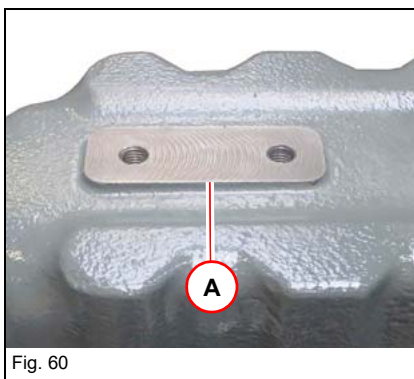
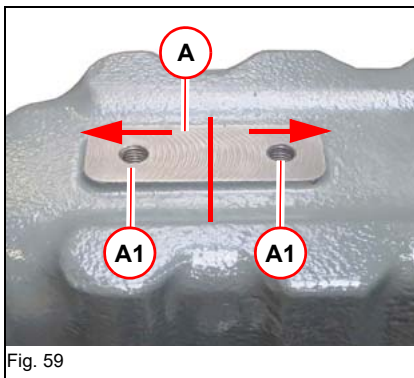
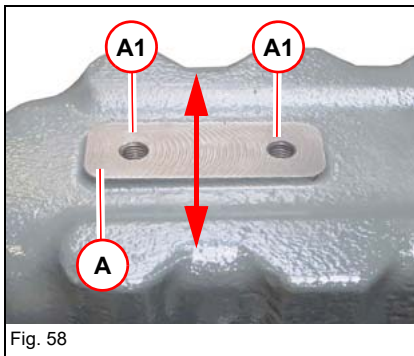


Fig. 57

- The surfaces of the load sensor **B008** may not be touched.
- Make sure that the bushings from the load sensor **B008** do not fall out.
- When delivered, the bushings are affixed with a rubber band.
- If bushings fall out of the load sensor **B008** check that the surface has not suffered any deformation or damage. If there is no damage or deformation to be seen, clean bushings and load sensor **B008** thoroughly.



It is essential that the following steps are observed:

1. Rethread both threads **A1** (M10) at 90° to the mounting surface **A** on the rear axle.
2. Clean mounting surface **A** across to the axle using sandpaper (180 grit) (shiny metallic), see [Fig. 59](#)
 - ➔ All remains of adhesive must be fully removed from the installation surface **A**.
3. Thoroughly blow out the tapped holes **A1**.
4. Check screw depth using an M10x20 mm hexagonal head screw. Screw the screw fully by hand.
 - ➔ The thread length is OK if the screw head of the hexagon head cap screw rests completely on the installation surface **A**.
5. Using a lint-free, cloth wetted with **Loctite® 7063**, wipe down the mounting surface **A** on the rear axle from the middle of the surface outwards.
6. Blow clean the threaded bores **A1** again thoroughly.
7. Using a lint-free, cloth wetted with **Loctite® 7063**, wipe down the mounting surface **A** on the rear axle from the middle of the surface outwards.
8. Apply **Loctite® activator 7471** evenly on the installation surface **A** of the axle. Full surface application.
 - ➔ Allow the activator to dry for 5 seconds.
9. Apply **Loctite® 7063** cleaner to a new, lint-free cloth and clean the installation surfaces **A** of the load sensor.
10. Do not touch the mounting surface **A** with your fingers any more.
11. Apply a few drops of **Loctite® 243** to the threaded bores **A**.

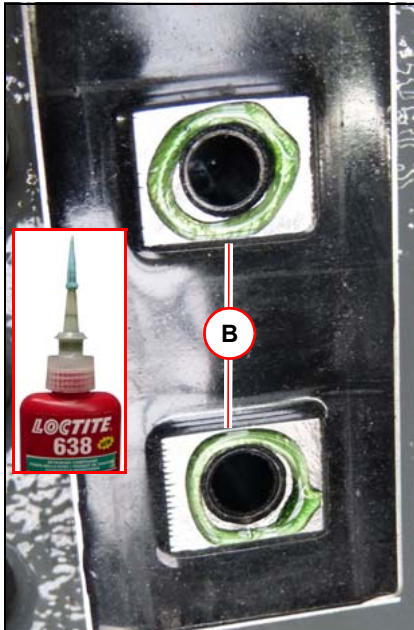


Fig. 63

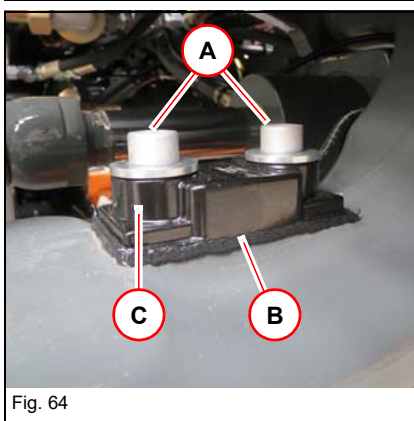


Fig. 64

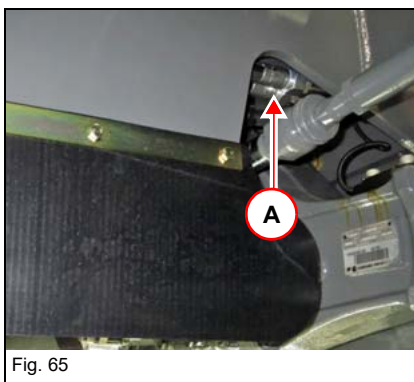


Fig. 65

12. Apply **Loctite® 638** evenly to the mounting surfaces **B** on the new load sensor **with disposable syringe** in circles.
13. Position the load sensors on the installation surface of the rear axle and screw in place.
14. Bear in mind the assembly direction.

15. Use new screws **A** (M10x35-12.9).
 - Pre-stressing torque 20 Nm (15 lbf ft)
 - Tightening torque 70 Nm (52 lbf ft)
16. Clean the gap **B** between load sensor **C** and rear axle with a clean brush and Terostat 450.
17. Seal the gap **B** between load sensor **C** and rear axle with Terostat MS 939. Start in the middle of the long side of the load sensor.

18. Insert cable **A** into wiring harness.

NOTICE

If the vehicle is moved immediately after installation of the load sensor, the load sensor can become loose.

- Do not move the vehicle for at least 6 hours at 20°C (68°F)!

19. Switch on battery master switch **S008** – see ["Switch on battery master switch S008" on page 1-3](#).
20. Re-calibrate safe load indicator – see ["Calibrating the safe load indicator" on page 9-45](#).

9.9 Calibrating the safe load indicator P006

Safety instructions for calibrating overloading warning indicator



Information

In order to avoid errors during the calibration routine, the following points must be observed.

- ▶ The load sensor **B008** and the axle must be at room temperature at about 20°C (68°F).
- ▶ Do not release the parking brake during calibration, as otherwise the calibration process will be interrupted.
- ▶ The vehicle must be parked on level, firm and flat ground.
- ▶ The front axle and rear axle wheels must be aligned in the straight-ahead position.



Information

Before starting work, read the safety and preparation instructions carefully

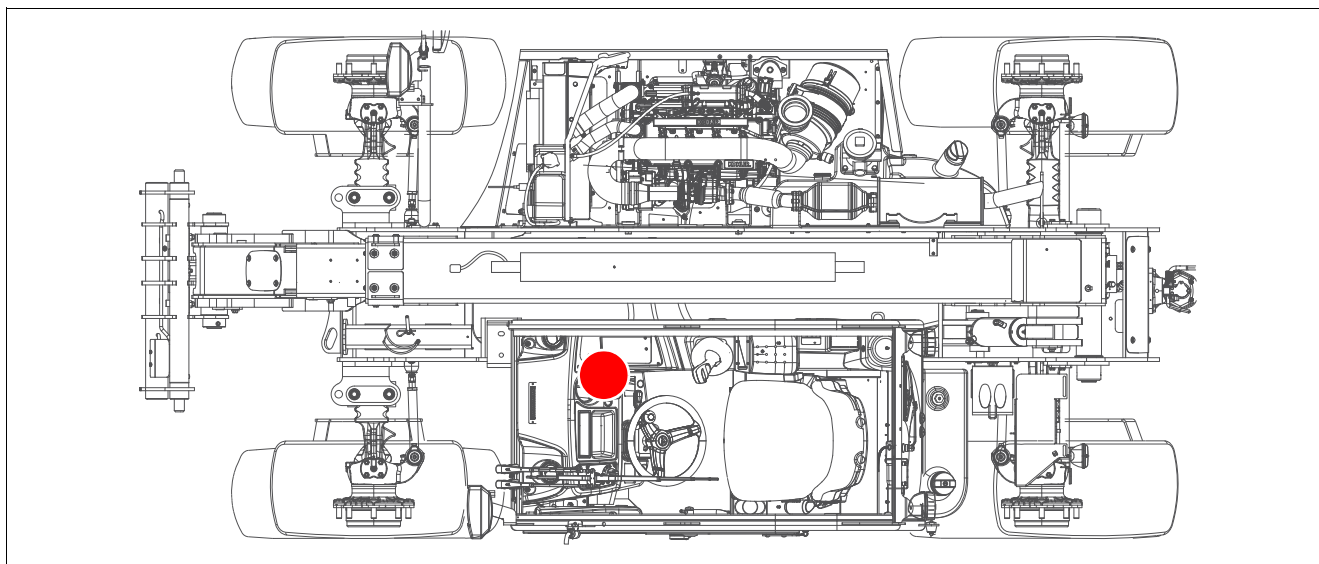
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Calibrating the safe load indicator

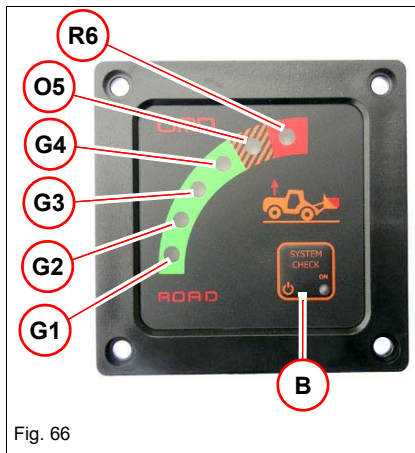
Tools:

- Standard tools
- Diagnosis tool
- Weight with approx. 1300 – 1800 kg (2866 – 3968 lb)

Technical data



Weight	BMK	Description	Remarks
–	P006	Safe load indicator	–
For non-specified tightening torques, see chapter “Introduction/tightening torques”			



Calibrating the 0% point

Perform 0% calibration without an attachment

1. Park the machine on horizontal, level and firm ground.
2. Apply the parking brake.
3. Retract the telescopic boom as far as it will go.
4. Move the telescopic boom as high up as it will go (0%- load state).
5. Switch off the ignition.
6. Press operating key **B** on the overload warning indicator and hold it down.
7. Start the engine.
8. Let operating key **B** go
 - ➔ On the display, there are 2 inward running light bars from **G1** to **G3** and from **O5** to **G3**.
 - ➔ A warning sounds.
9. Wait until LED **G3** illuminates.
10. Briefly press **operating key B**.
 - ➔ LED **G1** illuminated.
11. Briefly press **operating key B**.
 - ➔ LEDs **G1** to **G4** illuminated.
12. Wait until LED **R6** is illuminated.
 - ➔ The 0% point is set.

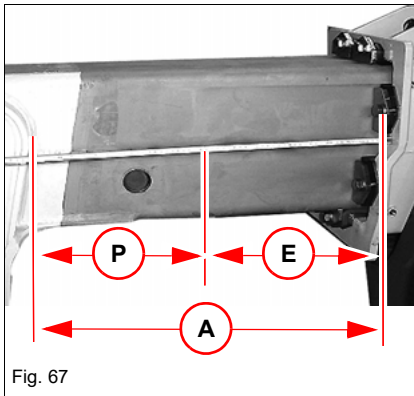


Fig. 67

Calibrating the 100% point

1. Accommodate pallet fork on the quickhitch frame and lock securely.
2. Grab a load of **approx. 1300 – 1800 kg** (2866 – 3968 lb) with horizontally positioned pallet fork.
3. Park the vehicle on level and firm ground.
4. Extend the telescopic boom until the vehicle inclines slightly to the front, the rear wheels must still be touching the ground slightly.
5. Measure extension dimension **A** between the outer mast and the gooseneck.
6. Calculate setting dimension **E**
 - ➔ Setting dimension **E** = extension dimension **A** - 60% (**P**)
7. Retract the telescopic boom to the setting dimension **E**.
8. Briefly press **operating key B**.
 - ➔ All LEDs flash.
 - ➔ The 100% point is set.
 - ➔ Calibration procedure is terminated.

LED colors

- G1 – G4 = Green
- O5 = Orange
- R6 = Red

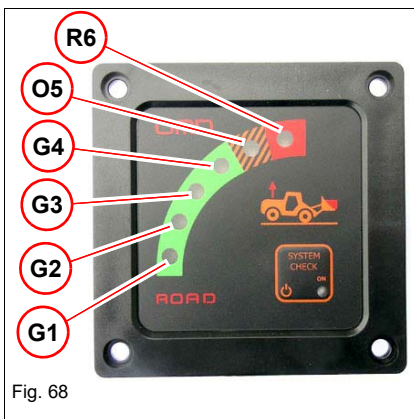


Fig. 68

Error codes during normal operation

G1	G2	G3	G4	O5	R6	Faults	Cause
						Time-out	Internal, program flow does not react within the expected time
						Digital output error	Digital output does not react as expected
						Redundancy	Difference of sensor current in cells A & B > 5%
						Control unit error	Control unit not found, no answer or incorrect answer
						Calculation error	internal calculation exceeds weight limit
						Beyond range	Sensor current too high, sensor short circuit
						Uncalibrated	System has not been calibrated
						Boom angle supplies incorrect signal or none at all	See error display in diagnostic tool
						Below range	Sensor current too low, sensor not connected
						Limit switch supplies incorrect signal	See error display in diagnostic tool
						Incorrect on-board voltage	
						Boom angle not or incorrectly calibrated	
						Incorrect +5 V supply	
						Release switch supplies incorrect signal	
						Limit switch not correct	
						Malfunctioning proportional valve	
						Release switch bypassed/pressed too long	

Error codes in calibration mode

G1	G2	G3	G4	O5	R6	Faults	Cause
						Calibration failed	Invalid measured weight / difference between min and max too small / sensor current outside the tolerance
						Beyond range	Sensor current too high, no compensation possible
						Below range	Sensor current too low, no compensation possible

9.10 Controller N004 / N005

Safety instructions for controller



Information

Before starting work, read the safety and preparation instructions carefully

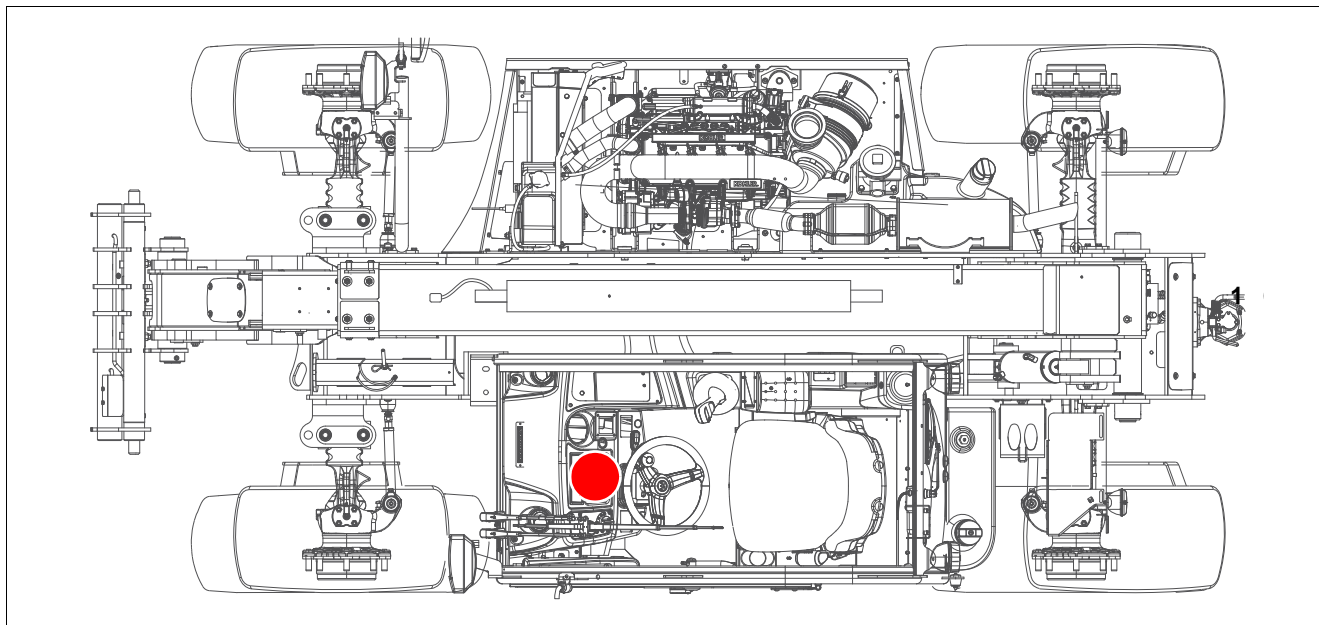
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install cab controller

Tools:

- Standard tools
- Diagnosis tool

Technical data



Weight	BMK	Description	Remarks
—	N004	Cabin controller	Hydac
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove cab controller

1. If possible, store the data from the controller using the diagnostics tool.
2. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
3. Remove trim under the instrument panel – see *"Install/remove trim in the cab" on page 12-19*.
4. Remove steering column completely – see *"Remove/install steering column" on page 7-21*.
5. Remove the joystick – see *"Removing / installing joystick" on page 9-8*.
6. Loosen the instrument panel on the right.
7. Remove instrument panel on the front – see *"Remove/install front instrument panel" on page 9-12*.
8. Remove fastening screws **A**.

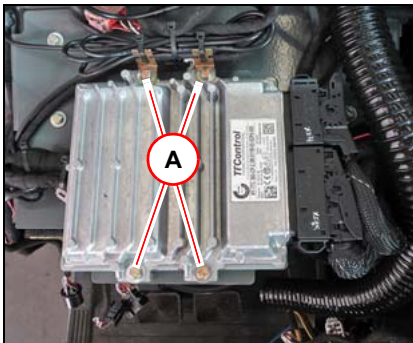


Fig. 69



Fig. 70

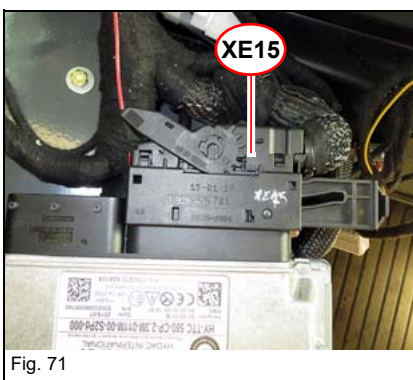


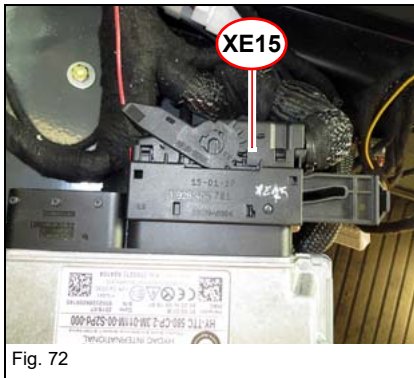
Fig. 71

9. Release plug **XE04** (pull lever to right).
10. Pull off **XE04** from controller **N004**.

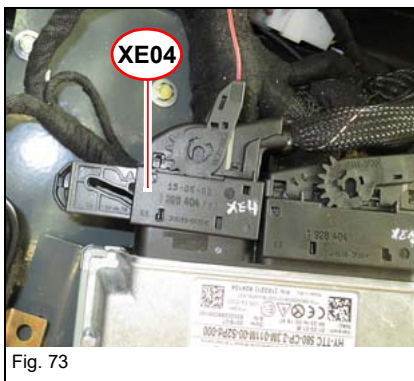
11. Release plug **XE15** (pull lever to left).
12. Pull off **XE15** from controller **N004**.
13. Take controller **N004** off.

Install cab controller

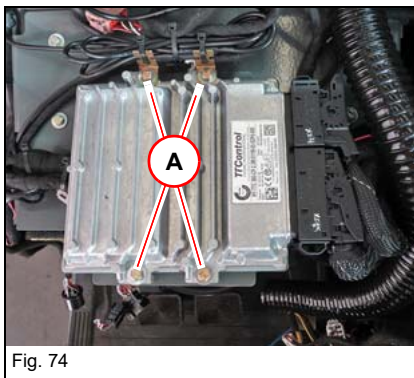
1. Put controller **N004** on.
2. Insert plug **XE15** on controller **N004**.
3. Lock plug **XE15** (pull lever to right).



4. Insert plug **XE04** from controller **N004**.
5. Lock plug **XE04** (pull lever to left).



6. Screw in and tighten fastening screws **A**.
7. Install instrument panel – see ["Remove/install front instrument panel" on page 9-12](#).
8. Fasten the instrument panel on the right.
9. Install the joystick – see ["Removing / installing joystick" on page 9-8](#).
10. Install steering column completely – see ["Remove/install steering column" on page 7-21](#).
11. Fit cladding under the instrument panel – see ["Install/remove trim in the cab" on page 12-19](#).
12. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
13. Load the latest software for the cab controller **N004** using the diagnostics tool.

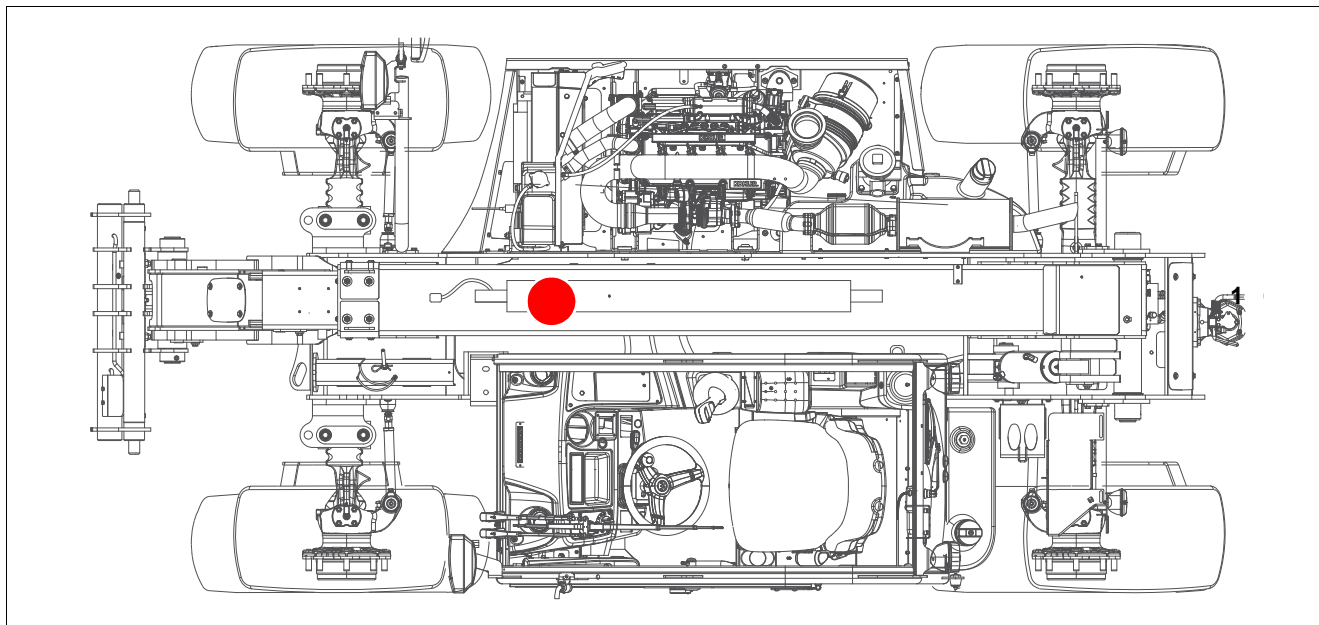


Remove/install diesel engine electronics

Tools:

- Standard tools
- Diagnosis tool

Technical data



Weight	BMK	Description	Remarks
—	N005	Diesel engine electronics	Kohler
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove diesel engine electronics

1. Secure data from diesel engine control unit.
2. Lift telescopic boom and secure the lifting cylinder with safety prop – [see "Safety prop for telescopic boom" on page 1-4.](#)
3. Switch off battery master switch **S008** – [see "Battery master switch S008" on page 1-3.](#)
4. Remove the fastening screws **A** from the fixing plate.

