OPERATION, MAINTENANCE AND PARTS MANUAL TRUCK - MOUNTED CONCRETE BOOM PUMP

MODEL: *XXT37R*

REED**,** provides this manual for the guidance of all owners, operators and servicing personnel in order to obtain the longest possible trouble-free service. It contains data, specifications, warranty, schematics, operating instructions, lubrication procedures, maintenance procedures, illustrated parts breakdown, vendor information, service bulletins, and safety rules.

Serial No.:	**07-260-XXT37.4R**
Date Delivered:	**OCTOBER 2007**
Customer:	**M&M CONCRETE PUMPING**

NOTE: Additional copies of this manual may be obtained through the ***REED*** Parts Department.

FIRST EDITION: OCTOBER 09, 2007
SERIAL NUMBER: 260

REED**,** *Technical Publications* • A Member of the Shea Family of Companies
13822 Oaks Avenue • Chino, California 91710 • USA
Phone 909-287-2100 • Fax 909-287-2140

REED

TRUCK MOUNTED CONCRETE BOOM PUMPS
• ONE • TWO • THREE WARRANTY

REED warrants each of its new Truck Mounted Concrete Boom Pumps to be free of defects in material and workmanship under normal use and service for a period of One • Two • Three years from date of delivery based on the following conditions:

- One (1) year or 2400 pumping hours whichever comes first
- Two (2) years covering the Solid State Black Box
- Three (3) years covering all structural parts

The **WARRANTY** is issued **ONLY** to the **INITIAL USER.** The warranty periods begins when the product is delivered to the initial user or when first put into service, whichever occurs first. Said warranty is void if the machine is subject to misuse, neglect, accident or abuse.

The **STRUCTURAL WARRANTY** will not be honored unless, regular inspections have taken place and repairs as recommended as a result of the inspection. Inspection guidelines are detailed in the **ACPA BOOM INSPECTION BOOK**, attached in the extreme rear of the **PARTS MANUAL**. The frequency of inspection must adhere to the **ACPA BOOM INSPECTION BOOK**. For **WARRANTY** to be considered valid, these inspections must be performed by a "qualified person" as defined by the **ACPA SAFETY MANUAL**.

REED'S obligation under this warranty is limited to correcting without charge, at its factory, any parts or parts thereof which shall be returned to its factory, transportation prepaid and upon ***REED'S*** examination proves to have been originally defective. Correction of such defects by repair or replacement shall constitute fulfillment of all obligations to the initial user. This warranty does not include labor or transportation charges unless specifically identified and authorized in writing by ***REED.*** Nor does the warranty apply to any unit upon which repairs or unauthorized alterations have been made.

This warranty does not apply to normal maintenance service or to normal replacement of certain machine parts,which are subject to normal wear (such as concrete cylinders and wear components, valve mechanisms, delivery systems and bracketry, chassis decking / walkways, steps and hand rails, hopper grate, etc.) ***REED*** makes no warranty in respect to trade accessories or outside vendor components including truck chassis, such being subject to the warranties of their respective manufacturers.

THIS IS A LIMITED WARRANTY AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. In no event shall ***REED*** be liable for incidental, general or consequential damages, loss or any expense directly or indirectly related and resulting from use or lack of use caused by delay in delivery, parts failure, or any other causes associated with the product use. No person, firm or corporation is authorized to assume for ***REED*** any other liability in connection with the sale of ***REED*** products.

J.F. Shea Co.

REED • A Member of the Shea Family of Companies

REED

Model XXT37R

Truck Mounted 37-Meter Concrete Boom Pump

- 120 ft (37 m) Vertical Reach
- 200 yd³/hr (154 m³/hr)
- 1300 psi Concrete Pressure
- 4-Section Roll and Fold Boom with 5" (125 mm) Line
- Exclusive, Versatile, *"DRAGONFLY"* XX Outrigger Design
- Efficient "POWER-FLO" Rexroth A4V125, Closed-Loop, Over-Center Hydraulics
- Exclusively 90° Elbows on Boom
- Radiused Boom Design

Boom: Versatile, compact, fully articulating 4-section roll-and-fold boom represents the latest in boom technology. Radiused boom design to improve durability and eliminate stress focal points. Low unfolding height of 28'4" (8.64 m).

Delivery Line: 5" (125 mm) delivery line with straight pipe sections and 90° elbows. Components are all readily available and bracket mounted for easy delivery line replacement.

Pedestal: Integrated outrigger and boom pedestal with small outrigger footprint. "XX"-structure design eliminates stress or twist in truck frame. Heavy-duty, low friction, double-row ball bearing rotates the 4-section boom assembly through a 370° slewing range. Hydraulic oil tanks and water tanks located in pedestal section for improved weight distribution. Two spacious 11' 9" (3.5 m) long decks for convenient storage of pipes and hoses.

Outriggers: ***REED's*** exclusive (patented) *"DRAGONFLY"* XX design sets new standards in maximum versatility and speed. Fully hydraulic operation. This innovative design allows operation in job site conditions where others can not open up.

Remote Controls: Lightweight fully proportional remote control box with 115 ft (35 m) cable for smooth operation of all boom and pump functions. Fully proportional radio remote controls included as well. Remote and radio controls have identical patterns. Manual boom controls are conveniently located on the RH deck.

Clean-Out: Hydraulically driven, high pressure 360 psi (25 bar) water pump with twin 90 gal (346 L) water tank and hose.

Concrete Pump: Efficient, closed-loop hydraulic system using dual Rexroth A4V125 hydraulic pumps for smooth, controllable pumping. Reduced boom bounce even when pumping at maximum output. Hard-chromed concrete cylinders and hard-faced wear parts precision machined for long life and tight sealing. Fully-variable volume control from 0 to 200 yd³/hr (0 to 154 m³/hr). Hinged clean-out door and swing away discharge pipe for quick, effective wash-out. All major system components located for good operator accessibility and ease of service. Harsh-mix hopper combines field proven boom pump experience with the most advanced technology available. Hopper screen and splash guards are standard.

REED **Solid State Black Box:** Reliable technology for smooth, fast cycling. This eliminates the heat-generation problem of hydraulic cycling and the eventual failure of old-style conventional relays.

Model XXT37R

Truck Mounted 37-Meter Concrete Boom Pump

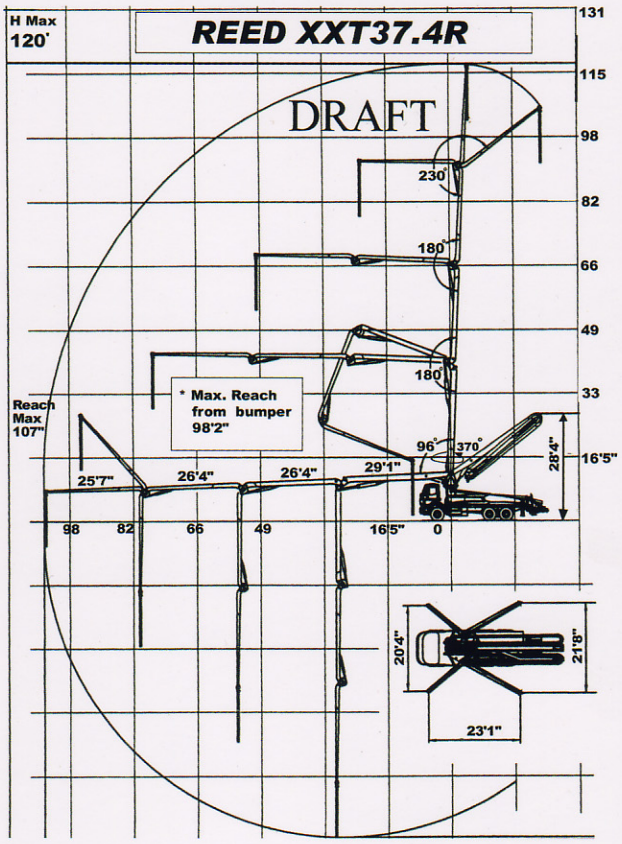
BOOM SPECIFICATIONS	XXT37R	
Height & Reach		
Vertical Reach	120'	36.58 m
Horizontal Reach	107'0"	32.61 m
Reach From Front of Truck	98'2"	29.92 m
Unfolding Height	28'4"	8.64 m
4-Section Boom		
1st Section Articulation	96°	96°
2nd Section Articulation	180°	180°
3rd Section Articulation	180°	180°
4th Section Articulation	230°	230°
1st Section Length	29'1"	8.87 m
2nd Section Length	26'4"	8.03 m
3rd Section Length	26'4"	8.03 m
4th Section Length	25'7"	7.72 m
General Specs		
Pipeline Size (ID) Metric Ends	5.0"	125 mm
With Couplings	5.5"	140 mm
Rotation	370°	370°
End Hose: Length (Heavy-duty)	13'0"	4.00 m
Diameter	5.0"	125 mm
Outrigger Spread L-R-Front	20'4"	6.20 m
Outrigger Spread L-R-Rear	21'8"	6.60 m

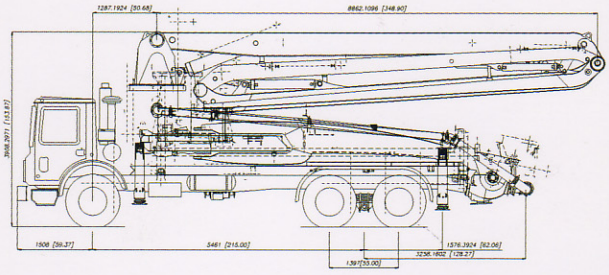
PUMP SPECIFICATIONS			
Output: Rod Side		200 yd³/hr	154 m³/hr
Piston Side		131 yd³/hr	101 m³/hr
Pressure: Rod Side		1300 psi	90 bar
Piston Side		1853 psi	128 bar
Hard-Chromed Concrete Cylinders		Standard	Standard
Concrete Cylinder Diameter		9.0"	230 mm
Stroke Length		79.0"	2000 mm
Maximum Strokes per Minute:	Rod Side	31	31
	Piston Side	18	18
Hopper Capacity		23 ft³	650 L
Volume Control		Zero to Full	Zero to Full
Hopper Grate Vibrator		Standard	Standard
Hydraulic System: RR A4V125		Closed-loop	Closed-loop
Hydraulic System Pressure		5000 psi	345 bar
Hydraulic Tank(s) Capacity	Pump	100 gal	378 L
	Boom	95 gal	359 L
Hydraulic Drive Cylinders:	Rod Diameter	3.15"	80 mm
	Piston Diameter	5.51"	140 mm
Water Tank Capacity (Twin 90 gal tanks)		180 gal	692 L
Maximum Aggregate Size		2.5"	63 mm

TRUCK MOUNTED SPECIFICATIONS*	Truck Model: Mack MR 688S	
Horsepower	350	350
Length	37'3"	11.36 m
Width	8'2"	2.49 m
Height	12'6"	3.81 m
Wheelbase	215"	5.46 m
Front Axle Weight (Approx.)	19,000 lbs	8,636 kg
Rear Axle Weight (Approx.)	39,260 lbs	17,845 kg
Total Weight (Approx.)	58,380 lbs	26,536 kg

Maximum theoretical performance shown above. Maximum output and pressure cannot be reached simultaneously. Performance will vary depending on slump, mix design and pipeline diameter. Specifications subject to change without prior notice.

*Dimensions vary with different truck makes, models and specifications.





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Baugruppenübersicht construction group survey	Betonpumpe: concrete pump:	Mast: boom:
Typenplan type parts list	**THP 150**	**37R4XXT**

Kunde: / customer:	**REED**	Auftrags.-Nr.: / order no.:	205244
Fahrzeug: / vehicle:	**Mack**	Bestellnr.: / purchase no.:	**Semi**

Zusammenstellung	assemble cpl.	(B 00 4 171)			
Aufbaurahmen	sub frame	B 01			
Rahmen	base frame	802613a	Reed Zeichn.		
Rahmenverbindung kpl.	frame connection cpl.	B 03			
Mastbockverbindung	boom connection cpl.	B 03 9 045			
Aufbau	housing	B 04			
Abstützung hinten	outrigger cpl.	B 05			
		B 06			
Podeste / Aufstiege	pedestal / ladder	B 07			
Mastauflagebock	boom support	B 08 0 003	Reed Zeichn.		
Gegengewicht	counter weight	B 09			
Pumpeneinheit kpl.	pump unit cpl.	B 10			
Pumpenlagerung	pump mounting	B 11 5 005	10,5 bis 11°		
Förderzylinder kpl.	conveying cylinder cpl.	B 12 5 010			
Förderkolben kpl.	conveying piston cpl.	B 13 3 020			
Spülkasten kpl.	water box cpl.	B 14 3 000			
Antriebszylinder	drive cylinder	B 15 4 031			
Schiebersystem	s-valve system 1:	B 17 5 200 R1	Eigener	Typenplan	
Schwenkantrieb	tilting device cpl.				
Zentral / Schmieranlage	central lubrication unit				
Förderkolbenschmierung	lubrication f. conveying piston	B 18 3 006 b			
Förderleitung Pumpeinheit	conveying pipe pump unit	B 19			
Förderleitung 6"	conveying pipe 6"				
Trichteroberteil	Hopper top part				
Trichterzubehör	hopper accessories				
Trichteroberteil	hopper upper part	B 22 5 090			
		B 23			
		B 24			
Rührwerk mit Antrieb	agitator with drive	B 25 5 080	2x Nutring		
		B 26			
		B 27			
Rütteleinrichtung	vibrating equipment	B 28			
		B 29			
Wasseranlage	water system	B 30			
Wassertank kpl.	Water tank cpl.	B 31			
Wasserpumpe mit Antrieb	Water pump with drive	B 32 3 070			
Halter für Wasserschlauch	Holder for water hose	B 33			
Halter für Wasserschlauch	Holder for water hose	B 33 0 020	(2x)		
Schlauchleitung	Hose line	B 34			
Druckluftanlage	Compressed air unit	B 35			
Hochdruckreiniger	High pressure cleaner	B 36			
Kompressor mit Antrieb	Compressor with drive	B 37			
		B 38			
Schlauchleitung	Hose line	B 39			
Hydraulikanlage BP	Hydraulic system	Wai 106474			
Hydrauliks. Pumpe/Rührwerk	Control block	WAI 108404			
		WAI 108403			
Blasenspeicher		WAI 103616			
Hydraulikpumpe	hydraulik pump	WAI 104777			
		WAI 100 938	4x		
		WAI 101 332	8x		
Hydrauliktank / Zubehör	hydraulic tank / accessories	WAI 101 950	4x		
Ölkühlung	oil cooler	WAI 101 979	4x		
Schläuche / Zubehör	hoses / accessories	WAI 103 207	4x		
Elektroanlage	wiring diagram	WAI 106059	B 51 3 017 d		
Steuerpult	control panel				
Motorabstellung	engine stop	B 52			
Pumpenverstellung elektrisch	pump adjustment electrical	B 53			
Drehzahlverstellung	rpm adjustment	B 54			

Elektroanlage Mast	wiring diagram boom	B 55			
Kabelbaum / Zubehör	wiring harness / accessories	B 56 1 070 a	B 56 1 071	B 56 1 066 d	B 56 1 049
Zubehör	accessories	B 57	Auf Layer	achten	
extra Mastkabelbaum		B 56 2 066			
Kabelfernsteuerung	cable remote control	WAI 105983			
Funkfernsteuerung	radio remote control	WAI 105982			
Verteilermast	distributor boom	B 66 7 120			
Mastbock	boom support	B 61 9 000 d	WAI 106535		
Drehwerk	rotating unit	B 62 8 010	B 62 8 011 a	B 62 8 012 c	WAI 106266
Abstützung kpl.	outrigger cpl.	B 63 9 150 e	WAI 106210		
Abstützung vorne rechts	outrigger front right 2:		B 63 9 170 c	WAI 109673	B 63 9 090 b
			B 63 9 246 a	B 63 0 104 a	WAI 106512
Abstützung vorne links	outrigger front left 2:		B 63 9 180 c	WAI 109673	B 63 9 090
					WAI 106512
Abstützung hinten rechts	outrigger rear right 2:		B 63 9 190 a	WAI 109673	
Abstützung hinten links	outrigger rear left 2:		B 63 9 210 b	WAI 109673	
Transportsicherung vorne	transportation safety device f.		B 63 9 197 b		
Transportsicherung hinten	transportation safety device r.		B 63 9 207 b		
Förderleitung	delivery line	B 64			
Endschlauchhalter	end hose holder	B 64			
Endschlauch	end hose	WAI			
		B 65			
Arm 1	boom element 1	B 66			
Arm 2	boom element 2	B 66			
Arm 3	boom element 3	B 66			
Arm 4	boom element 4	B 66			
Arm 5	boom element 5	B 66			
		B 67			
Drehkopf	rotating head	B 68			
		B 69			
Hydraulikanlage Mast	hydraulic system boom	WAI106 261			12Volt
Hydraulikanlage Mast	hydraulic system boom	B 71 9 001aR1			
Hydraulikanlage Mastbock	hydraulic sys. boom support	B 72 9 011aR2	Steuerbl. von	Fa. REED	
		B 73			
Hydraulikanlage Pumpeinheit	hydraulic sys. pump unit	WAI101529			
		B 75			
		B 76			
Hydrauliktank Mast	hydrauliktank boom	B 77			
		B 78			
		B 79			
Antrieb	drive	B 80			
Verteilergetriebe 4496	distribution gear	B 81 4 077aR1	i = 1:1,51		
Antriebsaggregat	engine	B 82			
Wellenstrang	lineshaft	B 83			
Unterfahrschutz	chassis protection	B 84			
Zubehör Beleuchtung	additional parts lightning				
Trichterbeleuchtung	lightning for hopper	B 86			
Beleuchtung	lightning	B 56			
Kotflügel	fender	B 87			
Federblockierung	spring lock	B 56			
Achse kpl.	axle cpl.	B 89			
Zubehör	accessories	B 90			
Standardzubehör	standard accessories	B 91			
Schilder Pumpe	sticker pump	B 92 1 004			
Schilder Mastbock	sticker boom support				
Schilder Mast	sicker boom				
		B 93			
Werkzeugkasten	tool box	B 94			
Zusatzteile Europa	additional parts europe	B 95			
Rohrmagazin	conveying pipe magazine	B 96			

Bemerkung / comment:

1 : ohne Klappbogen
2 : Abstützzylinder mit flexiblem Teller- Umbuchung nötig
Achtung : Tanks müssen abgedrückt sein !

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JOB #	XXT37R			SN # 07-260
	customer: M&M CONCRETE PUMPING			
VL	**BOOM MAKE UP PIPE LENGTHS**			
9160	ARM			LENGTH
	A			91 3/8"
	B			58"
	B-C			
	C			57"
	C-D			
	D			49 1/2"
	E			
	PIPE TYPE (Ultra III or Normal?)			ULTRA III
	TIP HOSE SIZE			4"
	SPECIAL ELBOWS			PART #
	Turret	A sect		801102
	A sect	B sect		
	B sect	C sect		801104
	C sect	D sect		
	D sect	E sect		
	DECK MAKE UP PIPE LENGTHS			
	PIPE			LENGTH
	#1			7 1/2"
	#2			102 1/4"
	#3			
	SPECIAL ELBOWS			
	TURRET PIPE			
	DECK DELIVERY LINE COMPONENTS			PART #
	HOPPER ELBOW			803024
	ELBOW 6"			803025
	REDUCER			803026
	SPECIAL TURRET ELBOW			

	RADIO REMOTE SERIAL NUMBER	SERIAL #
	RADIO REMOTE	
	CABLE REMOTE	
	TRUCK	SERIAL #
		IM2K189J5M028211
	BOOM SIZE	SERIAL #
	XXT37R	205244
	BOOM SIZE----	SERIAL #
	MAST	N 85 08
	A SECTION	N 86 09
	B SECTION	N 86 08
	C SECTION	N 86 09
	D SECTION	H 86 09
	E SECTION	

REED

USER MANUAL

MODEL: XXT37R
TRUCK - MOUNTED
CONCRETE BOOM PUMP

***REED*, LLC** • A Member of the Shea Family of Companies
13822 Oaks Avenue • Chino, California 91710 • USA
Phone 909-287-2100 • Fax 909-287-2140

0. Contents

1. Foreword

Dear customer,

Please read this user manual carefully before first using your truck-mounted concrete pump, so as to ensure that you use it safely and effectively.

We have written this user manual to familiarise you with the design, use, operation and operating conditions, and to list the servicing and maintenance work required, together with information on safe working.

Before starting to use the truck-mounted concrete pump, be sure that all the safety conditions have been satisfied.

This user manual forms part of the total documentation package for the truck-mounted concrete pump. It relates exclusively to the superstructure that is fitted to the truck. For the truck itself see the separate user manual issued by the truck manufacturer. There may be separate user manuals for certain components and options. These user manuals should also be read and complied with.

All repair work should be performed only by authorised skilled staff.

If maintenance work is neglected or improperly performed, we may no longer be liable to perform our warranty obligations under our conditions of supply.

Only original **WAITZINGER** spare parts ensure quality and interchangeability.

NOTE:

- ☞ **Safety instructions should be complied with at all times!**
- ☞ **We reserve the right to make technical changes and improvements to the equipment and its components from the illustrations and data set out in this user manual.**
- ☞ **This user manual is applicable only insofar as the truck-mounted concrete pump corresponds to the version and equipment described.**
- ☞ **In the following sections the truck-mounted concrete pump is also referred to as the “machine” or “equipment”.**

Only qualified and trained personnel over 18 years of age may work on and with the truck-mounted concrete pump.

Our customer service department will be pleased to offer you further information and advice if despite consulting this user manual you encounter any problem with your truck-mounted concrete pump.

We wish you all the best in trouble-free driving and use of your truck-mounted concrete pump.

The management

2. Safety instructions and information

☞ **In addition, please comply with the safety instructions and information for the truck itself!**
☞ **We expressly draw to your attention that we accept no liability for damage and operating failures that arise due to disregard of this user manual!**

☞ This section contains safety instructions which must be complied with at all times when the machine is in operation. These instructions are highlighted in the text by particular symbols.

2.1 Warranty and liability

☞ After the machine has been delivered, check the completeness of the scope of supply against the delivery note.

☞ If anything is missing, or damage has occurred in transport, please report this immediately to **WAITZINGER**.

☞ The machine as delivered is in accordance with current technology and complies with the mandatory safety standards.

☞ The machine should be operated only when it is in good technical condition and in a proper manner (see section 4.2 “Proper use”). Any use other than this or beyond this is deemed to be improper use.

☞ If the machine is used inappropriately or improperly risks to life and limb can arise, and/or damage to the machine or other property. **WAITZINGER** accepts no liability for damage that arises under such circumstances. The risk is borne solely be the user of the machine.

☞ Proper use of the machine also requires compliance by the user with national regulations for accident prevention and environmental protection, with recognised professional rules for good and safe working practice and with this user manual.

☞ No changes, additions or modifications of any sort may be made to the machine without express permission from **WAITZINGER**. Original spare parts and approved accessories from **WAITZINGER** contribute to safety. No liability is accepted for the consequences arising from use of other parts.

☞ Persons working on or with the machine must have read and understood the user manual before starting work and have appropriate physical and mental capabilities.

☞ Disregard of these instructions and information can lead to risks to life and limb, and/or damage to the machine or other property.

☞ If, due to disregard of / failure to comply with the instructions and information in this user manual or the operating and maintenance handbook for the overall system, accidents leading to personal injuries and/or damage to property occur, this circumstance releases **WAITZINGER** from any liability for direct or consequential damages such as personal injuries, damage to property not covered by the contract, loss of profits and interruption to production that comes under the heading

„**Product liability**“

to **WAITZINGER**.

2.2 Safety symbols

DANGER:
This symbol indicates an immediate danger to life and health of personnel! Disregard of this information can lead to serious effects on health, through to life-threatening injuries and even death.

WARNING:
This symbol indicates a possible danger to life and health of personnel! Disregard of this information can lead to serious effects on health, through to life-threatening injuries.

CAUTION:
This symbol indicates a situation that may possibly be dangerous! Disregard of this information can lead to minor injuries or damage to property.

These symbols are placed in front of the text to which they refer, in order to alert the operator to possible hazards before undertaking any activity on the machine / equipment.

NOTE:
This symbol is used to draw the operator's attention to notes and specially useful information for technical requirements and handling the machine / equipment.
These notes assist in making the best use of the functions of the machine / equipment.

This symbol follows the text to which it relates.

2.3 Safety equipment

☞ The safety equipment fitted to the whole system must be given particular attention.

☞ The safety equipment must be continually checked for correct operation.

☞ Safety equipment that operates on the basis of set values must not be reprogrammed without expressed permission from **WAITZINGER**.

☞ If the safety equipment is not operational or is malfunctioning, the truck-mounted concrete pump must not be used.

2.4 Personal safety equipment

In the entire working area of the truck-mounted concrete pump, suitable safety equipment should be worn, particularly when handling mortar additives.

The symbols for the necessary safety equipment are shown in the graphics panel alongside.

The symbols shown are as follows:

1. Hard hat
2. Safety boots
3. Ear defenders
4. Safety gloves
5. Safety glasses
6. Face mask
7. Protective clothing
8. Safety harness

Abb. Fig. 2.1 Symbols for personal safety equipment

2.5 Ensuring safe working and safety

The following safety regulations were taken into account when designing the truck-mounted concrete pump:

☞ pr EN 12001 “Conveying, spraying and distribution machines for concrete and mortar”

☞ EN 292 “Safety of machines, equipment and systems”

☞ EN 60204-1 “Safety of machines; electrical equipment for industrial machines”

☞ EMC “Electromagnetic compatibility - Directive 89/336/EWG”

The following instructions for ensuring health and safety at work must be observed by the user, the supervisor and the operator of the equipment at all times:

- ☞ VBG ZH1/653 “Health and safety when operating truck-mounted concrete pumps”
- ☞ VBG ZH1/573 In the German Federal Republic – “Directives for truck-mounted concrete pumps and distributor booms”
- ☞ BGR 182 “Rules for handling truck-mounted concrete pumps and distributor booms”
- ☞ VDM 24119 “Graphical signs”
- ☞ BGG “Basic requirements, selection and qualification of truck-mounted concrete pump operators”
- ☞ VDMA “Safety Handbook”
- ☞ VBG 1 “General instructions”
- ☞ VBG 4 “Electrical systems and equipment”
- ☞ VBG 5 “Power-operated equipment”
- ☞ VBG 8 “Winches, hoists and drawgear”
- ☞ VBG 9 “Cranes”
- ☞ VBG 9a “Load-bearing equipment for use as lifting gear”
- ☞ VBG 12 “Accident prevention regulations (UVV) for vehicles”
- ☞ VBG 37 “Accident prevention regulations (UVV) for building work”
- ☞ VBG 109 “First aid”
- ☞ VBG 121 “Noise”
- ☞ VBG 125 “Safety signage at the workplace”
- ☞ EC directive 89/655/EWG “Minimum machine instructions guidelines”
- ☞ EC directive 98/37 “Essential machine guidelines”
- ☞ EC directive EN 60204-1 “Electrical equipment of machines, part 1”
- ☞ EG directive 73/23 “Insulation of cables”
- ☞ EG directive “Electromagnetic compatibility EMC”
- ☞ EG directive 92/58 “Personal safety equipment”
- ☞ EG directive 89/689 “Waste disposal”

☞ Work on or with the machine may be performed only by suitably instructed reliable personnel and/or technical staff.

☞ Before starting work it should be determined which personnel shall perform the necessary operating and maintenance work.

☞ When operating the machine the legislation and regulations applicable at the place of use should be observed. In the interests of safe working procedures, the user, supervision and equipment operator are responsible for complying with regulations.

☞ Before starting work, all necessary functional checks should be performed on the machine.

☞ Items not required in the immediate working process (tools, lubricants, cleaning materials, etc.) must be stowed only in their proper places, since otherwise they may obstruct safe operation.

☞ During cleaning work, especially with solvents or petrol washes, safety gloves and safety glasses must be worn. No naked lights or smoking when cleaning is being performed! Disposal of consumable materials to TA waste code 524.02 should be to EC directive 91/689/EWG.

☞ Consumables such as lubricants, cleaning materials during maintenance, repair and oil change should be collected in suitable containers and disposed of in accordance with regulations (to EC directive 75/439/EWG and statutory instruments under §§ 5a, 5b AbfG and AltölV).

2.6 Information on risks of injury

Improper use of the truck-mounted concrete pump may lead to the following injuries:

☞ Injuries to the eyes due to splashes of concrete, concrete mixing water or other chemical substances.

☞ Injuries to the eyes and other injuries due to hydraulic oil spurting out if the system is not depressurised.

☞ Injuries due to centrifugal forces of bursting couplings, bursting pipework or plugs blown out of the concrete conveying pipework.

☞ Hazards of touching electrical cables.

☞ Electric shock (which can be fatal) from machines with electrical drives, if electrical connections are not properly made or the connecting cables are defective.

☞ Danger of tipping over due to collapse of the outriggers.

☞ Injuries due to burns if hot parts are touched.

☞ Injuries due to falling pipes.

☞ Injuries to personnel due to inadvertent operation of the machine controls and hence inadvertent operation of the machine.

- ☞ Head and shoulder injuries due to concrete discharging from the discharge hose or concrete conveying pipes.
- ☞ Injuries due to parts falling from the concrete conveying pipes, if these are not properly aligned.
- ☞ Injury to the hose operator from the discharge hose if this was secured in the catch and then suddenly swings out on release.
- ☞ The truck-mounted concrete pump can roll away if the brakes or outriggers are released.
- ☞ Injuries due to opening the conveying pipes when they are under pressure due to a blockage.
- ☞ Injuries due to reaching into the agitator hopper, or falling into it.
- ☞ Injuries due to slipping from or on the oily and slippery walkways on the machine.
- ☞ Injuries during pumping operations due to reaching into the water tank at the same time as the piston is in motion.
- ☞ Amputation of the hand if the arm is trapped in the S-valve when cleaning with the flap elbow open.
- ☞ Injuries due to tripping over cables, hoses or reinforcing rods.
- ☞ Injuries due to being caught in the mixing hopper or its parts (chute).
- ☞ Injuries due to unsecured conveying pipes slipping down or falling down.
- ☞ Risk of crushing at the complete outriggers.
- ☞ Injuries due to unintended movement of the distributor boom following inadvertent operation of the controls.

2.7 Safety information for setting up

DANGER:

- ☞ **The distributor boom should not be moved before all the outriggers have been fully extended and all support cylinders correctly set!**
- ☞ **The truck-mounted concrete pump must not be driven with the distributor boom deployed!**
- ☞ **The safety regulations for the country in which the truck-mounted concrete pump is being operated must be complied with!**

2.7.1 Set-up location

When selecting the set-up location, the following aspects should be considered:

☞ Check the route to the set-up location, if necessary have someone guide the driver to the location.

☞ Keep a safe distance from obstacles such as site cranes, buildings and equipment.

☞ Check there is sufficient room to extend the outrggers.

☞ Check there is sufficient room to deploy the distributor boom.

☞ Check there is sufficient ventilation to clear the vehicle exhaust gases.

2.7.2 Hazard area

The hazard area is the area around the truck-mounted concrete pump within which a person could encounter movements of the distributor boom, the truck and the outriggers, and thus be at risk.

DANGER:

- ☞ **The is a risk of crushing when slewing and extending the outriggers and when extending the support cylinders!**
- ☞ **The operator must continually monitor the hazard area!**

☞ The outriggers must not be extended when personnel are in their area of movement. Interlock the outriggers hydraulically or mechanically.

☞ Press the Emergency Stop button immediately if anyone approaches the hazard area.

☞ Extending the outriggers on only one side may be performed only of the manufacturer has approved this after consideration of the stability of the arrangement, and the distributor boom is restricted so that it can only move within the slewing arc specified for the situation.

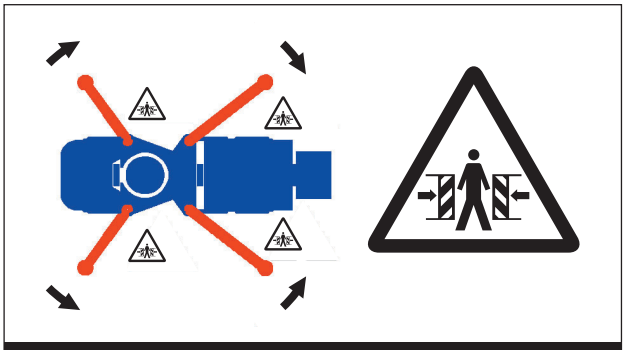


Fig. 2.2 Crush hazard in the slewing area of the of the support feet

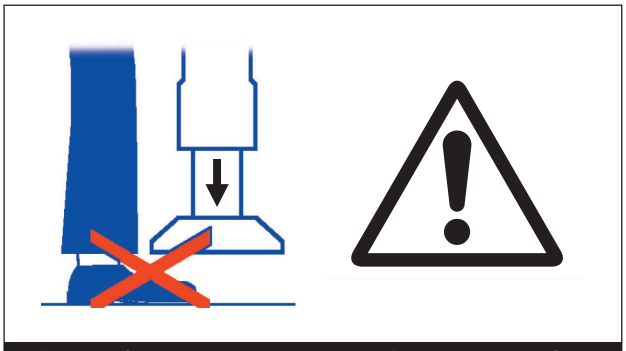


Fig. 2.3 Crush hazard when extending the support feet

2.7.3 Setting up

2.7.3.1 General

- Set up the truck-mounted concrete pump so that stability is assured.
- It must be at a sufficient distance from embankments, pits, excavations and other holes so that the pressure of the outriggers on the ground does not cause it to break into the hole.

2.7.3.2 Safety distances to the edges of excavation pits

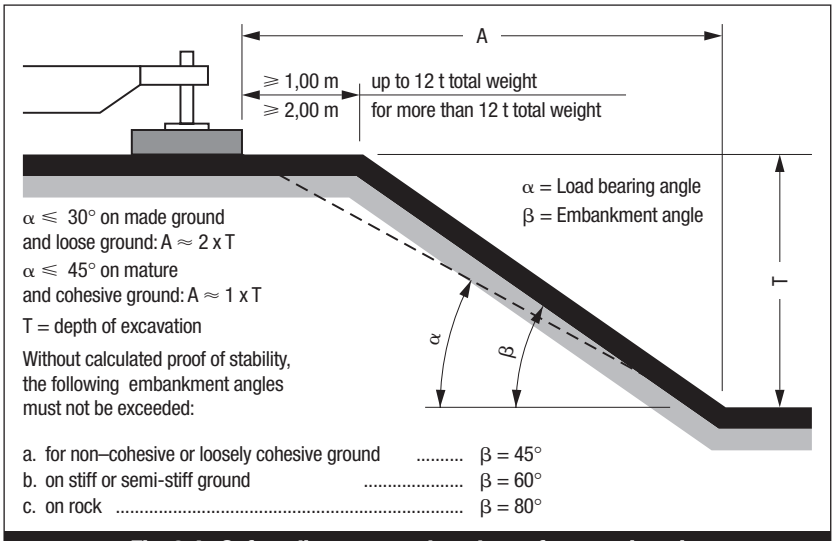


Fig. 2.4 Safety distances to the edges of excavation pits

2.7.3.3 Underground

The ground must be flat, horizontal and without voids.

On sloping ground the outriggers can slip from timber baulks.

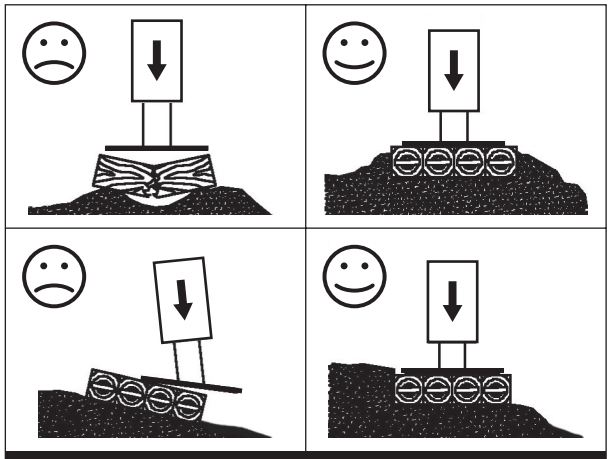


Fig. 2.5 Ground

2.7.3.4 Quality of ground

The ground must be of a quality sufficient to ensure the stability of the machine and the distributor boom. The outriggers exert a surface pressure up to 260 N/cm² (26 kg/cm²). If the ground quality is insufficient to accept this the bearing area should be enlarged with two crossed layers of support plates. See DIN 1054 for recommended values.

Types of ground	Premissible ground pressure N/cm² (kg/m²)
A. Backfilled ground, not artificially consolidated	0-10 (0-1)
B. Mature, obviously undisturbed ground:	
1. Silt, marsh, topsoil	0
2. Non-cohesive, sufficiently firm ground:	
fine to medium sand	15 (1,5)
Coarse sand to gravel	20 (2,0)
3. Cohesive ground:	
Mushy	0
Soft	4 (0,4)
Stiff	10 (1,0)
Semi-hard	20 (2,0)
Hard	30 (3,0)
4. Rock, unweathered with little fissuring and in a good position	150-300 (15-30)

Fig. 2.6 Permissible ground pressures for various types of ground

2.8 Safety instructions for remote control

☞ The remote control is active when the connecting cable is plugged into the machine.

☞ When remote control is in operation, the pendant must not be put down unless the Emergency Stop button has been pressed. To restart the machine (also after rectifying a fault), the Emergency Stop button must be released (twist it in the direction of the arrow, or pull it outwards).

☞ Before starting up the remote control, press the Emergency Stop button, so that all control and regulation devices for remote control are set to “0”.

☞ During interruptions, pauses whilst pumping takes place, also during maintenance and repair work, secure the remote control against unauthorised use e.g. by locking it in the cab or in a tool box etc.

2.9 Safety instructions for the working area

☞ During operation of the truck-mounted concrete pump, the machine operator is responsible for the entire working area. The working area must be fully within his field of view, otherwise an assistant is necessary. When leaving the machine, secure it against unauthorised use and self-acting movement.

☞ Barrier off the working area to other traffic in accordance with instructions.

☞ Personal protective clothing (hard hat, safety glasses, face mask, safety gloves, etc.) must be worn within the entire working area, in particular when working with cement or with chemical mortar additives.

☞ Unauthorised access to the hazard area of the machine is prohibited. If anyone is in the hazard area, first warn them, then if they still do not leave the hazard area, shut down the machine.

☞ Never, irrespective of whether the machine is running or not, reach with the hand into the transfer mechanism, pre-compression system, water tank, transfer tube or other moving part of the machine.
Always first switch the engine off and depressurise the system.

☞ When climbing on to and off the machine, use the handrails and the steps.
Keep steps, platforms, controls and regulation devices etc. free of dirt, oil, snow and ice.

☞ Whilst the machine is running never remove any guards (e.g. water tank cover), nor disable or bypass any safety devices (e.g. limit switches or mechanical catches for the grill interlocks).

☞ Whilst the pump is running, keep off the machine. All operation should be by remote control only.

GEFAHR

DANGER:

- ☞ **Under the slewing area of the distributor boom there is a risk of injury due to falling parts.**
- ☞ **At the discharge hose there is a there is a risk of injury due to falling concrete.**
- ☞ **Unauthorised persons must leave the hazard area immediately. If necessary, stop the machine immediately.**

2.9.1 Distributor boom

☞ The operator must ensure that no unauthorised person is in the hazard area.

☞ The distributor boom should not be moved before the outriggers have been fully extended and all support cylinders correctly set. The truck-mounted concrete pump must not be driven with the distributor boom deployed.

☞ Do not use the distributor boom as a crane jib or as a lever to push aside obstacles (such as trees).

☞ The distributor boom should be not be deployed beyond the lengths stated in the user manual.

☞ Add extensions to the conveying pipe to the distributor boom only if they do not place any additional load on the boom.

☞ When the wind reaches the critical speed, retract the distributor boom and secure it. Retract the boom and secure it also at the end of the day's work.

☞ If hazard areas are out of the operator's field of view, employ an assistant. Such hazard areas can be those within the slewing area of the distributor boom or the discharge hose.

☞ When the wind reaches the critical speed, retract the distributor boom and secure it. Retract the boom and secure it also at the end of the day's work. The machine operator must ensure that when moving the distributor boom the clearances to overhead electric cables are maintained as set out in the table.

2.9.2 Conveying pipes

☞ The machine operator must securely fasten the conveying pipes, particularly riser pipes, that are not incorporated in the distributor boom and ensure that the forces arising in the components and other parts of the design are appropriately taken up. The conveying pipes must be aligned so as to avoid kinks, sharp bends and damage in operation.

☞ If worn or defective components (high pressure hoses etc.) are not immediately replaced, **WAITZINGER** will not accept product liability. Conveying pipes are not under stress when the distributor boom is stowed, and can thus be replaced without problems at that time. If conveying pipes are replaced when the distributor boom is deployed, stresses may be introduced during assembly.

☞ To ensure a long working life for the conveying pipes, after delivering approx. 6,000 m^3, rotate all conveying pipes 120° clockwise, and rotate the elbows 180°. Check the minimum wall thicknesses and operating pressure.

WARNUNG

WARNING:

If you use compressed air for cleaning the conveying pipes, this is at your own risk! WAITZINGER accepts no liability for the risks involved.
If nevertheless you do use compressed air for cleaning, information can be found in an additional sheet which can be requested from WAITZINGER as required.

2.9.2.1 Locking the conveying pipe connections

- All conveyor pipe couplings must be secured with spring clips (arrowed) against bursting open.

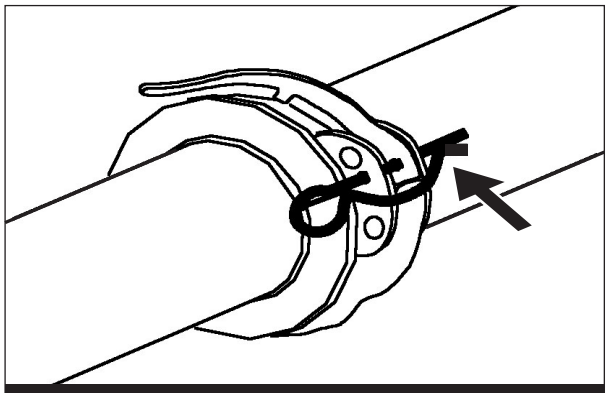


Fig. 2.7 Conveyor pipe coupling locking

2.9.2.2 Opening the conveying pipe conne•tions

- Conveying pipe connections must be knocked apart and opened only in the depressurised state.
- Always pump backwards 1-2 piston strokes.

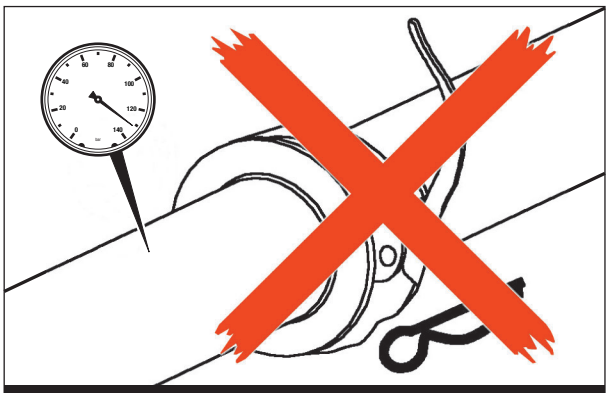


Fig. 2.8 Conveyor pipe coupling opening

2.9.3 Discharge hose

GEFAHR

DANGER:
When pumping, after interruptions, after undoing a plug or when cleaning the conveying pipes, the discharge hose can swing out.

☞ The hazard area around the discharge hose has a diameter twice the length of the discharge hose.

☞ If anyone is within this hazard area, stop the machine immediately and press the Emergency Stop button.

☞ If the discharge hose becomes snagged, never use the distributor boom to pull it free. This might put the stability of the machine at risk or overload the steel structure!

☞ The freely suspended discharge hose must not be extended with additional couplings, discharge pieces or other hazardous discharge arrangements.

☞ The discharge hose must not be extended beyond the length supplied by the manufacturer.

☞ If the machine operator connects another discharge piece in place of the discharge hose, this must not be guided manually.

☞ The machine operator must use only the end hose approved by the manufacturer for delivering concrete into high places.

2.9.3.1 Hazard area for the discharge hose

☞ When the pump is started or a blockage occurs, the end hose must hang freely.

☞ There is an injury risk of being struck by the discharge hose or by stones shooting out of it.

Hazard area = 2 ∞ discharge hose length

Fig. 2.9 Hazard area for the discharge hose

2.9.3.2 Kinks in the discharge hose

- Never kink the discharge hose whilst the pump is running. Blockages increase the risk of accidents.

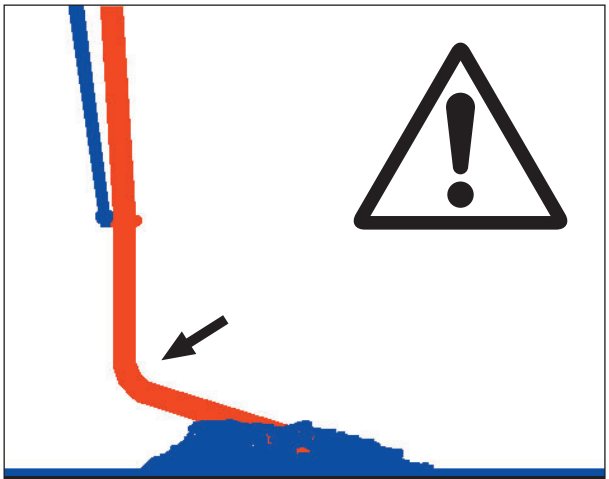


Fig. 2.10 Kink in the discharge hose

2.9.3.3 Use the guide rod to hold the dischargehose

- Do not hold the discharge hose by hand; if necessary to guide it use the guide rod as shownere.

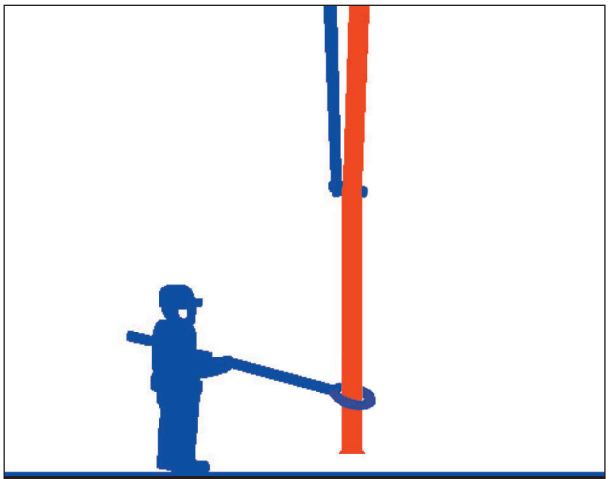


Fig. 2.11 Use the guide rod to hold the discharge hose

2.9.3.4 Securing the discharge hose with the catch

- Always secure the discharge hose with the catch.

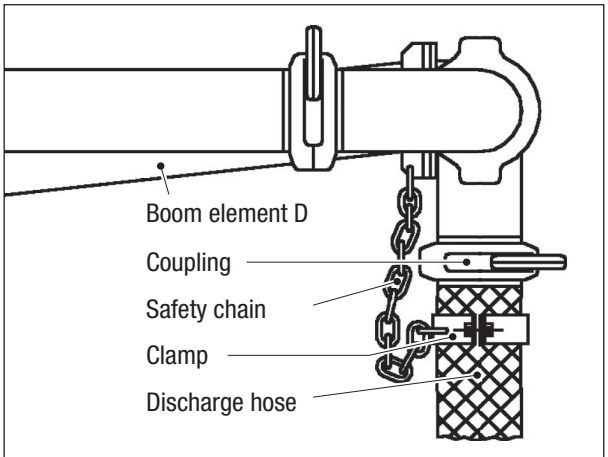


Fig. 2.12 Securing the discharge hose with the catch

2.9.4 Agitator

☞ To avoid air being sucked into the system, leading to spurting concrete, the hopper must be kept filled with concrete up to the level of the agitator shaft.

☞ Keep the safety grill closed in order to avoid injuries due to reaching into the agitator hopper, or falling into it. Do not place anything on the safety grill. Do not step on the safety grill.

☞ Never operate the machine unless the safety grill is closed and bolted into place or otherwise secured.

2.10 Safety instructions at concrete pressures in excess of 85 bar

If concrete is to be pumped at pressures in excess of 85 bar, the discharge must only be through the side outlet, not through the distributor boom. The machine operator must take the following safety precautions and perform the following tests:

a. Use only pipework supplied by the concrete pump manufacturer. At concrete pressures between 85 bar and 130 bar, high-pressure pipework is necessary.

b. Perform a water pressure test on pipes and couplings no later than after pumping 2000 m^3, at a pressure 30 % greater than the anticipated operating pressure.

c. All couplings, seals and pipe elbows that are less than 3 m from operating personnel should be regularly replaced. (e.g. after pumping each 1,000 m^3 of concrete)

2.11 Safety instructions for maintenance and repair

WARNING:
Rectifying faults, repairs and maintenance work may be performed only when the main drive engine is switched off, hydraulic units are depressurised and conveying pipework is also depressurised. Take out the ignition key.

☞ Factory-set chokes and pressure limiting devices may not be adjusted except by trained technical staff.

☞ Removing the seals from safety valves is prohibited.

WARNUNG

WARNING:

Before performing any electric arc welding, always unplug the cables from the control cabinet and disconnect the battery.
To disconnect the battery, undo the positive and negative terminal connections or switch off the Nato switch at the battery if this is fitted.

☞ Disconnect machines with electrical equipment such as radio remote control (receiver), controls etc. before performing electric arc welding.

☞ Modifications, welding and repair work on the distributor boom and all assemblies associated with it, load-bearing elements, securing points, outriggers, on the mounting frame and any part of the pump or pressure-bearing components may only be performed by persons appointed by the manufacturer. Special care must be taken in respect of boom mountings and outriggers used as hydraulic or diesel tanks.

☞ When replacing electrical, pneumatic or hydraulic components (valves, pumps etc.), the required data (pressure, voltage etc.) should be checked from the machine data sheet, test sheet or circuit diagram and adjusted as necessary.

☞ Maintenance and repair work may be carried out only after fluids have been depressurised. No changes of any sort to the hydraulics are permissible. We emphatically warn against improper repairs to hydraulics. Test certificates supplied with hydraulic components should be carefully filed away for reference.

☞ If any component is removed, carefully note how it was fitted and replace it correctly referring to the spare parts data sheet / service information.

2.12 High-tension overhead electric cables

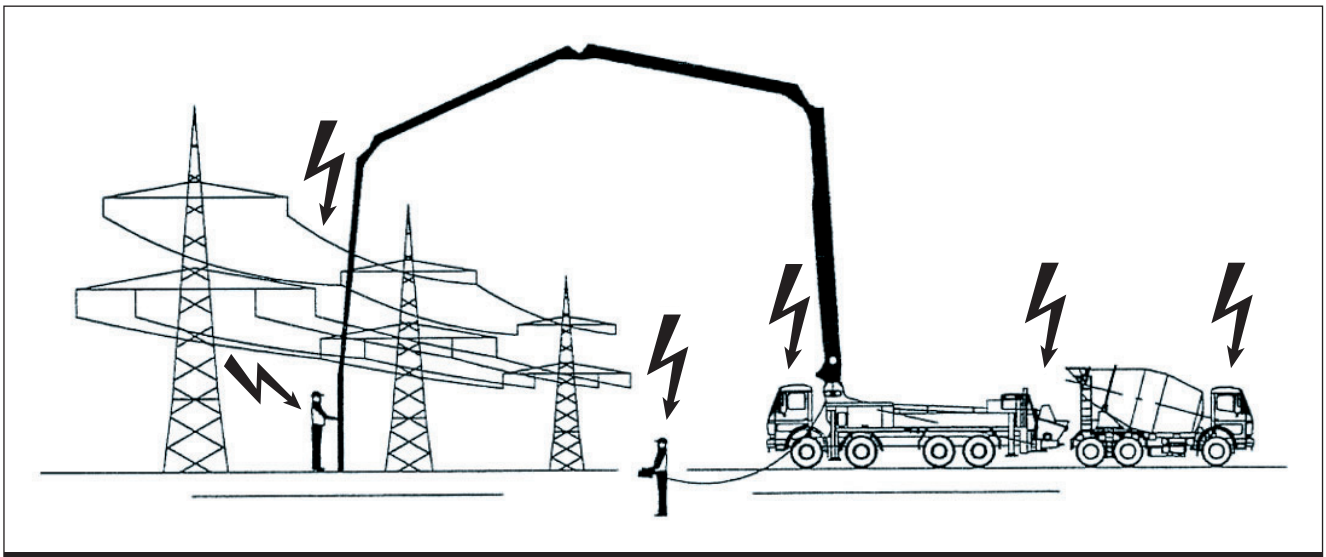


Fig. 2.13 Safety distances to high-tension overhead electric cables

DANGER:

☞ **Direct contact with high-tension cables can cause fatalities.**

☞ **Even coming close to high-tension overhead electric cables can cause the machine and the surrounding ground to become live due to a flashover.**

☞ **Always maintain the stated safety distance.**

2.12.1 Safety distance

☞ The machine operator must ensure that when moving the distributor boom the clearances to overhead electric cables are maintained as set out in the table. The following minimum safety distances are those specified for the German Federal Republic in VDE 0105:

Nominal voltage	Minimum safety distance
up to 1.000 Volt	1,0 metre
over 1 kV bis 110 kV	3,0 metre
over 110 kV bis 220 kV	4,0 metre
over 220 kV bis 380 kV	5,0 metre
if the voltage is not known	5,0 metre

Fig. 2.14 Minimum safety distance from overhead electric cables

☞ If the minimum safety distance from overhead electric cables shown in the table cannot be maintained, the machine operator must ensure that they are

- switched off for the duration of the work, or
- they are shrouded or insulated in the vicinity of the concrete pump and distribution boom.

☞ The same minimum safe distances apply to driving underneath overhead electric cables. Make allowance for the swing of the cables and the distributor boom in the wind.
High ambient humidities require safety distances greater than those listed.
Refer to the regulations for the country where the machine is in use.

☞ If the minimum distance cannot be maintained for all possible working positions, it is essential to contact the electricity supply company.
It may be necessary to forgo the use of the distributor boom altogether and use a separate conveyor pipe.

2.12.2 High-tension contacts

☞ High-tension contacts bring the risk of fatal injury for all persons who are on the machine and in its vicinity or are in any way connected to it (remote control, discharge hose etc.).

☞ High-tension contacts form a “Voltage funnel” underneath the equipment and in a circle around it. The voltage decreases as the radius increases.

☞ Every step within the voltage funnel is hazardous.
A step can span two different potentials (step voltage), so that the current flows through the body in proportion to the potential difference.

☞ If a high-tension contact occurs, keep calm, stand still (step voltage), and don’t touch anything.

☞ No-one else should enter the hazard area. Immediately have the high-tension cable switched off.

☞ After the high-tension cable has been switched off, move the machine away, help the injured and perform first aid.

☞ Using remote control protects the machine operator only if he is standing outside the voltage funnel.
In all other cases all personnel risk fatal injury.

☞ When working close to high-tension overhead cables, have these switched off by competent electricians.

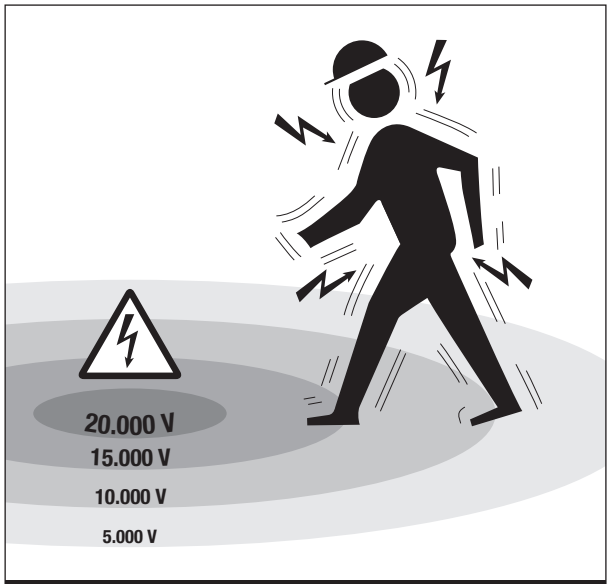


Fig. 2.15 Step voltage

2.12.2.1 Automatic reconnection

☞ Electrical supply systems are equipped with automatic reconnection.

☞ After the switchgear has tripped, the short-circuited cable is automatically reconnected after a brief interval.

☞ It is therefore necessary to arrange permanent disconnection.

2.12.3 Static discharge

☞ At close range to transmitting stations there can arise interference to radio and TV transmissions and hazardous static electrical discharges from the machine.

☞ Persons touching a statically charged machine will receive an electric shock.

☞ Machines close to transmitting stations should be earthed. Connect the earthing cable to a clean unpainted metal part of the machine, and anchor it in the ground with a conductive metal rod.

2.12.4 Immediate measures

☞ If an accident involving electric power occurs, immediately institute first aid measures.

☞ If despite all precautions a high-tension cable contact occurs, keep calm, stand still (step voltage), and don't touch anything.

☞ Tell those around to keep their distance (step voltage) and have the high-tension cable switched off.

☞ Only then can the machine be moved and the injured be assisted.

2.12.4.1 Actions after contacting a high-tension overhead cable

☞ Stay in the machine

☞ Drive the machine out of the hazard area

☞ Warn those standing around to keep away and not to touch the machine

☞ Have the high-tension cable switched off

☞ Do not leave the machine until the high-tension cable that was contacted / damaged has been switched off

2.13 Operation in winter

When operating in winter, take care:

☞ Increased danger of slipping, especial when cleaning

☞ Keep steps and platforms free of snow and ice

☞ Risk of blockages due to ice in the conveying pipe

2.14 Storms and thunderstorms

☞ From wind force 7 (wind speed 50 km/h), stop work and move the distributor boom to the transport position.

☞ During thunderstorms there is a risk of lightning strikes.

2.15 Noise emission measurement

The noise emission measurement to EN/ISO 3744 and EN/ISO 4871 have yielded a value of L_{Aeq} = 81.4 dB(A).

2.16 Environmental protection

☞ Use should be found around the building site for surplus concrete, or it should be disposed of as building waste according to the statutory requirements.

☞ Consumables such as lubricants, cleaning materials during maintenance, repair and oil change should be collected in suitable containers and disposed of in accordance with regulations (to EC directive 75/439/EWG and statutory instruments under §§ 5a, 5b AbfG and Altöl).

2.17 First aid

☞ Information should be sought for treatment of injuries that may arise when working with the truck-mounted concrete pump.

☞ Injuries must be reported to the supervisor.

2.18 Responsible persons

2.18.1 Personnel

The user must ensure that only personnel who have been properly trained and instructed work on or with the machine. The persons responsible for operation and maintenance must be clearly established. Furthermore he must ensure that only authorised persons use the machine.

2.18.2 Requirements

The following requirements apply to all personnel concerned with operation and maintenance of the machine:

☞ They must be at least 18 years of age

☞ They must have appropriate physical and mental capabilities

☞ They must be in good health (calm and not under the influence of alcohol, drugs or medicines)

☞ They must have been trained in the operation and maintenance of the machine

☞ They must have proved their capability to the user

☞ They must be expected to fulfil their duties reliably

Personnel must not wear any loose clothing or jewellery, including rings.
Free long hair must be secured using a hair net. This is an injury hazard since it may get caught or pulled in.

2.18.3 Skills

Personnel who are being trained, taught, instructed or educated on the machine may use it only under continuous supervision of an experienced operator.

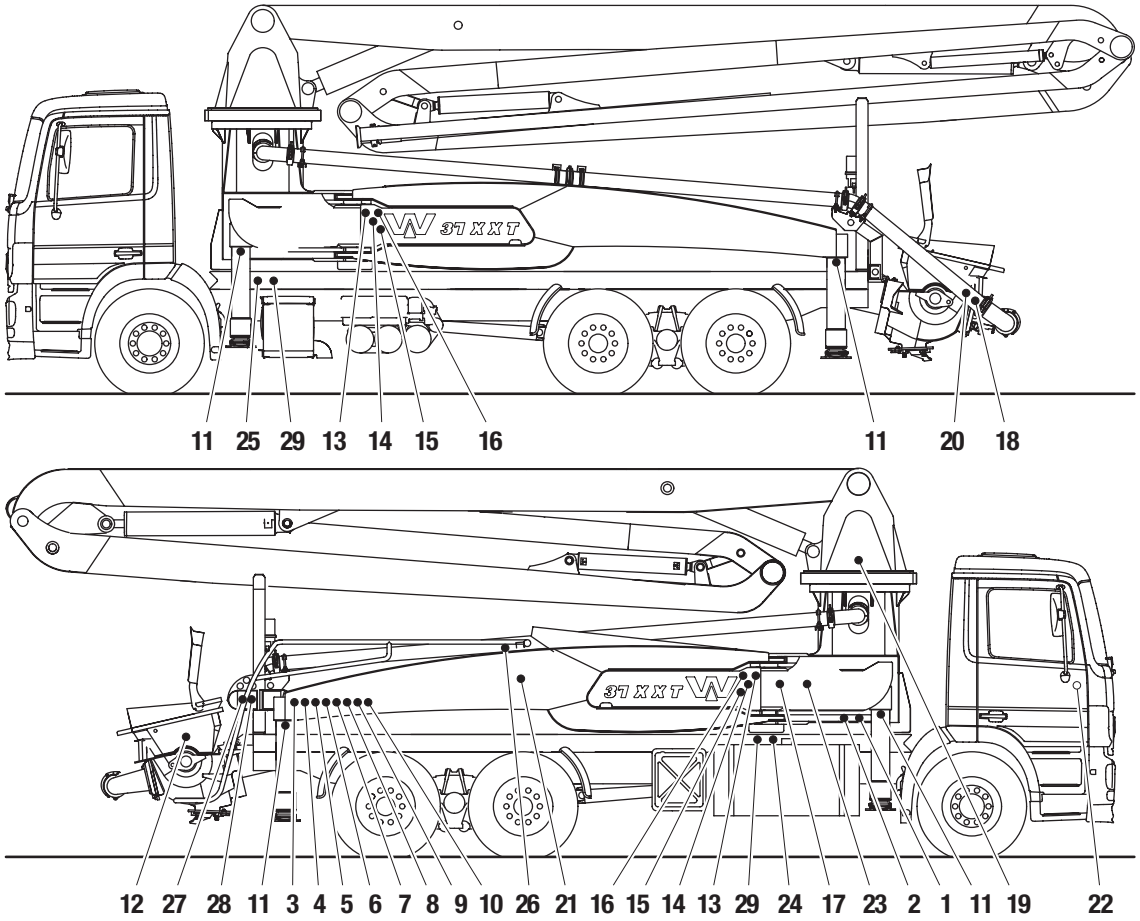
If no skilled personnel or workshop equipment etc. are available, apply to **WAITZINGER** Customer Service for maintenance of your machine.

2.18.4 Machine operator's responsibilities

The user must make clear the machine operator's responsibilities (including national regulations for driving on public roads) and enable him to refuse instructions from third parties to commit unsafe actions. The machine operator must be permitted to refuse to work at a location when there are technical safety problems.

2.19 Safety and warning notices

Safety and warning notices are attached to the truck-mounted concrete pump as listed below. All safety and warning notices are depicted below in more detail.



1	WAI106179	Serial plate
2	WAI106032	Matching pipe lengths / Conveying pipes
3	WAI105933	General instructions (D)
	WAI105932	General instructions (GB)
4	WAI105944	Safety equipment
5	WAI105934	High-tension overhead electric cables
6	WAI105974	Keep away
7	WAI105938	Remotely controlled machine
8	WAI105937	Boom is not a crane
9	WAI105975	Total weight of discharge hose
10	WAI105940	Slewing range of boom
11	WAI105941	Extending the support feet
12	WAI105939	Do not reach into the hopper
13	WAI106369	Grease point
14	WAI106370	Fully extend the outrigger
15	WAI106366	Max. inclination 3°
16	WAI106367	Crush hazard
17	WAI105976	Distributor boom range
18	WAI105942	Spring plug
19	WAI106769	Distributor boom serial plate
20	WAI105935	Coupling pipe wall thickness
21	WAI105936	Keep hands out of water box
22	WAI105943	Disengage the clutch
23	WAI106477	Safety instructions (D)
	WAI106478	Safety instructions (GB)
24	WAI106348	Operating panel right hand outrigger
25	WAI106349	Operating panel left hand outrigger
26	WAI106519	Operating panel distributor boom
27	WAI106030	Operating panel agitator
28	WAI106031	Operating panel water pump
29	WAI104770	Operating panel supports

Fig. 2.16 Overview of safety and warning notices

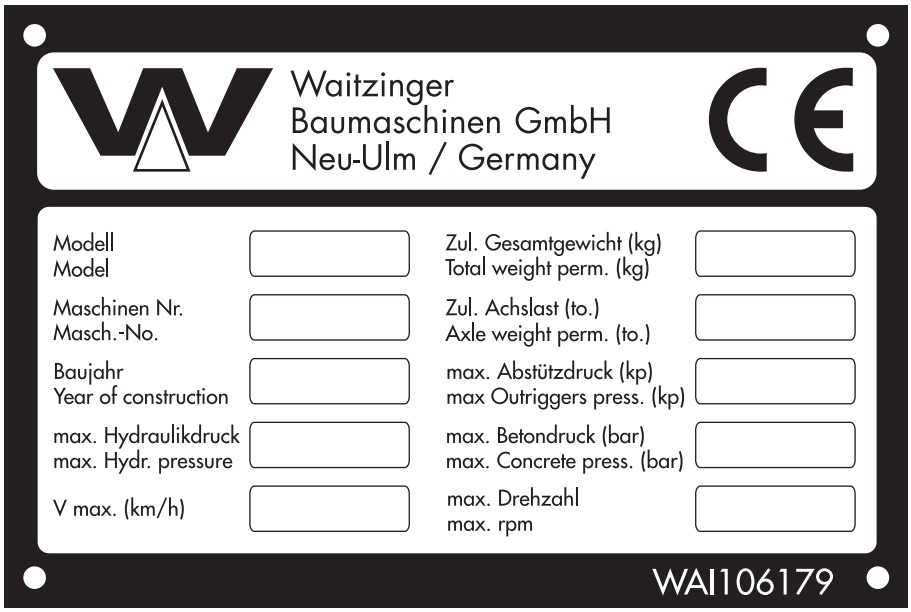


Fig. 2.17 Item 1 - WAI106179 – Serial plate

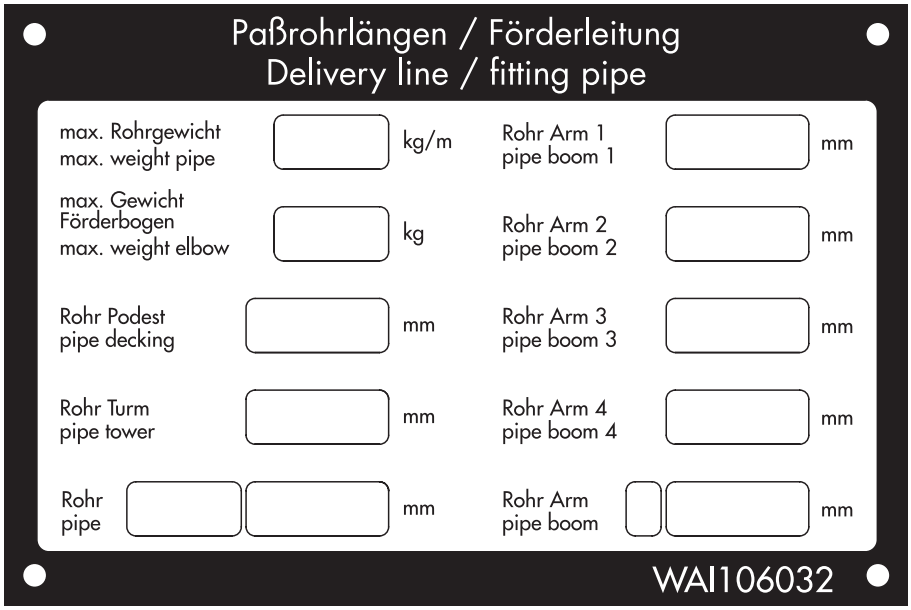
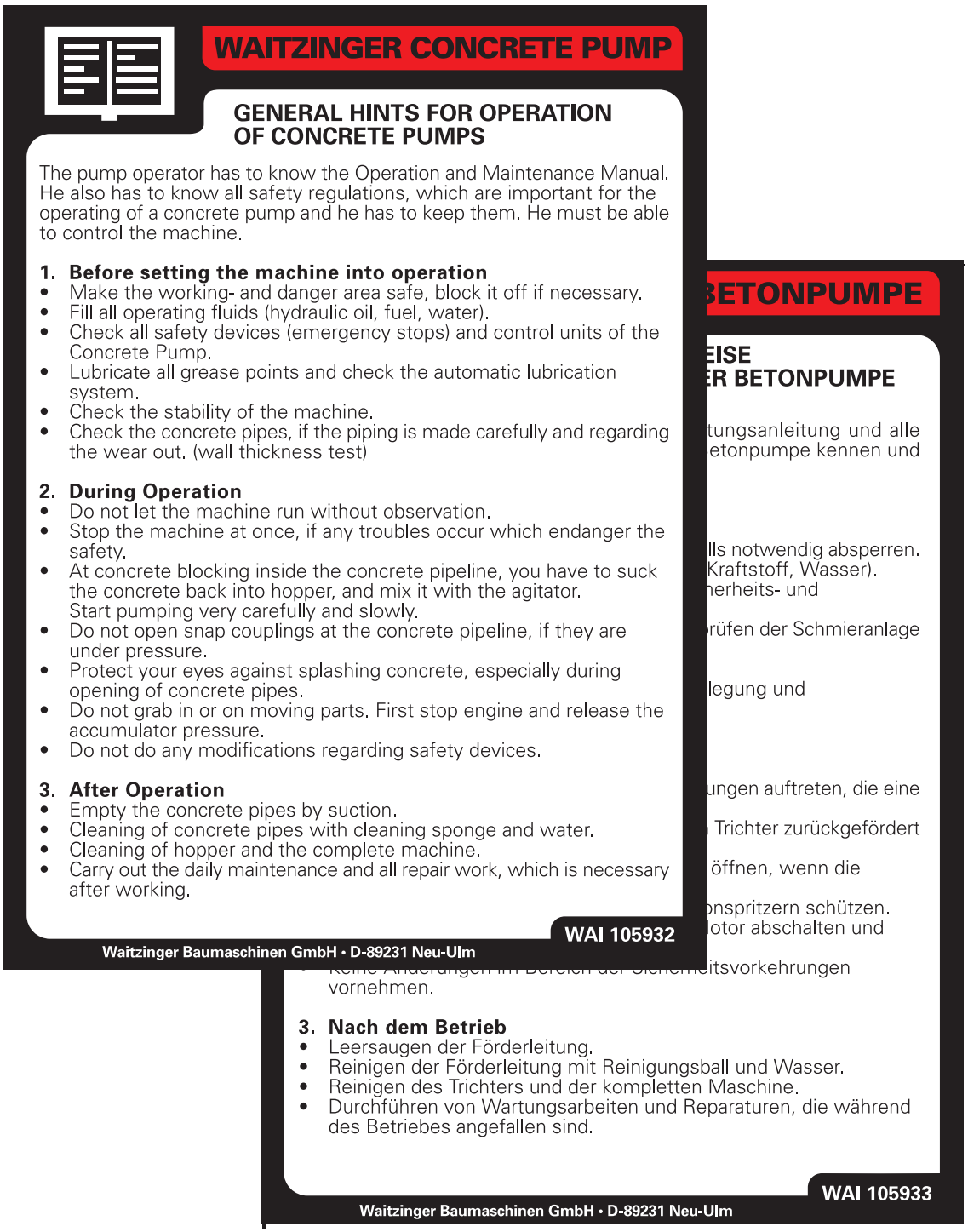


Fig. 2.18 Item 2 - WAI106032 – Matching pipe lengths / Conveying pipes



WAITZINGER CONCRETE PUMP

GENERAL HINTS FOR OPERATION OF CONCRETE PUMPS

The pump operator has to know the Operation and Maintenance Manual. He also has to know all safety regulations, which are important for the operating of a concrete pump and he has to keep them. He must be able to control the machine.

1. Before setting the machine into operation
- Make the working- and danger area safe, block it off if necessary.
- Fill all operating fluids (hydraulic oil, fuel, water).
- Check all safety devices (emergency stops) and control units of the Concrete Pump.
- Lubricate all grease points and check the automatic lubrication system.
- Check the stability of the machine.
- Check the concrete pipes, if the piping is made carefully and regarding the wear out. (wall thickness test)

2. During Operation
- Do not let the machine run without observation.
- Stop the machine at once, if any troubles occur which endanger the safety.
- At concrete blocking inside the concrete pipeline, you have to suck the concrete back into hopper, and mix it with the agitator. Start pumping very carefully and slowly.
- Do not open snap couplings at the concrete pipeline, if they are under pressure.
- Protect your eyes against splashing concrete, especially during opening of concrete pipes.
- Do not grab in or on moving parts. First stop engine and release the accumulator pressure.
- Do not do any modifications regarding safety devices.

3. After Operation
- Empty the concrete pipes by suction.
- Cleaning of concrete pipes with cleaning sponge and water.
- Cleaning of hopper and the complete machine.
- Carry out the daily maintenance and all repair work, which is necessary after working.

WAI 105932

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BETONPUMPE

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vornehmen.

3. Nach dem Betrieb
- Leersaugen der Förderleitung.
- Reinigen der Förderleitung mit Reinigungsball und Wasser.
- Reinigen des Trichters und der kompletten Maschine.
- Durchführen von Wartungsarbeiten und Reparaturen, die während des Betriebes angefallen sind.

