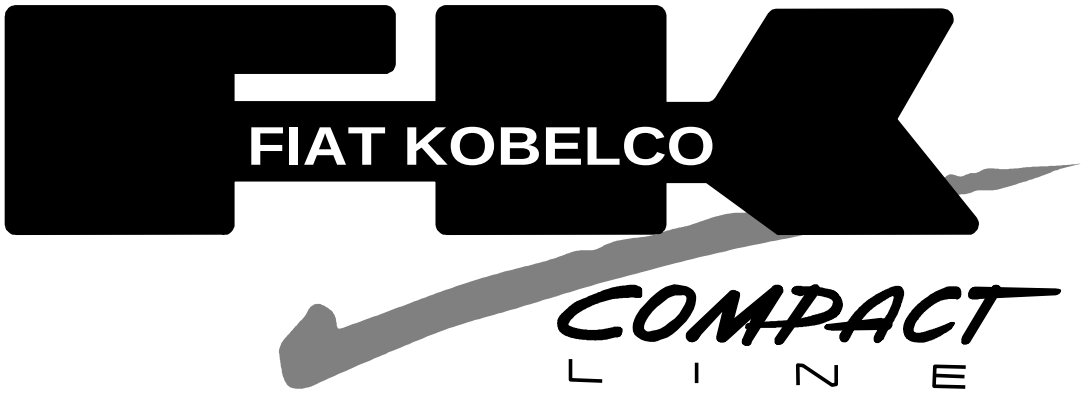


W50 / W60 / W70

Wheel Loader

TECHNICAL HANDBOOK

Publication no. 604.06.995.02 issue 07/02

Persons accompanying the driver must be seated on the passenger seats provided for this purpose.

When crossing underpasses, bridges and tunnels or when passing under overhead lines always make sure that there is is sufficient clearance.

Always keep at a distance from the edges of building pits and slopes.

Avoid any operation that might be a risk to machine stability.

Never travel across slopes; always keep the working equipment and the load close to the ground, especially when travelling downhill.

On sloping terrain always adapt your travelling speed to the prevailing ground conditions. Never change to a lower gear on a slope but always before reaching it.

Before leaving the driver's seat always secure the machine against inadvertent movement and unauthorized use.

MAINTENANCE, SAFETY INSTRUCTIONS

Observe the adjusting, maintenance and inspection activities and intervals set out in the operating instructions, including information on the replacement of parts and equipment. These activities may be executed by skilled personnel only.

Brief operating personnel before beginning special operations and maintenance work, and appoint a person to supervise the activities.

In any work concerning the operation, conversion or adjustment of the machine and its safety-oriented devices or any work related to maintenance, inspection and repair, always observe the start-up and shut-down procedures set out in the operating instructions and the information on maintenance work.

Ensure that the maintenance area is adequately secured.

If the machine is completely shut down for maintenance and repair work, it must be secured against inadvertent starting by:

- removing the ignition key and
- attaching a warning sign.

Carry out maintenance and repair work only if the machine is positioned on stable and level ground and has been secured against inadvertent movement and buckling.

To avoid the risk of accidents, individual parts and large assemblies being moved for replacement purposes should be carefully attached to lifting tackle and secured. Use only suitable and technically perfect lifting gear and suspension systems with adequate lifting capacity. Never work or stand under suspended loads.

The fastening of loads and the instructing of crane operators should be entrusted to experienced persons only. The marshaller giving the instructions must be within sight or sound of the operator.

For carrying out overhead assembly work always use specially designed or otherwise safety-oriented ladders and working platforms. Never use machine parts as a climbing aid.

FIAT KOBELCO

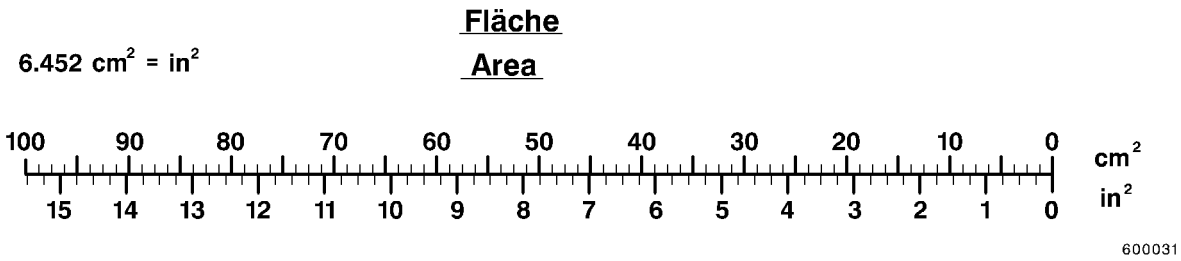
COMPACT LINE

SERVICE DATEN
SERVICE DATA
Allgemein
General

2 800 990.00 de/en

Umrechnung von Flächenmaßen
Conversion for units of area

Fläche Area	in^2	ft^2	yd^2	sqmile	acre	cm^2	m^2
1 square inch (Quadratzoll)	1	0,0069				6,4516	
1 square foot (Quadratfuß)	144	1	0,111			929,03	0,0929
1 square yard (Quadratyard)	1 296	9	1		0,00021	8361,3	0,8361
1 square mile (Quadratmeile)				1	640		
1 acre		43 560	4 840	0,00156	1		4 046,9
1 cm^2	0,1550					1	0,0001
1 m^2	1 550,0	10,764	1,1960			10 000	1



Umrechnungstabelle für Druckeinheiten von Gasen, Dämpfen und Flüssigkeiten

2801094

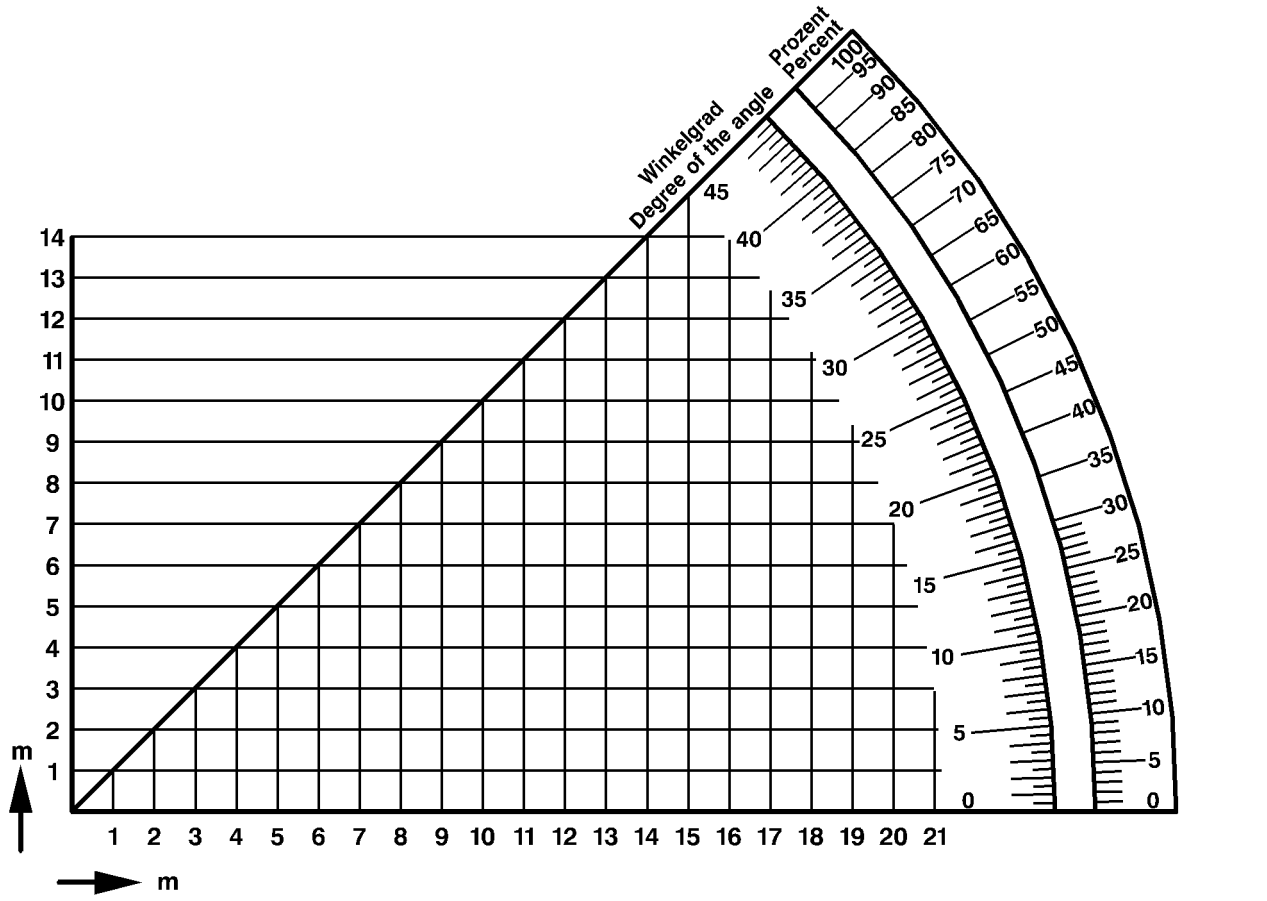
Conversion table for units of pressure in gases, steam and fluids

mit 1 Pa = 1 N/m^2 = $\frac{1}{9{,}81}$ kp/m^2 = 0,102 kp/m^2

	Pa	bar	kp/m^2	at	atm	Torr
1 Pa (= 1 N/m^2) =	1	10^{-5}	0,102	0,102 x 10^{-4}	0,987 x 10^{-5}	0,0075
1 bar (= 0,1 MPa) =	100 000 = 10^5	[1] (= 1000 mbar)	10 200	1,02	0,987	750
1 kp/m^2 =	9,81	9,81 x 10^{-5}	1	10^{-4}	0,968 x 10^{-4}	0,0736
1 at (= 1 kp/cm^2) =	98 100	0,981	10 000	1	0,968	736
1 atm (= 760 Torr) =	101 325	1,013 (= 1013 mbar)	10 330	1,033	1	760
1 Torr (= $\frac{1}{760}$ atm) =	133	0,00133	13,6	0,00136	0,00132	1

BERECHNUNGSBEISPIELE
CALCULATION EXAMPLES

Steigungswinkel
Angles of slope



600396

Fahrgeschwindigkeiten
Travel speeds

$$V = \frac{360}{t}$$

V = km/h
t = Sekunden auf 100 m
Seconds needed for 100 m

Beispiel: Bei einer konstanten Geschwindigkeit werden für eine Strecke von 100 m 18 Sekunden benötigt.

Example: At a constant speed, a travel time of 18 seconds is needed for a distance of 100 meters.

$$V_{(km/h)} = \frac{360}{18} = 20 \text{ km/h}$$

FIAT KOBELCO

COMPACT LINE

SERVICE DATA

W50

2 905 272.01 en

Variable pump (PAG = Primary unit)

	Unit	W50 No. 190 062 -
Type		Swashplate pump with over speed control
Model		A4VG40DA1D8/32R
Displacement	cc / rev.	40
Power requirement max.	kW	38.5
Drive		Direct from engine, i = 1.0
Operating speed (= rated speed of engine)	rpm	2300
Oil flow max.	l / min.	88.4
Displacement of the feed pump	cc / rev.	8.6

Triple hydraulic pump

	Unit	W 50 No. 190 062 -		
Function		**Working hydraulic and steering**	**fan**	**brake**
Type		Gear-type pump		
Displacement	cc / rev.	23	11	6
Drive		Direct drive from variable pump, i = 1.0		
Operating speed	rpm	2300	2300	2300
Oil flow (at operating speed)	l / min	50	24	13

Hydraulic cylinders

	Unit	W60 No. 218 038 -	
Function		**Lift cylinder**	**Tip cylinder**
Number of hydraulic cylinders		2	1
Rod - / piston - Ø	mm / mm	45 / 75	45 / 90
Stroke	mm	690	450

	Unit	W60 No. 218 038 -	
Function		**Steering cylinder**	**Cylinder for quick-hitch**
Number of hydraulic cylinders		1	1
Rod - / piston - Ø	mm / mm	32 / 70	25 / 50
Stroke	mm	300	75

Foreword

2800799

Anyone involved with commissioning, operating, inspecting and servicing the FH construction machine must read through and acquaint himself with the "OPERATING MANUAL" - and especially the Section "FUNDAMENTAL SAFETY INSTRUCTIONS" - before starting work.

The "Service Data" contains details which are important to the service staff. Data included in other parts of the general documentation have been left aside.

Data regarding auxiliary units for operating ancillary or special systems, as well as data on machines produced only in small numbers, have not been included.

Filling quantities are only approximate figures intended to help in stockholding the various fluids and agents. Each unit has appropriate checking systems, e.g. dipstick or checking screws, with which the exact filling level can be checked.

The Part Nos. given in the sections are not to be used when ordering spare parts. They are only intended to identify the component being referred to. When ordering spare parts, use only the Part Nos. given in the spare parts lists.

□

Tightening torque

		W70 No. 303 139 -
Wheel nut	Thread size **Tightening torque**	A 20-8 (M 20 x 1.5 / SW 27) **500 Nm**
Cardan shaft	Bolt size **Tightening torque**	M 8[1] / 10.9 / SW 13 **34 Nm** Hexagonal nut / M 8 - 10 / 251 793
Front axle mounting	Bolt size **Tightening torque**	M 24 / 8.8 / SW 36 **670 Nm**
Rear axle mounting (Pin mounting)	Bolt size **Tightening torque**	M 10[1] / 10.9 / SW 17 **68 Nm**
Variable pump-engine mounting	Bolt size **Tightening torque**	M 16[3] / 10.9 / SW 14 **250 Nm**
Variable motor-transfer mounting box gearing	Bolt size **Tightening torque**	M 12[1] / 8.8 / SW 19 **71 Nm**
Counter weight	Bolt size **Tightening torque**	M 20[1] / 8.8 / SW 30 **390 Nm**
Engine bracket	Bolt size **Tightening torque** Bolt size **Tightening torque** Bolt size **Tightening torque**	M 12 / 10.9 / SW 19 **140 Nm** M 14 / 8.8 / SW 22 **140 Nm** M 10 / 10.9 / SW 17 **80 Nm**

[1] Hex. hd. screw, lightly oiled

[2] Cyl. hd. screw, lightly oiled

[3] with liquid screw fixer

Principle: hydrostatic travel drive

2905285

To meet the demands of customers for optimum performance with simple operation and low-maintenance units in small to medium wheel loaders, they are equipped with hydrostatic drives.

In the W50 - W70 this is a self-contained system, comprising primarily a variable displacement pump (A3) driven direct by the diesel engine (1) and a hydraulic motor (A15) on the rear axle.

In neutral position (i.e. neither forward or reverse gear engaged) the driving pump (A3) is not swivelled out and pumps no pressure oil to the hydraulic motor (A15). The machine is stationary.

When the forward or reverse gear is engaged, the variable displacement pump (A3) swivels out in the corresponding direction and the hydraulic motor (A15) is provided with pressure oil on the required side. The machine moves forward or in reverse.

The control pressure which makes the driving pump (A3) swivel out is generated by the feed pump (A2). At the same time, oil gets from the feed circuit via the replenishing valves (A5) to the respective intake side of the variable displacement pump (A3) and thus compensates the leakages occurring in the high-pressure circuit.

Fig. 1 shows a simplified schematic diagram of a hydrostatic drive in a self-contained system.

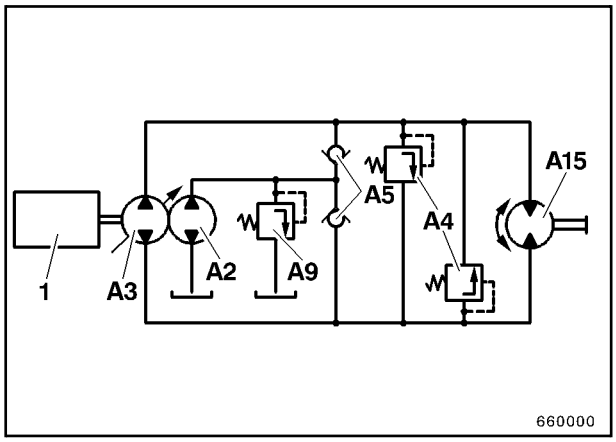


Fig. 1

Parts

1	-	Diesel engine - drives the system
A2	-	Feed pump - feeds the system with control and feed oil
A3	-	Travel pump, variable displacement pump provides the pressure oil for the hydraulic motor
A4	-	Pressure relief valves - limit the high pressure in the system
A5	-	Replenishing valves - allow for follow-up feeding
A9	-	Feed pressure relief valve - limits the feed pressure
A15	-	Reversible hydraulic motor - drives the machine

N.B.:

The diagram in Fig. 1 is highly simplified and serves only to explain the functioning principle.