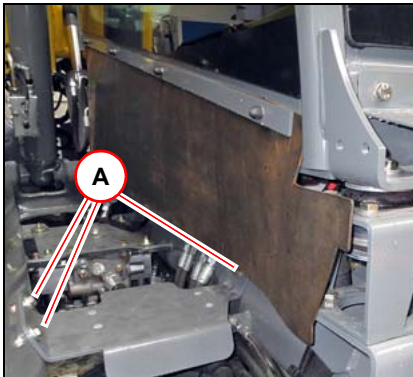


Fig. 75

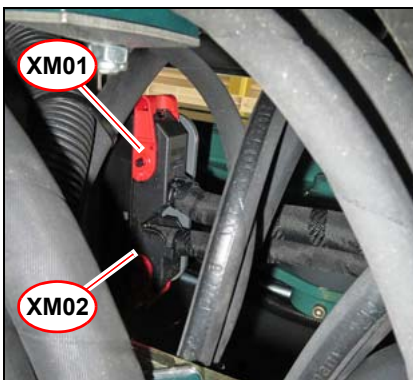


Fig. 76

5. Release plug **XM01** and plug **XM02** of the engine wiring on the diesel engine electronics **N005** and unplug.
6. Where applicable, unscrew the earthing strap.
7. Unscrew the diesel engine electronics **N005** from the fixing plate.

Install diesel engine electronics



Fig. 77

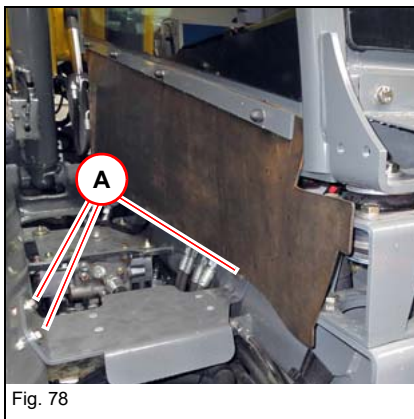


Fig. 78

1. Insert plug **XM01** and plug **XM02** of the engine wiring **A** onto the diesel electronics **N005** and secure.
2. Screw on the diesel engine electronics **N005** to the fixing plate **B**.
3. Where applicable, screw on the earthing strap.
4. Position mounting with engine control unit within the frame and tighten the fastening screws **A**.
5. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
6. Remove safety prop on the lift cylinder and lower the telescopic boom – see ["Safety prop for telescopic boom" on page 1-4](#).
7. Install the latest software for diesel engine electronics **N005** using the diagnostics tool.

12 Trim

12.1 Engine cover

Safety instructions for engine cover



Information

Before starting work, take safety and instructions into consideration

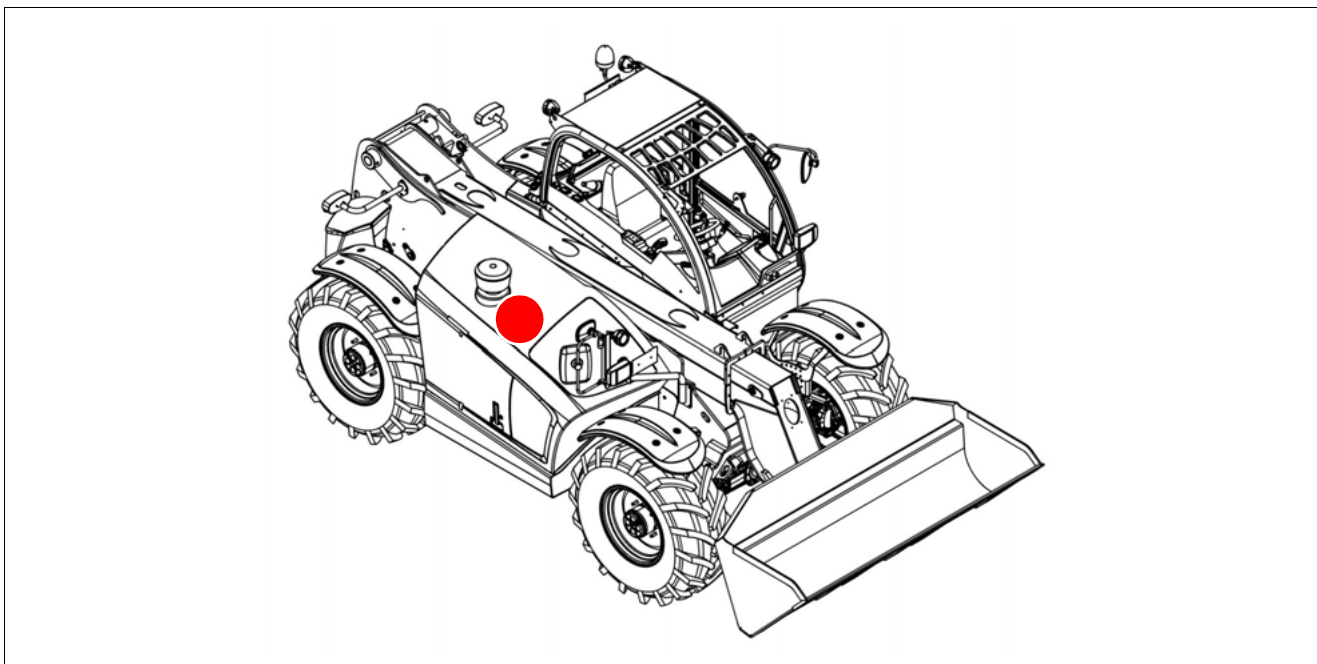
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Removing/installing the engine cover

Tools:

- 2nd person or suitable lifting device, minimum load-bearing capacity 50 kg (110 lb.)
- Standard tools

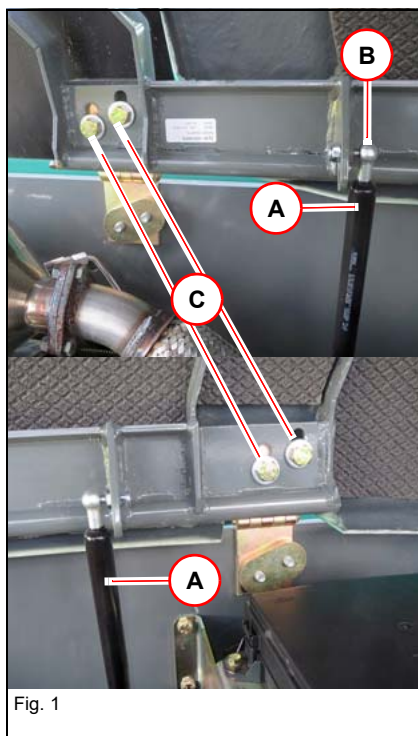
Technical data



Weight	BMK	Description	Remarks
28 kg (61.7 lb)	–	Engine cover	–
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

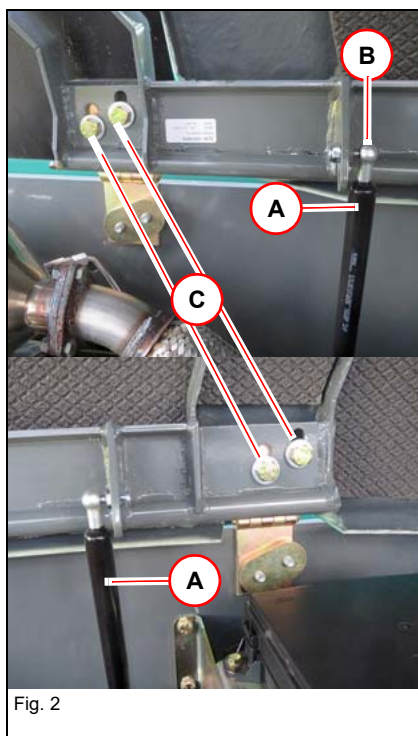
Remove engine cover.

1. Open the engine cover – see *"Engine cover" on page 1-23*.
2. Have 2nd person hold the front lid of the engine in position.
3. On both dampers **A** unlock locking clips **B** and remove from the ball head.
4. Remove the fastening screws **C** on both hinges.
5. Remove the front lid of the engine with 2 people.



Install engine cover.

1. Position the engine lid, taking 2 people to do so.
1. Mount the fastening screws **C** on both hinges.
2. Put both dampers **A** into the ball heads and inset the locking clips **B** and secure.
3. Close engine cover and check seal on the engine bay, where applicable correct using fastening screws **C**.



12.2 Exterior cab cover

Safety instructions for exterior cab cover



Information

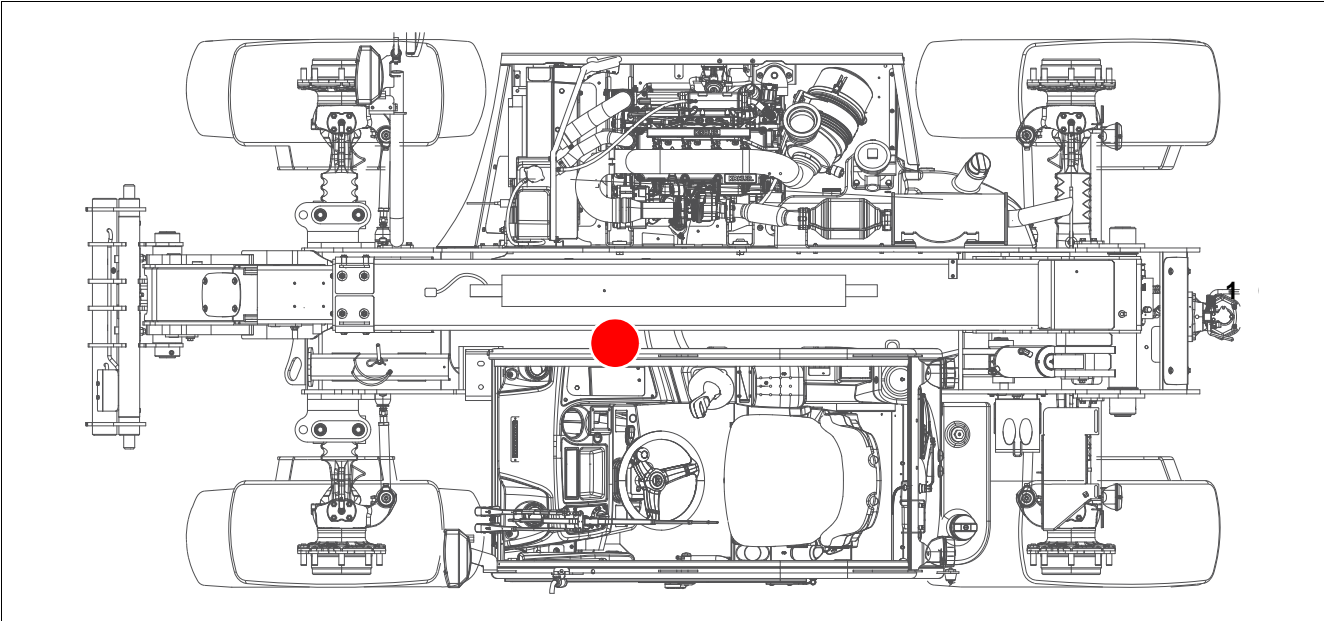
Before starting work, take safety and instructions into consideration

- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install cab cover

- Tools:
- Standard tools

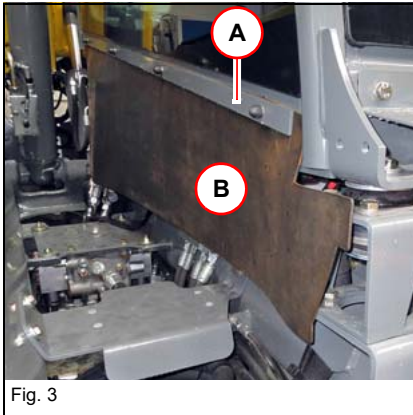
Technical data



Weight	BMK	Description	Remarks
–	–	Exterior cab cover	–
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

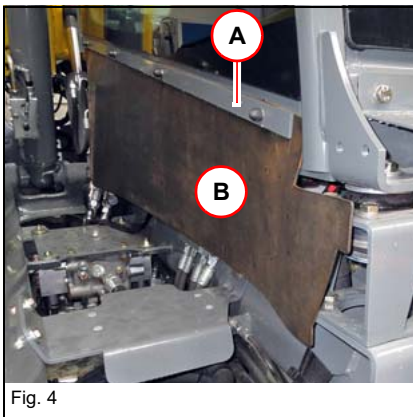
Remove cab cover

1. Lift boom and secure the hydraulic ram with safety struts – see ["Safety prop for telescopic boom" on page 1-4.](#)
2. Remove terminal block **A** and remove cover **B**.



Install cab cover

1. Position cover **B** and insert terminal block.
2. Remove safety struts and lower the boom.



12.3 Underride protection

Safety instructions for underride protection



WARNING

Risk of injury from the weight of the underride protection!

Risk of serious injuries in the event of the underride protection folding open by itself.

- ▶ Never dismantle the underride protection on your own, but only with two people.



Information

Before starting work, take safety and instructions into consideration

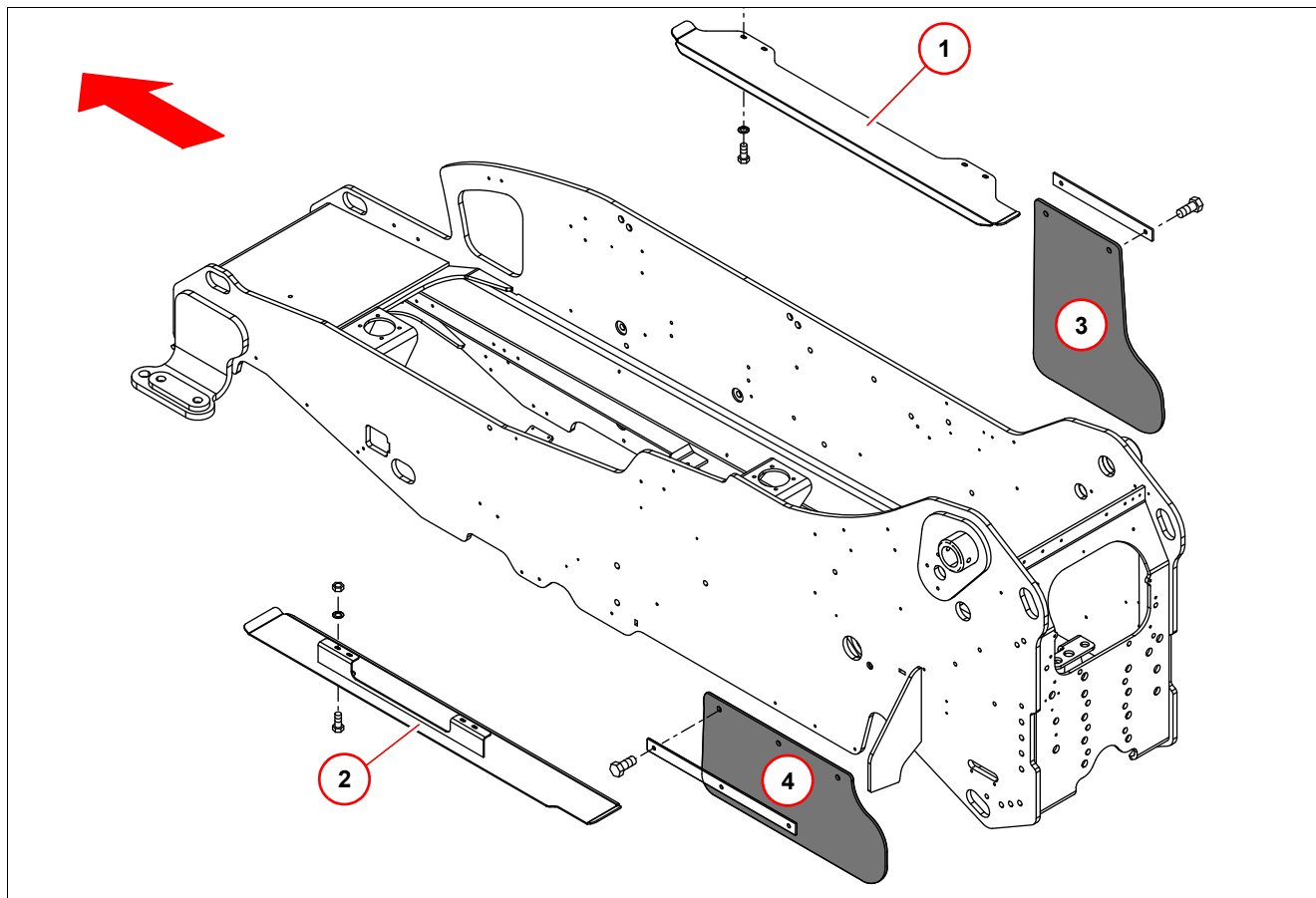
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Remove/install underride protection (standard)

Tools:

- Standard tools

Technical data

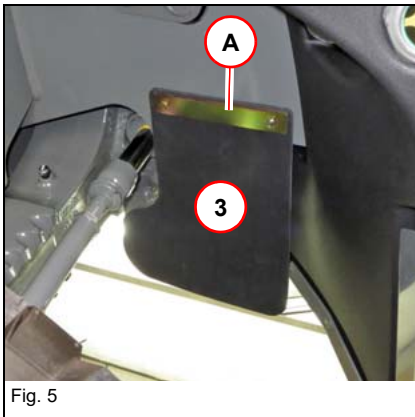


Pos.	Weight	BMK	Description	Remarks
1	4.7 kg (10 lb)	—	Underride protection	(right)
2	9 kg (20 lb)	—	Underride protection	(left)
3	0.4 kg (1 lb)	—	Rubber cover	(rear, right)
4	0.6 kg (1 lb)	—	Rubber cover	(rear, left)
For non-specified tightening torques, see chapter "Introduction/tightening torques"				

Remove underride

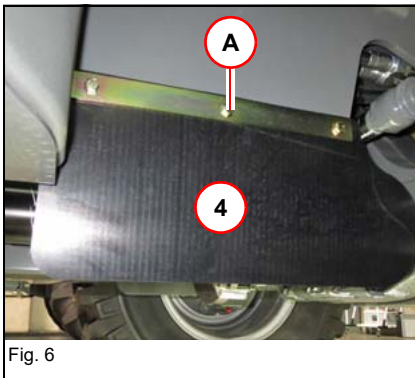
Remove rubber covers 3:

1. Remove terminal block **A**.



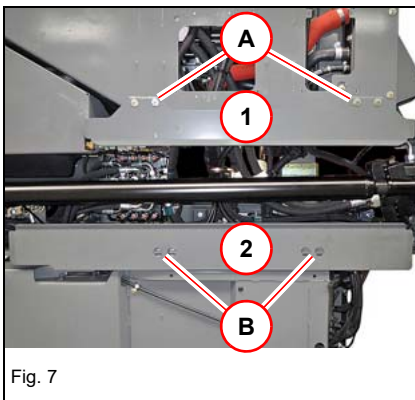
Remove rubber covers 4:

2. Remove terminal block **A**.



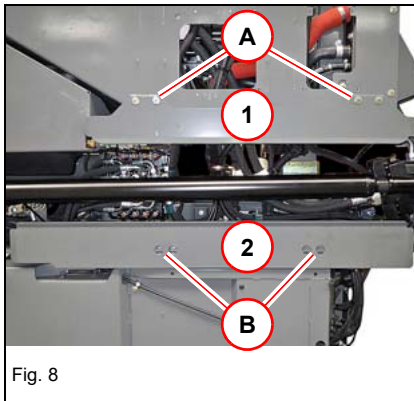
3. Remove screws **A** on underride protection 1 and take off underride protection 1.

4. Remove screws **B** on underride protection 2 and take off underride protection 2.



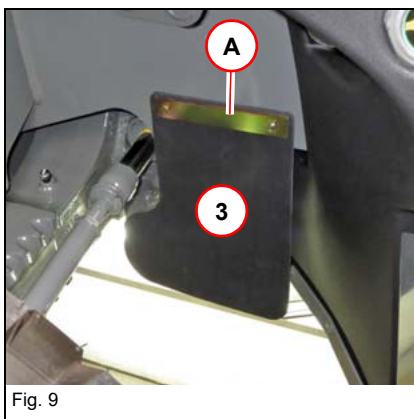
Install the underride protection

1. Position underride protection **1** and fasten using screws **A**.
2. Position underride protection **2** and fasten using screws **B**.