WAI 105933

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Fig. 2.19 Item 3 - WAI105933/WAI105932 - General instructions (D/GB)

Fig. 2.20 Item 4 - WAI105944 – Safety equipment

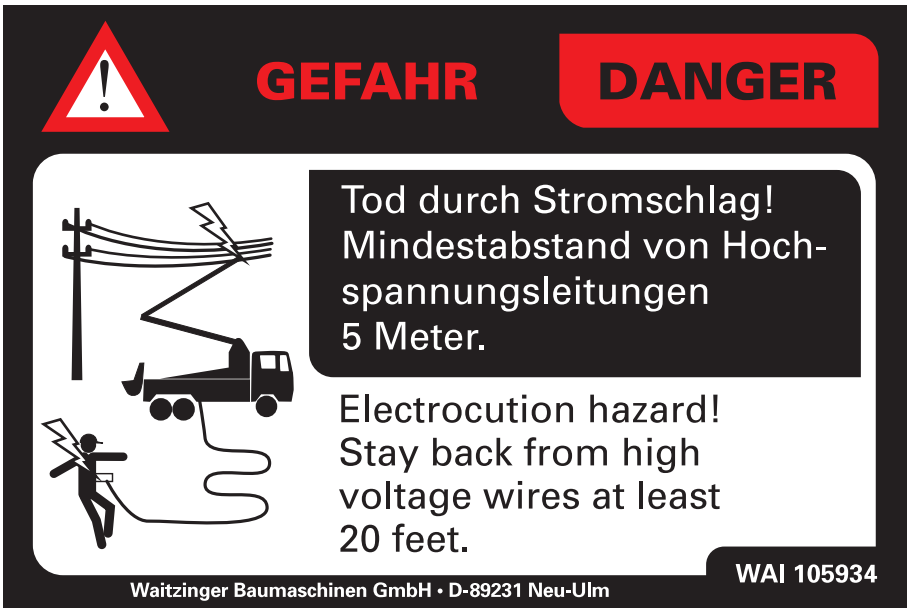


Fig. 2.21 Item 5 - WAI105934 – High-tension overhead electric cables

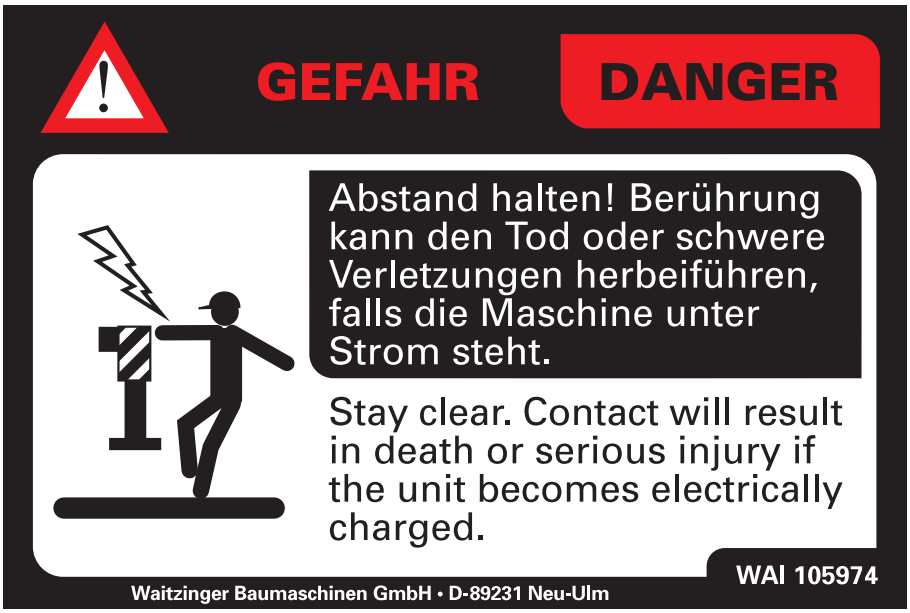


Fig. 2.22 Item 6 - WAI105974 - Keep away

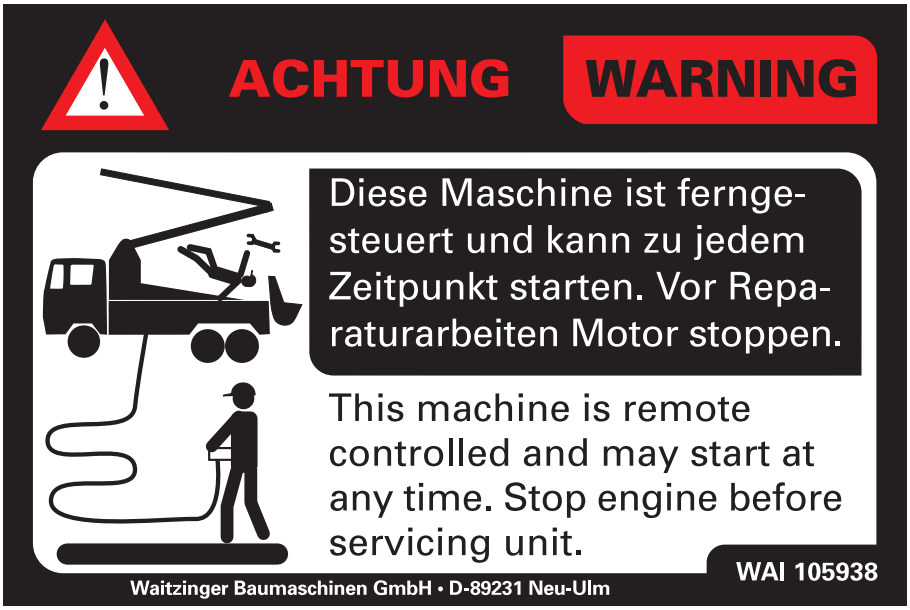


Fig. 2.23 Item 7 - WAI105938 - Remotely controlled machine

Fig. 2.24 Item 8 - WAI105937 - Boom is not a crane

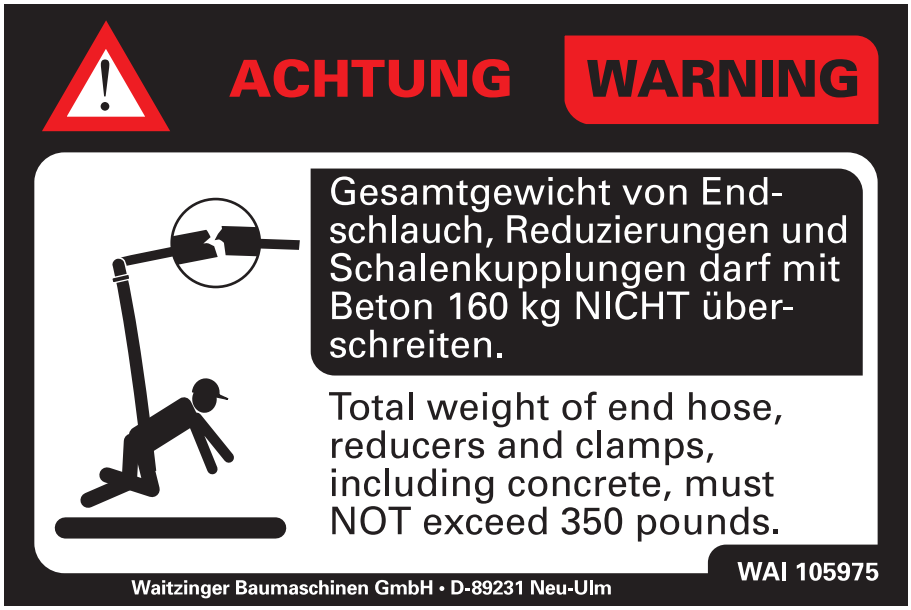


Fig. 2.25 Item 9 - WAI105975 - Total weight of discharge hose

Fig. 2.26 Item 10 - WAI105940 - Slewing range of boom

Fig. 2.27 Item 11 - WAI105941 - Extending the support feet

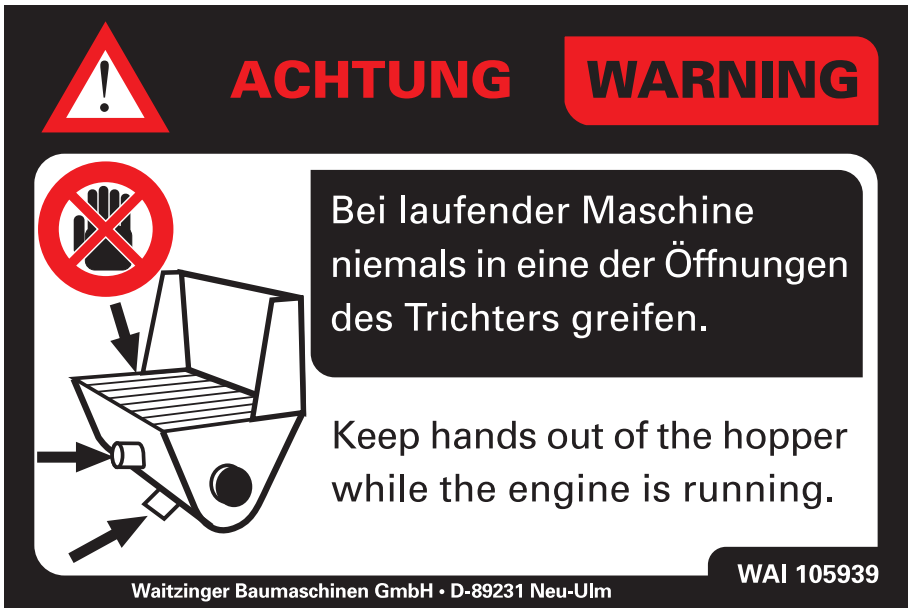


Fig. 2.28 Item 12 - WAI105939 - Do not reach into the hopper

Fig. 2.29 Item 13 - WAI106369 – Grease point

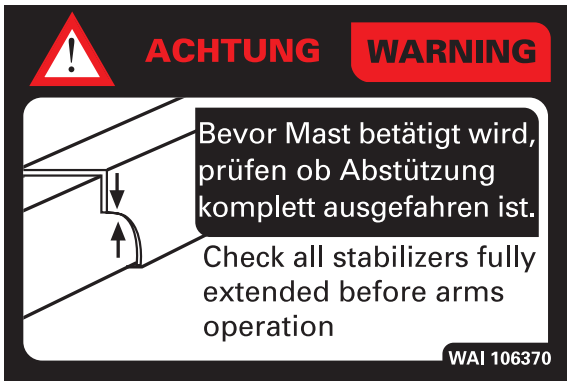


Fig. 2.30 Item 14 - WAI106370 - Fully extend the outrigger

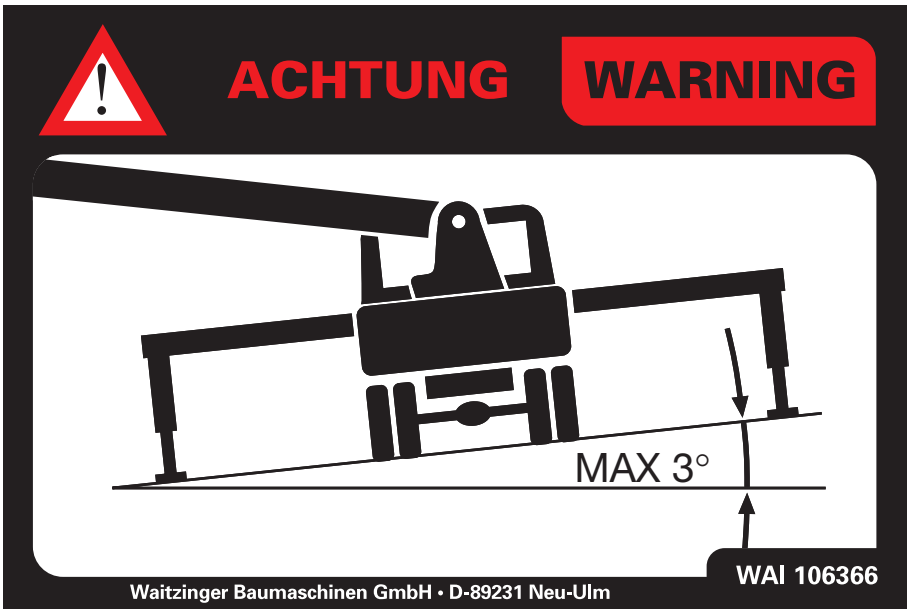


Fig. 2.31 Item 15 - WAI106366 - Max. inclination 3°

Fig. 2.32 Item 16 - WAI106367 - Crush hazard

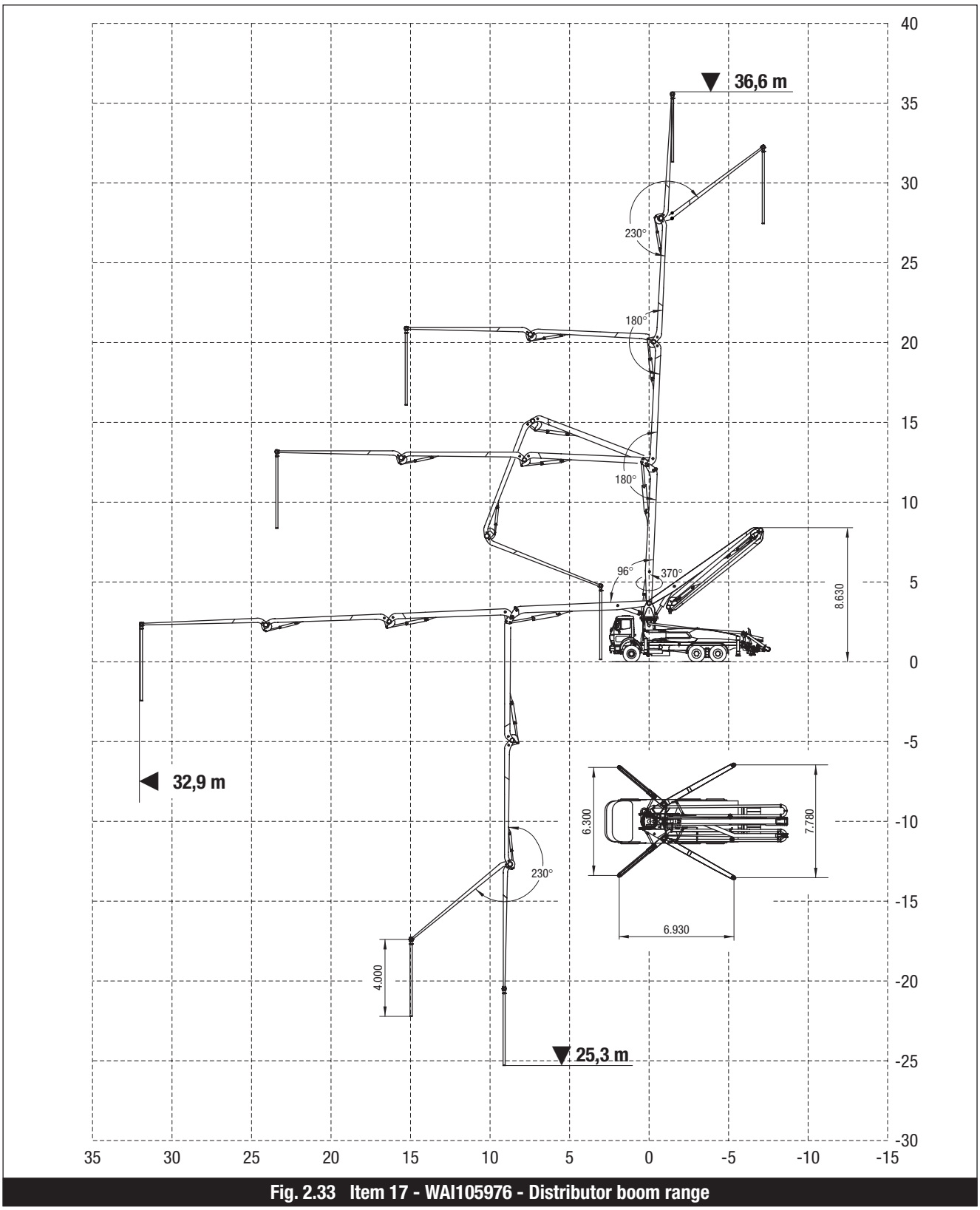


Fig. 2.33 Item 17 - WAI105976 - Distributor boom range

Fig. 2.34 Item 18 - WAI105942 - Spring plug

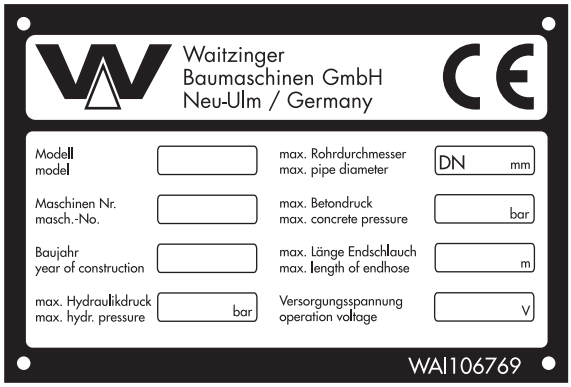


Fig. 2.35 Item 19 - WAI106769 - Distributor boom serial plate

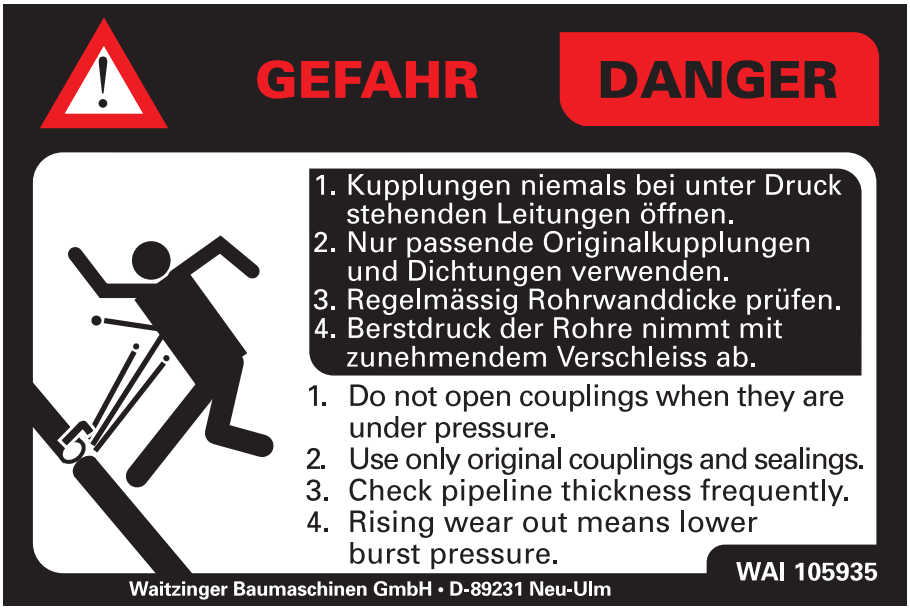
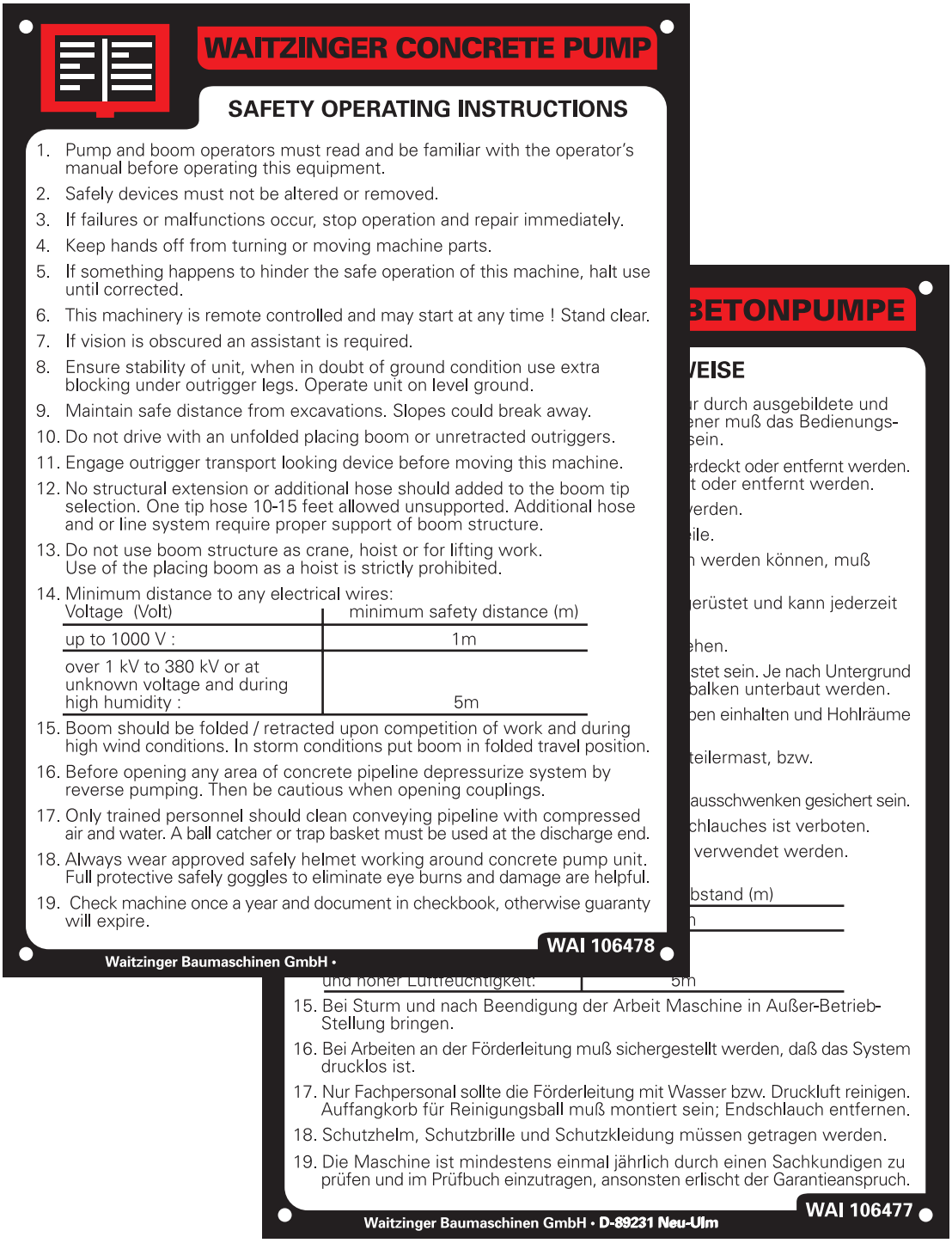


Fig. 2.36 Item 20 - WAI105935 - Coupling pipe wall thickness

Fig. 2.37 Item 21 - WAI105936 - Keep hands out of water box

Fig. 2.38 Item 22 - WAI105943 - Disengage the clutch



WAITZINGER CONCRETE PUMP

SAFETY OPERATING INSTRUCTIONS

1. Pump and boom operators must read and be familiar with the operator's manual before operating this equipment.
2. Safely devices must not be altered or removed.
3. If failures or malfunctions occur, stop operation and repair immediately.
4. Keep hands off from turning or moving machine parts.
5. If something happens to hinder the safe operation of this machine, halt use until corrected.
6. This machinery is remote controlled and may start at any time ! Stand clear.
7. If vision is obscured an assistant is required.
8. Ensure stability of unit, when in doubt of ground condition use extra blocking under outrigger legs. Operate unit on level ground.
9. Maintain safe distance from excavations. Slopes could break away.
10. Do not drive with an unfolded placing boom or unretracted outriggers.
11. Engage outrigger transport looking device before moving this machine.
12. No structural extension or additional hose should added to the boom tip selection. One tip hose 10-15 feet allowed unsupported. Additional hose and or line system require proper support of boom structure.
13. Do not use boom structure as crane, hoist or for lifting work. Use of the placing boom as a hoist is strictly prohibited.
14. Minimum distance to any electrical wires:

Voltage (Volt)	minimum safety distance (m)
up to 1000 V :	1m
over 1 kV to 380 kV or at unknown voltage and during high humidity :	5m

15. Boom should be folded / retracted upon competition of work and during high wind conditions. In storm conditions put boom in folded travel position.
16. Before opening any area of concrete pipeline depressurize system by reverse pumping. Then be cautious when opening couplings.
17. Only trained personnel should clean conveying pipeline with compressed air and water. A ball catcher or trap basket must be used at the discharge end.
18. Always wear approved safely helmet working around concrete pump unit. Full protective safely goggles to eliminate eye burns and damage are helpful.
19. Check machine once a year and document in checkbook, otherwise guaranty will expire.

WAI 106478

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BETONPUMPE

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bstand (m)
n
5m

und hoher Luftfeuchtigkeit:

15. Bei Sturm und nach Beendigung der Arbeit Maschine in Außer-Betrieb-Stellung bringen.
16. Bei Arbeiten an der Förderleitung muß sichergestellt werden, daß das System drucklos ist.
17. Nur Fachpersonal sollte die Förderleitung mit Wasser bzw. Druckluft reinigen. Auffangkorb für Reinigungsball muß montiert sein; Endschlauch entfernen.
18. Schutzhelm, Schutzbrille und Schutzkleidung müssen getragen werden.
19. Die Maschine ist mindestens einmal jährlich durch einen Sachkundigen zu prüfen und im Prüfbuch einzutragen, ansonsten erlischt der Garantieanspruch.

WAI 106477

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Fig. 2.39 Item 23 - WAI106477/WAI106478 - Safety instructions (D/GB)

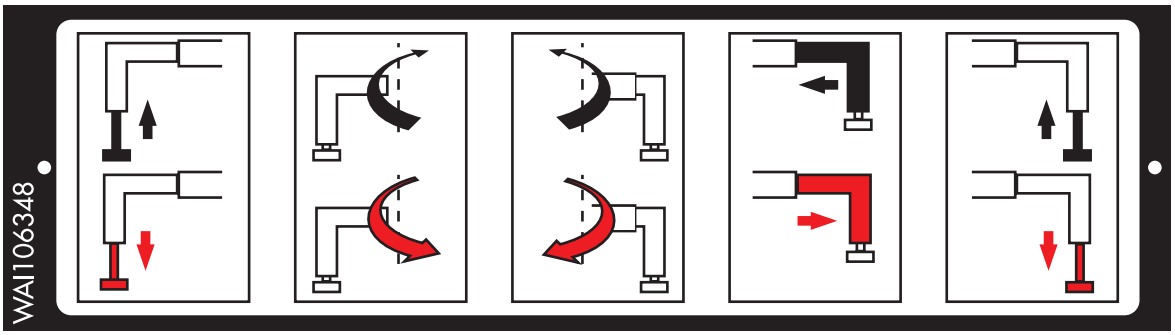


Fig. 2.40 Item 24 - WAI106348 - Operating panel right hand outrigger

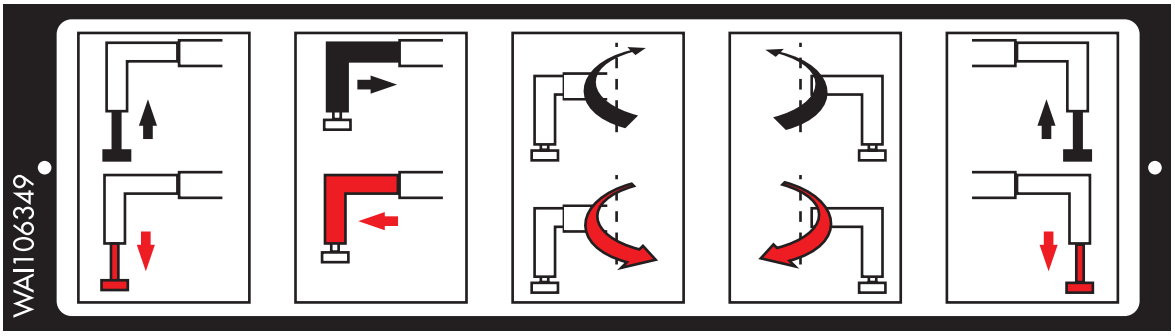


Fig. 2.41 Item 25 - WAI106349 - Operating panel left hand outrigger

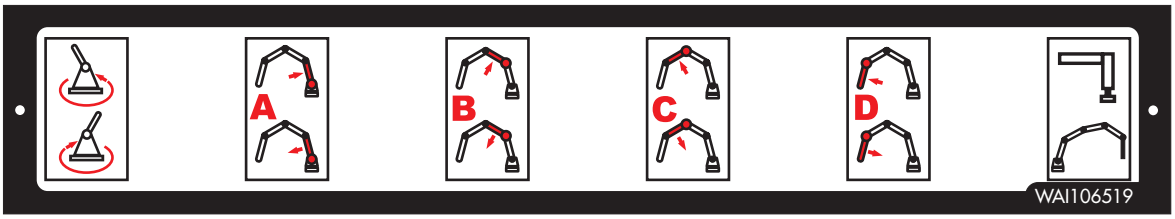


Fig. 2.42 Item 26 - WAI106519 - Operating panel distributor boom

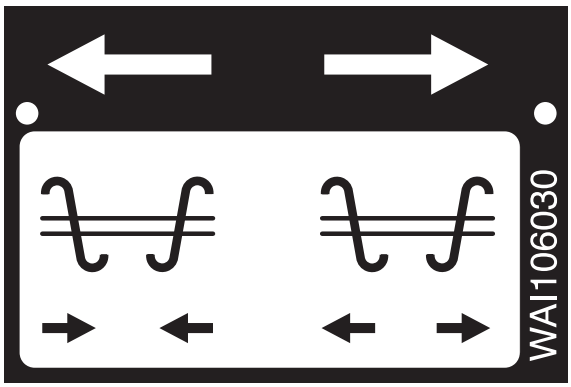


Fig. 2.43 Item 27 - WAI106030 - Operating panel agitator

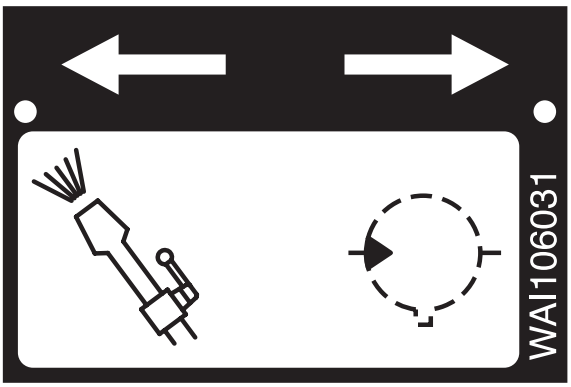


Fig. 2.44 Item 28 - WAI106031 - Operating panel water pump

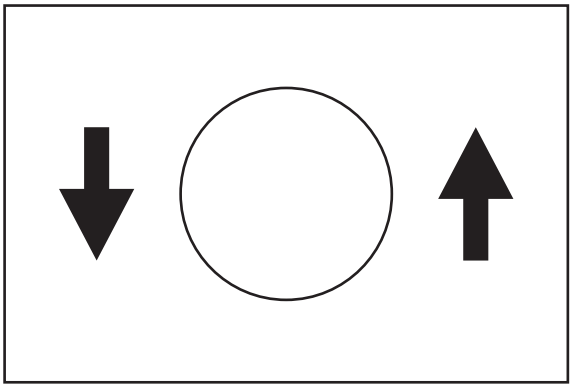


Fig. 2.45 Item 29 - WAI104770 - Operating panel supports

3. Technical data

3.1 Leading dimensions of the truck-mounted concrete pump,

Vehicle dimensions (Length ∞ Width ∞ Height)	approx. 11,550 mm ∞ 2,500 mm ∞ 3,920 mm
Weight (in full working order)	approx. 26,500 kg

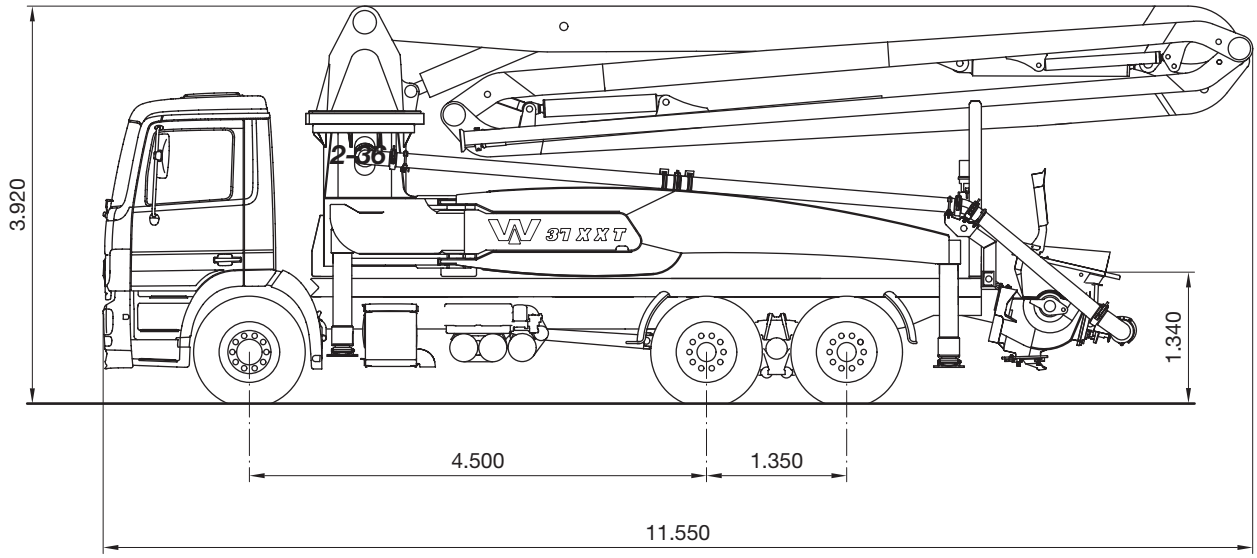


Fig. 3.1 Leading dimensions of the truck-mounted concrete pump

3.2 Truck

Information regarding the truck can be found in the separate user manual supplied by the truck manufacturer.

3.3 Distributor boom 37 R 4 XXT

Horizontal reach	[mm]	32.900
Vertical reach	[mm]	36.600
Slewing range	[degrees °]	370
1 / A element rotation	[degrees °]	96
2 / B element rotation	[degrees °]	180
3 / C element rotation	[degrees °]	180
4 / D element rotation	[degrees °]	230
Concrete pipeline diameter	[mm]	125
Front outrigger setup	[mm]	6.300
Rear outrigger setup	[mm]	7.780
Length of discharge hose	[mm]	4.000
Voltage	[V]	12/24
Max. slope of ground	[degrees °]	3
Front outrigger pressure	[kN]	200
Rear outrigger pressure	[kN]	200
Max. concrete pressure	[bar]	85
Max. weight of pipework	[kg/m]	12
Max. weight of elbow	[kg]	13
Max. density of concrete	[kg/m^3]	2,4
Hydraulic pressure for distributor boom	[bar]	330
Hydraulic pressure for outriggers	[bar]	200
Secondary settings		
Element 1 up	[bar]	280
Element 2 up	[bar]	280
Element 3 up	[bar]	330
Element 4 up	[bar]	280
Rotate	[bar]	160
Telescopic extension	[bar]	200/200
Slew out front outrigger	[bar]	50
Slew in front outrigger	[bar]	80
Time element 1 up/down 100 °	[sec]	80
Time element 2 up/down 180 °	[sec]	105
Time element 3 up/down 180 °	[sec]	70
Time element 4 up/down 235 °	[sec]	45
Rotate left/right 370 °	[sec]	147

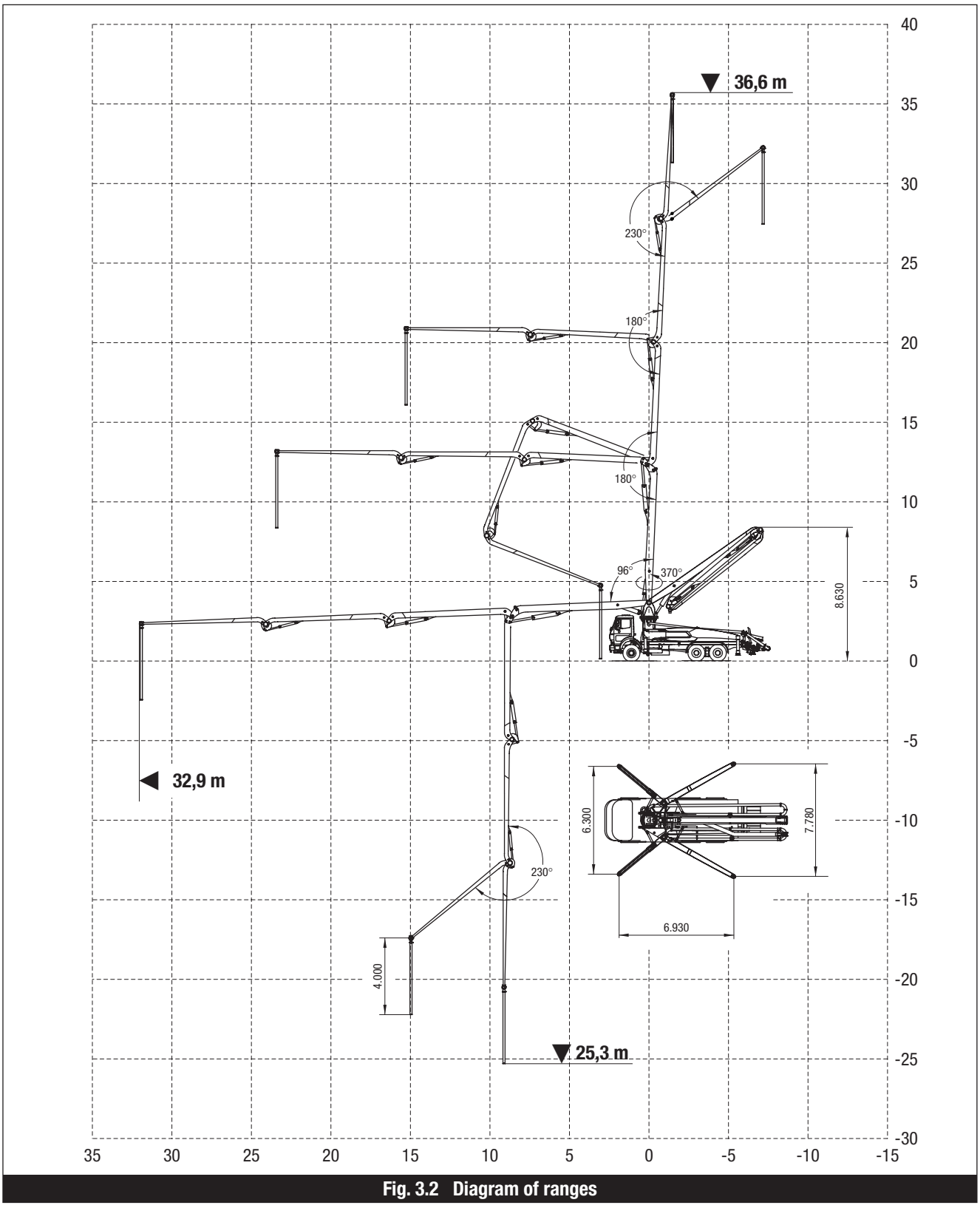


Fig. 3.2 Diagram of ranges

3.4 Concrete pump

		94/37 R 4 XXT	125/37 R 4 XXT	140 H/37 R 4 XXT
Max. concrete output, rod side	[m^3/h]	94	125	140
Max. concrete output, piston side	[m^3/h]	57	75	96
Max. concrete pressure, rod side	[bar]	75	55	80
Max. concrete pressure, piston side	[bar]	125	95	119
Pump cycles/min, rod side		25	25	28
Pump cycles/min, piston side		15	15	19
Conveying cylinder, D_{inner} ∞ stroke	[mm]	200 ∞ 2,000	230 ∞ 2,000	230 ∞ 2,000
Stroke volume / double stroke	[litre]	125	166	166
Hydraulic drive cylinder, D_{piston} /D_{rod} ∞ stroke	[mm]	125/80 ∞ 2,000	125/80 ∞ 2,000	140/80 ∞ 2,000
Oil tank volume	[litre]	600	600	600
Water tank volume	[litre]	600	600	600
Hopper capacity	[litre]	600	600	600
Water pump pressure	[bar]	20	20	20
Max. hydraulic pressure, concrete pump	[bar]	320	320	320
Max. hydraulic pressure, agitator	[bar]	250	250	250
Max. hydraulic pressure, water pump	[bar]	250	250	250
Max. speed of cardan shaft	[rpm]	1.650	1.650	1.650

WARNING:
Note transmission ratio from vehicle gearbox!

4. Description

4.1 Proper use

The truck-mounted concrete pump is a working machine and is exclusively intended for conveying concrete up a density in the pipe of 2,400 kg/m^3.

The machine is not to be used for transport of goods other than transporting accessories such as pipes and hoses etc. The maximum permissible total weight must not be exceeded.

Any use that is not covered by proper use is deemed to be improper use or misuse.
WAITZINGER accepts no liability for damage that arises under such circumstances.

The truck-mounted concrete pump as delivered is in accordance with current technology and complies with recognised safety standards for construction and use.

The truck-mounted concrete pump should be operated only when it is in good technical condition and for its proper purpose.

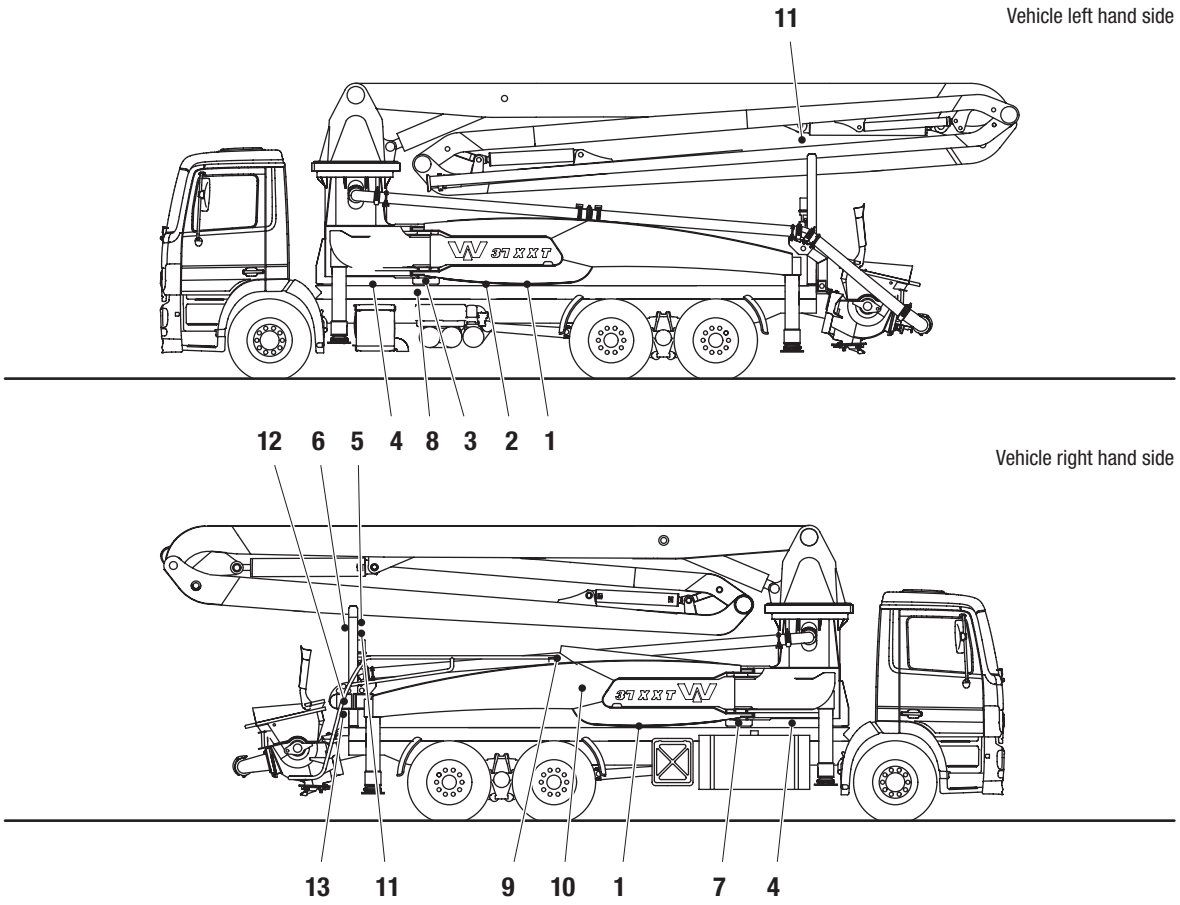
The mandatory regulations for accident prevention applicable in the country and location of operation, and the recognised technical safety rules for safe and proper working practices, together with the instructions for operation and maintenance, must all be complied with.

4.2 Structure and function of the truck-mounted concrete pump

4.2.1 Structure of the truck-mounted concrete pump

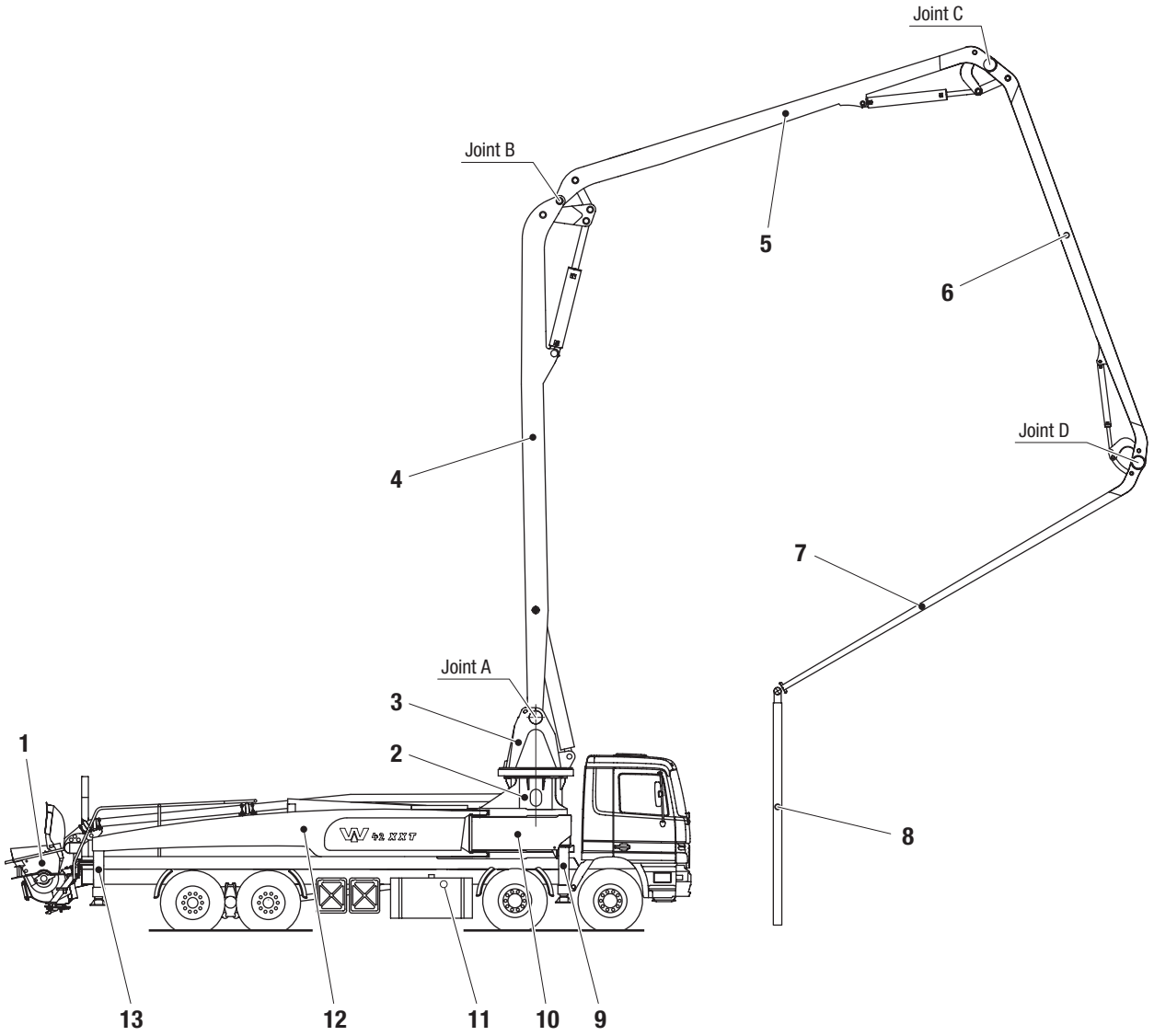
The truck-mounted concrete pump comprises a concrete pump conveying unit mounted on a truck chassis.

The concrete pump conveying unit comprises the following major subassemblies:



1 Rear outrigger catches in transport position
2 Water tank, filling and drain cock
3 Outrigger control block, left
4 Telescope limit of travel catch, front
5 Control
6 Lubrication system
7 Outrigger control block, right
8 Gearbox changeover valve
9 Boom control block
10 Concrete pump control block
11 Horn
12 Control panel
13 Control panel water pump / agitator

Fig. 4.1 Main components of the truck-mounted concrete pump - sheet 1



1	Pump group	**8**	Discharge hose
2	Boom block	**9**	Front outrigger cylinder
3	Slewing head	**10**	Front telescopic section
4	Boom element A	**11**	Transfer shift gearbox
5	Boom element B	**12**	Rear outrigge
6	Boom element C	**13**	Rear outrigger cylinder
7	Boom element D		

Fig. 4.2 Main components of the truck-mounted concrete pump - sheet 2

4.2.2 Function of the truck-mounted concrete pump

The concrete is delivered into the hopper and is pumped by the concrete pump through the S-valve and the conveying pipework to the discharge hose.

4.2.2.1 Distributor boom

All distributor boom functions are hydraulically actuated.
The conveying and riser pipes comprise pipes and pipe elbows.
Snap couplings allow the pipes to be joined together and the joints to be rotated.

4.2.2.2 Outriggers

The rear outriggers are swung out hydraulically. The telescopic front outriggers are hydraulically swung out and extended. The hydraulic support cylinders ensure the necessary stability of the truck-mounted concrete pump.
The rear outriggers contain the water tanks with a capacity of 400 litres each.

4.2.2.3 Control

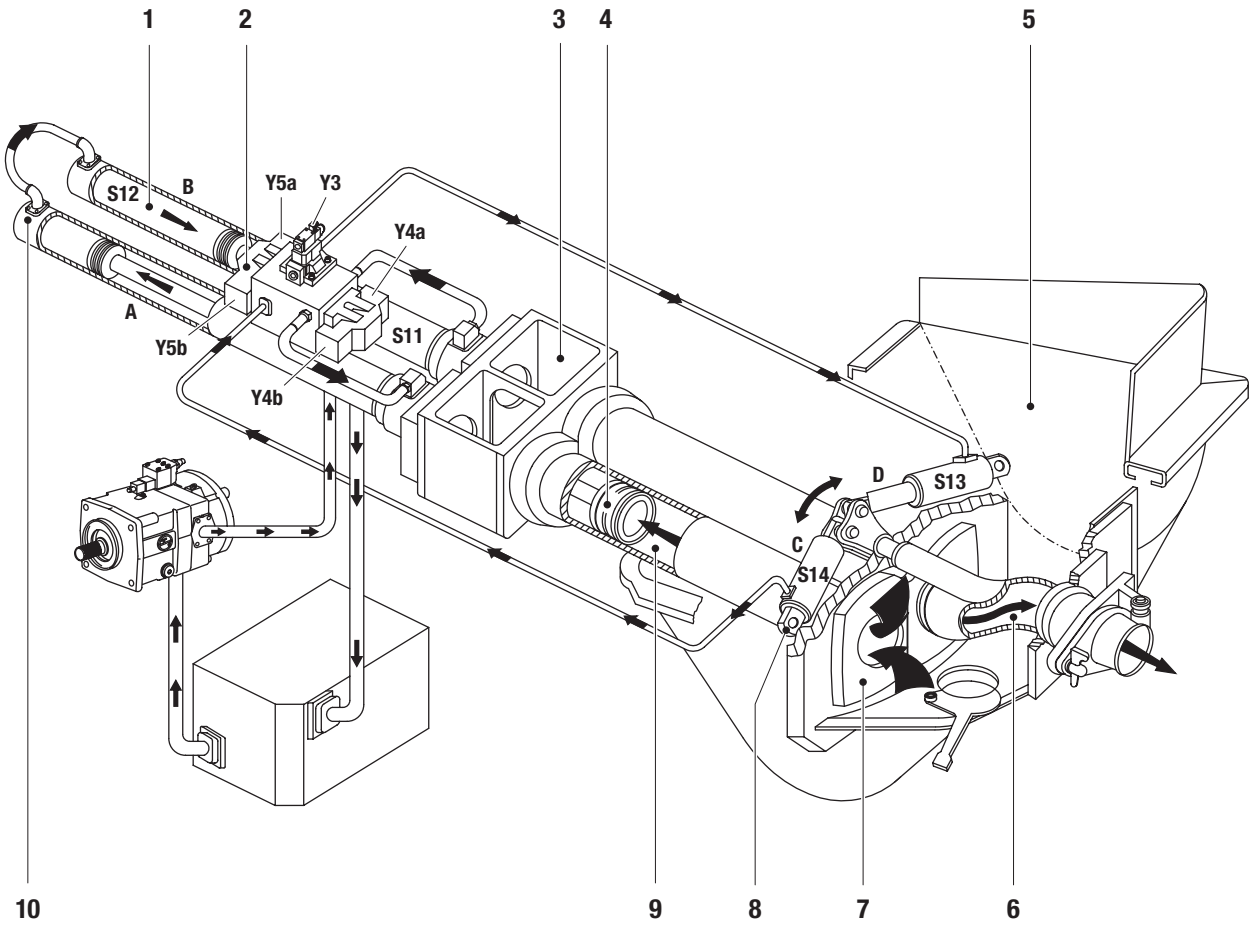
The controls actuate the hydraulic systems for the concrete pump and distributor boom. The operator can use the controls either at the control panel or at the remote control pendant.

4.2.2.4 Central lubrication

The central lubrication system is operated by compressed air from the pressure accumulator on the vehicle chassis. It supplies all lubrication points on the truck-mounted concrete pump (apart from the conveying piston).
An optional central lubrication system is available for the conveying piston and/or distributor boom.

4.2.2.5 Function of the concrete pump

The concrete pump is hydraulically driven by the vehicle engine through a transfer shift gearbox and hydraulic pump.
The controls are electric and fully automatic. In addition a back-up function can be engaged by a selection switch; this allows the concrete pump to continue to be run at a reduced speed should the control system or the sensors fail. The stroke rate can be varied between minimum and maximum.
The drive cylinders (**1**) are fitted with an automatic leakage compensation. The S-valve automatically compensates for wear at the wear plate and wear ring.



1 Right drive cylinder
2 Control block
3 Wash-out tank
4 Conveying piston
5 Slide housing with agitator
6 S-valve
7 Wear plate
8 Slewing drive
9 Conveying cylinder II
10 Left drive cylinder

Fig. 4.3 Operation of the concrete pump

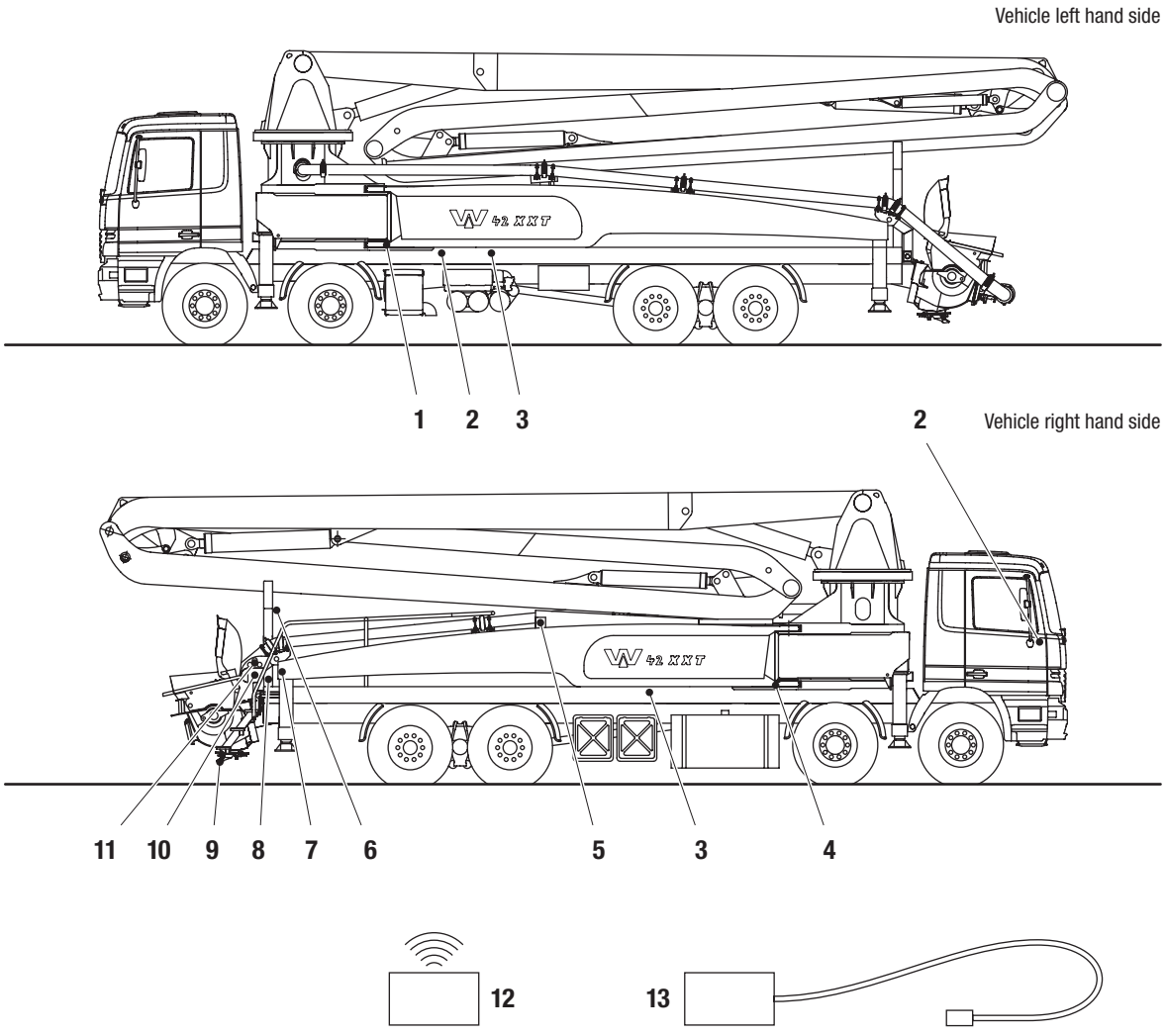
4.2.2.6 Method of operation of the concrete pump

The concrete pump operates as follows:

The oscillation cylinders are in position S13. On pumping the pressure relief valve Y3 is electrically actuated and closes, and Y4b is started. The drive cylinders move in direction “A”. The concrete in the left hand conveying cylinder is pushed into the S-valve into the conveying pipe.
Concrete is sucked into the right hand conveying cylinder through the free opening in the hopper. As soon as sensor S12 trips, valves Y4b and Y5b are started. The drive cylinders remain stationary and the oscillation cylinders start to move in direction “C”. The S-valve is now in line with the right hand conveying cylinder. Sensor S14 starts Y4a (and Y5b stops), and the drive cylinders move in direction “B”. The right hand conveying piston now pushes concrete through the S-valve and the left cylinder sucks concrete in from the slide housing. Sensor S11 stops Y4a and Y5a swings the S-valve back in direction “D”. A full cycle is now complete.

5. Controls and displays

5.1 Controls and displays for the truck-mounted concrete pump,



1 Outrigger control block, left
2 Changeover to transfer shift gearbox
3 Water tank, drain cock
4 Outrigger control block, right
5 Boom control block
6 Control elements on the control cabinet
7 Control panel desk
8 Control panel agitator / water pump
9 Surplus concrete discharge opening
10 Manometer agitator / water pump
11 Manometer concrete pump
12 Radio remote control
13 Cable remote control

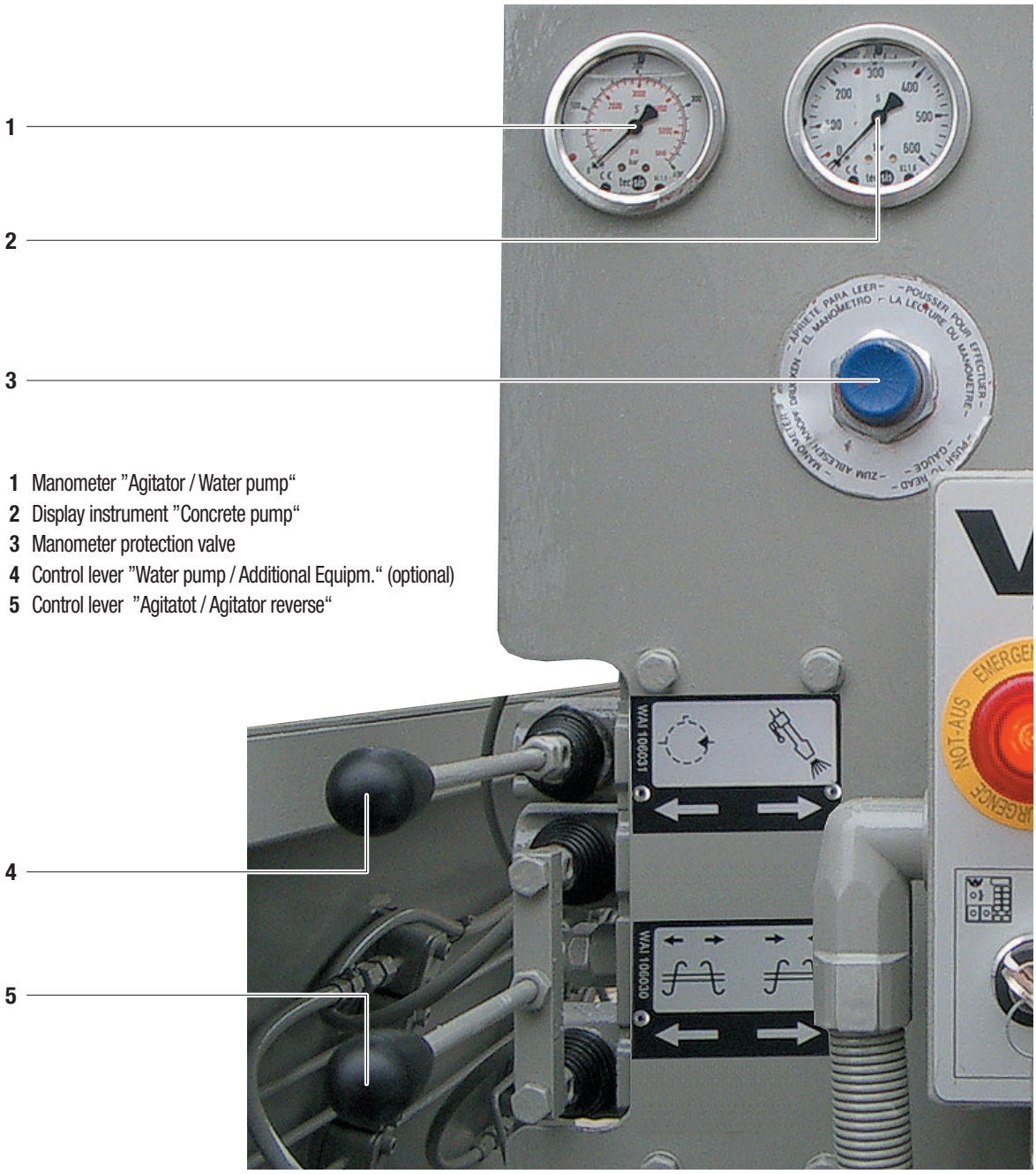
Fig. 5.1 Controls and displays for the truck-mounted concrete pump

5.2 Control panel desk

1 Emergency Stop button
2 Indicator lamp "Emergency Stop"
3 Indicator lamp "Controls on"
4 Indicator lamp "Hydraulic oil temperature"
5 Control panel lighting
6 Rocker switch "Horn-Reset/Lubrication"
7 Rocker switch "Light"
8 Rocker switch "Vibrator Auto/Manual"
9 Rocker switch "Engine speed +/–"
10 Indicator lamp "Pumps"
11 Rocker switch "Pump/Suck"
12 Indicator lamp "Suck"
13 Stroke rate potentiometer
14 Key switch "Desk/Remote control"

Fig. 5.2 Control panel desk

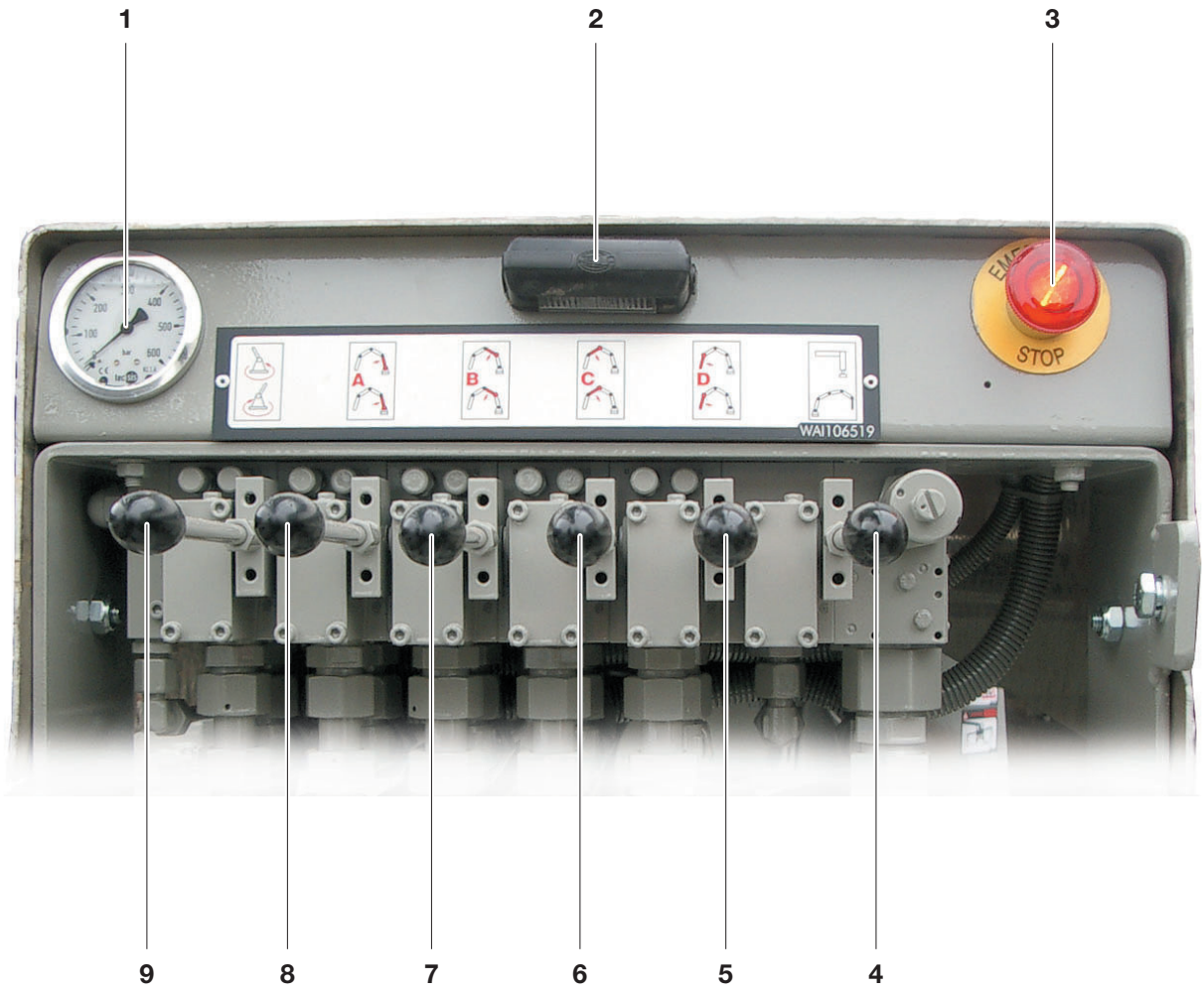
5.3 Control panel agitator / water pump



1 Manometer "Agitator / Water pump"
2 Display instrument "Concrete pump"
3 Manometer protection valve
4 Control lever "Water pump / Additional Equipm." (optional)
5 Control lever "Agitatot / Agitator reverse"

Fig. 5.3 Control panel Agitator / Water pump

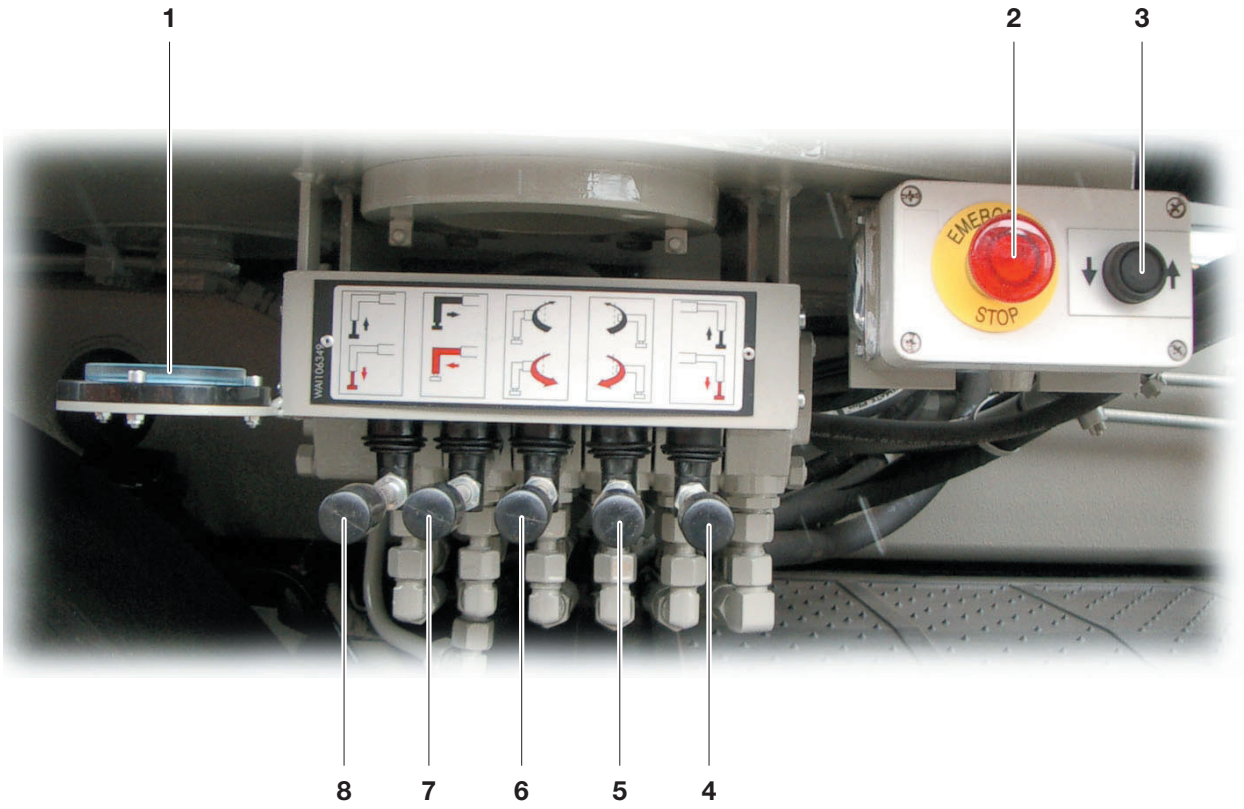
5.4 Boom control block



1 Manometer "Boom and outrigger"
2 Lighting for control panel
3 Emergency Stop button
4 Control lever "Outrigger / Boom"
5 Control lever "Deploy and retract boom element D"
6 Control lever "Deploy and retract boom element C"
7 Control lever "Deploy and retract boom element B"
8 Control lever "Deploy and retract boom element A"
9 Control lever "Boom slew left / right"

Fig. 5.4 Boom control panel

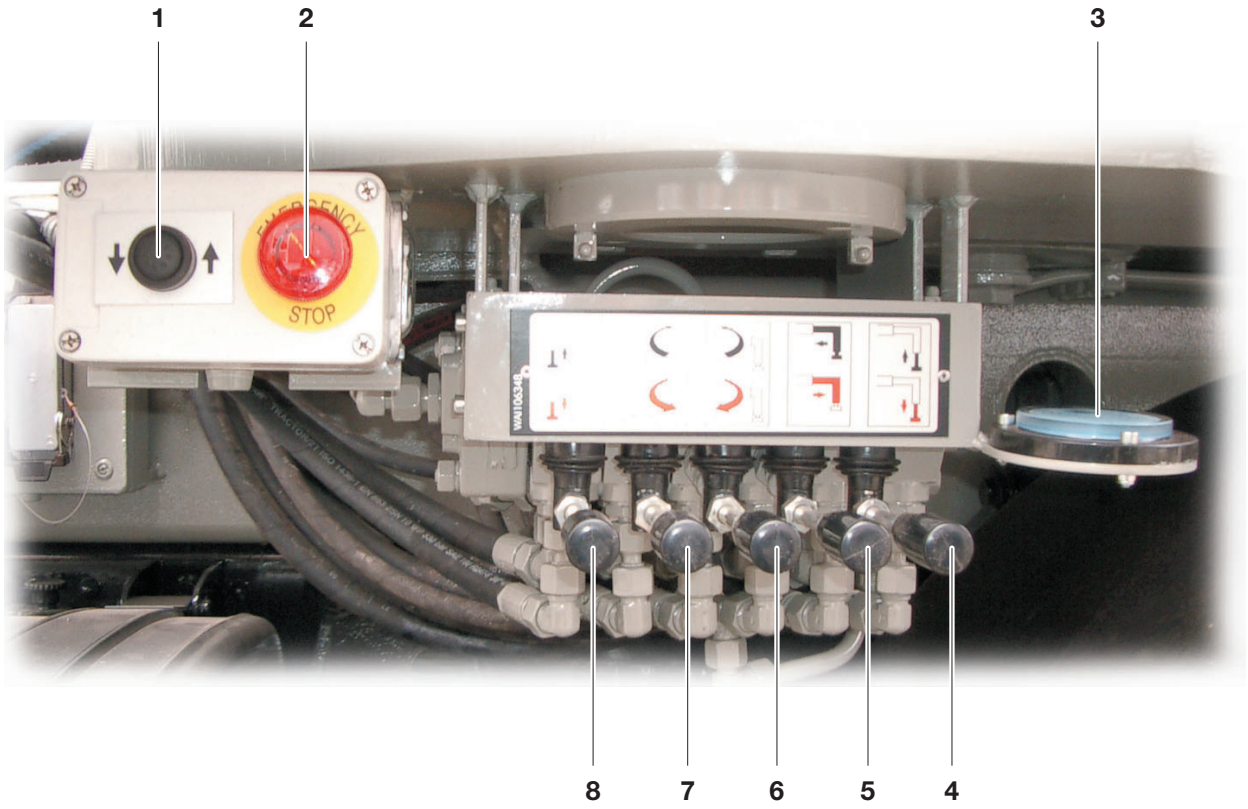
5.5 Outrigger control block, left



1 Circular level
2 Emergency Stop button
3 Outrigger safety button
4 Control lever "Extending / retracting the rear outrigger cylinder"
5 Control lever "Slewing the rear outrigger out / in"
6 Control lever "Slewing the front outrigger out / in"
7 Control lever "Extending / retracting the front outrigger telescope"
8 Control lever "Extending / retracting the front outrigger cylinder"