Explanation of terms

High pressure: Pressure generated by the travel pump to drive the hydraulic motor.

Feed pressure: Pressure generated by the feed pump.

Control pressure: Pressure needed to swivel out the travel pump.

High-pressure relief valve (A4), deblockable

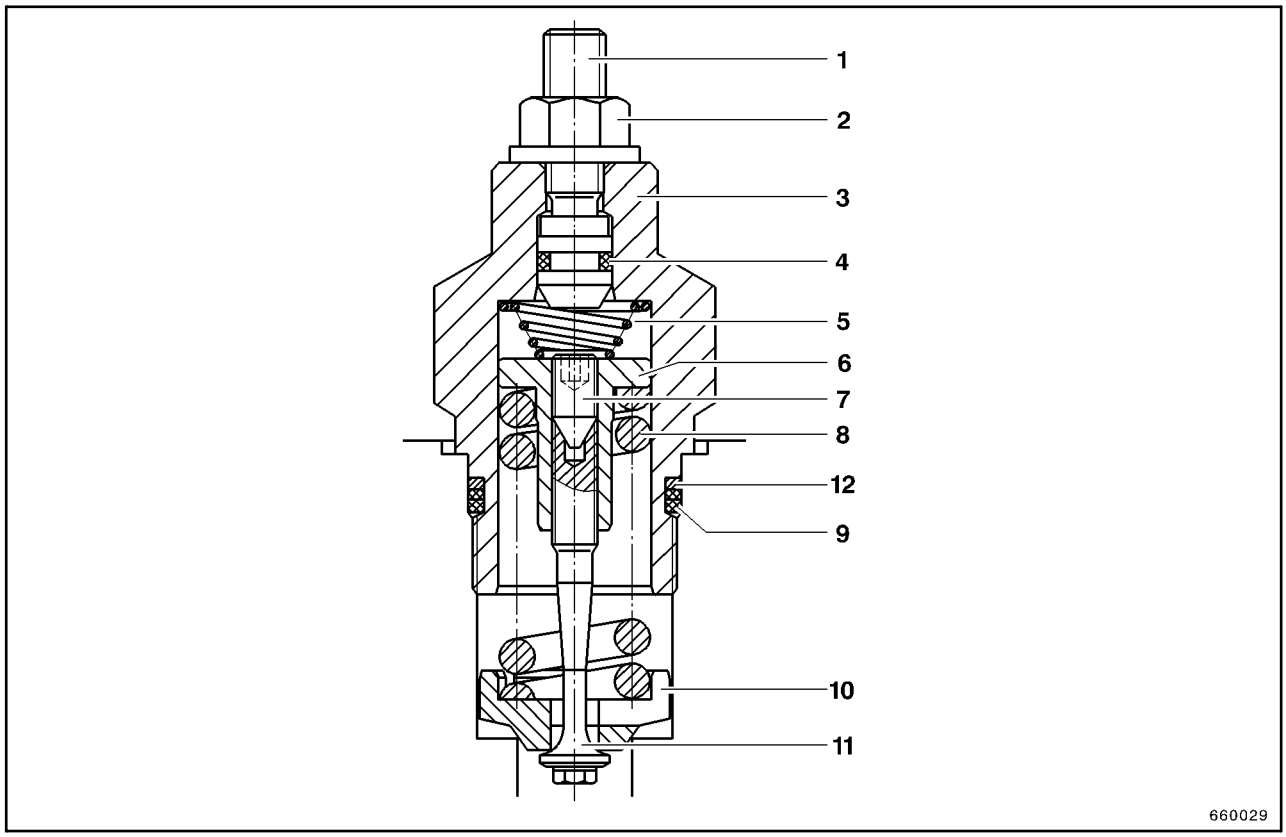


Fig. 7

Parts Fig. 7

1	-	Deblocking setscrew / bypass adjusting screw
2	-	Lock-nut
3	-	Plug
4	-	Sealing ring
5	-	Spring
6	-	Spring plate
7	-	Setscrew
8	-	Spring
9	-	O-ring
10	-	Valve disk
11	-	Valve spindle
12	-	Support ring

□

Checking and adjusting the regulation threshold of the hydraulic motor (displacement switch-over)

Pressure gauges with a measuring range of 600 bars must be connected at measuring points (M1) and (P_{HD}) in forward direction. The wheel loader is then driven in highway gear against a wall or a mound of earth. The speed of the diesel engine must then be gradually increased, with the two pressure gauges being observed at the same time.

The regulation threshold is reached when a first pressure rise is observed at the measuring point (M1). The high pressure at travelling (P_{HD}) read off simultaneously at the other pressure gauge is the set value for the regulation threshold (regulation threshold see Technical Data).
If it is too low (regulation threshold too early), the adjusting screw (A15, Part 2) must be **unscrewed** in CCW direction. This tightens the spring for the regulation theshold.
If the measured value is too high (regulation threshold too late), the adjusting screw must be **turned** in clockwise direction.
Adjustment of the hydraulic motor is completed when both pressure gauges indicate virtually the same pressure. This is the case at ca. 10 - 20 bars above regulation threshold.

N.B.:
For adjustment of the regulation threshold of the hydraulic motor, the high pressure at travelling can also be measured at measuring point (P_{HD}*).

Parts Fig. 12

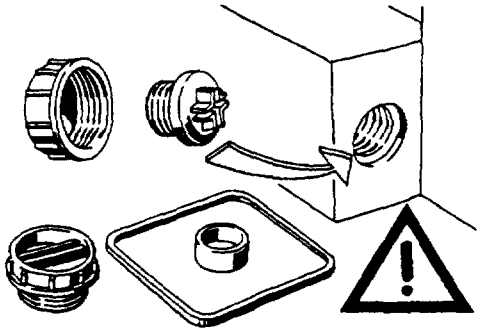
1 - Solenoid for displacement switchover
2 - Adjusting screw for regulation threshold
3 - Adjusting screw for swivel angle limitation Q^{min}; Do not re-adjust
4 - Adjusting screw for swivel angle limitation Q^{max}; Do not re-adjust

M1 - Measuring point for regulation threshold
P_{HD} - Measuring point for high pressure at travelling

□

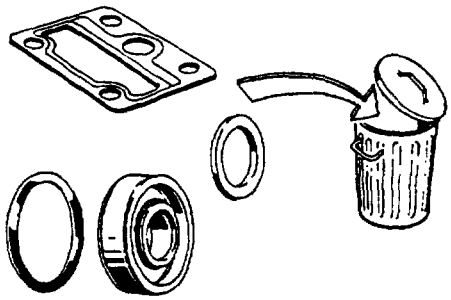
Achtung!
Nachfolgend Hinweise bei allen Reparaturarbeiten an Hydraulikaggregaten beachten!

Attention!
Observe the following notices when carrying out repair work at hydraulic aggregates!



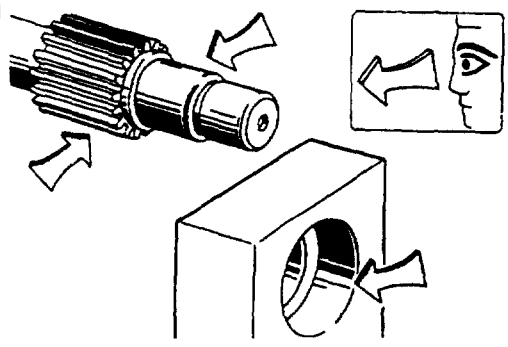
Alle Öffnungen der Hydraulikaggregate verschließen.

Close all ports of the hydraulic aggregates.



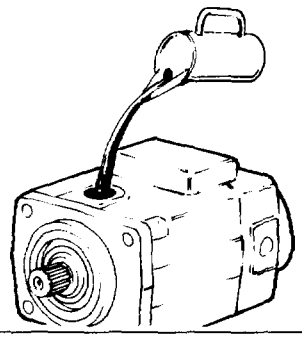
Alle Dichtungen erneuern.
Nur original -Ersatzteile verwenden.

Replace all seals.
Use only original spare parts.



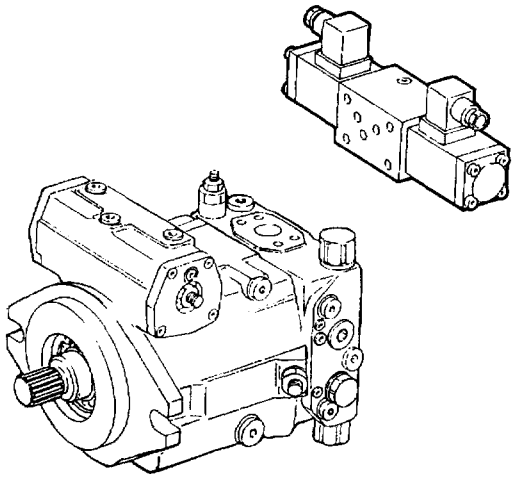
Alle Dicht- und Gleitflächen auf Verschleiß prüfen.
Achtung: Nacharbeiten an Dichtflächen z.B. durch Schleifpapier kann die Oberfläche beschädigen.

Check all seal and sliding surfaces for wear.
Attention: Rework of sealing area f. ex. with abrasive paper can damage surface.



Hydraulikaggregate vor Inbetriebnahme mit Betriebsmedium befüllen.

Fill up hydraulic aggregates with medium before start- up.



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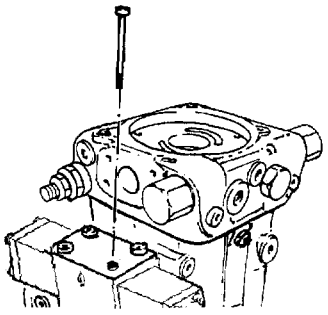
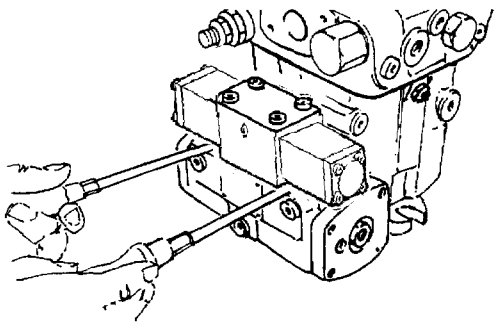


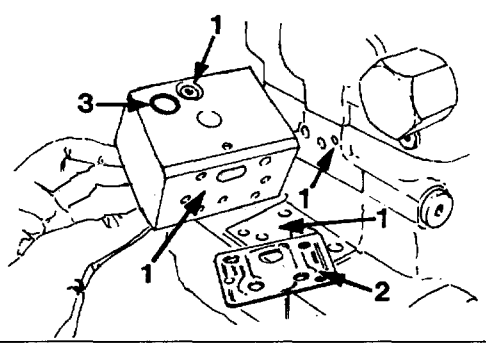
39 Befestigungsschrauben demontieren.

Remove fixing screws.



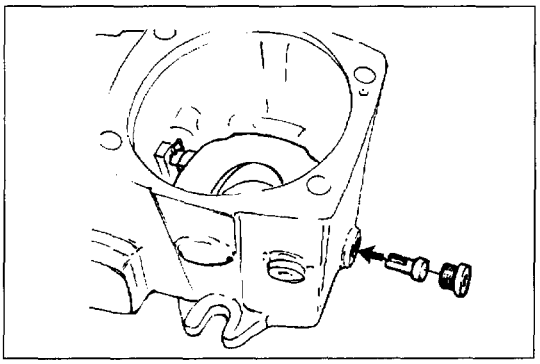
40 Ansteuergerät abdrücken.

Pry-off the control module.



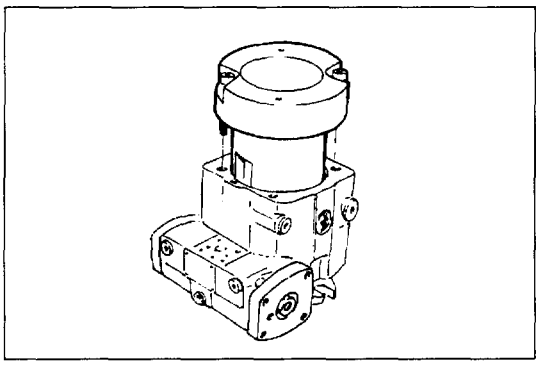
41 Kontrolle
Dichtfläche (1), Flachdichtung (2), O-Ringe (3).

Check
Sealing surface (1), gasket (2), o-rings (3).



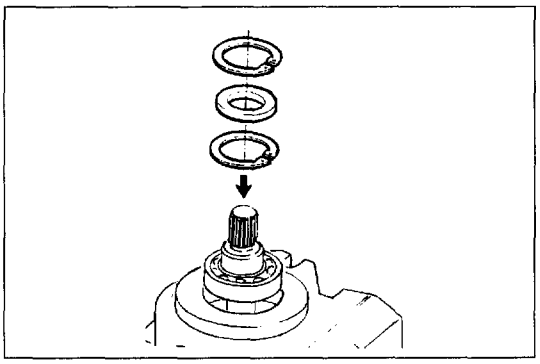
79 Gelenkstift montieren.

Assemble articulating pin.



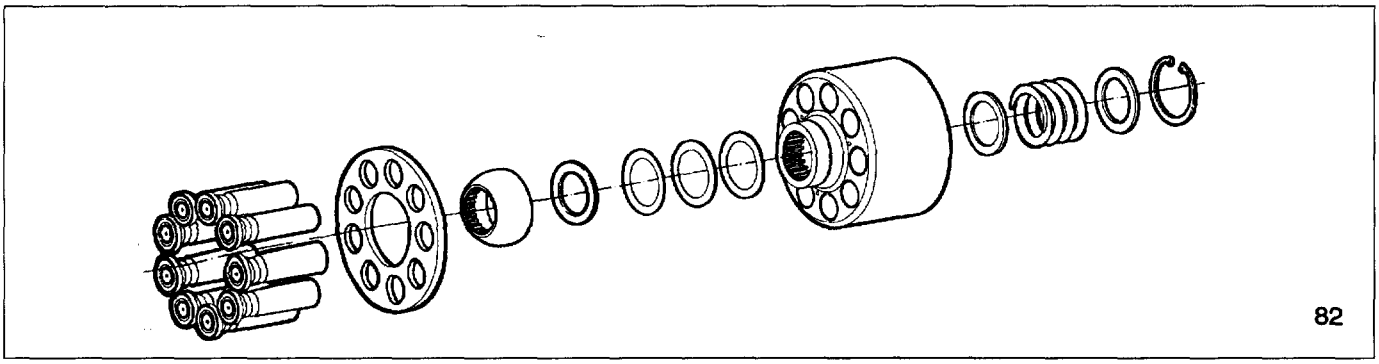
80 Vorrichtung zum Fixieren der Schwenkwiege montieren.

Assemble device for fixation of the swivel cradle.



81 Neue Montageposition!
Triebwelle mit Lager und Wellendichtring einbauen.

Assemble drive shaft with bearings and radial seal rings.