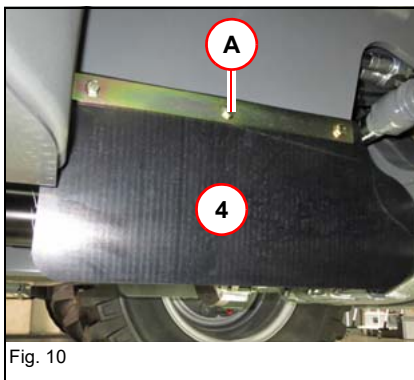
Fix rubber covers **3**:

3. Tighten terminal block **A**.



Fix rubber covers **4**:

4. Tighten terminal block **A**.

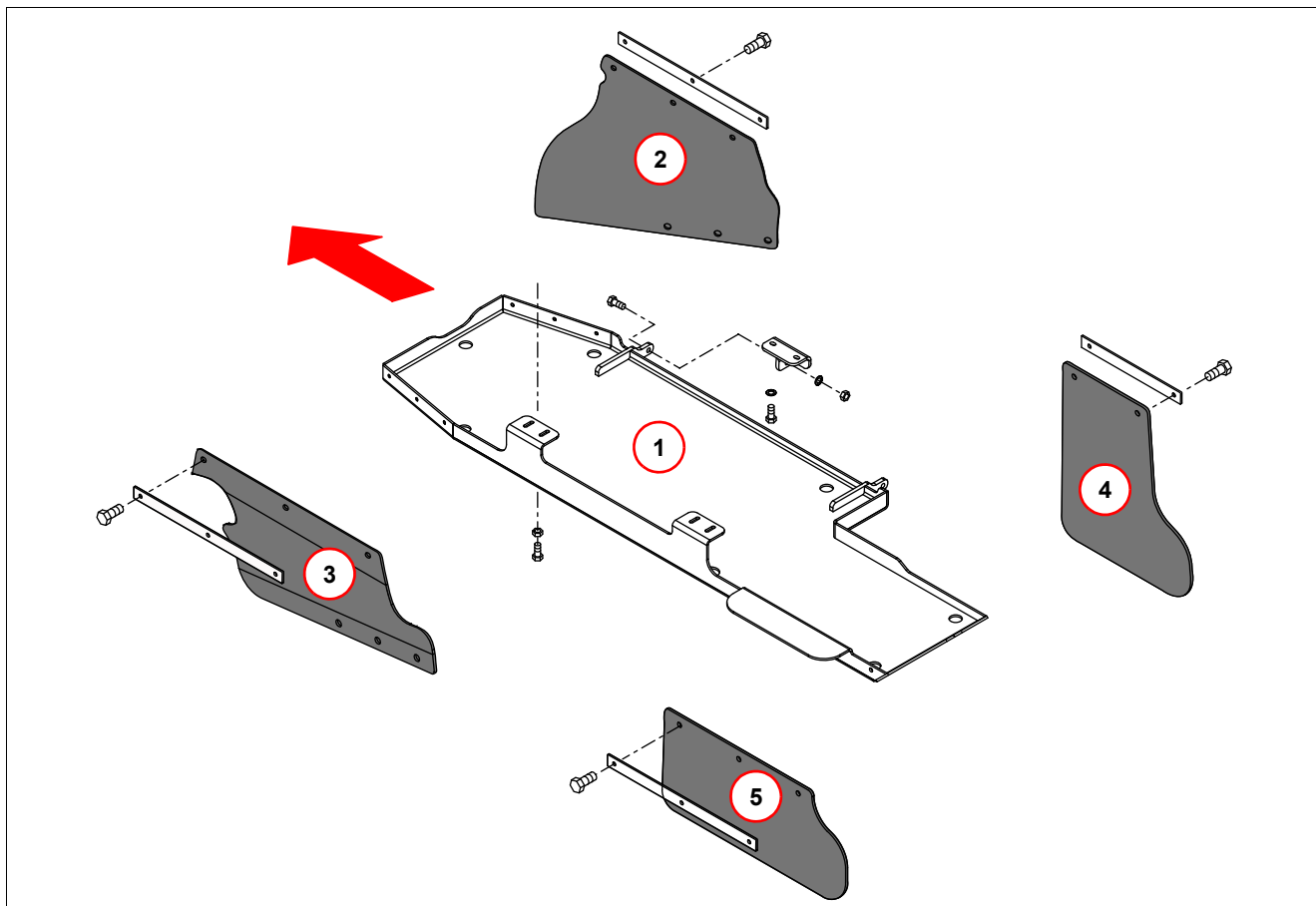


Remove/install underride protection (closed)

Tools:

- Standard tools

Technical data



Pos.	Weight	BMK	Description	Remarks
1	32.5 kg (72 lb)	—	Underride protection	(closed)
2	0.6 kg (1 lb)	—	Rubber cover	(front, right)
3	0.7 kg (2 lb)	—	Rubber cover	(front, left)
4	0.4 kg (1 lb)	—	Rubber cover	(rear, right)
5	0.6 kg (1 lb)	—	Rubber cover	(rear, left)
For non-specified tightening torques, see chapter "Introduction/tightening torques"				

Remove underride

Remove rubber covers **2**:

1. Remove terminal block **A**.

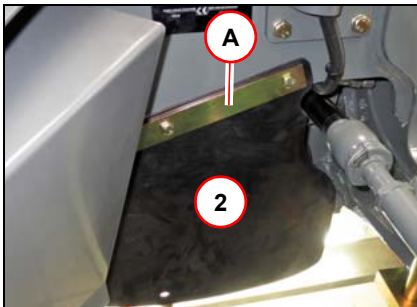


Fig. 11

Remove rubber covers **3**:

2. Remove terminal block **A**.

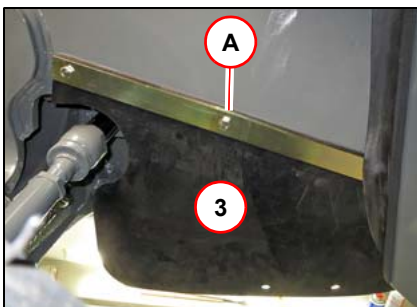


Fig. 12

Remove rubber covers **5**:

3. Remove terminal block **A**.

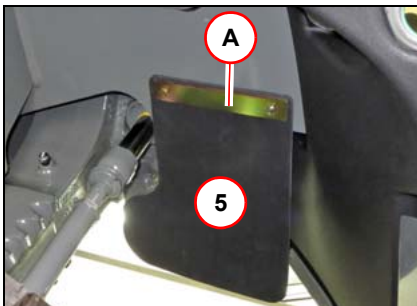


Fig. 13

Remove rubber covers **4**:

4. Remove terminal block **A**.

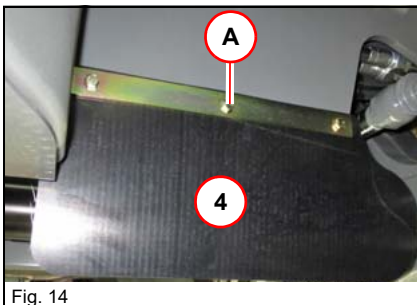
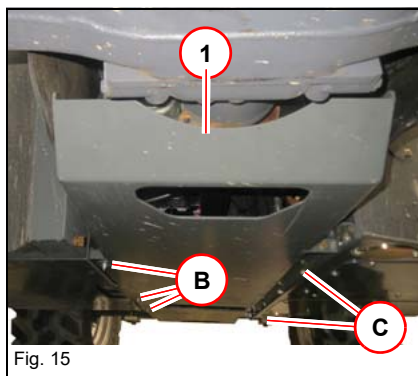


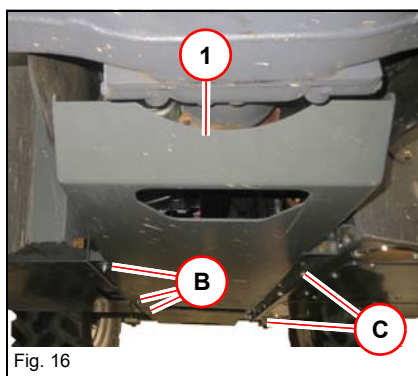
Fig. 14



5. Loosen screws **B** on underride protection **1** and fold down underride protection **1**.
6. Hold down the underride protection **1** in position and loosen screws **C**.
7. Put down the underride protection **1**.

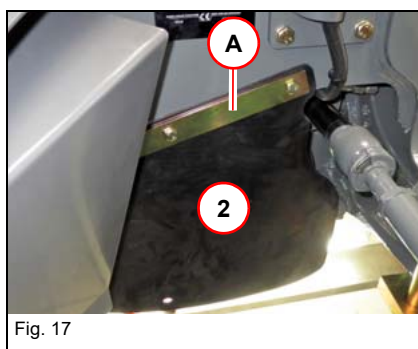
Install the underride protection

1. Position underride protection **1** and tighten screws **C**.
2. Fold up underride protection **1** and hold in position.
3. Tighten **B** screws on underride protection **1**.



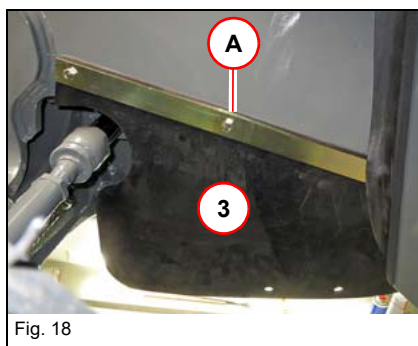
Fix rubber covers **2**:

1. Tighten terminal block **A**.



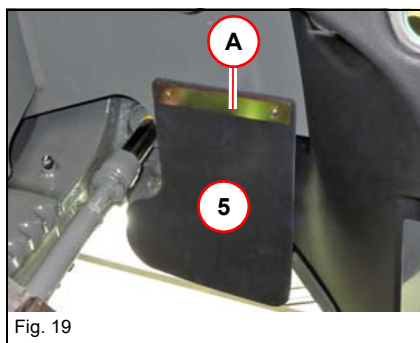
Fix rubber covers **3**:

2. Tighten terminal block **A**.



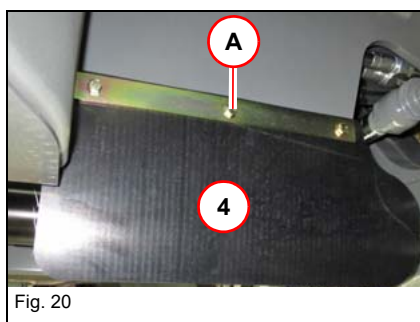
Fix rubber covers **5**:

3. Tighten terminal block **A**.



Fix rubber covers **4**:

4. Tighten terminal block **A**.



12.4 Cab front covering

Safety instructions for cab front trim



Information

Before starting work, take safety and instructions into consideration

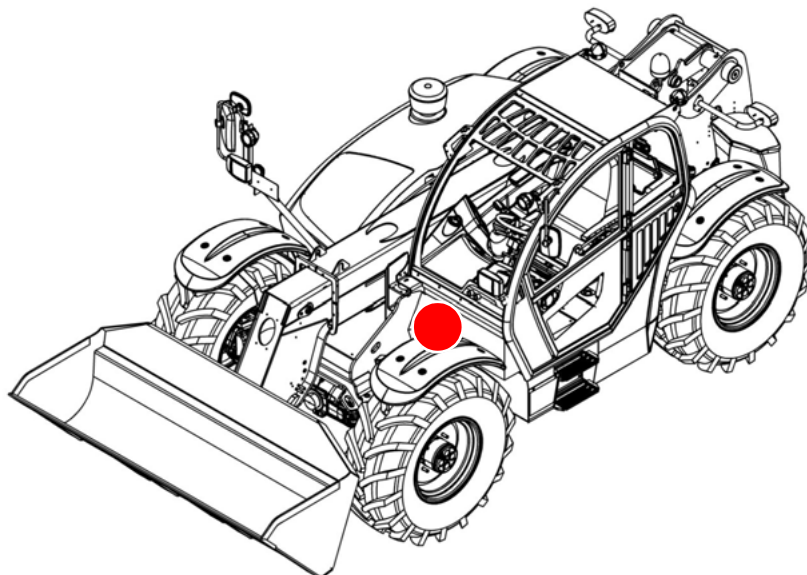
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install cab front trim

Tools:

- Standard tools

Technical data



Weight	BMK	Description	Remarks
2.3 kg (5.07 lb)	—	Trim	Front exterior
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove trim from cab front

1. Stop the engine and remove the starting key.
2. Remove 3x **A** screws.
3. Remove maintenance cover **B** downwards.

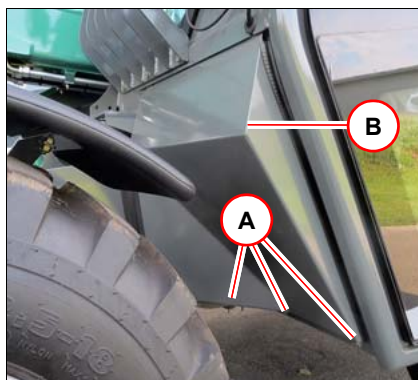


Fig. 21

Install trim cab front

1. Push maintenance cover **B** up from below.
2. Tighten 3x **A** screws.

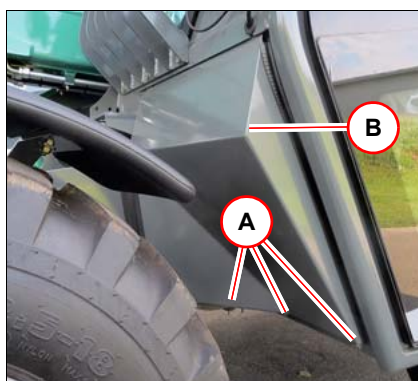


Fig. 22

12.5 Trim in the cab

Safety instructions for trim in the cab



Information

Before starting work, take safety and instructions into consideration

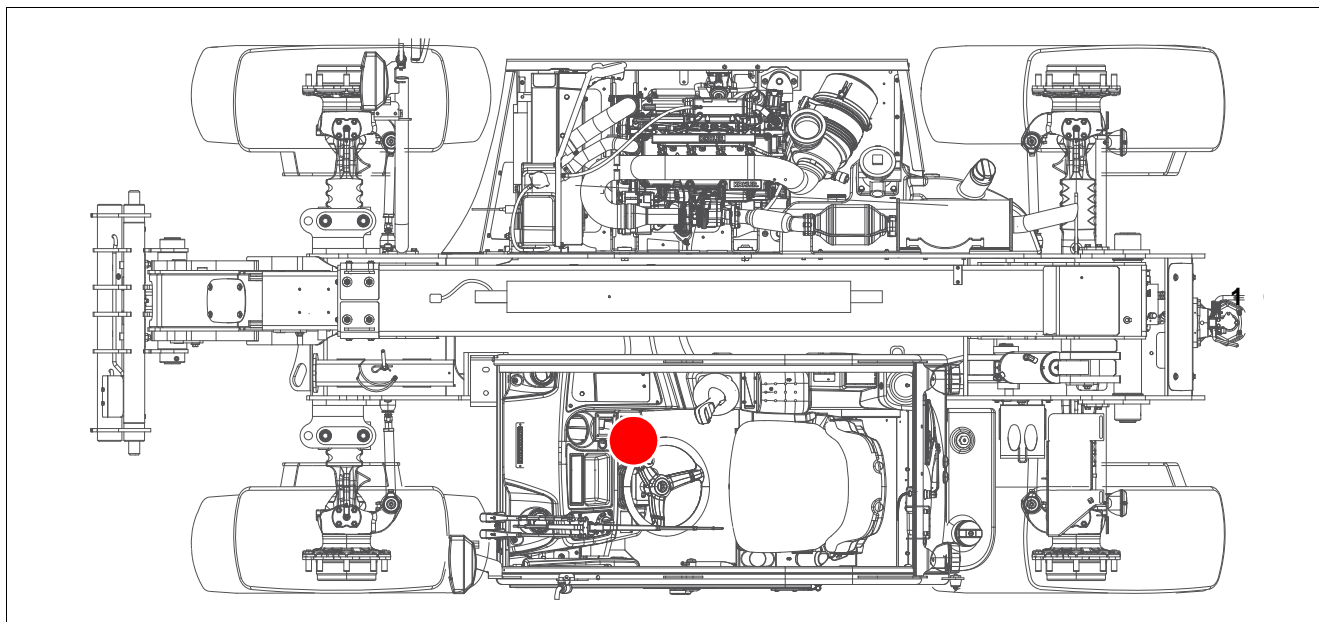
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Install/remove trim in the cab

Tools:

- Standard tools

Technical data



Weight	BMK	Description	Remarks
–	–	Trim	Front interior
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove trim in the cab

1. Switch off battery master switch **S008** – see *"Switch off the battery master switch S008" on page 1-3.*
2. Remove screws **A**.
3. Remove cover **B** from the expansion tank.
4. Remove cladding **C**.

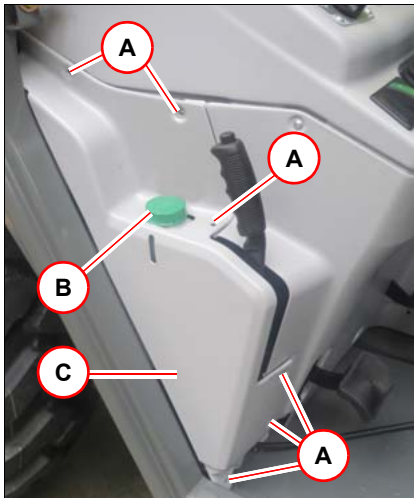


Fig. 23

5. Dismantle ventilations nozzles **A**.
6. Remove screws **B**.
7. Remove knurled screws **C**.
8. Remove trim **D**.

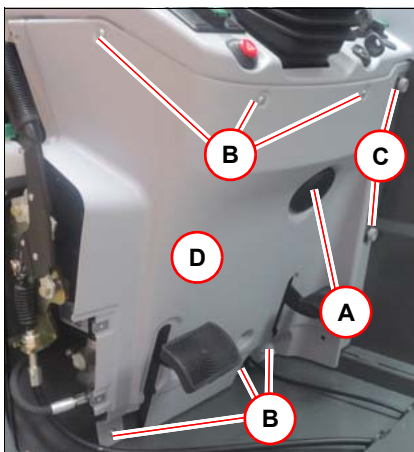


Fig. 24

Install trim in the cab

1. Position trim **D**.
2. Tighten knurled screws **C**.
3. Tighten screws **B**.
4. Fit the ventilation nozzles **A**.

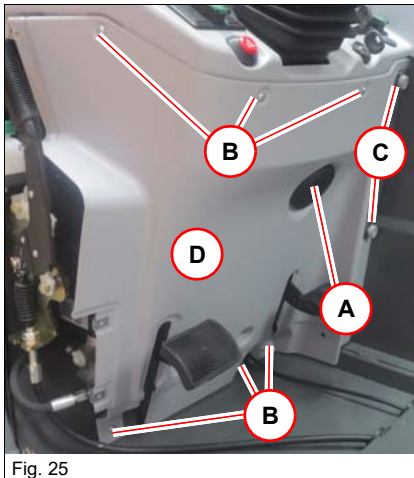


Fig. 25

5. Position cladding **C**.
6. Fit cover **B** on the expansion tank.
7. Tighten screws **A**.
8. Switch on battery master switch **S008** – see *"Switch on battery master switch S008" on page 1-3*.

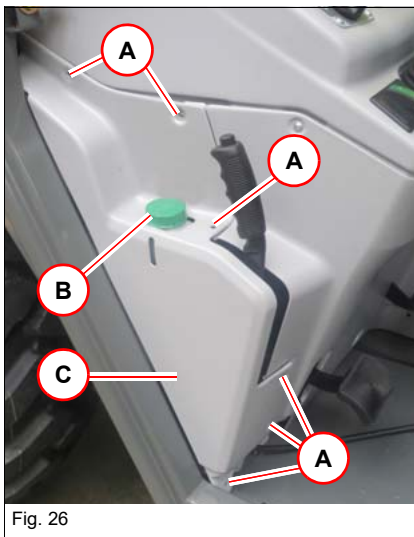


Fig. 26

14 Cabin

14.1 Seat

Safety instructions for operator seat



Information

Before starting work, take safety and instructions into consideration

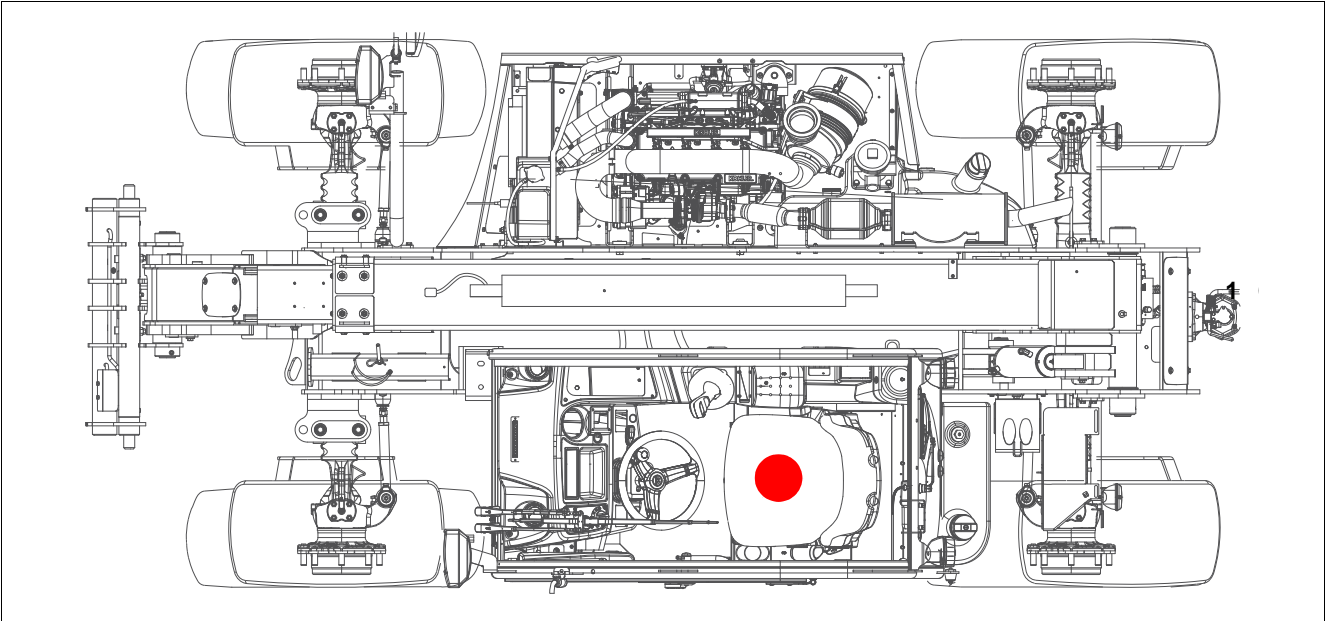
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove / install driver's seat

Tools:

- Standard tools

Technical data



Weight	BMK	Description	Remarks
36.5 kg (80 lb)	–	Operator seat	Default
43 kg (95 lb)			Air-sprung
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove the operator seat

1. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
2. Disconnect connector **A**.