Fig. 5.5 Left outrigger control panel

5.6 Outrigger control block, right



1 Outrigger safety button
2 Emergency Stop button
3 Circular level
4 Control lever "Extending / retracting the front outrigger cylinder"
5 Control lever "Extending / retracting the front outrigger telescope"
6 Control lever "Slewing the front outrigger out / in"
7 Control lever "Slewing the rear outrigger out / in"
8 Control lever "Extending / retracting the rear outrigger cylinder"

Fig. 5.6 Right outrigger control panel

5.7 Control cabinet

1 Display instrument "Operating hours"
2 Rotary switch "Back-up function A-0-B"
3 Indicator lamp "Fault"
4 Indicator lamp "Lubrication system"

Fig. 5.7 Control cabinet control panel

5.8 Changeover to transfer shift gearbox (in the cab)

1 Indicator lamp “Transfer shift gearbox on”

2 Key switch “Transfer shift gearbox on/off”

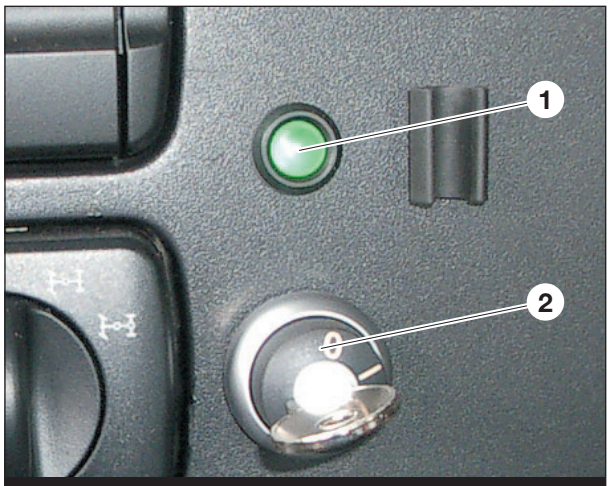


Fig. 5.8 Changing over the transfer shift gearbox

5.9 Surplus concrete discharge opening

1 Lever “Surplus concrete discharge opening”

2 Adjusting screws

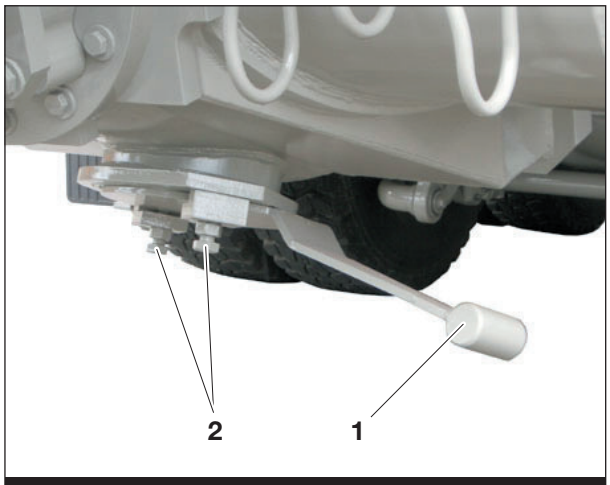


Fig. 5.9 Surplus concrete discharge opening

5.10 Water tank shut-off valve

1 Ball valve “Water tank filling / emptying”

2 Filling and emptying connection

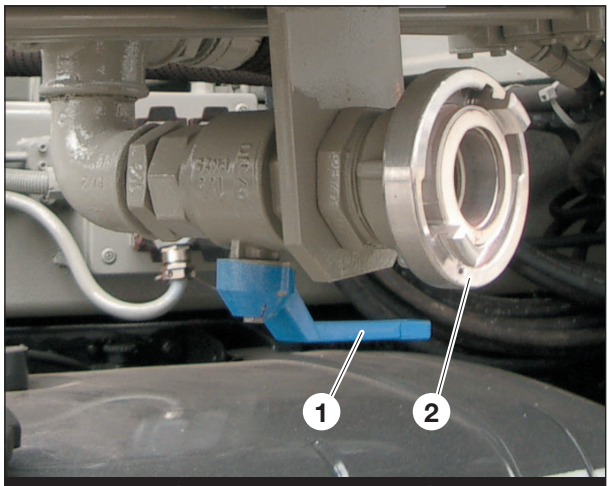


Fig. 5.10 Water tank drain

5.11 Water connection, rear

1 Geka connection for water hose

2 Ball valve for retaining or draining the water up to the water pump

3 Ball valve for filling the wash-out tank (optional)

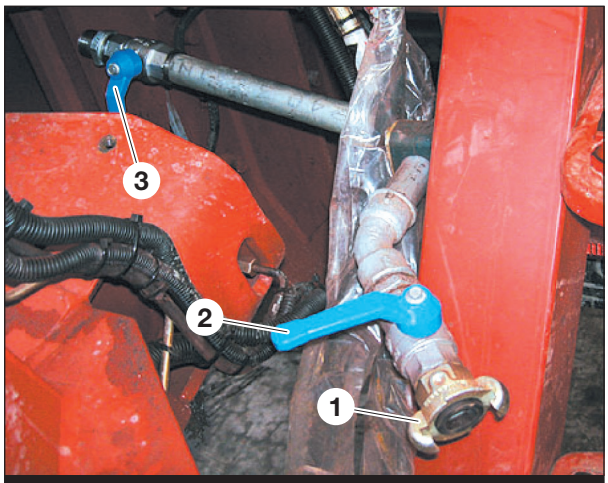
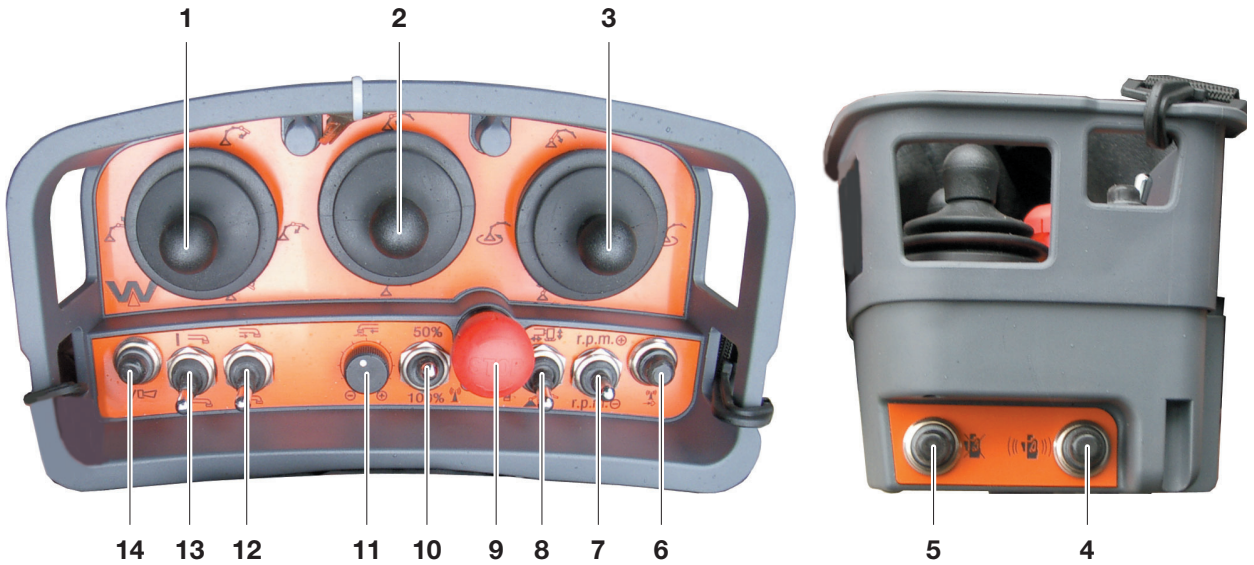


Fig. 5.11 Water connection, rear

5.12 Radio remote control / cable remote control



1 Joystick "Deploy and retract boom elements C and D"
2 Joystick "Deploy and retract boom element B"
3 Joystick "Deploy, retract and slew boom element A"
4 Push button "Start engine"
5 Push button "Stop engine"
6 Push button "Frequency changeover"
7 Rocker switch "Engine speed +/–"
8 Rocker switch "Outrigger / Boom"
9 Emergency Stop button – selector switch "Outrigger / Boom"
10 Rocker switch "Boom speed 50/100%"
11 Rotary switch "Stroke rate potentiometer"
12 Rocker switch " Pump / Suck"
13 Rocker switch "Pump On/Off"
14 Push button "Horn+Reset"

Fig. 5.12 Radio remote control / Cable remote control

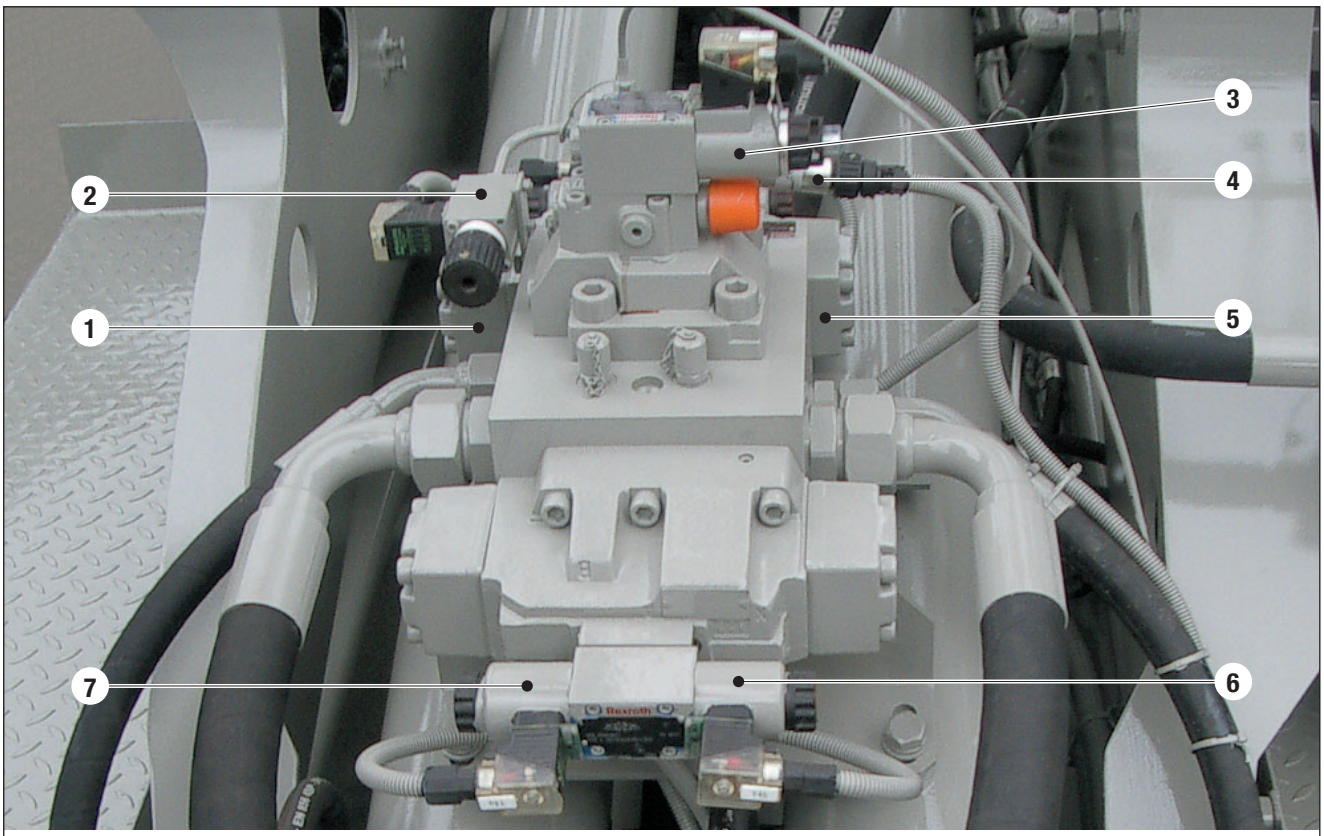
5.13 Emergency Stop button

Emergency Stop buttons are fitted to the truck-mounted concrete pump at the following places:

- ☞ Control panel desk
- ☞ Boom control block
- ☞ Outrigger control block, left
- ☞ Outrigger control block, right
- ☞ Radio remote control
- ☞ Cable remote control

Fig. 5.13 Emergency Stop button

5.14 Control elements on the hydraulic block



1 Valve Y5b
2 Push button
3 Valve Y3
4 Pressure sensor
5 Valve Y5a
6 Valve Y4a
7 Valve Y4b

Fig. 5.14 Hydraulic block

6. Driving, towing, loading

6.1 Driving

DANGER:
The centre of gravity of the truck-mounted concrete pump is very high, due to the nature of the design. Take extreme care when negotiating curves!

The truck-mounted concrete pump may be driven on public roads only in accordance with the applicable legislation and regulations of the country concerned. The driver must have a valid driving licence for this truck-mounted concrete pump.

6.1.1 Before a journey

The following actions must be taken before a journey:

- take all actions as described in the vehicle manufacturer's user manual
- check all components and transport restraints on the truck-mounted concrete pump to ensure they are in good condition
- check the outrigger catches to ensure they are properly engaged
- check that all components are secured against free movement
- check that the boom is in the transport position (height)

6.1.2 During the journey

Always drive the truck-mounted concrete pump having regard to the dimensions of the vehicle and its weight.
Further information on driving can be found in the separate vehicle manufacturer's user manual.

6.2 Towing

The truck-mounted concrete pump should be towed only in accordance with the instructions of the vehicle manufacturer, and only using the attachment points provided for the purpose. For towing the truck-mounted concrete pump, the front towing ring should be used; for towing other vehicles by the truck-mounted concrete pump, the rear towing plate.
Further information on towing can be found in the separate vehicle manufacturer's user manual.

6.3 Loading

CAUTION:
Not all the identified lifting points are suitable for lifting the complete machine. Always check before lifting!

The attachment points for lifting the truck-mounted concrete pump are specifically identified.
A transport company should be entrusted with loading and transporting by crane if necessary.

7. Starting up and operating

This chapter contains all the important information for the operator to safety start up and operate the truck-mounted concrete pump.

WARNUNG

WARNING:

Before first starting up the truck-mounted concrete pump, the operator must carefully read through this Chapter 7 “Starting up and operating” and perform all checks in accordance with the information set out in this chapter. Only when the operating safety has been assured in this way may the truck-mounted concrete pump be started up.

NOTE:

During start-up and operation, comply with the safety instructions set out in Chapter 2!

a. Personal safety equipment

In the entire working area of the truck-mounted concrete pump, suitable safety equipment should be worn, particularly when handling mortar additives.

The symbols for the necessary safety equipment are shown in the graphics panel alongside.

The symbols shown are as follows:

1. Hard hat
2. Safety boots
3. Ear defenders
4. Safety gloves
5. Safety glasses
6. Face mask
7. Protective clothing
8. Safety harness

Fig. 7.1 Symbols for personal safety equipment

b. General information for operating the truck-mounted concrete pump

The operator must be familiar with and comply with the user manual and all safety measures for operating the truck-mounted concrete pump. He must be able to control the machine.

b.1 Before starting up

☞ Secure the working- and hazard area and barrier it off if necessary
☞ Top up the fluids (hydraulic oil, fuel, water)
☞ Check the functioning of all safety devices - and controls
☞ Lubricate all grease points and check that the lubrication system is functioning
☞ Check the stability of the machine
☞ Check the conveying pipes for alignment and degree of wear (wall thickness measurement)

b.2 During operation

☞ Never allow the machine to operate unattended
☞ Stop the machine immediately if any fault occurs that might create a safety hazard
☞ In the event of blockages the material must be return to the hopper immediately. Start up again slowly!
☞ Open the snap couplings on the conveying pipes only when the conveying system has been depressurised
☞ When opening pipe joints, wear safety glasses to protect the eyes from spurting concrete
☞ Never reach into or on to moving parts, first switch the engine off or depressurise the accumulator
☞ Do not modify any safety device

b.3 At the end of operations

☞ Empty the conveying pipes
☞ Clean the conveying pipes using a cleaning ball and water
☞ Clean the hopper and the complete machine
☞ Perform routine maintenance, and repair any faults that have developed whilst the machine was running

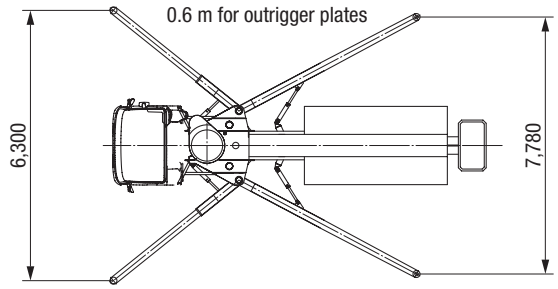
7.1 Setting up the truck-mounted concrete pump

Select the location having regard to the safety instructions in section 2.7, and drive the machine to the location.

NOTE:
Be sure to allow sufficient space for setting up truck-mounted concrete pump! Allow additional space for the mixer truck also!

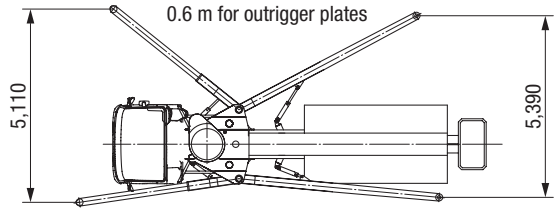
Fully deployed outriggers right:

Space requirement at the front: 6,3 m + 0, 6 m = 6,9 m
Space requirement at the rear: 7,8 m + 0, 6 m = 8,4 m
Slewing range: 0° - 360°



Narrow outriggers one side:

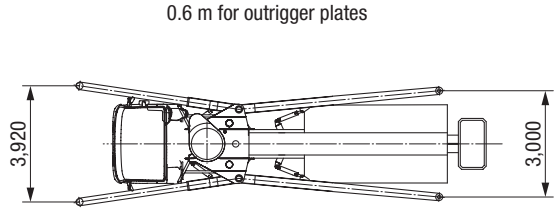
Space requirement at the front: 5,1 m + 0, 6 m = 5,7 m
Space requirement at the rear: 5,4 m + 0, 6 m = 6,0 m
Slewing range: 0° - 214° oder 360° - 146°



CAUTION: Narrow outriggers may only be used when XXA controls are installed and in use!

Narrow outriggers on both sides:

Space requirement at the front: 3,9 m + 0, 6 m = 4,5 m
Space requirement at the rear: 3,0 m + 0, 6 m = 3,6 m
Slewing range: 146° - 214°



CAUTION: Narrow outriggers may only be used when XXA controls are installed and in use!

Fig. 7.2 Space requirement for outriggers for the truck-mounted concrete pump

On sloping ground put chocks behind the wheels, release the brakes and allow the truck-mounted concrete pump to roll back on to the chocks. Then apply the handbrake and extend the outriggers.

The ground must be checked for its load-bearing capability.

7.2 Adjustments and actions before starting up.

7.2.1 Changing over the transfer shift gearbox

Use the key switch (**2**) in the cab to change over the transfer shift gearbox in the drive train from travel drive "**O**" to pump drive "**I**".

For the changeover the ignition switch must be in the "ON" position (vehicle engine can run, but need not be running), the pneumatic pressure must be more than 5 bar and the clutch fully disengaged.

The indicator lamp (**1**) lights up when the gearbox is switched to pump drive.

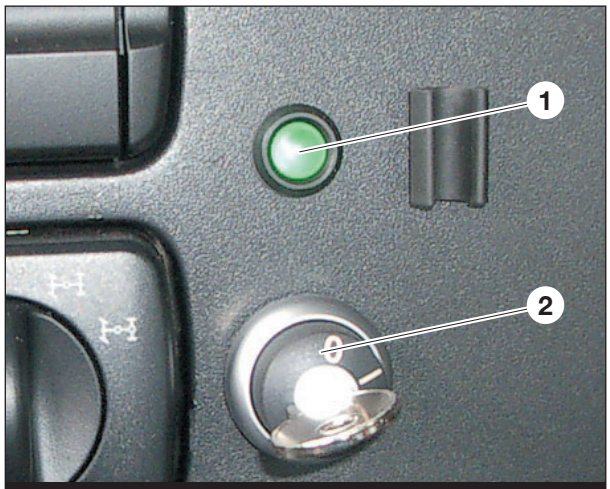


Fig. 7.3 Changing over the transfer shift gearbox

To drive the hydraulics a definite gear must be selected as shown in the information plate.

Example: 8 high

Fig. 7.4 Selecting a gear

WARNUNG

WARNING:

- ☞ **Selecting the wrong gear can lead to overspeeding and damage to the hydraulic pumps!**
- ☞ **Engine braking must be disengaged!**
- ☞ **The handbrake must be applied!**

The “Controls ON” indicator lamp (**3**) remains on as long as the ignition is on and the gearbox is set for pump drive. This function is independent of any Emergency Stop indication.

The vehicle engine must be running.

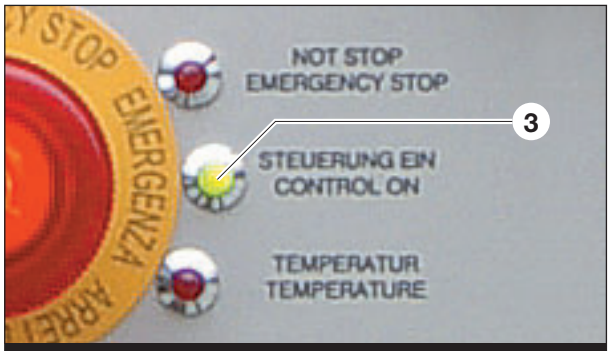


Fig. 7.5 Indicator lamp "Controls On"

7.2.2 Emergency Stop

The machine is fitted with 4 illuminated Emergency Stop buttons, plus an Emergency Stop button on each remote control pendant.

Each Emergency Stop button immediately switches off all functions and movements (optionally the engine can be switched off by an Emergency Stop).

The Emergency Stop buttons are located as follows:

- Control panel desk (Item 1, Fig. 5.2)
- Boom control block (Item 3, Fig. 5.4)
- Left hand outrigger controls (Item 2, Fig. 5.5)
- Right hand outrigger controls (Item 2, Fig. 5.6)
- Radio remote control (Item 9, Fig. 5.12)
- Cable remote control (Item 9, Fig. 5.12)

The activated Emergency Stop button is indicated n the control panel by the flashing Emergency Stop indicator lamp (Item 12, Fig. 5.2) and at the activated Emergency Stop button itself (except for remote control).

After the reason the activating the Emergency Stop button has been rectified, the activated Emergency Stop button can be released by pulling or twisting.

NOTE:

The controls must be reset after an Emergency Stop by pressing the “Horn/Reset” rocker switch (Item 6, Fig. 5.2) on the control panel desk.

All functions that were in operation when the Emergency Stop button was pressed must be restarted.

When the Emergency Stop button is pressed, the following conditions are set on the truck-mounted concrete pump:

- **Truck**
  Engine is switched to idling (or optionally switched off)
- **Truck-mounted concrete pump**
  Pumping / sucking is immediately switched off
- **Distributor boom**
  The distributor boom is halted at its current position

7.2.3 Selecting the operating mode

The control panel is at the right rear of the vehicle.

The functions on the control panel desk “Pump/Suck (**11**)” and “Stroke rate (**13**)” are disabled if the remote control is activated.

The key switch (**14**) allows switching between “Control Desk” and “Remote control”.

If the cable for remote control is plugged in, remote control is activated automatically.

In the setting “Remote control” the respective remote control pendant must be switched on, otherwise the controls are switched off in an Emergency Stop.

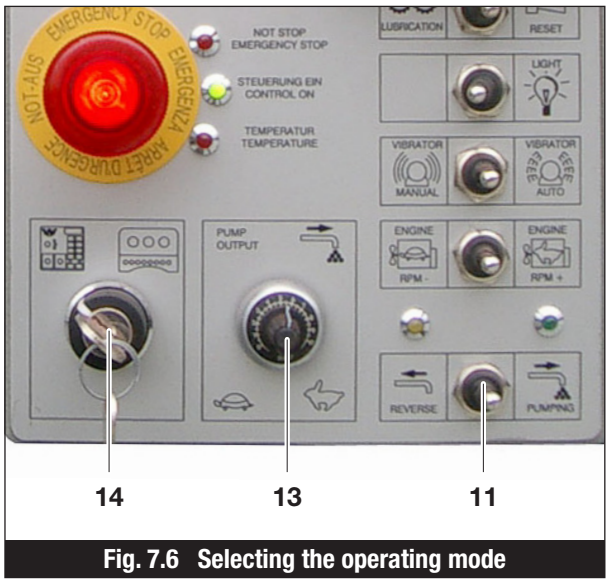


Fig. 7.6 Selecting the operating mode

NOTE:
The key should be withdrawn when the machine is in operation, so that no unauthorised person can tamper with the outriggers.

7.3 Operating the outriggers

GEFAHR

DANGER:
I When the outriggers are being slewed in/out or extended there is high crush risk hazard.

☞ The operator must continuously monitor the hazard area.

☞ The outrigger slew in/out and extension areas must be kept clear of all persons and objects.

☞ All instructions set out in Chapter 2 “Safety instructions” must be strictly complied with.

7.3.1 Stability checking

If the option “Stability checking” is installed, refer to the separate user manual.

7.3.2 Extending / retracting the outriggers

GEFAHR

DANGER:

☞ **For safety reasons the operator must always face towards the outrigger that is being extended / retracted and have an unimpeded view of the entire hazard area!**

☞ **When activating the functions with the respective operating lever, for safety reasons the other hand should always be keeping the safety button (Item 3, Fig. 5.5 / Item 1, Fig. 5.6) pressed!**

- Moving the operating lever on the outrigger control block **downwards**, means for all functions “**Extend**“.
- Moving the operating lever on the outrigger control block **upwards**, means for all functions “**Retract**“.
- The functions “Slew out” and “Telescopic extension” can be performed concurrently for the front outriggers. This causes the front outriggers to extend automatically to their full extent.
- The outriggers are secured in the stowed position for vehicle travel by hydraulically locked catches.

WARNUNG

WARNING:

Before moving the vehicle and before starting work make absolutely sure that the hydraulically locked catches are engaged!

NOTE:
If the operating mode selector switch (Item 14, Fig. 5.2) is in the remote control position, the remote control must be switched from the Boom control mode to the Outrigger control mode, using rocker switch (Item 8, Fig. 5.12).

7.3.2.1 Back-up operation

If the control system fails, the outriggers can be operated manually from the master control block. To do this a send person must stand at the “Outrigger/Boom” control panel and hold the control lever (Item 4, Fig. 7.11) in the UP position.

7.3.3 Functions at outrigger control block, left

Move the operating lever as shown to perform the respective functions on the outrigger.

1 Circular level
2 Emergency Stop button
3 Outrigger safety button
4 Extending / retracting the rear outrigger cylinder
5 Slewing the rear outrigger cylinder out / in
6 Slewing the front outrigger cylinder out / in
7 Extending / retracting the front telescopic outrigger
8 Extending / retracting the front outrigger cylinder

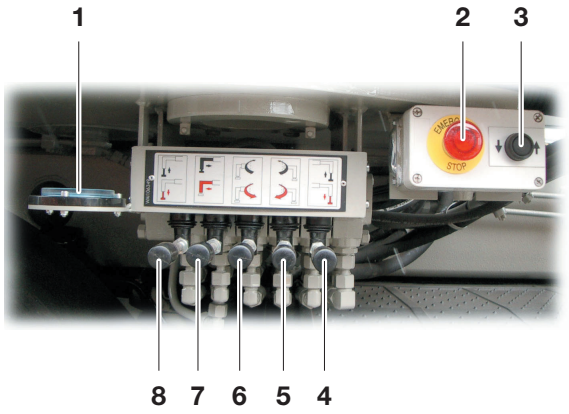


Fig. 7.7 Outrigger control block, left

7.3.4 Functions at outrigger control block, right

Move the operating lever as shown to perform the respective functions on the outrigger.

1 Outrigger safety button
2 Emergency Stop button
3 Circular level
4 Extending / retracting the front outrigger cylinder
5 Extending / retracting the front telescopic outrigger
6 Slewing the front outrigger cylinder out / in
7 Slewing the rear outrigger cylinder out / in
8 Extending / retracting the rear outrigger cylinder

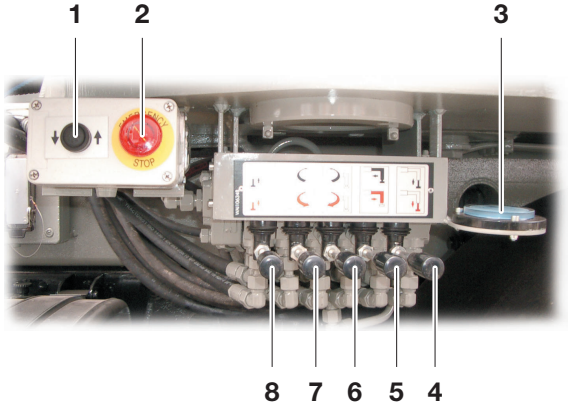


Fig. 7.8 Outrigger control block, right

7.3.5 Building up the outrigger

- Fully extend the outrigger and fully extend the telescopic sections.
- Extend the front telescopic outriggers until it clicks into a second registration point at the working setting (see detail, left).
- Check that the arrows match (see detail, right), indicating the that the outrigger is fully extended.
- Extend the front outrigger cylinder so far that the front wheels are lifted clear of the ground.
- The rear wheels must remain gently touching the ground (braking and stability).

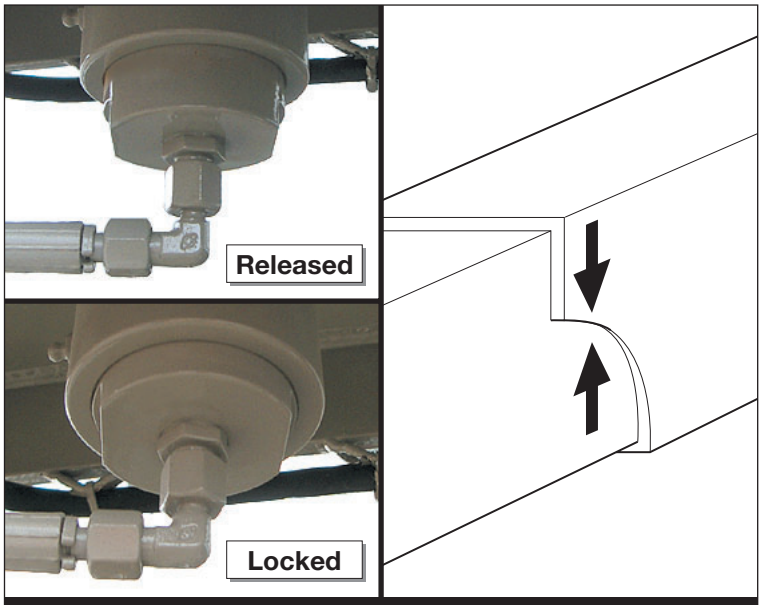


Fig. 7.9 Telescopic outrigger extended and locked

- The truck-mounted concrete pump may not stand more than 3° from level. Check the circular levels

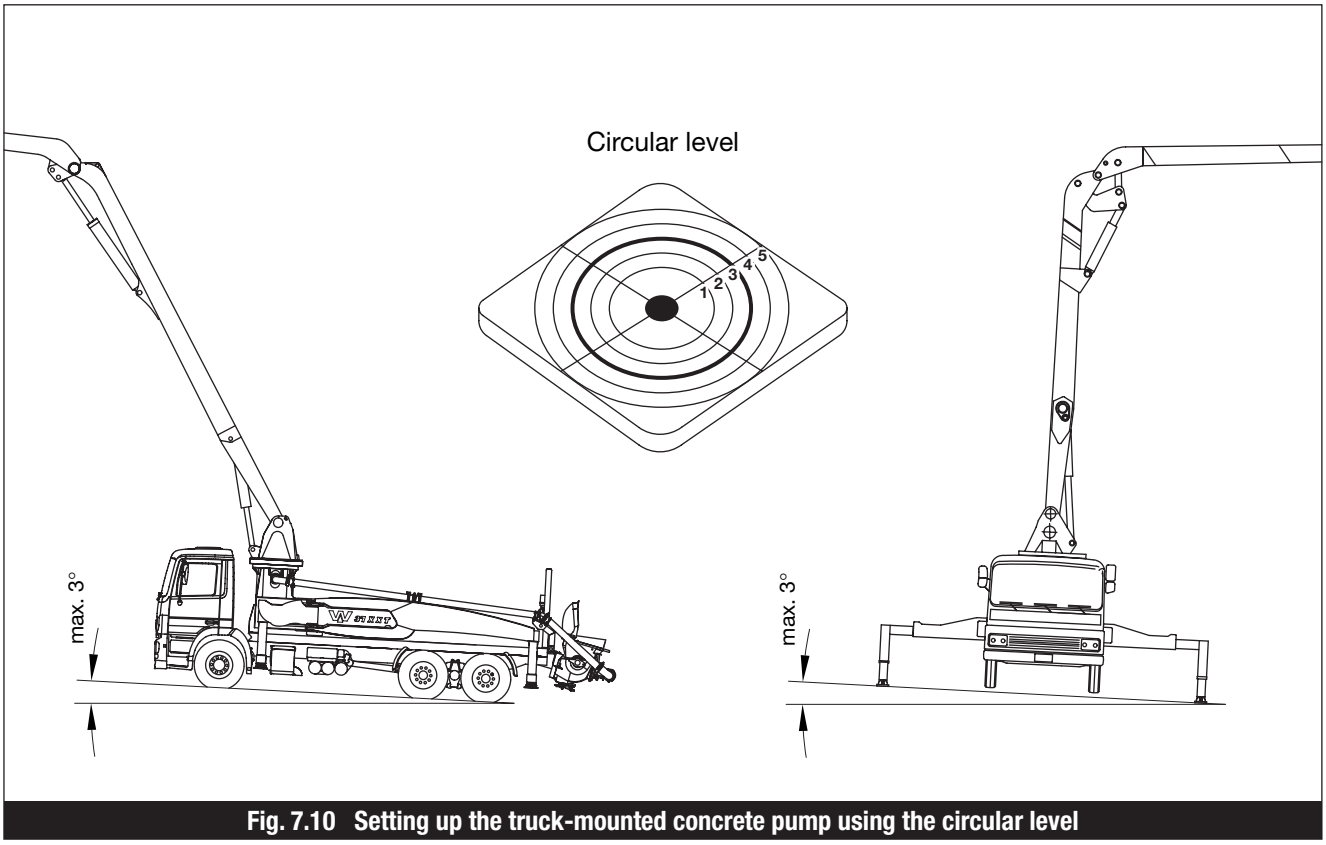


Fig. 7.10 Setting up the truck-mounted concrete pump using the circular level

7.4 Distributor boom operation

WARNUNG

WARNING:

☞ **Do not deploy the distributor boom until the truck-mounted concrete pump outriggers are fully extended!**

☞ **Never drive the truck when the distributor boom is deployed!**

☞ **When deploying and stowing the distributor boom there are many points against which the boom can foul and cause damage. Therefore be sure to follow the correct sequence of operations for deploying the boom!**

NOTE:

Normally the distributor boom is controlled using the radio/cable remote control pendant. All boom functions are performed proportionally.

7.4.1 Distributor boom operation using the master control block

NOTE:

Distributor boom operation using the master control block should only be used as back-up. Whenever possible control the boom using the radio/cable remote control pendant.

- Set the operating mode selection switch (Item 14, Fig. 7.6) to “Control panel desk”.
- Control each boom element individually by moving the respective control levers Element A (**8**), Element B (**7**) , Element C (**6**) and Element D (**5**) in desired direction.

  Moving a control lever downwards moves the element inwards, moving a control lever downwards moves the element outwards.
- The boom rotation lever (**9**) controls the rotation of the boom.
  Pressing the control lever downwards rotates the boom clockwise, pressing the control lever upwards rotates the boom anticlockwise.

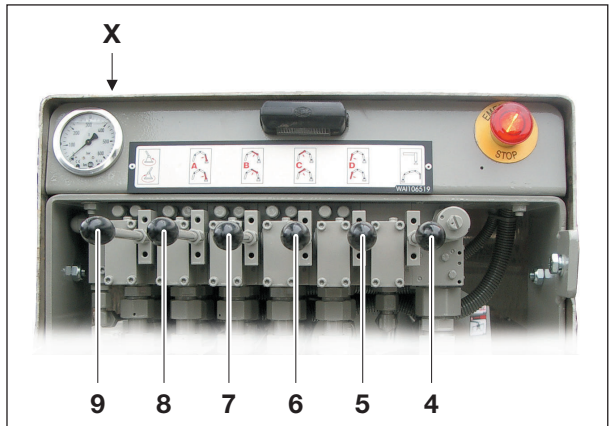


Fig. 7.11 Controll. the distrib. boom from the boom control block

- Press control lever boom A (Item 8, Fig. 7.11) and deploy the boom package.

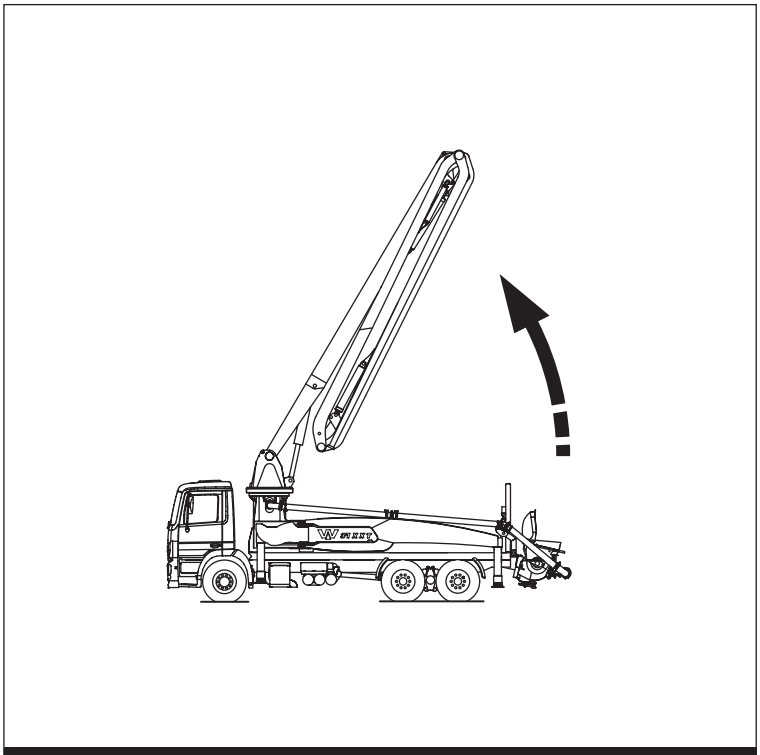


Fig. 7.12 Deploy the boom package, the catch hook releases

- Press the boom rotation control lever (Item 9, Fig. 7.11) to rotate the boom package into the working position.

Fig. 7.13 Slew the boom package into the working position

- Press control lever B (Item 7, Fig. 7.11) and deploy boom element B at 120° to boom element A.

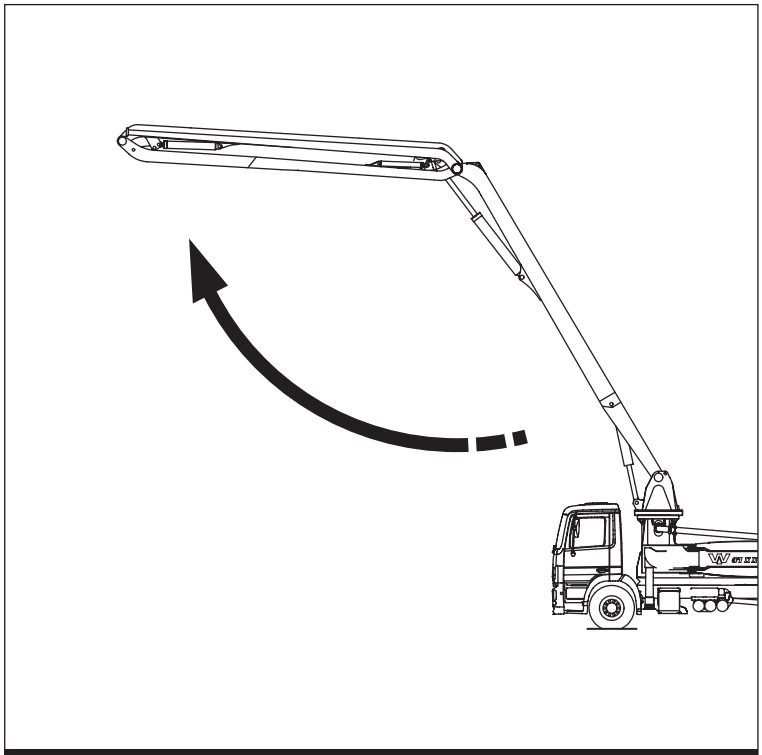


Fig. 7.14 Deploy boom element B

- Press control lever C (Item 6, Fig. 7.11) and deploy boom element C at 90° to boom element B.

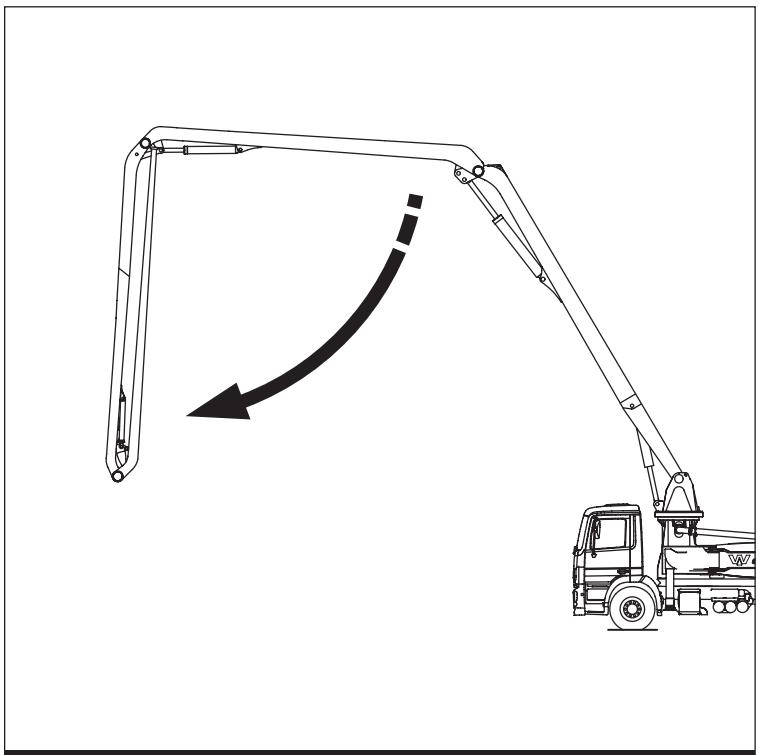


Fig. 7.15 Deploy boom element C

- Press control lever D (Item 5, Fig. 7.11) and deploy boom element D at 90° to boom element B.
- Position boom element D horizontally approx. 1 m above the ground.

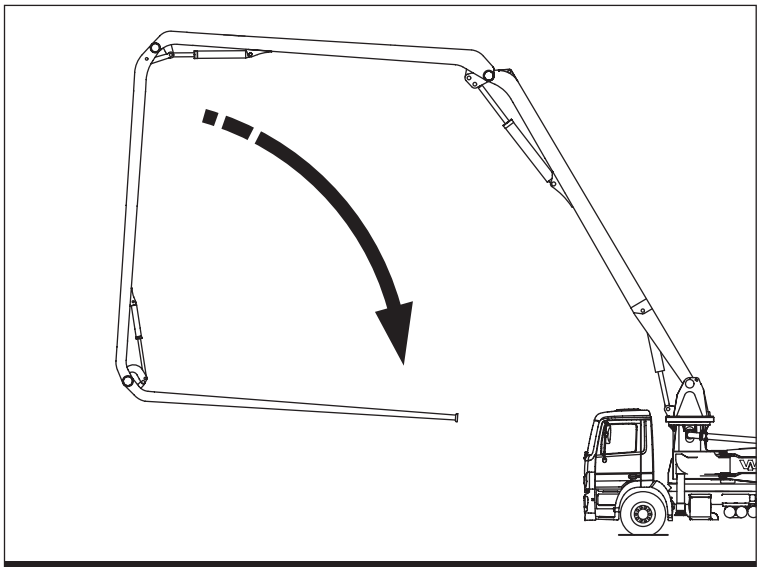


Fig. 7.16 Deploy boom element D

- Open the discharge hose retainer (arrowed) and release the discharge hose.
- Use the control levers (Items 5 to 9, Fig. 7.11) on the boom control block to move the distributor boom into the desired working position.

Fig. 7.17 Release the discharge hose

WARNUNG

WARNING:

When using manual control at the boom control block all safety circuits including Emergency Stop are disabled.

7.4.2 Controlling the distributor boom using the radio remote control pendant

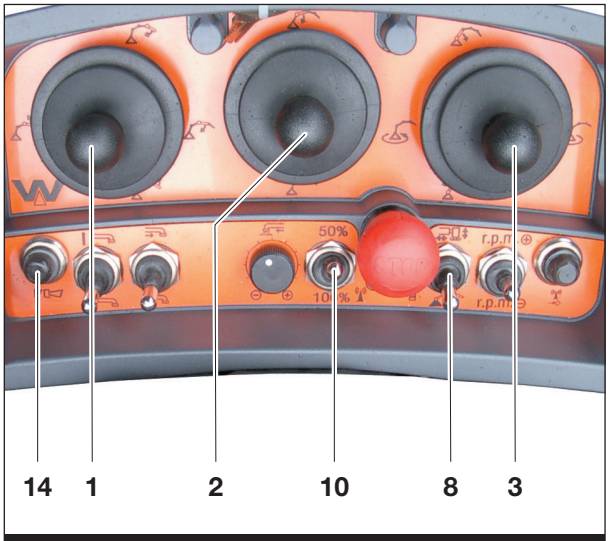


Fig. 7.18 Controll. the distrib. boom from the radio remote control pendant

- Set the operating mode selection switch (Item 14, Fig. 7.6) to “Remote control”.
- Activate the remote control pendant. See information in the separate user manual supplied by the manufacturer.
- Release the Emergency Stop by pressing the Horn/Reset (**14**). The horn will sound.
- Switch the selector switch “Outrigger/Boom” (**8**) to “Boom” and uncap the Emergency Stop button.
- The 50%/100% switch (**10**) controls the boom speed, 50% when pumping, 100% when deploying / stowing.
- Press the master switch “Deploy boom element A / Slew boom” (**3**) and deploy boom element A until the catch hook releases and the boom element B can be deployed (see Fig. 7.12).
- Press the master switch “Deploy boom element A / Slew boom” (**3**) to move the distributor boom into the position where the discharge hose retainer can be opened.
- Press the master switch “Deploy boom element B” (**2**) and deploy boom element B until it is approx. 120° to boom element A (see Fig. 7.14).
- Use the joystick “Deploy boom element C and D” (**1**) to deploy boom element C to 90° to boom element B (see Fig. 7.15).
- Use the joystick “Deploy boom element C and D” (**1**) to deploy boom element D to 90° to boom element C (see Fig. 7.15).
- Position boom element D horizontally approx. 1 m above the ground.
- Open the catch and release the discharge hose (see Fig. 7.17).
- Use the joystick s(**1** to **3**) on the radio remote control to move the distributor boom to the desired working position.

7.4.3 Controlling the distributor boom using the cable remote control pendant

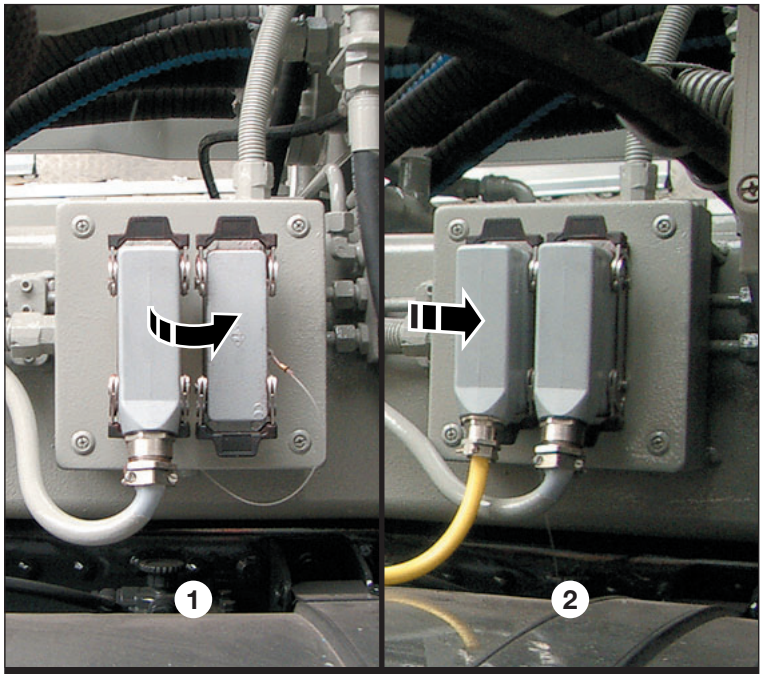


Fig. 7.19 Plug the extension cable for the cable remote control

- Remove the right hand protective cap.
- Unplug the “Radio” plug from the left hand socket and plug it into the free right hand socket ❶. Lock the plug in place.
- Plug the extension cable for the cable remote control into the left hand socket ❷. Lock the plug in place. Radio remote control is now deactivated.
- Set the operating mode selection switch (Item 14, Fig. 7.6) to “Remote control”.
- Release the Emergency Stop by pressing the Horn/Reset (Item 14, Fig. 7.18). The horn will sound.
- Switch the selector switch “Outrigger/ Boom” (Item 8, Fig. 7.18) to “Boom” and uncap the Emergency Stop button.
- The 50%/100% switch (Item 10, Fig. 7.18) controls the boom speed, 50% when pumping, 100% when deploying / stowing.
- Press the master switch “Deploy boom element A / Slew boom” (Item 3, Fig. 7.18) and deploy boom element A until the catch hook releases and the boom element B can be deployed (see Fig. 7.12).
- Press the master switch “Deploy boom element A / Slew boom” (Item 3, Fig. 7.18) to move the distributor boom into the position where the discharge hose retainer can be opened.
- Press the master switch “Deploy boom element B” (Item 2, Fig. 7.18) and deploy boom element B until it is approx. 120° to boom element A (see Fig. 7.14).
- Use the joystick “Deploy boom element C and D” (Item 1, Fig. 7.18) to deploy boom element C to 90° to boom element B (see Fig. 7.15).
- Use the joystick “Deploy boom element C and D” (Item 1, Fig. 7.18) to deploy boom element D to 90° to boom element C (see Fig. 7.16).
- Position boom element D horizontally approx. 1 m above the ground.
- Open the catch and release the discharge hose (see Fig. 7.17).
- Use the joystick s(**1** to **3**) on the radio remote control to move the distributor boom to the desired working position.

7.5 Pump operation

7.5.1 Motor Start/Stop, Speed control

The vehicle engine can be started from the remote control pendant using the push button (Item 4, Fig. 7.20). This can only be done if the key switch (Item 14, Fig. 7.6) on the control panel desk is set to “Remote Control”.
Pressing the push button (Item 5, Fig. 7.20) stops the vehicle engine, and inhibits its restart for approx. 10 sec.
Pressing the rocker switch (Item 7, Fig. 7.20 or Item 9, Fig. 7.21) brings the vehicle engine from idling to full speed within 10 sec.

Fig. 7.20 Operation "Motor Start/Stop"

7.5.2 “Pump/Suck” control at the control panel desk

The operating mode selection switch (Item 14, Fig. 7.21) must be set to “Desk”. The rocker switch (Item 11, Fig. 7.21) selects “Pump” or “Suck”. For confirmation one of the two indicator lamps (Item 10 or 12, Fig. 7.21) will light.

The stroke rate depends on the setting of the stroke rate potentiometer (Item 13, Fig. 7.21) and the engine speed.

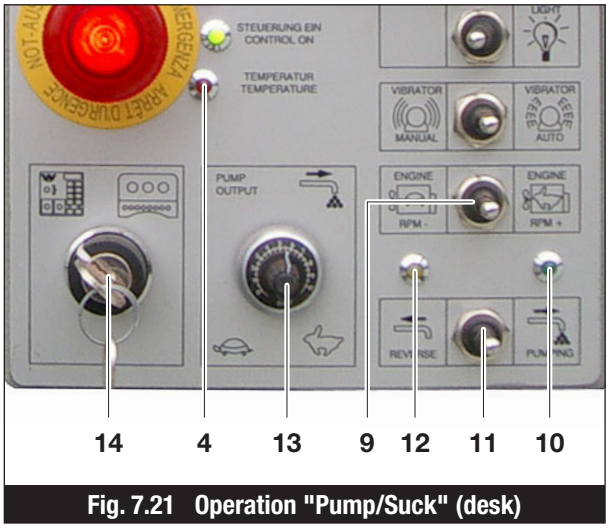


Fig. 7.21 Operation "Pump/Suck" (desk)

NOTE:
Opening the safety grill or pressing an Emergency Stop button (whilst the “Pump/Suck” switch is activated), will deactivate the “Pump/Suck” function.

NOTE:
If the hydraulic oil temperature exceeds 80 °C, the pump function is stopped and the indicator lamp (Item 4, Fig. 7.21) on the control panel desk will light. Sucking the concrete back remains available. The hydraulic system must be cooled down as quickly as possible by appropriate means (see section 7.6.4).

7.5.3 "Pump/Suck" control by radio remote control / cable remote control

The operating mode selection switch (Item 14, Fig. 7.6) must be set to "Radio remote control".

The rocker switch (Item 12, Fig. 7.21) on the remote control pendant is pre-set to "Pump" or "Suck". Select "Pump" or "Suck" using the rocker switch (Item 13, Fig. 7.21).

The stroke rate depends on the setting of the stroke rate potentiometer (Item 11, Fig. 7.22) and the engine speed.

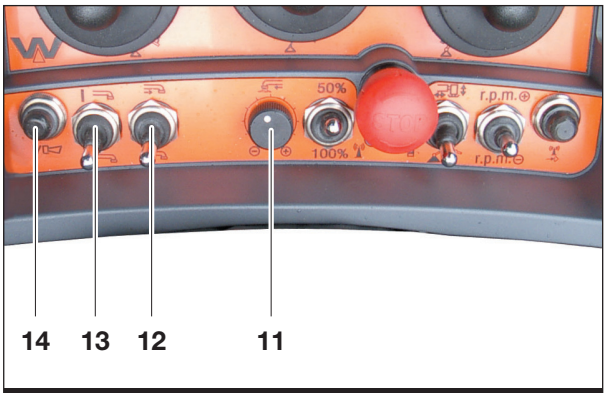


Fig. 7.22 Operation "Pump/Suck" (radio remote control)

NOTE:
Opening the safety grill or pressing an Emergency Stop button (whilst the "Pump/Suck" switch is activated), will deactivate the "Pump/Suck" function, which must then be restarted by switching the rocker switch (Item 13, Fig. 7.22) off and on again.

7.5.4 Back-up function for "Pump/Suck"

NOTE:
This function should only be switched on if the normal "Pump/Suck" controls are not operational!

7.5.4.1 Pumping with the control panel desk or via radio remote control/cable remote control

- Set the Back-up Pump control selector switch (Item 2, Fig. 5.7) to position "A or B"
  If the pump does not start (see trouble-shooting), back-up operation may be necessary in two possible fault situations:

Fault possibility 1: Defective sensors in the drive cylinder or oscillation cylinder

- Set the Back-up Pump control selector switch (Item 2, Fig. 5.7) to position “B”
- Set the pressure switch (Item 2, Fig. 7.23) to the anticipated pumping pressure (min. 60 bar, max. 280 bar)
- Set the key switch (Item 14, Fig. 7.21) to position “Desk“ or “Remote control“
- Switch on the “Pump/Suck“ function using rocker switch (Item 11, Fig. 7.21) or rocker switch (Item 13, Fig. 7.22)

NOTE:

☞ **If the pressure at the pressure switch is set too low, the stroke will be short and the S-valve may not swing over fully.**

☞ **If the pressure at the pressure switch is set too high, the pump can stop at the end of its travel.**

Fault possibility 2: Controller failure

- Set the Back-up Pump control selector switch (Item 2, Fig. 5.7) to position “A”
- Set the key switch (Item 14, Fig. 7.21) to position “Desk“ or “Remote control“
- Switch on the “Pump/Suck“ function using rocker switch (Item 11, Fig. 7.21) or rocker switch (Item 13, Fig. 7.22)

NOTE:

☞ **The stroke rate, the power control and switching speed do not function in setting “A“.**

☞ **The concrete delivery can only be changed via engine speed.**

☞ **A lower gear should generally be engaged on the vehicle gearbox.**

7.5.4.2 Pump control at the hydraulic control block

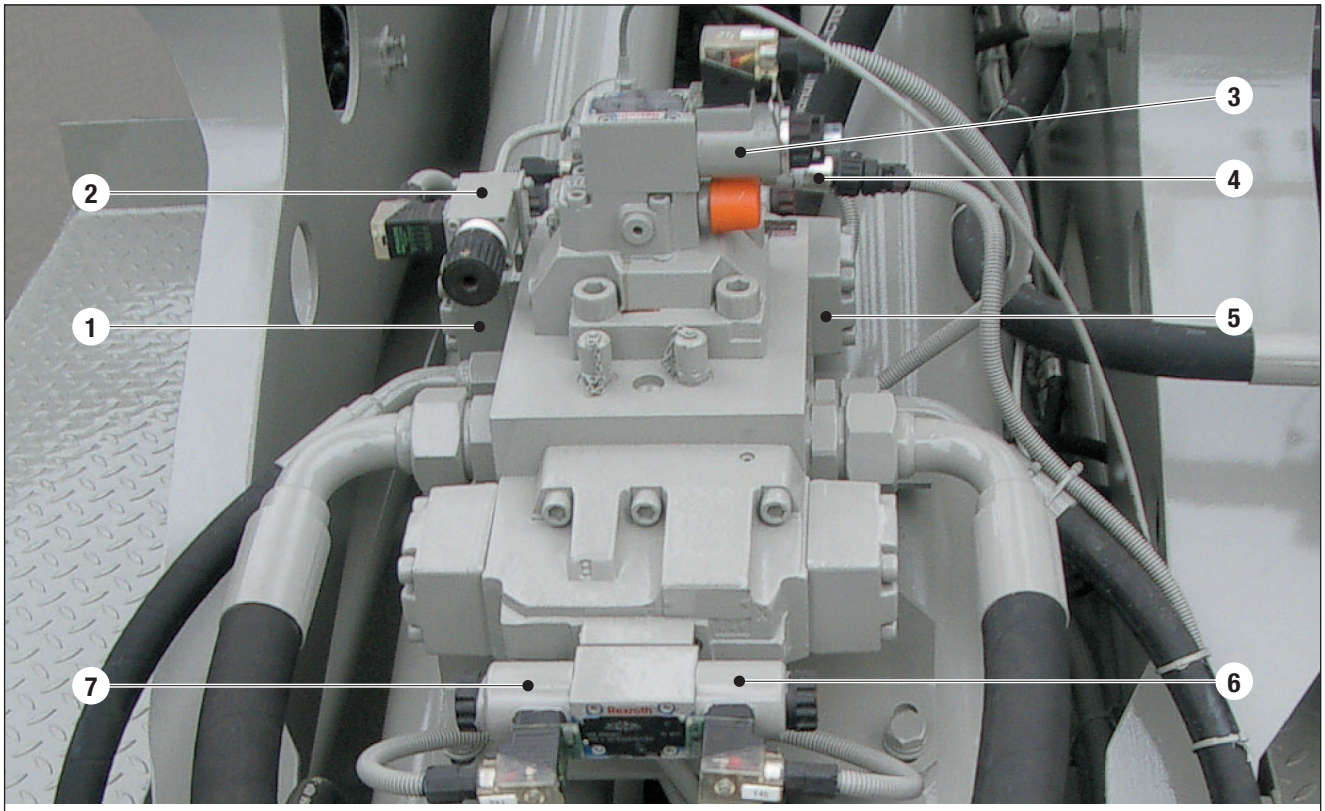
When controlling the valves manually, never run the engine at full speed.

WARNUNG

WARNING:
Valves and solenoids can be up to 100 °C temperature, risk of burns!

- Moving the drive cylinder
  Actuate Y4 a or b using a screwdriver (4 mm) or similar tool. Then press Y3 manually and move the drive cylinder to the desired position. Simultaneously releasing Y3 and Y4 will bring the cylinder to a halt.

- Moving the oscillation cylinder
  Actuate Y5 a or b using a screwdriver (4 mm) or similar tool. Then press Y3 manually and move the drive cylinder to the desired position. Simultaneously releasing Y3 and Y4 will bring the cylinder to a halt.



1 Valve Y5b
2 Push button
3 Valve Y3
4 Pressure sensor
5 Valve Y5a
6 Valve Y4a
7 Valve Y4b

Fig. 7.23 Pump hydraulic control block

7.5.5 Agitator

GEFAHR

DANGER:

☞ **During cleaning work the control lever (Item 5, Fig. 7.24) must always be in the 0 position and must on no account be moved during the cleaning work!**

☞ **When working in the hopper, keep the vehicle engine switched off at all times!**

The control lever “Agitator” (Item 5, Fig. 7.24) switches the agitator on (even when the Emergency Stop button has been pressed).
The agitator should always be set to move the concrete inwards to the centre – push the control lever to the right. Setting the agitator to move the concrete outwards (control lever to the left) should be done only for brief periods to relieve a blockage or the remix the concrete.

Opening the safety grill automatically stops the agitator.

The manometer Item 1, Fig. 7.24) shows the actual pressure at the agitator / water pump (optionally: high pressure water pump and compressor). The maximum pressure that can be set is 210 bar.

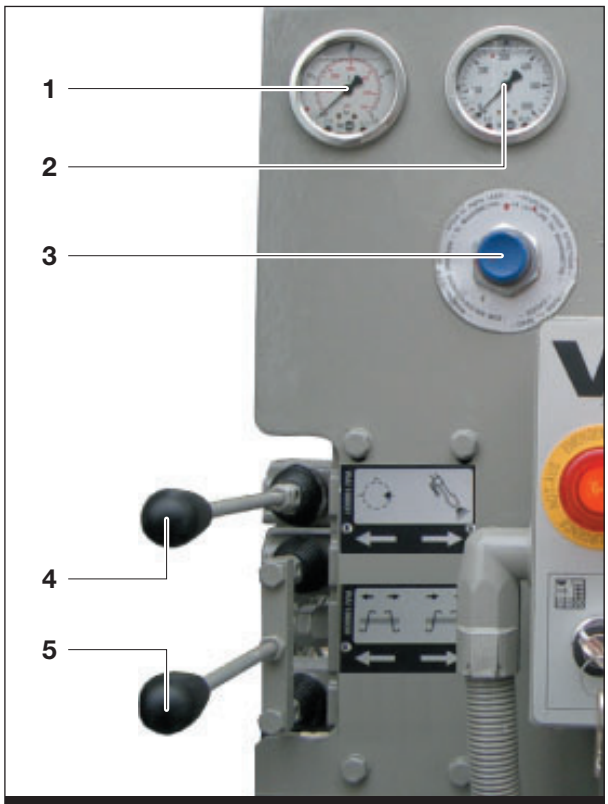


Fig. 7.24 Control panel Agitator / Water pump

7.5.6 Water pump

The control lever “Water pump” (Item 4, Fig. 7.24) switches the water pump on.

The manometer Item 1, Fig. 7.24) shows the actual pressure at the agitator / water pump (optionally: high pressure water pump and compressor). The maximum pressure that can be set is 210 bar.

NOTE:
When the agitator is switched on, the power of the water pump is reduced.

Option:
High pressure water pump or compressor, available as an option, are controlled by the same control lever (Item 4, Fig. 7.24).

7.5.7 Vibrator

The control lever “Vibrator” (Item 8, Fig. 7.24) switches the vibrator on.

Two operating modes are available:

MANUAL	=	Continuous operation
AUTO	=	The vibrator runs only when the pump is switched on.

Fig. 7.25 Control panel desk

7.5.8 Horn/Reset

Irrespective of the operating mode setting “Desk” or “Remote control” the horn can be sounded from any control panel using the rocker switch “Horn/Reset/Lubrication” (Item 6, Fig. 7.25).

If the Emergency Stop button has been pressed, provided all Emergency Stop buttons has been released, the controls will be switched on again (reset).

NOTE:
If the operating mode selector switch (Item 14, Fig. 7.25) is set to “Remote control”, the Emergency Stop button on the Remotecontrol pendant(radio or cable)must be released.

7.5.9 Light

The light switch (Item 7, Fig. 7.25) switches all operating lights on, including the outrigger feet lighting (optional) and working area floodlights.
The lighting around the outrigger feet is permanently switched on. It needs only be plugged into the appropriate socket on the outrigger foot.

7.5.10 Concrete pump manometer

By-passing or blocking the manometer protection valve (Item 3, Fig. 7.24) the actual pump pressure is shown at the manometer (Item 2, Fig. 7.24). At 320 bar the hydraulic pump has switched to “0”. The probable cause is a blockage in the conveying pipe.

7.5.10.1 Distributor boom manometer

The manometer (Item 1, Fig. 7.26) shows the actual pressure at the distributor boom.

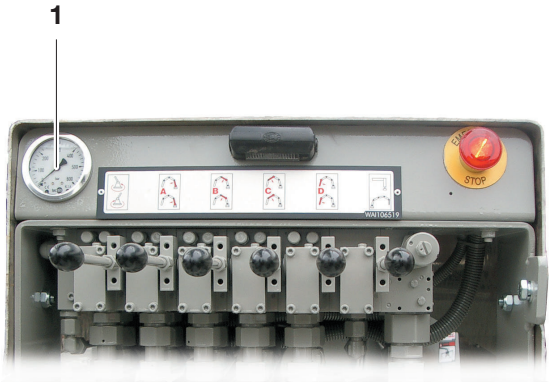


Fig. 7.26 Boom control block

7.5.10.2 Filter clogging display

The display instrument (Item 1, Fig. 7.27) shows the degree of clogging of the return flow filter. If when the hydraulic oil is at operating temperature the needle is in the red zone, the filter element must be changed immediately.

The display instrument (Item 2, Fig. 7.27) shows the degree of clogging of the in-line filter. If the needle indicates 3 bar, the filter cartridge must be changed.

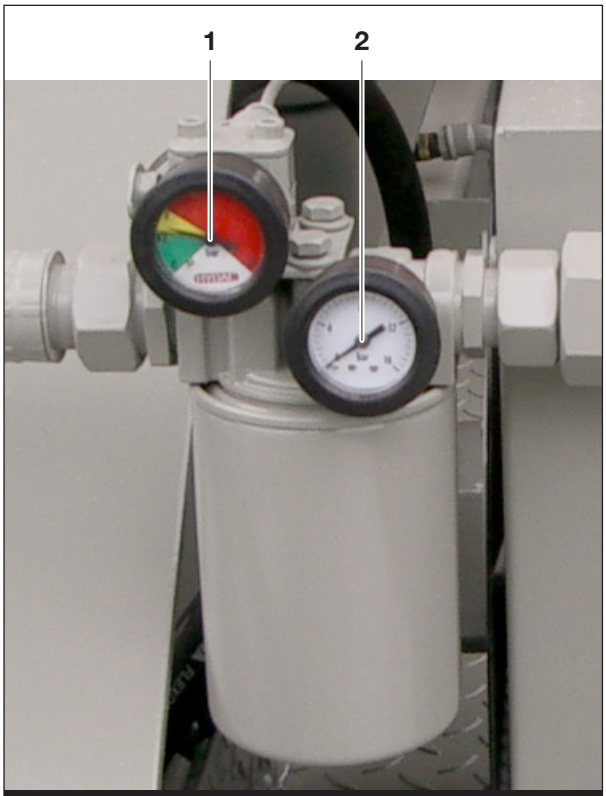


Fig. 7.27 Filter clogging indicator

7.5.10.3 Manometer for transfer shift gearbox

VORSICHT

CAUTION:

- ☞ **If the pressure is set too low, the transfer shift gearbox cannot change gear.**
- ☞ **If the pressure is set too low, the gearbox will be damaged.**

Maximum pressure 5 bar, see manometer (Item 1, Fig. 7.28).

Pull and twist the rotary controller (Item 2, Fig. 7.28) to adjust the pressure.

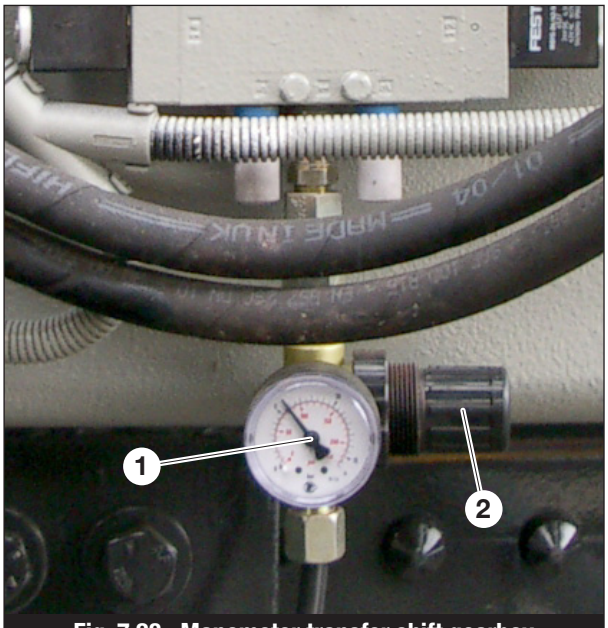


Fig. 7.28 Manometer transfer shift gearbox

7.6 Instructions for pump operation

NOTE:
The maximum conveying pressure must not exceed the pressure listed on the serial plate or in the test book.

- Mix the concrete in the mixer truck at full power and the highest speed, and check that the concrete is evenly mixed. After addition of concrete additives (accelerant, retardant) continue to mix for a further 4 minutes on site.

7.6.1 Instructions for pumping

- Immediately before starting pumping, with the agitator running, fill the hopper with several buckets of thin watery concrete, and send through two sponge balls in advance. Pump slowly, until a full stream of concrete emerges from the discharge hose.
- If the conveying pipework is short and clean, immediately before starting pumping, with the agitator running, fill the hopper with several buckets of laitance (cement-water mixture), and send through two sponge balls in advance, so that the laitance wets the whole periphery of the pipework. Pump slowly, until a full stream of concrete emerges from the discharge hose.
- For newer and longer conveying pipework the frictional resistance is greater, so make sure you pump sufficient laitance through.
- Fill the hopper with concrete from the silo or the mixer truck and keep pumping with the concrete pump.

NOTE:
If the pipework is rusted on the inside (high conveying resistance), do not increase the conveying quantity until you have pumped several m^3 continuously.

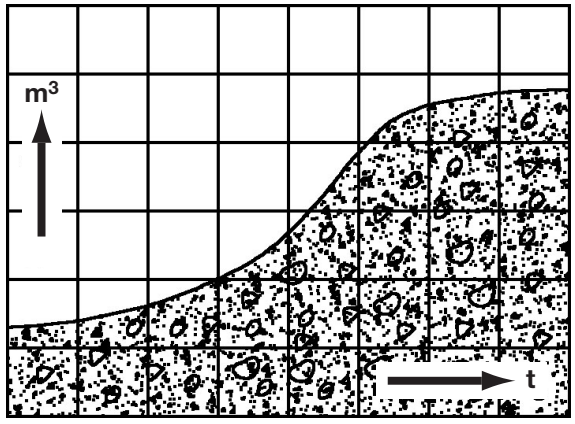


Fig. 7.29 Conveying quantity diagram

- If a blockage occurs, immediately pump the concrete back into the hopper and mix it. Only switch over to forward conveying when the conveying cylinder and transfer tube are correctly switching over automatically. Carefully start pumping through again.

7.6.1.1 Causes of blockages

- Laitance too thin or with insufficient cement
- Insufficient laitance used
- S-valve leaking (wear plate worn and ring too large: replace the parts)
- Leaking pipework (concrete bleeds out)
- Set concrete residues in the transfer tube or conveying pipes
- Unsuitable concrete composition

7.6.2 General instructions for pumping

- Whilst pumping, be sure not to draw any air in, since compressed air can emerge violently at the discharge hose, causing concrete to spray out. Therefore keep the hopper filled at least up to the level of the agitator shaft.
- When pumping, keep the agitator running.
- Avoid long pauses during which no concrete is pumped.

During pauses in pumping the concrete, observe the following points:

- Do not leave the conveying pipework under pressure
- Depressurise the conveying pipework by briefly reversing the pump
- Keep the concrete moving by briefly pumping through and back
- If there is a long pause in pumping, pump the concrete back into the hopper and mix it again before pumping it through the conveying pipework.

If the distributor boom whips around, determine the cause of this.

The following causes may lead to this:

- The outriggers may have moved – repeat the outrigger set-up procedure, see section 7.3.4

WARNING: Before restarting, determine the reason why the outriggers had moved.