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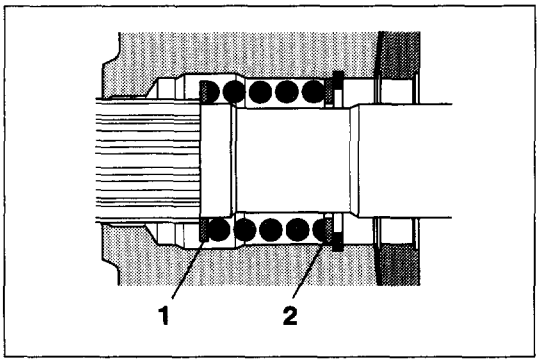
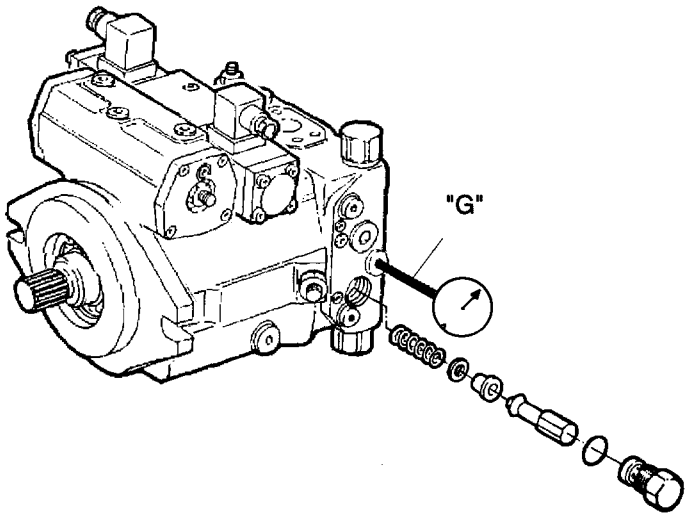


83 Scheibe 1, 2

Disc 1, 2



Achtung!
Sicherheitsbestimmungen beachten!

Hinweis:
Nachjustierung nur bei Betriebstemperatur.

Manometer an "G" anschließen.

Achtung!
Speisedruckeinstellung!
Nenndruck p_H - 18 bar
Höchstdruck p_H - 40 bar
Bei Max.-Drehzahl.

Hinweis:
Einstelldaten nach Werksauftrag.

bei DA-Ausführung

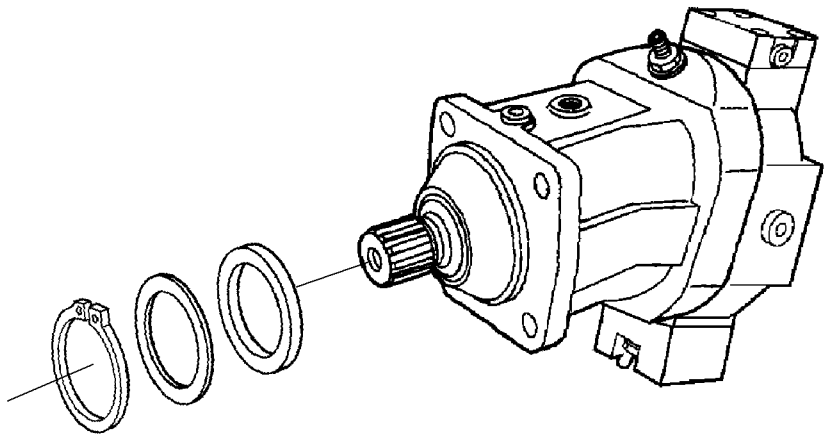
Attention!
Observe safety regulations!

Note:
Readjusting only at operating temperature.

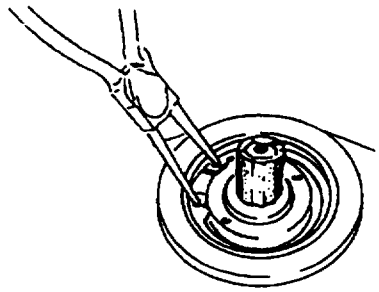
Connect manometer to "G".

Attention!
* Boost pressure setting!
Nominal pressure p_H - 18 bar
Peak pressure p_H - 40 bar
at max. speed.

Note:
Adjusting data according to order.

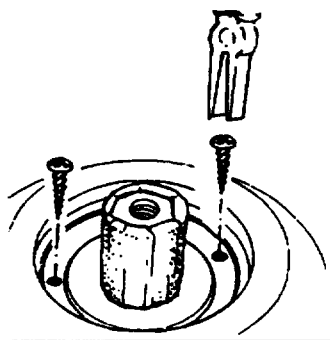


12



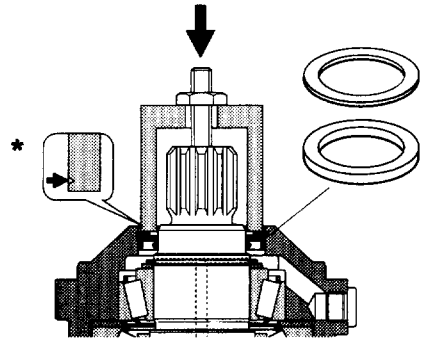
13 Triebwelle abkleben.
Sicherungsring und Scheibe ausbauen.

Protecting the drive shaft.
Remove retaining ring and shim.



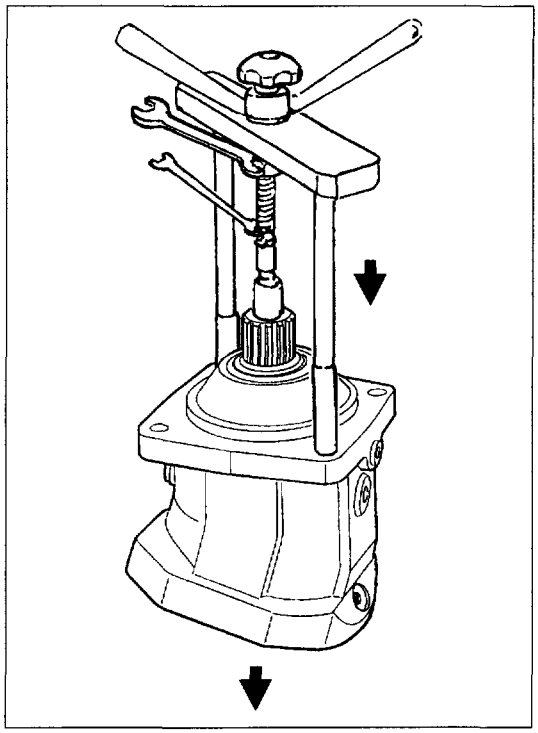
14 Blechschraube in die mit Gummi gefüllten Löcher eindrehen.
Mit Zange WDR herausziehen.

Screw in sheet metal screw into the holes fitted with rubber.
Pull out seal with pliers.



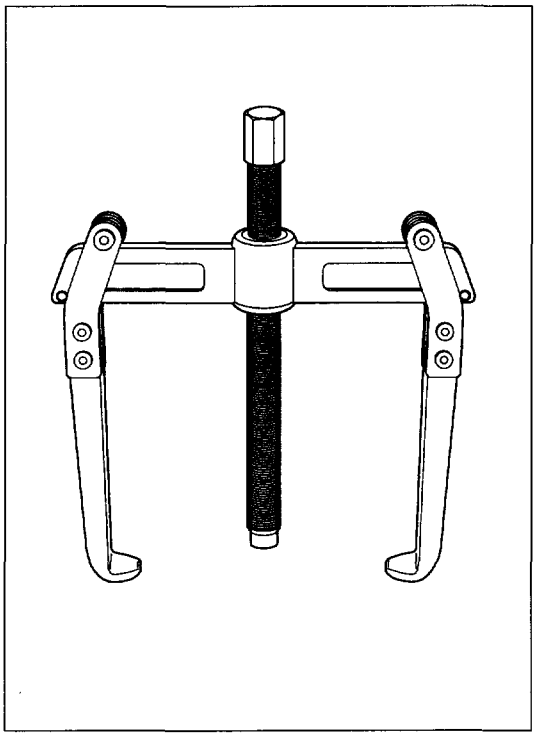
15 Wellendichtring und Scheibe mit Montagehülse einpressen.
⚠ Einpresstiefe beachten! * Marke für Einpresstiefe.
Sicherungsring einbauen.

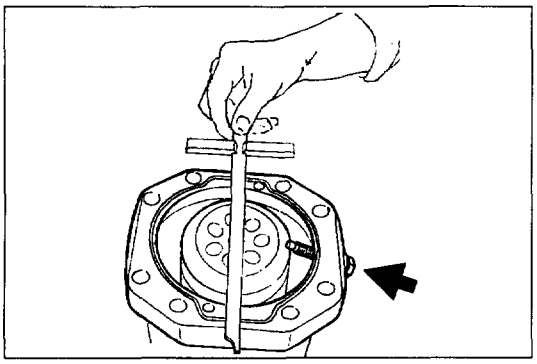
Press in shaft seal ring and shim with bush to stop.
⚠ Take note of press-in depth!
Install mark for press-in depth of safety ring.



39 Oder mit Abziehvorrichtung ausdrücken.

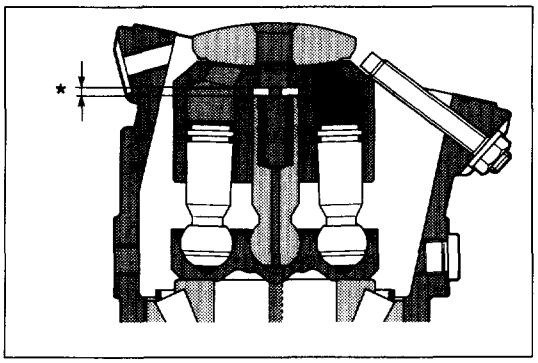
Or press-out with extraction device.





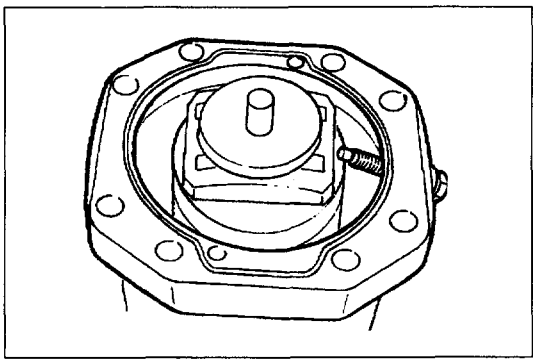
56 Mit Schraube Zylinderausschwenkung vermitteln.

Determine cylinder swivel range to max. angle with screw.



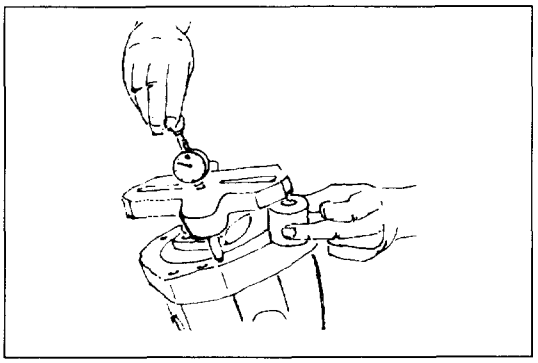
57 * Scheibe

* Disc



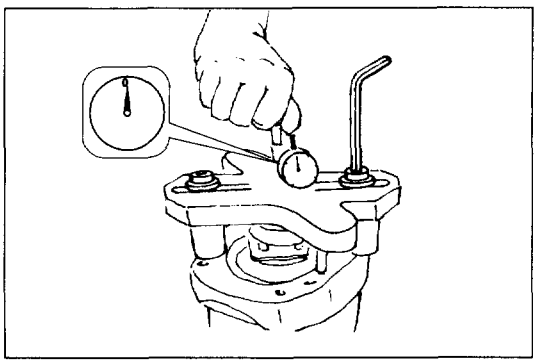
58 Zentrierscheibe aufsetzen.

Place centering disc.



59 Meßvorrichtung aufbauen.

Mount measuring device.



60 Maß X überprüfen.

Check dimension X.

Preface

2800496

As far as the assembly procedure is concerned, all axle versions are of identical design. There may be differences, however, in the transmission ratio and in the number of individual components (e.g. disks in multiple-disk brakes). Items shown in the Illustrations may deviate from the actual conditions. Illustrations of front or rear axles have been used several times when the same working sequence is concerned.

The Technical Handbook is not subjet to permanent revision. Changes will be incorporated in new editions which are identified by the rising index at the end of the 7-digit Part Number.

General

Design

The front and rear axles are rigid axles. The **front axle** is firmly bolted to the front chassis of the loader. A multi-disk self-locking differential is built in which has a locking factor of approx. 45 %.

The **rear axle** is free to float on the rear chassis. Two inner multi-disk brakes running in an oil bath and being operated hydraulically as service brake and mechanically as parking brake are arranged right and left to the axle drive and the differential, respectively. The transfer box bolted to the axle housing contains a countershaft stage for the flange-mounted hydraulic motor.

The rear and front axles are directly connected by a propeller shaft. Both axles have planetary gear systems in their hubs.

Maintenance

The wheel hubs, axles and the transfer box are not sealed with respect to one another. At inclined positions, the oil may flow over and then return. Oil level checks and oil changing on wheel hubs, axles and on the transfer box must, in each case, be done separately. Refer to the Operating Instructions.

Intervals for oil level checks and for oil changing are specified in the Operating Instructions.

Oil specification: API GL-5, SAE 90, LS. Refer to the Operating Instructions.

LS = Limited-slip-additives. They prevent noise and jerky rolling-off of the wheels as may be caused by locking differentials.

The **multi-disk brake** is operated by the oil of the hydraulic system.

Filling Quantities

Front axle	3.7 l (1.0 gal)
Rear axle	3.7 l (1.0 gal)
Wheel hub	4 x 0.6 l (4 x 0.16 gal)
Transfer box	1.0 l (0.3 gal)

Cf. machine operating instructions.

The **multiple-disk brake** is actuated with hydraulic oil from the hydraulic system.

For **checking of wear** remove plug (104) in the axle tube (101) and measure thickness of inner disks (84). Cf. machine operating instructions.

Rear Axle Assembly

Item	Quantity	Description
2	1	Rear axle assembly
141	16	Wheel nut
145	1	Pin
201	1	Hydraulic motor
202	1	Brake line
203	1	Lubrication piping
204	1	Lubrication piping

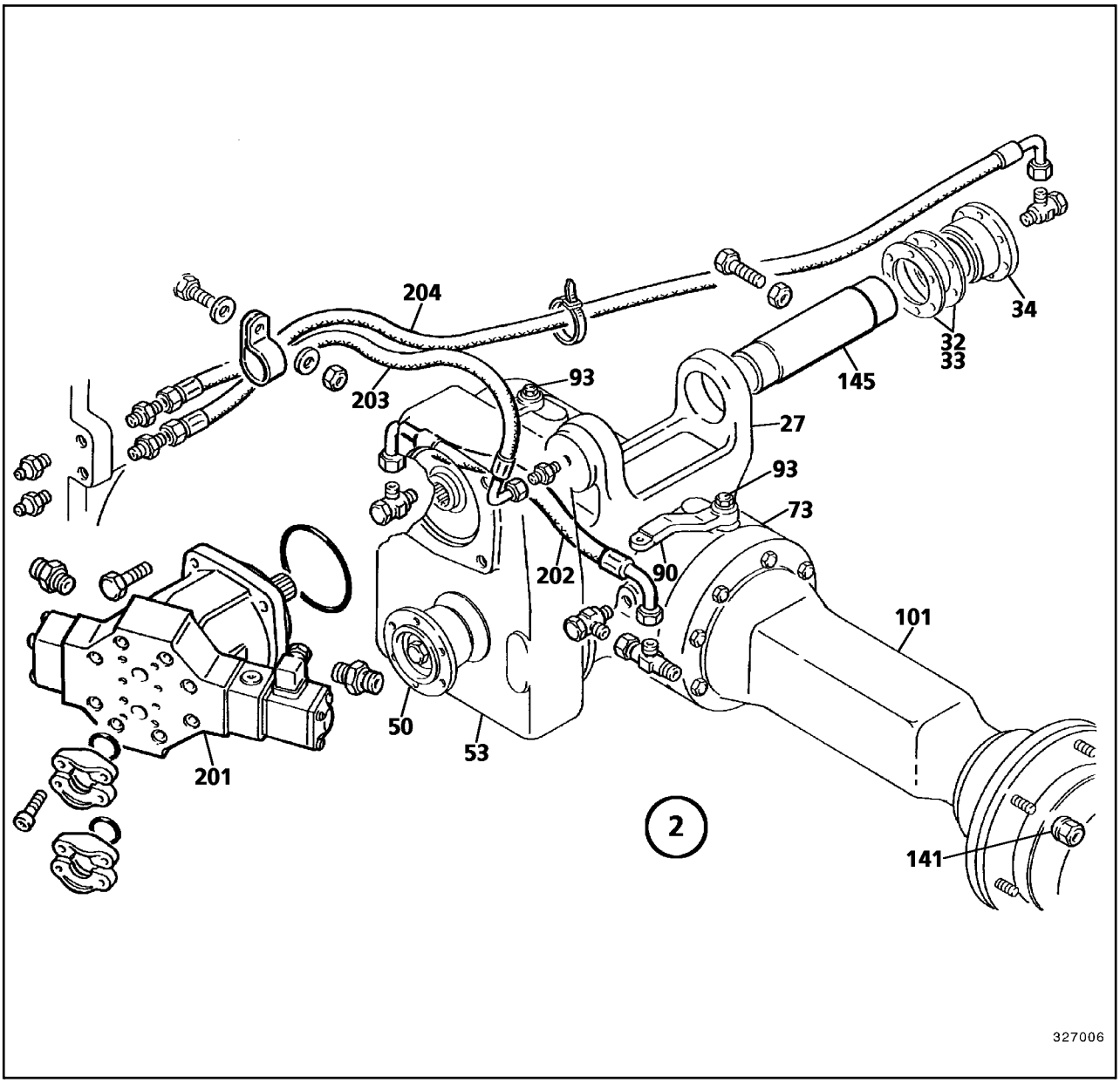


Fig. 2

Assembling the Front Axle

Wheel Hub Assembly

The following illustrations show axle tube (101) in vertical position, i. e. the complete axle is removed.