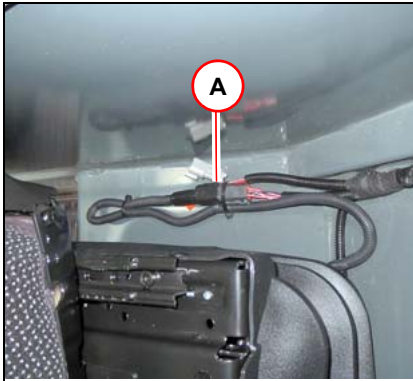


Fig. 1

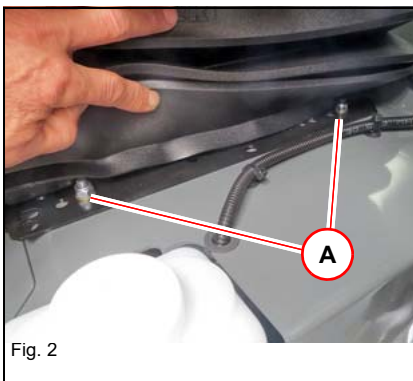


Fig. 2

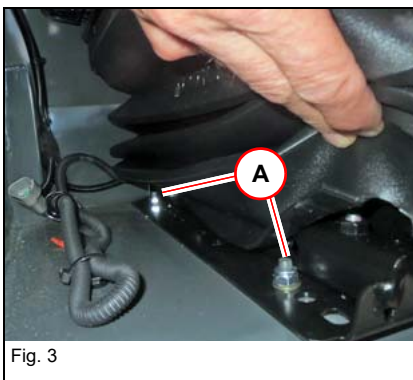
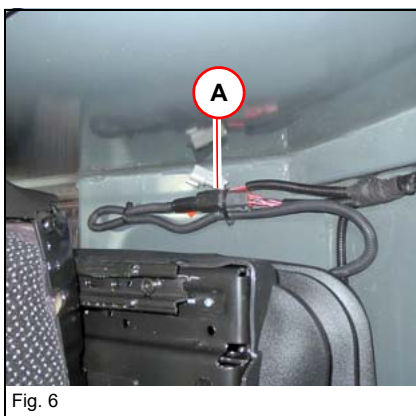
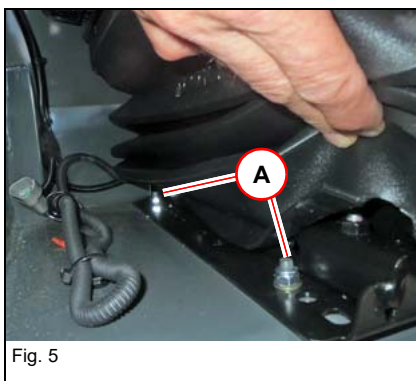
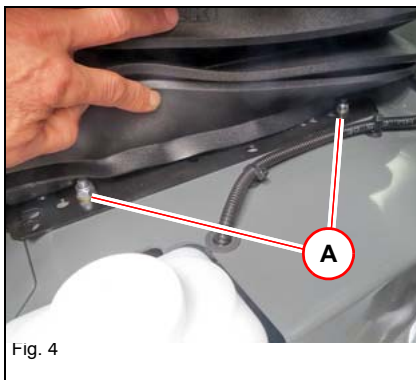


Fig. 3

3. Remove fixing nuts **B** underneath bellows left of the operator seat.
4. Remove fixing nuts **B** underneath bellows right of the operator seat.
5. Lift out operator seat.

Install operator seat

1. Position operator seat on floor of cab.
2. Tighten new fixing nuts **B** underneath bellows left of the operator seat.



3. Tighten new fixing nuts **B** underneath bellows right of the operator seat.
4. Plug in connector **A**.
5. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.

Remove/install the seat contact switch S104

Remove seat contact switch

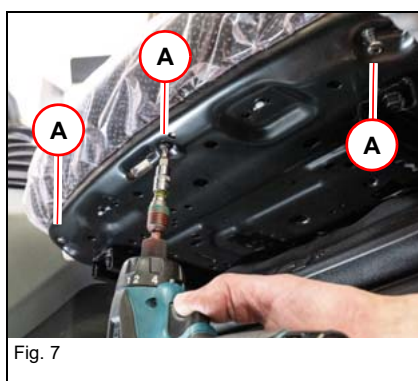


Fig. 7

1. Remove fastening screws **A** and take out the seat cushion.

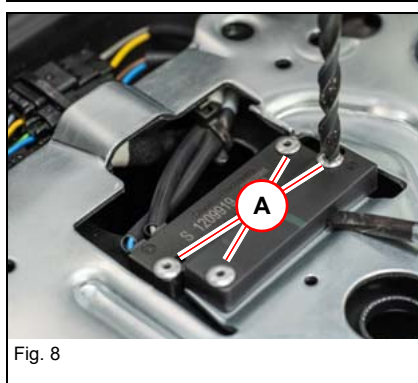


Fig. 8

2. Drill all rivets **A**.

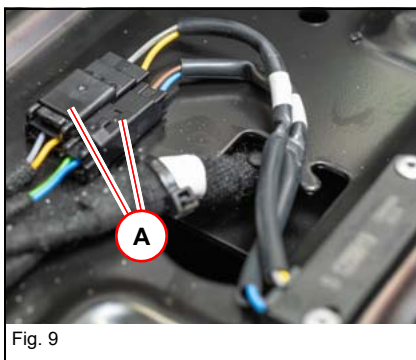


Fig. 9

3. Remove the cable ties.
4. Disconnect connections **A**.

Install seat contact switch

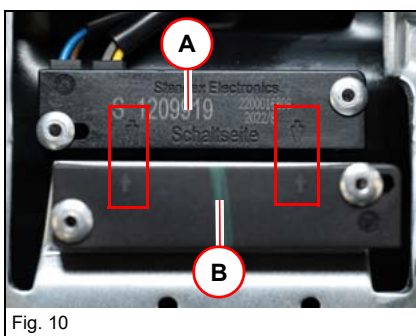


Fig. 10

1. Position seat contact switch **A** (switching side) for the magnet **B** over the arrow.



Fig. 11

2. Rivet the seat contact switch and magnet. See [Fig. 11](#)

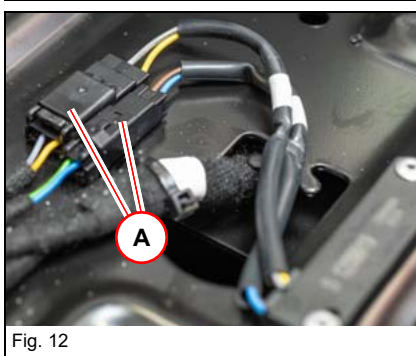
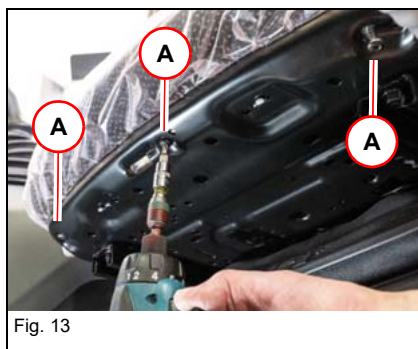


Fig. 12

3. Interlock the connector **B** and install the cable tie.



4. Position the seat cushion and tighten fastening screws **A**.
5. Perform a functional check.

14.2 Cabin

Safety instructions for cab



CAUTION

Risk of injury due to hot and moving engine parts!

Hot and moving engine parts can cause injury.

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



CAUTION

Health hazard due to diesel fuel!

Diesel fuel and fuel vapors are harmful to health!

- ▶ Avoid contact with the skin, eyes and mouth!
 - ▶ Seek medical attention immediately in case of accidents with diesel fuel!
 - ▶ Wear protective equipment.
-



WARNING

Risk of injury lifting heavy components.

Death or serious injury.

- ▶ Use lifting gear of sufficient lifting capacity.
 - ▶ Use functionally safe lifting gear.
 - ▶ Use lifting gear on firm and level ground.
 - ▶ Move the lifting tackle to predefined or suitable position on the component.
-



CAUTION

Health risk from urea solution!

Urea solutions and their vapors are harmful to health! Incorrect handling can cause injury.

- ▶ Avoid contact with the skin, eyes and mouth.
 - ▶ Ensure there is good ventilation.
 - ▶ Ensure cleanliness.
 - ▶ Wear protective equipment.
 - ▶ Seek medical attention immediately in case of accidents with urea solutions.
-

NOTICE

Destruction of the EAT system by filling the urea tank with other media (e.g. diesel).

- ▶ Fill urea tank only with urea solution.
- ▶ Empty and clean the urea tank when filled incorrectly.
- ▶ If other media make their way into the lines or the discharge module, these must be replaced.



Environment

Use a suitable container to collect the fuel and coolant as they drain and dispose of them in an environmentally friendly manner!



Information

Before starting work, take safety and instructions into consideration

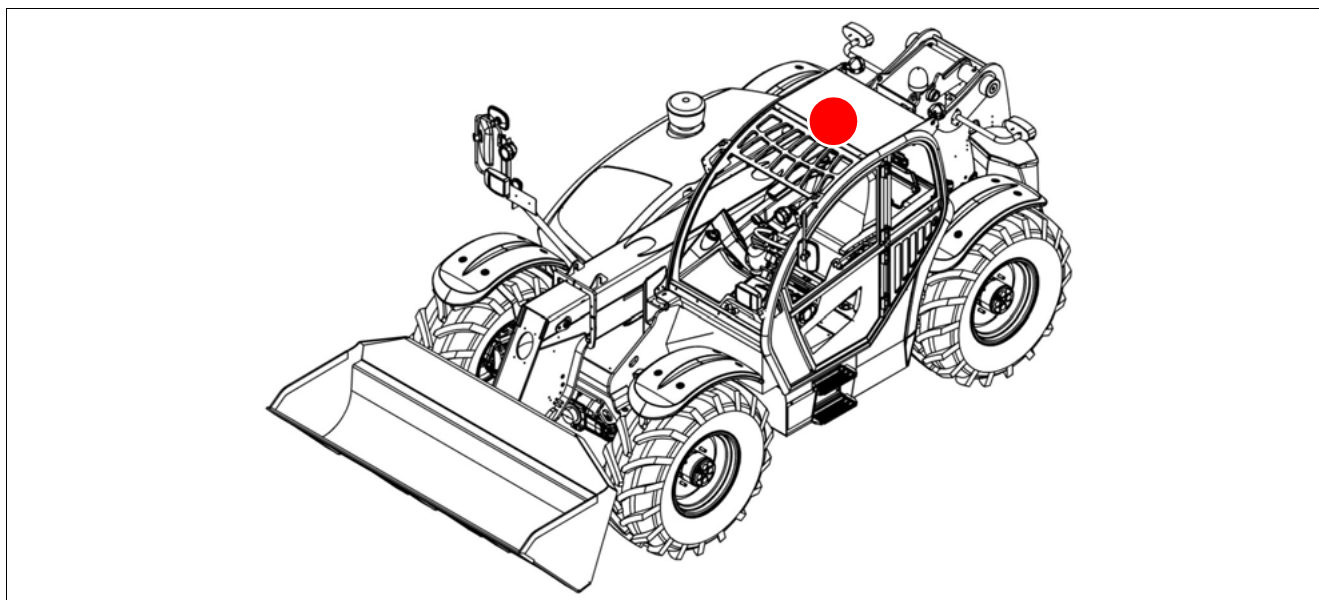
- see *"Notes on the repair manual" on page E-1,*
 - see *"Safety instructions" on page E-6,*
 - see *"Maintenance preparations, instructions" on page 1-1!*
-

Removing/installing cab

Tools:

- Suitable lifting gear, minimum load-bearing capacity 500 kg (1102 lb.)
- Suitable slings (cables and shackles) with corresponding load-bearing capacity
- Vacuum pump
- Container for collecting hydraulic oil [capacity of min. 55 l (15 gal)]
- Container for collecting coolant [capacity of min. 15 l (4 gal)]
- Suitable collecting vessel for fuel [100 l (27 gal)]
- Plugs (different sizes) for closing the oil lines
- Standard tools

Technical data



Weight	BMK	Description	Remarks
441 kg (973 lb)	–	Cab	–
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove cab

1. Park the machine on firm, level and dry ground in the vicinity of the charging station or a power source.
2. Apply the parking brake.
3. Raise the telescopic boom and secure with a safety prop [Safety prop for telescopic boom on page 1-4](#).
4. Turn the machine off and remove the ignition key.
5. Open the engine cover – see ["Engine cover" on page 1-23](#).
6. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
7. If air-conditioning is present:
empty the air-conditioning system – see ["Emptying/filling the air conditioning system" on page 1-115](#).
8. Uninstall cab cover exterior – see ["Remove/install cab cover" on page 12-5](#).

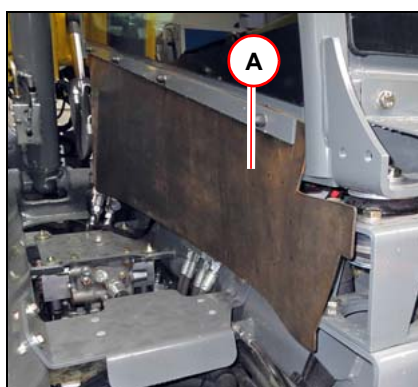


Fig. 14

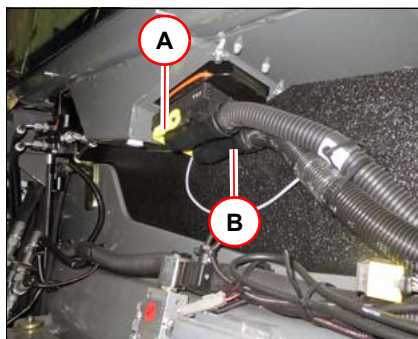


Fig. 15

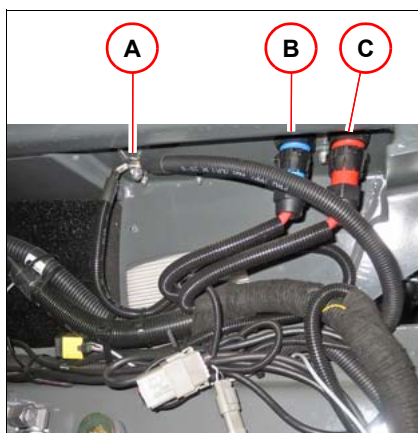


Fig. 16

9. Unlock and unplug the electric plug connections **A** and **B** at the cabin disconnection point.
10. Unlock and unplug the plug connections **A** and **B** at the cabin disconnection point.
11. Remove earthing strap **A** from the cab.



Fig. 17

Front in the cab:

12. Dismount the cover **A** below the front window – see *"Remove/install cab front trim"* on page 12-16.

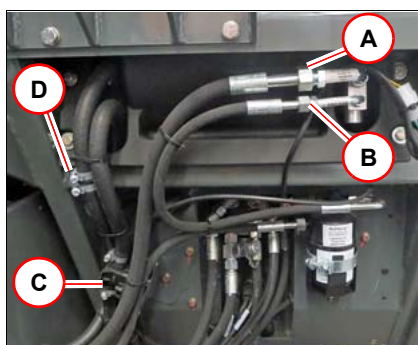


Fig. 18

13. Disconnect the coolant hoses **C** and **D** with a suitable tool and dismount at the hose clamps.

14. Seal tight the coolant hoses on both sides.

If air conditioning is available:

15. Unscrew air conditioning hoses **A** and **B** on the screw connections and tightly seal on both sides with plugs.

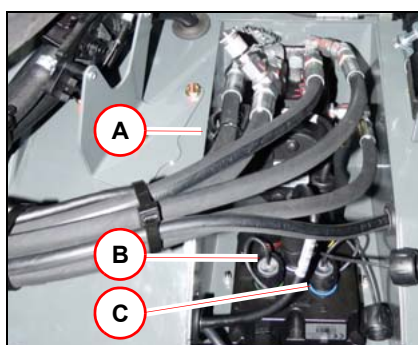


Fig. 19

16. Remove all hose pipes from the steering system.

17. Tightly seal all hydraulic lines **A** and screw connections.

18. Mark plug connections **B** and **C** of the camera, unlock and unplug.

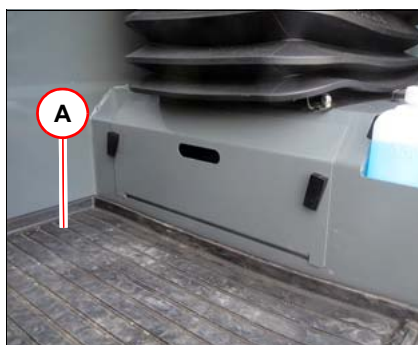


Fig. 20

19. Take out floor mats **A**.



Fig. 21

20. Remove interior cab trim **A** and **B** – see *"Trim in the cab"* on page 12-18.

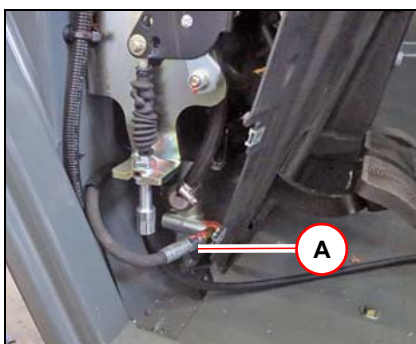


Fig. 22

21. Remove brake line **A** on the main brake cylinder and seal tightly.



Fig. 23

22. Dismount the clamp **A** of the hand brake cable via the brake disc at the frame.

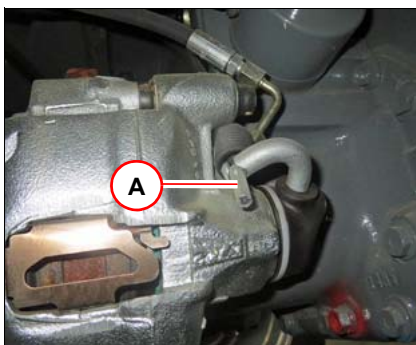


Fig. 24

23. Detach the hand brake cable **A** at the brake caliper.

Side trim on the right:

24. Remove the drink holder **A**.



Fig. 25

25. Unscrew the screws from the cover to the right **A**.



Fig. 26

26. Remove joystick **A** – see ["Removing / installing joystick" on page 9-8](#).

27. Remove the remaining cover screws to the right **B**.

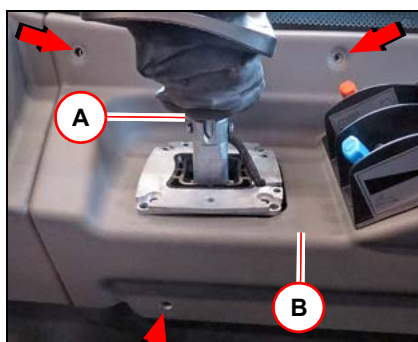


Fig. 27

28. Unplug the cable **B** at the DOC control element.

29. Lift the cover somewhat.

30. Press cable grommets **A** to the outside and carefully pull the cable **B** from the cover.

31. Mark the cable plug of the hand throttle potentiometer and the crawling speed potentiometer and unplug.

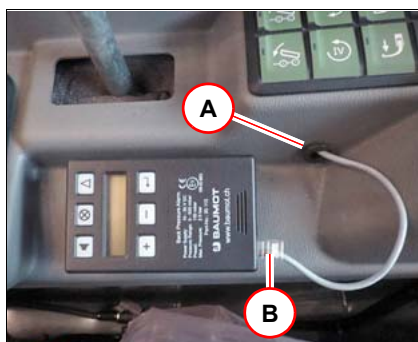
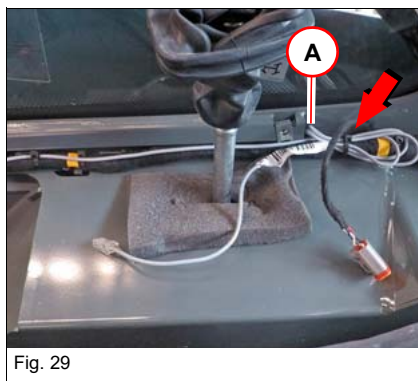
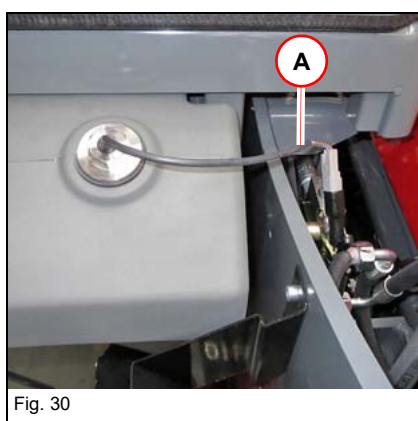


Fig. 28



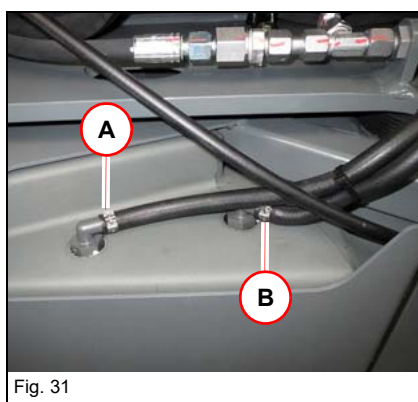
32. Carefully pull the cable **A** out from the outside.



At the top of the fuel tank:

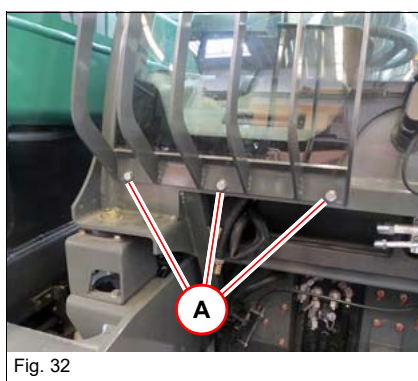
33. Completely empty the fuel tank – see ["Drain fuel" on page 1-50](#).

34. Unplug the tank sensor **A**.



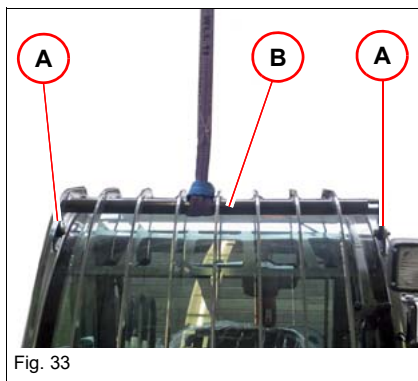
At the bottom of the fuel tank:

35. Release the clip **A** and **B** and pull the fuel lines from the fuel tank.

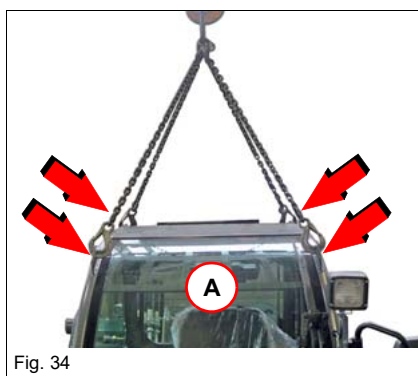


With the protective screen option:

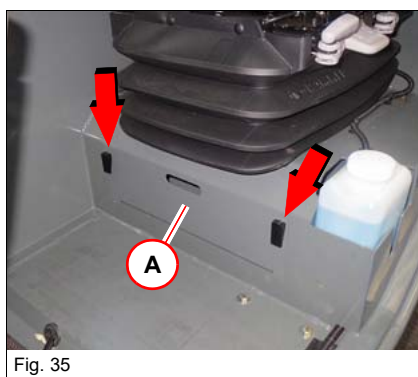
36. Remove fastening screws **A** below on protective grate.



- 37. Secure the protective screen **B** with suitable slings and lifting gears.
- 38. Remove the fastening screws **A** above at the protective grate.
- 39. Lift the protective screen **B** and place it on the pallet.