- The pump speed is too high, reduce the pump speed
- The distribution boom is badly positioned, move the distribution boom to a better position
  Example of a badly positioned distribution boom: Boom fully extended, element 4 vertical

7.6.3 Instructions for pumping (depending on the material to be pumped)

NOTE:
☞ **Only ever use pumpable concrete!**
☞ **If you are unsure, contact the concrete manufacturer.**

- If pumping concrete that is hard to pump, the agitator shaft should be visible at all times!
  Difficult concrete (extremely stiff, low-sand mixtures, light-weight concrete etc.) will pump better when the hopper is filled only to the lower edge of the agitator shaft. This procedure means that air will be drawn by the concrete pump into the conveying cylinder and the concrete will be conveyed in air plug mode. Caution, blockages may occur!
- The pressure should be relieved in the conveying pipework by brief reversal of the pump (2-3 strokes) during pauses in conveying. Frequently pump back and forwards. Never allow the conveying pipework to stand under pressure.
- If the concrete is very fluid, with a high proportion of large gravel, and tends to bleed from the conveying pipework, always pump out into the hopper during pauses in pumping.
- During longer pauses pump the concrete back into the hopper, mix it and pump it through again.
- During longer pauses in pumping, switch off the drive engine, so that its vibrations do not cause the concrete to separate out. At intervals of 10-15 minutes, pump the concrete back and forth.
- Never force concrete that has separated out, or concrete that is lumpy because it is beginning to set, through the conveying pipework.
- Especially with concrete that has a low capacity for retaining water (tendency to bleed) avoid pauses when working at high throughputs, and when restarting conveying be sure to let the pump run long enough for the transfer tubes on both sides to be filled. Only then switch over to forwards conveying again.
- Air inclusions in the conveying pipework can be hazardous, since compressed air can emerge violently at the discharge hose, causing concrete to spray out explosively.
  Air inclusions occur particular when pumping through by sucking in air when the hopper is insufficiently filled with concrete and when the conveying pipework has been extended.
- The characteristics of the concrete must not be changed in any way.

7.6.4 Instructions for pumping (depending on the machine)

- The max. running speed of the diesel engine must under no circumstances be exceeded, since otherwise the hydraulic pump will overspeed. The permissible speeds can be found on the machine data sheet.

- Pay attention if the piston strokes are shortened and if necessary take action to counteract this (see Chapter 8 “Trouble-shooting”).

- If during continuous operation under heavy loading the oil temperature exceeds 80 °C, the indicator lamp will light (Item 4, Fig. 5.2). Immediately top up the water tank with cold water.

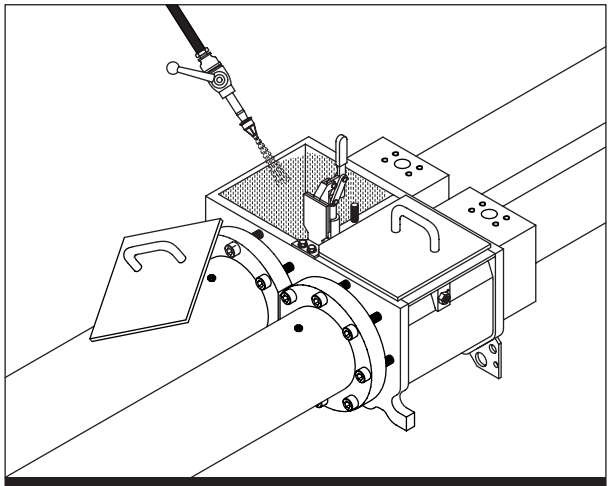


Fig. 7.30 Water in the wash-out tank

- After periods of heavy loading of the engine, never just switch it off, allow it to idle and cool down, at a diesel engine speed of approx. 1,000 rpm. This is particularly important for turbo diesel engines.

- Set the engine speed to more than the minimum speed (500-700 rpm).

- Damage due to operator error is not covered by the **WAITZINGER** warranty.

- If the temperature continues to rise, change the water continuously. Discover the cause of the overheating and rectify it. If the oil temperature rises above 40 °C the thermostatically controlled fan under the master control block will cut in.

- Under no circumstances spray the oil tank with water. This usually leads to a build-up of condensate water and damage to the hydraulic pump.
  If the cooling measures are insufficient, direct a water jet on to the drive cylinder (hydraulic cylinder) as shown here.

All pumps have a thermo-electric cut-out. If the oil temperature exceeds 80 °C the pump will be switched off automatically and the red indicator lamp on the control cabinet or control desk (Item 4, Fig. 5.2) will light up.

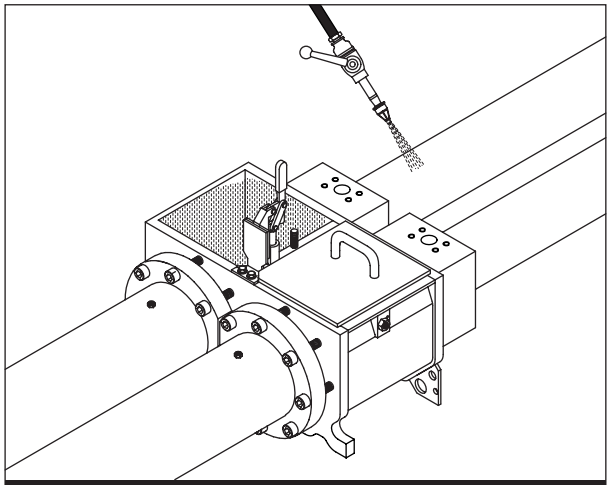


Fig. 7.31 Water on the drive cylinder

7.6.4.1 Measures to reduce the oil temperature

- Switch the pump to the “OFF” (**11**) position. The indicator lamp “Control System ON” (**3**) on the control panel will go out.
- Do not switch the engine off, the oil cooler must remain in operation.
- Renew the water in the water tank.
- When the red indicator lamp “Temperature” (**4**) has gone out, switch the pump on again. Continue to pump but at a lower power.
- When pumping is complete, establish the cause for the oil overheating and rectify it.
- The temperature sensor for the thermo-electric cutout is located in the hydraulic oil tank.

Fig. 7.32 Control panel desk

7.7 Cleaning the conveying pipework

7.7.1 General

- Do not use any aggressive cleaning additives for cleaning the conveying pipework
- Put the remote control pendants in a dry place.
- Follow the directions of the vehicle manufacturer
- Dispose of the cleaning materials according to regulations

7.7.2 Suction cleaning

- Pump out the agitator hopper down to the upper edge of the agitator shaft, then switch the pump off.
- Push a wetted cleaning sponge (cube) into the outlet of the discharge hose.
- Pull the cleaning sponge back through the boom by operating the pump in “reverse feed”; strike the conveying pipework with light hammer blows until the cleaning sponge has passed that point (the hollow ring is recognisable).

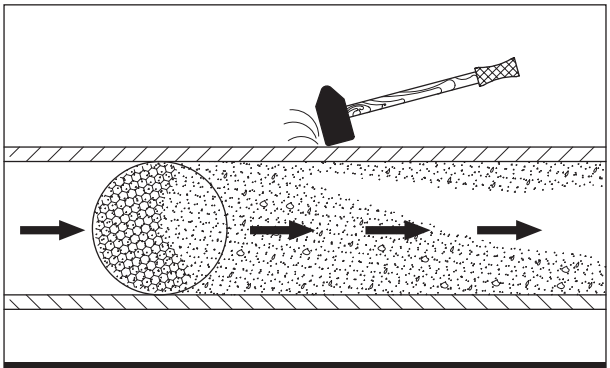


Fig. 7.33 cleaning sponge in suction cleaning

- Switch off the pump.
- Open the hinged base and retrieve the sponge.
- On long conveying pipework runs, repeat the cleaning process. One back suction run is not enough!
- If the protective grill has a safety cut-out, agitator and S-valve come to a halt as soon as the protective grill is opened. When cleaning, briefly shut the protective grill, let the pump run through one cycle, open the protective grill again. A protective grill that is bolted in position remains in position throughout cleaning.
- Remove any remaining material by opening the cleaning valve. Carefully spray the S-valve, hopper, conveying cylinder and water tank until they are clean. Clean the rest of the machine and spray it with formwork release oil.
- If there is a risk of frost, drain the wash-out tank, water tank and water pump. The wash-out tank should also be drained at normal temperatures during long pauses in pumping, overnight and at weekends.

7.7.3 Cleaning with pressurised water.

Cleaning the machine with pressurised water is a method well proven in practice.

- Empty the hopper as far as possible.
- Switch the pump to “Suck” mode using rocker switch (Item 11, Fig. 7.32) and pump 1 or 2 strokes to depressurise the conveying pipework.
- Switch off the pump.
- Drain out the remaining material by opening the cleaning valve, see section 7.7.4. When conveying upwards, close the blocking slide and open the cleaning port in the rising pipe.
- Switch the pump on again, in “Suck” mode, and carefully wash down the conveying pipe with the spray jet, working through the cleaning port. Take care that the hose is not cut through when the S-valve operates. Keep spraying the conveyor pipework until clear water emerges from the conveying cylinders.
- Switch off the pump.
- Clean the hopper and all the parts that come in contact with the material with the spray hose also.

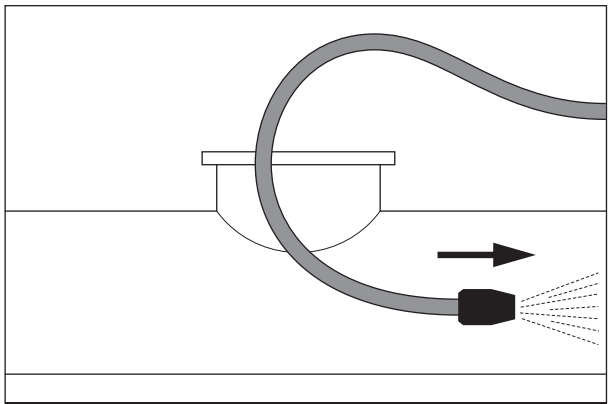


Fig. 7.34 Cleaning with water hose

- Push 2 or 3 cleaning sponges soaked with water into the cleaning port and the seal the cleaning port tightly.
- Close the cleaning valve and fill the hopper with water.
- Switch the pump on again, in “Suck” mode. Push the material in the conveying pipework forwards to the discharge.
  If a single filling of the hopper is insufficient for a long pipe run, switch the pump off before air is drawn in, and fill the hopper again with water. Then continue with the discharge of the material until the cleaning sponges emerge from the discharge hose.
- Take care that the water flowing from the discharge hose does not flow into the formwork.

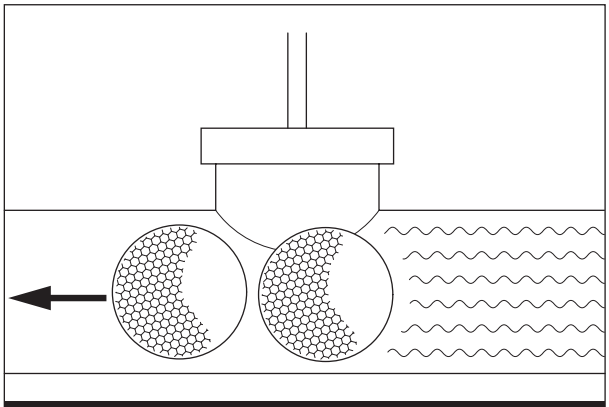


Fig. 7.35 Cleaning with sponges

- Suck the water back into the hopper by reversing the pump.
- If the protective grill has a safety cut-out, agitator and S-valve come to a halt as soon as the protective grill is opened. When cleaning, briefly shut the protective grill, let the pump run through one cycle, open the protective grill again. A protective grill that is bolted in position remains in position throughout cleaning.
- Remove the remaining water by opening the cleaning valve. Carefully spray the S-valve, hopper, conveying cylinder and wash-out tank until they are clean.
- Clean the rest of the machine also, and spray it with formwork release oil.

See further information in the separate documentation supplied by the manufacturer.

NOTE:

If there is a risk of frost, drain the wash-out tank, water tank and water pump. The wash-out tank should also be drained at normal temperatures during long pauses in pumping, overnight and at weekends.

7.7.4 Draining the remaining concrete

The remaining concrete can be drained through the drain valve under the hopper.

- Strike the cover (Item 1, Fig. 7.36) of the drain valve lightly with a hammer to open it. If the cover is too slack or too stiff, adjust the clamping screws (Item 2, Fig. 7.36).
- Collect the remaining concrete in a suitable container or on plastic sheeting, for reprocessing or disposal.
- Observe the safety instructions set out the Chapter 2 “Safety instructions”.

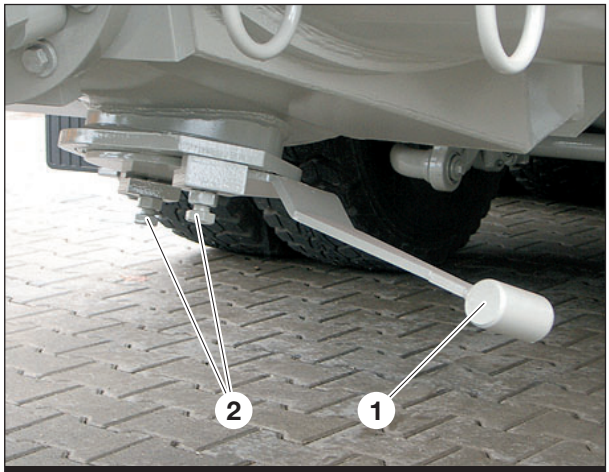


Fig. 7.36 Surplus concrete discharge opening

7.8 Water tank

7.8.1 Filling up / topping up with water by removing the cover

- Close all ball valves.
- Unscrew the cover (**1**) on the rear outrigger.
- Fill with water of a suitable quality (clean water without foreign bodies such as sand).
- Watch the water level indicator (**2**).
- Screw the cover back in place.

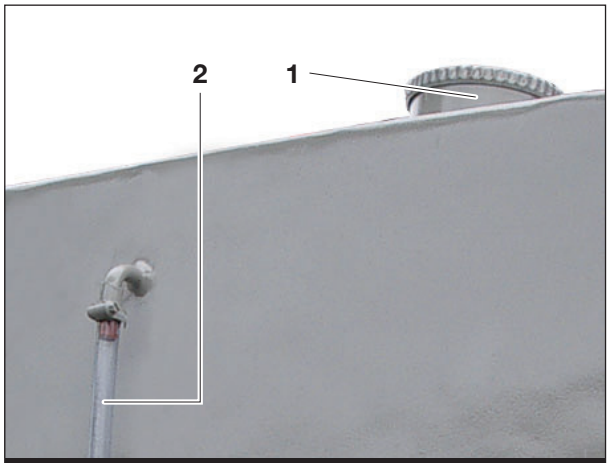


Fig. 7.37 Fill up with water by removing the cover

7.8.2 Filling with water using the C-coupling

- Connect the water hose to the C-coupling (Item 1, Fig. 7.38).
- Open the ball valve (Item 2, Fig. 7.38)
- Start filling with water; watch the water sight hose (Item 2, Fig. 7.37).
- Keep filling with water until water emerges from the filler opening.

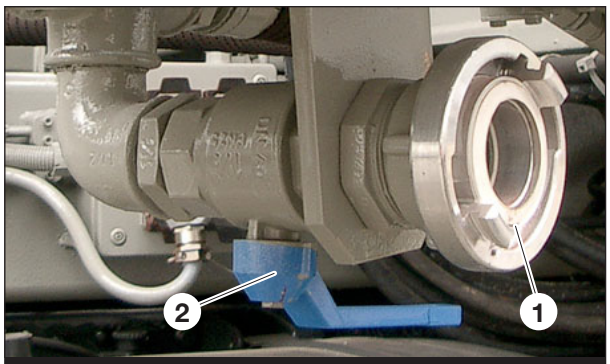


Fig. 7.38 Fill with water using the C-coupling

7.8.3 Filling with water from the mixer truck

- Connect the water hose to the Geka-coupling (Item 1, Fig. 7.39).
- Open the ball valve (Item 2, Fig. 7.39)
- Start filling with water; watch the water sight hose (Item 2, Fig. 7.37).
- Keep filling with water until water emerges from the filler opening.

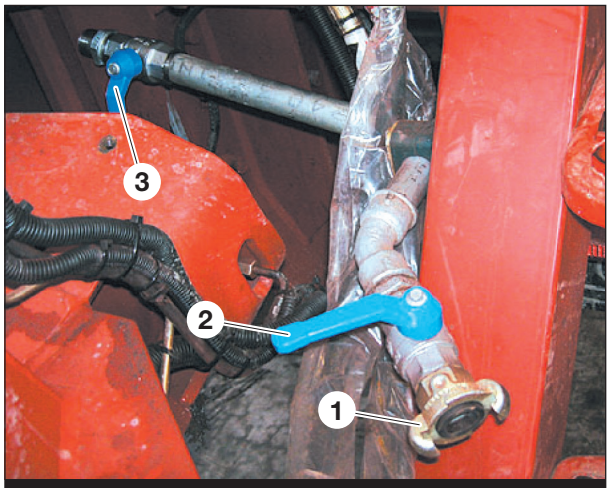


Fig. 7.39 Fill with water from the mixer truck

7.8.4 Operation in winter

- The machine must be standing level; level the machine using the circular levels (Item 1, Fig. 5.5 and Item 3, Fig. 5.6).
- Completely drain all water by opening all ball valves (Item 2, Fig. 7.38 and Item 2, Fig. 7.39).
- Drain the wash-out tank

8. Troubleshooting

8.1 General information

The actions described in this chapter for trouble-shooting should be employed if during operation deviations from normal performance are found.
Trouble-shooting should be performed based on the following table.
Only skilled technical staff should investigate the causes of faults and implement measures to rectify the fault.

If the fault cannot be rectified, contact **WAITZINGER** customer service.

8.2 Tracing faults

Fault	Cause	Remedy
Gearbox does not shift to “Pump position”.	Vehicle ignition not switched on.	Switch on the ignition.
	Clutch was not disengaged.	Disengage the clutch and engage the required gear.
	Pressure in vehicle compressed air system too low.	Allow the engine to run until It has built up sufficient pressure.
	Pneumatic valve iced up.	De-ice the muffler on the pneumatic valve.
	Solenoid on pneumatic valve defective.	Check solenoids and wiring. The valve can also be actuated with a screwdriver.
	Fuse in vehicle blown.	Establish cause and rectify it. Replace fuse
No indicator lamps lit on the controls (green LED on desk, and Emergency Stop not illuminated)	Vehicle ignition not switched on.	Switch on the ignition.
	Gearbox in driving position.	Change the gearbox over.
	Gearbox limit switch defective.	Replace gearbox limit switch. (Short-term remedy: Bridge the two contacts on the plug).
	Main fuse (battery) or fuse F1/F2 blown.	Establish cause and rectify it. Replace fuses.

Fault	Cause	Remedy
Emergency Stop indicator lamp flashing.	Emergency Stop button has been pressed.	Establish why the Emergency Stop button was pressed and remedy the cause. Release the Emergency Stop and restart the controls with the horn, see section 7.2.2.
	Selector switch set to remote	Release remote control Emergency control.Stop, or change over the selector switch on the desk, and start the controls with the horn.
	Broken cable or defective Emergency Stop switch	Have fault rectified by **WAITZINGER** customer service.
Pumping or sucking does not start, no pressure available.	Selector switch in position “Desk”. “Remote control”, operate horn.	Move selector switch to position
	Grill open.	Close grill. Check limit switch.
	“Pump ON” was selected when the controls were switched on using the horn.	Switch the pump off and restart it.
	Engine not running.	Start the engine.
	Vehicle gearbox in neutral.	Select a gear, see section 7.2.1.
	Stroke rate potentiometer at “0”.	Set a higher value, see section 7.2.1.
	Emergency Stop button has been pressed.	Establish why the Emergency Stop button was pressed and remedy the cause. Release the Emergency Stop and restart the controls with the horn, see section 7.2.2.
	Hydraulic oil too hot.	Let the hydraulic system cool down, see section 7.6.4.
	Spool valve defective.	Check valve and solenoid, and have fault rectified if necessary by **WAITZINGER** customer service.

Fault	Cause	Remedy
	Pressure relief valve defective.	Check valve and solenoid, and have part replaced if necessary by **WAITZINGER** customer service.
	Controls defective.	Check fuses F9 to F12. and replace if necessary. Set back-up function to position “A”.
		Immediately on finishing work have the fault rectified by **WAITZINGER** customer service.
Pumping or sucking does not at maximum pressure.	Blockage in the conveying pipework.	Suck back and establish the cause of the blockage, see section 7.6.1.1.
	Defective sensor on drive cylinder.	Set back-up function to position “B”. Replace the defective sensor at the earliest opportunity.
	Spool valve defective.	Check valve and solenoid, and have fault rectified if necessary by **WAITZINGER** customer service.
Concrete delivery from the pump is too little or is irregular.	Incorrect gear or stage engaged in the vehicle gearbox.	Engage the correct gear.
	Vehicle engine speed too low.	Increase the speed. Check the settings.
	Concrete pump sucking in air.	Inform the mixer truck driver the hopper must always be filled up to the agitator shaft at least, see section 7.6.2. Check the conveying piston for wear.
	Concrete mixture unsuitable for pumping.	Use only “pumping concrete”, see section 7.6.3.

Fault	Cause	Remedy
	Incorrect settings in the controls.	Have the settings checked by Seek advice from **WAITZINGER** customer service.
	S-valve stiff.	Check S-valve settings, check wear plate and ring for heavy wear or fracture, and check the S-valve bearings.
Concrete pump short strokes.	Back-up function B switched on.	Switch offrotary switch (Item 2, Fig. 5.7). Switch on the pressure switch, see section 7.5.4.
	Piston rings in drive cylinder worn.	
Outrigger does not extend.	Incorrect switch setting.	Set selector switch (Item 14, Fig. 5.2) to position “Desk” or set remote control (Item 8, Fig. 5.12) to position “Outriggers”.
	Safety switch on the outrigger has not been pressed.	Set safety switch (Item 3, Fig. 5.5) or Item 1, Fig. 5.6).
	Engine not running.	Start the engine.
	Vehicle gearbox in neutral.	Select a gear, see section 7.2.1.
	Pre-selector valve not actuated.	Check solenoid and wiring. Actuate the pre-selector valve “Outrigger”manually. Seek advice from **WAITZINGER** customer service on this point.
	Pressure setting too low at the outrigger valve.	Check pressure setting shown on the data sheet, adjust it if necessary.Clean the pressure relief valve. Seek advice from **WAITZINGER** customer service on this point.
	Outrigger catch does not open.	Lubricate the outrigger catch, if necessary disassemble it and clean it, replace the seals and deburr the edges. Seek advice from **WAITZINGER**customer service on this point.

Fault	Cause	Remedy
The outrigger moves of its own accord.	Releasable non-return valve dirty.	Have valve cleaned or replaced by WAITZINGER customer service.
	Cylinder seal worn.	Have seal replaced by **WAITZINGER** customer service.
	Cylinder distorted by over-pressure.	Check valves for operation. Replace the cylinder. Seek advice from WAITZINGER customer service on this point.
The boom will not move.	Incorrect switch setting.	Set selector switch (Item 14, Fig. 5.2) to position “Remote control” or set remote control (Item 8, Fig. 5.12) to position “Boom”.
	Engine not running.	Start the engine.
	Vehicle gearbox in neutral.	Select a gear, see section 7.2.1.
	Emergency Stop button has been pressed.	Establish why the Emergency Stop button was pressed and remedy the cause. Release the Emergency Stop and restart the controls with the horn, see section 7.2.2.
	Radio remote control not operational.	Check transmitter battery charge Restart the radio remote control (horn). Change the frequency. Use cable remote control instead.
	Pre-selector valve not actuated.	Check solenoid and wiring. Operate pre-selector valve manually. Seek advice from **WAITZINGER** customer service on this point.
	Insufficient hydraulic oil.	Stop engine immediately and top up with hydraulic oil.
		WARNING: The boom cylinder must be bled. Seek advice from **WAITZINGER** customer services on this point.

Fault	Cause	Remedy
	Dirt in the hydraulic system.	Change the filter and have **WAITZINGER** customer service clean out the entire system.
	Nozzle in “Load sensing pipe” closed (from 42 m boom).	Have nozzle cleaned by **WAITZINGER** customer service.
The boom will moves only slowly.	The “50/100%” switch is in the “50%” position.	Set the switch (Item 10, Fig. 5.12) to the “100%” position.
	Incorrect valves settings.	Have the settings checked by **WAITZINGER** customer service.
	Incorrect gear or stage engaged in the vehicle gearbox.	Engage the correct gear, see section 7.2.1.
	Check pressure setting at the boom the data sheet, adjust as necessary.	Check pressure setting shown on block is too low. Clean the pressure relief valve. Seek advice from **WAITZINGER** customer service on this point.
	Hydraulic pump defective.	Have pump replaced by **WAITZINGER** customer servi
Individual boom movements or replaced by do not operate.	Solenoids in the boom control block defective.	Have solenoids and wiring checked Seek advice from **WAITZINGER** customer service.
Element A does not rise.	Sensor on the boom mount is activated.	Have sensor replaced by **WAITZINGER** customer service.
Slewing not operational.	Boom is at the limit of travel.	Slew it in the opposite direction.
	Boom “Slew” limit switch or solenoid at the boom control block defective (from 42 m boom).	Have the limit switch or solenoid replaced by **WAITZINGER** customer service.
The boom moves although no no element is activated.	Dirt in the load retention valve.	Clean the load retention valve at the boom cylinder. Set the pressures to the data sheet values. If necessary, replace the valves. Seek advice from **WAITZINGER** customer service on this point.

Fault	Cause	Remedy
	Seal in boom cylinder worn.	Have seal replaced by **WAITZINGER** customer service.
	Book cylinder distorted by excessive pressure.	Rectify the cause and replace the cylinder. Seek advice from **WAITZINGER** customer service on this point.
”Slew” operation too slow, or or does not move.	Pressure setting too low.	Check pressure setting to data sheet, and adjust. Clean the pressure relief valve. Seek advice from **WAITZINGER** customer service on this point.
	Machine inclination too great.	Reduce the inclination, see section 7.3.4.
	Ball bearing slewing rim insufficiently lubricated.	Lubricate the ball bearing slewing rim.
	Slewing motor worn.	Have motor replaced by **WAITZINGER** customer service.
The boom slews although “Slew” not activated.	Brake in slewing drive worn	Have the brake linings replaced by **WAITZINGER** customer service.
Agitator does not operate.	Grill open.	Close grill.
	Water pump also running.	Switch off the water pump.
	Concrete too stiff, or setting in the hopper.	Empty the hopper and clean it.
	Pressure setting at the agitator control block is too low.	Check pressure setting to data sheet, adjust as necessary. Clean the pressure relief valve. Seek advice from **WAITZINGER** customer service on this point.
Water pump does not operate.	Water tank empty.	Fill up with water.
	Agitator switched on.	Switch the agitator off using the control lever (Item 5, Fig. 5.3)

Fault	Cause	Remedy
	Pressure setting at the agitator control block is too low.	Check pressure setting to data sheet, adjust as necessary. Clean the pressure relief valve. Seek advice from **WAITZINGER** customer service on this point.
	Dirt in the water pump.	Disassemble the water pump and clean it. See separate user manual from the manufacturer.
	Axial play in the pump shaft incorrect.	Undo the coupling and adjust to the mid value.
Lubrication system does not operate.	Fuse blown.	Replace fuse
	Pump switched off.	Switch the pump on.
	Grease too stiff.	Replace grease with suitable grease, see Figure 9.5.
	Lubrication point blocked.	Clear the blockage at the lubrication point.
	Lubrication distributor blocked.	Replace the grease up to the lubrication distributor and replace the lubrication distributor
	Pump impeller defective.	Replace pump impeller.

9. Maintenance & Inspection

9.1 General information

The truck-mounted concrete pump must be thoroughly cleaned, maintained and inspected at regular intervals. All parts of the machine should be checked that they are in good condition and safe working order. The maintenance actions are listed in the Maintenance Schedule, section 9.4.

WARNING:

☞ **Maintenance and inspection work must always be carried out when the truck-mounted concrete pump is stopped and switched off.**

☞ **The adjacent notice must be placed in a suitable place where it is easily visible.**

DANGER:

Work on the hydraulics, pneumatics, electrics and electronics must only be performed by suitably trained skilled staff.

Further information on the truck part of the vehicle can be found in the separate vehicle manufacturer's user manual.

9.2 Safety instructions for maintenance and inspection

☞ Maintenance and inspection of the truck-mounted concrete pump must only be carried out by authorised staff.

☞ Repair work must only be carried out by authorised skilled staff or service personnel of the manufacturer.

☞ Maintenance and inspection work must be carried out precisely in accordance with the specifications and instructions in this maintenance section.

☞ Make sure that the user manual for the truck-mounted concrete pump, the maintenance and special tools and fixtures for it, the oilcans and grease guns for lubrication and the cleaning and lubrication media are always kept in the places provided for them.

☞ Used cleaning materials must be removed from the truck-mounted concrete pump and placed in a specially designated container (fire hazard!). The use of highly flammable materials (e.g. petrol) is prohibited - VBG 1 § 43 and 44!

NOTE:

☞ **Consumables such as gearbox oil used during maintenance, repair and oil change should be collected in suitable containers and disposed of in accordance with regulations (to EC directive 75/439/EWG and statutory instruments under §§ 5a, 5b AbfG and AltölV).**

☞ Electrical control equipment, resistors and contactors should be kept clean and cleaned as required.

☞ Check electrical cables for damage to the insulation.

☞ Check mechanical components for wear, deformation, crushing, cracks, breakage, corrosion and secure mounting.

☞ Regularly check all pipes, hoses and screwed connections for leaktightness and for externally evident damage.

☞ Fluids which emerge at high pressure can be hazardous.

9.2.1 Lubricants and solvents

WARNING:

☞ **As far as possible, avoid allowing lubricants and solvents to contact the skin.**

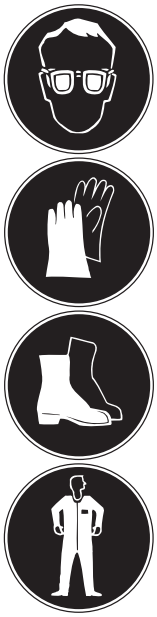
☞ **Store fluids, especially hydraulic oils and also engine oils, lubricants and liquefied or compressed gaseous products, only in the containers legally prescribed for them.**

☞ **These should carry appropriate warning notices identifying their contents.**

☞ **Comply with all warning notices.**

☞ **When handling these materials wear protective clothing at all times (skin, eyes, hand and foot protection).**

☞ **Used protective clothing must be placed in sealed plastic sacks after wearing.**



9.2.2 Sealing rings (containing fluorine)

WARNING:

- ☞ Always wear protective clothing when removing the remains of sealing rings.
- ☞ Fluorine is contained in Viton sealing rings, O-rings and flat gaskets.
- ☞ Under normal conditions of use, Viton seals and O-rings are safe to use. However at temperatures in excess of 400 °C they decompose, e.g. if equipment catches fire.
- ☞ The remains of such seals are then extremely aggressive and generally cannot be removed from the skin.

9.2.3 Oils and greases

WARNING:

- ☞ Allergic reactions can arise when handling oils and greases.
- ☞ Use barrier creams and avoid all contact with the skin.
- ☞ Never wash your hands in oil.
- ☞ Hydraulic oil emerging at high pressure can penetrate the skin and cause severe injuries.
- ☞ To avoid severe infections, call a doctor immediately.
- ☞ Dispose of oils and filters in accordance with statutory regulations.
- ☞ Never pour lubricating oil down the public drains.

9.2.4 Paints, varnishes and thinners

☞ These materials are highly inflammable when applied as sprays and mists.

☞ Thinners vapours are heavier than air and create an extremely high explosion hazard.

WARNING:

- ☞ **Materials soaked in paint, varnish or thinners can ignite spontaneously if they are carelessly thrown into a rubbish bin.**
- ☞ **Do not breathe in paint or thinners mists.**
- ☞ **When painting, ensure good ventilation and never smoke.**
- ☞ **When spraying paint always wear a close-fitting face mask.**
- ☞ **Never allow petrol or paraffin to come into contact with rubber components. Contamination of rubber components with these materials causes them to swell and soften, leading to failure.**
- ☞ **When working with paraffin or petrol, naked flames and smoking are prohibited.**

9.2.5 Glues, adhesives and solvents

☞ Some vapours from these materials are flammable and/or poisonous if breathed in.

☞ Even gases which are not themselves flammable can decompose at high temperatures and release poisonous gases, e.g. when drawn through the glowing tip of a cigarette.

☞ Thus the same safety instructions apply as for paraffin and petrol.

9.2.6 Battery acid

WARNING:

- ☞ **Battery fluid contains aggressive sulphuric acid. Always wear protective clothing and protective gloves. Handle batteries with care.**
- ☞ **If any battery acid splashes on to the skin, wash it off immediately with clean water.**
- ☞ **If any battery acid splashes on to the eye, wash it out immediately with clean water. Then immediately summon a doctor.**
- ☞ **Because of the risk of an explosion, keep sparks and naked flames away from batteries. Battery acid can catch fire.**

9.2.7 Safety precautions when charging batteries

WARNUNG

WARNING:

- ☞ Around batteries there is an explosion hazard due to short circuits, sparks or naked flames.
- ☞ Batteries on charge release explosive gas.
- ☞ Switch off the charging power before disconnecting the charging lead plug.
- ☞ When charging in enclosed spaces, ensure good ventilation.
- ☞ Continue to ventilate the room up until an hour after completing the charge.
- ☞ No smoking!.
- ☞ Do not place tools on the battery.
- ☞ Disconnect the battery terminals before working on the electrical system.
- ☞ Electric arcs can be life- threatening and cause fires!
- ☞ Do not place anything metallic on the battery.
- ☞ Sulphuric acid is corrosive.
- ☞ When working on the battery always wear safety glasses and protective gloves!
- ☞ Battery fluid contains sulphuric acid.
- ☞ Remove splashes from the skin immediately with soap and water.
- ☞ Immediately summon a doctor is acid splashes the eyes or mucous membranes.

9.2.8 Safety instructions for welding work

VORSICHT

CAUTION:

- ☞ Whenever carrying out welding work on the truck-mounted concrete pump, disconnect the battery and unplug all electrical control equipment!
- ☞ Attach the earth connection immediately adjacent to the welding location!

In addition, observe all safety instructions set out in Chapter 2 Safety Instructions!

9.3 Tightening torques for screw connections

The following values apply to tightening torques for machine screws to DIN 912, 931 and 934 based on a friction factor of μ = 1.25 (lightly oiled).

Thread Ø	Tightening torque M_D [Nm] 8.8	Tightening torque M_D [Nm] 10.9
M8	23	32
M10	46	64
M12	80	110
M14	125	180
M16	195	275
M18	270	390
M20	385	540
M22	510	720
M24	660	930
M27	980	1.400

Fig. 9.1 Tightening torque for screw connections

9.4 Maintenance schedule

Certain maintenance work must be carried out on the machine at specified intervals. These intervals are expressed either as numbers of operating hours or as periods of time such as **semi-annually** or **annually**, whichever interval **is reached** earlier.

Before performing the work for any maintenance interval, the maintenance work for all previous maintenance intervals must have been completed.

Maintenance work	Maintenance intervals				
	Daily	After the first 50 operating hours	Weekly	Every 500 operating hours	Every 1,000 operating hours or annually
Check all components for wear, deformation, corrosion and secure mounting.	X				
Check oil, fuel, grease and water levels, top up as necessary. The machine must be standing on level ground at this time.	X				
Check all filter clogging indicators.	X				
Check components that come in contact with concrete, replace worn parts.	X				
Check the wear condition of the conveying pipework by knocking it or by using a wall thickness gauge (see section 9.8) and replace worn parts. The minimum wall thicknesses can be found in the diagram in section 9.8.2.	X				
Check lubrication system for operation.	X				
Lubricate the conveying piston with grease (unless the automatic piston lubrication option is fitted).	X				
Visually check all hydraulic lines and screwed joints for leak-tightness.	X				

Maintenance work	Maintenance intervals				
	Daily	After the first 50 operating hours	Weekly	Every 500 operating hours	Every 1,000 operating hours or annually
Check the attachment of the discharge hose and the security of all snap couplings.	X				
Perform all necessary maintenance work on the truck in accordance with the separate user manual supplied by the manufacturer.		X			
Clean all filters and replace as necessary, see section 9.6.		X			
Check all screw connections against the tightening torque table in section 9.3.		X			
Check the screw connections on the cardan shaft joints.		X			
Change the oil in the boom slewing gearbox and transfer shift gearbox, see sections 9.7.1 and 9.7.2.		X			
Lubricate all grease points on the boom, boom mounting, pump and ball bearing slewing rim, see section 9.5.			X		
Check the oil level in the slewing gearbox.			X		
Make a thorough visual check for damage of all seals on the S-valve and agitator.			X		
Check the adjustment of the S-valve and adjust it as necessary.			X		
After at least 24 hours settling time check the condensation water in the hydraulic oil tank; drain it through the ball valve until hydraulic oil comes out.			X		

Maintenance work	Maintenance intervals				
	Daily	After the first 50 operating hours	Weekly	Every 500 operating hours	Every 1,000 operating hours or annually
Check the operation of all safety equipment such as Emergency Stop, grill and guards.			X		
Check the structural steelwork of the boom, boom mounting and outriggers for cracks.			X		
Completely drain the hydraulic oil, flush out the hydraulic oil tank and fill with the necessary quantity of hydraulic oil, see section 9.7.3.				X	
Replace the filter cartridges in the hydraulic oil tanks for the boom and concrete pump. Clean the magnetic rod.				X	
Check the oil level in the transfer shift gearbox.				X	
Perform a wear check on the S-valve, verify 8 mm wall thickness.				X	
Perform a wear check on the conveying cylinders.				X	
Clean the diesel pre-filter on the vehicle.				X	
Check the pressure setting of the pump and distributor boom against the data sheet, see sections 3.3 and 3.4.				X	
Check engine speed and operation of the pump together with stroke rate against the data sheet, see sections 3.3 and 3.4.				X	
Check that the conveying piston fastenings are tight.				X	

Maintenance work	Maintenance intervals				
	Daily	After the first 50 operating hours	Weekly	Every 500 operating hours	Every 1,000 operating hours or annually
Check all screw connections on the ball bearing slewing rim against the tightening torque table in section 9.3.				X	
Check that the conveying pipework fastenings on the distributor boom are tight.				X	
Clean the air filter casing.				X	
Change the breather filter on the hydraulic oil tank.				X	
Have all mechanical and hydraulic components examined by an expert.					X
Check all safety equipment that is fitted for good condition.					X
Check distributor boom play between the pinion and the ball bearing slewing rim, see section 9.8.5.					X
Check play within the ball bearing slewing rim, see section 9.8.6.					X
Change the oil in the slewing gearbox, see section 9.7.1.					X
Change the oil in the transfer shift gearbox, see section 9.7.2.					X

9.5 Lubrication

9.5.1 Central lubrication system

Use only greases of NLGL classes 0 to 2. See documentation for the central lubrication system.

9.5.1.1 Checking the central lubrication system

The operation of the central lubrication system must be checked daily. To do this, all grease points should be lubricated once manually.

1. Starting the lubrication system manually

The ignition must be switched on and all Emergency Stop switches released. Set the concrete pump to the setting “Pump”. Actuate the lubrication system for approx. 2 sec.

VORSICHT

CAUTION:

- ☞ **Check whether the rotor vane on the lubrication pump rotates and sufficient grease is fed in.**
- ☞ **If grease emerges from the safety valve, no grease points are being lubricated. This fault must be rectified immediately!**

2. Checking the grease points on the hopper (Fig. 9.2)

At the bearings of the S-valve no. 2 and no. 3 and agitator no. 4 and no. 5 grease must emerge into the hopper; at S-valve no. 1 grease must emerge into the conveying pipe (the flap elbow must be open).

3. Checking the operation of the lubrication distributor

After waiting no more than 4 minutes the control pin in the lubrication distributor must be seen to move in and out.

4. Checking the lubrication pipes

VORSICHT

CAUTION:

Immediately replace any defective lubrication pipes!

Check the lubrication pipes for damage and leak-tightness. All lubrication pipes must be securely connected.

5. Checking the grease nipples for manual lubrication

No grease must be leaking from the grease nipples. Either replace the defective grease nipple and non-return valve immediately (or close it off).

6. Lubricating “manually”

VORSICHT

CAUTION:

Before starting work, check that grease is issuing at all grease points, see point 2.

If the central lubrication system is defective, all grease points can be lubricated manually, using a grease gun. This should be performed no less frequently than every 2 hours of operation.

7. Blocked grease points

If no grease can be injected into a lubrication point, this problem must be rectified as soon as possible by a **WAITZINGER** customer service fitter.

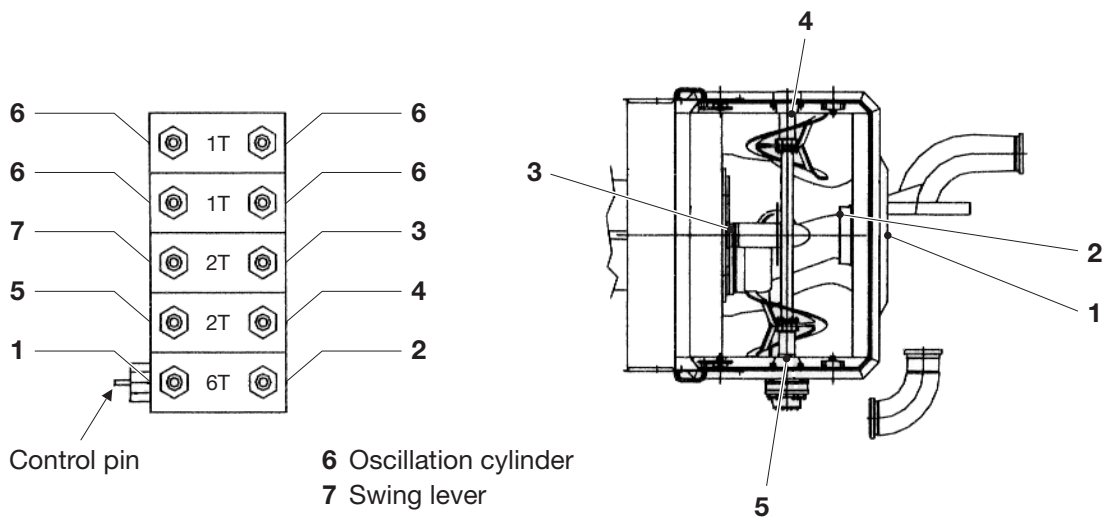


Fig. 9.2 Lubrication system

9.5.2 Manual lubrication

An acid-free multi-purpose grease should be used for manual lubrication, see Figure 9.5.

9.5.3 Sliding surfaces

Use graphite grease for sliding surfaces, see Figure 9.5.

9.5.4 Overview of grease points

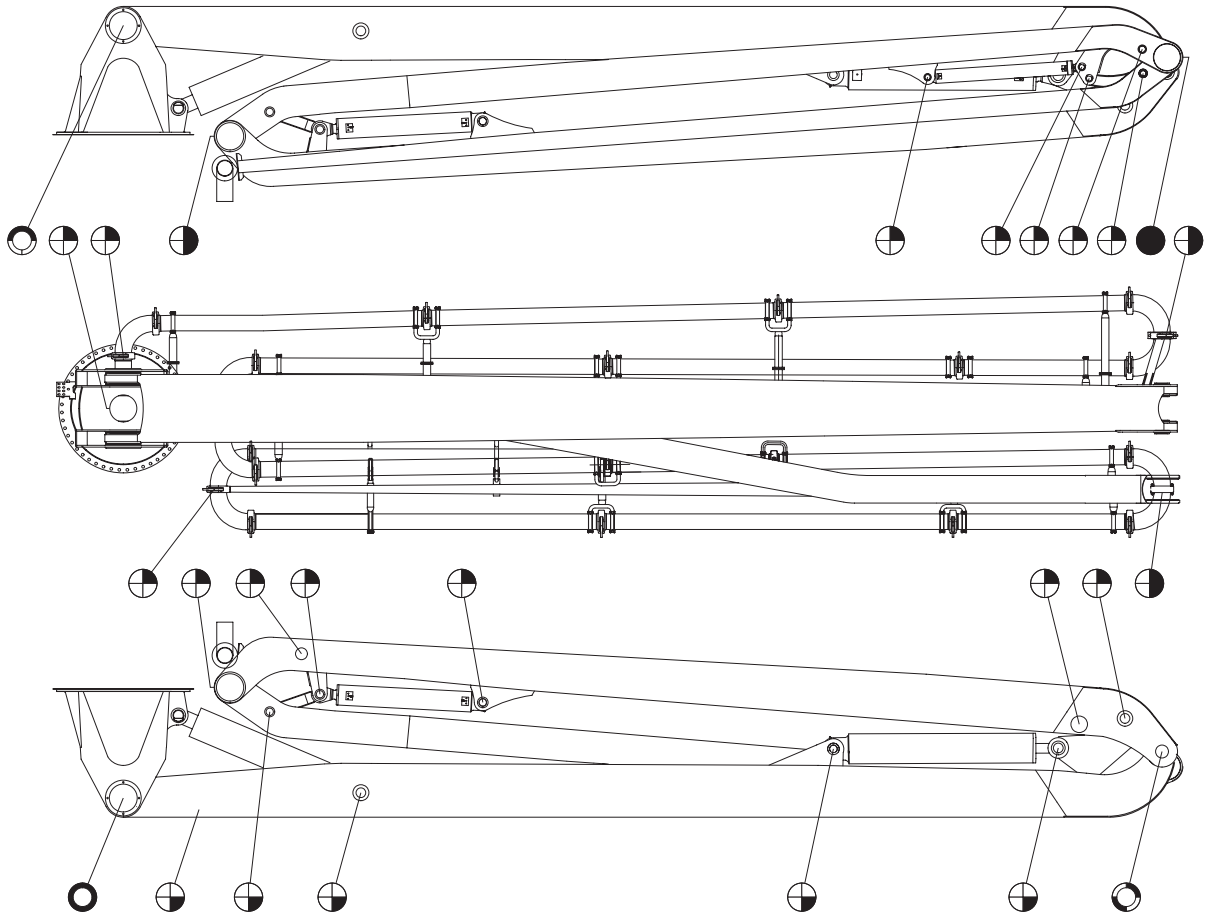
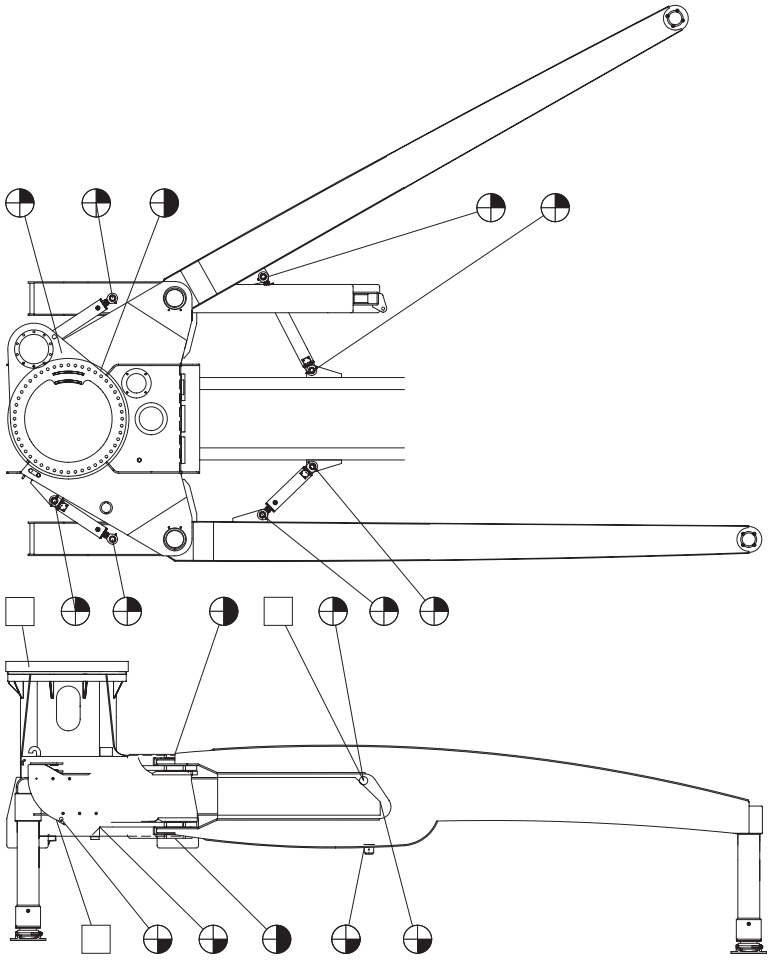


Fig. 9.3 Grease points overview



= 1 Grease nipples

= 2 Grease nipples

= 2 Grease nipples, opposite

= 2+2 Grease nipples, opposite

= 2 Grease nipples on the inner side

= 2 Grease nipples on the inner side, opposite

= 2 Grease nipples on the inner side, opposite

= Surface lubrication

Fig. 9.3 Grease points overview Boom block

9.5.5 Reference tables for hydraulic oils, greases and gear oils

Lubricants suitable for the truck-mounted concrete pump are listed in table below. **WAITZINGER** Takes no responsibility for the quality of the lubricants that are listed, nor for variations in their quality.

VORSICHT

CAUTION:

- ☞ **Hydraulic oils with different characteristics – biologically degradable / mineral-based hydraulic oils – must on no account be mixed!**
- ☞ **Engine oil data can be found in the separate user manual issued by the vehicle manufacturer.**

Manufacturer	Standard » HLP 46 «	Tropen » HLP 100 «
AGIP	Arnica 46 L-HV/46	Blasia S 220
ARAL	Vitam CF 46	Vitam CF 100
BP	Energol HLP 46	Energol HL P10
ELF	Olna 46	Olna 100
ESSO	Nuto H 46	Nuto H 100
FANAL	Salvo MWS 46	Salvo MWS 100
FUCHS	Renolin B 15	Renolin B 30
MOBIL	DTE 25	DTE 27
SHELL	Tellus Öl 46	Tellus Öl 100

Fig. 9.4 Hydraulic oils reference table

The automatic lubrication system can convey greases only up to NLGI class 2 or mineral oils which have at least 40 mm^2/s (cST) at 40 °C.
IMPORTANT: When handling greases be scrupulous about cleanliness. Contaminants remain in suspension in the grease, they do not settle out. They can lead to blockages in the delivery pipes, causing damage to bearings.

	Manufacturer	Designation	Type of saponification	Min. conveying temperature
Conventional greases	AGIP	F1 Grease 24	Ca	–
	ARAL	Mehrzweckfett ZS 1/2	Ca/Li	-20 °C
	AUTOL	Top 2000	Ca	-10 °C
		Top 8000 W	Ca	-20 °C
	BP	Abschmierfett	Ca	–
		C1 Abschmierfett	Ca	-20 °C
	CASTROL	CLS - Grease	Ca/Li	–
	ESSO	Cazar K2	Ca	–
		Hochdruckfett	Ca	–
	FIAT LUBRIFICANTI	Comar 2	Li	-25 °C
	FINA	Ceran LT	Ca	-20 °C
		Ceran WR2	Ca	–
	FUCHS	FN 745	Ca	-25 °C
		Renocal FN3	Ca	-20 °C
		Renolit HLT 2	Li	-25 °C
	KLÜBER	Centoplex 2 EP	Li	–
	MOBIL	Mobilgrease	Li	-30 °C
	MOLYKOTE	TTF 52	anorg. Verd.	-30 °C
	OPTIMOL	Longtime PD 2	Li	-20 °C
		OLIT CLS	Li/Ca	-15 °C
	SHELL	Retinax C	Ca	–
	WESTFALEN	Gresalit ZSA 2	Li	-15 °C
	ZELLER & GMELIN	ZG 450	Li	–
		ZG 736	Li	–
Biologically degradable greases	ARAL	BAB EP 2	Li/Ca	–
	AUTOL	Top 2000 Bio	Ca	-25 °C
	AVIA	Biogrease 1	Li	bis 0 °C
	DEA	Dolon E 2	Li	-15 °C
	FUCHS	Plantogel S2	Li/Ca	–
	KLÜBER	Klüberbio M32 - 82	Ca	-20 °C

Fig. 9.5 Greases reference table

As-sembly	Transfer gearbox / Slewing gearbox											Lubrication system										
Type of lubricanr	Mineral						Synthetic					Low-viscosity grease			Roller bearing Grease							
	ÖI – CLP DIN 51517						ÖI – PGLP DIN 51502															
Kinematic viscosity in cSt at 40 °C	460		320		220 (standard)	100	15	460		220	100	–		–	–		–					
Ambient temperature in °C	+5	– +46	0	– +40	-5	– +35	-15 – +25	-50 – +10	-15	– +100	-25 – +80	-35 – +60	-20	– +50	-35 – +60	-30	– +60					
ARAL	Degol BG 460		Degol BG 320		Degol BG 220		Degol BG 100	–	Degol GS 460		Degol GS 220	–	Aralub FDP 00		–	Multi-purpose grease Aralub I IL 2		–	–			
BP	Energol GR-XP 460		Energol GR-XP 320		Energol GR-XP 220		Energol GR-XP 100	Bartran HV 15	Energol SG-XP 460		Energol SG-XP 220	–	Energrease HT 00-EP		Energrease FG 00-EP	Energrease GSF	Multi-purpose grease L 2		Energrease LS 2	–		
CALYPSOL	UK-Ecubsol Öl 8140		UK-Ecubsol Öl 8060		UK-Ecubsol Öl 8050		UK-Ecubsol Öl 8030	–	UK-Ecubsynth Öl PG 460		UK-Ecubsynth Öl PG 220	–	Calypsol D 6024		Calypsol D 8024	–	Calypsol H 441		Multi-purpose grease Calypsol 20	Calypsol H 729		
CASTROL	Alpha SP 460		Alpha SP 320		Alpha SP 220		Alpha SP 100	Alphasyn T 15	Alphasyn T 460		Alphasyn T 220	–	CLS-Grease		–	CLS-Grease	Spheeröl AP 2		–	LZV-EP		
CHEVRON	NL-Gear Compound 460		NL-Gear Compound 320		NL-Gear Compound 220		NL-Gear Compound 100	Mechanism LPS 15	–		–	–	Dura-Lith. EP Grase 00		–	–	Dura-Lith. EP Grase 2		–	–		
DEA	Falcon CLP 460		Falcon CLP 320		Falcon CLP 220		Falcon CLP 150	Astron Z HLP 15	Polydea CLP 460		Polydea CLP 220	–	Glissando 283 EP 00		Orona DR 00	–	Glissando R EP 2		Glissando 20	–		
ESSO	Spartan EP 460		Spartan EP 320		Spartan EP 220		Spartan EP 100	Univis N 15	–		Circulation oil S 220	Circulation oil EZL 502	Fibrax EP 370		Fibrax 370	Low-viscosity grease S 420	Beacon 2		Unirex N 2	–		
KLÜBER	Klüberoil GEM 1-460		Klüberoil GEM 1-320		Klüberoil GEM 1-220		Klüberoil GEM 1-100	Isoflex MT 30 ROT	Klübersynth GH 6-460		Klübersynth GH 6-220	Klübersynth GH 6-100	Microlube GB 00		–	Klübersynth GE 46-1200	Centoplex 2 EP		Centoplex	Isoflex Topas NCA 52		
MOBIL	Mobilgear 634		Mobilgear 632		Mobilgear 630		Mobilgear 627	Mobil DTE 11	Mobil Glygoyle 80		Mobil Glygoyle 30	Mobil Glygoyle 11	Gargoyle Fett 1200 W		–	–	Mobilgrease MP		Mobilux 2	Mobiltemp SHC 100		
SHELL	Shell Omala Öl 460		Shell Omala Öl 320		Shell Omala Öl 220		Shell Omala Öl 100	Shell Tellus Öl T 15	Shell Tivela Oil SD		Shell Tivela Oil WB	Shell Tivela Oil WA	Shell Spezial Gear box grease H		Shell Tivela Compound A	Shell Tivela Compound A	Shell Alvania Fett G 2		Shell Alvania Fett R 2	Aeroshell Grease 7		

Fig. 9.6 Gearbox oils reference table

9.6 Changing filters

9.6.1 General

DANGER:

☞ **Filters may be changed only when the engine is switched off and the hydraulic system is depressurised (accumulator pressure or hydraulic pressure generated by static pressure in the conveying pipework).**

☞ **The distributor boom must be stowed for transport or propped.**

- Changing a filer always involves some loss of hydraulic oil. Therefore be sure always to have a container or oil barrel to hand.
- Filters should be changed in a short a time as possible, so that there is the least opportunity for contamination to enter the hydraulic system. Therefore before starting work have the replacement filter element, O-rings, lint-free wipe cloths and petrol for washing down ready to hand.
- After changing the filter, always check the oil level and top up with oil as necessary.

NOTE:

Do not let hydraulic oil drain into the ground, always use a sufficiently large bowl or container and dispose of it in accordance with the applicable regulations.

9.6.2 High-pressure filters for the boom and hydraulic pumps

If the red ring in the clogging indicator (Item 1, Fig. 9.7) is visible, the filter element must be changed:

1. Unscrew the filter casing (**2**) anti-clockwise.
2. Pull the filter element (**3**) downwards from the casing (**4**).
3. Clean the filter casing, replace the O-ring, and grease the thread and O-ring.
4. Fill the filter casing with clean oil.
5. Plug in the filter element.
6. Fit the filter casing and tighten it to approx. 150 Nm.

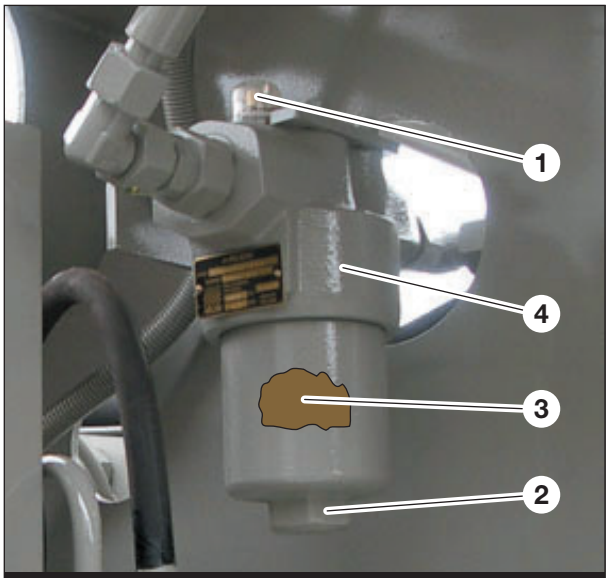


Fig. 9.7 Changing the high pressure filter

9.6.3 Return flow filter

If the clogging indicator (Item 1, Fig. 9.8) is in the red zone when the oil is at operating temperature, the filter element must be changed:

1. Have a suitable container ready for the oil filter element, and clean the outside of the filter casing.
2. Undo the 4 screws (**3**) and place the cover (**2**) on a clean surface.
3. Take out the filter element (**4**) with spring and dirt sleeve (**5**).
4. Twist the dirt sleeve anti-clockwise and pull it off, then thoroughly clean it and fit it to the new filter element.
5. Fit the new filter element into the return flow filter.
6. Fit the spring and cover, secure with 4 screws.
7. Check filter for leak-tightness.

NOTE: When changing the return-flow filter, always change the air filter (6) also!

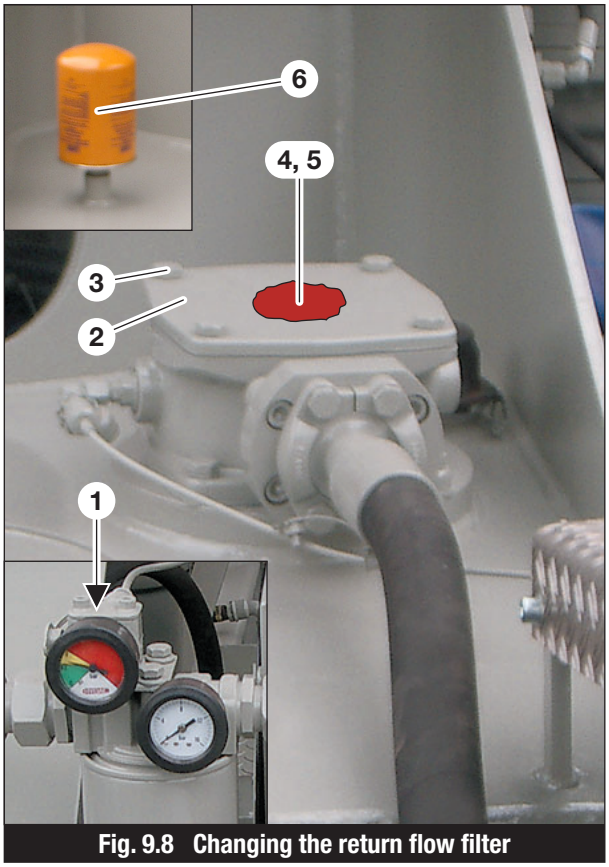


Fig. 9.8 Changing the return flow filter

9.6.4 In-line filter cartridge

If the manometer (Item 1, Fig. 9.9) shows a value in excess of 3 bar when the oil is at operating temperature, the filter element must be changed:

1. Turn the filter cartridge (**2**) anti-clockwise by hand to undo it, and dispose of it correctly.
2. Wet the sealing ring of the new filter cartridge with oil and screw it in clockwise by hand.
3. Check the in-line filter for leak-tightness.

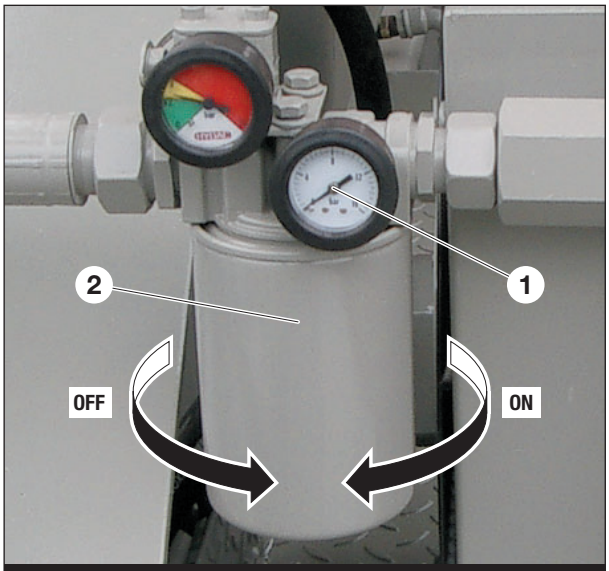


Fig. 9.9 Changing the in-line filter

9.7 Changing the oil

9.7.1 Changing the oil in the slewing gearbox

NOTE:
☞ **The slewing gearbox has only one oil circuit (oil circuit A).**
☞ **Use only gear oil as shown in the gear oil reference table Fig. 9.6.**

Use oil grades / alternative grades as shown in the gear oil reference table Fig. 9.6. Oil capacity 10 litres.

To change the oil in the slewing gearbox, proceed as follows:

1. Remove the breather screws (**1**) and fully remove the drain plug (**2**).
2. If the oil was very dirty, it is essential to fill the gearbox completely with flushing oil, and slew the distributor boom for several rotations. This ensures that any deposits of dirt in the gearbox are fully mixed into the oil; after this, repeat point 1.
3. Reinsert the drain plugs.
4. Open the air bleed screw (**3**). Use a funnel to fill the gearbox with oil through the breather screws opening until the oil reaches level **A**.
5. Screw in the air bleed screws and the breather screws.

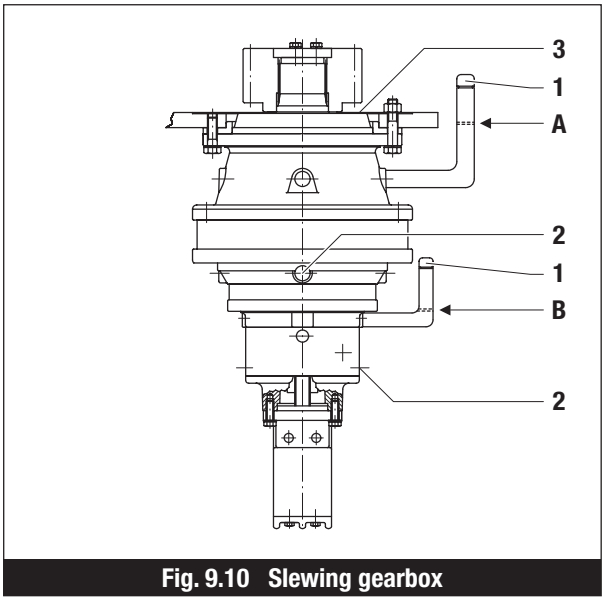


Fig. 9.10 Slewing gearbox

9.7.2 Changing the oil in the transfer shift gearbox

Use oil grades / alternative grades as shown in the gear oil reference table Fig. 9.6. Oil capacity 7.3 litres.

To change the oil in the transfer shift gearbox, proceed as follows:

1. Remove the oil level screw (**1**) and drain plug (**2**) and let the oil drain into a tray.
2. If the oil was very dirty, it is essential to fill the gearbox completely with flushing oil, and run the hydraulic system for a short period. This ensures that any deposits of dirt in the gearbox are fully mixed into the oil; after this, repeat point 1.
3. Reinsert the drain plug.
4. Use a funnel to fill the gearbox slowly with oil through the breather screw opening (**3**) until the oil comes out of the oil level screw hole.
5. Screw in the oil level screw.

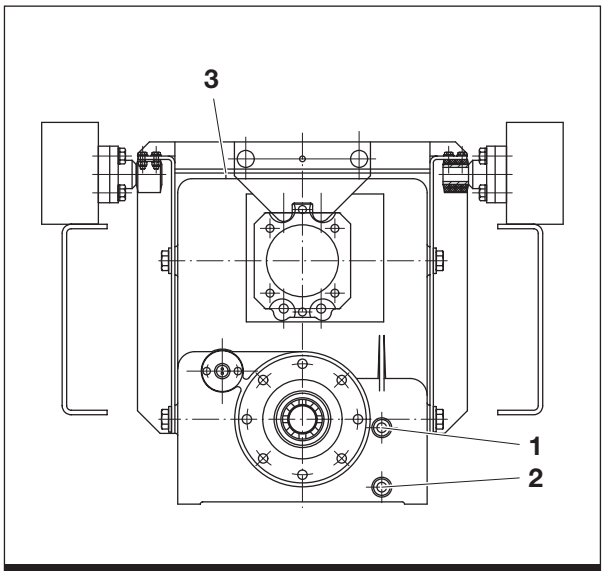


Fig. 9.11 Transfer shift gearbox

9.7.3 Changing the oil in the hydraulic system

Use oil grades / alternative grades as shown in the hydraulic oil reference table Fig. 9.4. Oil capacity 600 litres.

CAUTION:

Always refill with the same grade as was used previously. Before changing over to a biologically degradable oil the entire hydraulic system must be rendered totally oil-free. This procedure can only be performed by an authorised specialist company.

1. Remove the drain plug from the drain cock (Item 1, Fig. 9.12).
2. Connect a 3/4" hose from the drain cock to the container.
3. Open the filler neck cap (Item 3, Fig. 9.13).

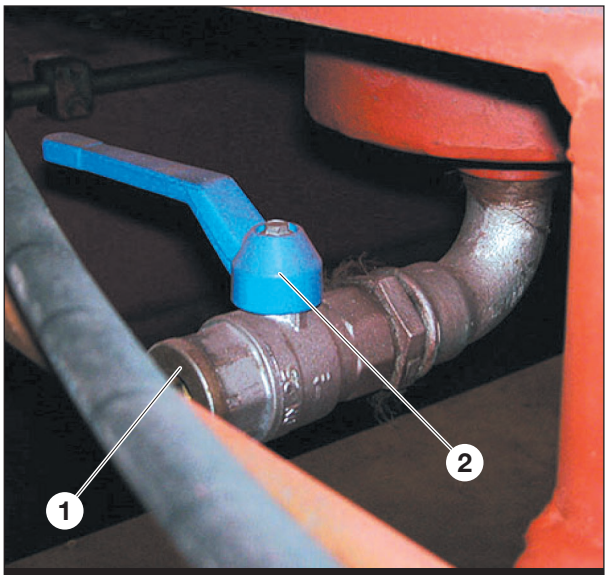


Fig. 9.12 Oil drain pipe

4. Open the ball valve (Item. 2, Fig. 9.12) and allow oil to drain into the container.

5. If the old oil is very dirty or has significant water content, flush the oil tank with suitable flushing oil.

6. Close the ball valve (Item 2, Fig. 9.12) and watch the oil emerging from the drain hole.

7. Pour hydraulic oil into the hydraulic tank through the return flow filter element, or pump it in using a pump with a fine filter.

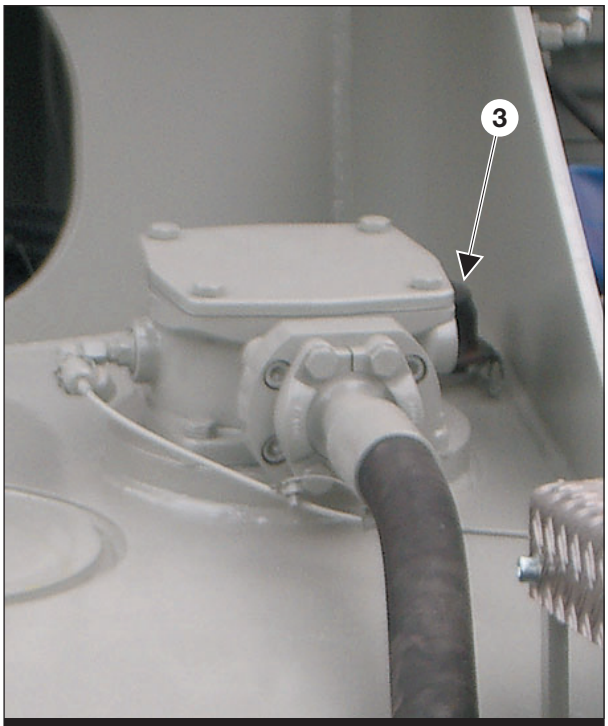


Fig. 9.13 Oil filler neck

VORSICHT

CAUTION:
Never pour hydraulic oil into the tank directly from the barrel without filtration!

8. Keep feeding hydraulic oil until the maximum oil level of 2 cm below the upper edge of the sight glass.

9. Close the filler neck cap (Item 3, Fig. 9.13) or the return flow filter.

10. Perform a trial run to check for leak-tightness.

NOTE:
Before operating the hydraulics, first run the system at idling for 15 minutes.

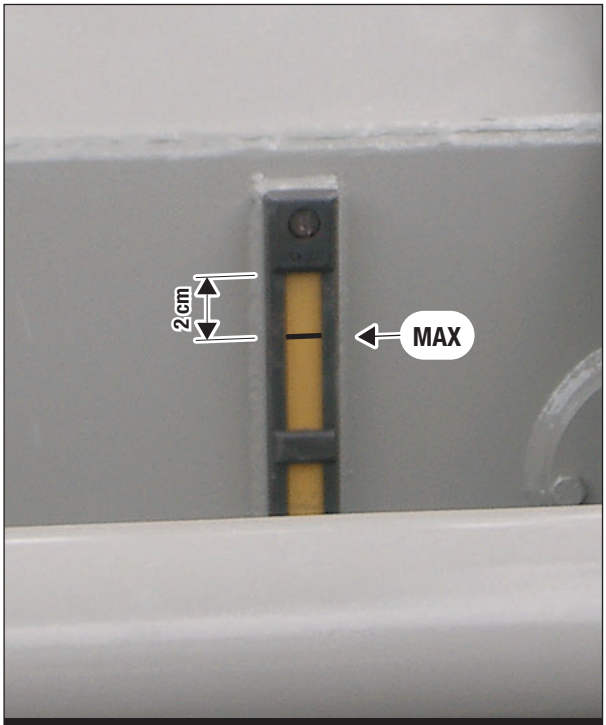


Fig. 9.14 Hydraulic oil tank sight glass

9.8 Performing tests

9.8.1 Measuring the wall thickness of the conveying pipework

GEFAHR

DANGER:

☞ **Only knock the conveying pipes apart and open them when they have been depressurised.**

☞ **Always pump backwards 1-2 piston strokes.**

- Check the wear condition of the conveying pipework by knocking it, or better by using a wall thickness gauge. Replace worn parts.
- The wall thickness can also be measured using a special wall thickness gauge.

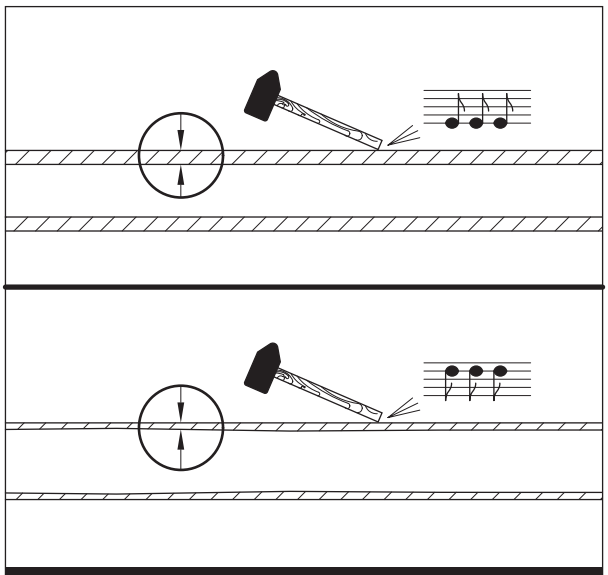


Fig. 9.15 Measuring the wall thickness of the conveying pipework

9.8.2 Minimum wall thicknesses and conveying pipework operating pressures

Always comply with the maximum pipe weight of the conveying pipework.
Unless stated otherwise on the serial plate:
Pipe 12.8 kg/m
Elbows
Y = Concrete pressure in bar
X = Minimum wall thickness in mm to DIN 2413 part 3
DN = Nominal diameter
Conveying pipework designation: Standard size
Maximum pressure
Code

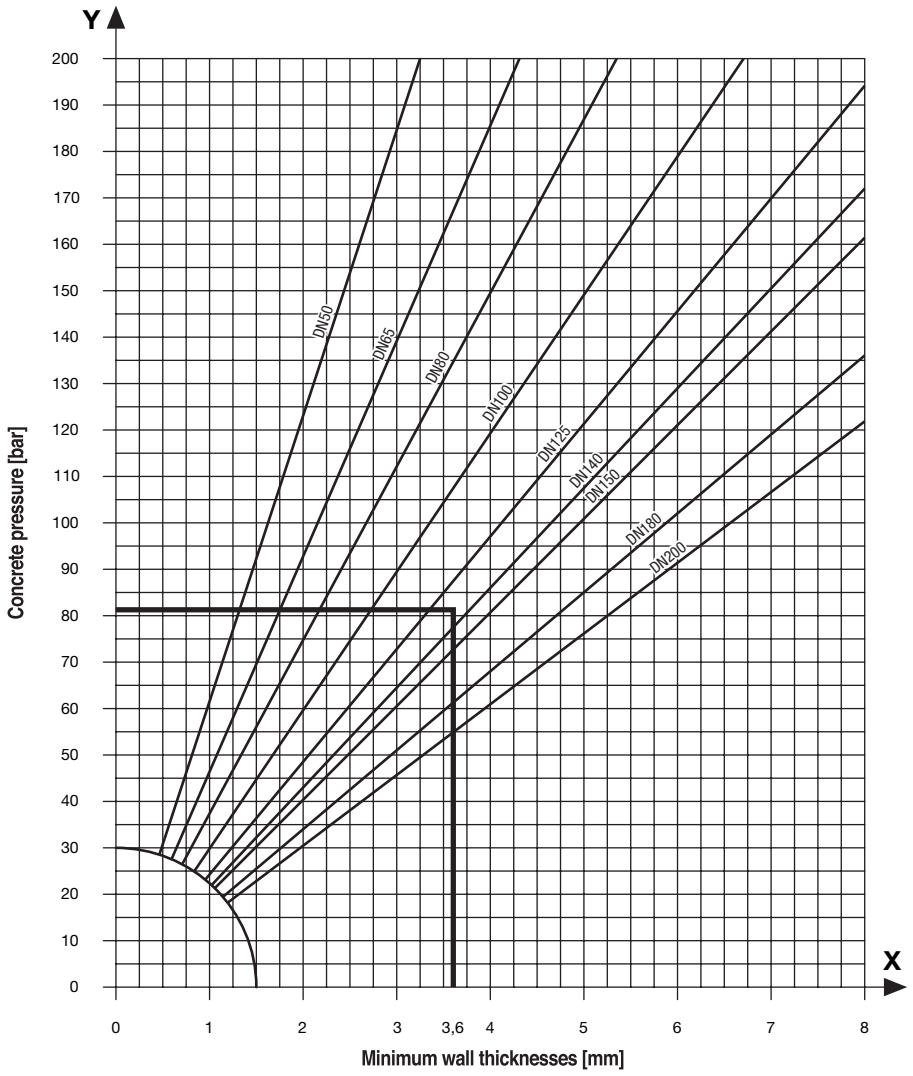


Fig. 9.16 Minimum wall thickness diagram

9.8.3 Adjusting the S-valve

Perform the following steps to adjust the S-valve:

1. Remove the locking plate (**1**) from the swing lever.
2. Tighten the screw (**2**) to approx. 100 Nm, then back off by 30%.
3. Refit the locking plate.
4. Perform a trial run of the concrete pump.