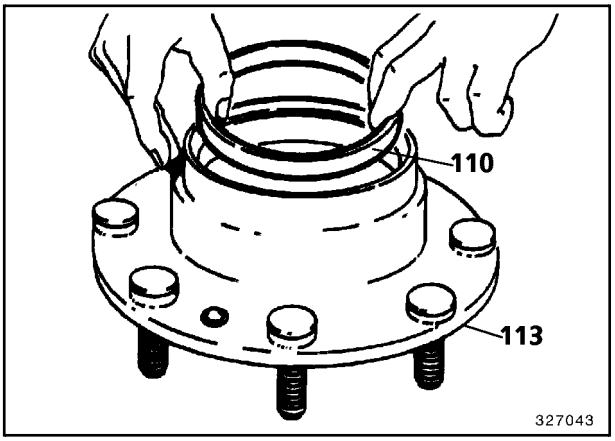


Fig. 1

Insert outer ring of tapered roller bearing (110) into hub (113).

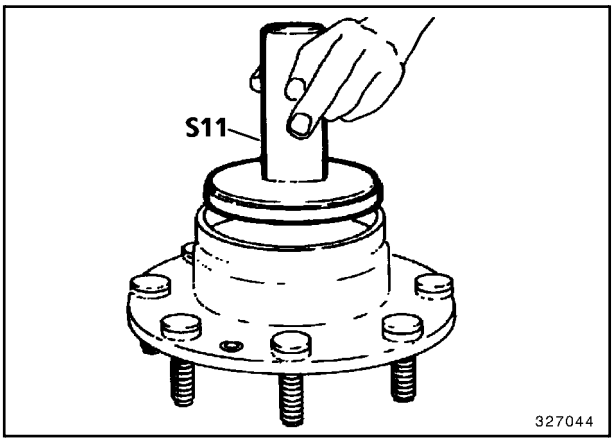


Fig. 2

Apply punch (S11).

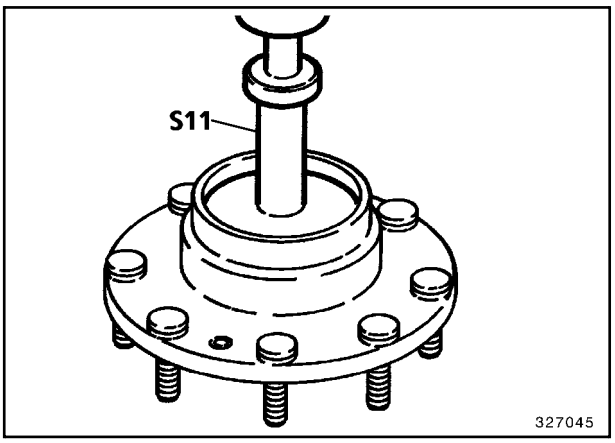


Fig. 3

Force bearing outer ring into hub by hydraulic press.

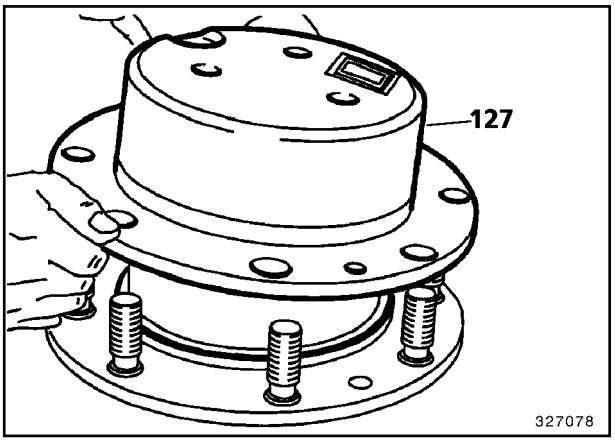


Fig. 37

Attach complete planetary carrier assembly. Mind small holes for hex screws (111, Fig. 38).

In case of partial repair of the installed axle, axle shaft (108) and pinion shaft (124) must be installed before hand.

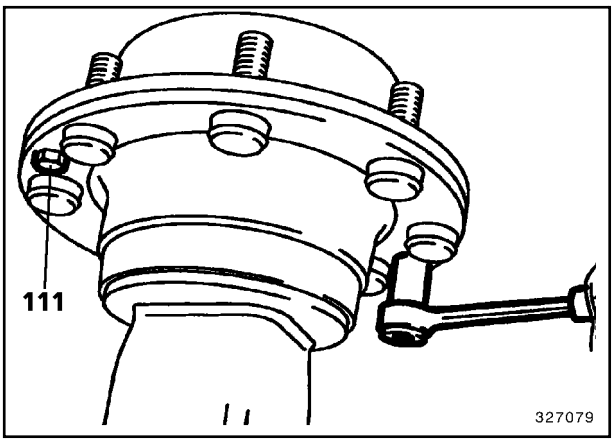


Fig. 38

Turn in two hex screws (111) and tighten.

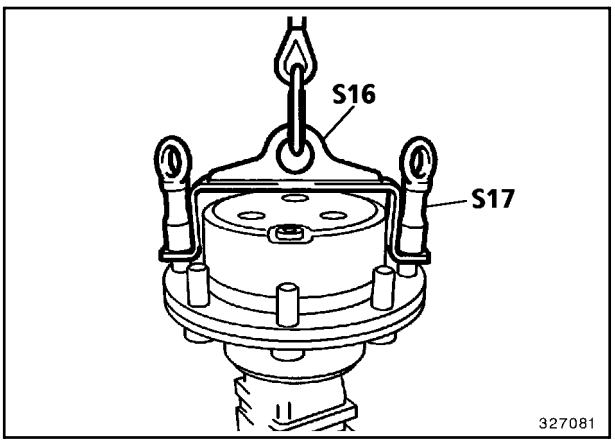


Fig. 39

Fixture for lifting the pre-assembled wheel hubs.

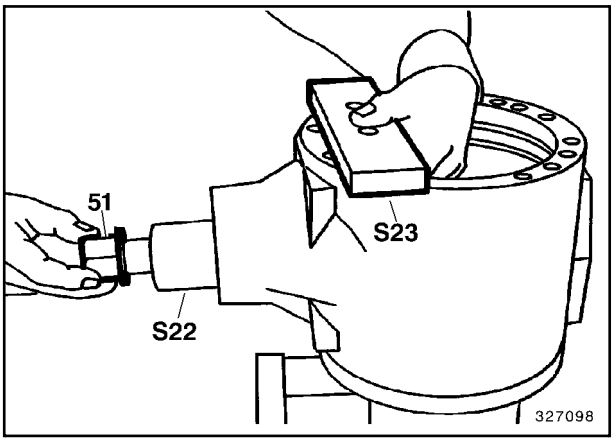


Fig. 68

Push on bush of test shaft (S22) to substitute flange (50).

Screw on collar unit (51) and tighten.

Tightening torque M_A = 200 Nm (148 lbft).

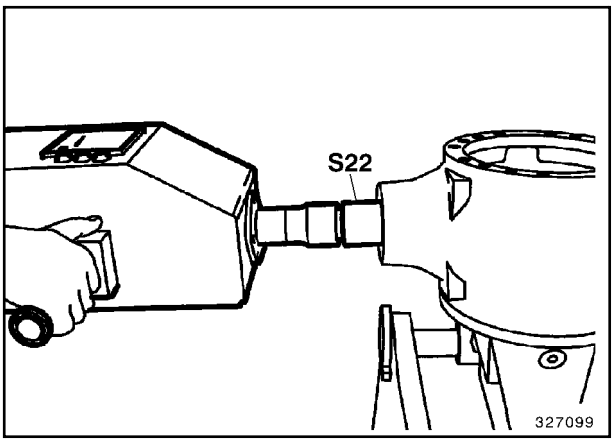


Fig. 69

Measure bearing friction torque with suitable test unit or spring balance.

Desired value 2 ... 3 Nm (1.5 ... 2.2 lbft).

Measured value greater: Insert spacing washer (44-46).
Measured value smaller: Remove spacing washer. Minor corrections can be achieved by shortening (grinding) bush (40).

Remove test shaft (S22).

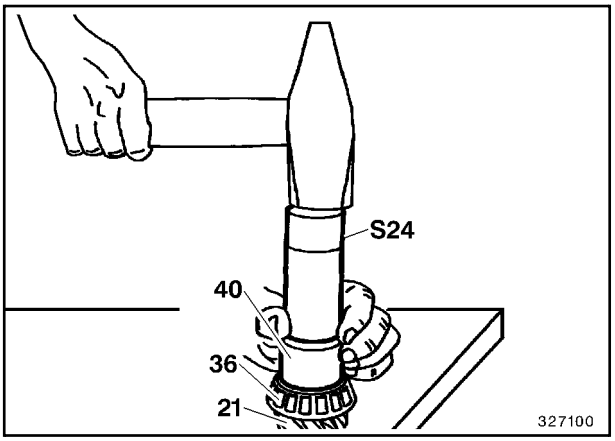


Fig. 70

Change tapered roller bearing (36) to pinion shaft (21) and drive on. Then, drive on bush (40). (New bushes (40-43) are available with different lengths from 42.0 to 42.9 mm.)

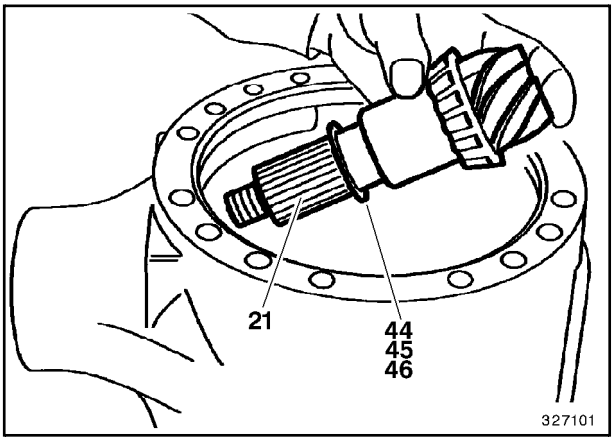


Fig. 71

Change spacing washers (44-46) from test shaft to pinion shaft (21).

Insert pinion shaft into housing from inside.

Assembling the Rear Axle

Wheel Hub Assembly

Refer to Chapter "Wheel Hub Assembly".

Brake Assembly (Pre-Assembling)

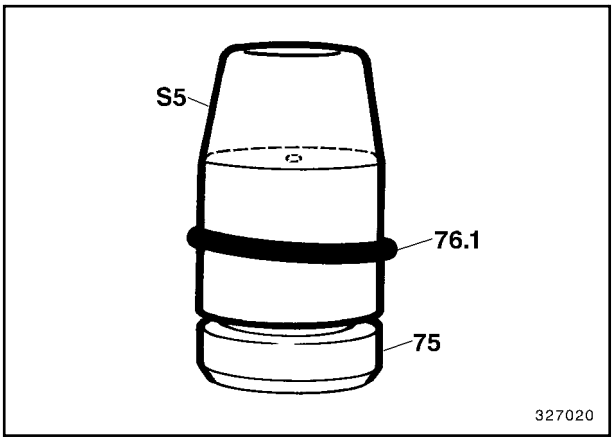


Fig. 1

Place piston (75) so that M6 centering hole is on top. Put on long mounting sleeve (S5) and insert O-ring (76.1) twist-free into free piston groove.

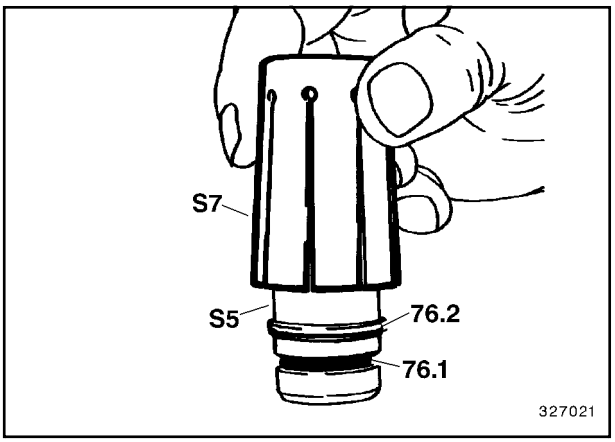


Fig. 2

Push piston seal (76.2) into groove using expansion sleeve (S7).

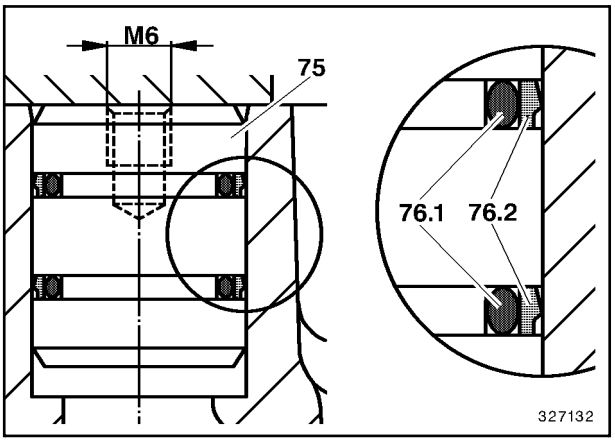


Fig. 3

Piston seal fitting position (76).

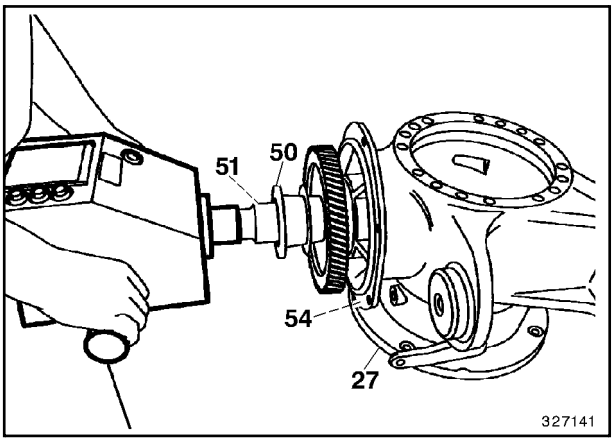


Fig. 32

Measure bearing friction torque with suitable test unit or spring balance.

Desired value 2 ... 3 Nm (1.5 ... 2.2 lbft).

Measured value greater: Insert spacing washer (44-46).

Measured value smaller: Remove spacing washer. Minor corrections can be achieved by shortening (grinding) bush (40).

Remove collar unit (51) and flange (50).

Put O-ring (54) on flange of housing (27).

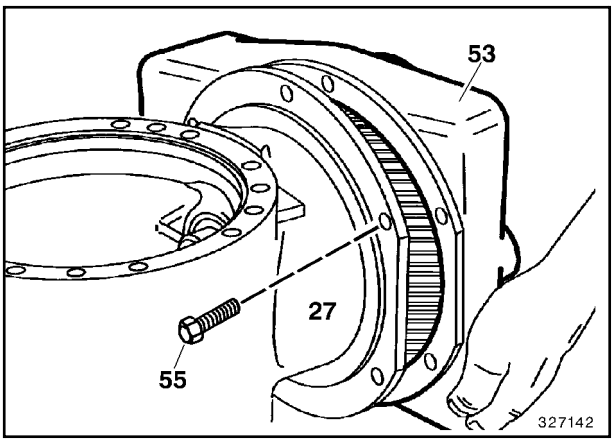


Fig. 33

Apply sealing compound to flange of housing (53).