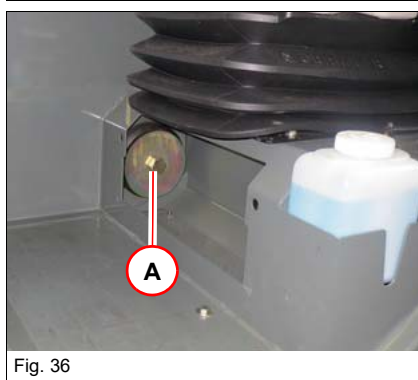


- 40. Secure suitable lifting gear on the eyelets of the cab.
- 41. Lift the cabin **A** with suitable lifting gear.



Middle cab bearings:

- 42. Unlock and remove the cover **A** of the storage compartment below the operator seat.



- 43. Remove fastening screw **A** and disc.

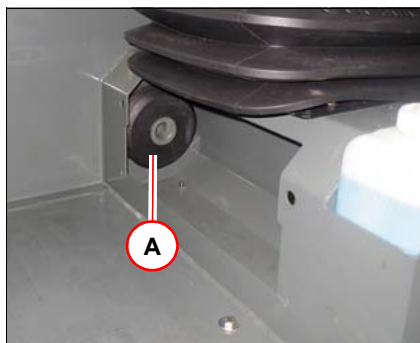


Fig. 37

44. Remove bearing **A**.



Fig. 38

Front cabin bearings:

45. Remove fastening screw **A** and disc.



Fig. 39

Rear cabin bearings:

46. Remove fastening screw **A** and disc.

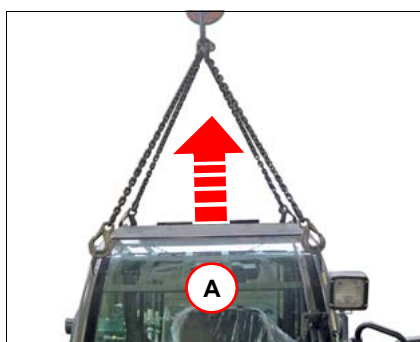


Fig. 40

47. Carefully lift up cab **A** and set aside safely.

Install cab

1. Before installation, check the cab bearings, replace cab bearings if necessary .
2. Secure suitable lifting gear on the eyeletsof the cab.
3. Carefully lower and position cab **A** on the chassis.

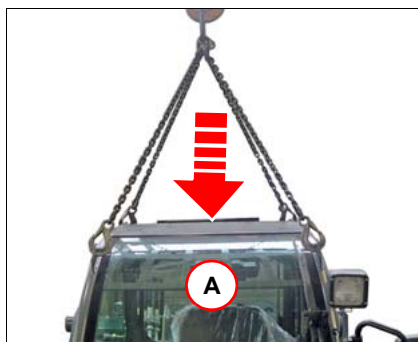


Fig. 41

Rear cabin bearings:

4. Insert fastening screw **A** with washer from above, and insert washer and nut from below and tighten to 195 Nm (144 lbf ft).



Fig. 42

Front cabin bearings:

5. Insert fastening screw **A** with washer from above, and insert washer and nut from below and tighten to 195 Nm (144 lbf ft).

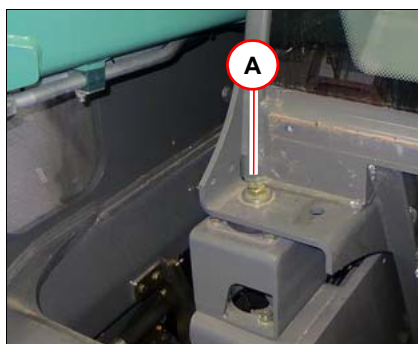


Fig. 43

Middle cab bearings:

6. Position bearing **A**.

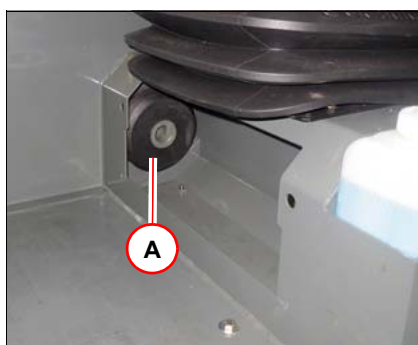


Fig. 44

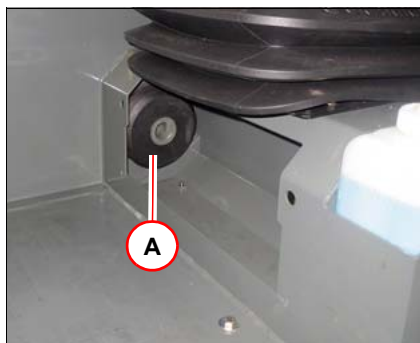


Fig. 45

7. Insert fastening screw **A** with washer and tighten to 395 Nm (291 lbf ft).



Fig. 46

8. Attach and unlock the cover **A** of the storage compartment below the operator seat.

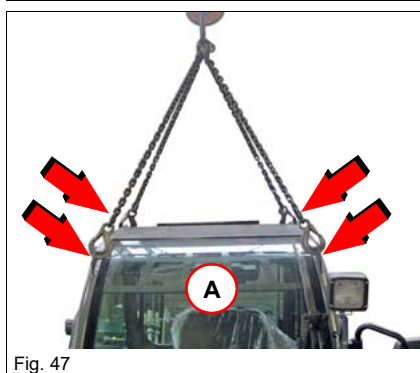


Fig. 47

9. Remove suitable lifting gear on the eyelets of the cab **A**.

With the protective screen option:

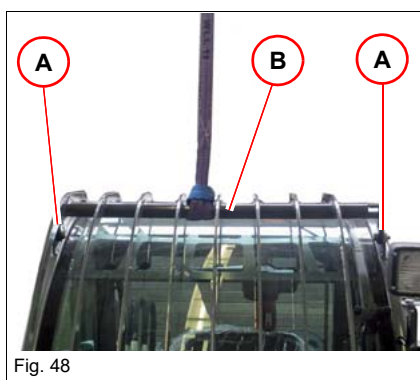


Fig. 48

10. Position the protective screen **B** with suitable slings and lifting gear.
11. Insert fastening screws **A** above at the protective grate.

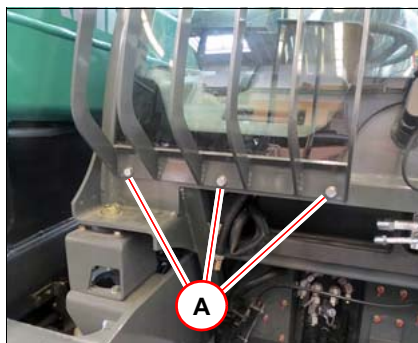


Fig. 49

12. Mount screws **A** at the bottom of the protective screen.

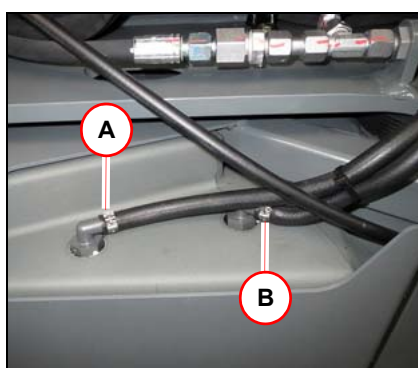


Fig. 50

At the bottom of the fuel tank:

13. Put the vacuum hose on the fuel tank and tighten the clip **A**.

14. Put return flow hose on fuel tank and tighten clip **B**.

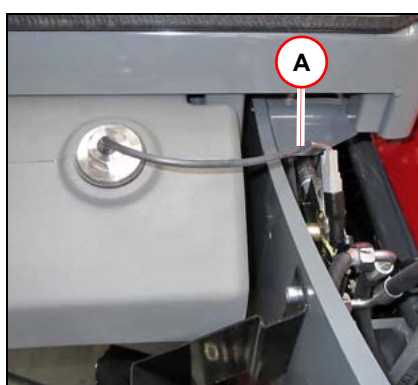


Fig. 51

At the top of the fuel tank:

15. Insert the tank sensor **A**.

16. Fill the fuel tank with clean fuel.

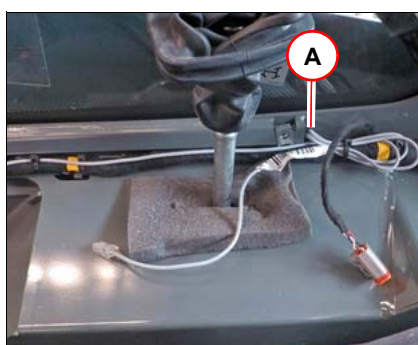


Fig. 52

Side trim on the right:

17. Carefully push the cable **A** in from the outside.

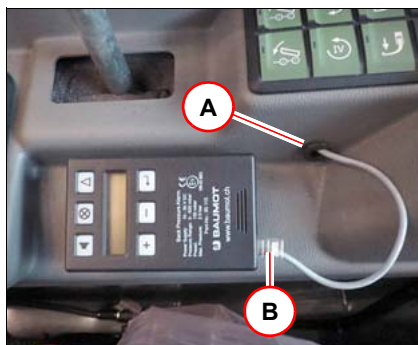


Fig. 53

18. Place cover on right.
19. Mount cable grommets **A**.
20. Insert cable **B** on DO control element.

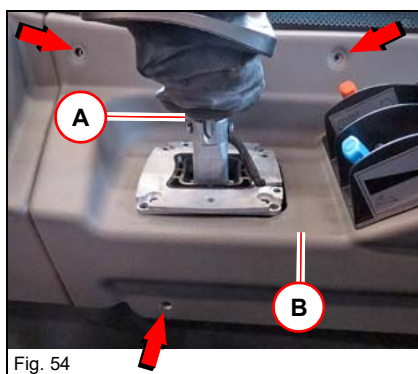


Fig. 54

21. Insert cable plug for hand throttle potentiometer and the crawler speed potentiometer.
22. Mount the screws of the cover on the right **B**.
23. Mount joystick **A**— see ["Removing / installing joystick" on page 9-8](#).



Fig. 55

24. Unscrew the remaining screws from the cover to the right **A**.



Fig. 56

25. Install the drink holder **A**.

At the parking brake:

26. Hook up the hand brake cable **B** at the brake caliper.

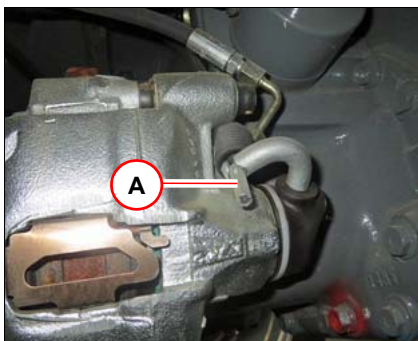


Fig. 57

27. Mount the clamp **A** of the hand brake cable via the brake disc at the frame.

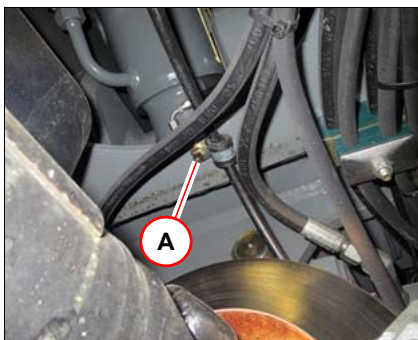


Fig. 58

At the service brake:

28. Install the brake hose **A** into the cabin from the outside.

29. Insert brake hose **A** and tighten to 18 Nm (13 lbf ft).

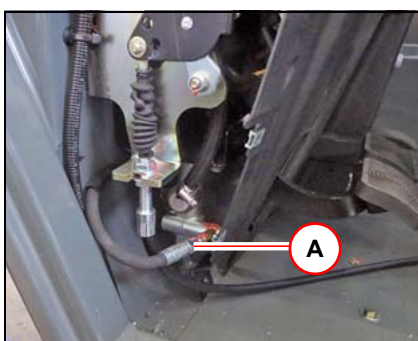


Fig. 59

30. Insert trim **A** and **B** – see *"Install trim in the cab" on page 12-21*.

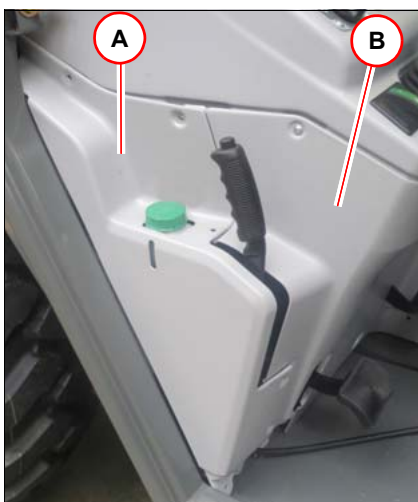


Fig. 60

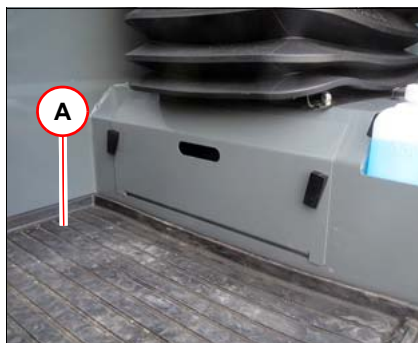


Fig. 61

31. Insert the foot mat **A**.

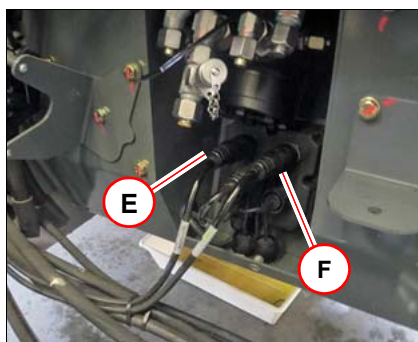


Fig. 62

Front in the cab:

32. With the camera option:

Insert and lock the plug connections **E** and **F**.

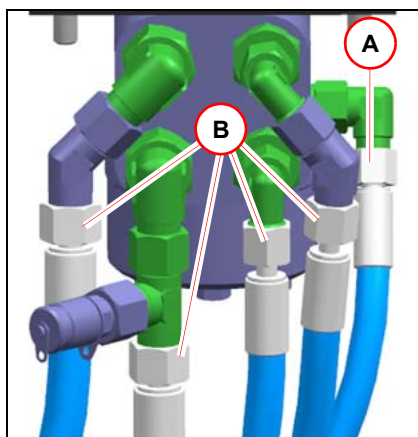


Fig. 63

33. Position the hose and tighten the screw connection **A** to 23 Nm (17 lbf ft).

34. Position hose and tighten screw connection **B** to 40 Nm (30 lbf ft).

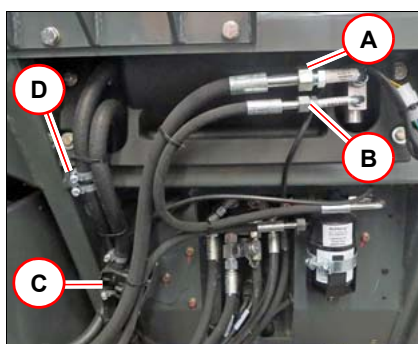


Fig. 64

If air conditioning is available:

35. Mount air conditioning hose **A** to screw connection and tighten to 44 Nm (32 lbf ft).

36. Mount air conditioning hose **B** to screw connection and tighten to 28 Nm (21 lbf ft).

37. Insert air conditioning hoses **C** and **D** and mount hose clips.



Fig. 65

38. Mount the cover **A** below the front window – see *"Remove/install cab front trim" on page 12-16*.

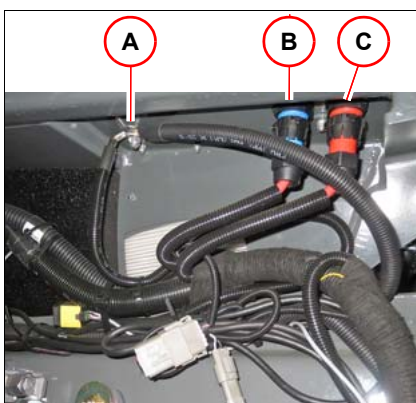


Fig. 66

At the transmission tunnel:

39. Screw on earthing strap **A** to the cab.

40. Insert the plug connections **B** and **B** to the cabin disconnection point and lock.

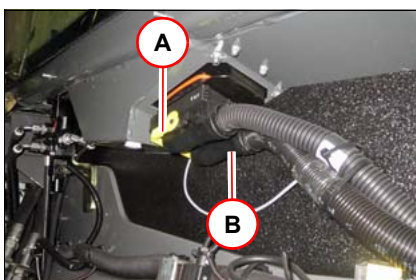
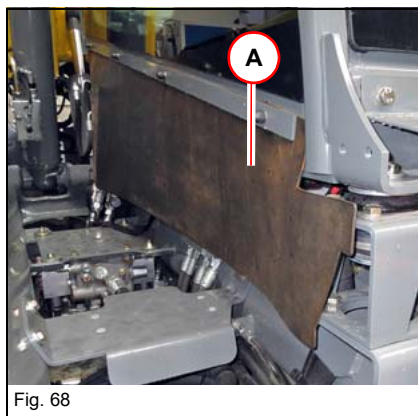


Fig. 67

41. Insert and lock the electric plug connections **A** and **B** at the cabin disconnection point.



42. Mount the cover **A** of the transmission tunnel – see *"Remove/install cab cover" on page 12-5.*
43. Add coolant – see *"Adding coolant" on page 1-69.*
44. Fill air conditioning system – see *"Emptying/filling the air conditioning system" on page 1-115.*
45. Bleed the braking system and check for proper functioning and tightness – see *"Change and vent the brake fluid" on page 1-129.*
46. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
47. Start the vehicle to warm it up.
48. Set the heating to the highest setting in order to vent the system.
49. Check the coolant level – see *"Checking the coolant level" on page 1-68.*
50. Adjust the parking brake – see *"Adjusting the parking brake" on page 6-29.*
51. Bleed the steering and synchronize – see *"Bleed/synchronize steering system" on page 7-6.*
52. Carry out test run and check the system for leaks.
53. Test all functions and switches for function.

15 Heating/air conditioning

15.1 Heater/air conditioning system

Safety instructions for heater/air conditioning system



Information

Before starting work, take safety and instructions into consideration

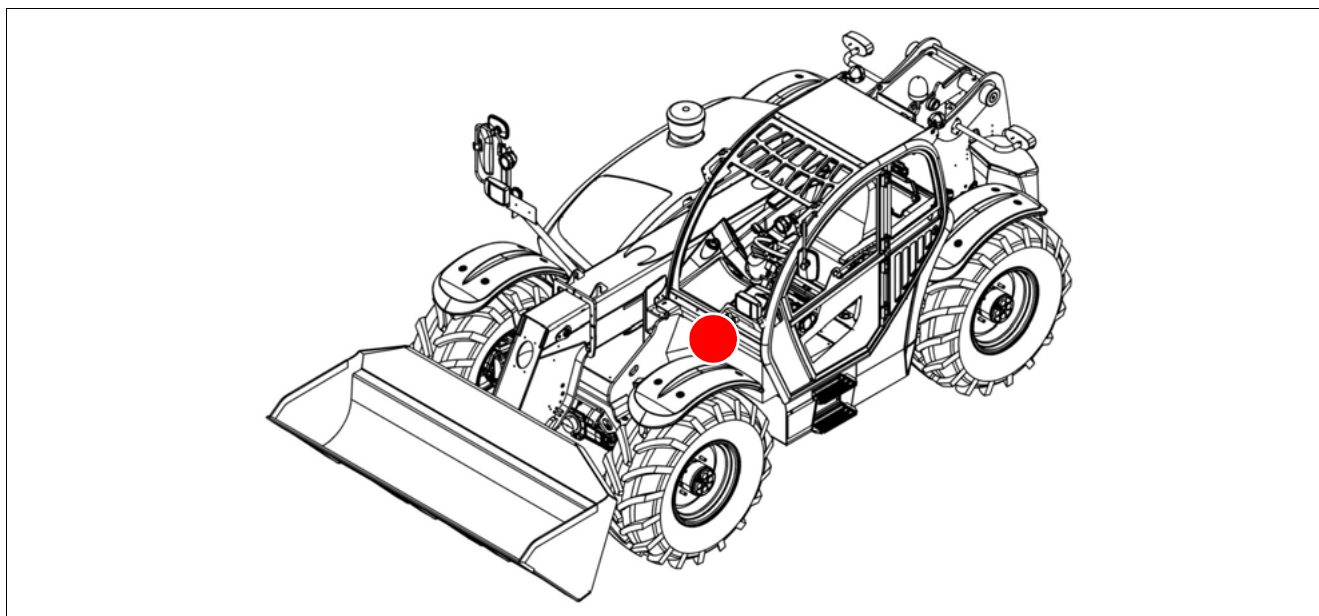
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install heater/air conditioning system

Tools:

- Collecting container for coolant
- Plugs (different sizes) to close hoses
- Sealing strip
- Commercially-available hose clips
- Air conditioning service centre
- Standard tools

Technical data



Weight	BMK	Description	Remarks
2.9 kg (6 lb)	–	Heating unit	–
3.8 kg (8 lb))	–	Air conditioning	–

For non-specified tightening torques, see chapter “Introduction/tightening torques”

Remove heater / air conditioning system

1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
2. Remove cabin front maintenance cover– see *"Remove/install cab front trim" on page 12-16.*
3. Empty the air conditioning system – see *"Emptying/filling the air conditioning system" on page 1-115.*
4. Dismount steering column – see *"Remove/install steering column" on page 7-21.*
5. Dismount instrument panel – see *"Remove/install front instrument panel" on page 9-12.*
6. Dismount controller N004 – see *"Remove/install cab controller" on page 9-50.*
7. Release clips **A** and pull off heater hoses.

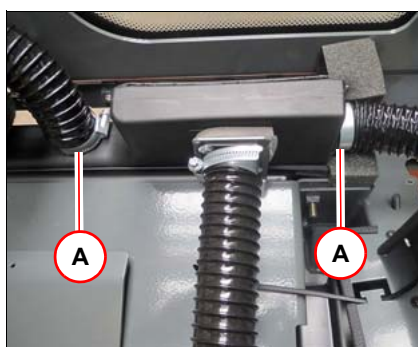


Fig. 1

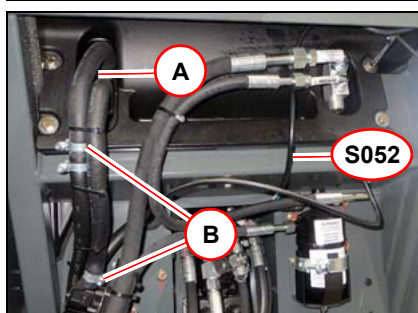


Fig. 2

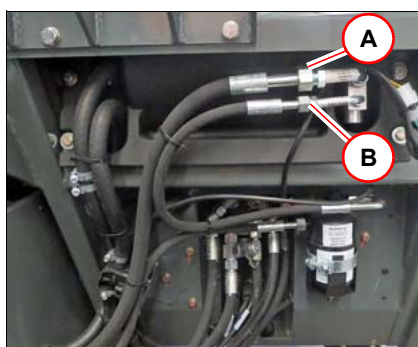


Fig. 3

8. Pinch off the heater hoses **A** with a suitable tool.
9. Release clips **B** and pull off heating hoses **A**.
10. Disconnect plug connections **S052** on the dehumidifier.
11. Unscrew air conditioning hoses **A** and **B** on the screw connections and tightly seal on both sides with plugs.