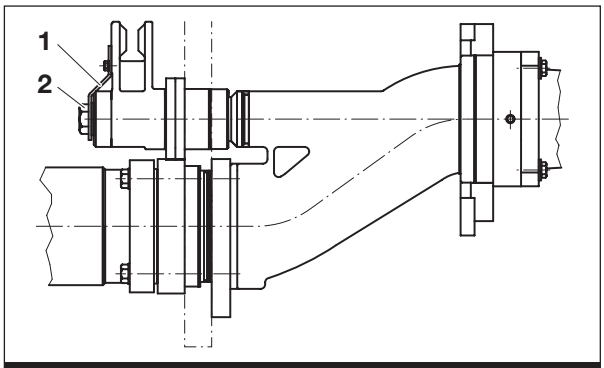


Fig. 9.17 Adjusting the S-valve

9.8.4 Checking cable tension on telescopic unit

When the wire cable tension is correctly set, the cable should not sag. If a finger is placed on the cable, it should not give more than 15 mm. Here the telescopic extension should not be moved out completely when checking, and the machine should not be propped up.

To increase the wire cable tension the hexagon nuts (**1**) and (**2**) must each be turned clockwise to an equal amount. When doing so, the relevant bolt must be held stationary.

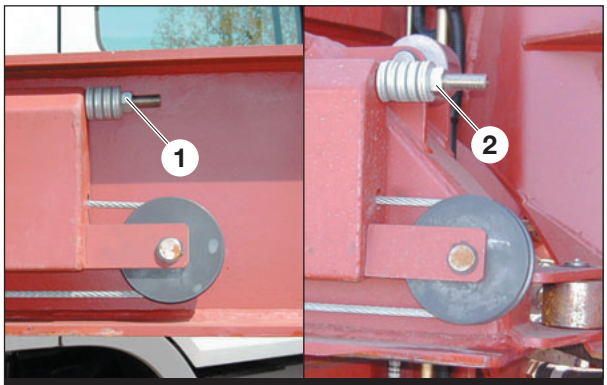


Fig. 9.18 Checking cable tension

VORSICHT

CAUTION:

Adjusting the hexagon nuts on one side will displace the telescope. This prevents or damages automatic end locking!

1. Once the cable tension has been adjusted, the function of the automatic end locking must be checked without fail. To do so the telescopic extension must be moved out completely, and the automatic end locking must engage.
2. It must be possible to operate the automatic end locking by hand.
3. When the support cylinder is moved out, the automatic end locking must not move out (release).

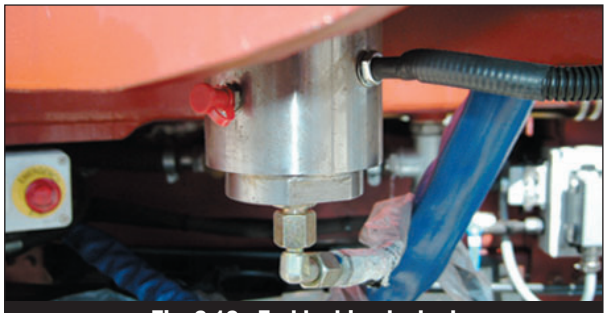


Fig. 9.19 End locking locked

9.8.5 Checking the backlash in the slewing gearbox

The backlash is checked as follows:

1. Remove the pinion gear cover.
2. With the boom in the horizontal position, slew it slightly until a tooth is engaged without play.
3. Insert a feeler gauge to measure the engagement clearance as shown in the adjoining diagram.
4. If the backlash is excessive, the gearbox and the ball bearing slewing rim must be adjusted by a skilled fitter.

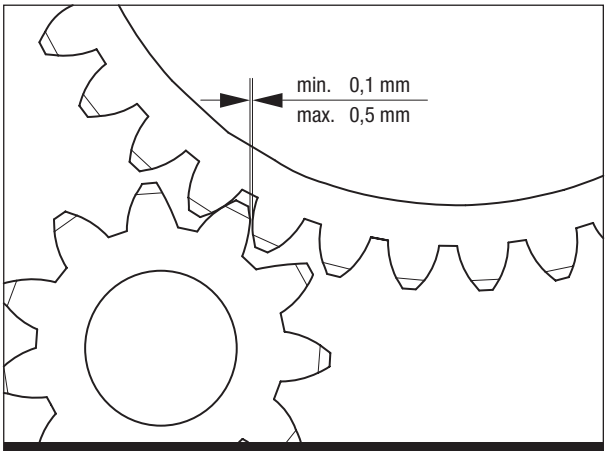


Fig. 9.20 Checking the backlash in the slewing gearbox

9.8.6 Checking the boom backlash (ball bearing slewing rim in the slewing gearbox)

Boom backlash means the increased play between outer ring and inner ring of the ball bearing slewing rim in the slewing gearbox.

- The calculation of boom backlash may only be performed by a specialist authorised workshop.

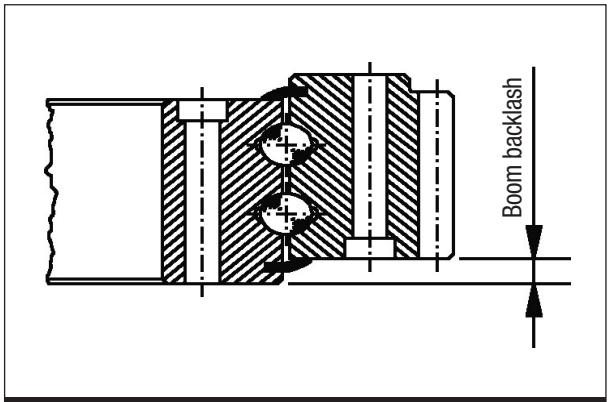


Fig. 9.21 Checking the boom backlash

- The measurement must be performed at 2 points (loaded side and unloaded side) as shown in the diagram alongside.

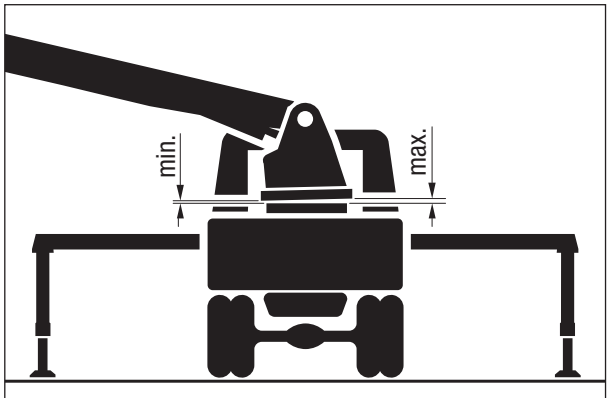


Fig. 9.22 Measurement points for checking the boom backlash

- The difference between the two values is the exact value for the measured backlash. This value must be entered in the boom test book every time the boom is tested. The maximum permissible value shown in the adjoining table must not be exceeded.

Rolling diameter [mm]	Ball diameter [mm]				
	20	22	25	30	40
1.000	1,8	1,9	1,9	2,0	2,5
1.250	1,9	2,0	2,0	2,1	2,6
1.500	2,0	2,1	2,1	2,2	2,7
1.750		2,2	2,2	2,3	2,8
2.000			2,3	2,4	2,9
2.250				2,5	3,0
2.500					3,1

Fig. 9.23 Maximum values for the boom backlash

9.8.7 Checking the operation of the sensors

The operation of the sensors is checked as follows:

There are two ways of checking the condition of the sensors.

1. Directly in the sensor or in its plug there are one or two LEDs.

One LED Green = Switch activated

Two LEDs Green = Power on
Yellow = Switch activated

2. On the 4-fold distributor there are

Two green LEDs Power for the sensors

Each with a yellow LED Switch activated

Drive cylinder sensors: Move the drive cylinder (**1**) to the end of its travel to check the operation of the sensor (**2**).

Oscillation cylinder sensors: Move the oscillation cylinder (**3**) to the end of its travel to check the operation of the sensor (**4**).

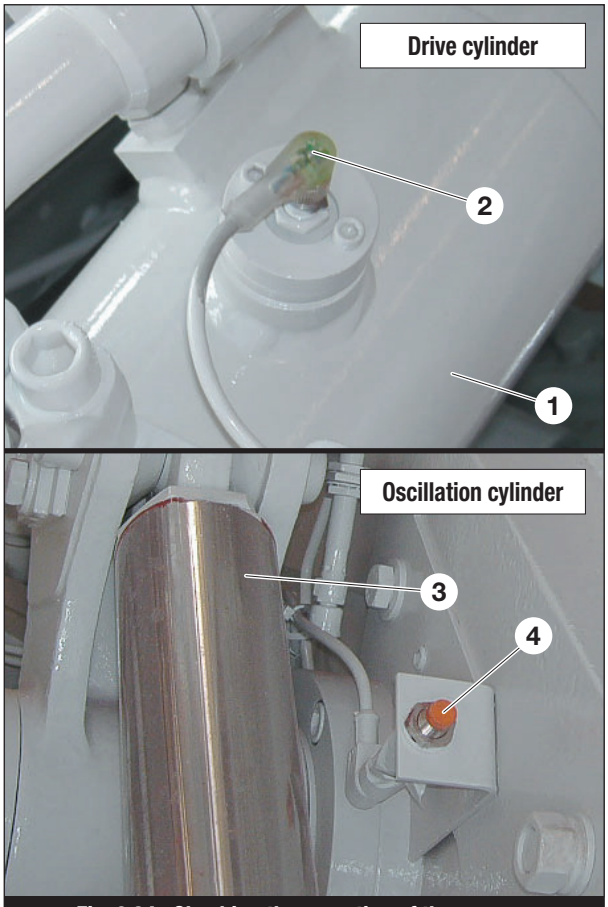


Fig. 9.24 Checking the operation of the sensors

9.9 Replacing worn parts

9.9.1 Exchanging the wear plate and wear ring

GEFAHR

DANGER:
When working in the hopper and in the area of the oscillation cylinder, always switch the engine off and remove the ignition key.

1. Remove the locking plate (**1**) from the swing lever. Undo the screws (**2** and **3**) to relieve the load on the S-valve by 15 mm.
2. Exchange the free wear plate (**4**) by removing the first 2 screws (**6**) and tighten the screws.
3. Swing the S-valve over to the other side.
4. Remove the second wear plate by removing the other two screws (**6**).
5. Swing the S-valve back to the other side and exchange the wear ring (**5**).
6. Swing the S-valve on to the wear plate already fitted and fit the second wear plate.
7. Restore the S-valve pre-load by tightening the 4 screws (**3**).
8. Tighten the screw (**2**) by hand until the gap is closed. Back off the screw by at least 1/6 of a turn and refit the locking plate.

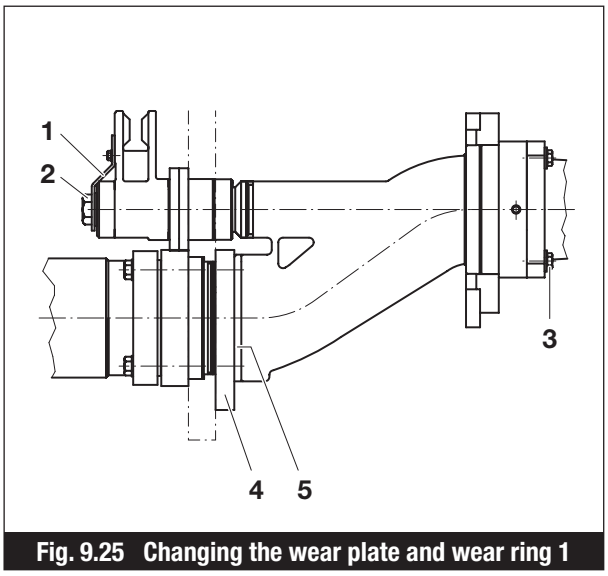


Fig. 9.25 Changing the wear plate and wear ring 1

NOTE:
Tighten the screws (3 and 4) to the torque set out in the table in section 9.3.

9. Perform a trial run.

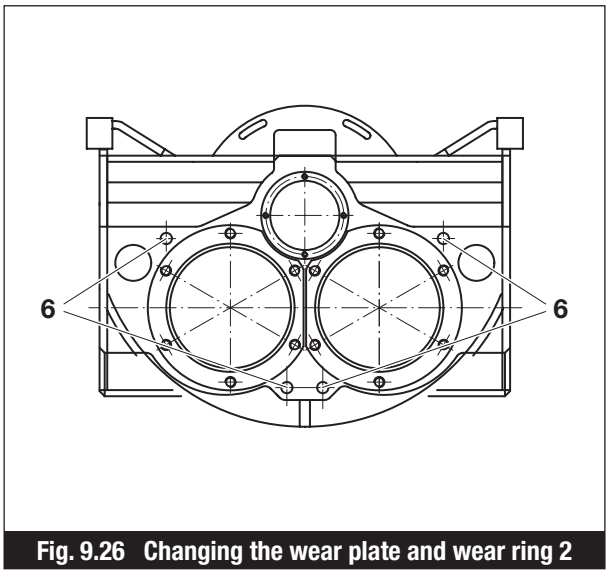


Fig. 9.26 Changing the wear plate and wear ring 2

9.9.2 Changing the conveying piston

- Turn a hardened conveying piston by 180° after 2 mm wear (4 mm on the diameter); turn a chromium plated conveying piston by 180° when the chromium plate layer is 30 µm.

GEFAHR

DANGER:

☞ **When working in the wash-out tank always switch off the engine and take out the ignition key.**

☞ **Never reach your hands into the wash-out tank when the engine is running.**

☞ **Always actuate the hydraulic cylinder by actually actuating the valves (see section 7.5.4.3) at a low engine speed and reduced stroke rate.**

1. Drain the water tank and remove the protective grill.
2. Actuate valves Y3 and Y4 to move one drive cylinder to the end of its travel.
3. Remove hose clip (**2**) and snap coupling (**4**).

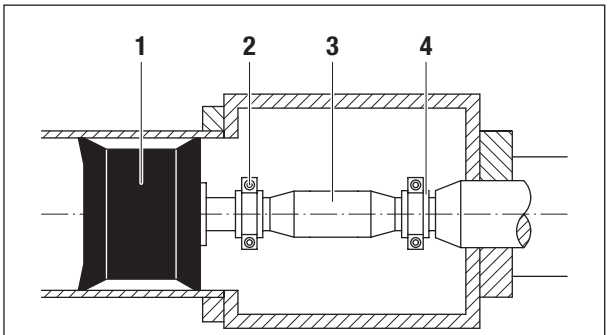


Fig. 9.27 Changing the conveying piston 1

4. Push the conveying piston (**1**) about 5 mm towards the conveying cylinder by levering with a pry bar, and remove the spacer (**3**).

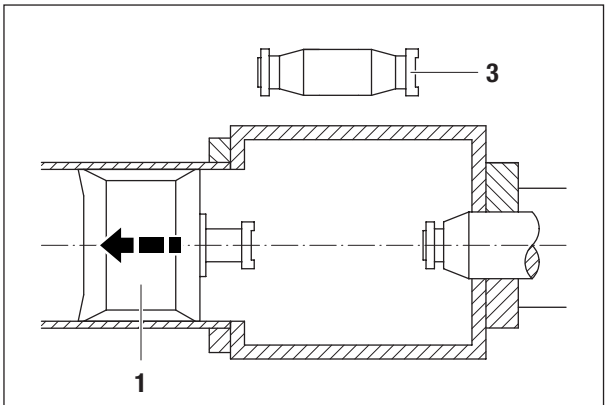


Fig. 9.28 Changing the conveying piston 2

5. Carefully move the drive cylinder out until it touches the flange. Fit a snap coupling (**4**).

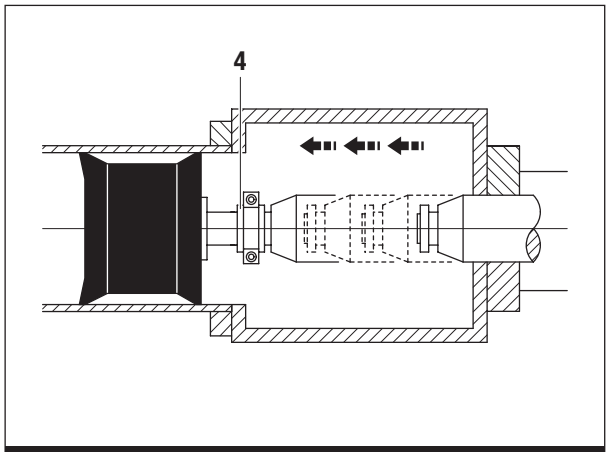


Fig. 9.29 Changing the conveying piston 3

6. Move the drive cylinder back in, and remove the snap coupling (**4**) and the conveying piston (**1**).

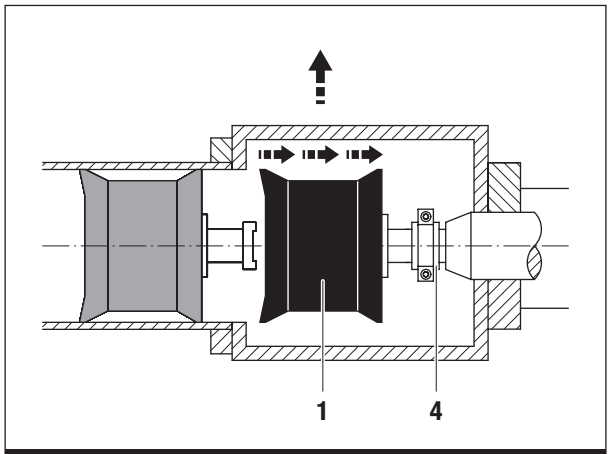


Fig. 9.30 Changing the conveying piston 4

7. Liberally lubricate the new conveying piston (**1**), attach a shell coupling (**4**) and fit it.

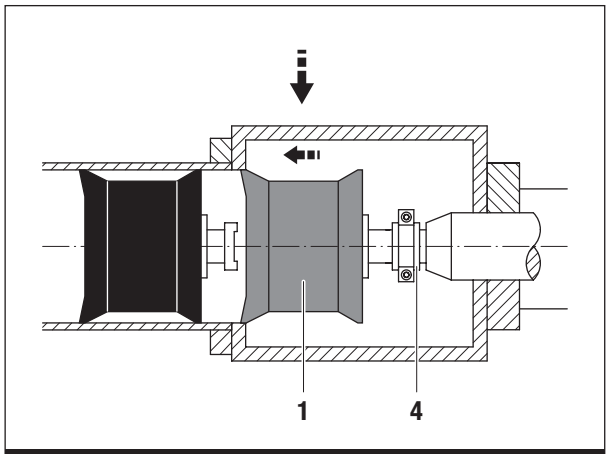


Fig. 9.31 Changing the conveying piston 5

8. Use the drive cylinder to move the conveying piston far enough for there to be room to fit the spacer (**3**).

9. Remove the snap coupling (**4**) and back off the drive cylinder to the end of its travel.

10. Fit the spacer (**3**) to the drive cylinder with the snap coupling (**4**).

11. Push the conveying piston (**1**) on to the spacer (**3**) by levering with a pry bar and fit the snap coupling (**4**).

12. Fit the hose clip (**2**).

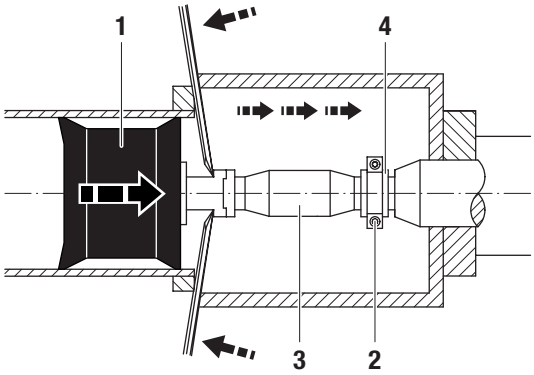


Fig. 9.32 Changing the conveying piston 6

9.9.3 Changing / turning the conveying cylinder

1. Remove the conveying cylinder as described in section 9.9.2.

2. Move both drive cylinders to the limit of their travel: Disconnect the oscillation pipe from a retracted drive cylinder and hang it over a container. Slowly move the drive cylinder to limit of its travel by actuating valves Y5 + Y6 manually.

3. Disconnect the shaft, support the wash-out tank.

4. Remove the 26 screws (**1**) and support the conveying cylinder, e.g. with a fork lift truck.

5. Lift the slide housing with a crane.

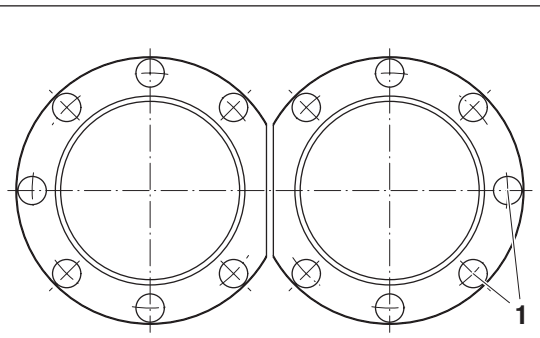


Fig. 9.33 Changing / turning the conveying cylinder

NOTE:
When lifting, take care that no hoses or cables are trapped!

6. Remove or turn the conveying cylinder.

NOTE:

To increase the working life of the conveying cylinders, these can be turned by 180°. Make sure that the conveying cylinders are turned in good time. If the wear has already passed the point of no return, the conveying cylinders must be replaced.

7. Refit the conveying cylinders in the reverse sequence to removal.
8. Fit the conveying pistons and oscillation pipe as described in section 9.9.2.
9. Manually activate valves Y3 and Y4 or the rocker switch (Item 11, Fig. 5.2) to slowly extend the right hand drive cylinder.
10. Bleed air from the drive cylinder.
11. Perform a trial run.

9.9.4 Changing the agitator blades

1. Remove the screws (**2**).
2. Change the agitator blades (**1**). Check that the seating faces are clean. The right hand agitator blades must be 90° out of phase with the left hand blades.
3. Fit the screws (**2**) and tighten them to the torque set out in the table in section 9.3. Always replace these screws.

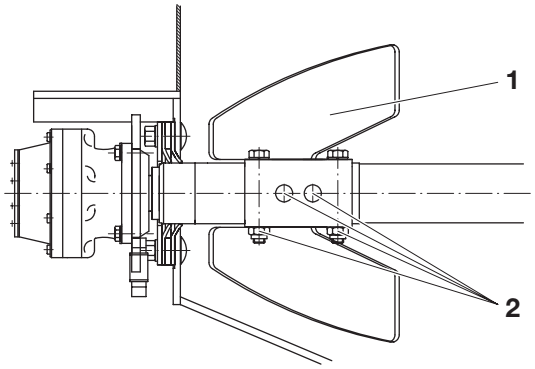


Fig. 9.34 Changing the agitator blades

9.9.5 Changing the agitator seals

1. Remove the agitator blades.
2. Pull the right hand motor (**4**) out approx. 10 mm and put the agitator shaft (**3**) to one side.
3. Remove the retaining ring (**5**), pull the left and right hand motors (**4**) out and put them to one side. Take care not to kink the hydraulic hoses.
4. Remove the screws (**6**) and take out the spacer plates with the seals (**7**).
5. Exchange the seals (**7**) and refit them. The gap between the seals must be completely filled with grease.
6. Reassemble the motors (**4**) and shafts (**3**) together with the agitator blades in the reverse sequence to removal (see Fig. 9.24).

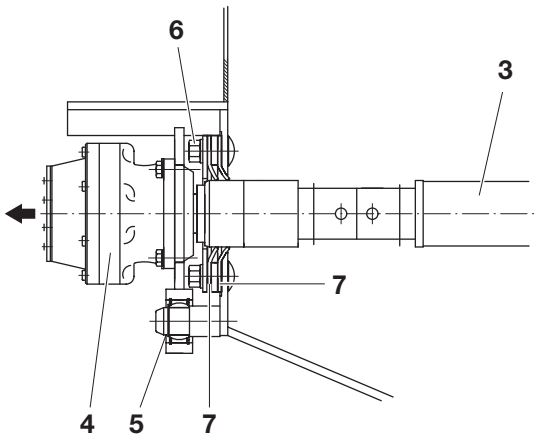


Fig. 9.35 Changing the agitator seals

9.9.6 Changing the agitator wear sleeves

1. Remove the motors (Item 4, Fig. 9.34) and put them in a safe place.
2. Knock the securing pin (**8**) fully inwards, remove the washer (**9**) and unscrew the nut (**10**).
3. Lever out the shaft (**11**) using pry bars.
4. Split the wear sleeves (**12**) off the shaft (**11**) and remove them.
5. Clean the shaft and evenly spread it with Loctite. Warm the new wear sleeves up to 200 °C and quickly slide them into place.
6. Refit the agitators in the reverse sequence to removal. A new hole must be drilled for the securing pin (**8**).

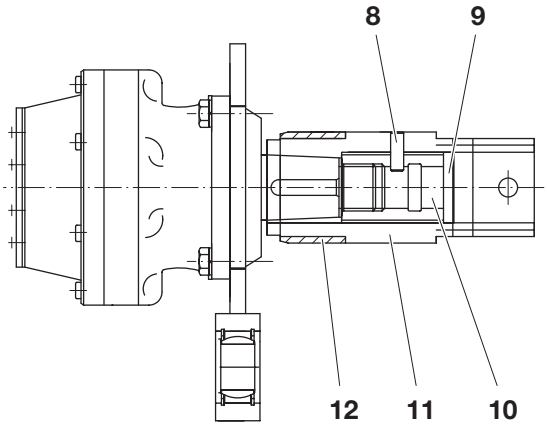


Fig. 9.36 Changing the agitator wear sleeves

9.10 Changing the conveying pipework

VORSICHT

CAUTION:

The maximum weight of the conveying pipework and the conveying elbows on the boom, and the maximum pressure of 85 bar in the conveying pipework must be observed!

When the distributor boom is in the stowed position for transport it is not under stress; elements can thus easily be exchanged when it is in this configuration. If conveying pipes are replaced when the distributor boom is deployed, stresses may be introduced during assembly.

VORSICHT

CAUTION:

A distance of 3 mm must be maintained between the flanges!

- Arrange the “Matching pipe lengths / Conveying pipes” as shown in the safety notice in Figure 2.16.

9.11 Crack-checking on the steelwork

VORSICHT

CAUTION:

☞ **Cracks on the distributor boom, on the boom mounting and the outriggers must be rectified immediately they are noticed! To do this, request the WAITZINGER repair guide without delay!**

☞ **Repairs must only be performed by an authorised specialist company!**

- For crack checking the machine must be clean. Excess grease on the joints must be removed.
- Patches of rust and cracks in the paintwork can indicate underlying structural cracks.
- If there is doubt, have the steelwork checked by an authorised skilled operator using the “Dye penetrant crack detection method”.

9.12 Checking the hoses

DANGER:
If a hose splits suddenly under pressure, personnel can be seriously injured! WAITZINGER takes no responsibility for damages that result from the use of worn or defective components.

Regular checking of hoses is part of the technical safety checks to be performed on the machine.

Do not repair damaged hydraulic or conveying pipes; instead replace them immediately. Damaged or weeping hydraulic hoses must also be replaced immediately.

All hydraulic hoses must be renewed after a life of 6 years (including a shelf life of 2 years), even if they exhibit no evident damage. The period of time can be calculated from the identification mark on the connection fitting (date of manufacture of the hose).

9.13 Cleaning the machine

- If the truck-mounted concrete pump is to be moved to another location for cleaning, move all parts of the machine to their transport positions.
- The truck-mounted concrete pump must not be driven with the distributor boom deployed or the outriggers extended, even for short distances.

DANGER:
☞ No highly flammable materials (e.g. petrol) may be used for cleaning!
☞ Never direct a water jet or steam jet towards electrical components, this can occasion a flashover with fatal consequences!

- Protect electrical components by covering them or sealing them shut to prevent ingress of water. After completion of cleaning, remove the covers and seals, leaving no residues.
- Never use seawater or other saline water for cleaning.
- Never use compressed air for cleaning.

- After completion of cleaning, check all pipework for leaktightness and loose connections, and check the machine for chafing points.
- Check all components for any sort of damage. If faults are found, rectify them immediately.
- If there is a risk of frost, completely drain the conveyor pipework, water tank and water pump. Leave all water drain points open.

9.14 Disposal of the machine

NOTE:
Observe national and regional legislative regulations and guidelines when disposing of the machine.

10. Repair work

WARNING:

☞ **Repair work must only be performed by trained personnel or service personnel who have been authorised by WAITZINGER.**

☞ **The user is not permitted to carry out repair work on his own account. Any work on the machine in breach of this provision will render the warranty void and relieve the manufacturer of all liability!**

WARNING:

☞ **Only skilled specialists or trained personnel may perform repair work on electrical systems!**

☞ **Before carrying out electrical repair work the system must be electrically de-energised and this state must be secured for the duration of the work!**
The VDE regulations and the VBG 4 regulations must be complied with!

☞ **When fitting fuses, fit only fuses of the same type and rating as were originally fitted!**

☞ **It is absolutely prohibited to repair fuses!**

11. List of operators of the equipment

- Each operator of the equipment confirms here by his signature that he has received, read and understood this user manual.
- He agrees to comply with all instructions conscientiously.
- If he does not do so, the manufacturer's warranty will become void.

Operator name	Accepted on	Operator signature

Make further copies if required

Operator name	Accepted on	Operator signature

NOTES

NOTES

REED

Waitzinger
Baumaschinen GmbH

MODEL *XXT37R*

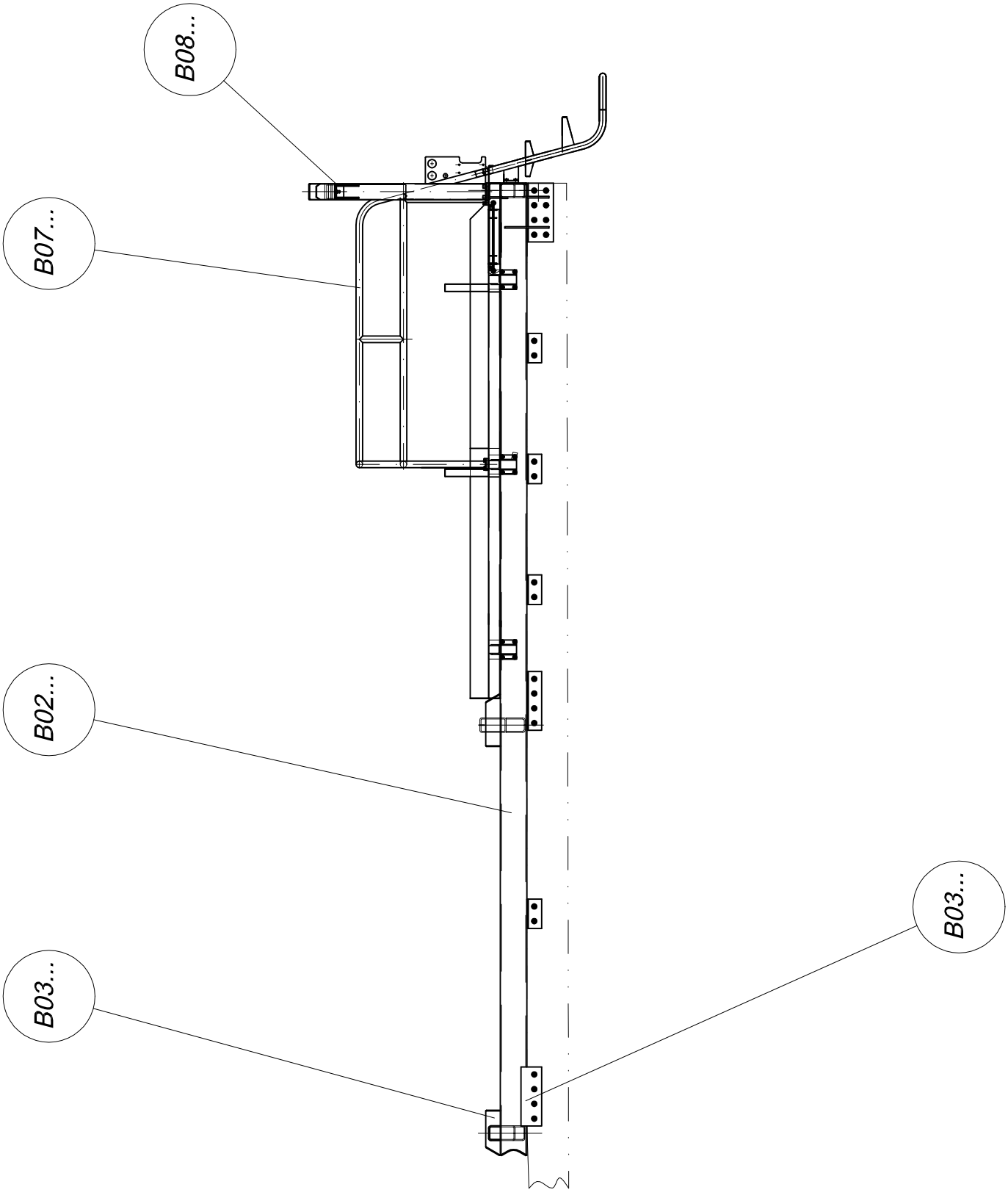
PARTS LIST

SN07-260

Übersicht B 00 - B 09

over view B 00 - B 09

Waitzinger
Baumaschinen GmbH



22.07.2002

Mastbockverbindung kpl.

connection for boom base cpl.

B 03 9 045

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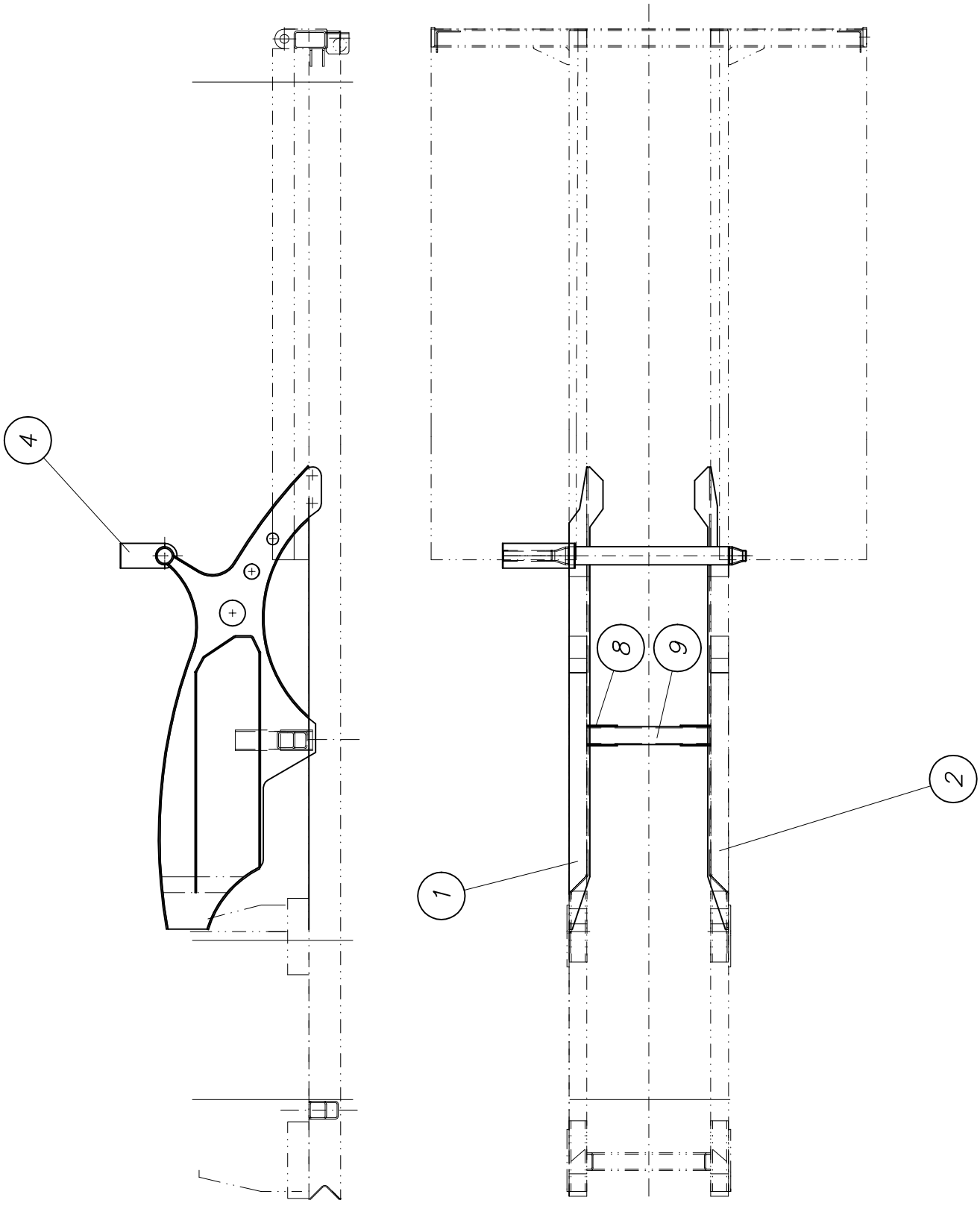

03.09.2004

PARTS LIST

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B039045	connection for boom base cpl 37 XXT Reed	04.08.04 ak			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	connection for boom base 36XXT own parts list	B039104		a 26.04.05	80,00	1,00 Stk
2	connection for boom base 36XXT own parts list	B039101		a 26.04.05	80,00	1,00 Stk
4	pipe (welding group) own parts list	B039035			28,00	1,00 Stk
8	strut own parts list	B039037			7,00	2,00 Stk
9	cross profile	B023083 MSH 100x100x8x6	59410 S355J2G3		15,90	1,00 Stk

Mastauflagebock kpl.

boom support cpl.

B 08 0 003

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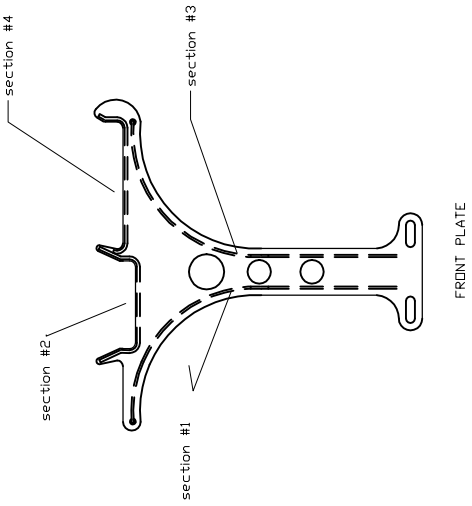
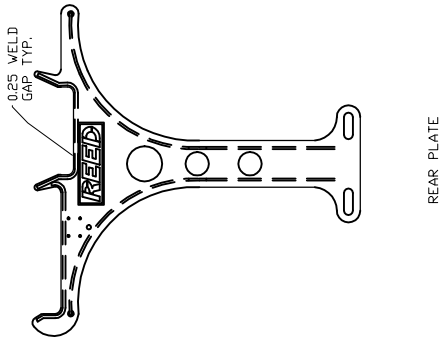
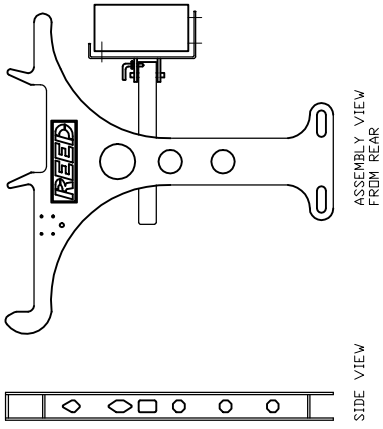
Baumaschinen GmbH



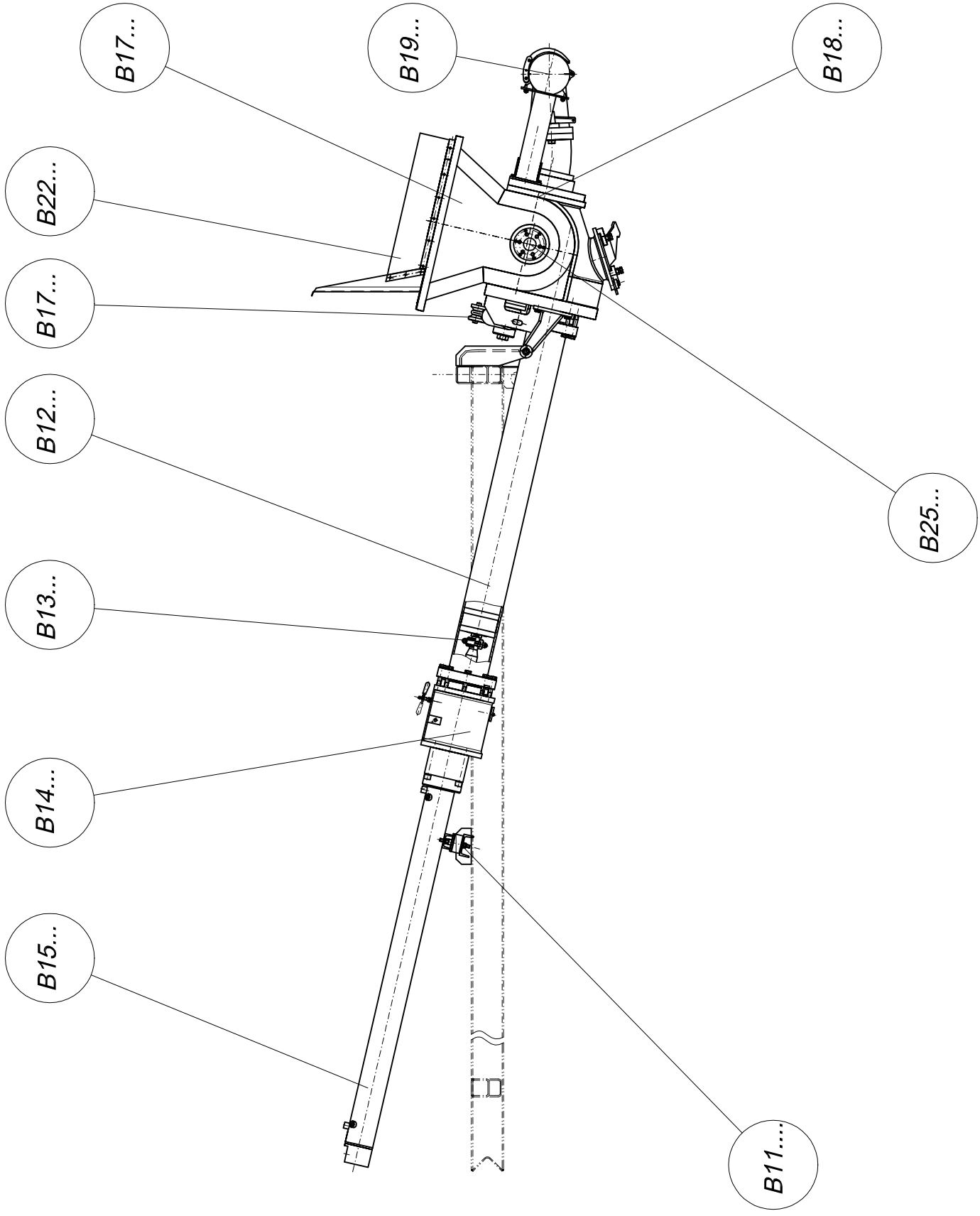




Übersicht B 10 - B 29

over view B 10 - B 29

Waitzinger
Baumaschinen GmbH



22.07.2002

Pumpenlagerung kpl.

pump support cpl.

B 11 5 005

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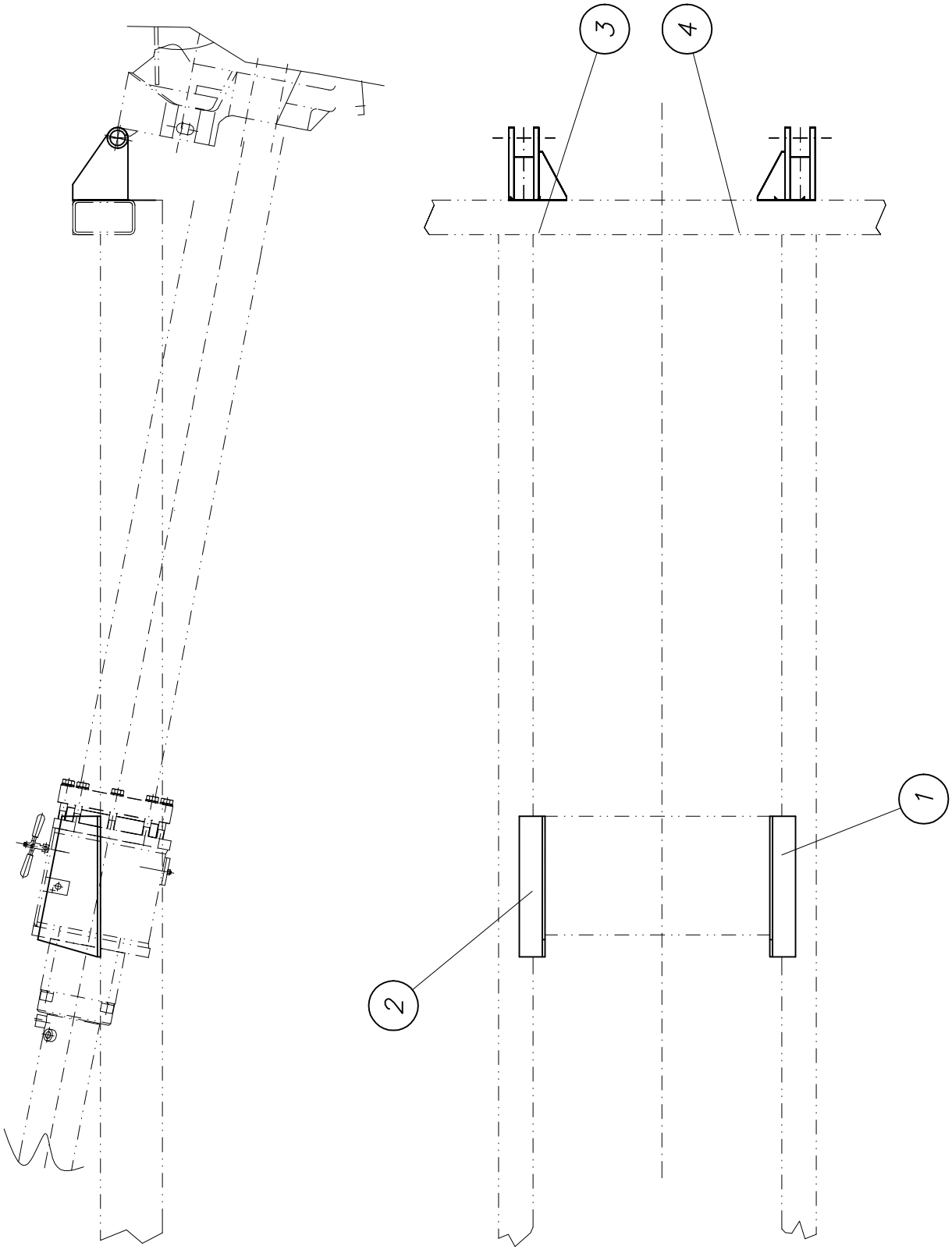

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B115005	pump support funnel	22.01.04 HF			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	holder for water box left	B114166 Bl 8x237x407	1543/EN10029 St37-2		5,00	1,00 Stk
2	holder for water box right	B114167 Bl 8x237x407	1543/EN10029 St37-2		5,00	1,00 Stk
3	bracket right cpl. -N own parts list	B113024		a 20.02.04	6,60	1,00 Stk
4	bracket left cpl. -N own parts list	B113025		a 20.02.04	6,60	1,00 Stk

Förderzylinder kpl.

conveying cylinder cpl.

B 12 5 010

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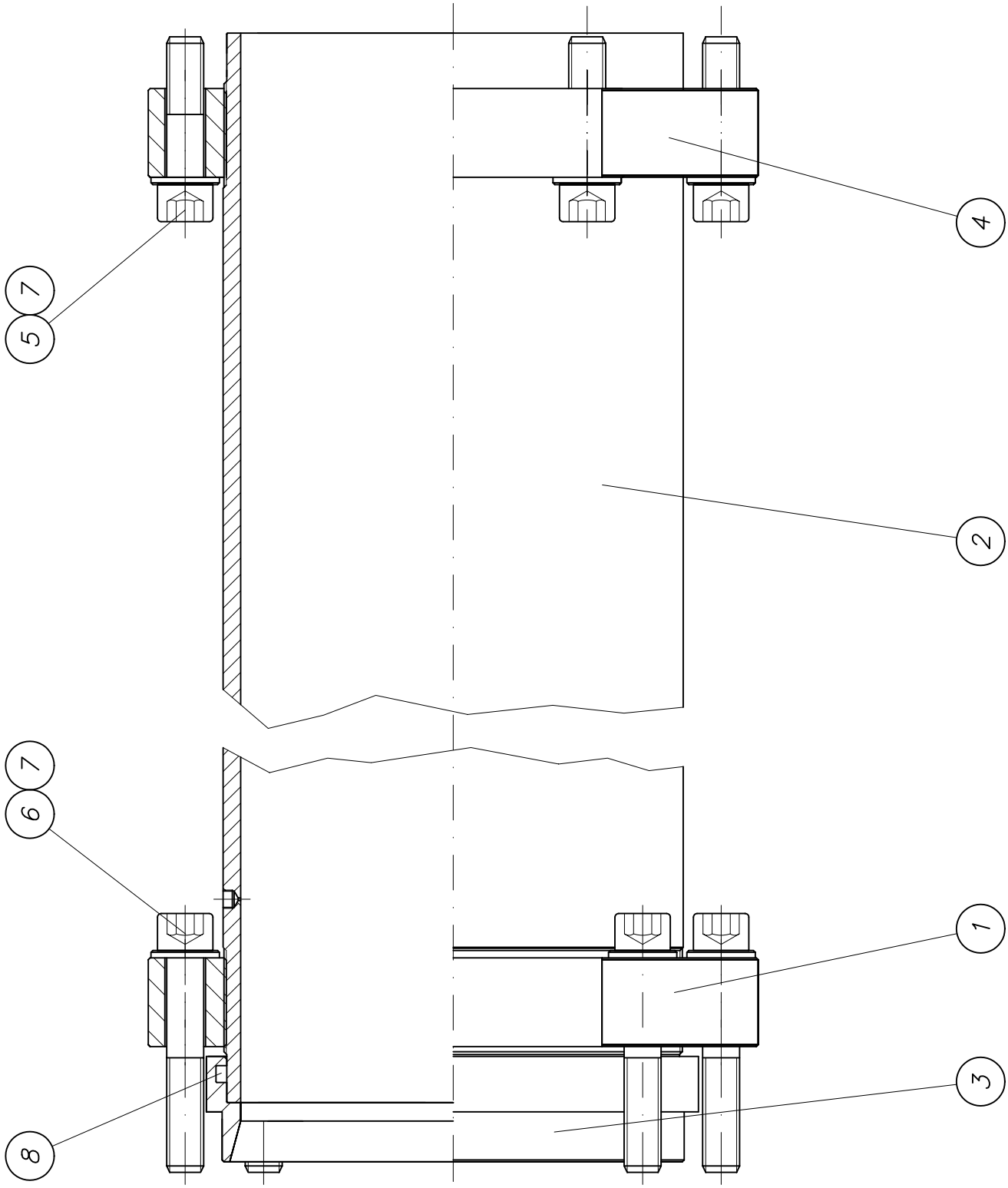

PARTS LIST

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B125010	conveyor cylinder cpl. DN230/215x2000 w.	15.03.01 Mi			

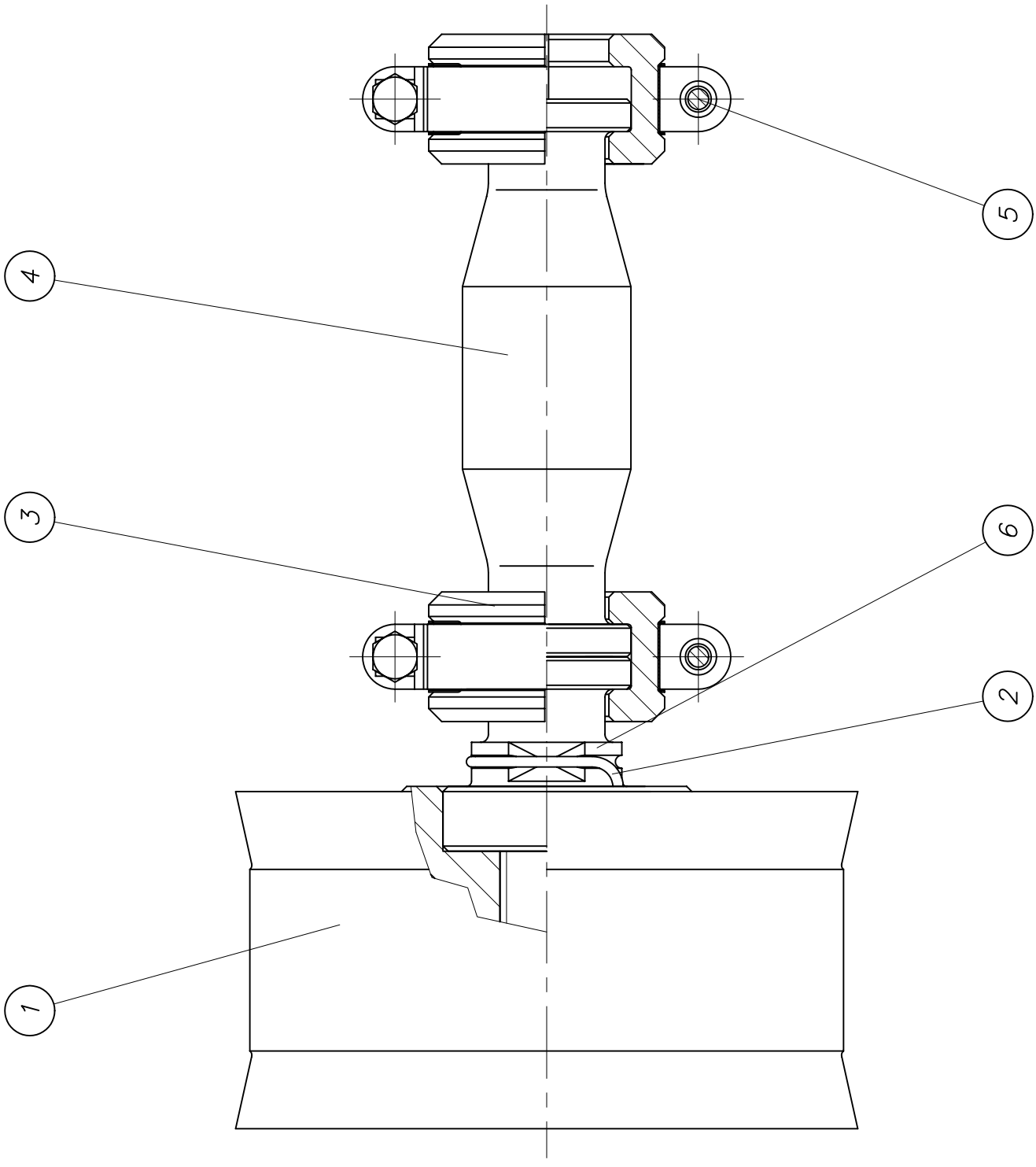
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	flange ring DN 230 threaded	B124021 Bl 55xd330	1543/EN10029 St52-3		12,20	2,00 Stk
2	conveyor cylinder DN230x2000 chromized	B124019 Rohr 250x12.5x2	2448 St52.0		150,00	2,00 Stk
3	fitting ring DN 230 water box	B123012 Rohr 267x36x65	2448 St52.0		6,00	2,00 Stk
4	flange ring DN 230 threaded	B125014 Bl 55xd330	1543/EN10029 St52-3		12,20	2,00 Stk
5	cheese head screw M20 x 80	WAI106754				12,00 Stk
6	cheese head screw M20 x 120	WAI103970				14,00 Stk
7	washer HV	WAI100691			0,01	26,00 Stk
8	O-ring 244 x 7, NBR70	WAI102868				4,00 Stk

Förderkolben kpl.

conveying piston cpl.

B 13 3 020

Waitzinger
Baumaschinen GmbH



15.03.2001

PARTS LIST

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B133020	piston ram cpl. DN 230	08.07.98 Mi			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	piston ram DN 230	WAI100175			19,90	2,00 Stk
2	protection ring	B133019 Federst. 4	17223			2,00 Stk
3	clamp coupling	B131004 Rd 95x50	1013 42CrMo4V			4,00 Stk
4	distance piece	B133003 Rd 70x225	1013 42CrMo4V			2,00 Stk
5	hose clamp S86/25	WAI101381			0,22	4,00 Stk
6	coupling bolt	B133018 Rd 82x120	1013 42CrMo4V		2,20	2,00 Stk

Spülkasten kpl.

water box cpl.

B 14 3 000

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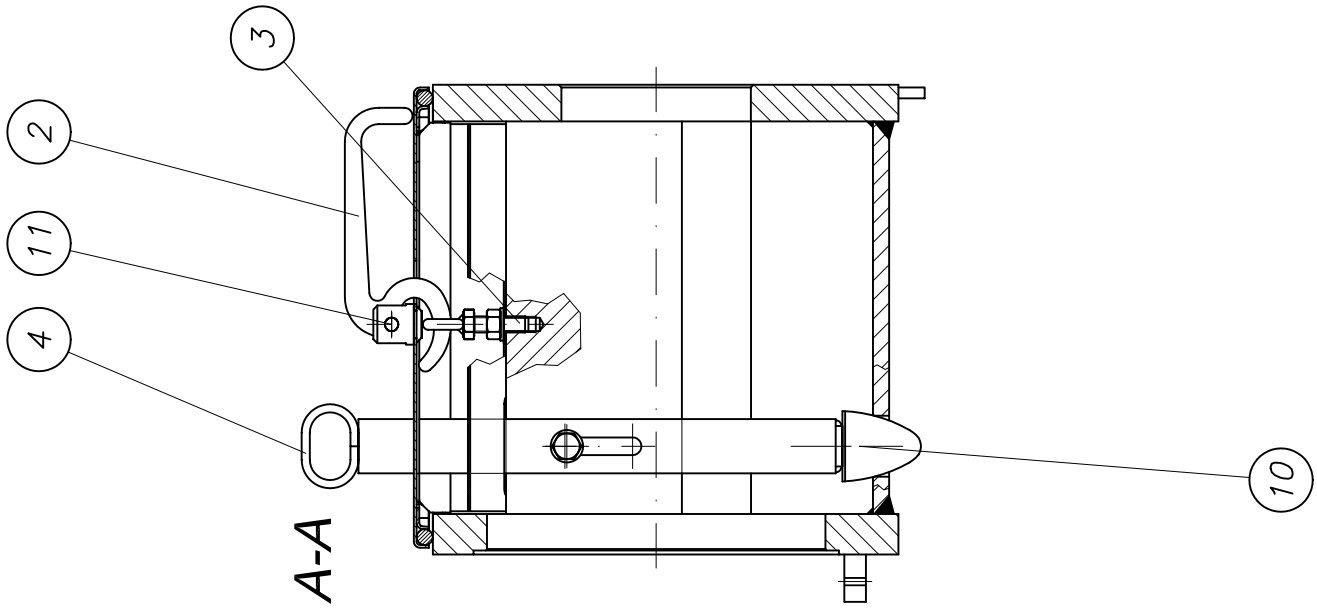

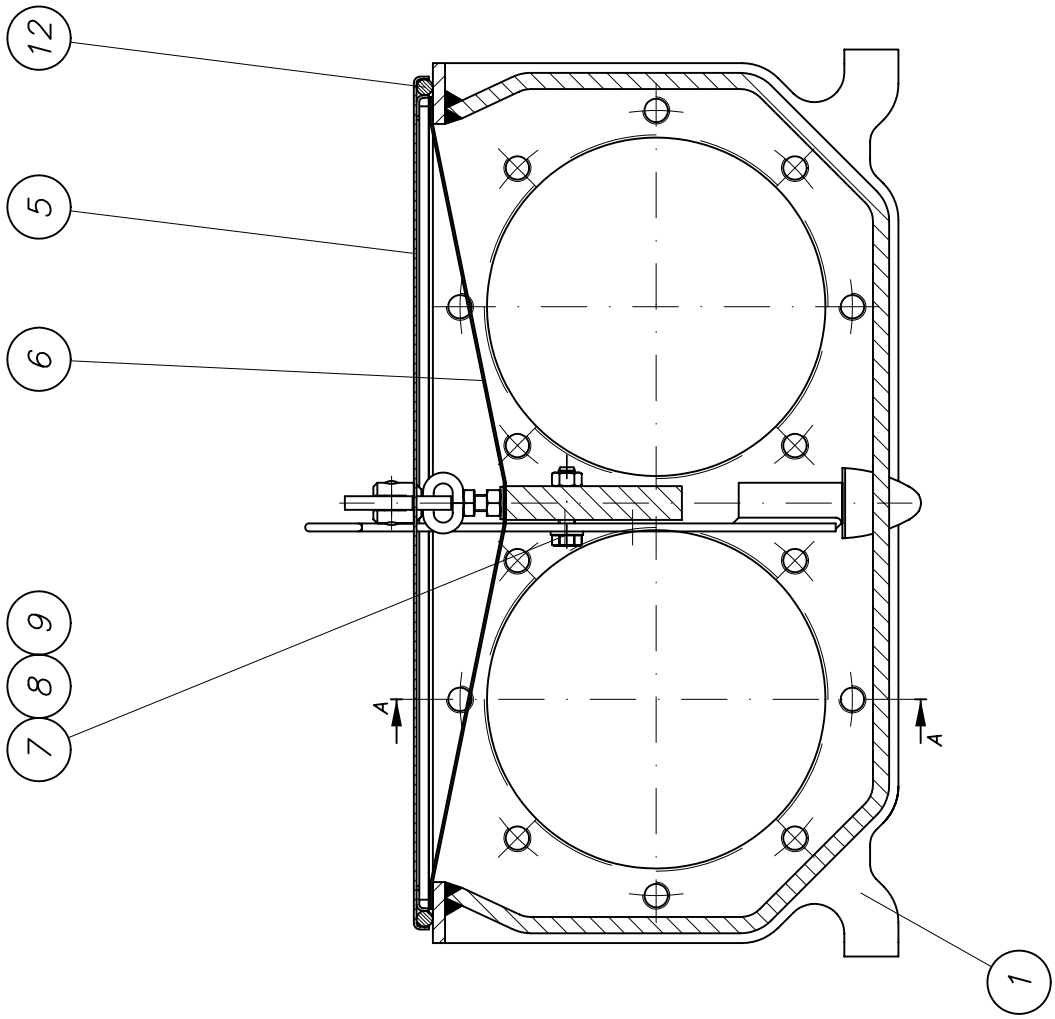

PARTS LIST

27.06.05 08:46:41

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B143000	waterbox cpl. DN 200/230 plug	19.06.97 HG			

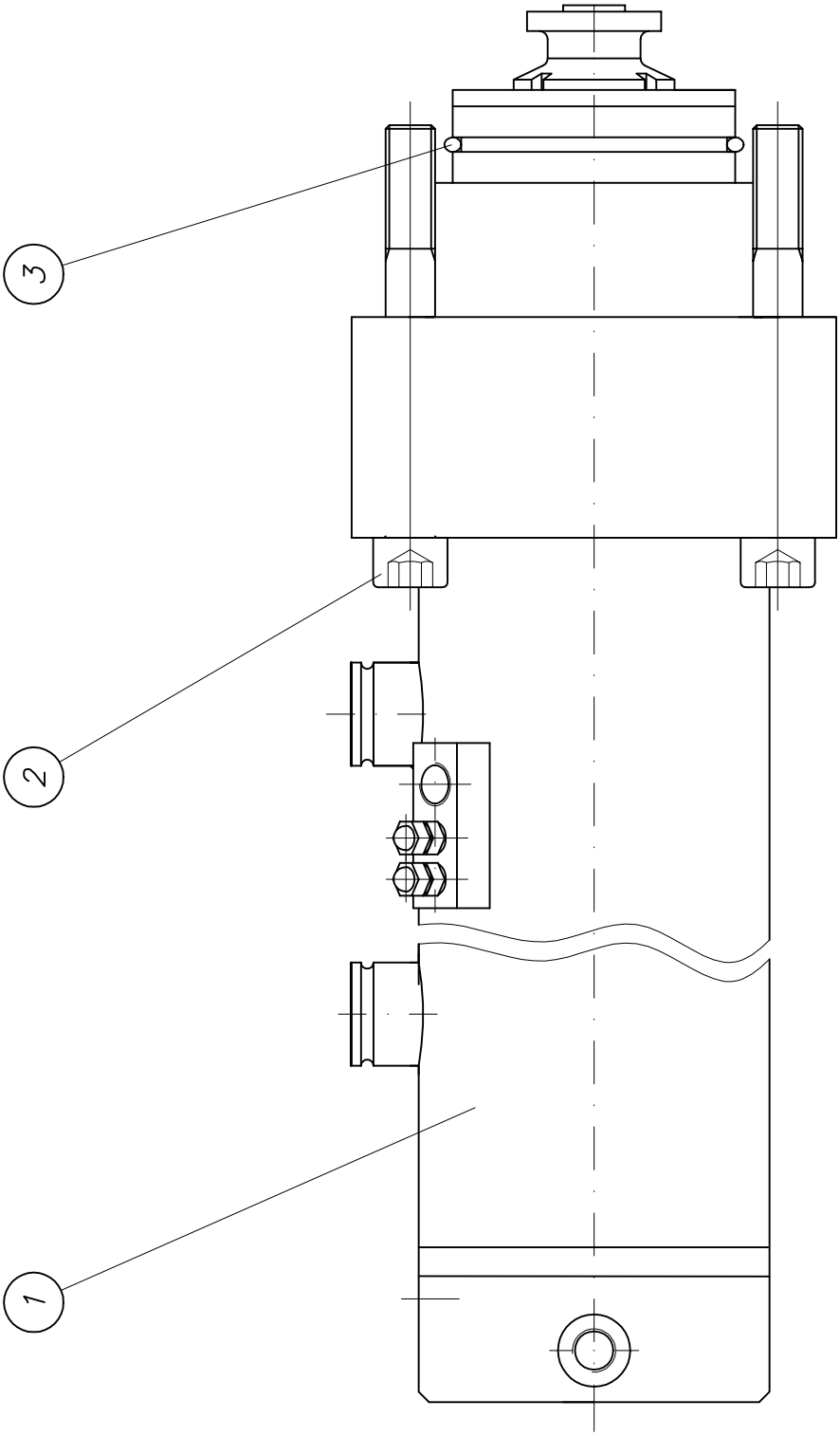
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	waterbox cpl. DN 200/230 (processing) own parts list	B143001		b 02.05.00		1,00 Stk
2	lever	B143007 Bl 10x195x78.5	1543/EN10029 St52-3			1,00 Stk
3	loop bolt cpl. own parts list	B143009			0,09	1,00 Stk
4	drain pin own parts list	B143011			1,14	1,00 Stk
5	cover for waterbox cpl. own parts list	B143015			4,55	1,00 Stk
6	savety lattice	B143020 Lochbl. 1.5x610	Rostfrei	a 28.05.03		1,00 Stk
7	hex. screw M12	WAI103688				1,00 Stk
8	nut M12 DIN 934	WAI101557			0,02	2,00 Stk
9	washer	WAI100504				2,00 Stk
10	rubber buffer 50 x 58	WAI102712				1,00 Stk
11	pin	WAI103387				1,00 Stk
12	O-ring cord 12mm	WAI101831				1,95 Mtr

Antriebszylinder kpl.

drive cylinder cpl.