Screw on housing (53), lock hex screws (55) with LOCTITE 243.

Tightening torque M_A = 53 Nm (39 lbft).

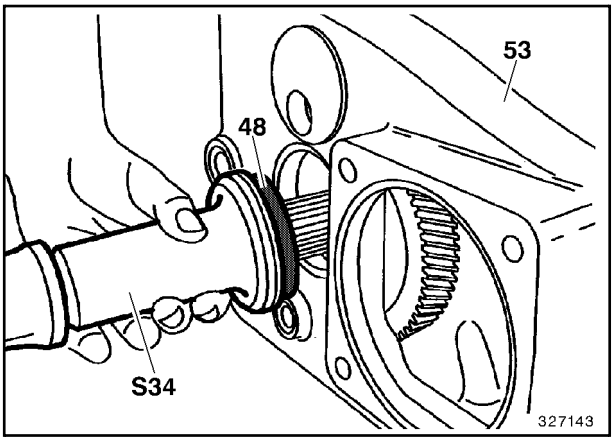


Fig. 34

Put shaft ring (48) on punch (S34), apply sealing compound and drive in shaft ring.

Shaft ring filled 50 % with grease. Apply grease to sealing lips.

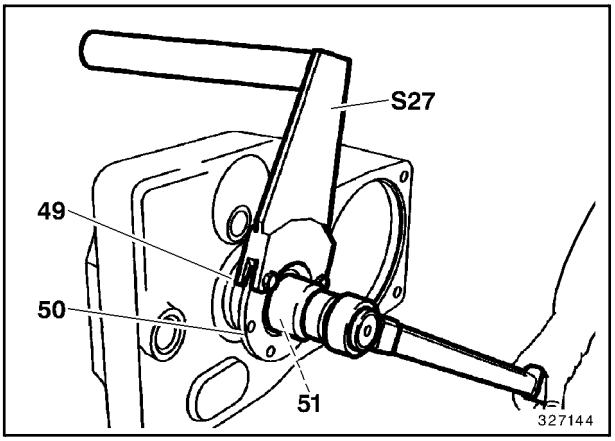


Fig. 35

Re-insert flange (50) incl. cap (49), screw on collar unit (51) with LOCTITE 243. Arrest flange with crank (S27) and tighten collar unit.

Tightening torque M_A = 200 Nm (148 lbft).

Swing crank forth and back and remove.

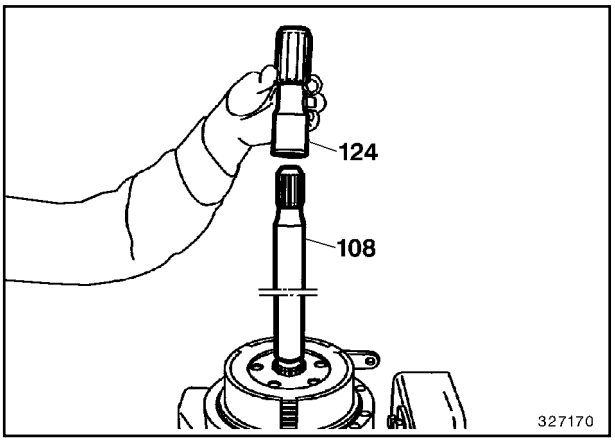


Fig. 70

Slip over pinion shaft (124).

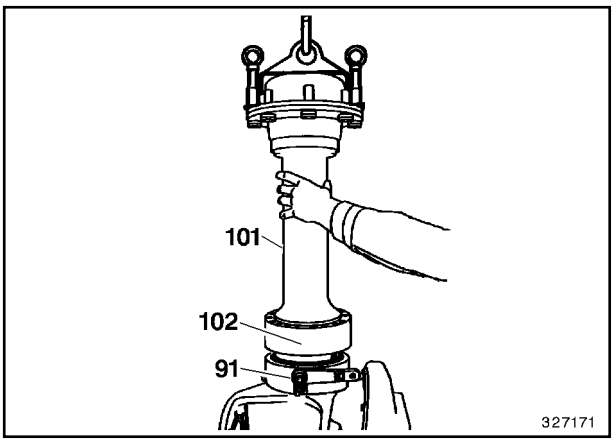


Fig. 71

Attach axle tube (101) with pre-assembled wheel hub. Fit drive shaft into planetary gear set.

Mind marks made on axle housing, brake carrier and axle tube. Vent plug (102) and brake lever (91) and to be located one upon the other.

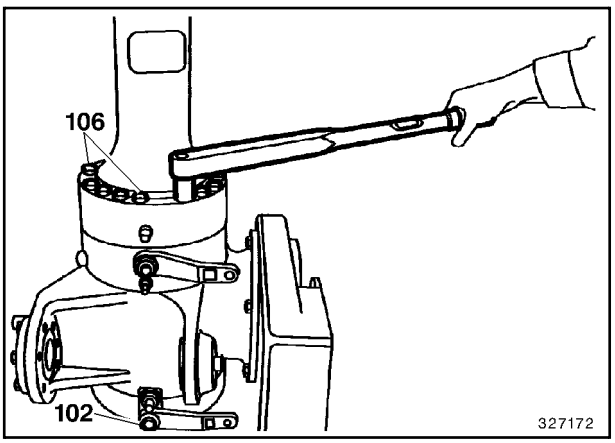


Fig. 72

Crosswise tighten hex screws (106).

Tightening torque M_A = 120 Nm (89 lbft).

Screw in vent plug (102).

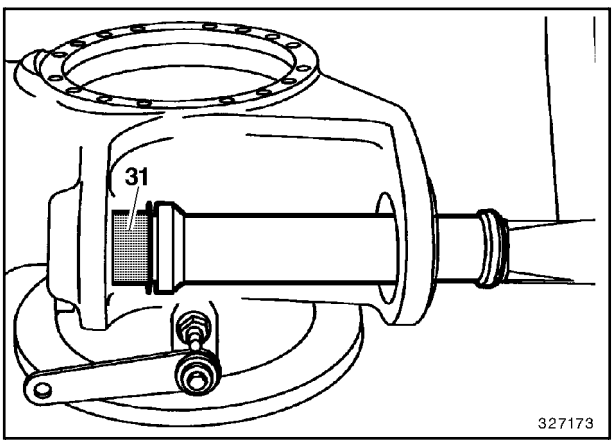


Fig. 73

Drive in self-aligning bearing collar bush (31).

Notes

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Functional description

The hydraulic pump (H17), which is operated by the Diesel engine (1), pumps the oil from the hydraulic fluid tank (T1) to the priority valve (L6).
If the steering system is not actuated, no signal pressure is sent from the steering gear (L2) to the priority valve and the delivered fluid can be used by the working hydraulics.

If the steering system is actuated, pressure gathers in the signal line, which causes the change-over piston of the priority valve (L6) to switch.
Depending on the amount of the signal pressure, the priority valve (L6) conveys different quantities of oil to the steering valve (L2).

The primary valve of the steering system (L4) ensures that the pressure of the hydraulic fluid in the steering system does not exceed approx. 175 bars.

In the secondary circuit the pressure of the steering system is limited to 240 bars by two secondary valves (L3).

When the steering cylinder (L1) has been actuated, the hydraulic fluid flows back to the hydraulic fluid tank (T1) over the steering valve (L2), the distributor (T5) and through the return filter (T3).
The check valve (T4) prevents the unfiltered steering fluid from flowing back to the hydraulic fluid tank (T1).

The check valve (T4) allows the steering valve (in case of pump damage etc.) to such oil out of the hydraulic tank (T1) and makes a emergency steering possible. □

Installing the steering system

Parts Fig. 8

1 - Steering column, top
2 - Steering column, bottom
3 - Pin
4 - Washer
5 - Shaft, bottom
6 - Universal joint
7 - Screw M 8 x 35
8 - Nut M 8
9 - Screw M 6
10 - Bracket
11 - Locking nut M 6
12 - Gas spring
13 - Pin
14 - Washer
15 - Spacer
16 - Screw M 3 x 45
17 - Washer
18 - Nut M 3
19 - Multifunct. lever
20 - Bracket plate
21 - Screw M 5 x 45
22 - Washer
23 - Cable harness
24 - Washer
25 - Nut M 5
26 - Clamp
27 - Gasket
28 - Damper
29 - Spacer
30 - Screw M 10 x 30
31 - Washer
32 - Washer
33 - Screw M 10 x 25
34 - Washer
35 - Paneling
36 - Screw M 6 x 20
37 - Nylon washer
38 - Spring
39 - Paneling
40 - Control panel
41 - Paneling
42 - Self-tapping screw M 3,9 x 9
43 - Steering wheel complete
44 - Steering wheel
45 - Cap
46 - Button
47 - Woodruff key
48 - Washer
49 - Screw M 18 x 1,5, M_A = 40 Nm

□

Auxiliary brake

If a pressure of less than 14 bars is reached with the pedal-type brake valve (B5), the braking pressure is transmitted only to the inching valve (B10), as the connecting valve (B8) transmits only the pressure in excess of 14 bars to the multiple-disc brakes (B9).

Depending on the level of the pressure reached, the inching valve (B10) opens a larger or smaller throttling channel which connects the control pressure of the driving pump (cf. Transmission Drive section) with the hydraulic tank (T1).

This results in the driving pump swivelling towards minimum pumping as a result of the brake being applied and the driving motion thus being reduced, i.e. the machine is braked.

One great advantage of this inching is that most of the engine output can be supplied to the operating hydraulics once the driving pump has swivelled back.

The functioning of the inching valve is shown in the hydraulic diagram Driving Operation.

Parking brake

The parking brake acts by cable control on the multiple disc brakes of the rear axle. The layout of the individual components is shown in Fig. 11.

Note that the drive is switched off by the handbrake switch (Fig. 3) when the handbrake lever is pulled.

a = position at rest max. 6,0 mm
b = switching point 5,5 mm

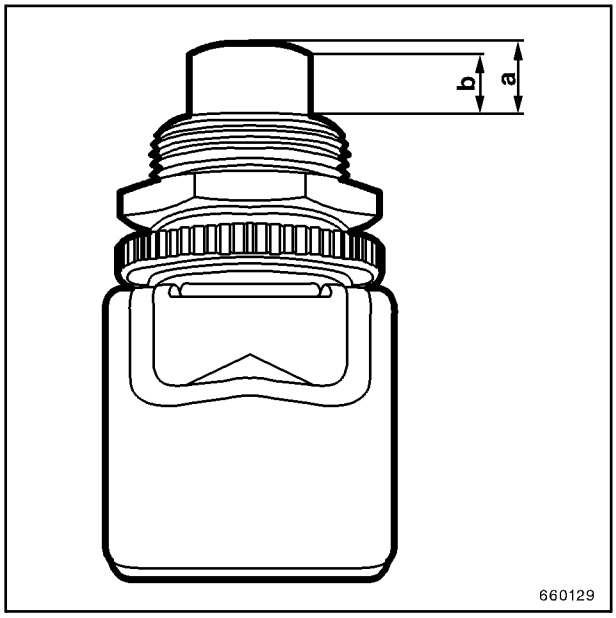

Fig. 3

Important:

The handbrake switch is located below the handbrake lever (1, Fig. 11).

- To check the lining thickness, see Multiple-disc Brakes.
- To replace the brake linings, see section on Axles. □

Checking the brake disks 2800493

Every time the oil is changed in the rear axle, check the thickness of the brake disks.

- Stop machine as detailed in the section "Securing the machine".
- When gearbox oil is drained off, unscrew screws (10.1, Fig. 9).
- Apply parking brake.

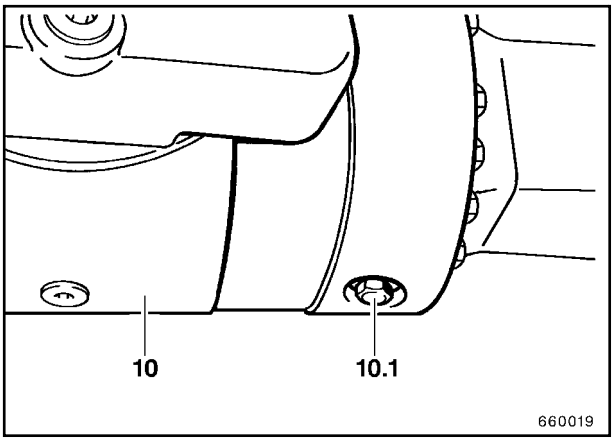

Fig. 9

- Check for wear. The interior disks with friction lining must be replaced if they are worn down to a minimum (S,Fig. 10) of 4.5 mm.

  Consult your Dealer.

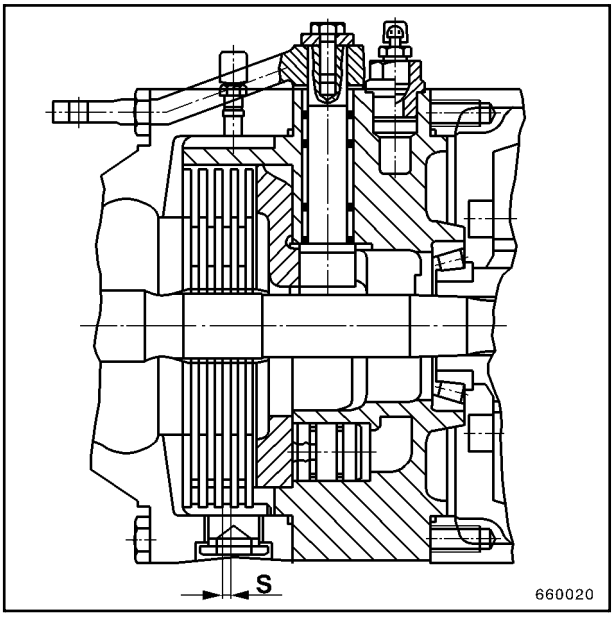

Fig. 10

Testing and adjusting operations on the auxilliary brake

These operations are described in the section Travel drive - Adjusting the inching threshold. □

Functional description, working hydraulics

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The hydraulic oil pumped by the gear pump (H17) is fed to the working hydraulics and the steering system.

The priority valve (L6) gives the steering system oiling priority for safety reasons, so that the steering system is always supplied first when steering system and working hydraulics are activated simultaneously, and in this case only the residual oil goes to the working hydraulics (cf. section on Steering System).

The measuring connection at which the pumping pressure of the gear pump (H17) or the setting of the primary valve (H9) can be controlled is located direct at the priority valve (L6).

From the priority valve (L6) the oil goes into the control block (H6).
The maximum pumping pressure is limited here by the primary valve (H9) to 230 bars (W50 and W70), 210 bar (W60).

If no working hydraulics function is activated, the hydraulic oil flows back through the control block (H6) to the distributor (T6) and via the return-flow filter (T3) into the tank (T1).

If one of the control pistons (H14, H15, H16) is shifted, the hydraulic oil is directed into the corresponding hydraulic cylinder and the required function is executed.

The control piston (H14) controls the oil for the lifting and lowering function. If the operating lever is pressed beyond the lowering position, the piston engages into floating position.
In floating position, the hydraulic oil is returned unpressurized to the tank and the rod and piston ends of the lifting cylinder (H1) are interconnected via the control channels of the control piston (H14).
In this position, the bucket or the operating equipment is supported with its own weight on the ground.

To ensure that sufficient oil reaches the rod end of the lifting cylinder during rapid lowering movements, hydraulic oil is drawn in from the tank reflow when required by means of the replenishing valve (H10).
The lifting function is pressure-limited by secondary valve (H20) to prevent damage due to excessive forces.
The secondary valve is equipped with an integrated replenishing valve which sucks in oil from the tank return line if needed.
(Pressure setting (H20), see chapter 02, Service-Data).

The rearward tilting and dumping function is controlled by means of the control rod (H15). To prevent damage due to excessive external forces, the rearward tilting line is secured by the secondary valve (H7) and the dumping line by the secondary valve (H8).

Both secondary valves also operate as replenishing valves and can draw oil from the tank reflow as required.

The control piston (H16) switches the 3rd function (H4) and the quick changer (H3).
When the multiway cock (H5) is opened, the changer cylinder is pressurized with the pressure oil (H3).
The cylinder movements of the 3rd function are pressure-limited by secondary valves (H18) and (H19) to prevent damage due to excessive forces.
(Pressure setting (H18), (H19), see chapter 02 Service-Data).