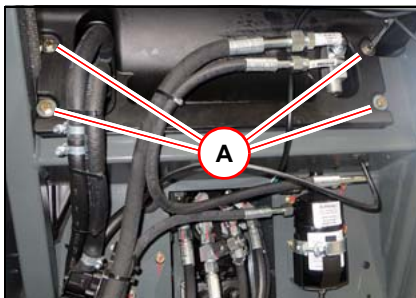


Fig. 4

12. Remove fastening screws **A**.

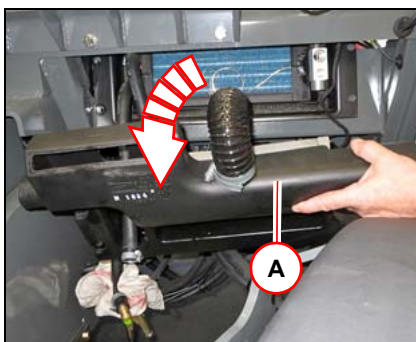


Fig. 5

13. Lift air distributor **A** out to the front.

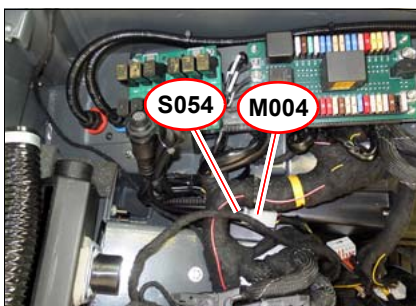


Fig. 6

14. Disconnect plug connections **S054** and **M004**.

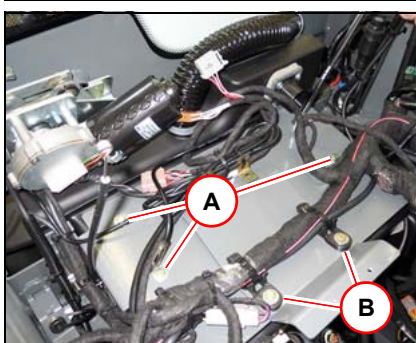


Fig. 7

15. Remove wiring harness mount **B**.

16. Remove fastening screws **A** and take off cover.

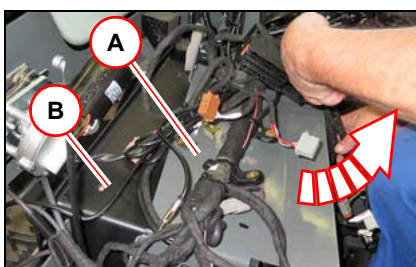
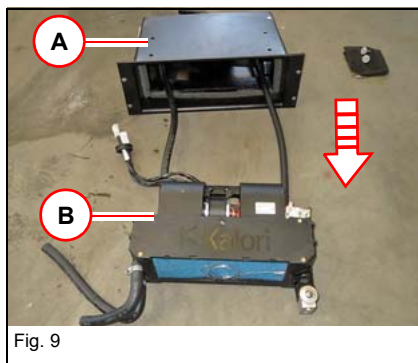


Fig. 8

17. Carefully pull cover **A** out from under the wiring harness.

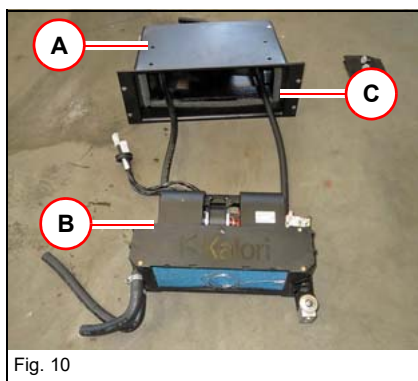
18. Take out heater/air conditioning system **B**.



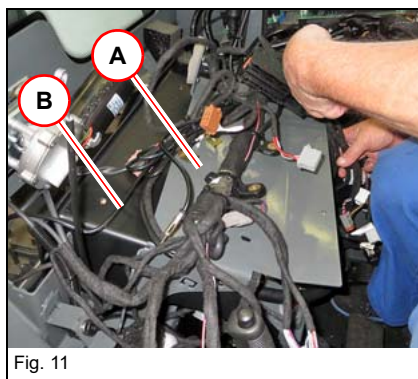
19. Pull the heater/air conditioning system **B** out from the housing **A**.
20. Dismantle the hose lines.

Install heater / air conditioning system

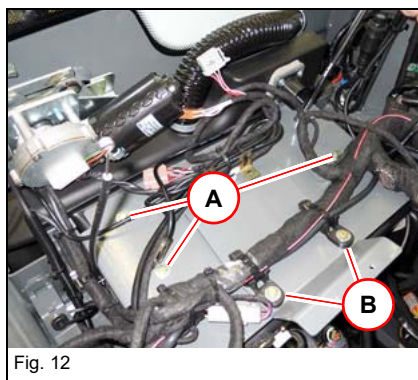
1. Stick on new sealing tape **C** to the housing **A**.
2. Mount hose pipes on the heater/air conditioning system **B**.
3. Insert the heater/air conditioning unit **B** into the housing **A**.



4. Position the heater/air conditioning unit **B** together with the cover **A** in the cab.



5. Tighten fastening screws **A** and **B**.



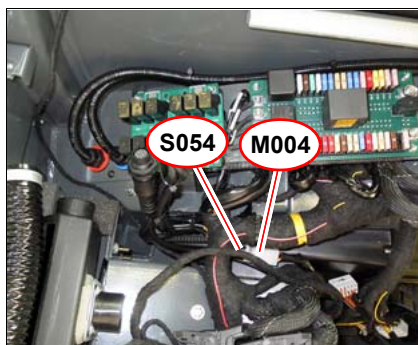


Fig. 13

6. Connect plug connections **S054** and **M004**.

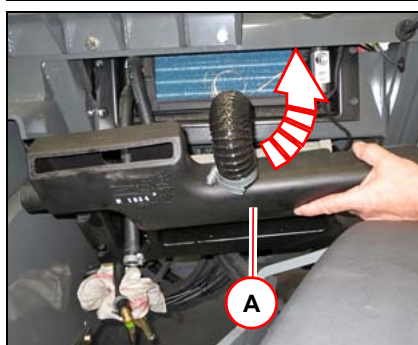


Fig. 14

7. Insert air distributor **A** from the front on the cab.

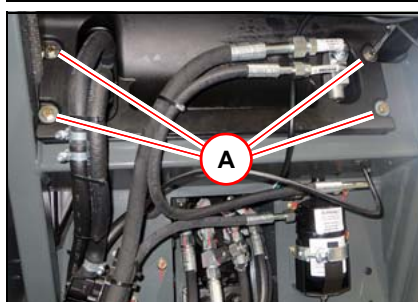


Fig. 15

8. Install fastening screws **A** on the air distributor.

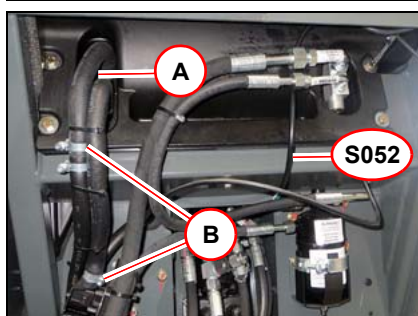


Fig. 16

9. Push the drain hose **A** out from the cab interior.

10. Connect hoses **A** and tighten clips **B**.

11. Connect plug connections **S052** on the dehumidifier.

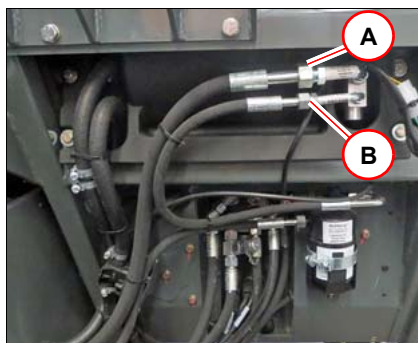


Fig. 17

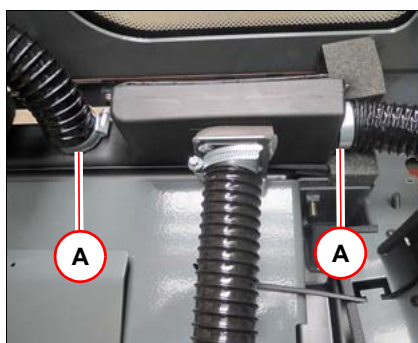


Fig. 18

12. Install air conditioning lines **A** and **B**.

13. Affix heater hoses and tighten clips **A**.

14. Mount controller **N004** – see ["Remove/install cab controller" on page 9-50](#).

15. Install the instrument panel – see ["Remove/install front instrument panel" on page 9-12](#).

16. Install the steering column – see ["Remove/install steering column" on page 7-21](#).

17. Install cabin front maintenance cover – see ["Remove/install cab front trim" on page 12-16](#).

18. Add coolant – see ["Adding coolant" on page 1-69](#).

19. Fill air conditioning system – see ["Emptying/filling the air conditioning system" on page 1-115](#).

20. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).

21. Start the vehicle to warm it up.

22. Set the heating to the highest setting in order to vent the system.

23. Check the coolant level – see ["Checking the coolant level" on page 1-68](#).

15.2 Air conditioning compressor Y031

Safety instructions for air conditioning compressor



Information

Before starting work, take safety and instructions into consideration

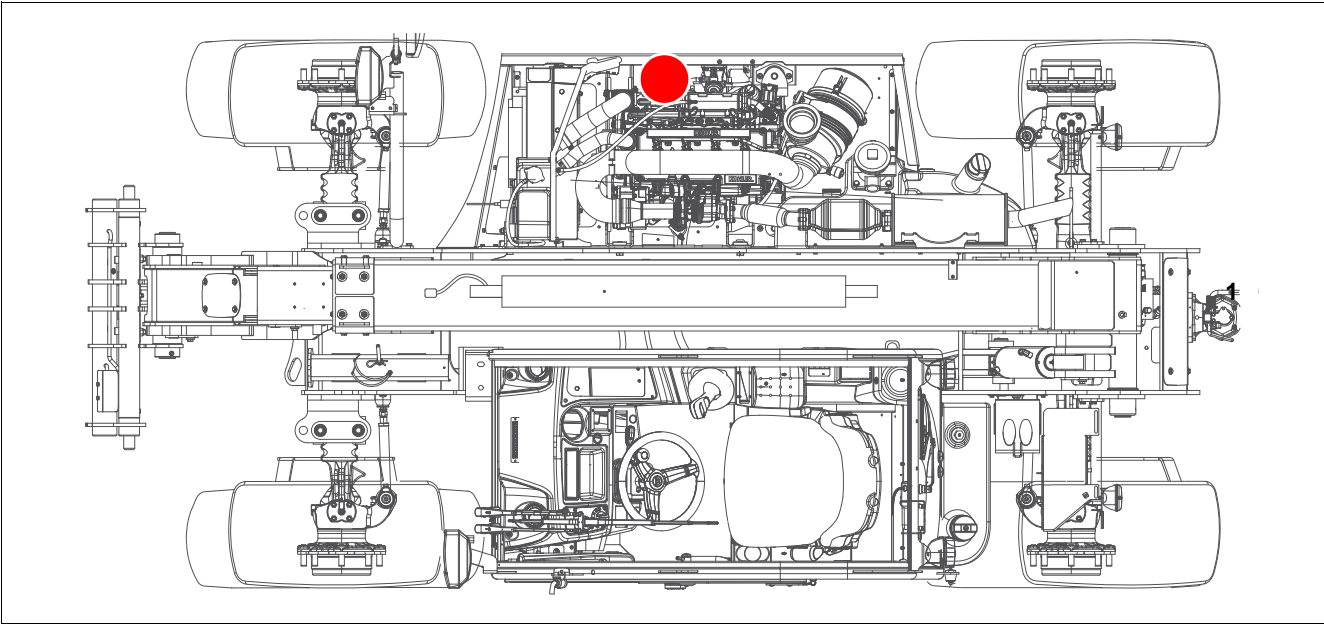
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install air conditioning compressor

Tools:

- Air conditioning service centre
- Plugs (different sizes) to close hoses
- Standard tools

Technical data



Weight	BMK	Description	Remarks
7.5 kg (17 lb)	Y031	Air conditioning compressor	—
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

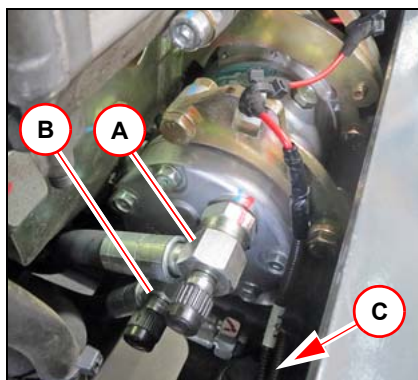


Fig. 19

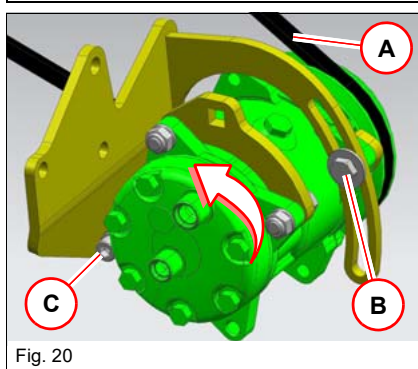


Fig. 20

Remove air conditioning compressor

1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
2. Remove the V-belt cover.
3. Empty the air conditioning system – see *"Emptying/filling the air conditioning system" on page 1-115*.
4. Loosen the screw connections **A** and **B** and remove the hoses.
5. Close and seal the openings.
6. Disconnect the connector **C**.
7. Remove tensioning screw **B** and take belts **A** off.
8. Remove the fastening screw **C**.
9. Take out air conditioning compressor to the front and up out fo the engine bay.

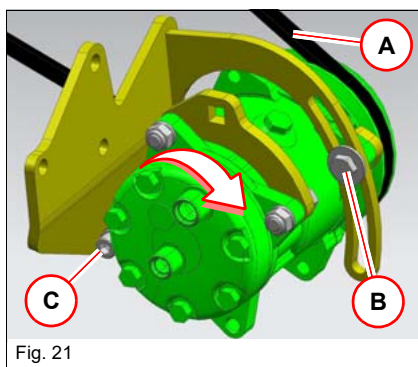


Fig. 21

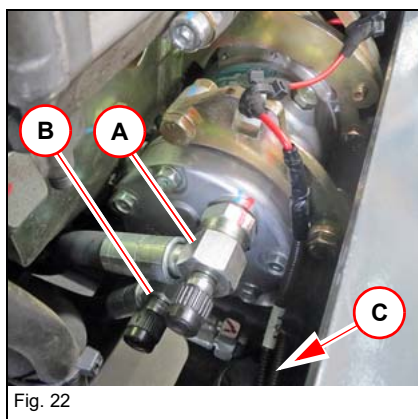


Fig. 22

Install air conditioning compressor

1. Position air conditioning compressor on the diesel engine.
2. Install fastening screw **C**.
3. Place belts **A** and insert tensioning screw **B** hand-tight.
4. Tighten belt – see *"Checking/re-tensioning the V-belt air conditioning (opt)" on page 1-87*.
5. Tighten tensioning screw **B**.
6. Insert the connector **C**.
7. Position hose and tighten screw connections **B** to 25 Nm (18.4 lbf ft).
8. Position hose and tighten screw connections **A** to 35 Nm (25.8 lbf ft).
9. Install V-belt cover.
10. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
11. Fill air conditioning system – see *"Emptying/filling the air conditioning system" on page 1-115*.
12. Use the air conditioning service station to check that the air conditioning system does not leak.
13. Perform a functional check.

15.3 Air conditioning cooler (capacitor)

Safety instructions for air conditioning cooler (capacitor)



Information

Before starting work, take safety and instructions into consideration

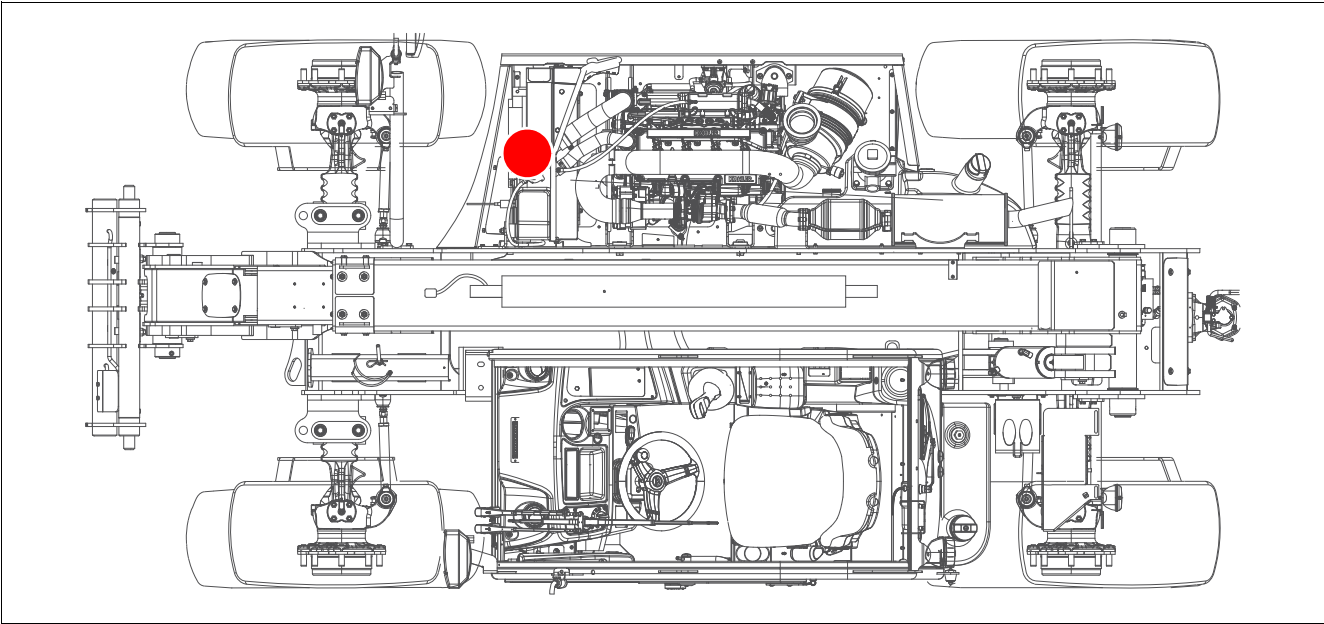
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install air conditioning cooler (condenser)

Tools:

- Air conditioning service centre
- Plugs (different sizes) to close hoses
- Standard tools

Technical data



Weight	BMK	Description	Remarks
5.0 kg (11 lb)	—	Air conditioning cooler	—
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

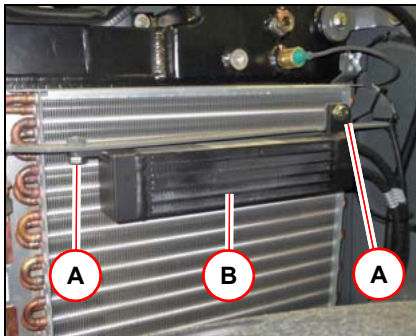


Fig. 23

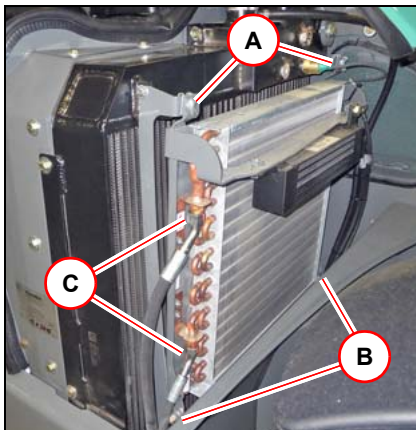


Fig. 24

Remove air conditioning cooler (capacitor)

1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
2. Empty the air conditioning system – see *"Emptying/filling the air conditioning system" on page 1-115*.
3. Remove fastening screws **A** on the fuel cooler **B**.
4. Place fuel cooler **B** to the side.
5. Release screw connections **C** and remove the hoses on the air conditioning cooler.
6. Open wing nuts **A**.
7. Remove fastening screws **B** on the air conditioning cooler frame and take out the air conditioning cooler.

Install air conditioning cooler (capacitor)

1. Position air conditioning cooler on the frame and tighten fastening screws **B**.
2. Position air conditioning hoses and tighten screw connections **C** underneath to 15 Nm (11.1 lbf ft) and above to 25 Nm (18.4 lbf ft).
3. Close wing nuts **A**.

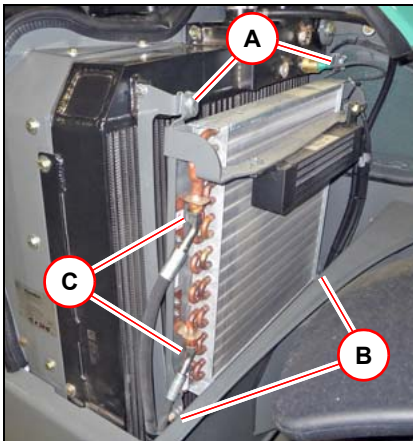


Fig. 25

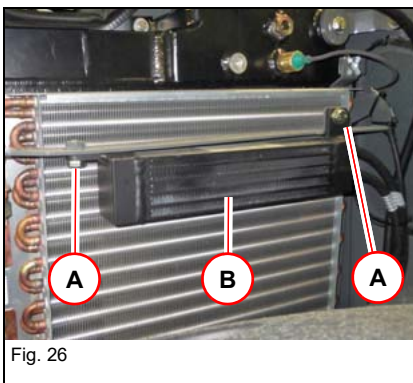


Fig. 26

4. Position fuel cooler **B** and insert fastening screws **A**.
5. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
6. Fill air conditioning system – see ["Emptying/filling the air conditioning system" on page 1-115](#).
7. Use the air conditioning service station to check that the air conditioning system does not leak.
8. Perform a functional check.