B 15 4 031

Waitzinger
Baumaschinen GmbH



PARTS LIST

27.06.05 08:26:11

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B154031	drive cylinder cpl. 140/80-2000	20.09.00 Mi			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	drive cylinder 140/80-2000 REED own parts list	WAI106154		a 30.10.03	295,00	2,00 Stk
2	cylinder head screw M 24 x 200	WAI103828				8,00 Stk
3	O-ring 129,2 x 5,7	WAI101441				2,00 Stk

Antriebszylinder

drive cylinder

WAI 106154a

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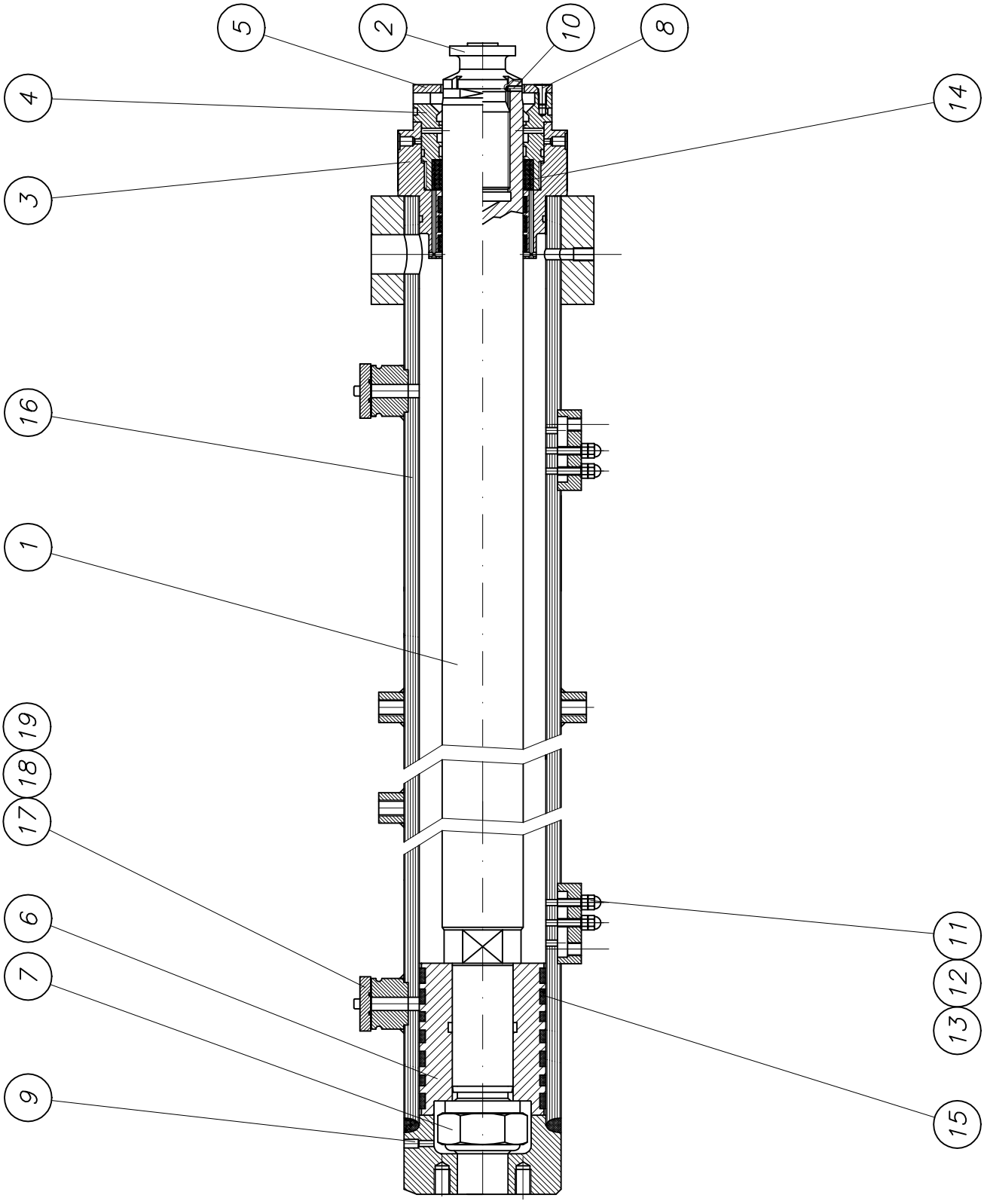

01.12.2003

PARTS LIST

27.06.05 08:28:07

part list	description	created	index	valid from	valid to
WAI106154	drive cylinder 140/80-2000 REED	15.05.00 Mi	a	30.10.03	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	piston rod for drive cylinder	WAI105724 Rd 90x2173	1013 Ck45			1,00 Stk
2	piston joint	WAI104146 Rd 80x131	1013 42CrMo4V		1,87	1,00 Stk
3	guide piece for drive cylinder 140	WAI105725 Rd 180x142	1013 St52	a 30.07.03		1,00 Stk
4	sealing carrier for drive cylinder	WAI104890	GGG 40	a 29.07.03		1,00 Stk
5	aperture for drive cylinder	WAI105726 8x d137	Polyamid			1,00 Stk
6	piston 140 REED	WAI106305		b 30.07.03		1,00 Stk
7	piston nut for drive cylinder	WAI105728				1,00 Stk
8	sunk screw M 8 x 20	WAI103397				3,00 Stk
9	locking screw G 1/8	WAI100528				3,00 Stk
10	set screw	WAI105739				1,00 Stk
11	hex. nut M8 DIN 934 8. VERZ.	WAI102880				4,00 Stk
12	cap nut M8	WAI104933				4,00 Stk
13	set screw	WAI105740				4,00 Stk
14	sealing set for drive cylinder 125/80 own parts list	WAI104690				1,00 Stk
15	sealing set for drive cylinder 140/80 own parts list	WAI106156				1,00 Stk
16	cylinder pipe cpl. 140 REED	WAI106153		a 30.07.03		1,00 Stk
17	cover for sensor connection	B154017 Rd 11x55	1013 S235J2G3		0,20	2,00 Stk
18	o-ring	WAI108533				2,00 Stk
19	alien bolt M 6x25	WAI103673				4,00 Stk

Stangendichtsatz
rod sealing set

WAI 104690

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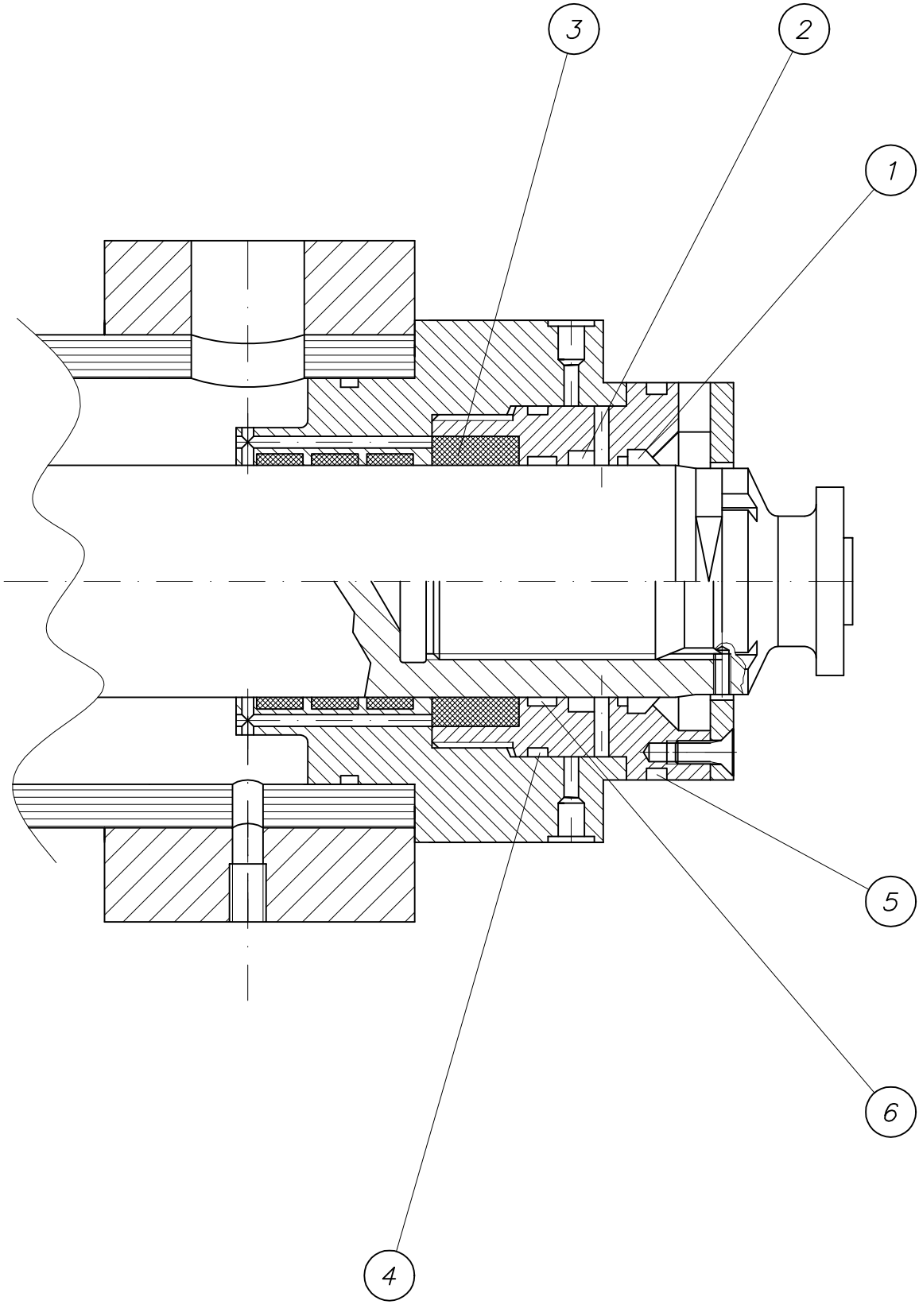

15.03.2001

PARTS LIST

27.06.05 08:29:29

part list	description	created	index	valid from	valid to
WAI104690	sealing set for drive cylinder 125/80	30.08.99 Mi			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	wiper	WAI100259			0,00	1,00 Stk
2	wiper	WAI105729				1,00 Stk
3	v-packing 80 x 100 x 30	WAI102584				1,00 Stk
4	sealing for drive cylinder	WAI105732				1,00 Stk
5	o-ring	WAI105731				1,00 Stk
6	rod support for drive cylinder	WAI105738				1,00 Stk

Dichtsatz für Antriebszylinder
sealing set for drive cylinder

WAI 106156

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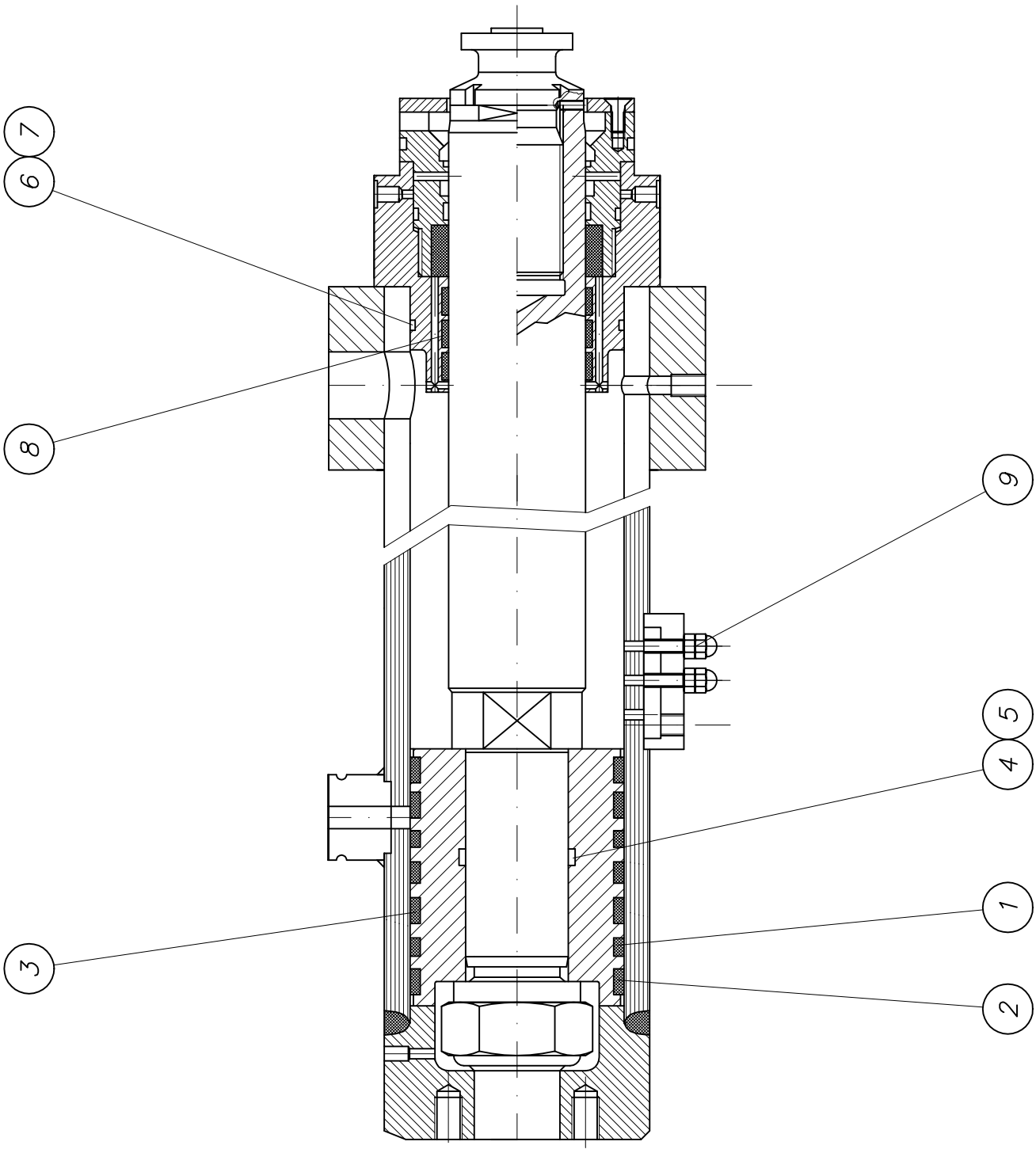


12.11.2002

PARTS LIST

27.06.05 08:31:02

part list	description	created	index	valid from	valid to
WAI106156	sealing set for drive cylinder 140/80	03.08.00 hbk			

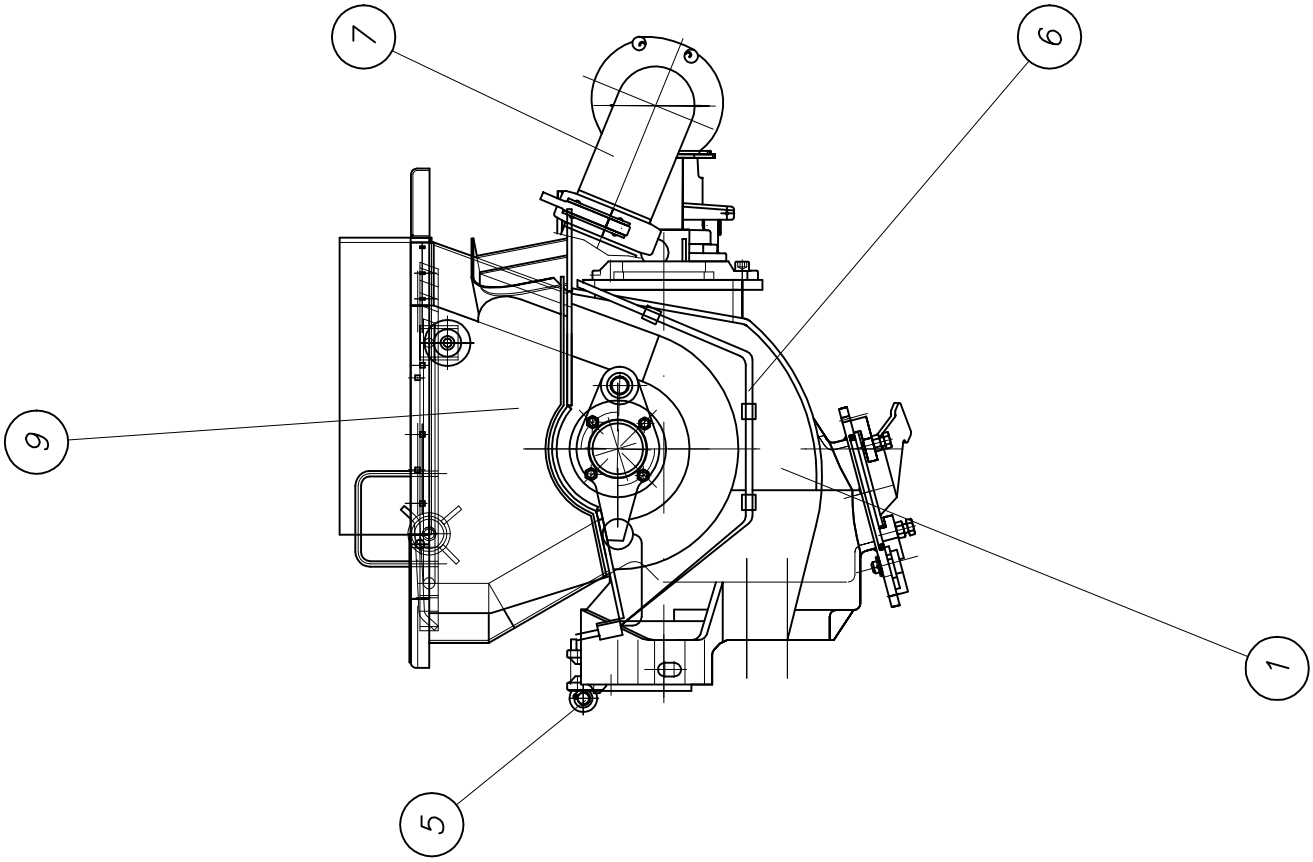
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	piston guide	WAI105735				3,00 Stk
2	piston ring permasel DN140	WAI105049			0,05	2,00 Stk
3	piston ring DN 140	WAI106313				2,00 Stk
4	back-up ring	WAI105736				2,00 Stk
5	o-ring	WAI105734				1,00 Stk
6	O-ring 134 x 4	WAI106314				1,00 Stk
7	back-up ring	WAI106315				1,00 Stk
8	piston guide	WAI106316			5,00	3,00 Stk
9	usit-ring 8.7-14-1	WAI101269				8,00 Stk

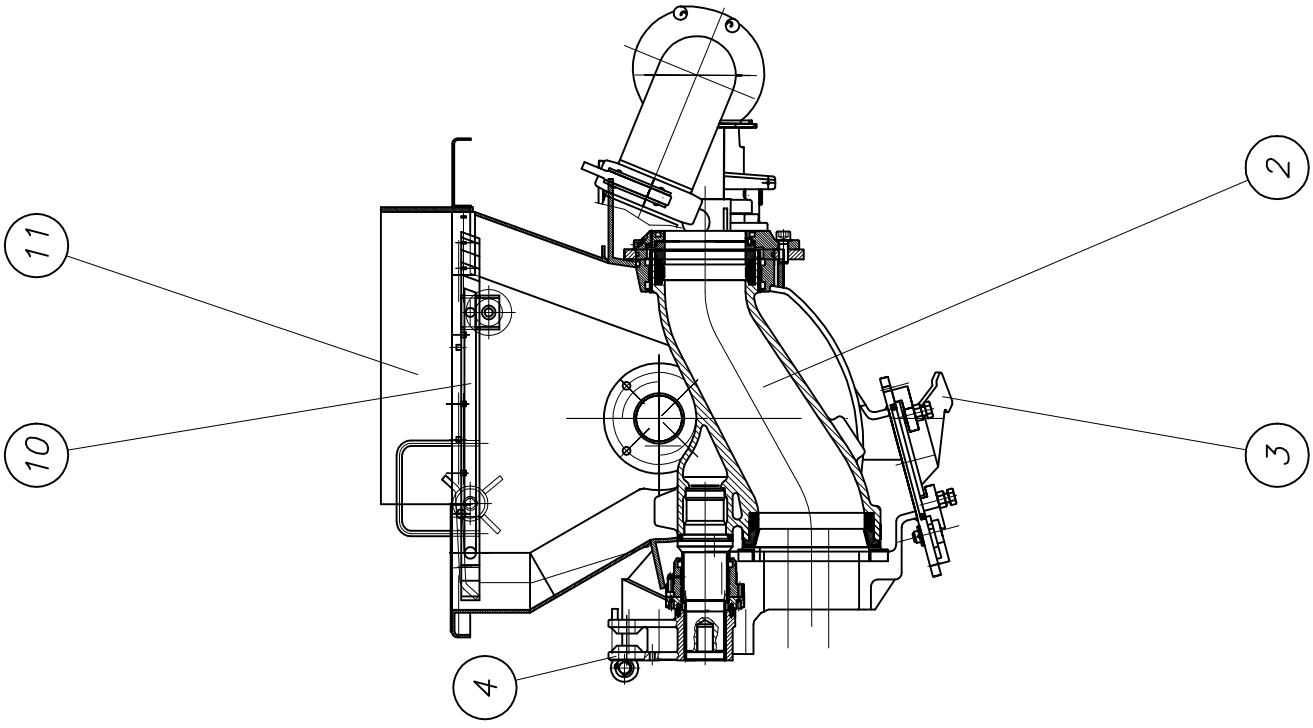
Schiebersystem kpl.

s-valve system cpl.

B 17 5 200R1

Waitzinger
Baumaschinen GmbH





28.09.2005

PARTS LIST

28.09.05 09:41:32

part list	description	created	index	valid from	valid to
B175200R1	s-valve system w/o	20.07.05 TECHNIK			

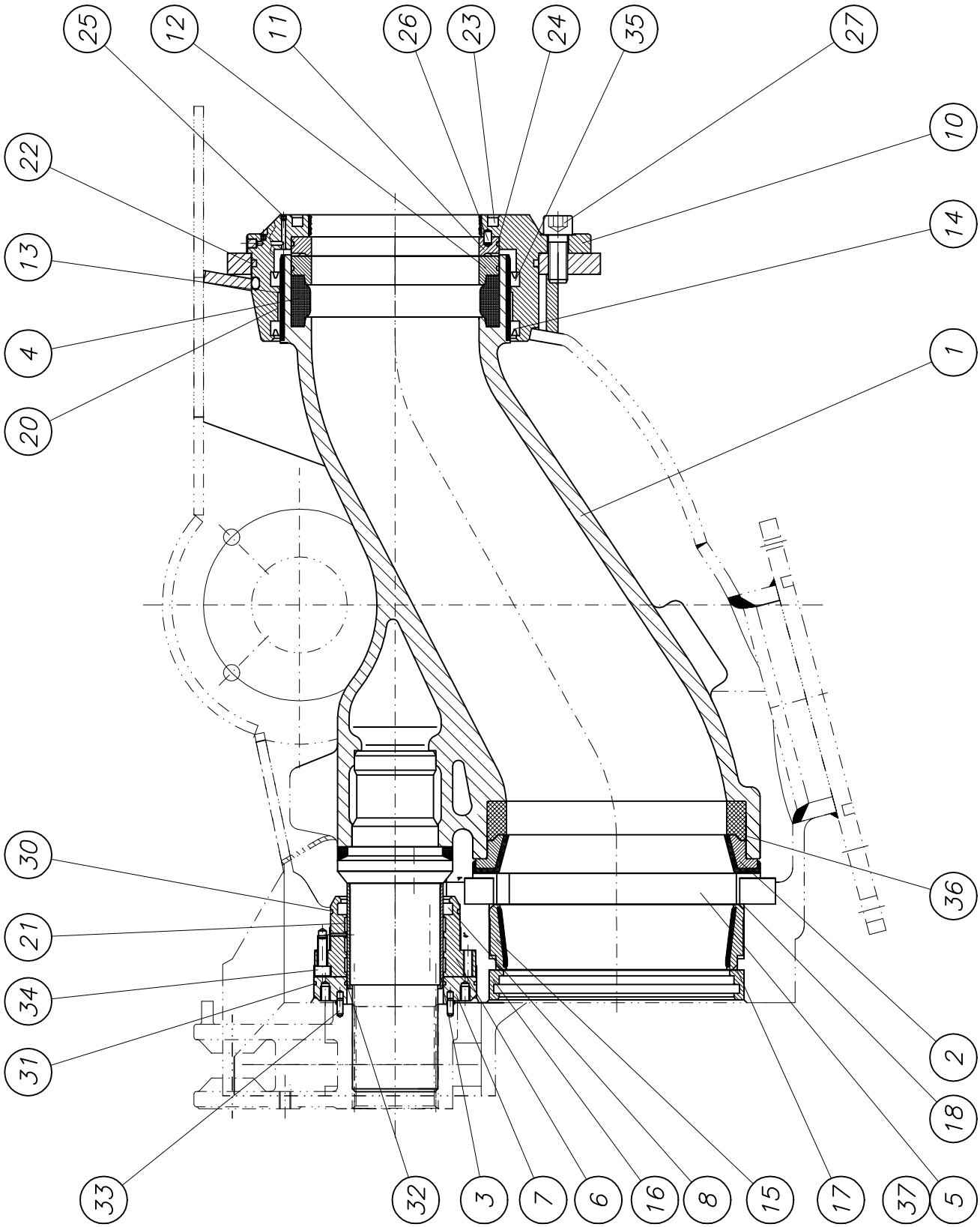
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	s-valve housing cpl. (processing) DN 230 own parts list	B175025		e 25.05.05	572,00	1,00 Stk
2	s-valve system complete own parts list	B175006		b 25.02.05		1,00 Stk
3	cleaning hole assembly own parts list	B175050		a 21.03.03		1,00 Stk
4	shift drive system cpl. own parts list	B175020		b 02.08.05		1,00 Stk
5	pump support funnel own parts list	B115001				1,00 Stk
6	lubrication system complete own parts list	B185003		a 29.07.04		1,00 Stk
7	conveying pipe line 6" own parts list	B195065R1				1,00 Stk
9	hopper upper part own parts list	B225055				1,00 Stk
10	grid cpl. own parts list	B225040		b 29.11.04		1,00 Stk
11	rubber apron cpl own parts list	B225045		a 04.04.03		1,00 Stk

Schiebersystem kpl.

s-valve system cpl.

B 17 5 006b

Waitzinger
Baumaschinen GmbH



04.03.2005

PARTS LIST

22.06.05 10:11:14

part list	description	created	index	valid from	valid to
B175006	s-valve system complete	21.01.04 ek	b	25.02.05	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	s-valve cpl. own parts list	B175080			98,00	1,00 Stk
2	wear ring DN230	B175210 Bl 40xD300	1543/EN10029 S355J2G3		4,00	1,00 Stk
3	wear bushing small	B175175 Rohr 108x10x115	2448 StE690		1,70	1,00 Stk
4	tension ring DN217x64 / 70 shore	B175202 217x64	70 Shore			1,00 Stk
5	wear plate DN 250	B175177 Bl 30x400x644	1543/EN10029 St52-3	a 02.12.03	23,00	1,00 Stk
6	bearing housing small	B175178 Rd 180x90	1013 St52-3	b 24.07.03		1,00 Stk
7	axial bearing washer	B175179 Rd 180x35	1013 CuSn8P (2.18	a 01.08.03		1,00 Stk
8	groove ring 100x120x12 own parts list	B175181			0,04	1,00 Stk
10	bearing housing big (processing) megahop own parts list	B175009		b 23.05.05		1,00 Stk
11	slide ring DN 217 x 20	B173013 d217x20				1,00 Stk
12	slide ring DN 217 x 30	B173014				1,00 Stk
13	wear bushing big	B173073 Rohr 244.5x12.5	2458 StE690	a 01.08.03	2,00	1,00 Stk
14	groove ring 240x260x15 own parts list	B173078			0,04	1,00 Stk
15	fitting ring with hardened surface own parts list	B175071			7,60	2,00 Stk
16	fitting ring	B175072 Bl 40xd275	DIN EN 10029 S235J2G3	a 01.07.04	2,90	2,00 Stk
17	O-Ring 243 x 4	WAI108633				2,00 Stk
18	O-Ring 258 x 4	WAI108634				2,00 Stk
20	rod wear-ring 240 x 245 x 15 mm	WAI102487			0,03	2,00 Stk
21	rod wear-ring 105 x100 x 15 mm	WAI106096			0,01	3,00 Stk
22	O-ring 290 x 5	WAI102539			0,02	1,00 Stk
23	O-ring 193 x 10	WAI103563			0,05	1,00 Stk
24	O-ring	WAI101808				2,00 Stk

PARTS LIST

22.06.05 10:11:14

part list	description	created	index	valid from	valid to
B175006	s-valve system complete	21.01.04 ek	b	25.02.05	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
25	set screw M 8 x 8	WAI106824				4,00 Stk
26	straight pin	WAI103717				2,00 Stk
27	cheese head screw M20 x 50	WAI102854				4,00 Stk
30	O-ring 129,5 x 3 SH90	WAI102448				1,00 Stk
31	sealing ring 165 x 3	WAI103580				1,00 Stk
32	O-ring	WAI105771				1,00 Stk
33	straight pin	WAI103061				2,00 Stk
34	cheese head screw M 10 x 25	WAI109528				4,00 Stk
35	groove ring 240x260x15	WAI100479				1,00 Stk
36	tension ring	B175201 270x45	50 Shore		0,60	1,00 Stk
37	cheese head screw M20 x 130	WAI104885				4,00 Stk

Reinigungsklappe kpl.

cleaning cover cpl.

B 17 5 050a

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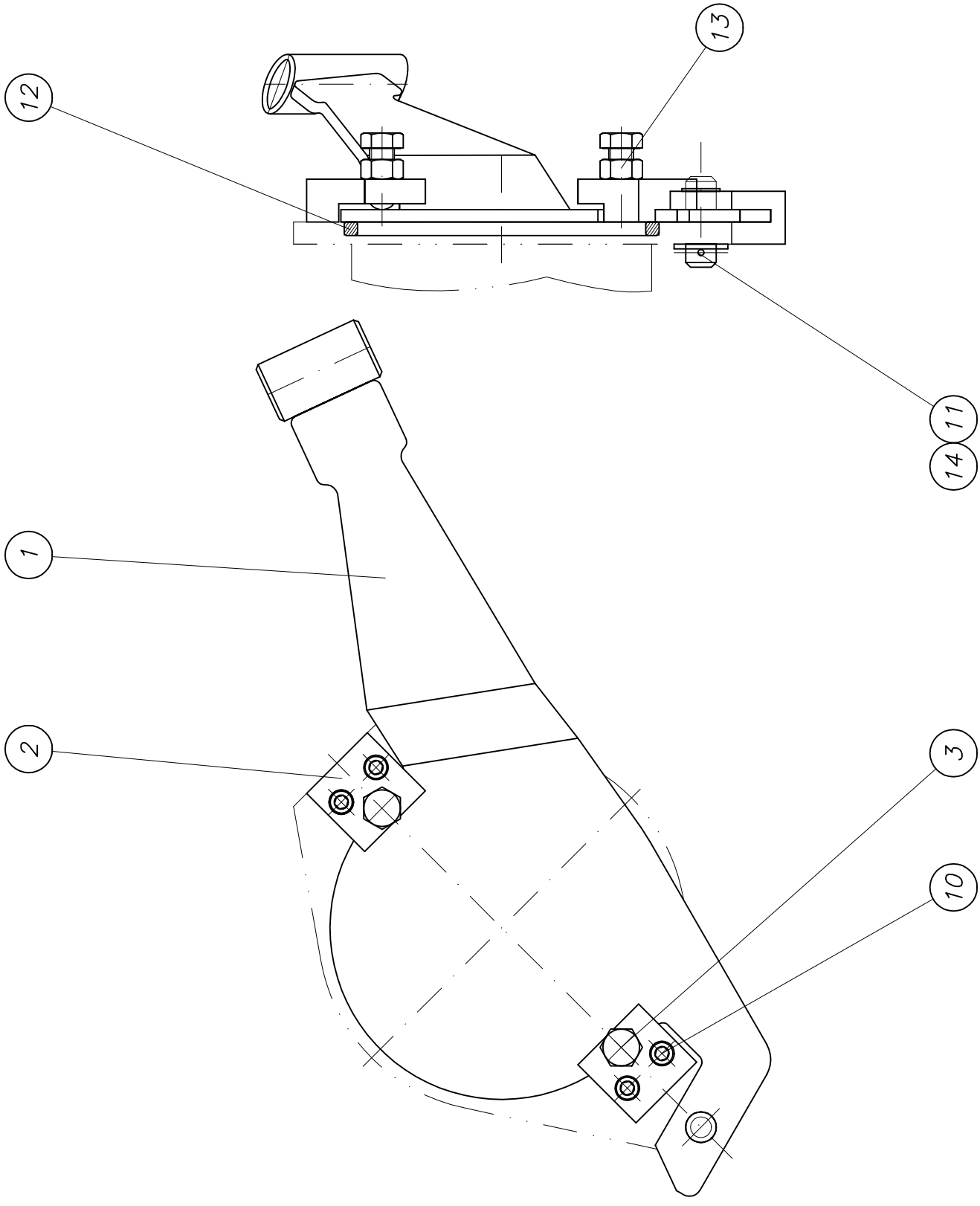
Baumaschinen GmbH



PARTS LIST

22.06.05 10:11:47

part list	description	created	index	valid from	valid to
B175050	cleaning hole assembly	03.03.00 Mi	a	21.03.03	

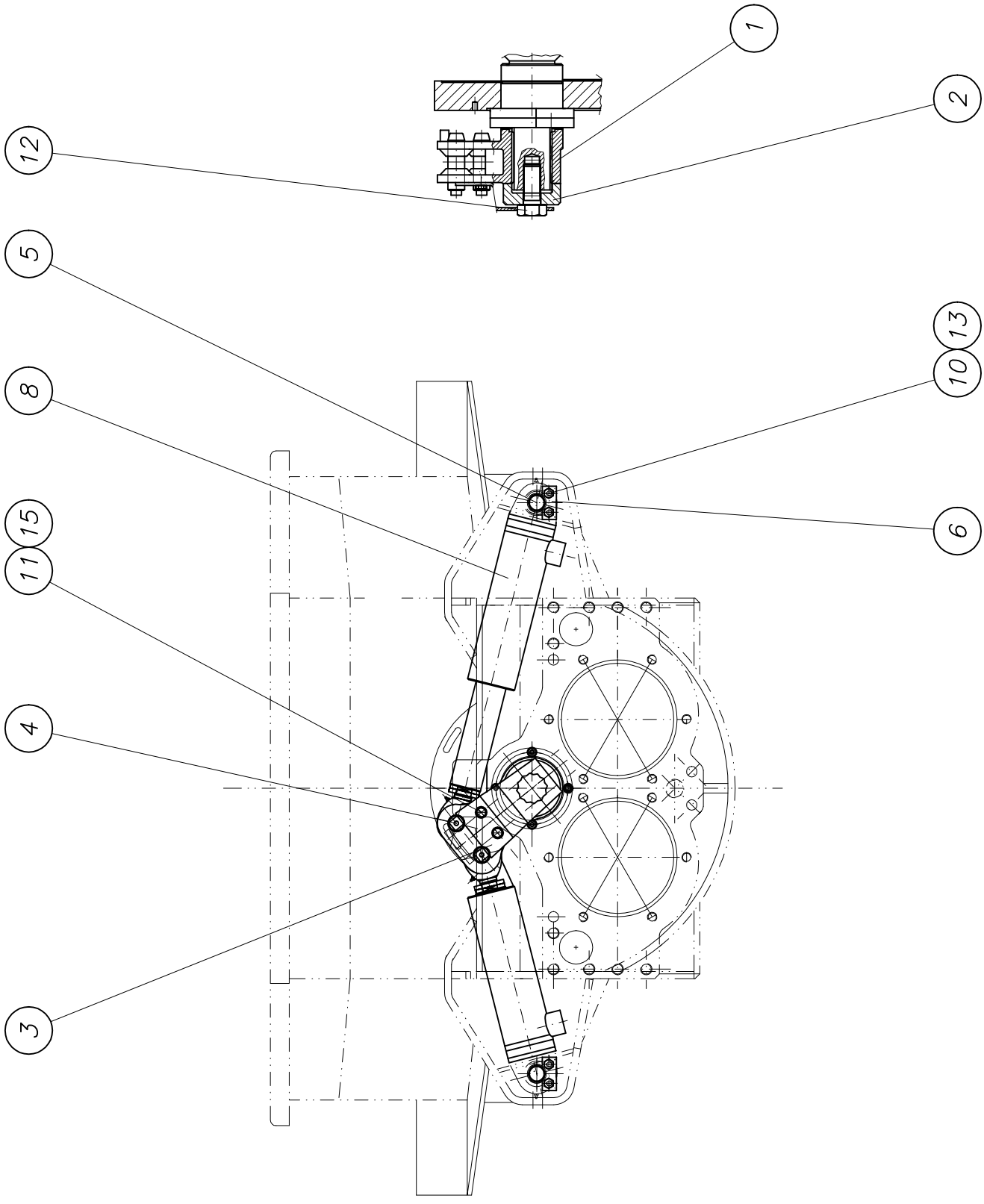
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	cover cpl. for cleaning cover own parts list	B175051		b 15.06.04	9,00	1,00 Stk
2	plate	B172126 Bl 40x67x70	1543/EN10029 St52-3		0,89	2,00 Stk
3	screw M 20 (processing) own parts list	B172128 6-Kt.Schraube M	933-8.8		0,18	2,00 Stk
10	cheese head screw M 12 x 40	WAI102855				4,00 Stk
11	washer 25, DIN 125	WAI103298				1,00 Stk
12	O-ring cord 12mm	WAI102908				0,78 Mtr
13	nut M20 DIN 934	WAI102891				2,00 Stk
14	split pin	WAI105194				1,00 Stk

Schwenkantrieb kpl.

tilting device cpl.

B 17 5 020b

Waitzinger
Baumaschinen GmbH



PARTS LIST

25.08.05 09:50:12

part list	description	created	index	valid from	valid to
B175020	shift drive system cpl.	11.07.01 Mi	b	02.08.05	

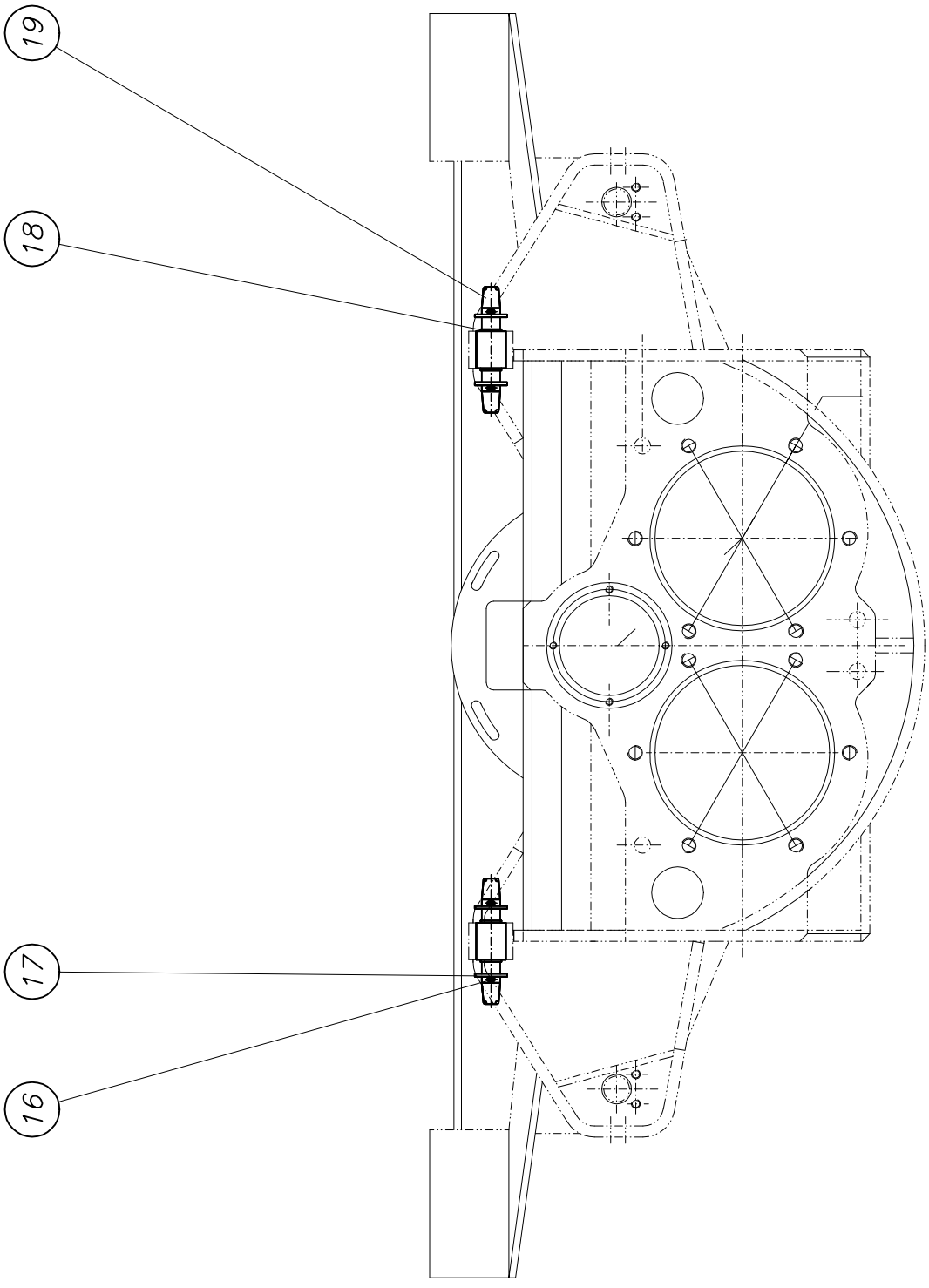
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	tilting lever (processing) own parts list	B175180			13,00	1,00 Stk
2	pressure disc	B174103 Rd125x50	1013 42CrMo4V		2,70	1,00 Stk
3	locking plate	B174104 Bl 6x220x120	1543/EN10029 St52-3		1,00	1,00 Stk
4	bolt	B173019 Rd 40x125	1013 42CrMo4V		0,83	2,00 Stk
5	bolt	B173066 Rd 40x115	1013 42CrMo4V	a 06.04.00	0,80	2,00 Stk
6	axle retainer	B173067 Fl 30x6x70	1017 St52-3		0,13	2,00 Stk
8	tilting cylinder D 65x220	WAI109491			23,00	2,00 Stk
10	hex. bolt M12 x 25 DIN 933 8.8	WAI101001			0,04	4,00 Stk
11	hex. bolt M12x30 DIN 933 8.8	WAI102107			0,04	2,00 Stk
12	hex.screw M 36 x 3 x 85	WAI103327		a 01.08.05		1,00 Stk
13	conical spring washer 12 mm	WAI102877				4,00 Stk
15	spring washer A12 DIN 127 VERZ.	WAI102896				2,00 Stk

Pumpenlagerung Trichter kpl.

pump support hopper cpl.

B 11 5 001

Waitzinger
Baumaschinen GmbH



PARTS LIST

22.06.05 10:12:42

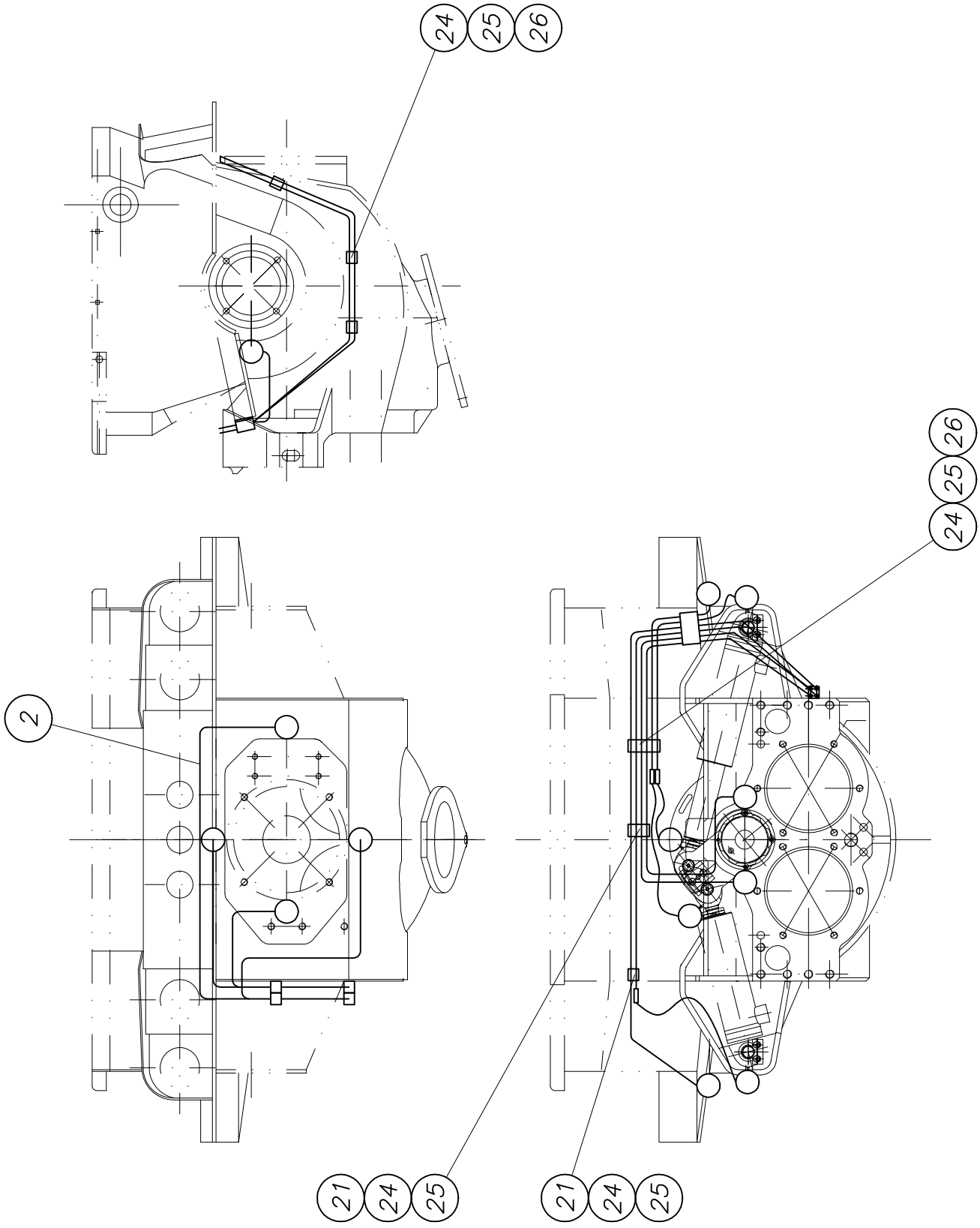
part list	description	created	index	valid from	valid to
B115001	pump support funnel	13.10.03 ute			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
16	pin	WAI100940				4,00 Stk
17	washer 26, DIN 126	WAI103411				4,00 Stk
18	rubber buffer 40 x 25 x 50	WAI102489			0,21	2,00 Stk
19	bolt	B113021 Rd 30x175	1013 42CrMo4V	a 13.02.02	0,65	2,00 Stk

Schmieranlage kpl.
lubrication system cpl.

B 18 5 003a **1**

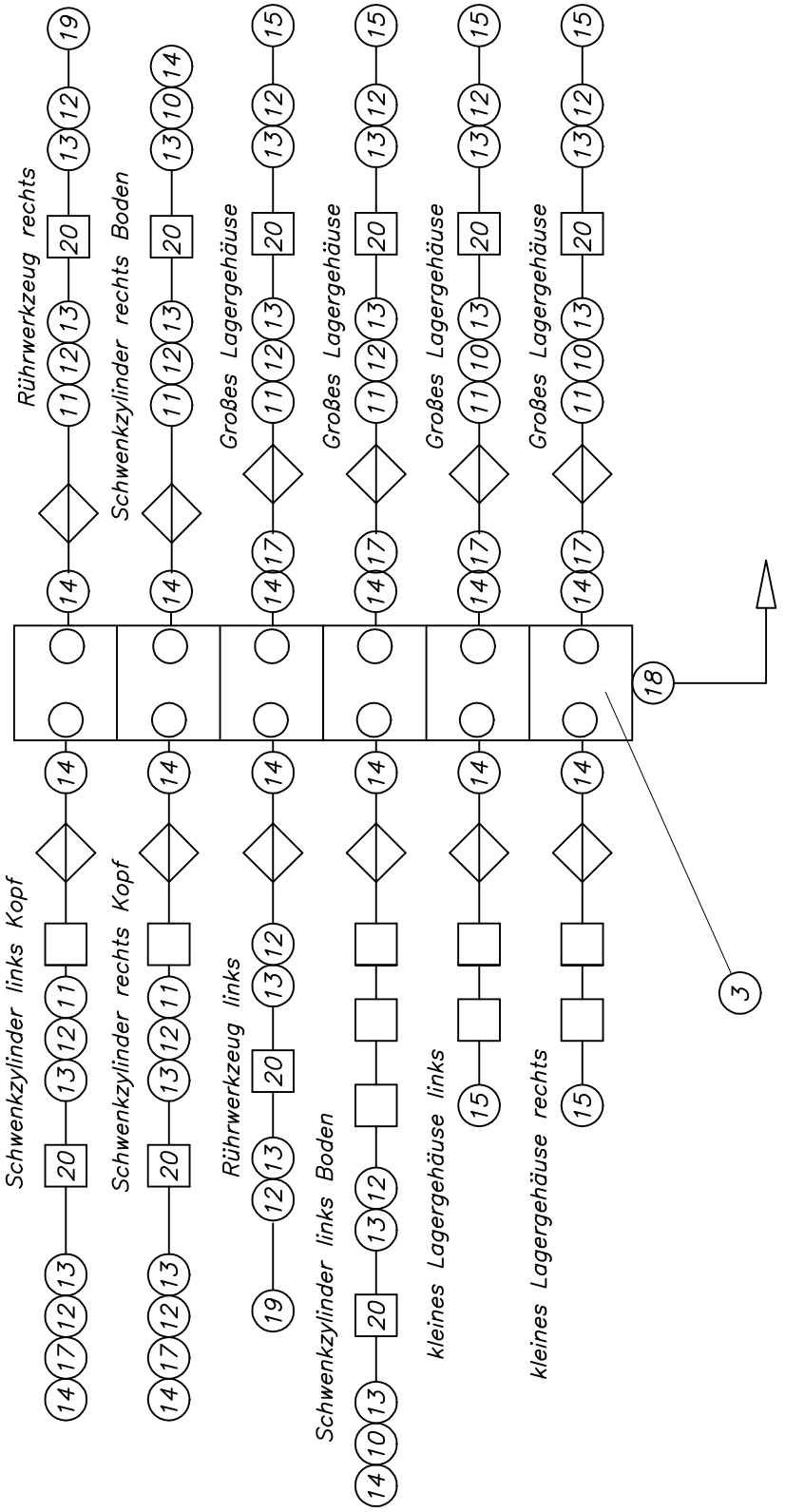
Waitzinger
Baumaschinen GmbH



Schmieranlage kpl.
lubrication system cpl.

B 18 5 003a **2**

Waitzinger
Baumaschinen GmbH



PARTS LIST

22.06.05 10:13:14

part list	description	created	index	valid from	valid to
B185003	lubrication system complete	15.10.03 ek	a	29.07.04	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
2	set of pipes for greasing system	WAI106760				1,00 Stk
3	lubrication distributor complete (12) own parts list	WAI105657			0,01	1,00 Stk
10	threaded sleeve, 90 degrees	WAI102643			0,02	4,00 Stk
11	straight couplings L6	WAI105282				8,00 Stk
12	hose connecting piece, DN6, short	WAI100253			0,01	16,00 Stk
13	threaded sleeve	WAI100254			0,01	20,00 Stk
14	straight male stud couplings L6M	WAI100546			0,03	16,00 Stk
15	throttlefree banjo elbows L6M	WAI102284				6,00 Stk
17	adjustable elbow bodies L6	WAI102664			0,02	8,00 Stk
18	straight male stud couplings L6M14 x 1,5	WAI102665			0,04	1,00 Stk
19	male stud LL6M 6 x 1	WAI102603				2,00 Stk
20	plastic pipe 8.4 x 2.1	WAI100255			0,05	6,00 Mtr
21	hexagon screw	WAI102109			0,01	2,00 Stk
24	pipe clip 6 mm (double)	WAI105281				8,00 Stk
25	welding plate for pipe clip	WAI105422			0,03	2,00 Stk
26	hexagon screw M 6 x 60 DIN 931 8.8	WAI104065				3,00 Stk
27	cable tie 200x3.6, black	WAI103137				10,00 Stk

PARTS LIST

28.09.05 09:49:46

part list	description	created	index	valid from	valid to
b195065R1	conveying pipe line 6"	20.07.05 TECHNIK			

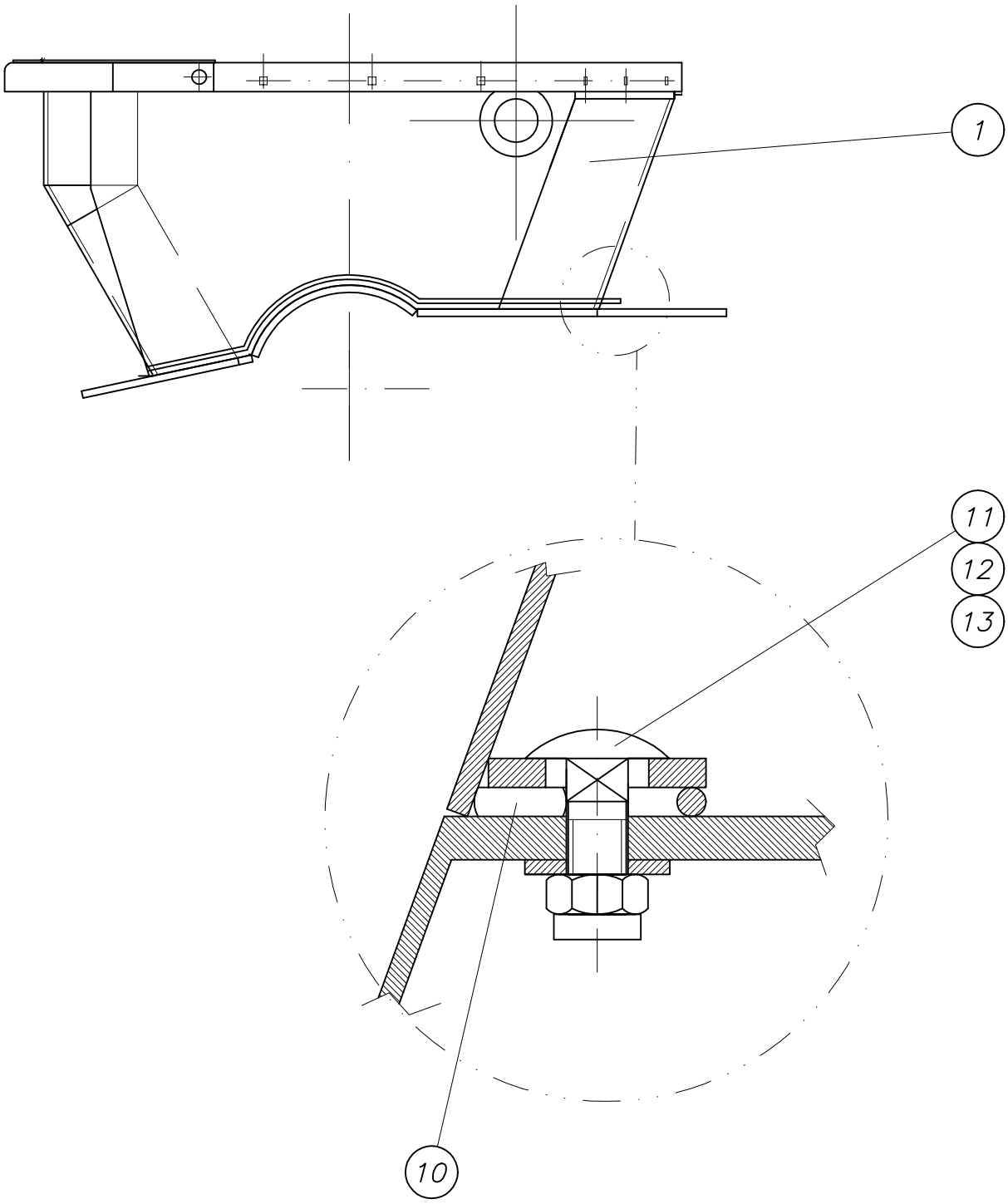
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	hinge own parts list	B190004			6,00	1,00 Stk
2	pin	B190008 Rd 40x315	1543 669		3,00	1,00 Stk
3	locking pin complete own parts list	B193008		a	3,00	1,00 Stk
4	locking wedge complete own parts list	B194046			1,85	1,00 Stk
10	cheese head screw M 16 x 40	WAI102859				4,00 Stk
11	spring washer A16	WAI103489			0,01	4,00 Stk
12	O-ring 193 x 10	WAI103563			0,05	1,00 Stk
13	cheese head screw M20 x 50	WAI102854				2,00 Stk
22	locking ring	WAI102865				2,00 Stk
23	key ring	WAI104636				2,00 Stk
24	chain 4mm	WAI103732				1,00 mtr

Trichteroberteil kpl.

hopper upper part cpl.

B 22 5 055

Waitzinger
Baumaschinen GmbH



PARTS LIST

22.06.05 10:14:34

part list	description	created	index	valid from	valid to
B225055	hopper upper part	11.11.02 Mi			

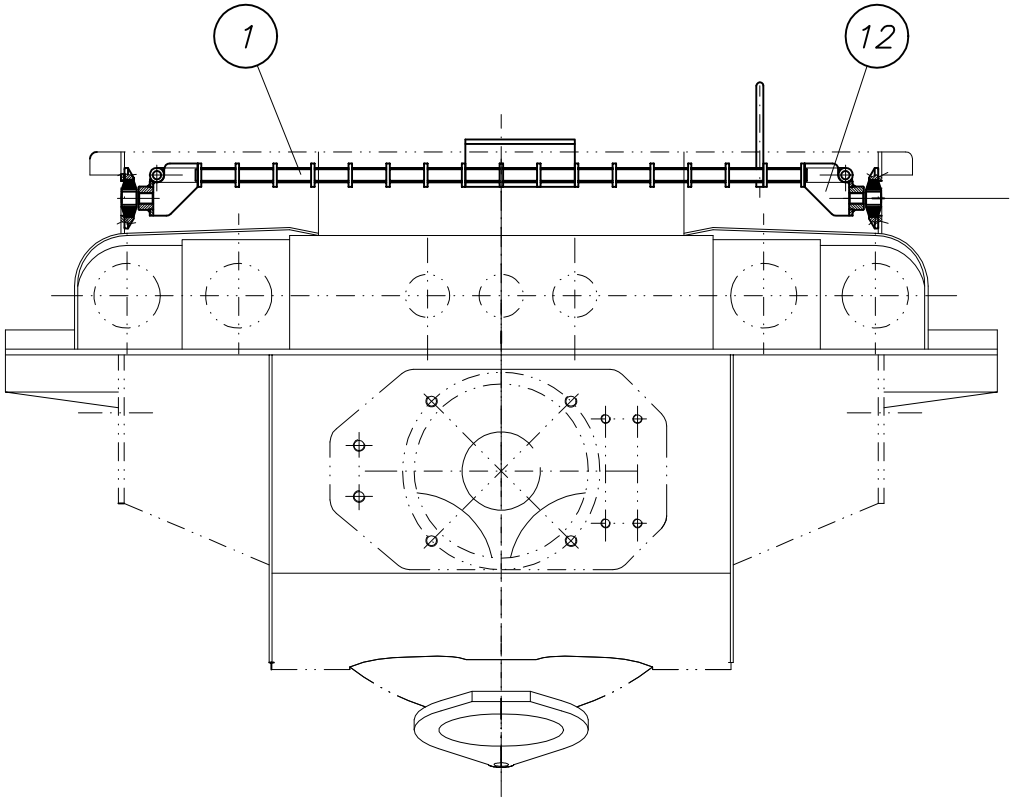
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	kopper upper part own parts list	B175011		a 30.05.05	86,00	1,00 Stk
10	expanded rubber	WAI103309				4,00 Mtr
11	cup square neck bolt M 16 x 50	WAI105131				4,00 Stk
12	nut M16 DIN 985	WAI102330				4,00 Stk
13	washer DIN 6916 17	WAI101558			0,02	4,00 Stk

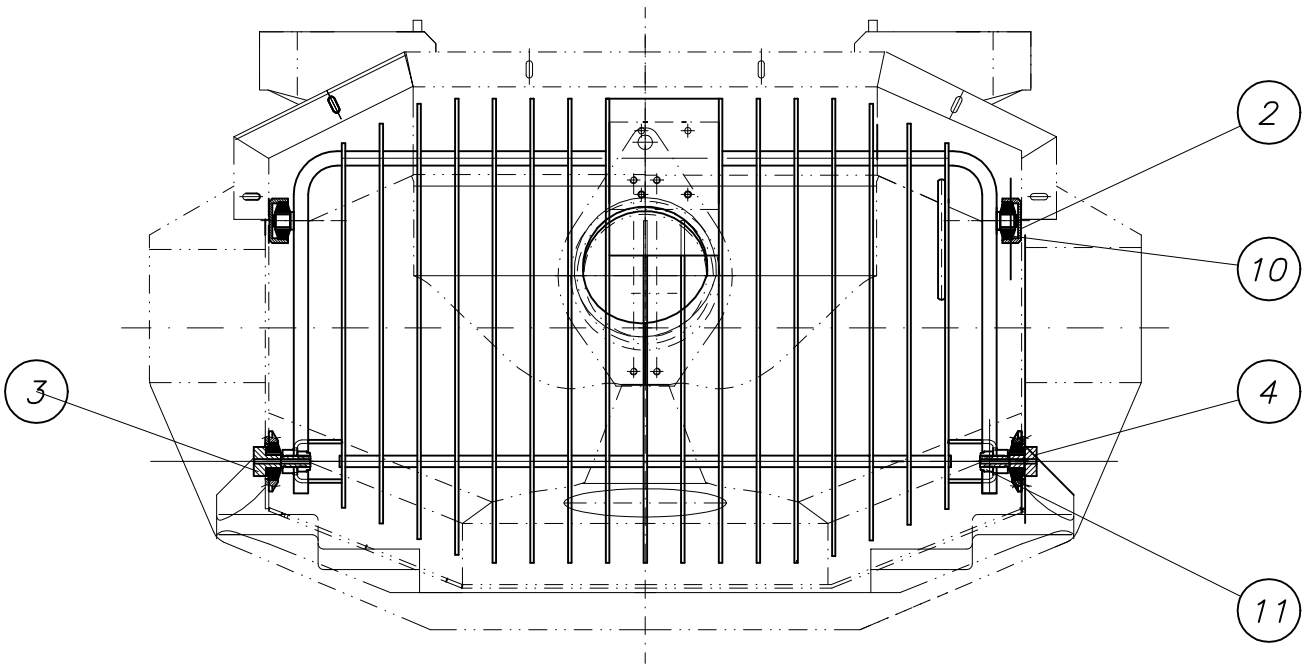
Gitterrost kpl.

grid cpl.

B 22 5 040b

Waitzinger
Baumaschinen GmbH





PARTS LIST

22.06.05 10:15:05

part list	description	created	index	valid from	valid to
B225040	grid cpl.	29.01.01 Mi	b	29.11.04	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	grate own parts list	B225010		b 09.09.04	33,42	1,00 Stk
2	housing for grating	B223061 Rd 80x20	1013 S355J2G3		0,50	2,00 Stk
3	bolt	B225041 Rd 50x104	1013 St52-3	b 05.04.05	0,20	1,00 Stk
4	bolt	B225085 Rd 50x109	1013 St52-3	a 05.04.05	0,20	1,00 Stk
10	rubber buffer 65 x 22,5 x 26	WAI102490			0,17	4,00 Stk
11	nut M20 DIN 985	WAI106610				2,00 Stk
12	fixing sheet	B223057 Bl 10x32x50	1543/EN10029 St37-2		0,10	2,00 Stk

Gummischürze kpl.

rubber apron cpl.

B 22 5 045a

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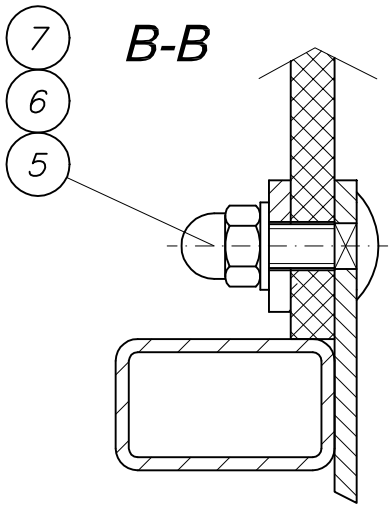
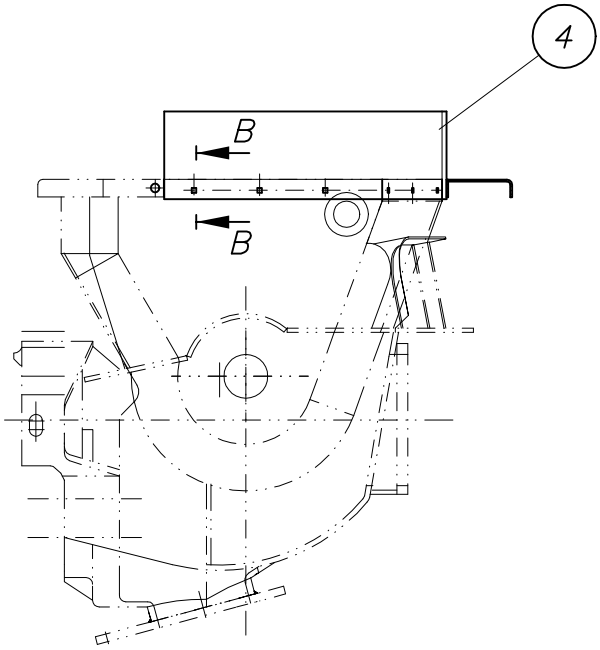
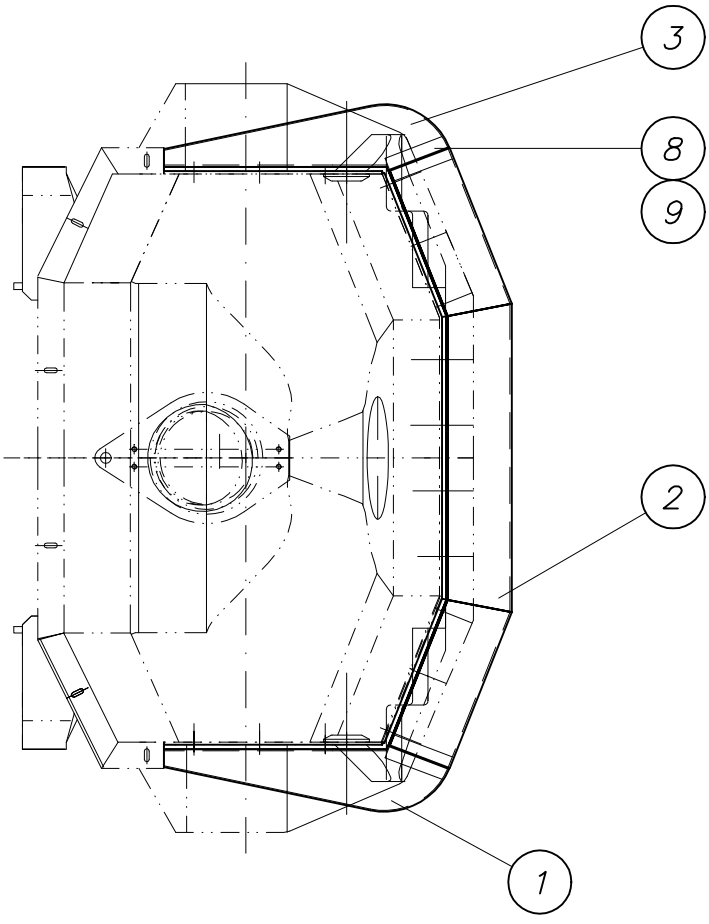
Baumaschinen GmbH







PARTS LIST

22.06.05 10:15:29

part list	description	created	index	valid from	valid to
B225045	rubber apron cpl	07.03.01 Mi	a	04.04.03	

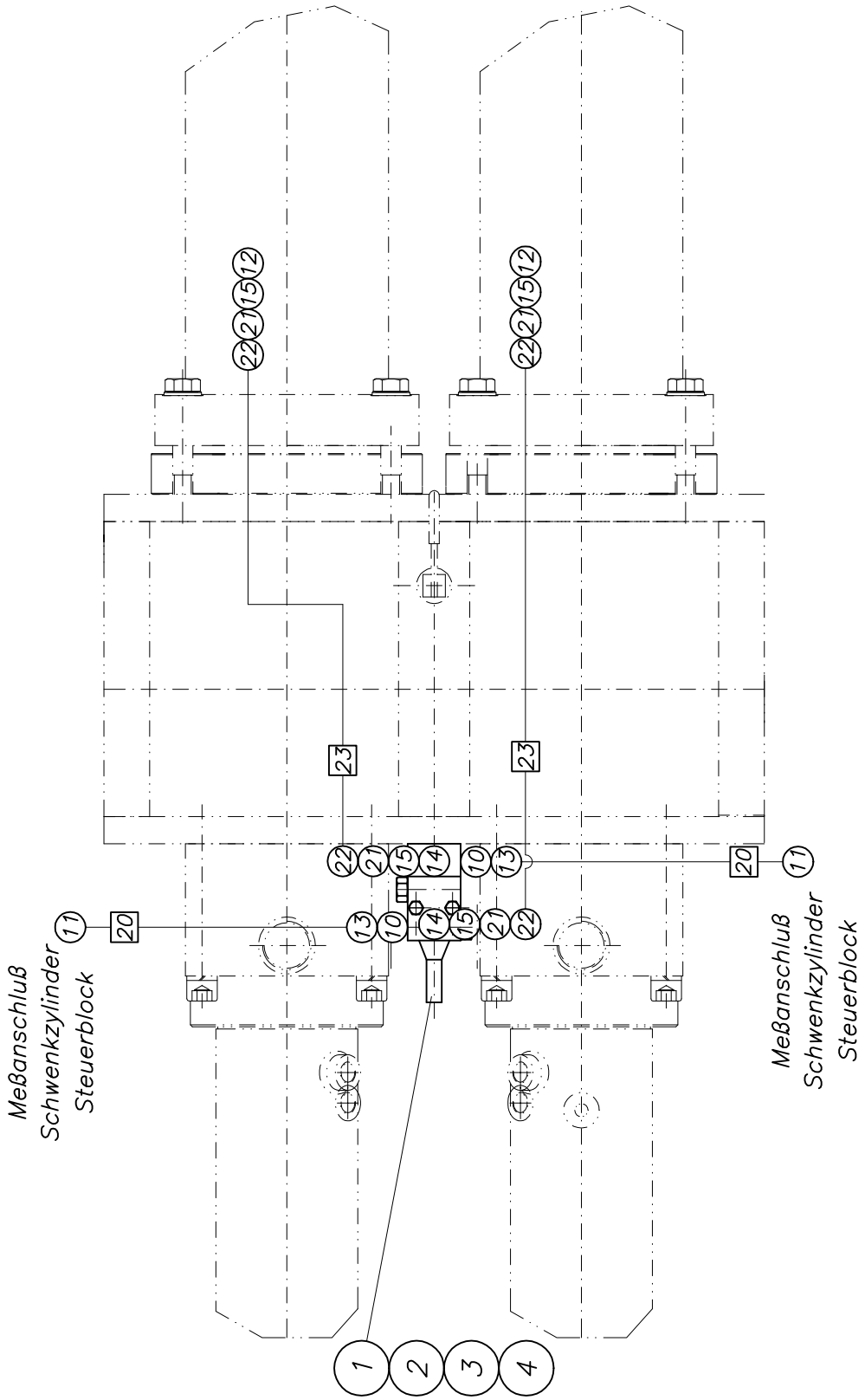
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	strip	B225042 Bl 4x220x701	1543/EN10029 St37-2	a 04.04.03	2,60	1,00 Stk
2	strip cpl. own parts list	B225053		b 02.03.04	10,00	1,00 Stk
3	strip	B225054 Bl 4x220x701	1543/EN10029 St37-2	b 30.11.04	2,60	1,00 Stk
4	rubber apron	B224013 Gummi 10x200x31		a 25.02.00		1,00 Stk
5	cup square neck bolt M 10 x 30	WAI103972				12,00 Stk
6	washer 10.5	WAI101559			0,00	12,00 Stk
7	cap nut M10	WAI101847				12,00 Stk
8	countersunk screw	WAI103176				4,00 Stk
9	hex. nut M6	WAI102998				4,00 Stk

Förderkolbenschmierung kpl.

conveying cyl. lubrication cpl.

B 18 3 006b

Waitzinger
Baumaschinen GmbH



PARTS LIST

27.06.05 08:51:45

part list	description	created	index	valid from	valid to
B183006	conveyor cyl. autom. cpl.	15.01.99 Mi	b	01.03.05	

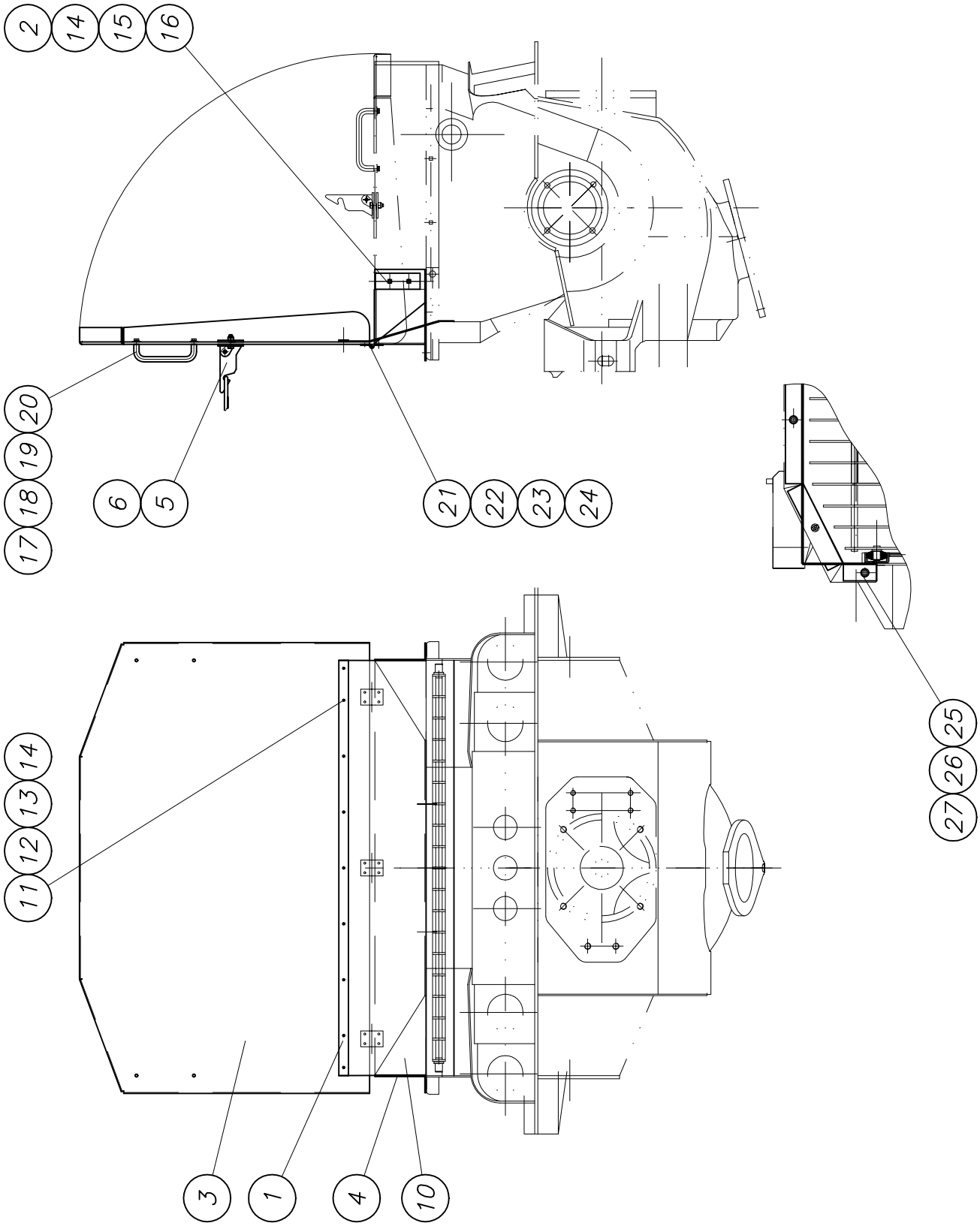
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	holder for distributor	B183008 Bl 8x52x95	1543/EN10029 St37-2		0,30	1,00 Stk
2	distributor VSKH 2-D	WAI104402				1,00 Stk
3	hexagon bolt M 8 x 70	WAI105277				2,00 Stk
4	spring washer A8 DIN 127 VERZ.	WAI102205			0,00	2,00 Stk
10	straight male stud couplings L8R 1/4"	WAI105202				2,00 Stk
11	swivel barrel tee L8	WAI100556			0,08	2,00 Stk
12	straight male stud couplings L6M	WAI103737				2,00 Stk
13	adjustable elbow bodies L8	WAI100589				2,00 Stk
14	male stud couplings L6 R 1/4" WD	WAI105434				2,00 Stk
15	adjustable elbow bodies L6	WAI102664			0,02	4,00 Stk
20	hydraulic hose DN 6 x 1000	WAI103234				2,00 Stk
21	hose connecting piece, DN6, short	WAI100253			0,01	2,00 Stk
22	threaded sleeve	WAI100254			0,01	2,00 Stk
23	plastic pipe 8.4 x 2.1	WAI100255			0,05	3,00 Mtr

Trichterabdeckung kpl.

cover for hopper cpl.