When the multiway cock (H5) is closed, the oil is available for the 3rd function and the changer cylinder (H3) is locked.

All three control pistons (H14, H15, H16) have an upstream pump-side check valve (H11, H12, H13) which acts as a pressure-retaining valve to prevent inadvertent movements (stalling of the lifting cylinder or emptying of the bucket).

After passing the control block (H6), the oil flows back via distributor (T6) and return-flow filter (T3) to the hydraulic tank (T1). □

Parts Fig. 9

T1 - Hydraulic tank
T3 - Hydraulic filter

1 - Oil gauge
2 - Cap
3 - Gasket
4 - Filter cartridge
5 - Filter housing
6 - O-ring
7 - Pressure indicator (filter soiling)
8 - Venting filter
9 - Connection for thermostat, hydraulic oil

□

Distributor (T6)

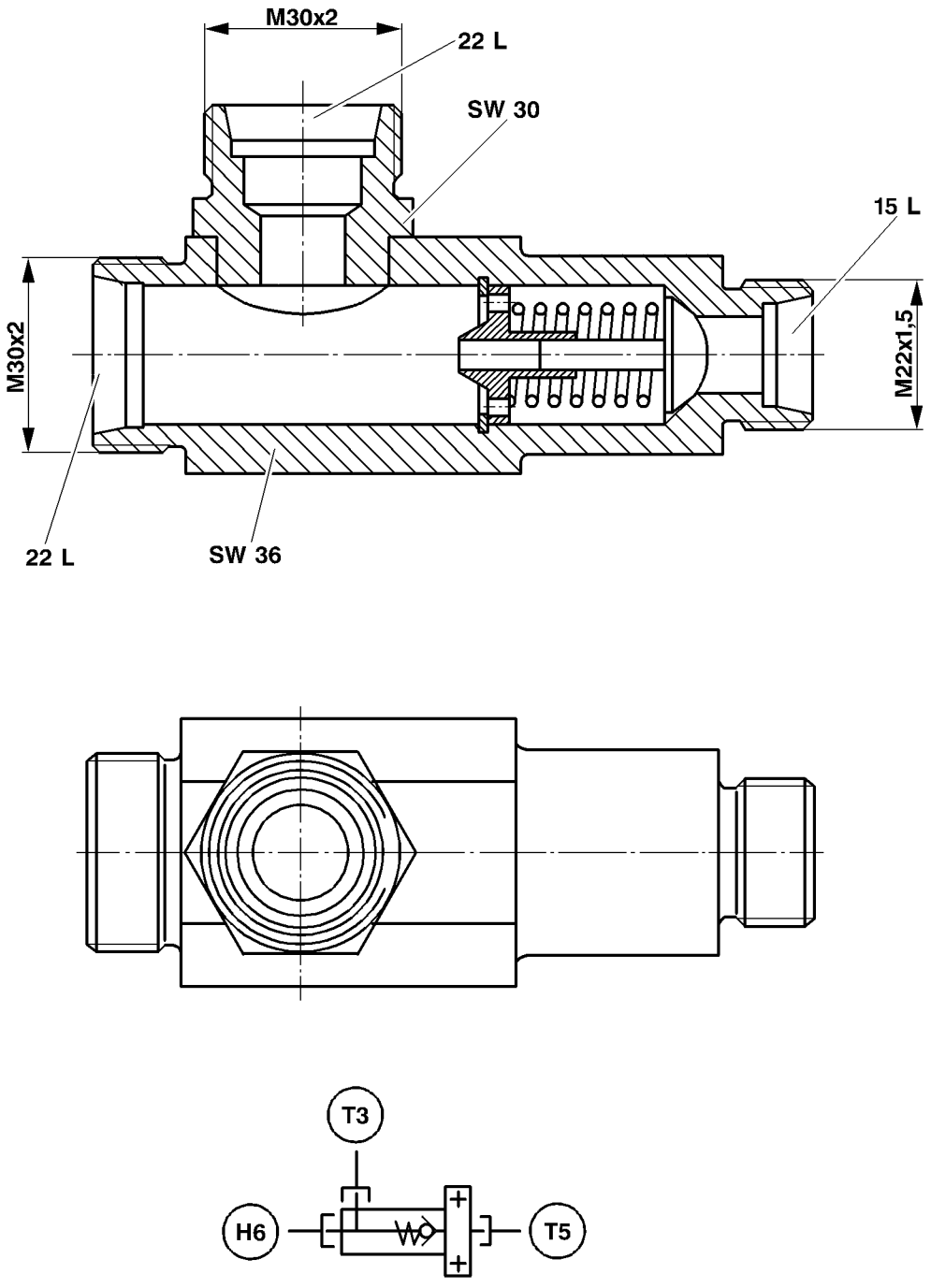
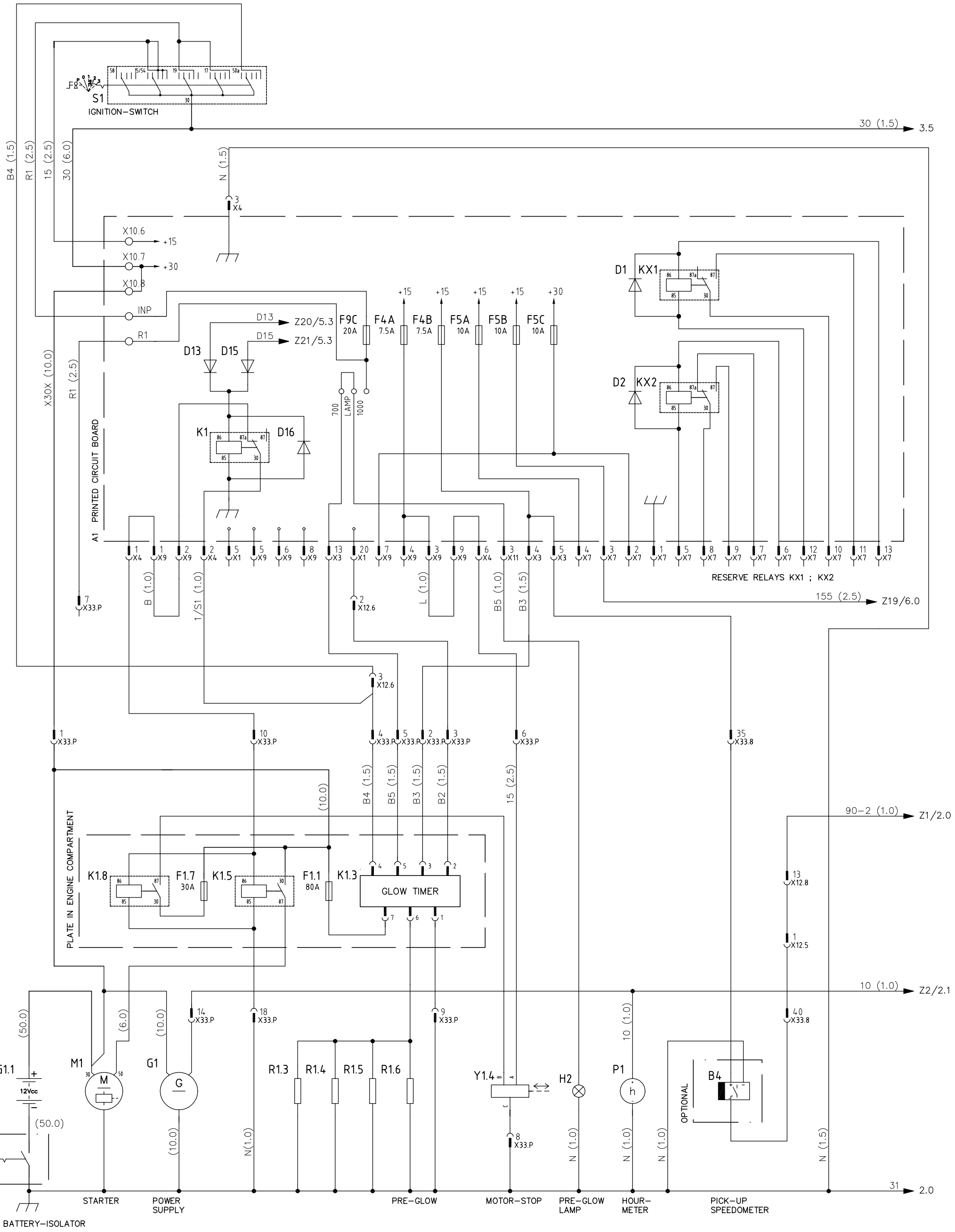


Fig. 17 □



					Datum/Date	Name
04						
04				Bearb./Written	27.07.00	SIK
02				Gepr./Checked		
01	---	02.04.01	SIK	Norm/St.Check		
Ind.	Änd.-Nr./Change-No	Datum/Date	Name	Bearb.Abt./Written department	G3350	

955	32	050	50
Typ	BG	UBG	CH
80WKZ W50H			

Orenstein & Koppel
Aktiengesellschaft

Ursprung/Origin.

Benennung/Description

WIRING DIAGRAM ENGINE

Sach-Nr. / Part-No 3004800

A4

Blatt / Sheet 1

F.K. / D.S.No

15 Blätter / Sheets

Ers. für / Substitut for

Ers. durch / Substituted

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A3H38	FAST GEAR LAMP	5 / 3	
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A3H28	REVERSE LAMP	5 / 3	
A3H39	CRAWL GEAR LAMP	5 / 3	
E6E50	REVERSING LIGHT LEFT	5 / 5	
E6E51	REVERSING LIGHT RIGHT	5 / 5	
F3C	REVERSING LIGHTS & BACK UP ALARM FUSE	5 / 5	
F6B	F/R SWITCH & CRAWL GEAR FUSE	5 / 0	
H81	BACK UP ALARM	5 / 5	OPT.
K81.2	REVERSING LIGHTS RELAY	5 / 5	
K21.2	REVERSE RELAY	5 / 4	
K21.1	FORWARD RELAY	5 / 3	
K93	CRAWL GEAR STEP UNIT	5 / 1	
K94	CRAWL GEAR RELAY	5 / 1	
K95	FAST 2. GEAR RELAY	5 / 2	OPT.
S22.1	F/R SWITCH & CRAWL/FAST GEAR PUSH BUTTOM	5 / 0	
S22.5	FAST 2. GEAR SWITCH	5 / 2	OPT.
S81	BACK UP ALARM SWITCH	5 / 4	OPT.
Y21	FORWARD SOLENOID	5 / 3	
Y21.1	CRAWL GEAR SOLENOID	5 / 3	
Y21.2	REVERSE SOLENOID	5 / 1	
Y21.3	FAST 2. GEAR SOLENOID	5 / 2	OPT.
E19B1	AIR CONDITIONED PRESSURE SWITCH	6 / 4	OPT.
E19K2	AIR CONDITIONED THERMOSTAT	6 / 4	
E19S1	AIR CONDITIONED SWITCH	6 / 4	OPT.
E19Y1	MAGNETIC COUPLING COMPRESSOR	6 / 4	OPT.
E19F5	AIR CONDITIONED FUSE	6 / 6	OPT.
E19K4	MAGNETIC COUPLING COMPRESSOR RELAY	6 / 5	OPT.
E19K3	AIR CONDITIONED ELECTRIC FAN RELAY	6 / 6	OPT.
E19M1	AIR CONDITIONED ELECTRIC FAN	6 / 5	OPT.
F2A	SOLENOID Y42 & S42.1 SWITCH FUSE	6 / 1	
F7A	DRIVER SEAT FUSE	6 / 0	
F7B	BLOWER MOTOR FUSE	6 / 3	
K42	FLOATING POSITION RELAY	6 / 1	OPT.
M2	BLOWER MOTOR	6 / 3	
S2	BLOWER MOTOR SWITCH	6 / 3	
S42.1	FLOATING POSITION SWITCH	6 / 1	OPT.
X121	DRIVER SEAT PLUG	6 / 0	
Y42	MAGNETIC VALVE	6 / 2	OPT.

Ind.	Änd.-Nr./Change-No	Datum/Date	Name		Datum/Date	Name
04						
04				Bearb./Written	27.07.00	SIK
02				Gepr./Checked		
01				Norm/St.Check		
				Bearb.Abt./Written department	G3350	

Typ	BG	UBG	CH
955	32	050	50

80WKZ W50H

Orenstein & Koppel
Aktiengesellschaft

Urspr./Origin.

Benennung/Description

WIRING DIAGRAM
PARTS DESCRIPTION

Sach-Nr.
Part-No 3004800

A4 | Blatt Sheet 11

F.K. D.S.No | 15 Blätter Sheets

Ers. für Substitut for

Ers. durch Substituted

Testing the charging system

To test the charging system, the voltmeter must be connected direct to the battery. The engine must then be run up to top speed. After ca. 2 minutes, the required charging voltage must be attained. This is between 13 and 14.5 V for a 12 V system, and 26 to 29 V for a 24 V system.

If the voltmeter indicates a higher value, the regulator is defective. If the measured value is lower, however, the fault is in the charging system.

Important: The voltmeter must be switched to the d.c. voltage measuring range.

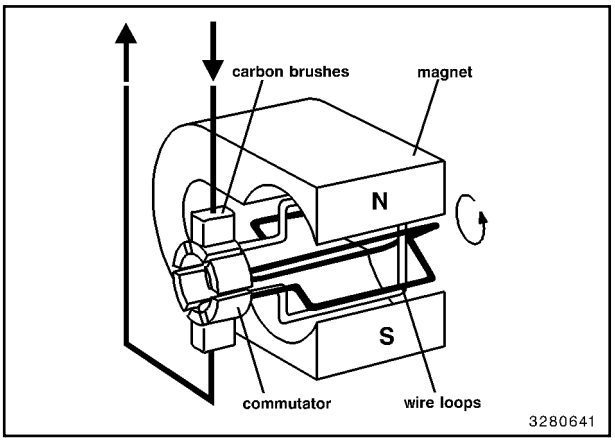


Fig. 8

Fig. 8 = Schematic diagram of an electric motor with three wire loops

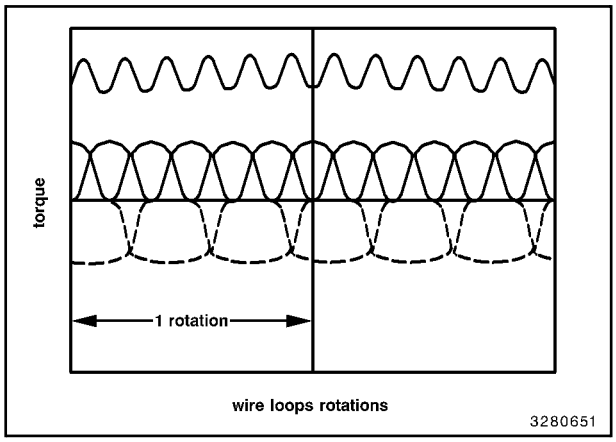


Fig. 9

Fig. 9 = Torque of three wire loops

Lines and wires in automotive electrical systems

Table 2 - Electrical copper wires for motor vehicles

Single-conductor, untinned, PVC-insulated

Nominal cross-section	Resistance per meter at 20˚C	Diameter of conductor	Diameter of cable	Admissible permanent current (recommended value)		Admissible current density Permanent operation
		Largest dimension	Largest dimension	at + 30˚C	at + 50˚C	
mm²	mΩ /m	mm	mm	A	A	A/mm²
0,5	37,1	1,0	2,3	11	7,8	10
0,75	24,7	1,2	2,5	15	10,6	10
1	18,5	1,4	2,7	19	13,5	10
1,5	12,7	1,6	3,0	24	17,0	10
2,5	7,6	2,1	3,7	32	22,7	10
4	4,71	2,7	4,5	42	29,8	10
6	3,14	3,4	5,2	54	38,3	6
10	1,82	4,3	6,6	73	51,8	6
16	1,16	6,0	8,1	98	69,6	6
25	0,743	7,5	10,2	129	91,6	4
35	0,527	8,8	11,5	158	112	4
50	0,368	10,3	13,2	198	140	4
70	0,259	12,0	15,5	245	174	3
95	0,196	14,7	18,0	292	207	3
120	0,153	16,5	19,8	344	244	3

Design example

If an electrical component is to be installed in addition to those existing, we must know the cross-section of the cable to be used.