15.4 Dehumidifier

Safety instructions for the dehumidifier



Information

Before starting work, take safety and instructions into consideration

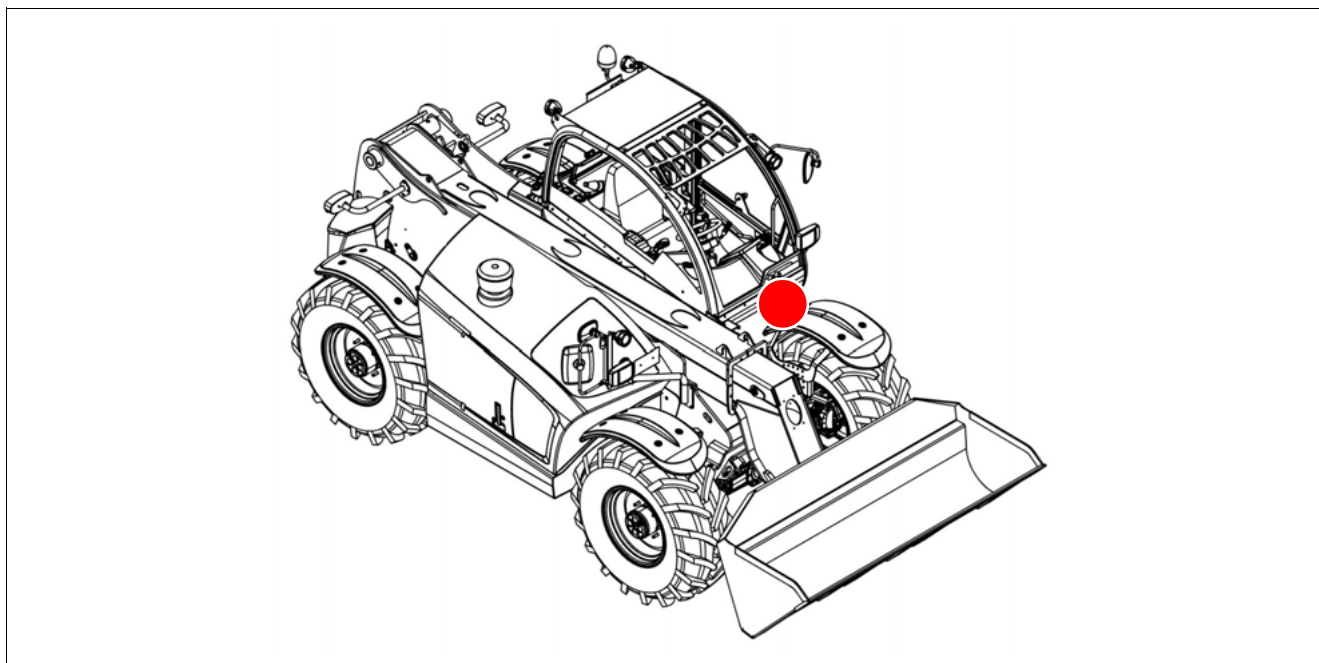
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove / install dehumidifier

Tools:

- Air conditioning service centre
- Plugs (different sizes) to close hoses
- Standard tools

Technical data



Weight	BMK	Description	Remarks
0.88 kg (2 lb)	–	Dehumidifier	–
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove the dehumidifier

1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
2. Remove cabin front maintenance cover – see *"Remove/install cab front trim" on page 12-16*.
3. Empty the air conditioning system – see *"Emptying/filling the air conditioning system" on page 1-115*.
4. Separate plug **A** from pressure accumulator.

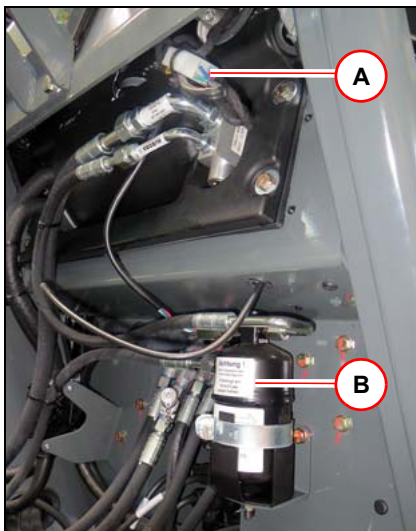


Fig. 27

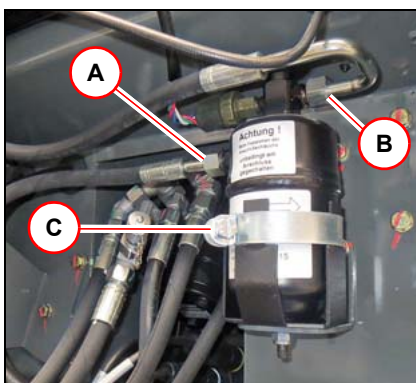


Fig. 28

5. Loosen the screw connections **A** and **B** and remove the hoses.
6. Release fastening clip **C** and remove dehumidifier.

Install the dehumidifier

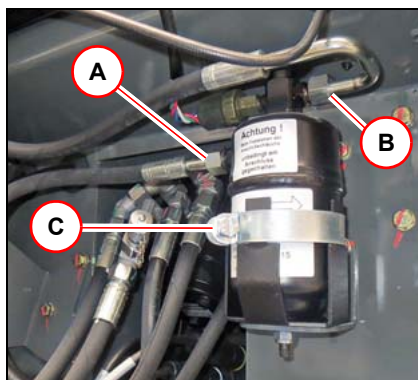


Fig. 29

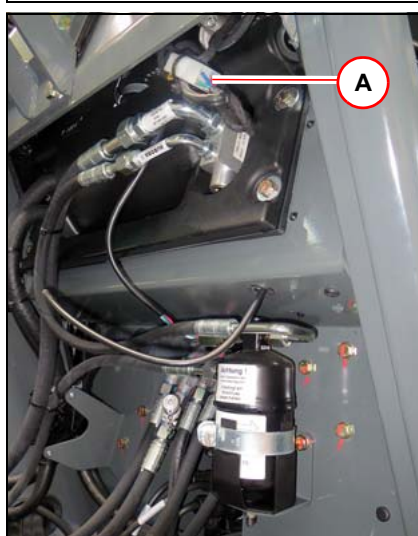


Fig. 30

1. Position dehumidifier and tighten fastening clip **A**.
2. Position climate hose **A** and tighten screw connections to 28 Nm (21 lbf ft).
3. Position climate hose **B** and tighten screw connections to 28 Nm (21 lbf ft).
4. Plug in connector **A**.
5. Fill air conditioning system – see *"Emptying/filling the air conditioning system" on page 1-115*.
6. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
7. Use the air conditioning service station to check that the air conditioning system does not leak.
8. Perform a functional check.

17 Automatic coupling

17.1 Autohitch

Safety instructions for autohitch



WARNING

Crushing hazard! Assembly and maintenance operations on raised but not secured boom.

Causes serious injury or death!

- ▶ Place the telescopic boom on a firm support and in a way that no pressure is applied.



WARNING

Burn and injury hazard!

Burn and injury hazard when working next to hot and/or pressurized hydraulic components!

- ▶ Allow the hydraulic system to cool down before removing components
- ▶ Wear protective gloves

NOTICE

In order to ensure that the hydraulics function smoothly, all work must be executed carefully and cleanly.

- ▶ Before removing, thoroughly clean the parts of the machine where assembly work is to be performed.
- ▶ Clean all the hydraulic screw connections and ports before disassembly.



Environment

Use a suitable container to collect the hydraulic oil as it drains off and dispose of it in an environmentally friendly manner!



Information

Before starting work, take safety and instructions into consideration

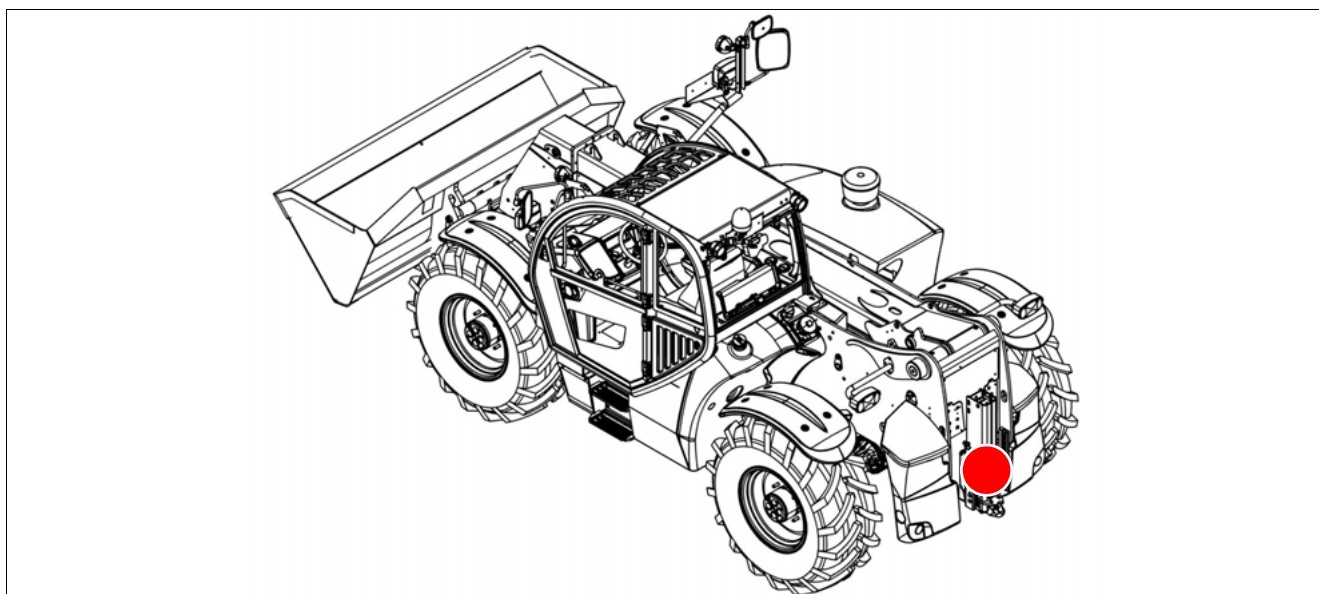
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Removing/installing the autohitch

Tools:

- Hexagonal pins SW17, max. 25 mm long (0.98 in)
- Suitable lifting gear
Load-bearing capacity minimum 130 kg (287 lb)
- Suitable receptacle for collecting the hydraulic oil
- Plugs (different sizes) for closing the oil lines
- Standard tools

Technical data



Weight	BMK	Description	Remarks
128 kg (282 lb)	—	Auto-Hitch	—
For non-specified tightening torques, see chapter "Introduction/tightening torques"			

Remove autohitch

1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3.*
2. Open the cover – see *"Rear of machine" on page 1-25.*
3. Separate plug **A** of sensor cable and pull through the connection plate.

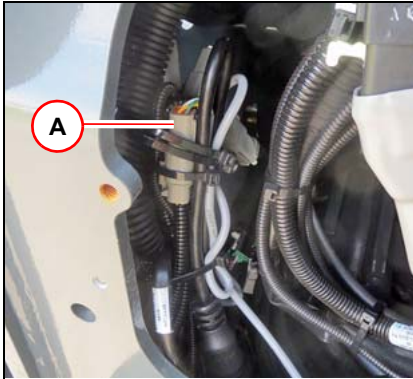


Fig. 1

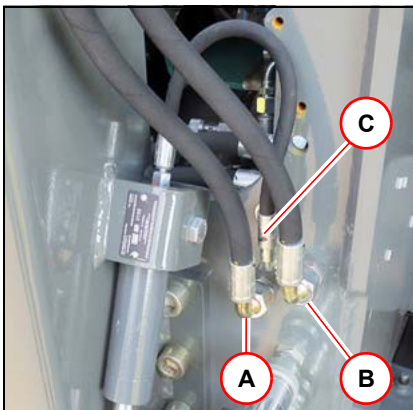


Fig. 2

4. Release screw connections **A**, **B** and **C** and remove hydraulic hoses.
5. Tightly seal all openings.

Rear hydraulic connections:

6. Take off overflow oil container **B** and unscrew the hydraulic connection **A**.

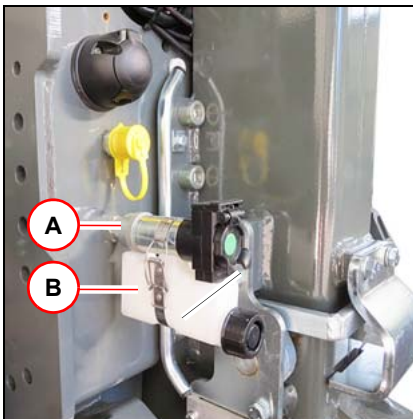


Fig. 3

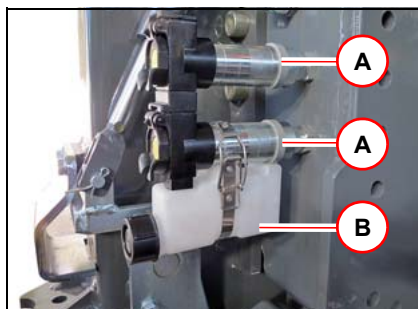


Fig. 4

7. Take off overflow oil container **B** and unscrew the hydraulic connections **A**.

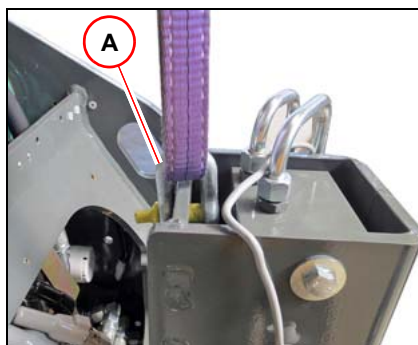


Fig. 5

8. Secure the autohitch **A** with suitable lifting gear.

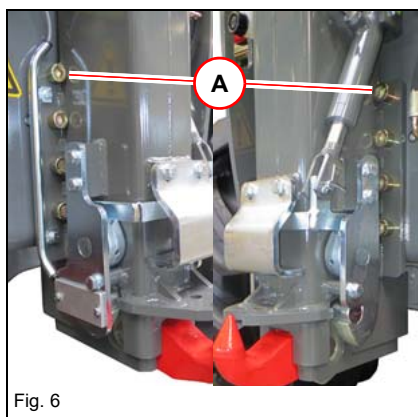


Fig. 6

9. Remove all fastening screws **A** left and right and autohitch.

Install autohitch

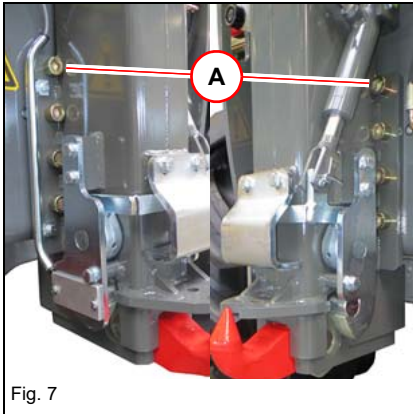


Fig. 7

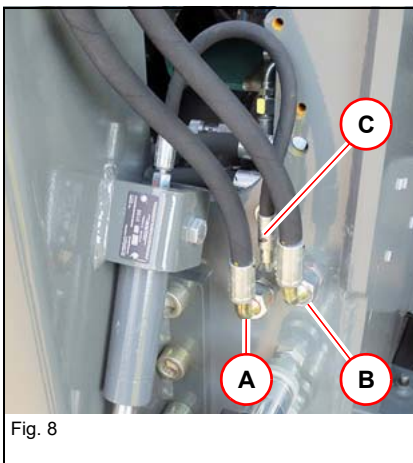


Fig. 8

1. Hang autohitch on suitable lifting gear and position on the frame.
2. Mount fastening screws **A** (left and right) with Loctite® 243 and tighten to 395 Nm (291 lbf ft).

3. Position hydraulic hose **A** and **B** and tighten with union nuts to 50 Nm (37 lbf ft).
4. Position hydraulic hose **C** and tighten union nuts to 18 Nm (13 lbf ft).

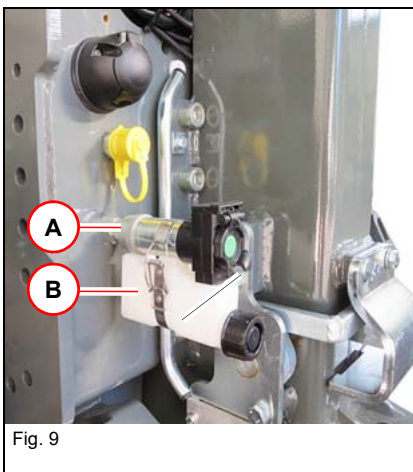


Fig. 9

Rear hydraulic connections:

5. Screw in and tighten hydraulic connection **A**.
6. Mount overflow oil container **B**.

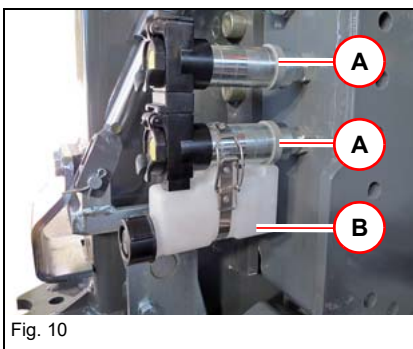


Fig. 10

7. Screw in and tighten hydraulic connections **A**.
8. Mount overflow oil container **B**.

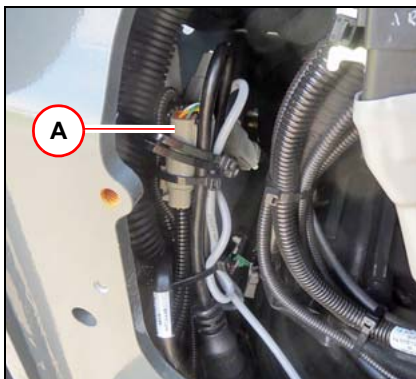


Fig. 11

9. Pull the sensor cable through the connecting plate.
10. Connect sensor cable plug **A**.
11. Open the cover – see *"Rear of machine" on page 1-25*.
12. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
13. Check the autohitch for leaks and correct function.

Change bolt A

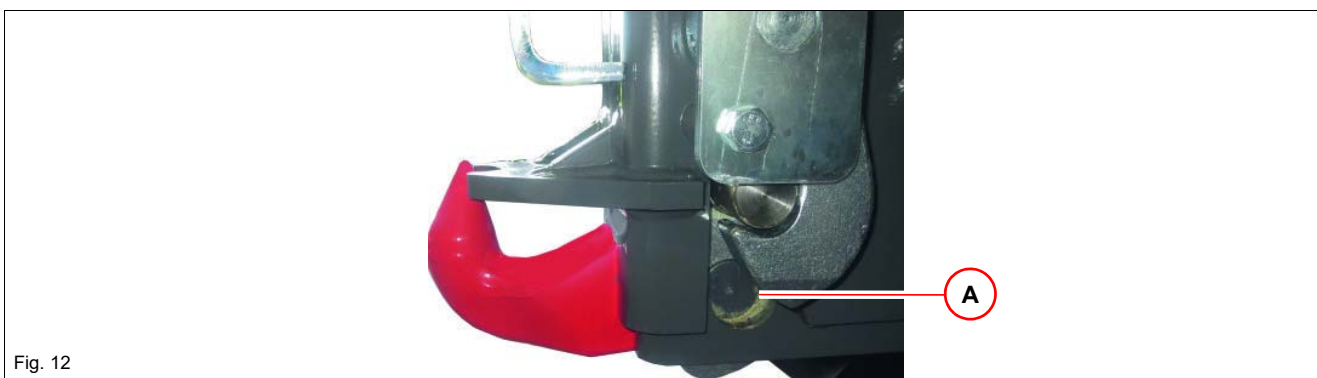


Fig. 12

Preparatory work

1. Park the vehicle on firm and level ground.
2. Apply the parking brake.
3. Lower autohitch approx. 30 – 40 cm (approx. 12 – 16 in).
4. Stop and park the vehicle.
5. Switch off the starter and remove the starting key.
6. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.

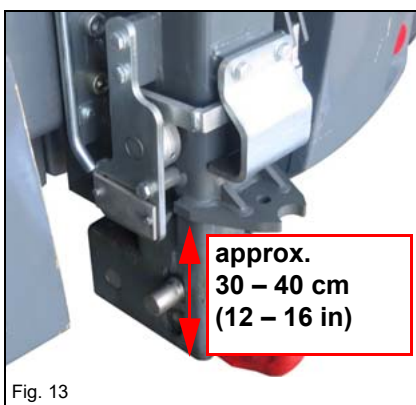
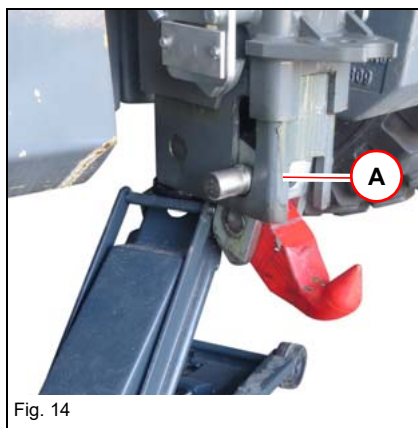
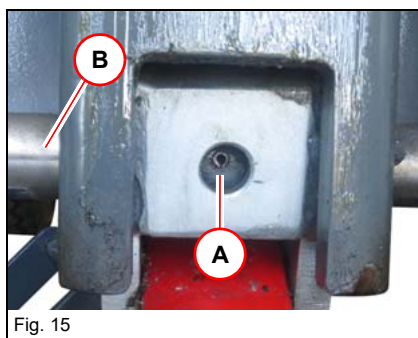


Fig. 13

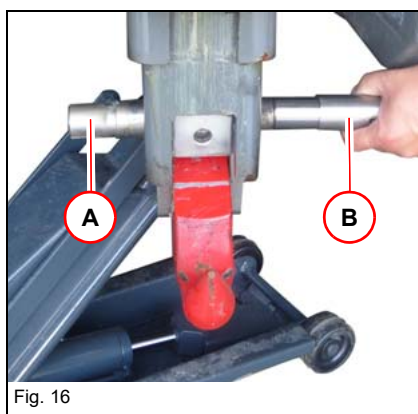
approx.
30 – 40 cm
(12 – 16 in)



7. Press autohitch **A** upward as far as it goes using a suitable jack.



8. Remove safety pin **A** from securing pin **B** using a suitable tool.



9. Press out old pin **A** using new pin **B**.

Install the new pin B

1. Position the new pins until the magnet **A** is in the pins **B** in the upper position.

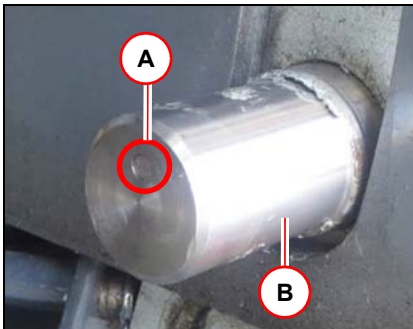


Fig. 17

2. Push in the pin until the drill hole in the pin aligns with drill hole **A** of the autohitch.

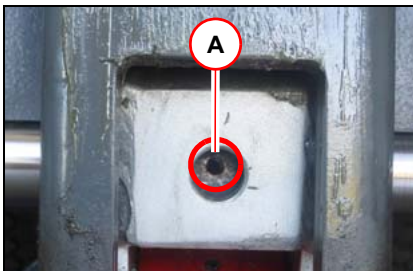


Fig. 18

3. Mount new safety pin **A**.

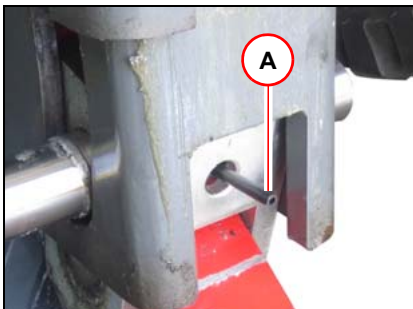


Fig. 19

4. Drain the jack **A** remove the jack **A**.
5. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
6. Check the autohitch for leaks and correct function.