B 22 5 090

Waitzinger
Baumaschinen GmbH



PARTS LIST

21.09.05 08:57:59

part list	description	created	index	valid from	valid to
B225090	cover for hopper cpl.	18.05.05 hbk			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	plate	B255063 Bl4x30x1280	10029 S235J2G3	a 19.07.05	1,20	1,00 Stk
2	plate	B255064 Bl5x50x140	10029 S235J2G3		0,27	2,00 Stk
3	splash board own parts list	B255065	 Alu	c 27.07.05	12,00	1,00 Stk
4	splash board own parts list	B255075			15,00	1,00 Stk
5	hook cpl. own parts list	B224025		a 06.09.05	0,90	1,00 Stk
6	holder	B224021 Rd 10x1060	1013 S355J2G3	a 23.05.05	0,65	1,00 Stk
10	rubber apron	WAI107190				1,00 Stk
11	countersunk head screw M6x20	WAI103153				9,00 Stk
12	washer 6 mm	WAI106432				9,00 Stk
13	spring washer A6	WAI103000				9,00 Stk
14	cup square neck bolt M 10 x 30	WAI103972				4,00 Stk
15	washer 10.5	WAI101559			0,20	4,00 Stk
16	cap nut M10	WAI101847				4,00 Stk
17	hexagon bolt M 8 x 20	WAI101837				4,00 Stk
18	washer 8.4 DIN9021	WAI102882				4,00 Stk
19	spring washer A8 DIN 127 VERZ.	WAI102205			0,00	4,00 Stk
20	bow grip	WAI104441				2,00 Stk
21	hinge	WAI103237			0,10	3,00 Stk
22	countersunk screw	WAI103176				12,00 Stk
23	washer	WAI103572				12,00 Stk

PARTS LIST

21.09.05 08:57:59

part list	description	created	index	valid from	valid to
B225090	cover for hopper cpl.	18.05.05 hbk			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
24	hex. nut M6	WAI101624				12,00 Stk
25	cup square neck bolt M 10 x 25	WAI103971				6,00 Stk
26	hex. nut M10 DIN985 8.	WAI102125			0,01	6,00 Stk
27	washer 10.5	WAI101559			0,20	6,00 Stk

Haken kpl.

hook cpl.

B 22 4 025a

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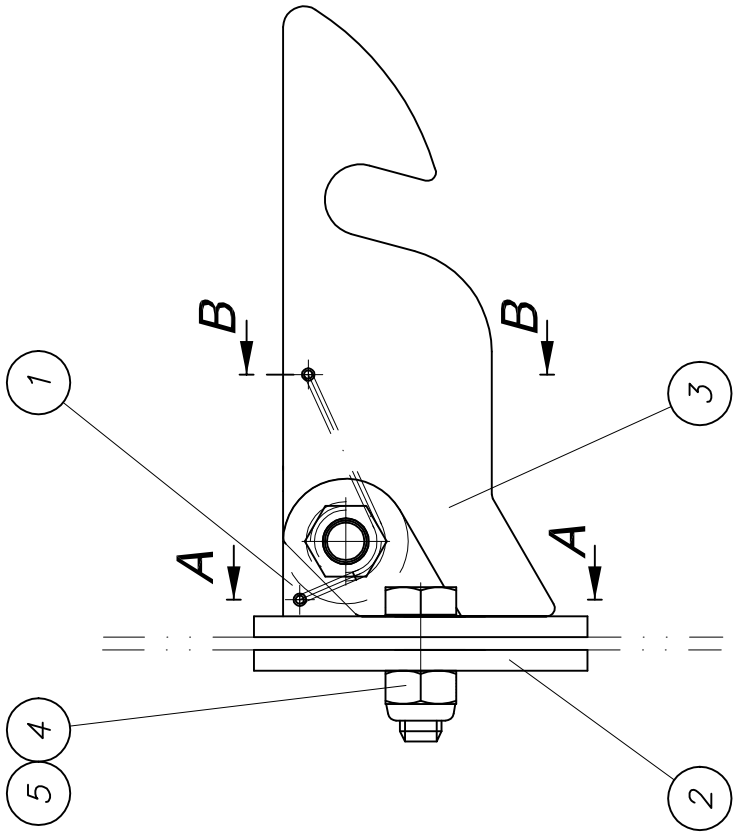

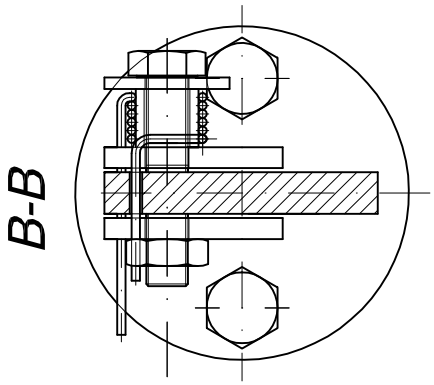

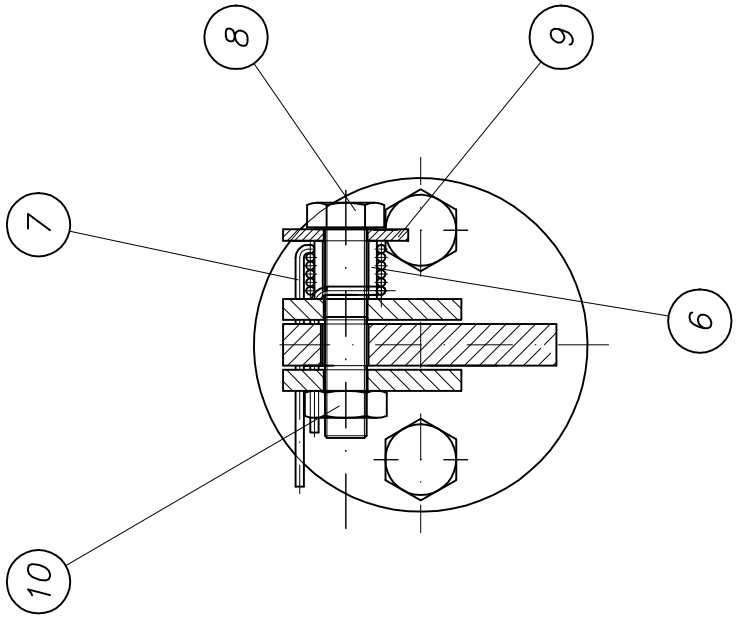

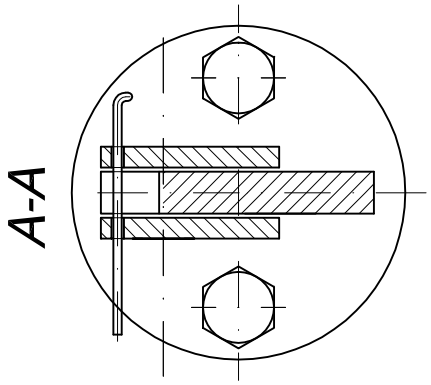

PARTS LIST

21.09.05 08:48:25

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B224025	hook cpl.	14.01.98 RH	a	06.09.05	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	basic plate own parts list	B224026		a 07.09.05	0,27	1,00 Stk
2	plate	B224027 5xDurchm.80	1543/EN10029 St37-2		0,19	1,00 Stk
3	hook	B224030 Bl 10x66.6x160.	1543/EN10029 St37-2	b 05.09.05	0,42	1,00 Stk
4	nut M10 DIN 934	WAI101556			0,01	2,00 Stk
5	hexagon bolt M 10 x 30	WAI101553			0,03	2,00 Stk
6	hydr. pipe 15x2x12	B224031 Hydr.Ro15x2x14			0,01	1,00 Stk
7	spring	WAI109678				1,00 Stk
8	hex. bolt M10x50	WAI102124			0,04	1,00 Stk
9	washer 10.5	WAI103288			0,00	1,00 Stk
10	hex. nut M10 DIN985 8.	WAI102125			0,01	1,00 Stk

Rührwerk mit Antrieb kpl.

agitator with drive cpl.

B 25 5 080

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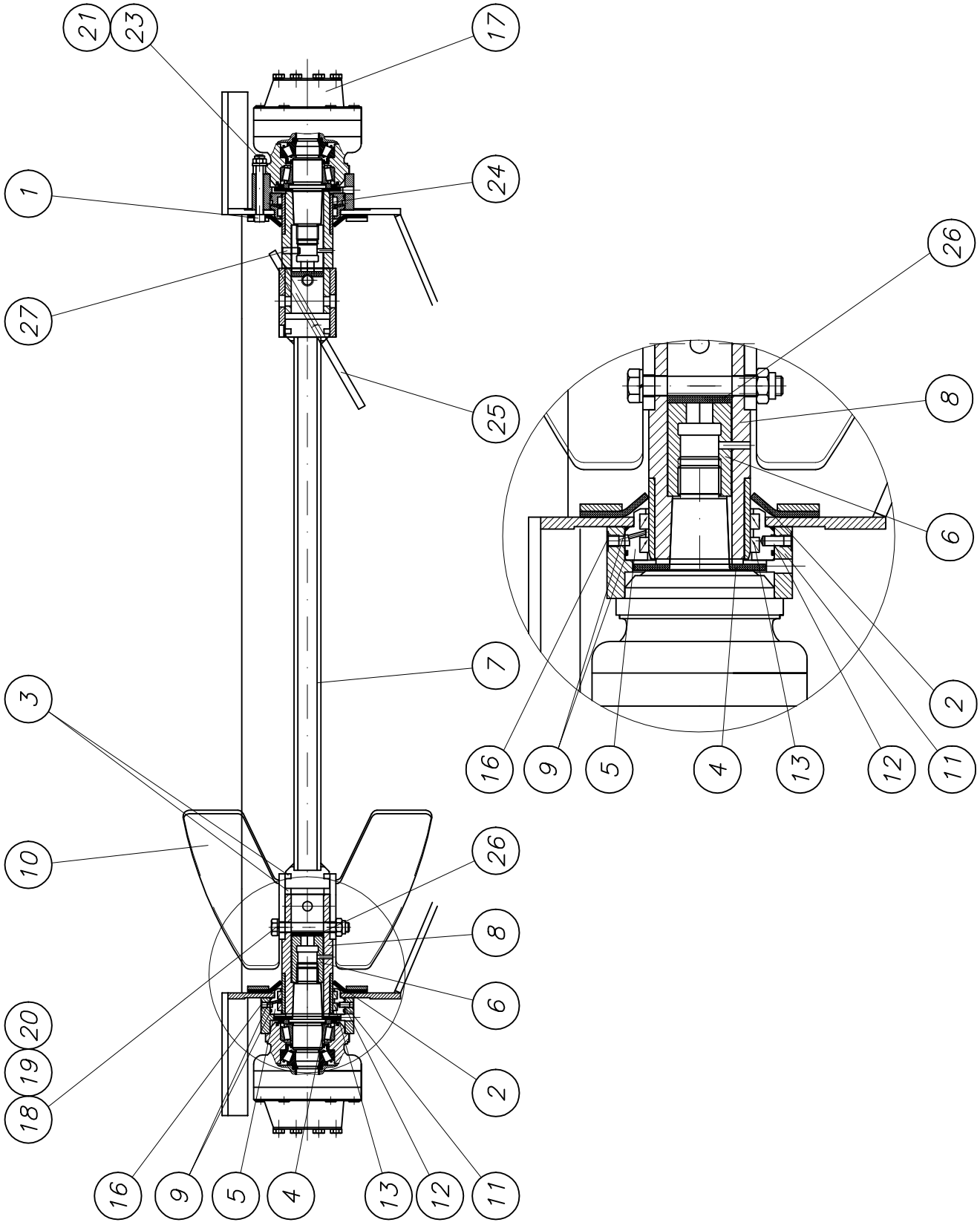
Baumaschinen GmbH



06.07.2005

PARTS LIST

28.09.05 09:53:53

part list	description	created	index	valid from	valid to
B255080	agitator with drive	13.06.05 TECHNIK			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	washer cpl. own parts list	B255092			1,00	2,00 Stk
2	seal disc	B255044 5xd 240	Gummi 70 Shore	a 31.03.04		2,00 Stk
3	sealing	B255083 Gummi 8x 76x 76	Gummi 60Shore			4,00 Stk
4	seal disc	B254109 5xDurchm.110	Gummi 60 Sho			2,00 Stk
5	sealing carrier	B255078 Rd 140x 50	DIN 1013 S355J2G3		0,31	2,00 Stk
6	shell	B255025 Rd 50x84	1013 S355J2G3	a 17.09.03	0,70	2,00 Stk
7	agitat shaft complete own parts list	B255079				1,00 Stk
8	shaft	B255028 Rd 85x208	1013 S355J2G3	c 01.07.05	5,00	2,00 Stk
9	O-ring 120 x 3	WAI108298				4,00 Stk
10	agitator cpl. left own parts list	B255085			4,50	1,00 Stk
11	motor support	B255076 Bl. 70x 155x 15	DIN EN10029 S235J2G3		4,80	2,00 Stk
12	set screw M 10x1x 20	WAI109709				2,00 Stk
13	groove ring 85-100-11.5	WAI102544			0,02	4,00 Stk
16	male stud LL6M 6 x 1	WAI102603				2,00 Stk
17	hydraulic motor MCR 3D 280 own parts list	WAI101240			28,00	2,00 Stk
18	washer DIN 6916 17	WAI101558			0,02	4,00 Stk
19	nut M16 DIN 985	WAI102330				4,00 Stk
20	hexagon bolt	WAI107513			0,21	4,00 Stk
21	hex. nut M12 DIN 985 8. VERZ.	WAI101626				2,00 Stk
23	washer	WAI102962			0,01	8,00 Stk

PARTS LIST

28.09.05 09:53:53

part list	description	created	index	valid from	valid to
B255080	agitator with drive	13.06.05 TECHNIK			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
24	wear sleeve	B253020 Rohr 101.6x13.5	2448 StE690	b 30.03.99	0,34	2,00 Stk
25	agitator cpl. right own parts list	B255088		a 28.07.05	4,50	1,00 Stk
26	seal disc	B255057 8xD53	Gummi 70 Shore			2,00 Stk
27	straight pin 10 H 6 x 30	WAI103065				2,00 Stk

Übersicht B 30 - B 39

over view B 30 - B 39

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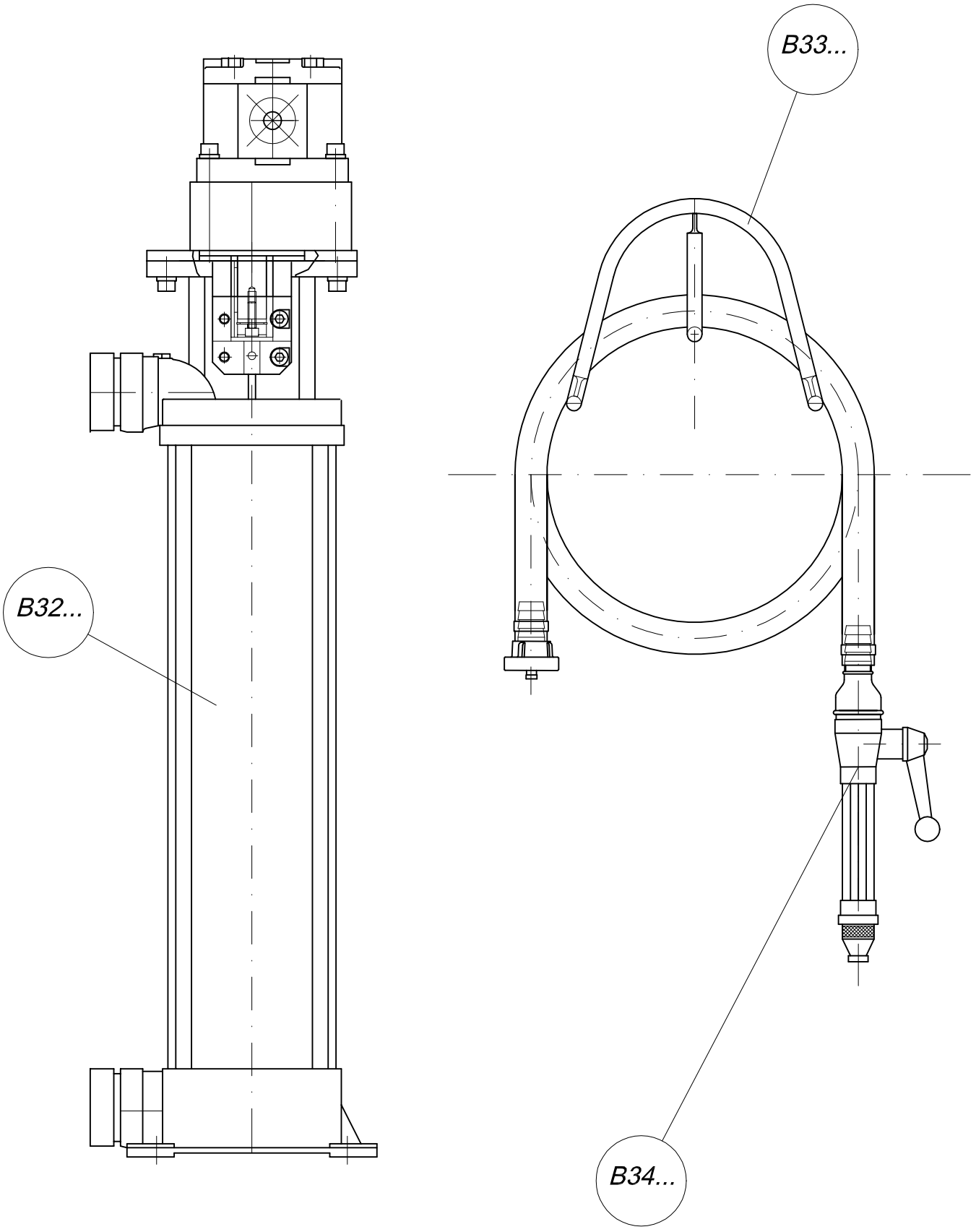

22.07.2002

Wasserpumpe kpl.

water pump cpl.

B 32 3 070

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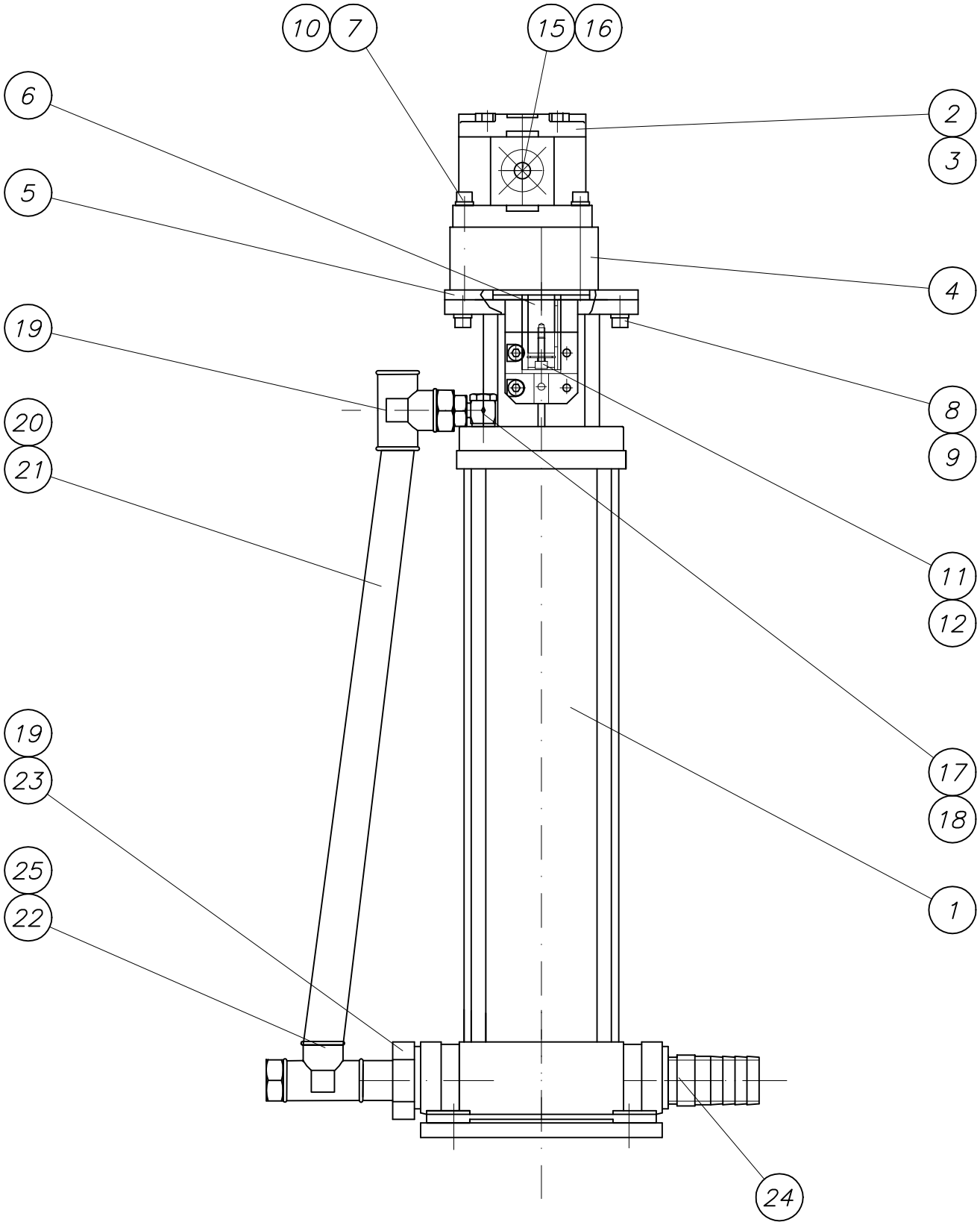


PARTS LIST

27.06.05 10:56:48

part list	description	created	index	valid from	valid to
B323070	water pump with drive	02.04.03 rhbk			

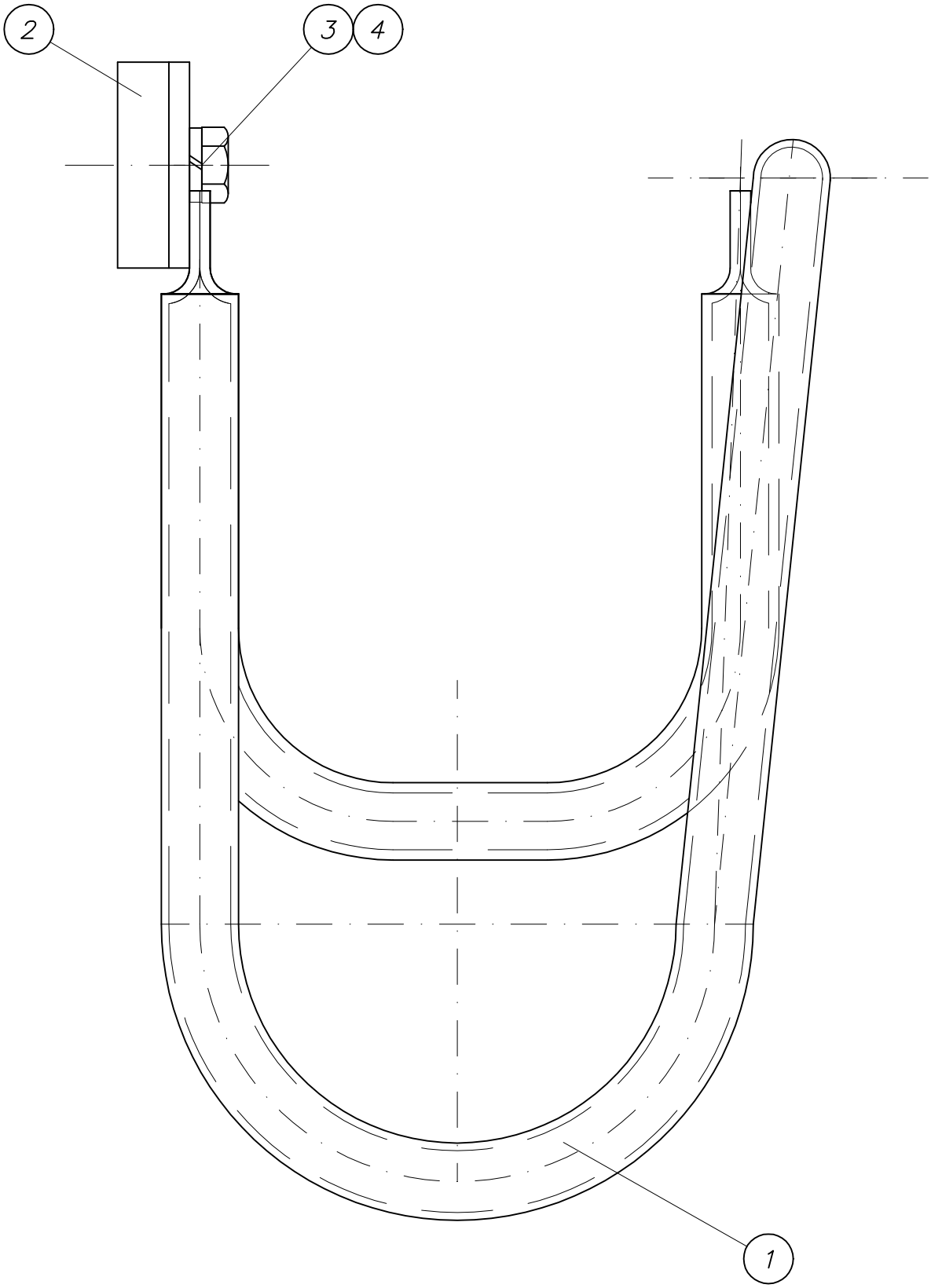
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	water pump INV	WAI108082				1,00 Stk
2	gear motor own parts list	WAI105922				1,00 Stk
3	splined coupling	WAI102916				1,00 Stk
4	belt pulley support	WAI102915				1,00 Stk
5	flange	B323061 Rd 170 x12	1013 S235J2G3		1,35	1,00 Stk
6	coupling piece	B323019 Rd 38x58	670 ST50-k			1,00 Stk
7	alien bolt M 8x70	WAI105929				4,00 Stk
8	alien bolt M 8x25	WAI105930				5,00 Stk
10	spring washer	WAI100235			0,00	8,00 Stk
11	locking ring	WAI105931				1,00 Stk
12	washer	B323023 Rd 22x6	670 St50-2k		0,05	1,00 Stk
15	elbow flange coupling L15-40	WAI102678			0,23	1,00 Stk
16	elbow flange coupling L12-35	WAI105921			0,23	1,00 Stk
17	bow	WAI104163				1,00 Stk
18	thread red.adaptors"3/4-3/8"	WAI100347			0,09	1,00 Stk
19	t-piece	WAI103590				2,00 Stk
20	hose	WAI102117				0,50 Mtr
21	hose clamp 25-28 mm	WAI108309				4,00 Stk
22	hose socket	WAI105993				1,00 Stk
23	double nipple 3/4"	WAI103566				1,00 Stk
24	nipple	B323059 Rohr 42.4x4.5x9	2448 S235J2G3		0,30	1,00 Stk
25	connecting piece waterpump	B323062 Rohr 42,2x4.5x6	2448 S235J2G3		0,30	1,00 Stk

Halter für Wasserschlauch kpl.

holder for water pipe cpl.

B 33 0 020

Waitzinger
Baumaschinen GmbH



29.07.2002

PARTS LIST

27.06.05 10:58:29

part list	description	created	index	valid from	valid to
B330020	holder for water hose	06.06.02 ek			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	holder for water hose own parts list	B330015			1,00	1,00 Stk
2	flat bar	B330018 Bl 10x40x260	1543 St 37-2	a 27.09.02	0,30	1,00 Stk
3	hexagon bolt M 8 x 12 DIN 933 8.8	WAI103274				2,00 Stk
4	spring washer A8 DIN 127 VERZ.	WAI102205			0,00	2,00 Stk

Übersicht B 40 - B 49

over view B 40 - B 49

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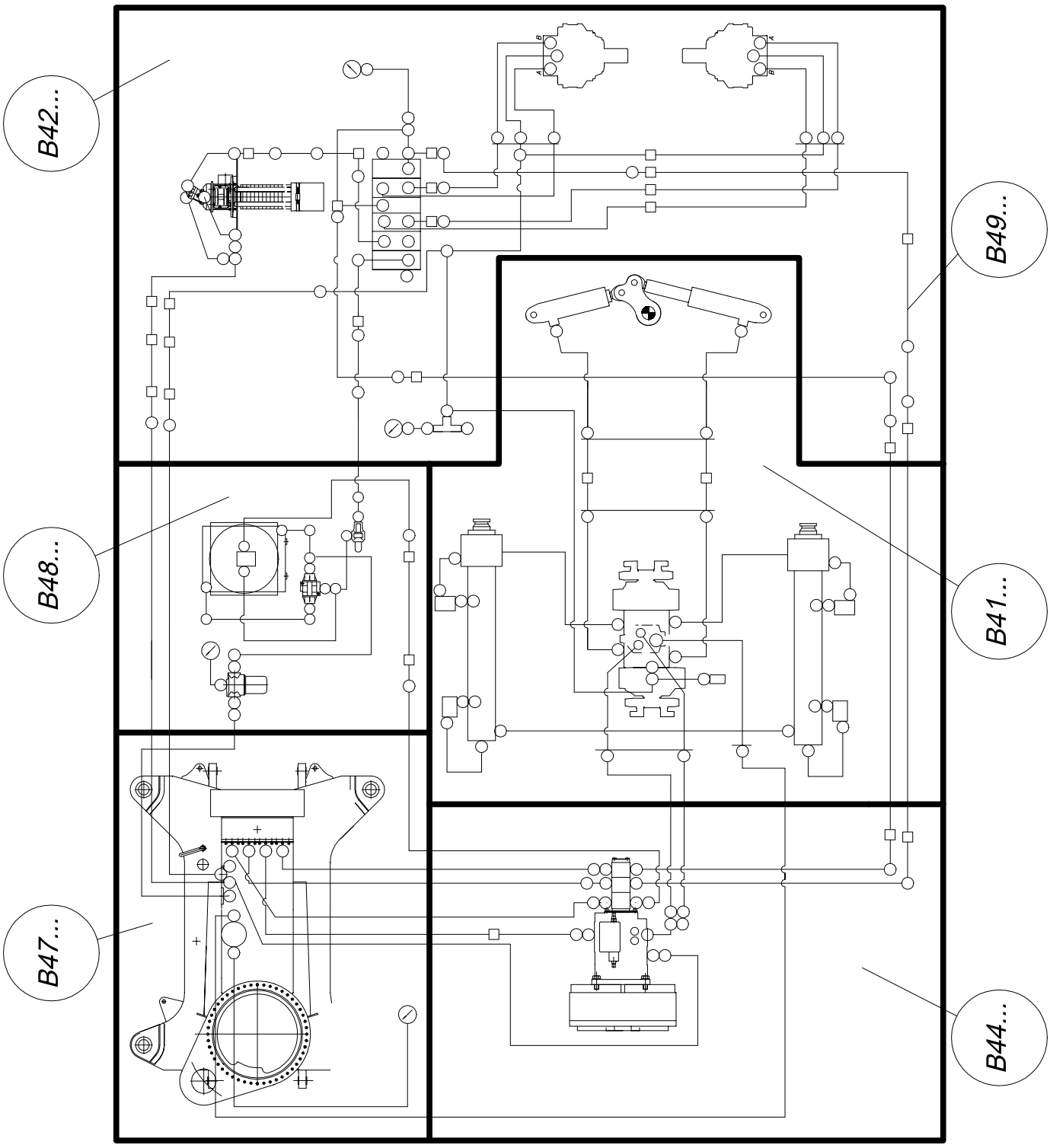

Blasenspeicher
hydraulic accumulator

WAI 103616

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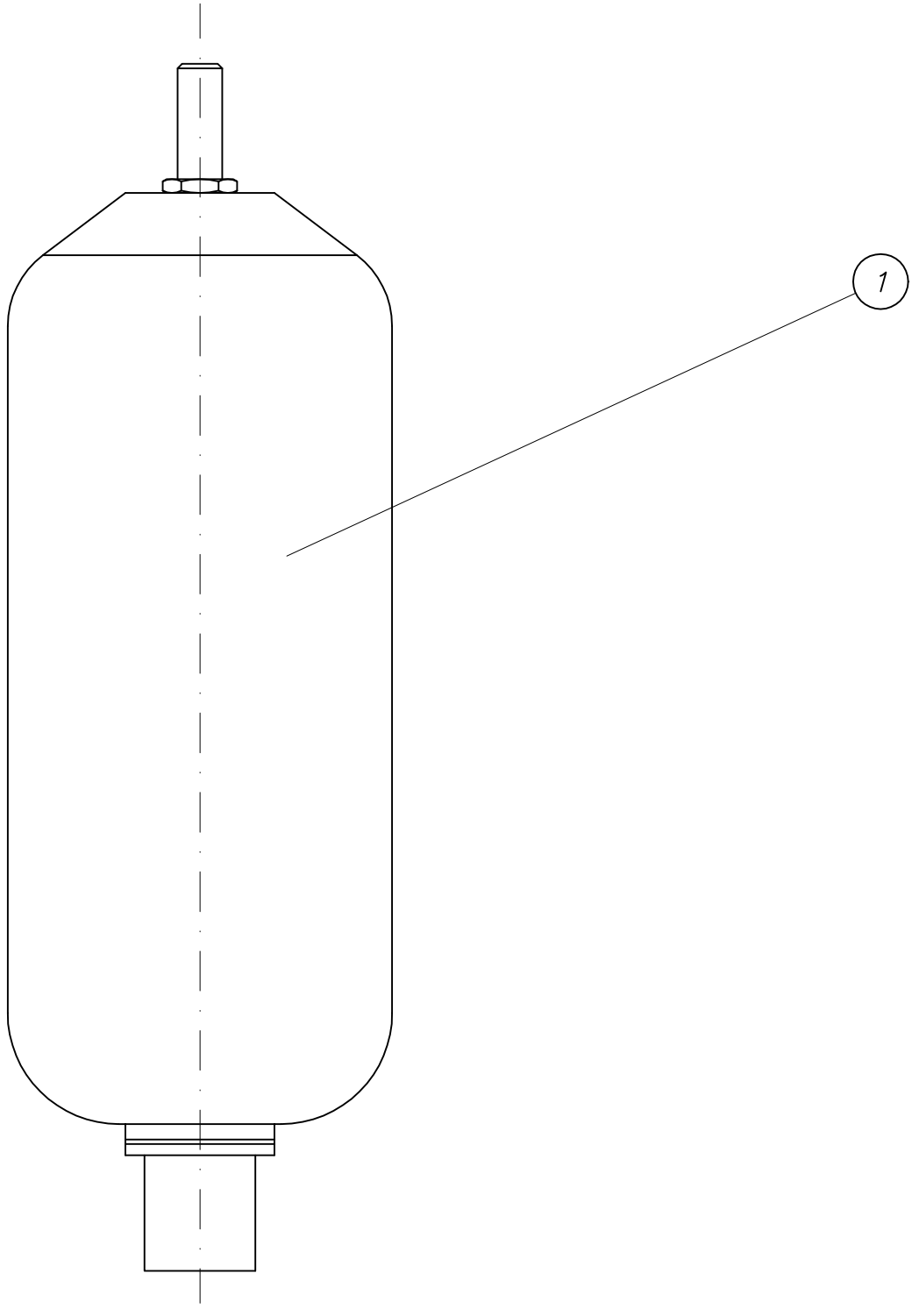
Baumaschinen GmbH



PARTS LIST

28.09.05 11:17:13

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WAI103616	hydraulic accumulator 6 liter	01.09.99 Mi			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	spare bubble for hydraulic accumulator	WAI105555				1,00 Stk

Übersicht B 50 - B 59

over view B 50 - 59

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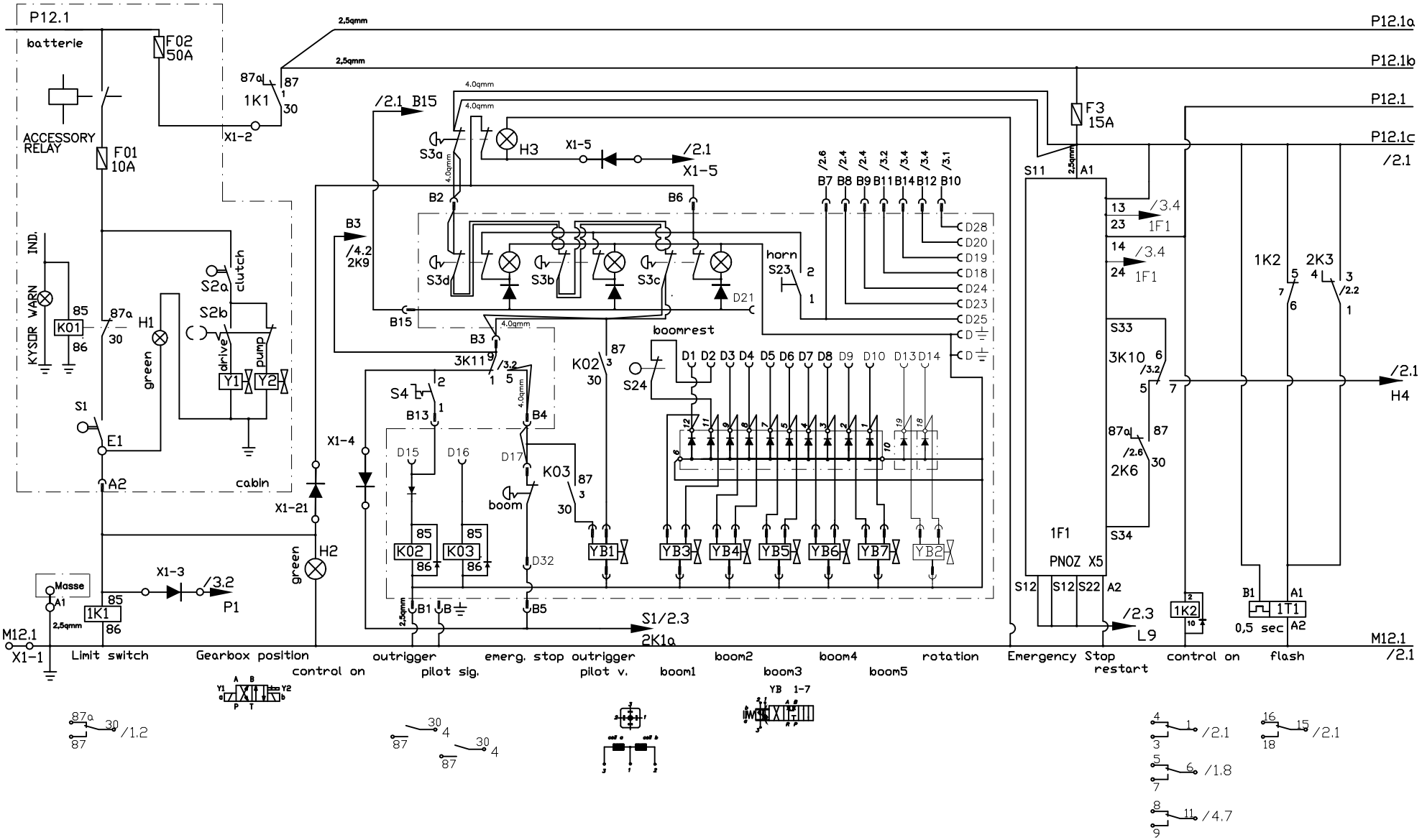

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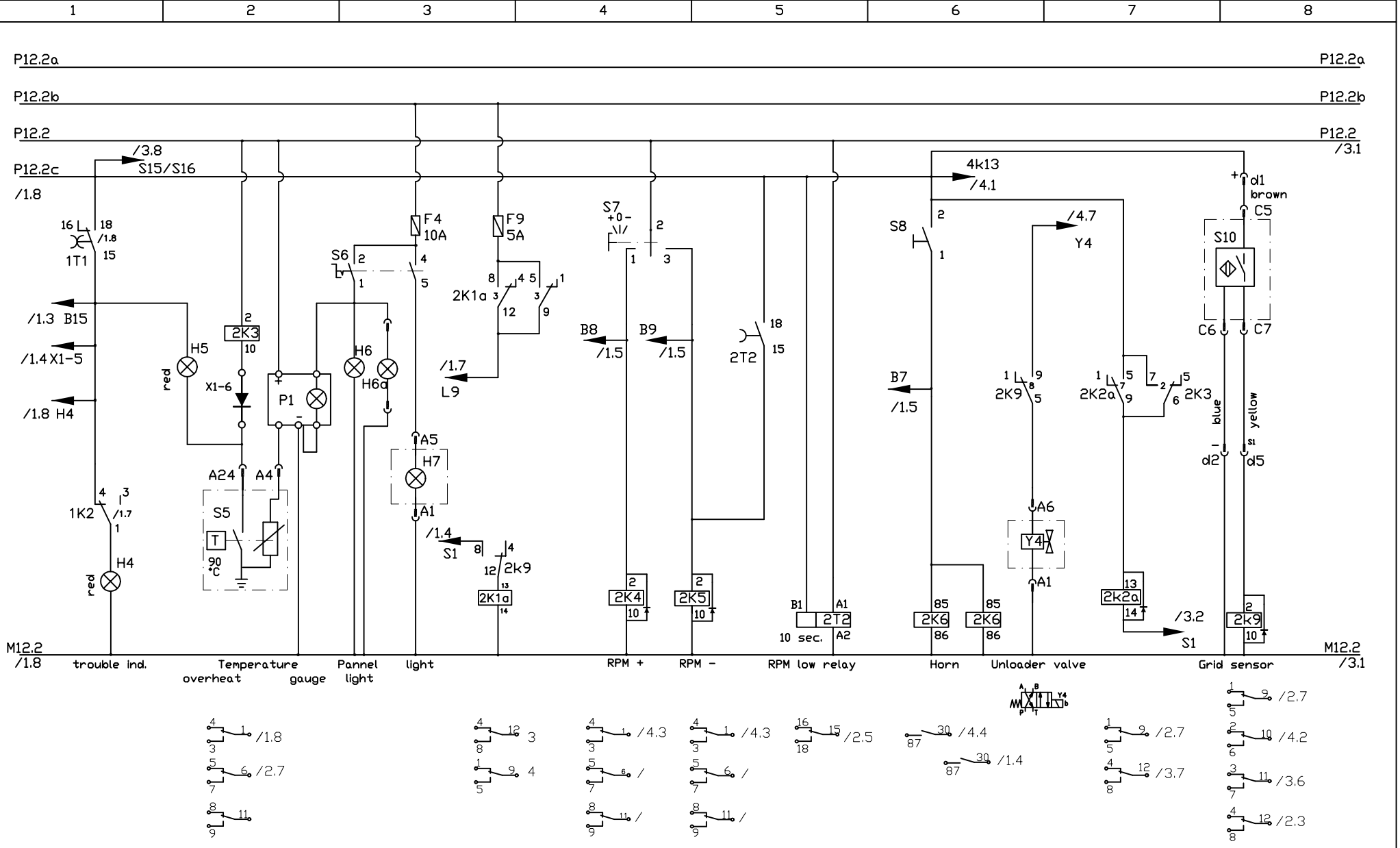
				CHKD.				
				APPD.				
d	siehe B_513017.doc	19.07.05	Körner					
c	siehe B_513017.doc	24.02.05	Körner					
b	siehe B_513017.doc	02.02.04	Körner	CHANGE ONLY WITH CAD			B 51 3 017	SHEET
a	siehe B_513017.doc	15.01.04	Körner					OF
ISSUE	MODIFICATION	DATE	NAME	ORIGINAL			REPLACEMENT FOR	REPLACEMENT BY



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				CHKD.			
				APPD.			
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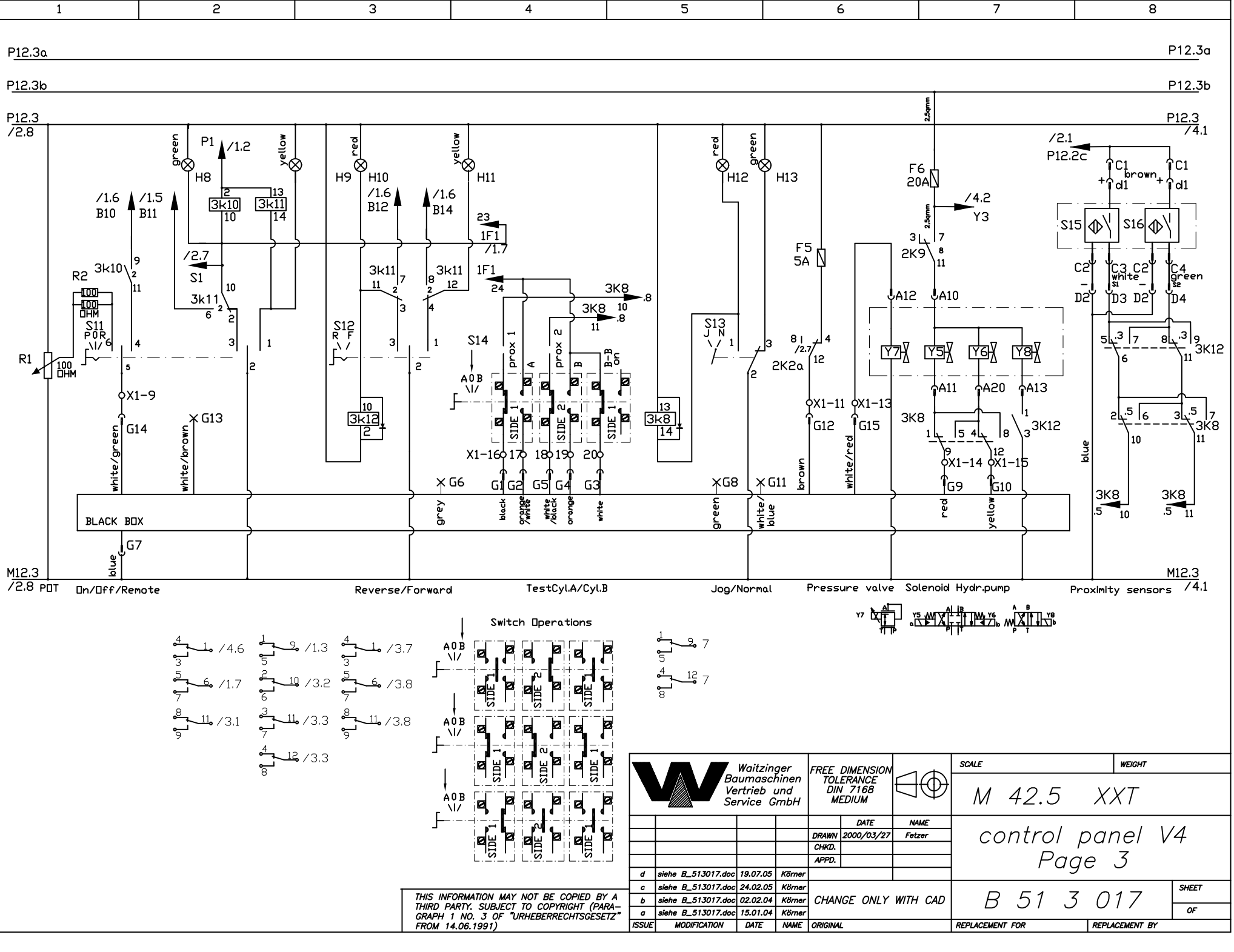

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Waitzinger Baumaschinen Vertrieb und Service GmbH

FREE DIMENSION TOLERANCE DIN 7168 MEDIUM

	DATE	NAME
DRAWN	2000/03/27	Fetzer
CHKD.		
APPD.		

ISSUE	MODIFICATION	DATE	NAME
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c	siehe B_513017.doc	24.02.05	Körner
b	siehe B_513017.doc	02.02.04	Körner
a	siehe B_513017.doc	15.01.04	Körner
ORIGINAL			

CHANGE ONLY WITH CAD

SCALE

WEIGHT

M 42.5 XXT

control panel V4
Page 3

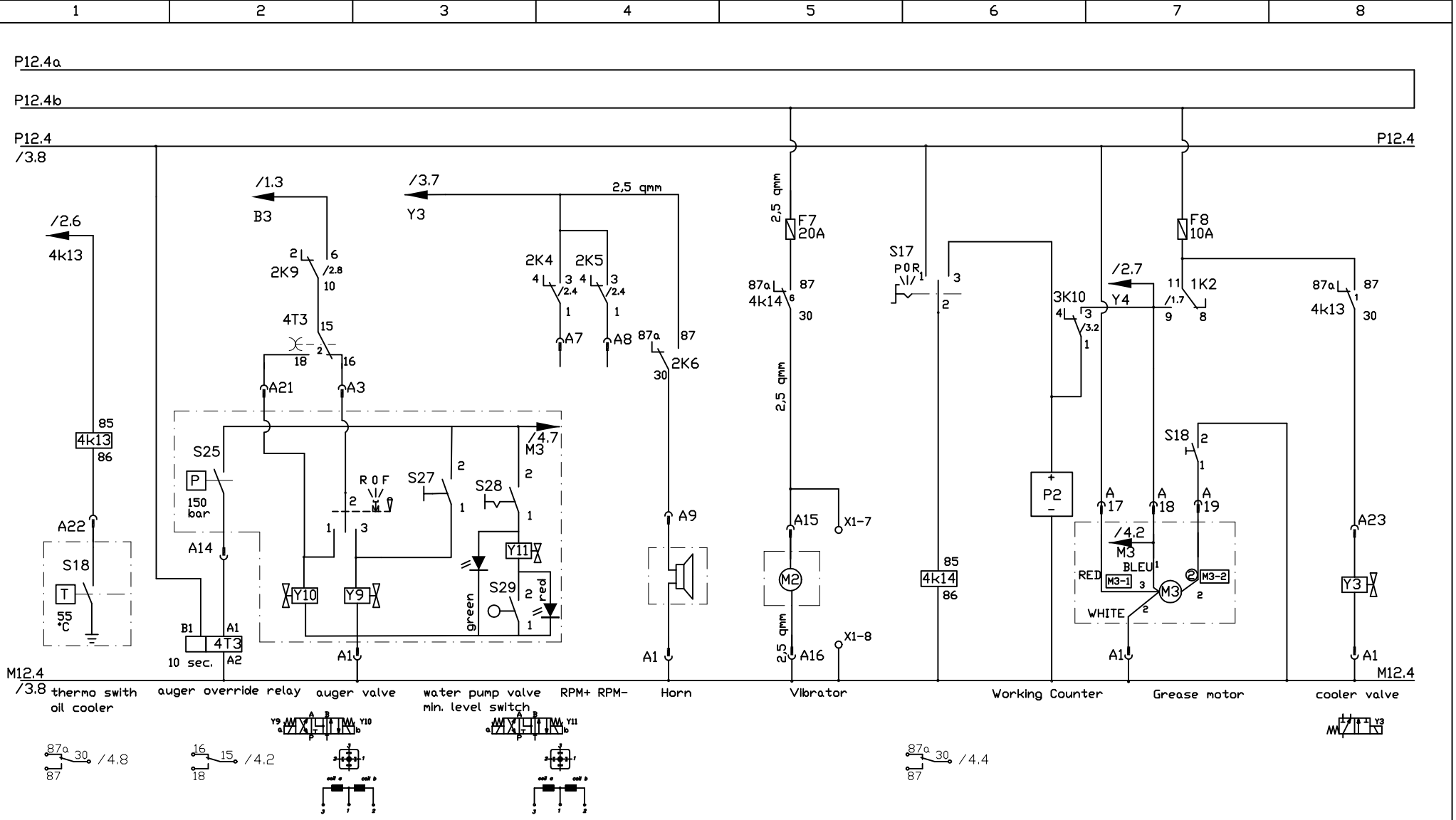
B 51 3 017

SHEET

OF

REPLACEMENT FOR

REPLACEMENT BY



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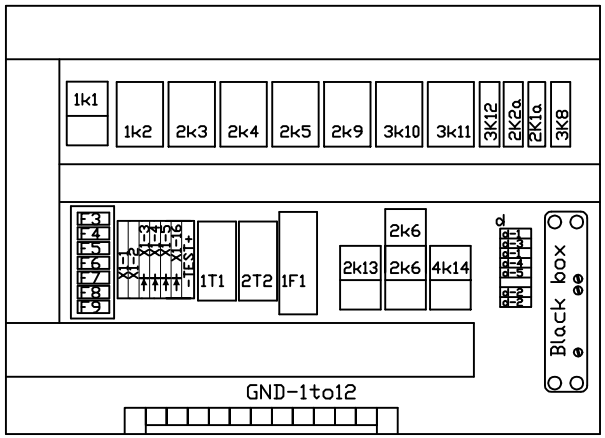

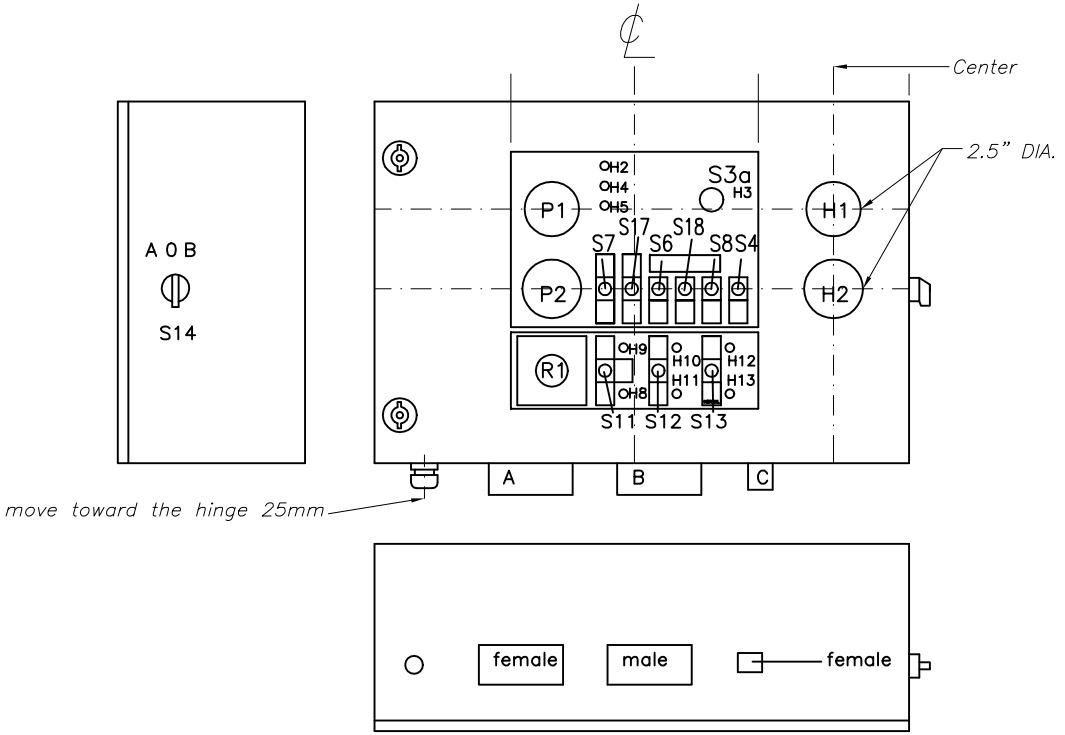

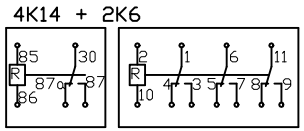

ISSUE	MODIFICATION	DATE	NAME
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b	siehe B_513017.doc	02.02.04	Körner
a	siehe B_513017.doc	15.01.04	Körner

Waitzinger Baumaschinen Vertrieb und Service GmbH

FREE DIMENSION TOLERANCE DIN 7168 MEDIUM

CHANGE ONLY WITH CAD

ORIGINAL

	DATE	NAME
DRAWN	2000/03/27	Fetzer
CHKD.		
APPD.		

SCALE

WEIGHT

M 42.5 XXT

control panel V4
Page 5

B 51 3 017

SHEET

OF

REPLACEMENT FOR

REPLACEMENT BY

STÜCKLISTEN-DRUCK

Stückliste	Benennung	Anlage	Änderungsindex	gültig ab	gültig bis
B513017	SCHALTPULT WAI 106059 VERSION 4	07.02.01 Mi	c	24.02.05	

Pos	Bezeichnung Rohmaterial	Sach-Nr. Abmessung	DIN Werkstoff	Index	Gewicht Kg	Anzahl Einheit
1	Not-Stop Schalter	WAI105094				1,00 Stk
2	Kontaktblock m. Lampenfassung	WAI105095				1,00 Stk
3	Schild "emergency - stop" ZB2-BY9330	WAI102278				1,00 Stk
4	Lampe 12V-2W BA 9S	WAI104083			0,10	1,00 Stk
5	LED-Signalleuchte 12 VDC 14 mm, rot	WAI105811				4,00 Stk
6	LED-Signalleuchte 12 VDC 14 mm, gelb	WAI105812				2,00 Stk
7	LED-Signalleuchte 12 VDC 14 mm, grün	WAI105813				3,00 Stk
8	Hebelschalter - abged. MOM-OFF-MOM 2	WAI103976				1,00 Stk
9	Hebelschalter - abgedichtet ON-OFF-ON	WAI104090				2,00 Stk
10	Hebelschalter - abgedichtet MON-ON	WAI104091				2,00 Stk
11	Hebelschalter - abgedichtet ON-OFF	WAI104089				2,00 Stk
12	Hebelschalter - abgedichtet ON-ON	WAI104092			0,10	2,00 Stk
13	Relais - Industrie 3W, 12VDC	WAI104093				7,00 Stk
14	Relaissockel 11-pol. ohne Diode	WAI104859				2,00 Stk
15	Relaissockel 10A, 380V, 11 Pins	WAI100178				5,00 Stk
16	Haltebügel f. Industrierelais	WAI104094				7,00 Stk
17	Sicherungskasten	WAI101577				1,00 Stk
18	Stecksicherung 5 A	WAI101922				1,00 Stk
19	Stecksicherung 10 A	WAI101921				3,00 Stk
20	Stecksicherung 20 A	WAI104096				2,00 Stk

STÜCKLISTEN-DRUCK

Stückliste	Benennung	Anlage	Änderungsindex	gültig ab	gültig bis
B513017	SCHALTPULT WAI 106059 VERSION 4	07.02.01 Mi	c	24.02.05	

Pos	Bezeichnung Rohmaterial	Sach-Nr. Abmessung	DIN Werkstoff	Index	Gewicht Kg	Anzahl Einheit
21	Betriebsstundenzähler	WAI100900				1,00 Stk
22	Anbaugehäuse CNI 16	WAI104097				1,00 Stk
23	Steckereinsatz 1-16 pol.	WAI104022				1,00 Stk
24	Anbaugehäuse 24-pol. Gr. 8	WAI101533				1,00 Stk
25	Steckdoseneinsatz 24-pol.	WAI100710				1,00 Stk
26	Erdungsschiene für Steuerpult WAI100251	WAI102577				1,00 Stk
27	Schaltplantasche	WAI104099				1,00 Stk
28	Gummipuffer 25 x 20 2 Bolzen	WAI104100				4,00 Stk
29	Verteilersystem 4-fach MVP 12	WAI105998				1,00 Stk
30	Lampe 12V-5W	WAI104101			0,10	3,00 Stk
31	Potentiometer 100 Ohm	WAI104103				1,00 Stk
32	Potentiometer - Antrieb schwarz	WAI104104				1,00 Stk
33	Kabelverschraubung PG21	WAI104109				1,00 Stk
34	Kabelverschraubung PG11	WAI104110				1,00 Stk
35	Gegenmutter PG21	WAI104114				1,00 Stk
36	Stecker für UK 4-TG leer ST-BE	WAI106395				1,00 Stk
37	Relais 12 VDC, 1W	WAI104117				4,00 Stk
38	Relaissockel für Bosch Relais	WAI100986				4,00 Stk
39	Gegenmutter PG11	WAI104112				1,00 Stk
40	Relais - Hochl. 12VDC, 70A, 1S	WAI104122				1,00 Stk

STÜCKLISTEN-DRUCK

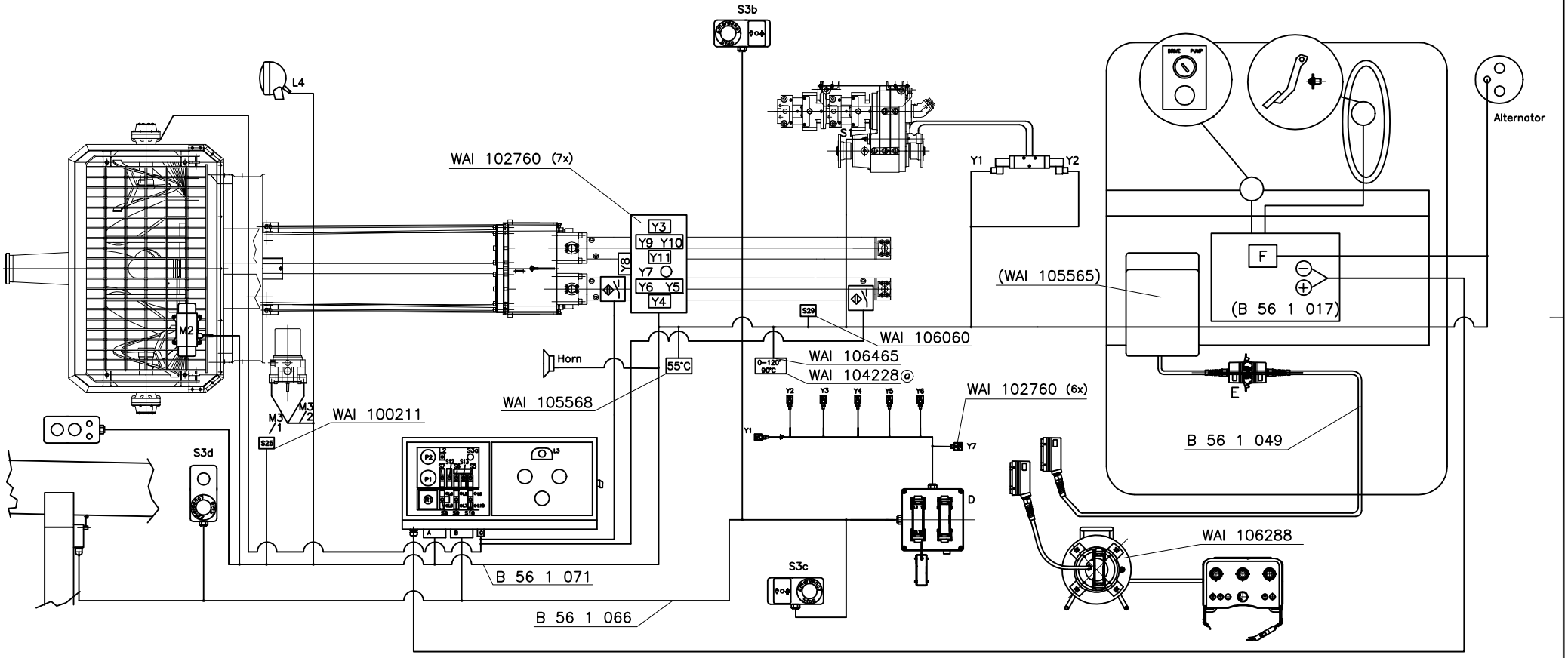
Stückliste	Benennung	Anlage	Änderungsindex	gültig ab	gültig bis
B513017	SCHALTPULT WAI 106059 VERSION 4	07.02.01 Mi	c	24.02.05	

Pos	Bezeichnung Rohmaterial	Sach-Nr. Abmessung	DIN Werkstoff	Index	Gewicht Kg	Anzahl Einheit
41	Relaissockel	WAI105619				1,00 Stk
42	Kabelverschraubung PG16 vernickelt	WAI102933				1,00 Stk
43	Widerstand 100 Ohm, 4,5W	WAI104118				2,00 Stk
47	Durchgangsklemme grau 2-Leiter 6qmm	WAI105817				2,00 Stk
48	Abschluß- und Zwischenplatte orange	WAI105818				1,00 Stk
49	Knebel	WAI100968				1,00 Stk
50	Halter	WAI100287				1,00 Stk
51	Schaltelement	WAI100969				3,00 Stk
52	Schalter - Brücke 3SB1S12OAN	WAI103735				2,00 Stk
53	Relais - Miniatur DC 12V 4 Wechsler	WAI105046				4,00 Stk
54	Kondensatablauf	WAI104669				1,00 Stk
55	Klemme UK 4-TG	WAI104186				7,00 Stk
56	Stecker m. Diode, ST-1N4007	WAI104185				6,00 Stk
57	Crimpkontakt - Stift 0,75 - 1 qmm	WAI103695				2,00 Stk
59	Relais - Zeit blinkend RZ12Ti-01	WAI105331				1,00 Stk
60	Relais - Ausschalt-Wisch EZ12RV-001	WAI105815				1,00 Stk
61	Not-Aus-Schaltgerät PNOZ X5	WAI105814				1,00 Stk
62	Alu-Klebeschild m. Bohr. für WAI105542	WAI105819				1,00 Stk
63	Klemme UK 5 N f. Hutschiene	WAI104671				2,00 Stk
64	Fassung 14-pol. m. Freilaufdiode	WAI103974			0,02	4,00 Stk

STÜCKLISTEN-DRUCK

Stückliste	Benennung	Anlage	Änderungsindex	gültig ab	gültig bis
B513017	SCHALTPULT WAI 106059 VERSION 4	07.02.01 Mi	c	24.02.05	

Pos	Bezeichnung Rohmaterial	Sach-Nr. Abmessung	DIN Werkstoff	Index	Gewicht Kg	Anzahl Einheit
65	Haltebügel f. Miniaturrelais	WAI104860			0,02	4,00 Stk
66	Fernthermometer 12 Volt	WAI105823				1,00 Stk
67	Black box	WAI104442				1,00 Stk
68	Gegenmutter CE16 PA 6	WAI104519				1,00 Stk
69	Leuchte innen 2JA 001 330-001	WAI106402				1,00 Stk
71	Relais - Zeit 12V, Multifunktion	WAI106393				1,00 Stk
72	Kennzeichenleuchte klein 2KA 001 389-10	WAI106182				1,00 Stk



PLUG A

1	Y3+L4+M3/1+ Y4+Y7+FAN	brn
2	S1>F1	blk/whi
3	Y3−1	red/yel
4	temp. switch	yel/whi
5	L4	grn/whi
6	Y4−1	blu/whi
7	F3	blu
8	F2	blk
9	Horn	blk
10	Y5−1/hopper Y6/Y8/Y9	blk/grn
11	Y5− 2	blk/red
12	Y7	gry/red
13	Y8	whi/brn
14	Y9	vio
15	M2	blk
16	M2	blu
17	M3/1 −1	gry
18	M3/1−3	grn
19	M3/2 −2	yel
20	Y6	whi
21	temp switch	whi
22	temp switch	whi
23	Y10	grn
24	free	free
	F5	red
	F6	gry/blk

PLUG B

1	D10	brn	ground
2	S3b	gry	emergency stop
3	S3c	blk	emergency stop
4	D13	blu	emergency stop
5	D 22	gry/red	emergency stop
6	S3b−d	white	emergency stop
7	D 20	whi/grn	horn
8	D 15	grn	RPM +
9	D 16	blk/whi	RPM −
10	D 24	vio	Pot
11	D 17	blk/grn	pumping on
12	D 19	gry/blk	reverse
13	free	free	free
14	D 18	blu/whi	pumping
15	D 21	blk/red	flashing light
16	free	free	free

PLUG C

pin No.	wire No.	function
1	brown	+
2	blue	−
3	black	Sensor 1
4	black	Sensor 2
5		
6		
7		
8		

PLUG D

⏚	A 1	brn	ground
1	Y3/3	brn/whi	boom 1 up
2	Y3/2	blu	boom 1 down
3	Y4/3	grn/whi	boom 2 up
4	Y4/2	blk/grn	boom 2 down
5	Y5/3	gry/blk	boom 3 up
6	Y5/2	blk/whi	boom 3 down
7	Y6/3	blk/red	boom 4 up
8	Y6/2	gry/red	boom 4 down
9	free	free	free
10	⊣⊢	brn	ground
11	Y2/2	vio	turn clockwise
12	Y2/3	blu/whi	turn anticlockw.
13	B4	red	plus
14	Y1/2/3 Y7	gry	pilot valve
15	B 8	grn	RPM +
16	B 9	blk/whi	RPM −
17	B 11	blk/grn	pumping on
18	B 14	blu/whi	pumping
19	B 12	gry/blk	reverse
20	B 7	whi/grn	horn
21	B 15	blk/red	free
22	B 5	gry/red	emergency stop
23	Y7	brn/whi	free
24	B 10	vio	POT

PLUG E

pin No.	wire No.	function	pin No.	wire No.	function
1	1	power supply 12V	17	34	boom 4 up
2	3	emergency stop	18	31	boom 3 down
3	4	12 V+	19	32	boom 3 up
4	5	RPM−	20	29	turn clockwise
5	6	free	21	30	turn anticlockw.
6	8	horn	22	28	boom 1 down
7	11	RPM+	23	27	boom 1 up
8	13	pump on	24	39	boom 2 down
9	9	GND	25	40	boom 2 up
10	14	reverse	26	–	free
11	25	pilot valve	27	–	free
12	–	free	28	35	pump speed pot
13	–	free	29	–	free
14	–	free	30	–	free
15	–	free	31	–	free
16	33	boom 4 down	32	–	free

TERMINAL F

blk/whi	A2
whi	S1
grn	Y1
gry/whi	Y2
blu	A7
blk	A8
vio	Lima D
brn	⊖
red	reserve
gry/blk	reserve

Waitzinger Baumaschinen Vertrieb und Service GmbH

FREE DIMENSION TOLERANCE DIN 7168 MEDIUM

	DATE	NAME
DRAWN	2000/03/28	MI
CHKD.		
APPD.		