Example:
Installation of a floodlamp (two bulbs)

The following characteristics must be known: operating voltage of the vehicle and power consumption of the floodlamp. In our example, we assume the operating voltage to be 24 volts (28 volts) and the power consumption of one floodlamp bulb to be 70 W.

The first step consists in calculating the current flowing through the bulb (cf. chapter 4 - variations of ohm's law).

$$J = \frac{P}{U} = \frac{70\ W}{24\ W} = 2.9\ A$$

The current flowing through one of the bulbs would be 3 A. As we are installing two lamps in our example, we have to take twice this current (6 Ampere).

With reference to table 2 and for an ambient temperature of 50˚C (always used for calculations, as it cannot be excluded that the cable crosses the engine compartment), we can use a cable having a conductor cross-section of 0.5 mm².

Important:
The cables should be laid in a flexible tubing to avoid chafing or squeezing.

When retrofitting electrical components, it must be ensured that only "brown" cables are used for ground connections or negative leads. It must not be forgotten to protect all circuits with suitable fuses. If switches are used, the contacts must be designed for the currents expected.

Terminal	Designation
	Relay contact for normally closed and change-over contacts
87	Input
87 a	1st output (break contact side)
87 b	2nd output
87 c	3rd output
87 z	1st input
87 y	2nd input
87 x	3rd input
	Relay contact for normally open operation
88	Input
	Relay contact for normally open and change-over operation (break contact side)
88 a	1st input
88 b	2nd output
88 c	3rd output
	Relay contact for normally open operation
88 z	1st input
88 y	2nd input
88 x	3rd input

[1)] Polarity change terminal 32 - 33 possible

Generator and generator regulator	
B +	Battery plus
B -	Battery minus
D +	Dynamo plus
D -	Dynamo minus
DF	Dynamo field
DF 1	Dynamo field 1
DF 2	Dynamo field 2
	Alternator
U, V, W	Alternator terminals

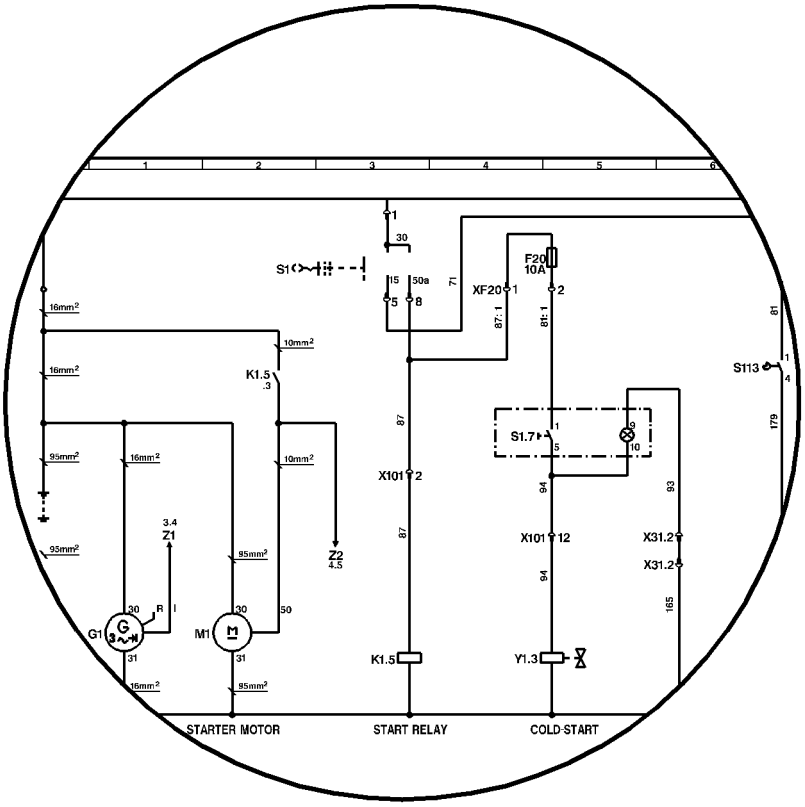
Turn-signal indicator (flasher relay)	
C	First monitoring lamp
C 0	Main connection for control circuits separated from flasher
C 2	Second monitoring lamp
C 3	Third monitoring lamp (e.g. for double-trailer operation)
L	Turn-signal lamp, left
R	Turn-signal lamp, right

FIAT KOBELCO

COMPACT LINE

Technical Handbook

Automotive electrical systems in construction machinery Interpretation of wiring diagrams Troubleshooting



2 800 960.00 en

7. Cable cross-section

The following number refers to the cross-section of the cable **10** meaning that this cable has a conductor cross-section of 10 mm^2.

8. Identification of contacts

The numbers at relay contacts or at switch connections at contacts are identical with the numbers found on the components themselves.

Example:

Label **S113, 1,4** means:

The switch is the S113 with connections at contacts 1 and 4.

9. Cable number

The cable number (**94** in this case) is printed on the insulation at intervals of several centimeters.
This number together with number of the connector permits easy identifaction of a cable even in a cable harness or by the connector (e.g. for continuity checking). The connectors are also marked with their specific number (e.g **X101**). The connection tables showing the pin assignment of each connector can be found after the wiring diagram (e.g. **X101**, Fig. 4).
If a cable is defective and if you don't know which components are linked by this specific cable, then this can be determined from the connection tables.

The example (Fig. 2 and 4) shows how to identify cable **94** in connector **X 101:**
One end is connected to terminal **5** of switch **S 1.7** (cable cross-section 1.5 mm^2) and the other end to solenoid valve **Y 1.3** (cable cross-section 2.5 mm^2). The cable is connected to pin **12** of the connector which is part of the "engine cable harness". The exact location of the connector at the machine and the corresponding order number are set out in the "WIRING DIAGRAM LEGEND".

END POINT	CABLE NO.	C mm²	NO.	■ mm²	CABLE NO.	END POINT
A10x1: 24	86	0.5	1	1	86	B10.1: A
S1: 8(50a)/FX20: 1	87/87.1	2.5	2	2.5	87	K1: 5
A100X2: 11/X117: 12	26/26.1	0.5	3			S13: 1 (OPTIONAL)
A100X2: 25	40	0.5	4	1		X101: 5
A10X1: 3	88	0.5	5	1		X101: 4
A10X1: 5	89	0.5	6	1	89	B13: 1
N. C.			7			
A100X2: 24	39	0.5	8			N. C.
A100X2: 16	31	0.5	9			N. C.
			10			
K7: 30 (OPTIONAL)	341	0.5	11	1	341	H7.1 (OPTIONAL)
S1.7: 5	94	1.5	12	2.5	94	Y1: 3
X115: 2	95	0.5	13			N. C.
			14			ENCODING PIN
X13: 1	96	0.5	15			N. C.
CONNECTION TABLE PLUG/SOCKET			X101			CABLE MOTOR

328331

Fig. 4

10.Electronic units (Fig. 3)

Electronic units (e.g. Central Electronic Unit, Load Limit Governor) are displayed in the wiring diagram as black boxes. □

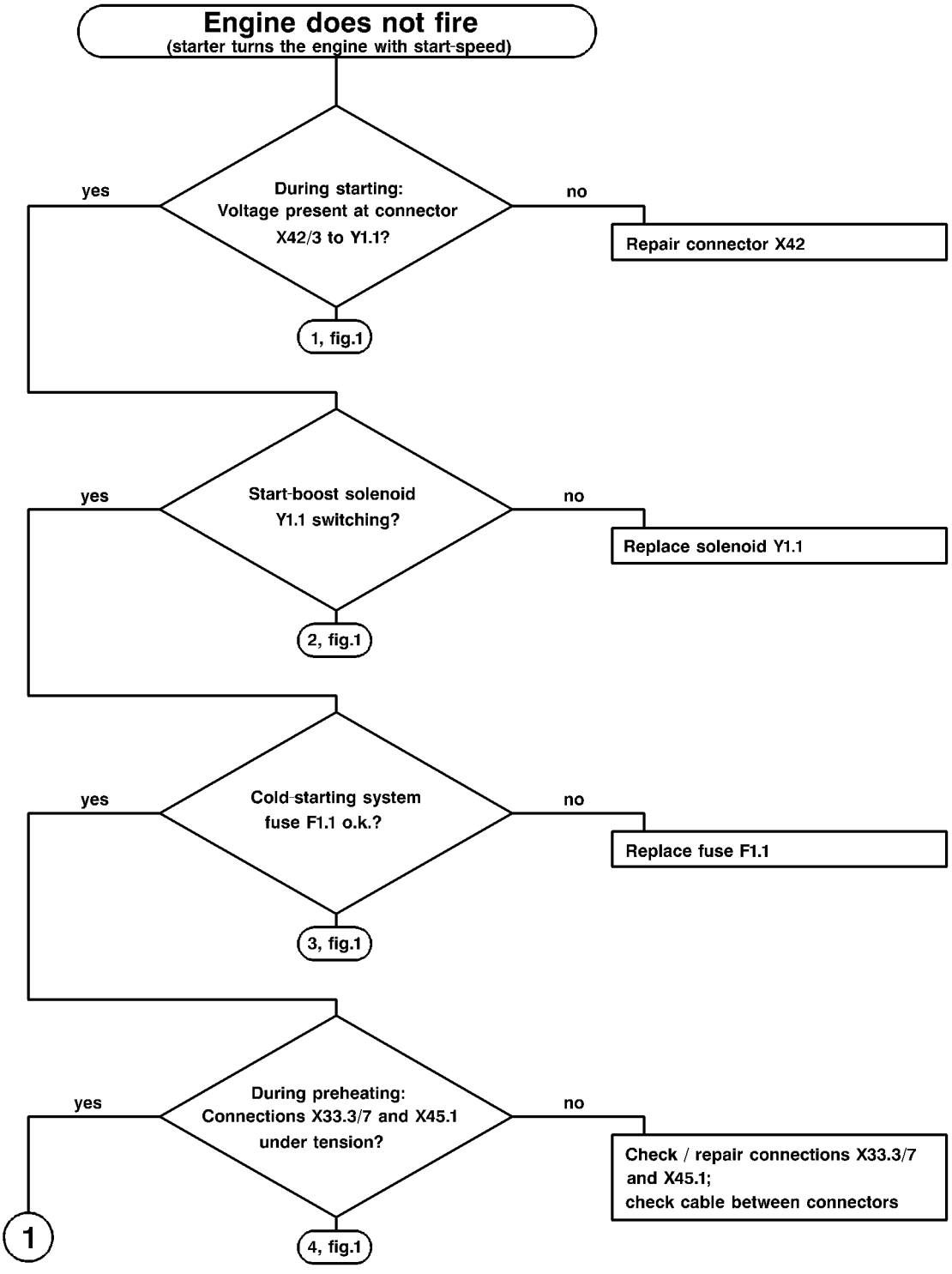


Fig. 2

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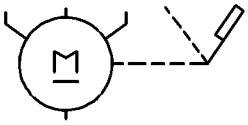
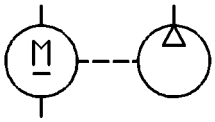
Motors, alternators

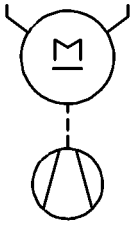
DC motor, general (f.ex. engine starter motor)



Windscreen wiper motor



DC motor with pump



Fan motor

3-phase alternator with rectifier

3282121

10 FRAME

Repair work - safety instructions

2800608

Operating instructions

Never carry out repair work without having read and understood the operating instructions.

Pay special attention to:

"Fundamental Safety Instructions", "Inspection and servicing - safety instructions" and all warnings and safety instructions attached to the machine.

The descriptions of job sequences provide only experienced personnel with the necessary instructions.

The operating manual must be kept with the machine at all times.

Repair personnel

Repair personnel must have know-how and experience relevant to repairing this or comparable machines.

In the absence of such know-how, meticulous training must be given by experienced repair personnel.

Working at greater heights

Always wear safety harnesses when working at greater heights.

Wear an approved safety harness; it must be equipped with stabilizers and safety cables.

Blocking the articulated joint

When carrying out repair work in the pivoting range, block the articulated joint. Remove the block on completing work.

Prestressed units

Never open defective prestressed units but replace them as an entirety.

In exceptional cases, open only when the system and the operating sequence are precisely known and any special tools required are available.

The operating manual contains no information on this point.

Dismantling components

Never dismantle while the machine is at operating temperature.

Oils, greases, brake fluid or coolants may have a high temperature and result in burning or scalding.

Leave time for the machine to cool down.

Before starting work, depressurize piping and hoses, cylinders, radiator, hydraulic tank, air-brake reservoir and other systems or units.

Replace defective components in good time to prevent major damage.

Clean the defective component carefully before dismantling it.

Mark the dismantled parts in the correct sequence to facilitate assembly.

When dismantling the component, close off exposed hose and piping connections, exposed drill holes and housing carefully to prevent any dust from penetrating.

Never remove lead seals

Never change the rated pressure of pressure relief.

Never remove lead seals from pressure relief valves and accumulators.

Fitting instructions

Pipe couplings with large diameters should be assembled in a vice if possible. A wrench with a grip approximately 15 times longer than the jaw width should be used.

1. Cut pipe end at right angles and de-burr - see section "Steel pipes"
2. Lightly oil (do not grease):
   thread and internal cone (Figs. 1 + 2)
   cutting ring all round (Fig. 3)
   inside of union nut (Fig. 4)

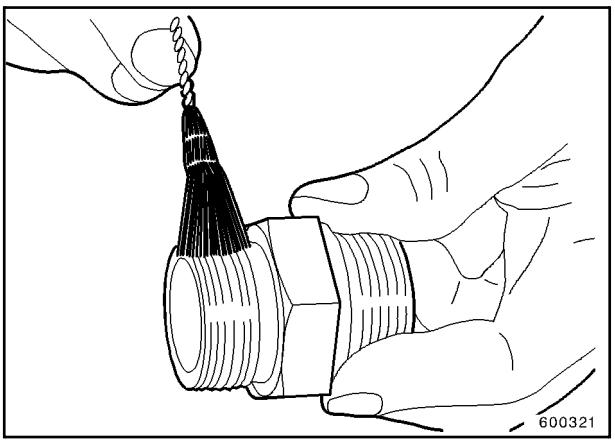


Fig. 1

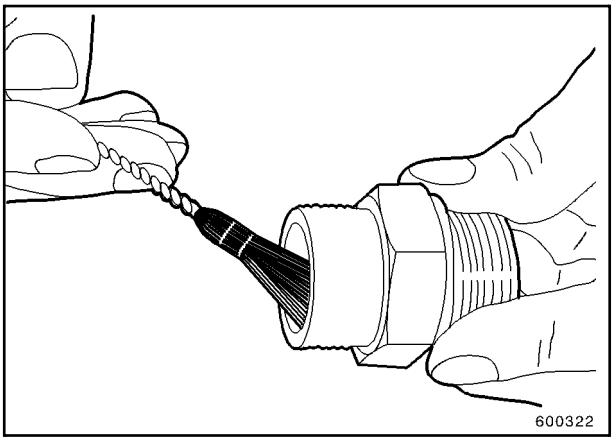


Fig. 2

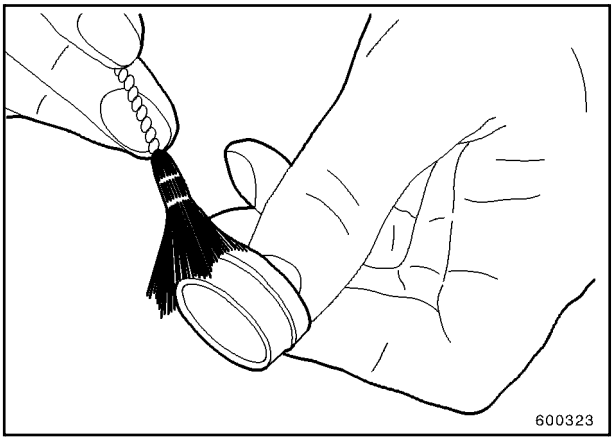


Fig. 3

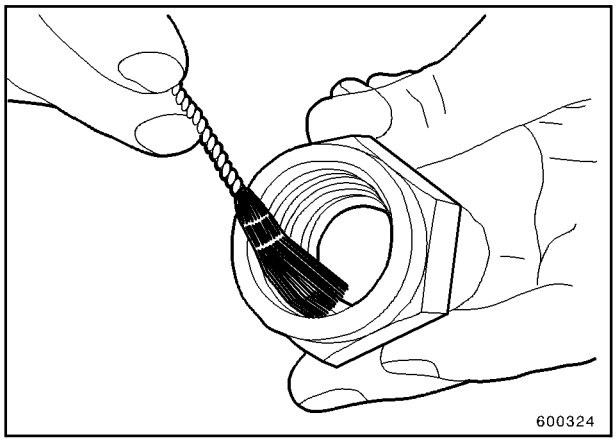


Fig. 4

3. First push union nut and then cutting ring onto the pipe (Fig. 5).
   The thicker shoulder of the cutting ring must point towards the union nut (Fig. 6).