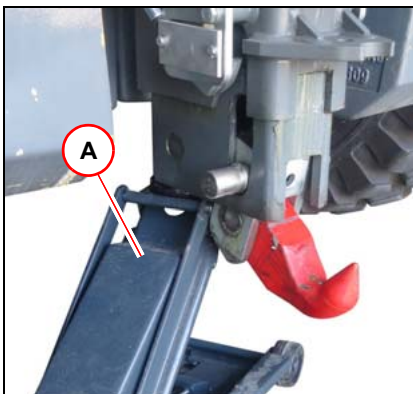


Fig. 20

Replacing the sensor plate and counterbracket

1. Open the cover – see ["Rear of machine" on page 1-25](#).
2. Separate plug **A** of sensor cable and pull through the connection plate.

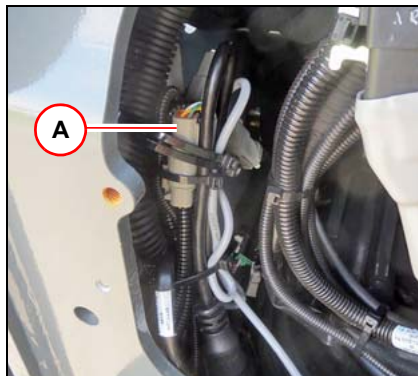


Fig. 21

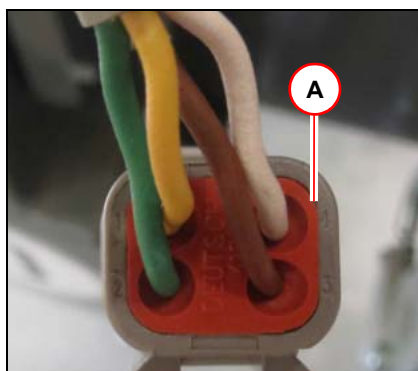


Fig. 22

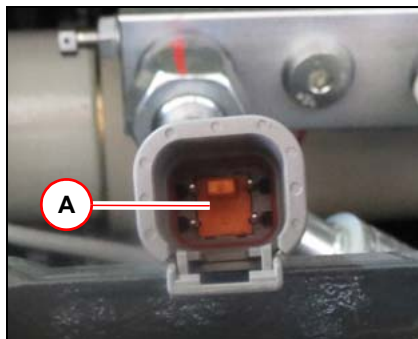


Fig. 23

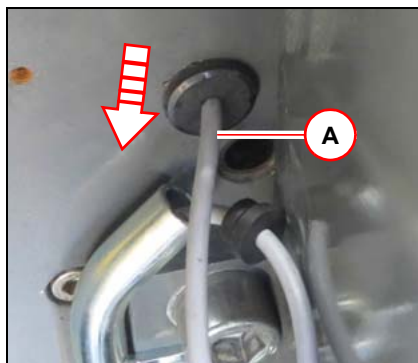
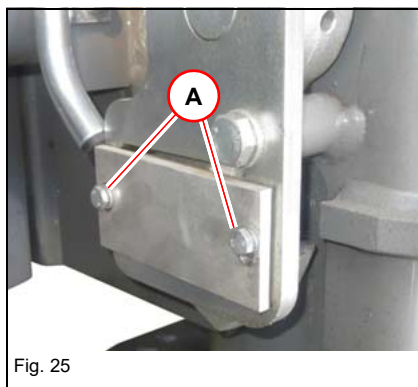
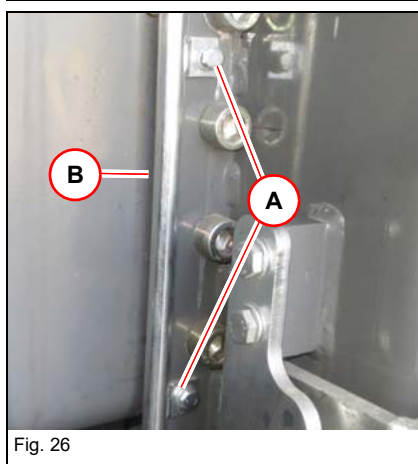


Fig. 24

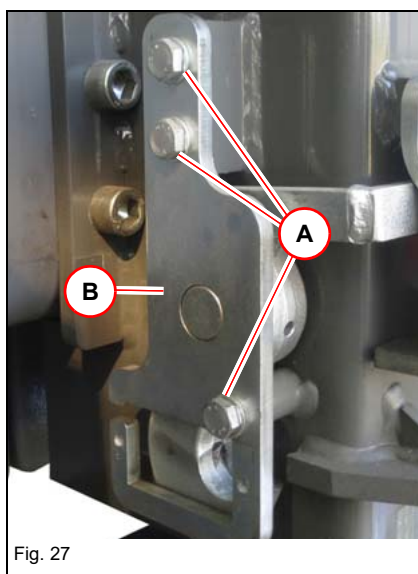
3. Make a note of the pin assignment of the sensor connector **A**.
4. Pull out fuse **A** from the sensor plug and weave the cable cores.
5. Carefully pull sensor cable **A** out of the rubber grommet at the rear of the machine.



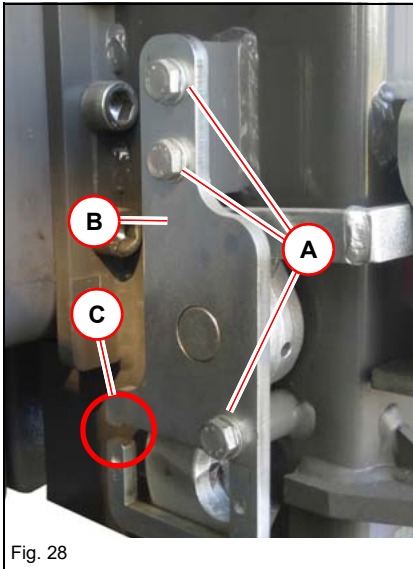
6. Remove fastening screws **A** from the sensor plate and take out.



7. Remove screws **A** and take out protective tube **B**.



8. Remove fastening screws **A** and take out retainer **B**.



9. Position new retainer **A** and tighten screws **B** with washers.



Information

Ensure that they are placed in the correct position!

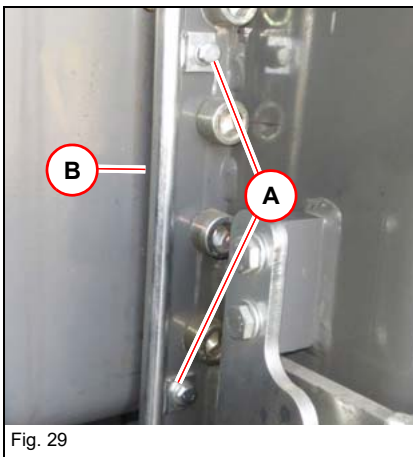
Opening **C** must point towards the rear of the machine!



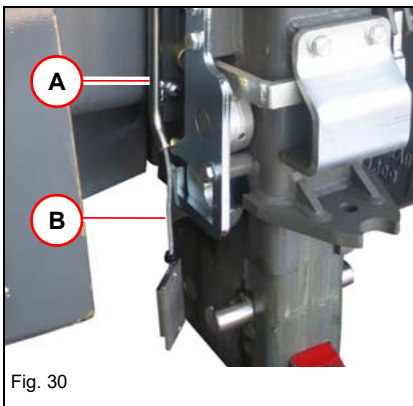
Information

The counter-holder must make full contact!

If this is not the case, the counter holder **A** must have spacer washers placed under it!



10. Position protective tube **A** and tighten the new screws **B** with new washers using Loctite®243.



11. Pull sensor cable **B** up through the protective tube **A**.

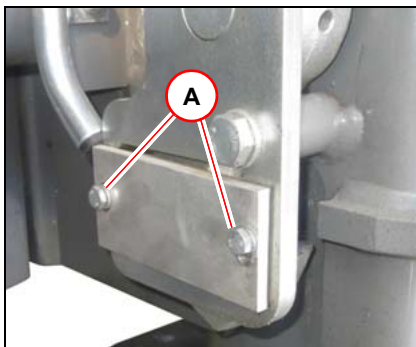


Fig. 31

12. Position sensor plate **A** and tighten new screws **B** with new washers.

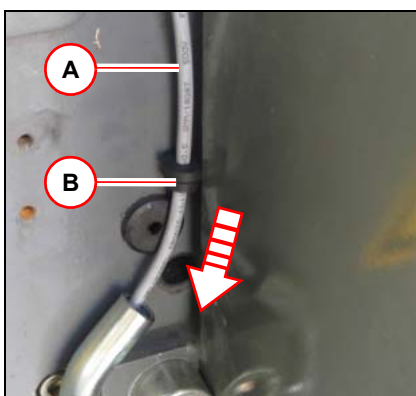


Fig. 32

13. Attach new rubber grommets **B** to the sensor cable **B**.

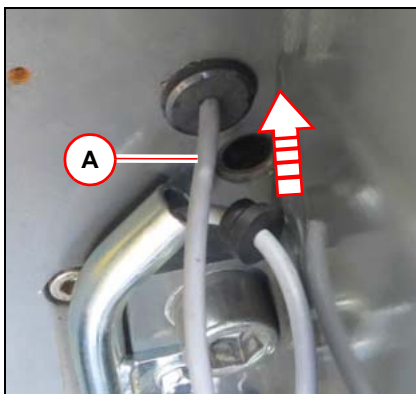


Fig. 33

14. Pull the sensor cable **A** through the rubber grommets to the rear of the vehicle.

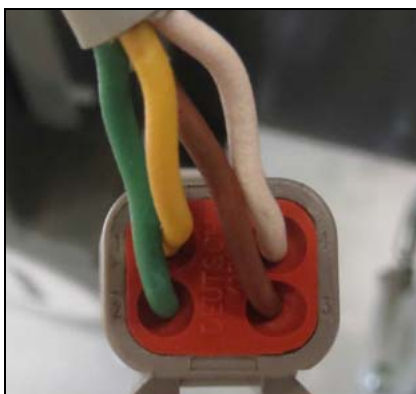


Fig. 34

15. Mount cable cores at the previously noted plug position.

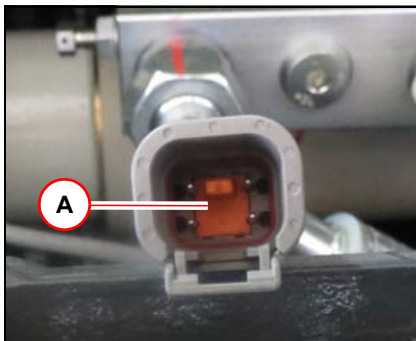


Fig. 35

16. Mount fuse **A** in the sensor plug.

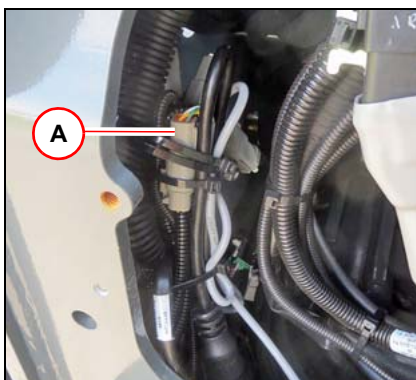


Fig. 36

17. Insert plug **A** of the sensor.



Fig. 37

18. Insert rubber grommets **A** at the top in the protective tube.

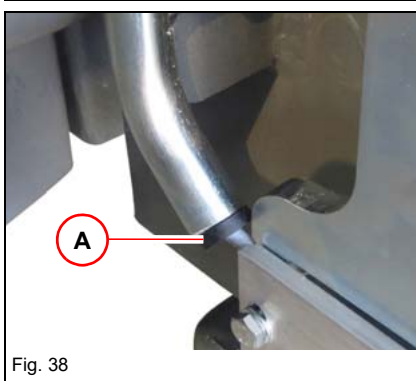


Fig. 38

19. Insert lower rubber grommets **A** into the protective tube.

20. Close cover – see ["Rear of machine" on page 1-25](#).

21. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).

22. Check the sensor for correct function and adjust it as required.

➔ See in SHB Chapter 8 Setting the sensor plate.

17.2 Height adjustable ball hitches

Safety instructions for height-adjustable trailer coupling



Information

Before starting work, take safety and instructions into consideration

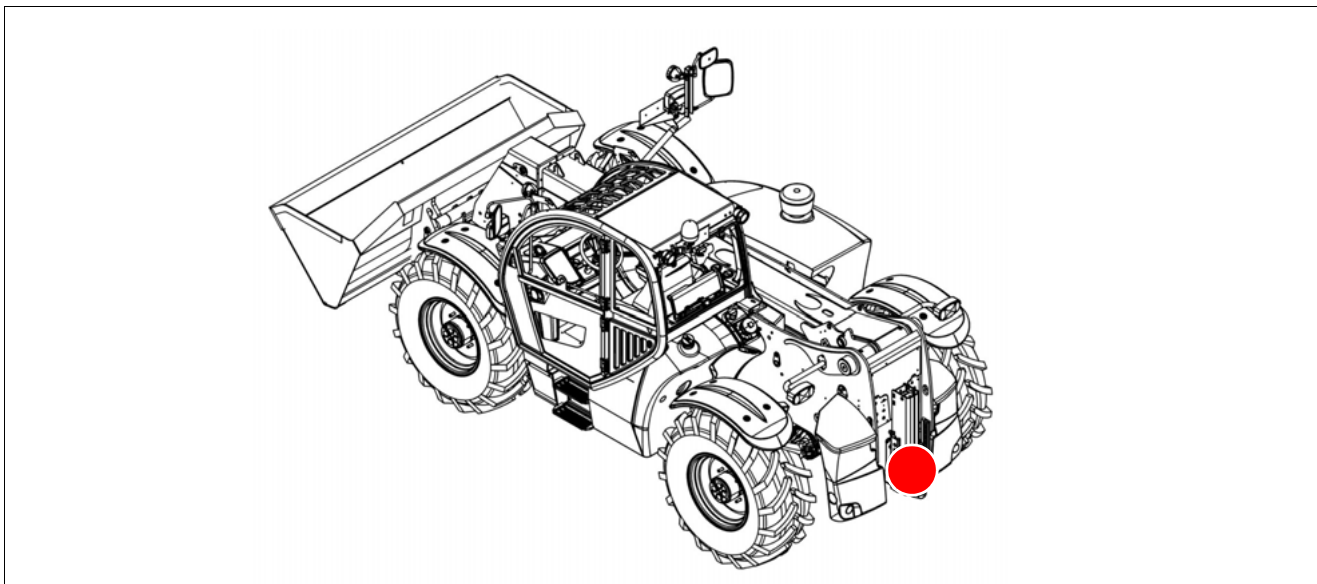
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install height-adjustable trailer coupling

Tools:

- Suitable lifting gear, load-bearing capacity min. 50 kg (110 lb)
- Standard tools

Technical data



Weight	BMK	Description	Remarks
45 kg (99.2 lb)	–	Tow coupling	Height-adjustable
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Remove height-adjustable trailer coupling

1. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
2. Hook height-adjustable trailer coupling to suitable lifting tackle.
3. Remove all fastening screws **A** and take off trailer coupling.

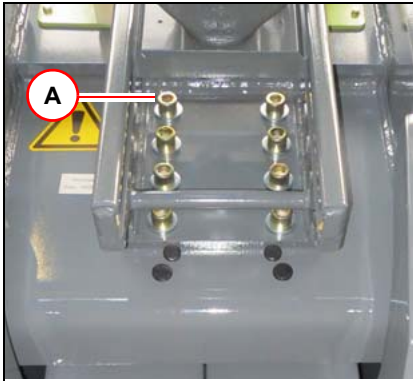


Fig. 39

Install height-adjustable trailer coupling

1. Hook height-adjustable trailer coupling to suitable lifting tackle.
2. Position the trailer coupling and tighten all fastening screws **A** to 560 Nm (413 lbf ft).
3. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).

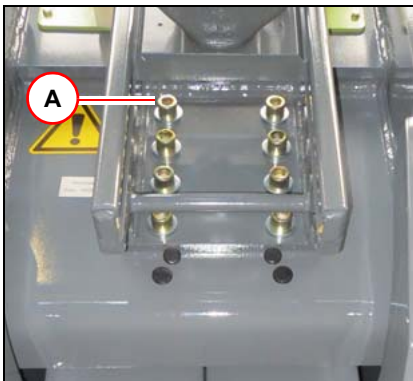


Fig. 40

17.3 Automatic / pivotable trailer coupling

Safety instructions for automatic / pivotable trailer coupling



Information

Before starting work, take safety and instructions into consideration

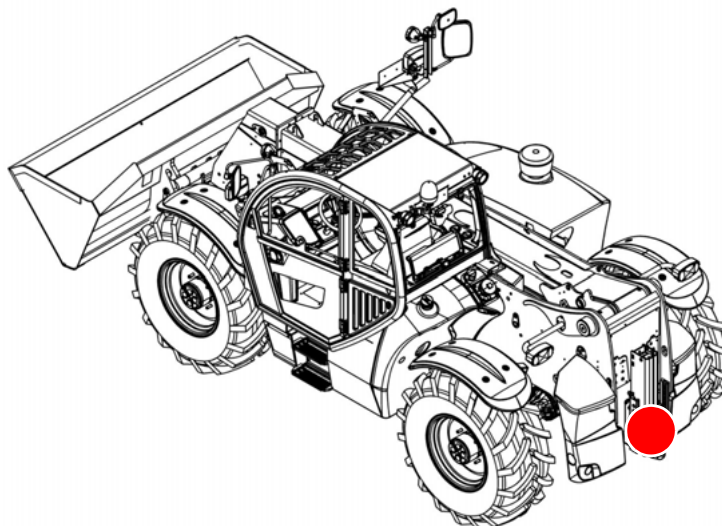
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove/install automatic / pivotable trailer coupling

Tools:

- Standard tools

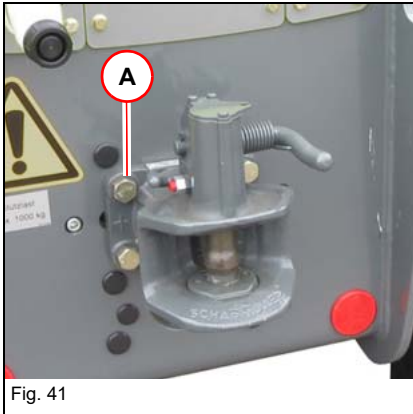
Technical data



Weight	BMK	Description	Remarks
15.5 kg (34.2 lb)	—	Trailer coupling	Automatic/pivotable
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

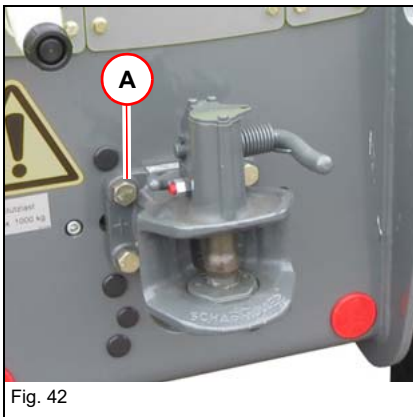
Remove automatic / pivotable trailer coupling

1. Switch off battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.
2. Remove all fastening screws **A** and take off trailer coupling.



Install automatic / pivotable trailer coupling

1. Position the automatic/rotating trailer coupling.
2. Tighten all fastening screws **A** to 195 Nm (143.8 ftlb).
3. Switch on battery master switch **S008** – see *"Battery master switch S008" on page 1-3*.



17.4 Tow coupling

Safety instructions for the tow coupling



Information

Before starting work, take safety and instructions into consideration

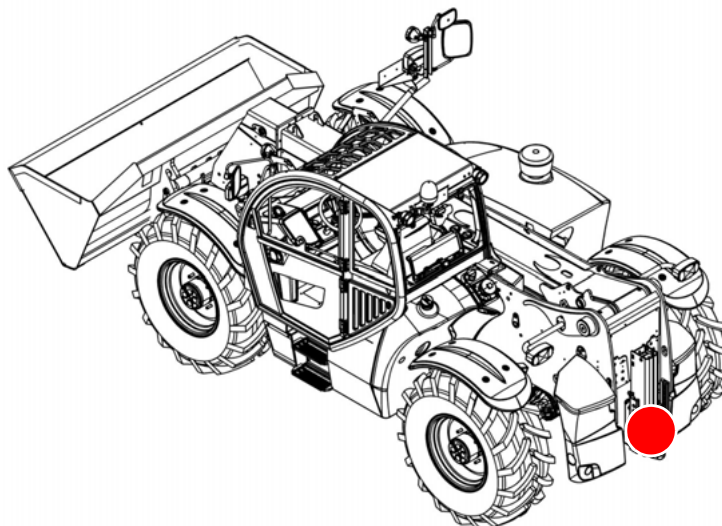
- see *"Notes on the repair manual" on page E-1,*
- see *"Safety instructions" on page E-6,*
- see *"Maintenance preparations, instructions" on page 1-1!*

Remove / install tow coupling

Tools:

- Standard tools

Technical data



Weight	BMK	Description	Remarks
5.5 kg (12.1 lb)	—	Tow coupling	—
For non-specified tightening torques, see chapter “Introduction/tightening torques”			

Disassemble

1. Switch off battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).
2. Remove fastening screws **A** and take off break-down coupling.

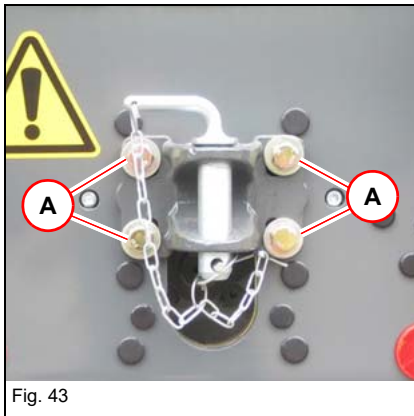


Fig. 43

Install

1. Position tow coupling.
2. Tighten fastening screws **A** to 195 Nm (143.8 lbf ft).
3. Switch on battery master switch **S008** – see ["Battery master switch S008" on page 1-3](#).

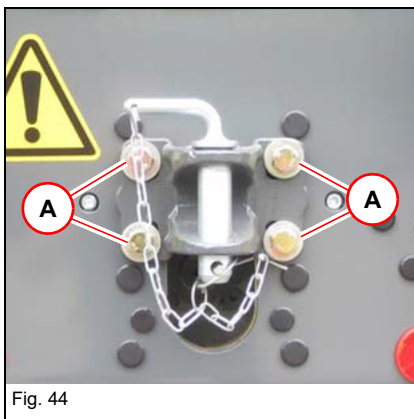


Fig. 44

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Technical data, dimensions and weights are only given as an indication. Responsibility for errors or omissions not accepted.

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