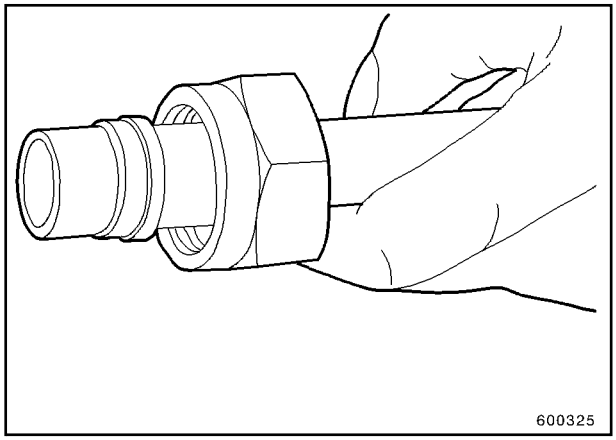


Fig. 5

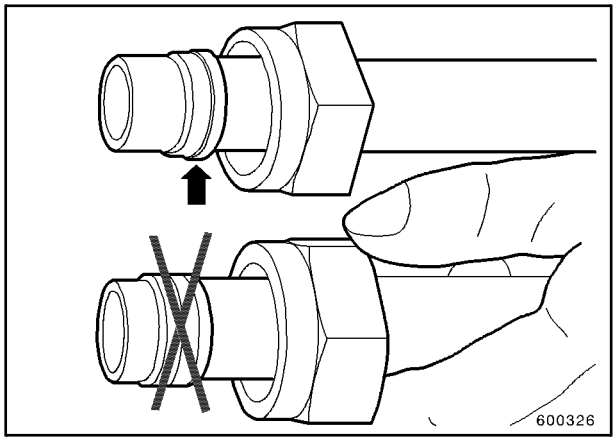


Fig. 6

Sealing and connecting components

Flanges

In the case of flanged pipe couplings, one-part flanges are used. Flanges of the same size, but different systems (Flanit/Zako) differ mainly in the contour of the middle bore.

Flanged hose couplings are assembled with two-part flanges. These are referred to as flange halves.

The flanges can be used several times.

Wedge rings

Wedge rings for flanged pipe couplings are available in two designs.

Fig. 1 (F-system, for example)
3 - Wedge ring with seal ring groove
7 - Wedge ring without seal ring groove

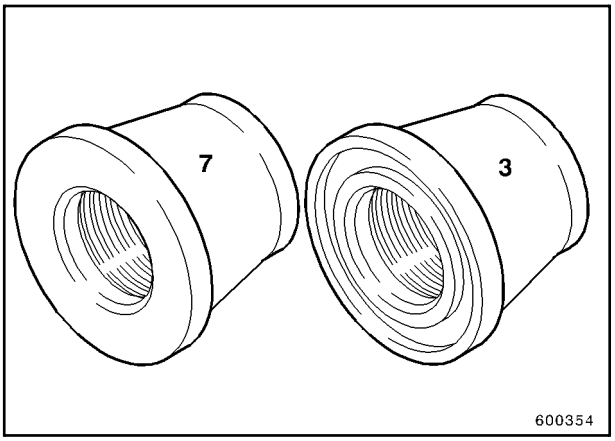


Fig. 1

When making pipe/pipe connections with either the new F-system or the Z-system, a wedge ring with seal ring groove must always be mated opposite a wedge ring without a seal ring groove .

In the original F-system, nearly all connections were made up of two wedge rings with grooves. In such installations, a centre disk (see Section "Centre disks") is necessary. Such a centre disk is also to be used with other systems in exceptional cases in which two wedge rings with grooves need to be mated together.

Direct assembly of two wedge ONLY rings with seal ring grooves is permitted in cases of emergency as a permanent seal cannot be achieved.

Used Z-rings can be removed from their pipe seating and fitted to another pipe section. During this repeated assembly, attention must be given that the cutting edges of the Z-ring are free of metal chippings.

F-rings cannot be re-used.

Seal rings

The seal rings are one-part plastic rings (Fig. 2). They can be used several times and can be installed in all connections previously sealed with the old type of 2-part seal ring.

Table 1 (Appendix) lists all of the available sizes, together with their appropriate Part Nos.

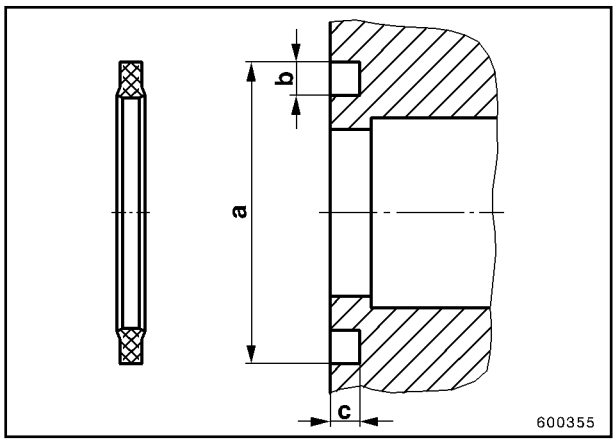


Fig. 2

Flange coupling - pipe / pipe

F-system

Figs. 1 and 2 show:

2 - Seal ring
3 - F-ring (wedge ring) with seal ring groove
4 - Flange(one-part)
5 - Double-hex bolt
6 - Pipe
7 - F-ring (wedge ring) without seal ring groove[1)]
11 - Hex. nut

[1)] If the second F-ring also has a seal ring groove (3, Fig. 3), a centre disk (8) and a second seal ring (2) must be used.

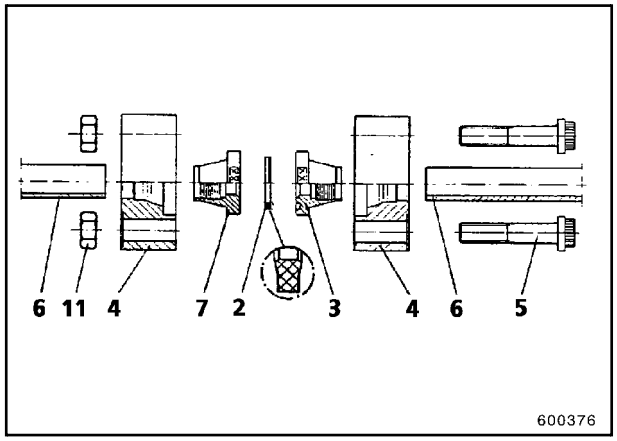


Fig. 1

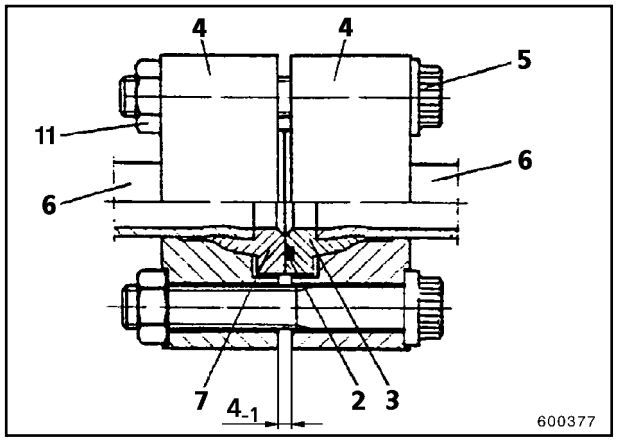


Fig. 2

Assembly:

1. Prepare pipe for assembly.
2. Oil bolts (5) and inner contours of flanges (4).
3. Push flanges (4) and F-rings (3 & 7) onto pipes. Place seal ring (2) into groove. If necessary, fit a second seal ring (2) and centre disk (8).
4. Push pipes (6) against shoulders of F-rings (3 & 7). F-rings must lie firmly against one another and must be seated securely in the flanges (4).
5. Insert bolts (5) and tighten as far as possible by hand.

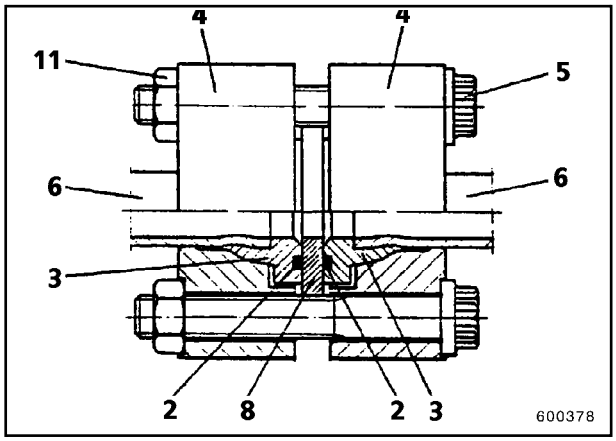


Fig. 3

Flanges (4) must be at right angles to the pipe axes and parallel to one another.

Tighten double-hex bolts (5) diagonally in stages of max. 1/2 a turn each.

The coupling has been assembled correctly when the gap between the parallel faces of the flanges is 4_{-1} mm (gap for first assembly).

Exception: If a centre disk (8) is being used, the gap dimension increases by the thickness of the relevant disk.

Check gap at least three separate points (see arrows, Fig. 4). The difference must not be greater than 0.3 mm.

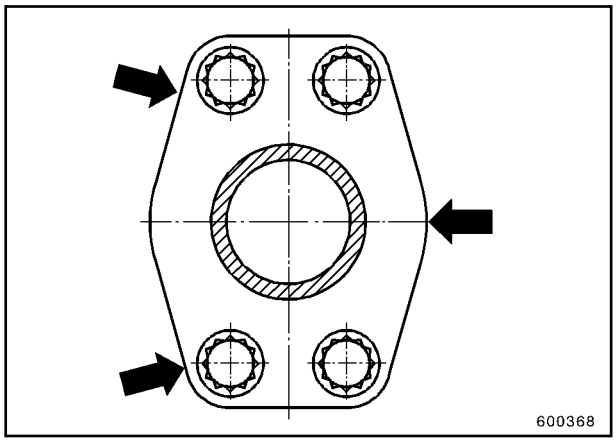


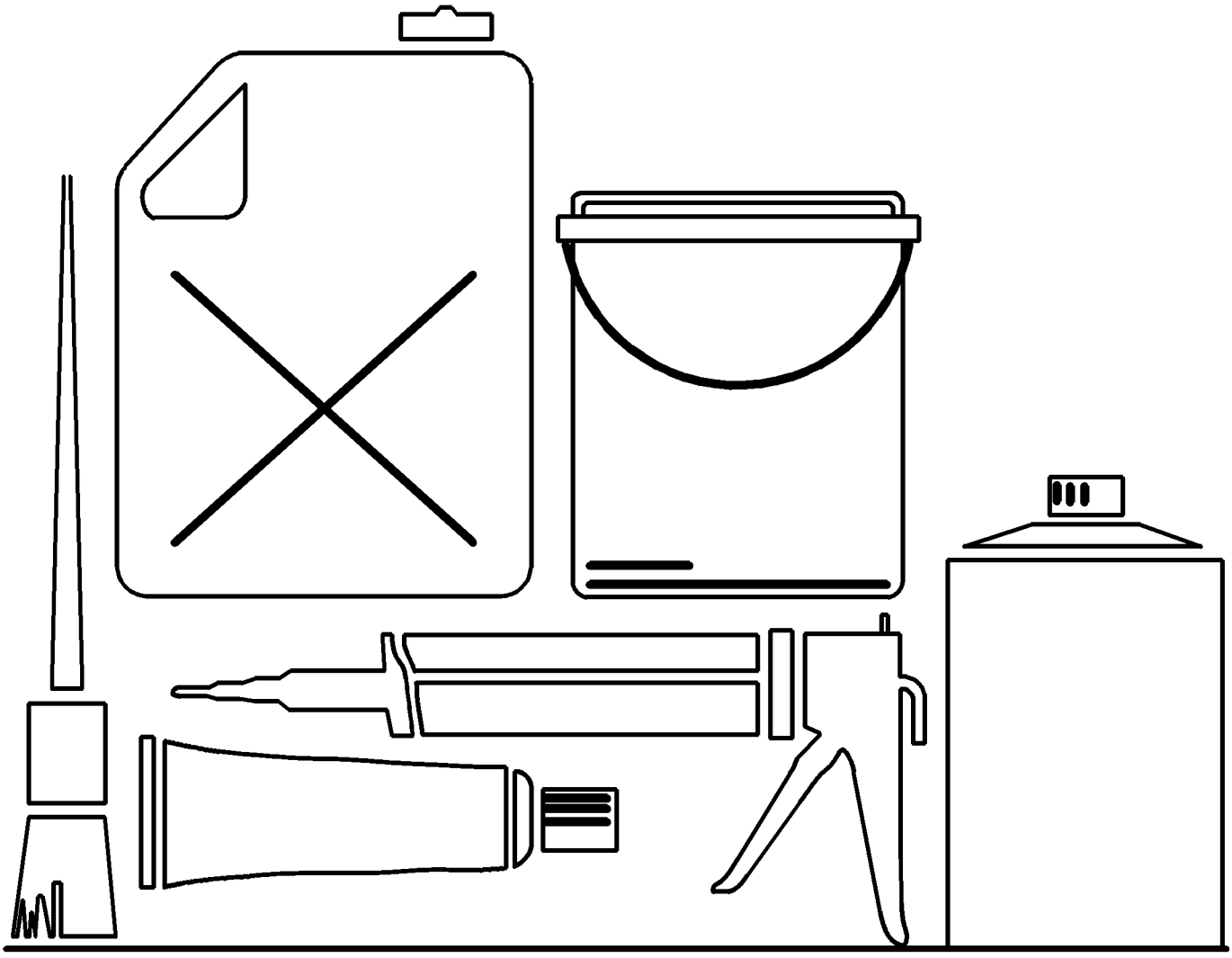
Fig. 4

FIAT KOBELCO

COMPACT LINE

Technical Handbook

Sealing, protective, testing and cleaning agents



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Corrosion protection for pins and bearings (bushings and hubs) 2801916

Use Voler A.C. anti-corrosive agent only.

Other agents are not approved.

All pins and bearings (bushings and hubs) of the working equipment or in equipment components must be treated with **Voler A.C.** anti-corrosive agent before fitting.

Voler A.C.:

- permits easy fitting and dismantling
- protects against rust, oxidation and similar wear
- prevents seizing and fretting corrosion in non-moving parts of bearings.

This is achieved by aluminium and copper particles forming a protective layer on the metal. This layer removes surface irregularities and does not sweat, seize or harden.

Part nos. for Voler A.C.

P/N 73171461 - 0,5 l spray can (CFC-free)

P/N 73171462 - 0,5 kg tin

P/N 73171463 - 4,5 kg bucket

Available from the Spare-Parts Service.

Application of Voler A.C.

- Clean off grease, oil, dirt and corrosion protection agents from pins and bearings using white spirit or diesel fuel.

  Rust patches must be thoroughly removed, if any.

  All parts must present a dry, bright metal surface.

- Apply a thin layer of Voler A.C. on pins and all bearings using a brush or a spray can. Pin shafts and bearings must be completely covered by the protective layer.

  If the protective layer of a pin already treated with Voler A.C. is damaged, these areas must be touched up before fitting the part.

- Fitting and securing of pins

  If the pin is too heavy to be fitted manually, apply Voler A.C. at first only on abt. a quarter of the pin's length

  Then position pin by means of a lifting gear ready for fitting.

  Apply Voler A.C. on the remaining length of pin shaft, fit pin and secure. □