CHANGE ONLY WITH CAD

a siehe B_561070.doc 29.08.05 Kilmer

MODIFICATION | DATE | NAME

ORIGINAL

SCALE without | WEIGHT

own parts list

Cable harness / accessories REED V4

B 56 1 070

SHEET | OF

REPLACEMENT FOR | REPLACEMENT BY

PARTS LIST

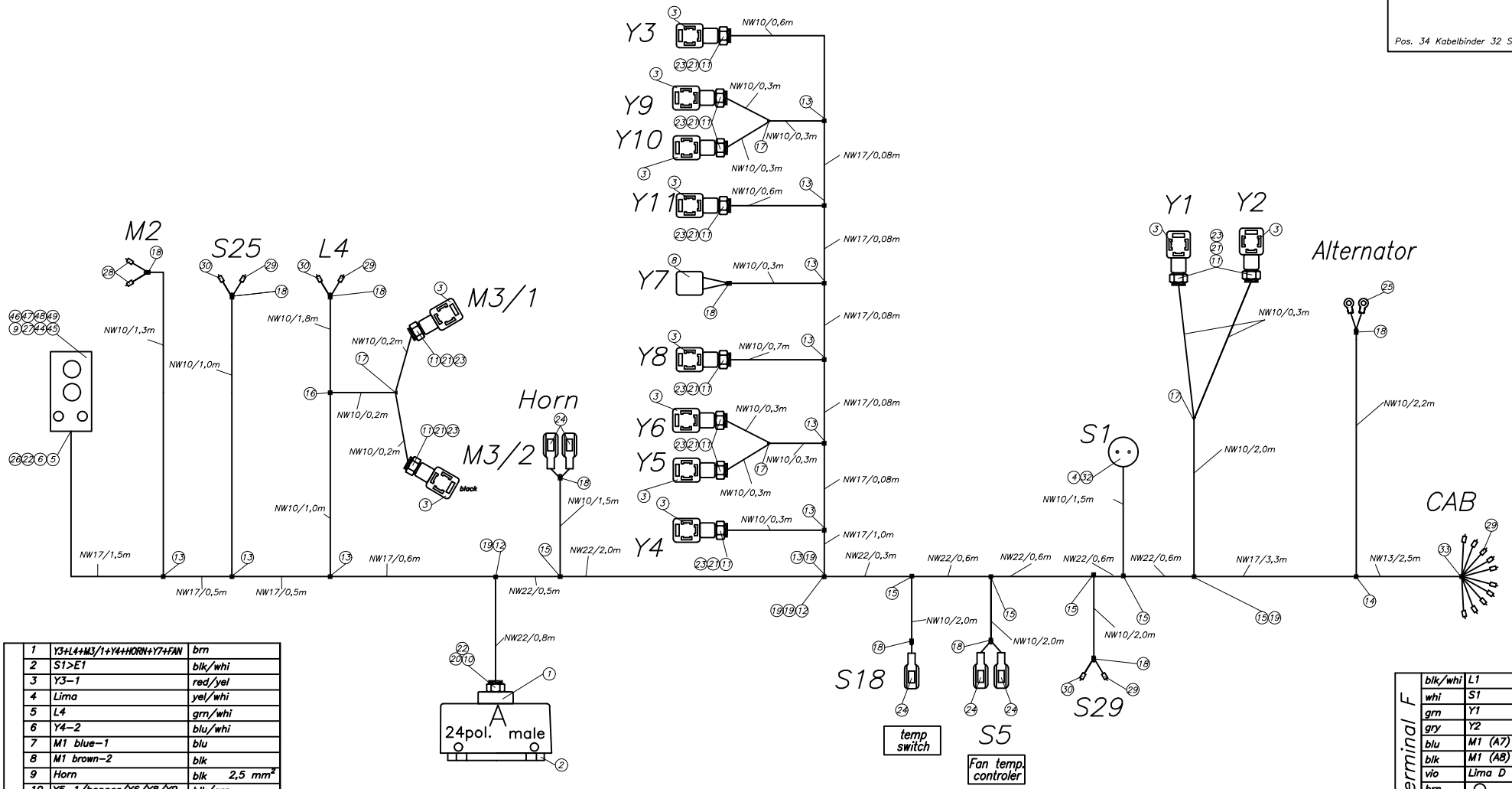
28.09.05 10:34:39

part list	description	created	index	valid from	valid to
B561070	cable harness closed loop version IV	28.03.00 Mi	a	29.08.05	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	cable harness boom REED V III own parts list	B561066		c 26.08.04	9,00	1,00 Stk
2	cable harness pump REED CL 32/36 V IV own parts list	B561071				1,00 Stk
3	cable cpl. for cable control own parts list	B561049				1,00 Stk
4	cable drum + 35m cable (34 x 0,5) own parts list	WAI106288				1,00 Stk
5	anti-interference device	WAI102760				14,00 Stk
6	thermo sensor	WAI104228				1,00 Stk
7	thermo sensor 55 degrees C	WAI105568			0,10	1,00 Stk
8	pressure switch	WAI100211			0,87	1,00 Stk
9	switch swimmer	WAI106060				1,00 Stk
10	sealing ring 14x18x2	WAI106465				1,00 Stk

Lose Teile:

Pos. 34 Kabelbinder 32 Stück



PLUG A			
	1	Y3+L4+M3/1+Y4+HORN+Y7+FAN	brn
	2	S1>E1	blk/whi
	3	Y3–1	red/yel
	4	Lima	yel/whi
	5	L4	grn/whi
	6	Y4–2	blu/whi
	7	M1 blue–1	blu
	8	M1 brown–2	blk
	9	Horn	blk 2,5 mm²
	10	Y5–1/hopper/Y6/Y8/Y9	blk/grn
	11	Y5–2	blk/red
	12	Y7	gry/red
	13	Y8	whi/brn
	14	Y9	vio
	15	M2	blk 2,5 mm²
	16	M2	blu 2,5 mm²
	17	M3/1 –1	gry
	18	M3/1–3	grn
	19	M3/2 –2	yel
	20	Y6	whi
	21		
	22		
	23	Fan	grn
	24	S5	yel/whi
		Res. F	red
		Res. F	gry/blk

Terminal F	
blk/whi	L1
whi	S1
grn	Y1
gry	Y2
blu	M1 (A7)
blk	M1 (A8)
vio	Lima D
brn	⊖
red	reserve
gry/blk	reserve

Waitzinger Baumaschinen Vertrieb und Service GmbH

free dimension tolerance DIN 7168 medium

issue	MODIFICATION	date	name

	date	name
drawn	1998/07/13	Mi
chkd.		
appd.		

change only with CAD

original

scale 1:1 weight 00 N

semi–finished product
Material

cable loop pump
REED cl 37m

B 56 1 071

sheet 1 of 2

replacement for

replacement by

PARTS LIST

28.09.05 10:35:01

part list	description	created	index	valid from	valid to
B561071	cable harness pump REED CL 32/36 V IV	28.03.00 Mi			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	housing upper part, 24-pol	WAI101542				1,00 Stk
2	plug insertion 24-pol.	WAI100714				1,00 Stk
3	plug	WAI104691				10,00 Stk
4	coupling	WAI104523				1,00 Stk
5	fitting PG16	WAI104510				1,00 Stk
6	sealing for cable fitting PG16	WAI104696				1,00 Stk
7	plate	WAI104735				12,00 Stk
8	plug 2-poles, AMP junior timer	WAI106058				1,00 Stk
9	housing agitator own parts list	B561072				1,00 Stk
10	fitting PG21	WAI104507				1,00 Stk
11	fitting PG9	WAI104506				12,00 Stk
12	t - piece 22-22-22	WAI104515				2,00 Stk
13	t - piece 17-10-17	WAI104332				8,00 Stk
14	t - piece	WAI104511				2,00 Stk
15	t - piece 22-10-22	WAI105263				6,00 Stk
16	t - piece 10-10-10	WAI104514				4,00 Stk
17	reducer	WAI104512				1,00 Stk
18	cap	WAI104513				8,00 Stk
19	reducer 22/17	WAI104509				5,00 Stk
20	sealing for cable fitting PG21	WAI104697				1,00 Stk

PARTS LIST

part list	description	created	index	valid from	valid to
B561071	cable harness pump REED CL 32/36 V IV	28.03.00 Mi			

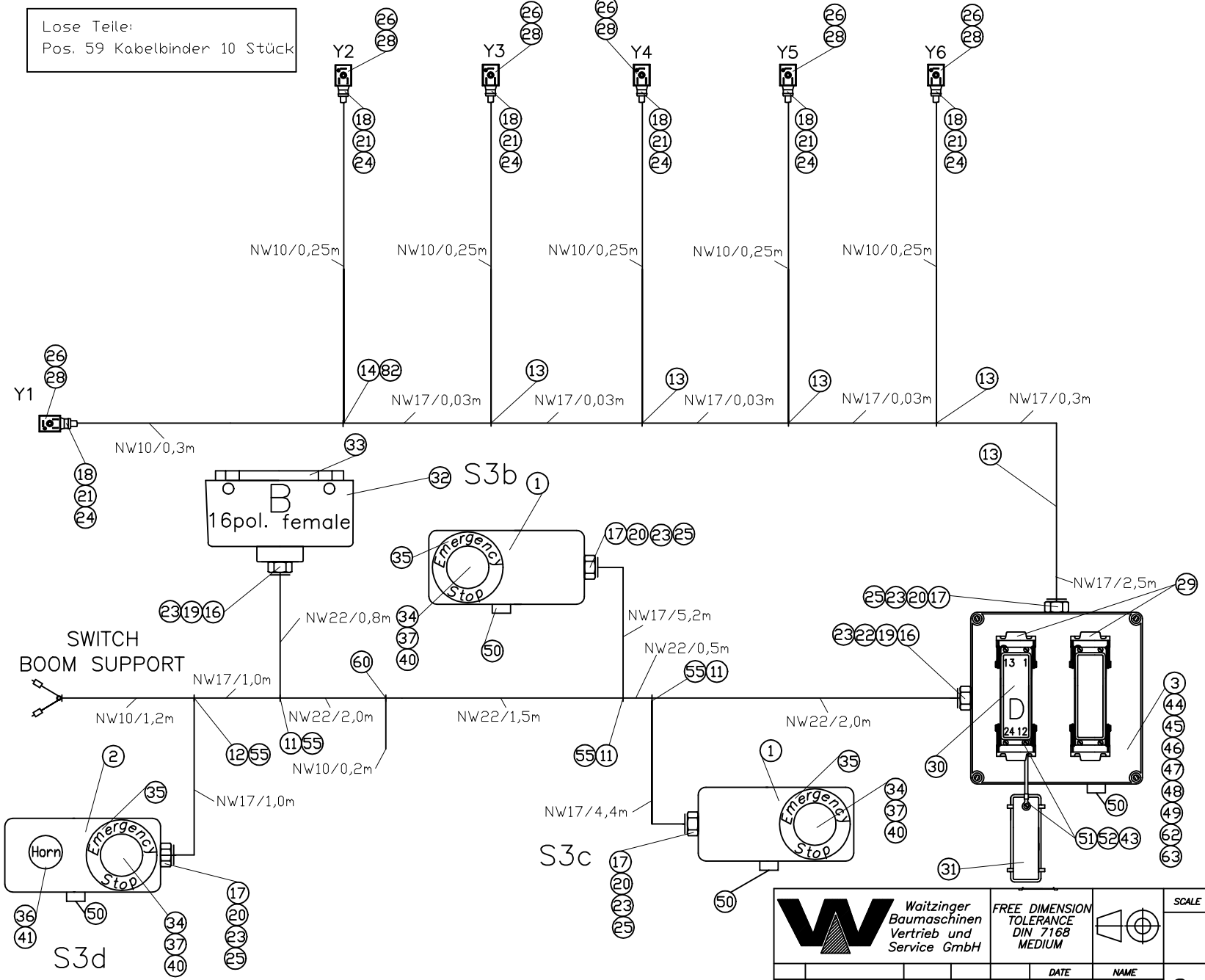
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
21	sealing for cable fitting PG9	WAI104695				12,00 Stk
22	O-ring 15 x 1,5	WAI104701				2,00 Stk
23	O-ring 8.9 x 1.25	WAI104700				12,00 Stk
24	flat plug sleeve 2,5mm	WAI104785				15,00 Stk
25	thimble 2,5 qmm M6	WAI104693			0,02	5,00 Stk
26	nut CE 16	WAI104519				2,00 Stk
27	push button	WAI100569				1,00 Stk
28	cove end sleeve 2.5mm	WAI101997				4,00 Stk
29	cove end sleeve 1.5mm	WAI101996				36,00 Stk
30	cove end sleeve 1.5mm	WAI104692				6,00 Stk
31	shrink hose	WAI104677				0,10 Mtr
32	shrink hose	WAI104505				0,05 Mtr
33	cable tie 200x3.6, black	WAI103137				32,00 Stk
34	plug	WAI104530				2,00 Stk
40	cable pipe	WAI104520				6,00 Mtr
41	cable pipe	WAI104216				7,80 Mtr
42	cable pipe	WAI104215				2,50 Mtr
43	cable pipe	WAI104213				23,80 Mtr
44	sign AL agitator	WAI106030				1,00 Stk
45	sign AL water pump	WAI106031				1,00 Stk

PARTS LIST

part list	description	created	index	valid from	valid to
B561071	cable harness pump REED CL 32/36 V IV	28.03.00 Mi			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
46	lever switch ON-OFF-ON	WAI104090				2,00 Stk
48	led-signal lamp, red	WAI105811				1,00 Stk
49	led-signal lamp, green	WAI105813				1,00 Stk
50	cable	WAI108059				270,00 Mtr

Lose Teile:
Pos. 59 Kabelbinder 10 Stück



PLUG B

1	D10 ⊣⊪	brn	ground
2	S3d	gry/brn	emergency stop
3	S3c	blk	emergency stop
4	D13	blu	emergency stop
5	D 22	gry/red	emergency stop
6	S3d	whi	emergency stop
7	D 20	whi/grn	horn
8	D 15	grn	RPM +
9	D 16	blk/whi	RPM –
10	D 24	vio	Pot
11	D 17	blk/grn	pumping on
12	D 19	whi/gry	reverse
13	D 23	brn/whi	outrigger
14	D 18	blu/whi	pumping
15	D 21	blk/red	free
16			free

PLUG D

⏚	B 1	brn	ground
1	Y3/3	brn/whi	boom 1 up
2	Y3/2	blu	boom 1 down
3	Y4/3	grn/whi	boom 2 up
4	Y4/2	blk/grn	boom 2 down
5	Y5/3	gry/blk	boom 3 up
6	Y5/2	blk/whi	boom 3 down
7	Y6/3	blk/red	boom 4 up
8	Y6/2	gry/red	boom 4 down
9	free	free	free
10	⊣⊪	brn	ground
11	Y2/2	vio	turn clockwise
12	Y2/3	blu/whi	turn anticlockw.
13	B4	red	plus
14	Y1/3 Y1/2 Y7	gry	pilot valve
15	B 8	grn	RPM +
16	B 9	blk/whi	RPM –
17	B 11	blk/grn	pumping on
18	B 14	blu/whi	pumping
19	B 12	gry/blk	reverse
20	B 7	whi/grn	horn
21	B 15	blk/red	free
22	A 5	gry/red	emergency stop
23	B13	brn/whi	free
24	B 10	vio	POT

ISSUE	MODIFICATION	DATE	NAME
d	siehe B 561066.doc	02.06.05	Körner
c	siehe B 561066.doc	26.08.04	Körner
b	siehe B 561066.doc	03/09/19	Hoh.
a	siehe B 561066.oen	08/03/20	Mi

Waitzinger Baumaschinen Vertrieb und Service GmbH

FREE DIMENSION TOLERANCE DIN 7168 MEDIUM

	DATE	NAME
DRAWN	1998/10/05	Fetzer
CHKD.		
APPD.		

CHANGE ONLY WITH CAD

ORIGINAL

SCALE | WEIGHT

Cable harness boom
REED 37m

B 56 1 066

SHEET 1 OF 3

REPLACEMENT FOR | REPLACEMENT BY

PARTS LIST

28.09.05 10:35:23

part list	description	created	index	valid from	valid to
B561066	cable harness boom REED V III	18.05.99 Mi	c	26.08.04	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	housing emergency stop own parts list	B561091				1,00 Stk
2	housing left own parts list	B561043		a 25.02.02		2,00 Stk
3	Clamp box for boom own parts list	B561029		a 15.01.02		1,00 Stk
11	t - piece 22-22-22	WAI104515				3,00 Stk
12	t - piece	WAI104508				1,00 Stk
13	t - piece 17-10-17	WAI104332				4,00 Stk
14	t - piece	WAI104511				1,00 Stk
16	fitting PG21	WAI104507				2,00 Stk
17	fitting PG16	WAI104510				4,00 Stk
18	fitting PG9	WAI104506				7,00 Stk
19	sealing for cable fitting PG21	WAI104697				2,00 Stk
20	sealing for cable fitting PG16	WAI104696				4,00 Stk
21	sealing for cable fitting PG9	WAI104695				7,00 Stk
22	lock nut PG21	WAI104114				1,00 Stk
23	O-ring 15 x 1,5	WAI104701				6,00 Stk
24	O-ring 8.9 x 1.25	WAI104700				7,00 Stk
25	nut CE 16	WAI104519				4,00 Stk
26	plate	WAI104735				7,00 Stk
28	plug	WAI104691				6,00 Stk
29	housing-body, lower part 24-pol	WAI101533				2,00 Stk

PARTS LIST

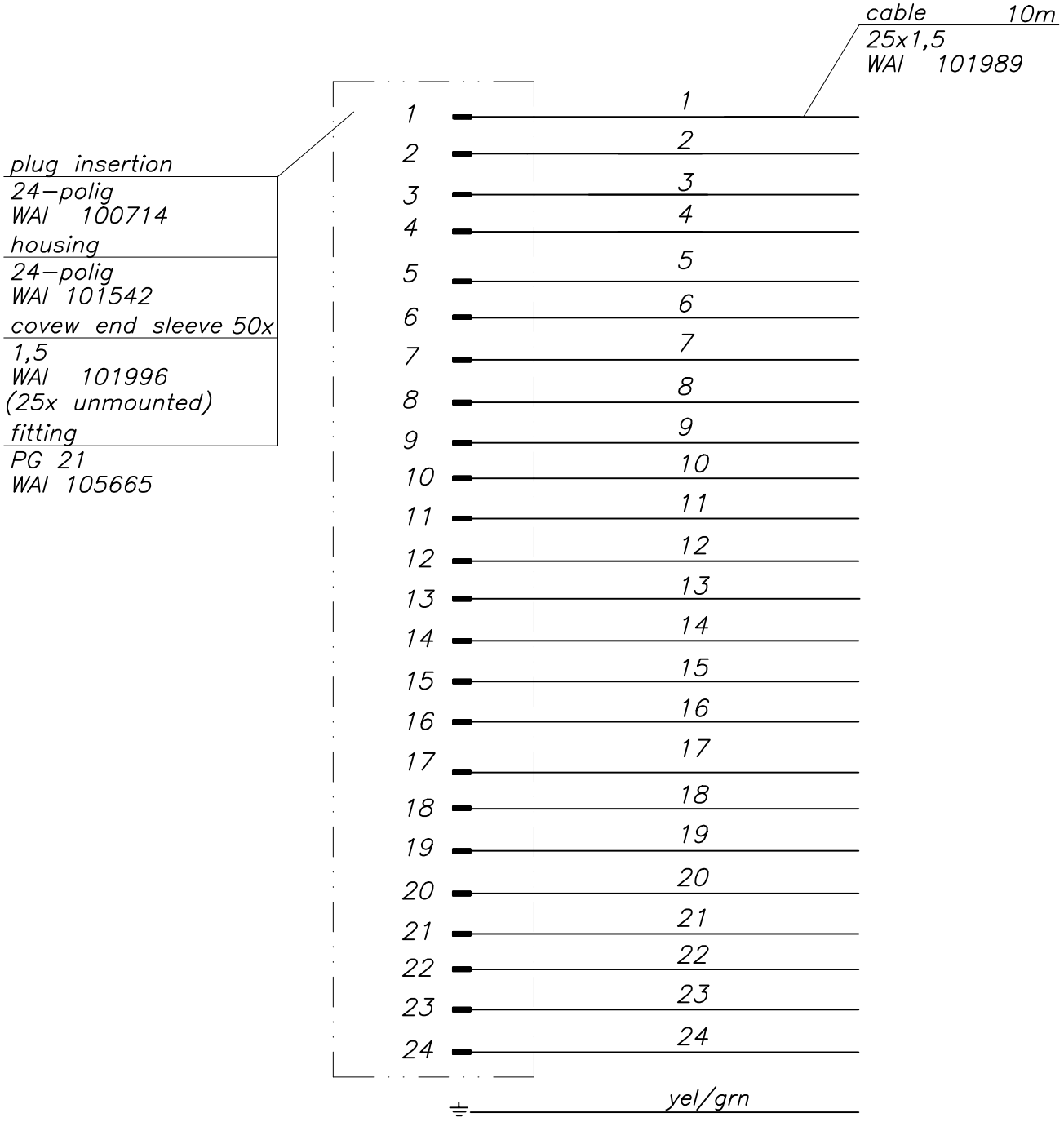
part list	description	created	index	valid from	valid to
B561066	cable harness boom REED V III	18.05.99 Mi	c	26.08.04	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
30	socket insertion 24-pol.	WAI100710				1,00 Stk
31	protective cap	WAI101305				1,00 Stk
32	housing upper part 16-pol.	WAI104023				1,00 Stk
33	plugbox insert 1-16 pol.	WAI104121				1,00 Stk
34	emergency stop switch	WAI105094				3,00 Stk
35	label ZB2-BY9330	WAI102278				3,00 Stk
36	push button	WAI100569				1,00 Stk
37	contact block	WAI105095				3,00 Stk
40	lamp 12V	WAI104083			0,10	3,00 Stk
41	plate "horn"	WAI105415				1,00 Stk
42	diode, 1A	WAI105337				3,00 Stk
43	washer 4	WAI104633				9,00 Stk
44	rail	WAI104772				0,20 Mtr
45	diode, MKS-D10	WAI104541				1,00 Stk
46	clamp	WAI104186				2,00 Stk
47	plug with diode	WAI104185				2,00 Stk
48	end plate	WAI104833				1,00 Stk
49	clamp	WAI104672				2,00 Stk
50	condenser	WAI104669				4,00 Stk
51	hexagon bolt M 4 x 12	WAI104632				9,00 Stk

PARTS LIST

part list	description	created	index	valid from	valid to
B561066	cable harness boom REED V III	18.05.99 Mi	c	26.08.04	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
52	hex. nut M4	WAI104634				9,00 Stk
53	cove end sleeve 1.5mm	WAI101996				60,00 Stk
54	cove end sleeve 1.5mm	WAI104692				35,00 Stk
55	reducer 22/17	WAI104509				4,00 Stk
56	cable pipe	WAI104520				7,00 Mtr
57	cable pipe	WAI104216				12,50 Mtr
58	cable pipe	WAI104213				3,40 Mtr
59	cable tie 200x3.6, black	WAI103137				28,00 Stk
60	t - piece 22-10-22	WAI105263				1,00 Stk
62	relay socket	WAI100986				2,00 Stk
63	relay DC 12V, 30 A	WAI104845				2,00 Stk
81	flat plug sleeve 2,5mm	WAI104785				14,00 Stk
82	reducer	WAI104512				1,00 Stk
83	cable	WAI108059				300,00 Mtr
90	thimble 1,5 - 2,5 qmm	WAI102458				3,00 Stk
91	cove end sleeve 2.5mm	WAI101997				20,00 Stk
92	cove end sleeve 1.0mm	WAI101995				20,00 Stk
93	plate	WAI106435				3,00 Stk



Waitzinger Baumaschinen Vertrieb und Service GmbH

free dimension tolerance DIN 7168 medium

	date	name
drawn	1999/07/20	Mi
chekd.		
appd.		

scale | weight

own parts list

cable cpl. for cable control

change only with CAD

B 56 1 049

sheet

of

issue	modification	date	name

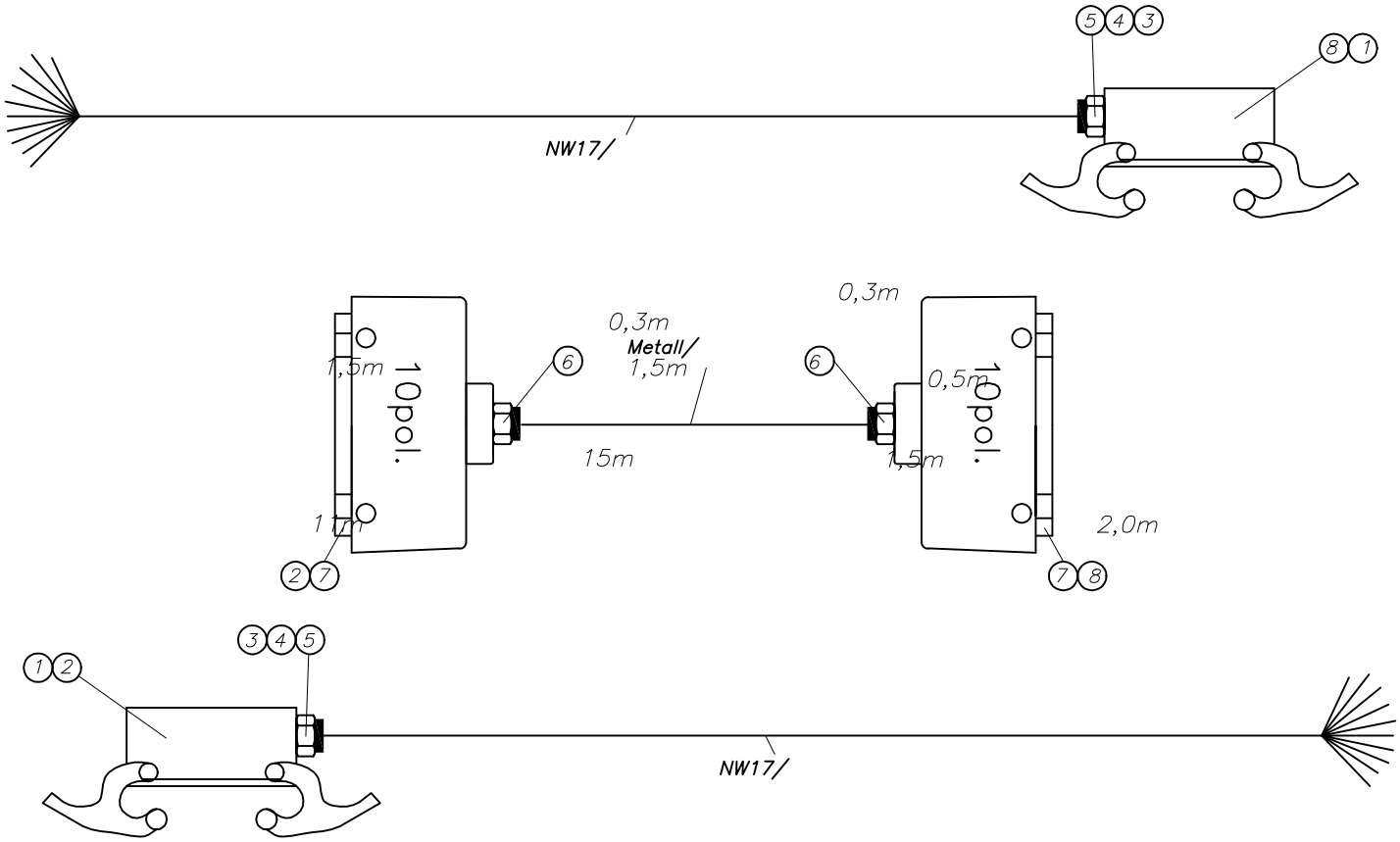
original | replacement for | replacement by

PARTS LIST

28.09.05 10:35:45

part list	description	created	index	valid from	valid to
B561049	cable cpl. for cable control	20.07.99 Mi			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	cable 25 x 1.5	WAI101989				10,00 Mtr
2	plug insertion 24-pol.	WAI100714				1,00 Stk
3	housing upper part, 24-pol	WAI101542				1,00 Stk
4	fitting PG21	WAI105665				1,00 Stk
5	cove end sleeve 1.5mm	WAI101996				50,00 Stk
6	sealing for cable fitting PG21	WAI104697				1,00 Stk



Waitzinger Baumaschinen Vertrieb und Service GmbH				Freimaßtoleranz DIN 7168 mittel		Maßstab	Gewicht
						eigene Stückliste	
					Datum / Name		
				Bearb.	06.09.2004 Körner	Kabelbaum Mast 37m REED	
				Gepr.			
				Norm			
				Änderung nur auf CAD		B 56 2 066	Blatt 2 von 2 Bl.
Zust.	Änderung	Datum	Name	Urspr.		Ers. für	Ers. durch

PARTS LIST

28.09.05 10:36:06

part list	description	created	index	valid from	valid to
b562066	cable loop boom REED	06.10.04 ALEXAND			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	housing 10 poles	WAI106688				2,00 Stk
2	plug insert 1-10 pin	WAI106687				2,00 Stk
3	fitting PG16	WAI104510				2,00 Stk
4	sealing for cable fitting PG16	WAI104696				2,00 Stk
5	O-ring 15 x 1,5	WAI104701				2,00 Stk
6	reduc. ring PG16 - 13,5	WAI107524				2,00 Stk
7	coupling housing 10-pole	WAI106689				2,00 Stk
8	plugbox insert 1-10 pol.	WAI106686				2,00 Stk
21	cable pipe	WAI104216				25,50 Mtr
22	cable	WAI108059				280,00 Mtr

Funkfernsteuerung kpl.

radio control cpl.

WAI 105982

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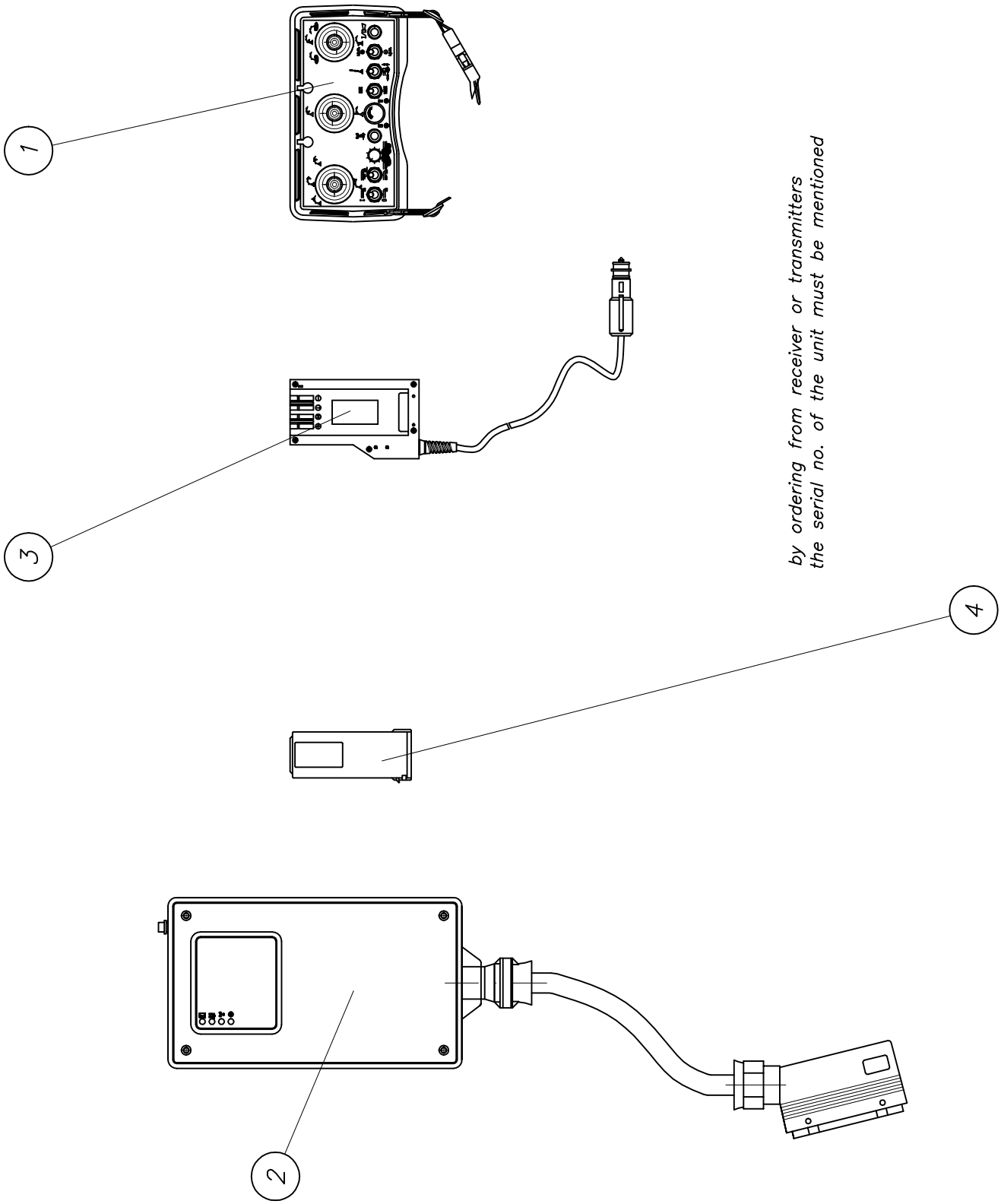

by ordering from receiver or transmitters the serial no. of the unit must be mentioned

PARTS LIST

28.09.05 10:42:58

part list	description	created	index	valid from	valid to
WAI105982	radio control	16.03.00 Mi			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	transmitter for remote control Reed 6	WAI106051				1,00 Stk
2	receiver for remote control REED 6	WAI106052				1,00 Stk
3	battery charger PNN-System	WAI104743				1,00 Stk
4	accumulator for remote control	WAI104745				1,00 Stk

Übersicht B 60 - B 69

over view B 60 - B 69

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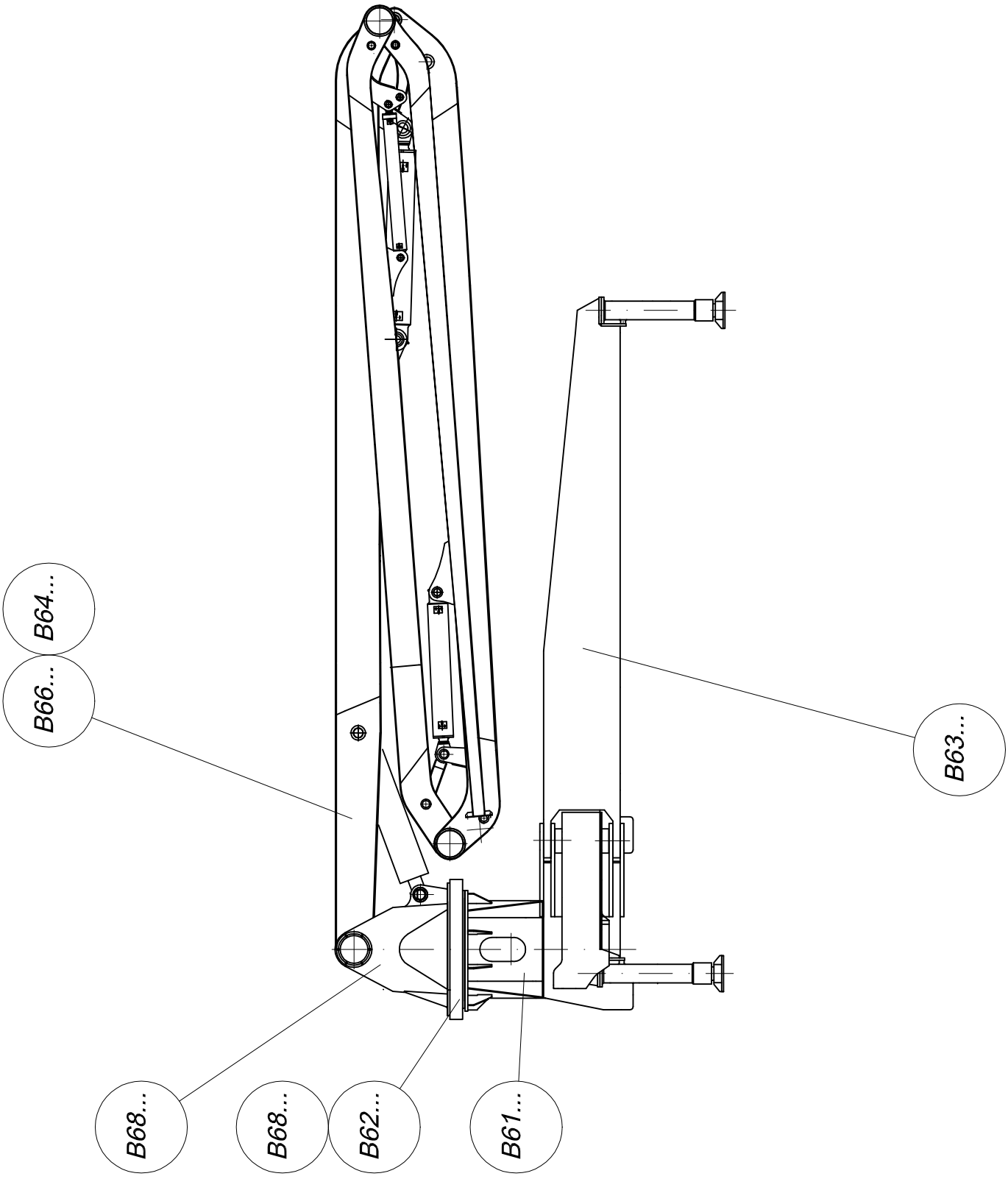

23.07.2002

Mastbock kpl.

boom base cpl.

B 61 9 000d

Waitzinger
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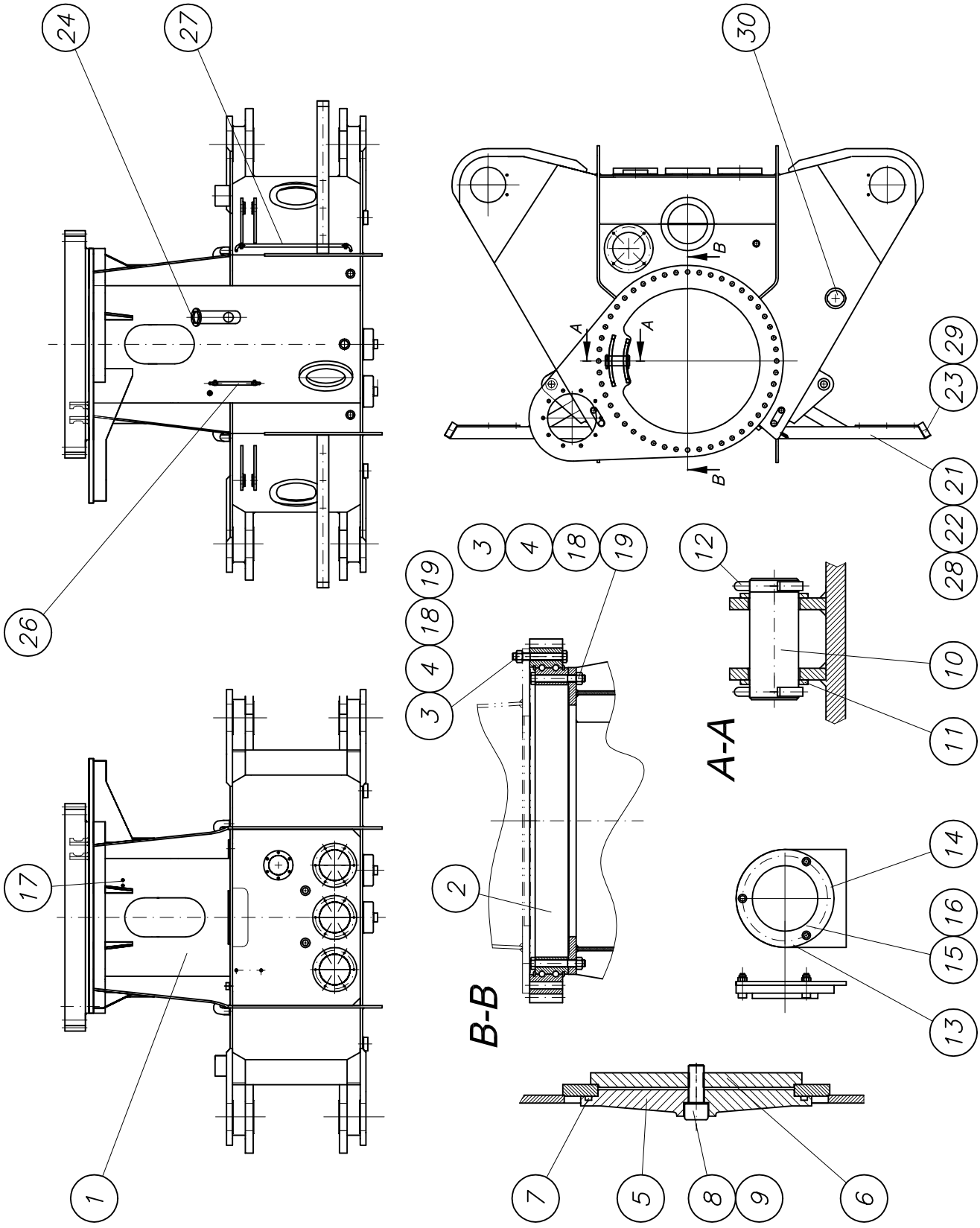


PARTS LIST

23.06.05 10:30:26

part list	description	created	index	valid from	valid to
B619000	boom base 32/36XXT cpl.	07.11.00 hbk	d	31.10.03	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	boom base 32/36XXT cpl. own parts list	B619010		b 17.04.02		1,00 Stk
2	rotation bearing	WAI106168			300,00	1,00 Stk
3	hexagon bolt M 22 x 160	WAI105029				96,00 Stk
4	nut M22 DIN 934 10.	WAI104827				96,00 Stk
5	cover for oiltank D236 X 27 36XT	B610033 RD 240x30	1747 Al99		1,80	4,00 Stk
6	star for oilcover FL 15X 220X 220	B610034 Fl 220x220x15	1017 S235JR	a 12.02.03	2,00	4,00 Stk
7	O-ring 217x5, No. A0120.371	WAI106011				4,00 Stk
8	u-seal 16,7 x 24 x 1,5T	WAI101572				4,00 Stk
9	cheese head screw M 16 x 55	WAI104550				4,00 Stk
10	pin 50 x 128	B610022 Rd 55 x 130	1013 39NiCrMo3/b	a 03.08.04	1,90	1,00 Stk
11	spacer ring RD 70X 4.5	B610025 Rd 70 x 4.5	1013 S235JR		0,10	2,00 Stk
12	split pin 8 x 63 VERZ. DIN 94	WAI102875				2,00 Stk
13	box level d80	WAI106237				2,00 Stk
14	holder for can drag and fly	B619093 Bl 5x100x112.5	1543/EN10029 S235J2G3	a 13.02.03	0,22	2,00 Stk
15	cheese head screw M5x20 DIN 912 8.8	WAI103389				6,00 Stk
16	locking nut DIN 980	WAI102068				6,00 Stk
17	lubrication kit for rotation bearing cpl own parts list	WAI106535			3,00	1,00 Stk
18	washer HV DIN 6916 23 C45	WAI101566				66,00 Stk
19	washer HV 6916 21 C45 tooled	WAI107180			0,01	30,00 Stk
21	guide profil	B619109 8x30x320	Polyamid			2,00 Stk
22	stop cpl. own parts list	B619110			8,00	2,00 Stk
23	stop	B619111 30x60x75	Polyamid			2,00 Stk

PARTS LIST

23.06.05 10:30:26

part list	description	created	index	valid from	valid to
B619000	boom base 32/36XXT cpl.	07.11.00 hbk	d	31.10.03	

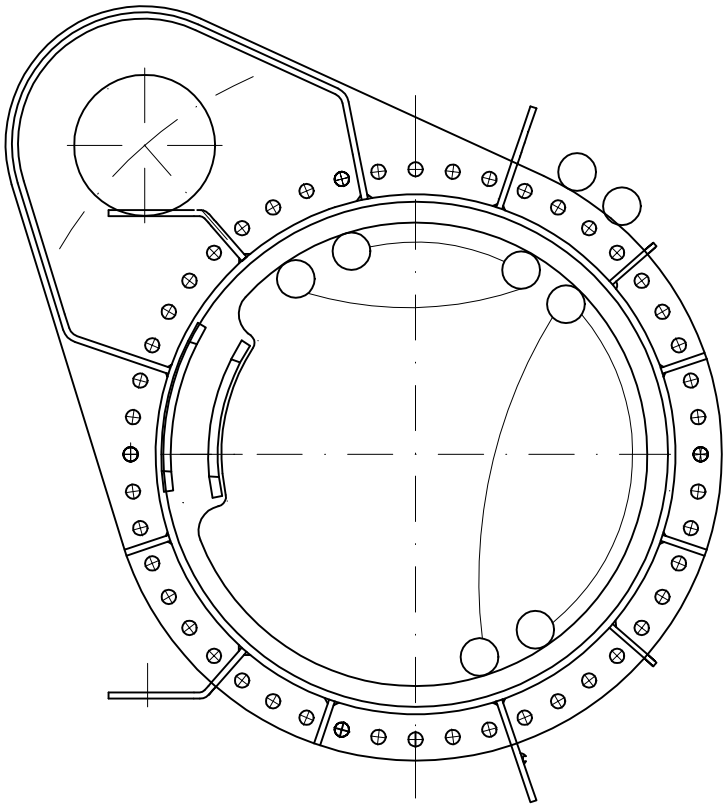
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
24	filling and air filter	WAI106163				1,00 Stk
26	fuel hose DN 12	WAI103104				1,70 Mtr
27	hose clamp 15mm	WAI103103				6,00 Stk
28	sunk screw M 10 x 20	WAI104689				6,00 Stk
29	cheese head screw	WAI102243			0,00	2,00 Stk
30	tank cover	WAI103102			0,80	1,00 Stk

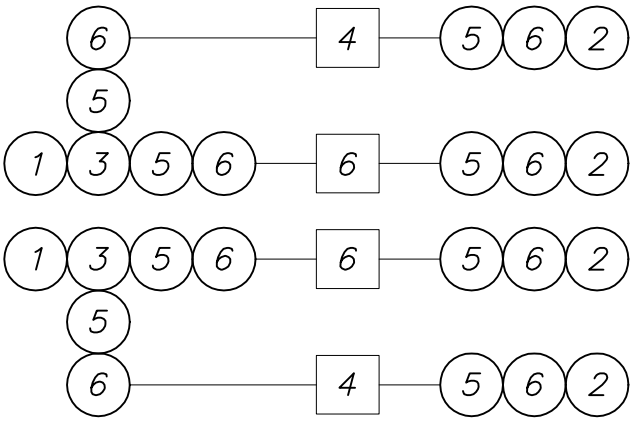
Schmieranlage für Drehkranz

lubrication for turning unit

WAI 106535

Waitzinger
Baumaschinen GmbH





PARTS LIST

23.06.05 10:32:06

part list	description	created	index	valid from	valid to
WAI106535	lubrication kit for rotation bearing cpl	04.12.00 Mi			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	grease nipple H1 M10 X 1 DIN 71412	WAI100805			0,01	2,00 Stk
2	male stud coupling LL6M	WAI100305				4,00 Stk
3	t-fitting LL6	WAI106534				2,00 Stk
4	plastic pipe 8.4 x 2.1	WAI100255			0,05	3,50 Mtr
5	hose connecting piece, DN6, short	WAI100253			0,01	8,00 Stk
6	threaded sleeve	WAI100254			0,01	8,00 Stk

Drehwerk kpl.

turning unit cpl.

B 62 8 010

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1 Drehwerkseinheit kpl.
turning unit cpl.
B 62 8 011a

2 Schutzeinrichtung kpl.
protection unit cpl.
B 62 8 012c

Drehwerkseinheit kpl.

turning unit cpl.

B 62 8 011a

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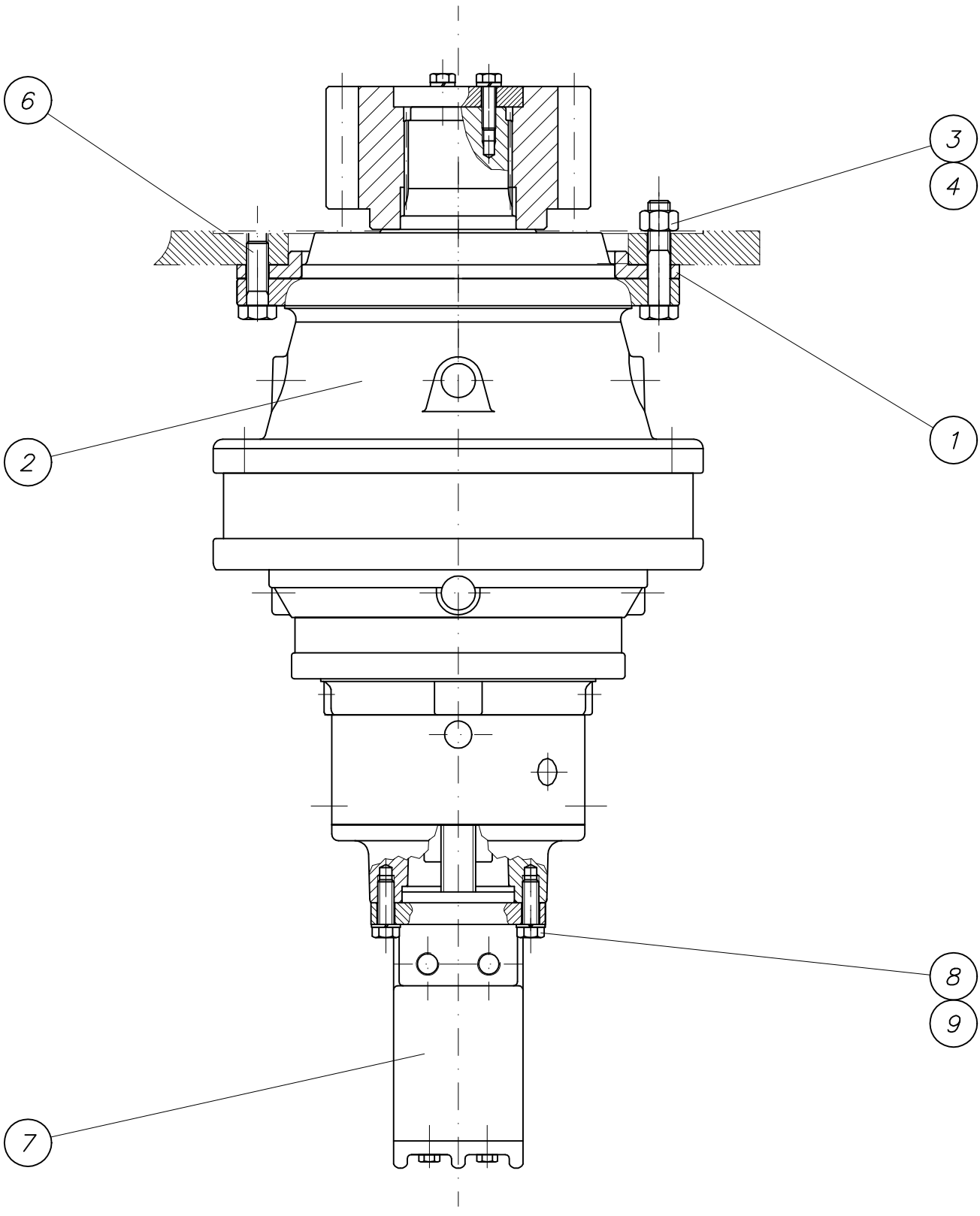


24.06.2004

PARTS LIST

19.07.05 08:33:46

part list	description	created	index	valid from	valid to
B628011	turning unit cpl.36XT AND 36ST	27.06.00 hbk	a	17.06.04	

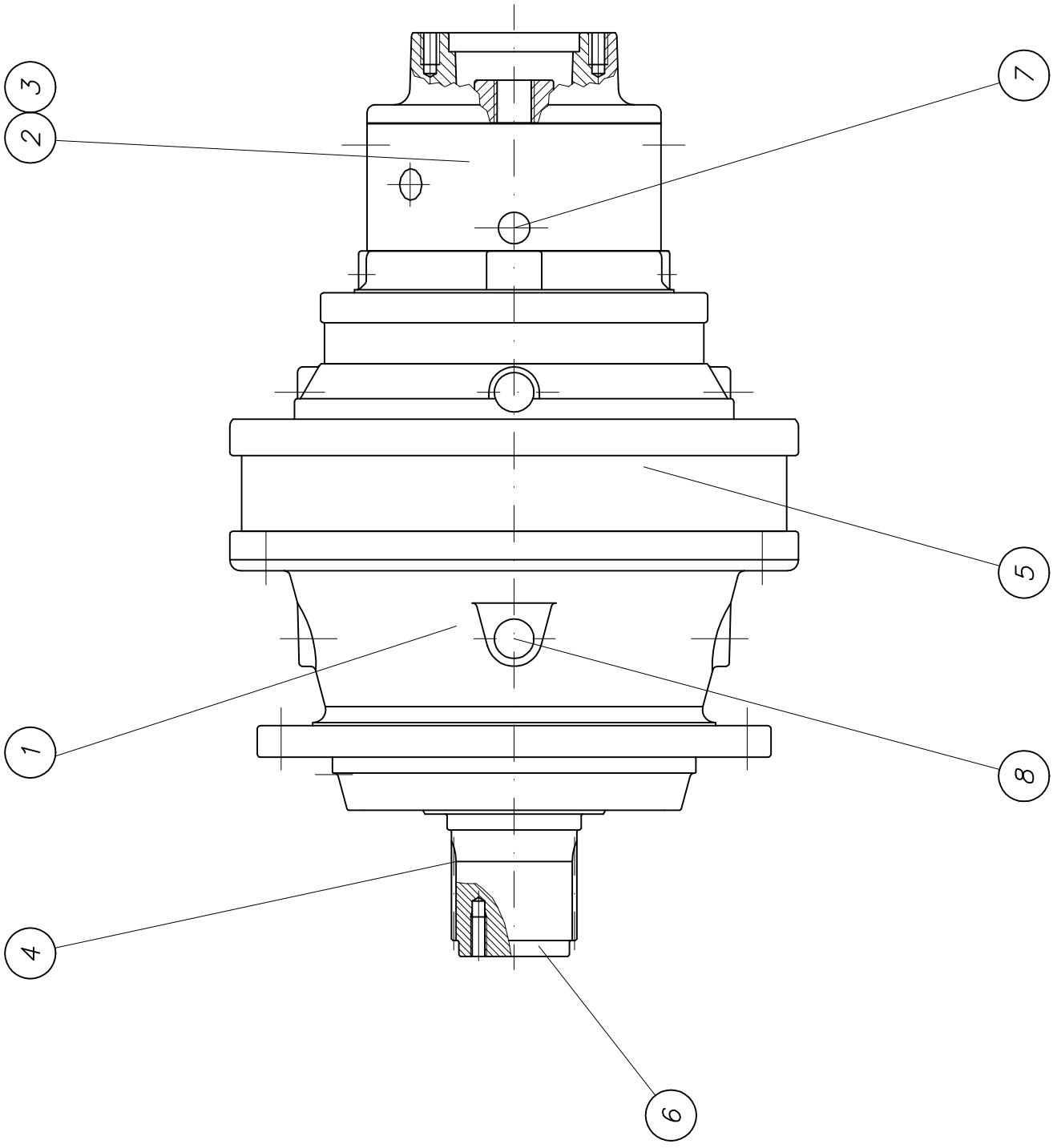
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	eccentric flange for turning unit	B620049 Rohr 323.9 x 50	2448 S355JR	a 04.01.01	3,60	1,00 Stk
2	gearbox PG1602-MFS SOM own parts list	WAI106266			151,60	1,00 Stk
3	hexagon bolt M16 x 80	WAI106268			0,17	7,00 Stk
4	nut M16 DIN 934	WAI101555				7,00 Stk
6	hexagon bolt M16 x 50	WAI106269			0,17	3,00 Stk
7	hydraulic motor Char Lynn	WAI106301				1,00 Stk
8	hexagon bolt M12 x 35	WAI102122			0,04	2,00 Stk
9	spring washer A12 DIN 127 VERZ.	WAI102896				2,00 Stk

Drehwerksgetriebe

rotating gear box

WAI 106266

Waitzinger
Baumaschinen GmbH



08.03.2001

PARTS LIST

19.07.05 08:36:15

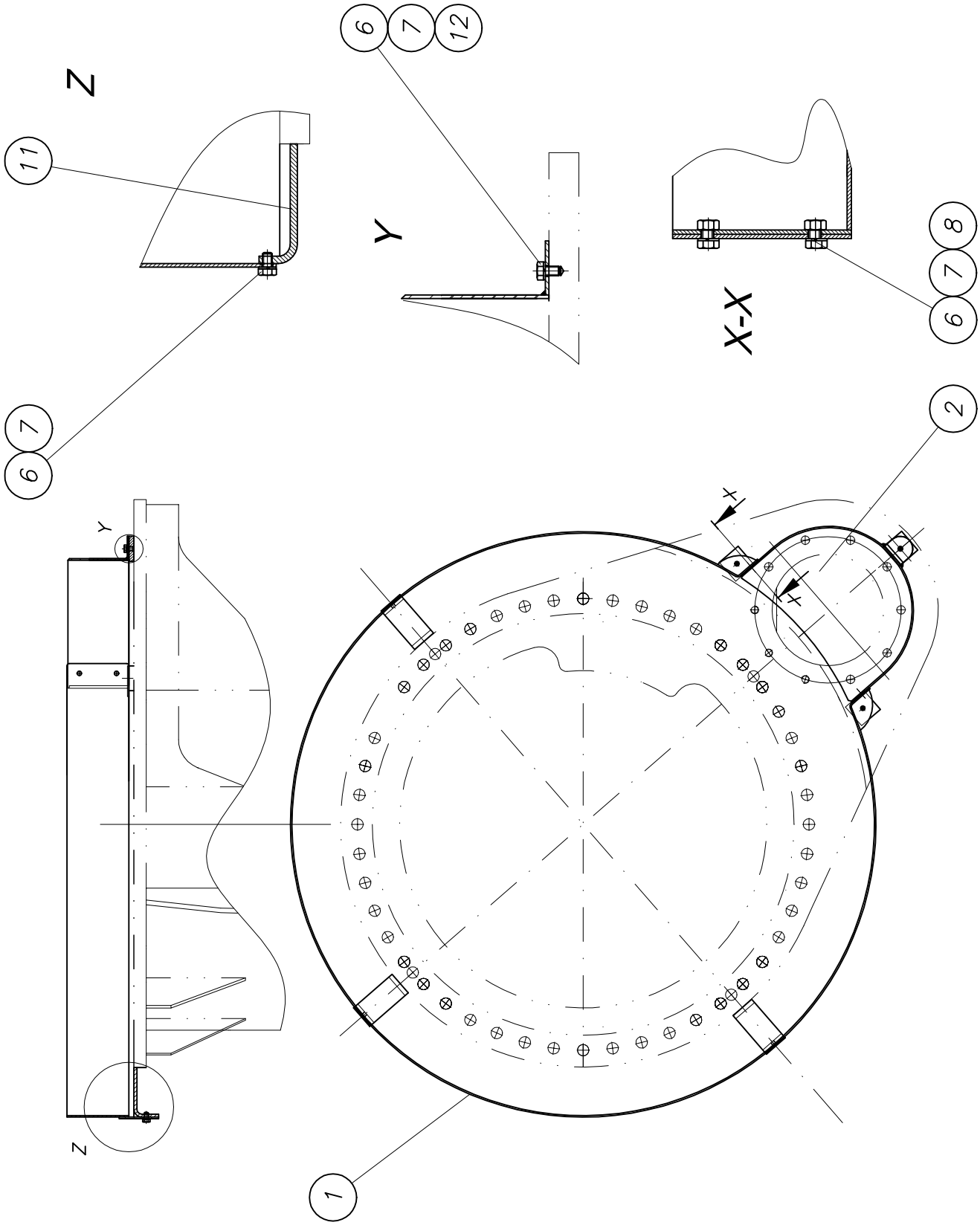
part list	description	created	index	valid from	valid to
WAI106266	gearbox PG1602-MFS SOM	08.03.01 Mi			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	lamina	WAI106712				4,00 Stk
2	lamina	WAI106713				5,00 Stk
3	sealing set for rotation gearbox 36 mtr	WAI106272			0,50	1,00 Stk
4	gear 14	WAI106511			10,00	1,00 Stk
5	gearbox RE040.11201	WAI106748			140,00	1,00 Stk
6	cap RP100	WAI106749				1,00 Stk
7	gauge LL301	WAI106750			0,00	1,00 Stk
8	breather FS020	WAI106751			1,50	1,00 Stk

Schutzeinrichtung kpl.
protection unit cpl.

B 62 8 012c

Waitzinger
Baumaschinen GmbH



27.02.2004

PARTS LIST

19.07.05 08:35:02

part list	description	created	index	valid from	valid to
B628012	turning unit protection partsKPL.36XT/ST	27.06.00 hbk	c	24.02.04	

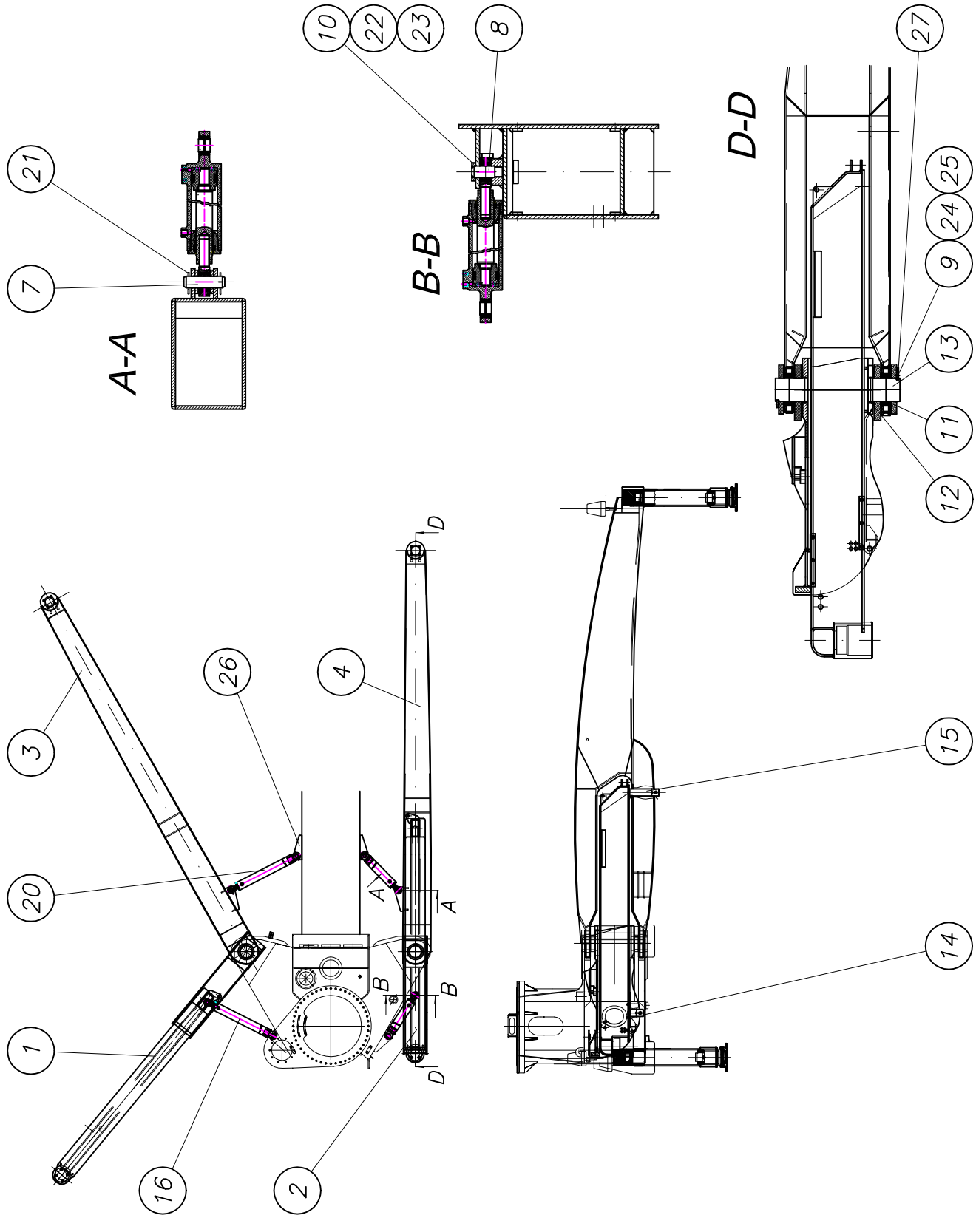
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	rotation bearing protection own parts list	B620050			13,00	1,00 Stk
2	pinion cover f. 36 mtr. KPL. own parts list	B620055				1,00 Stk
6	hexagon bolt M 8 x 12 DIN 933 8.8	WAI103274				9,00 Stk
7	spring washer A8 DIN 127 VERZ.	WAI102205			0,00	11,00 Stk
8	hex. nut M8 DIN 934 8. VERZ.	WAI102880				4,00 Stk
11	holder BL 6X 50X 119	B620058 Bl 6x50x119	1543/EN10029 St37-2	b 27.01.03	0,30	4,00 Stk
12	hexagon bolt M 8 x 50 DIN 931 8.8	WAI108743				2,00 Stk

Abstützung kpl.

outrigger cpl.

B 63 9 150e

Waitzinger
Baumaschinen GmbH



PARTS LIST

23.06.05 10:38:22

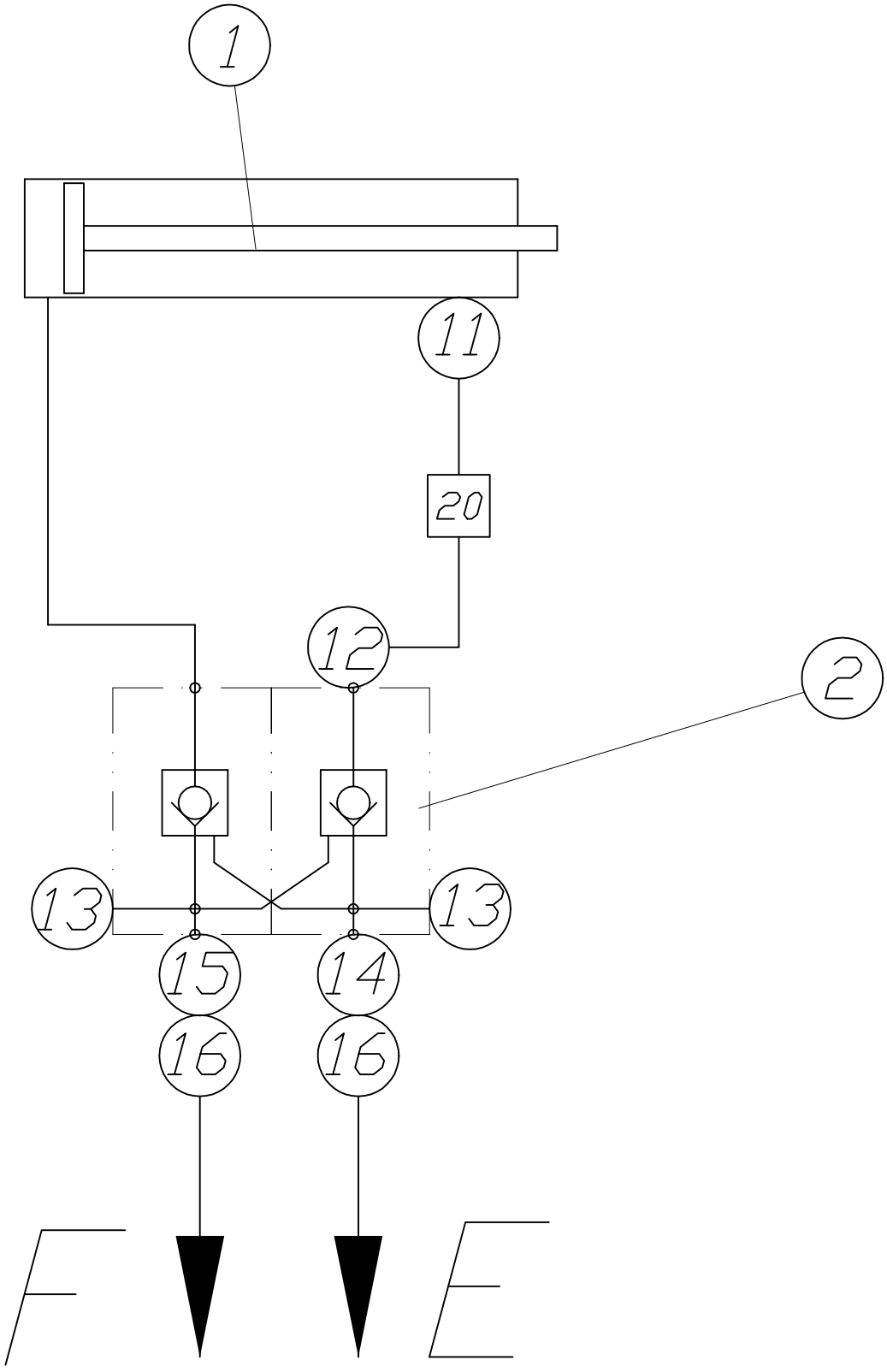
part list	description	created	index	valid from	valid to
B639150	outrigger 32/36 xxt cpl	04.01.01 Mi	e	01.06.05	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	front right stabilizer 32/36XXT cpl. own parts list	B639170		c 01.06.04		1,00 Stk
2	front left stabilizer 32/36XXT cpl. own parts list	B639180		c 01.06.04		1,00 Stk
3	rear right stabilizer 32/36XXT cpl. own parts list	B639190		a 02.12.03	820,00	1,00 Stk
4	rear left stabilizer 32/36XXT cpl. own parts list	B639210		b 14.03.05	820,00	1,00 Stk
7	pin 35 x 124	B610020 Rd 40 x 130	1013 C40		1,00	6,00 Stk
8	pin	B639183 Rd 35 x 92.5	1017 ST52-2	a 09.02.01	0,50	2,00 Stk
9	embed plate	B639184 Fl 12x140x65	1017 St37-2	a 07.11.02	0,90	4,00 Stk
10	embed plate	B639185 Fl 12x100x55	1017 St37-2		0,50	2,00 Stk
11	bushing	B639191 Ro D159x12.5	2448 STE770		2,30	4,00 Stk
12	bushing	B639251 Rohr D159°12.5	DIN 2448 STE770		1,50	4,00 Stk
13	pin 140 x 194	B639193 Rd D150x200	1013 42CrMo4V	b 26.02.04	23,50	4,00 Stk
14	transport savety device own parts list	B639197		b 14.10.03		2,00 Stk
15	transport savety device own parts list	B639207		b 20.10.04		2,00 Stk
16	swing cylinder cpl. own parts list	B630104		a 02.06.05	155,00	2,00 Stk
20	swing cylinder cpl. own parts list	B639246		a 02.06.05	155,00	2,00 Stk
21	split pin 8 x 63 VERZ. DIN 94	WAI102875				12,00 Stk
22	hexagon bolt M 8 x 20	WAI101837				4,00 Stk
23	spring washer A8 DIN 127 VERZ.	WAI102205			0,00	4,00 Stk
24	hex. bolt M12x30 DIN 933 8.8	WAI102107			0,04	8,00 Stk
25	spring washer A12 DIN 127 VERZ.	WAI102896				8,00 Stk
26	bracket own parts list	B639241			1,50	2,00 Stk
27	flat bar	B630013 Fl 30x10x140	1017 S235J2G3		0,30	4,00 Stk

Ausschwenkzylinder kpl.
swing cylinder cpl.

B 63 9 246a

Waitzinger
Baumaschinen GmbH



PARTS LIST

23.06.05 10:41:16

part list	description	created	index	valid from	valid to
B639246	swing cylinder cpl.	07.10.03 Mi	a	02.06.05	

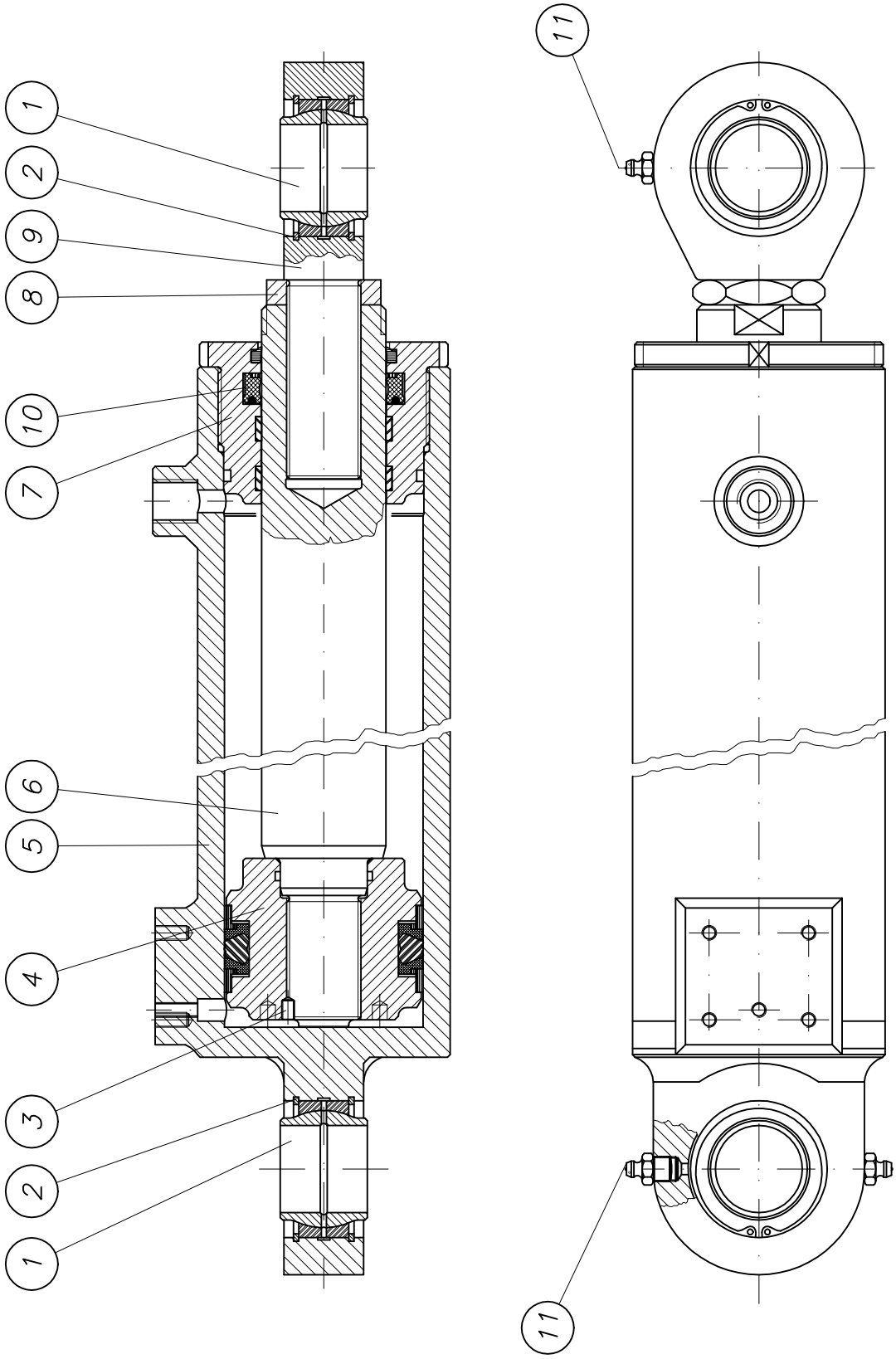
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	swing cylinder 80/50 x 305 own parts list	WAI106210			22,50	1,00 Stk
2	pilot operated twin check valve	WAI106410				1,00 Stk
11	banjo coupling L12 RD	WAI103684				1,00 Stk
12	straight male stud couplings L12D	WAI100548				1,00 Stk
13	locking screw G 3/8	WAI100521				2,00 Stk
14	straight male stud couplings L12R 1.2 own parts list	WAI107456			0,13	1,00 Stk
15	straight male stud couplings L12R 1.5 own parts list	WAI106427			0,13	1,00 Stk
16	swivel elbow L12	WAI103794				2,00 Stk
20	hydr. pipe 12 x 2	WAI102022			0,49	0,30 Mtr

Ausschwenkzylinder

swing cylinder

WAI 106210

Waitzinger
Baumaschinen GmbH



12.03.2001

PARTS LIST

23.06.05 10:43:01

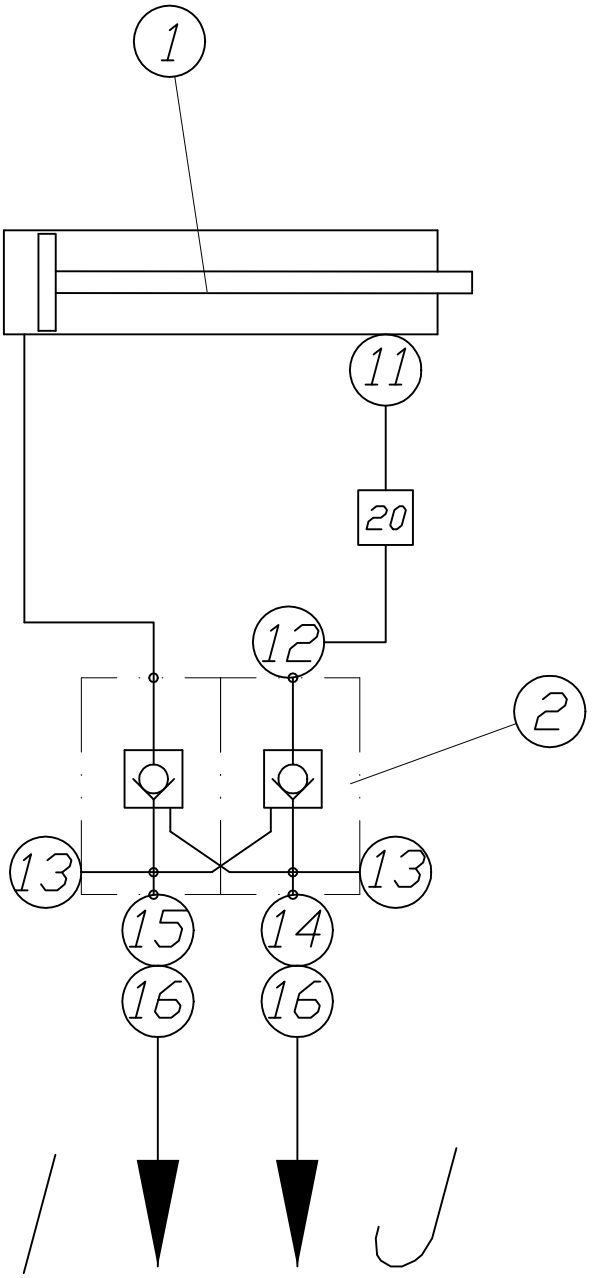
part list	description	created	index	valid from	valid to
WAI106210	swing cylinder 80/50 x 305	26.03.01 Mi			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	joint bearing	WAI103626			1,50	2,00 Stk
2	clamping ring	WAI106780			0,02	4,00 Stk
3	set screw M 6 x 8	WAI103646				1,00 Stk
4	piston	WAI106781				1,00 Stk
5	housing	WAI106782				1,00 Stk
6	piston rod	WAI106783				1,00 Stk
7	head for drive cylinder	WAI106784				1,00 Stk
8	piston nut	WAI106785				1,00 Stk
9	piston head	WAI106786				1,00 Stk
10	SEALING SET FOR SWING CYLINDER 32	WAI106574				1,00 Stk
11	grease nipple H1 M10 X 1 DIN 71412	WAI100805			0,01	3,00 Stk

Ausschwenkzylinder hinten kpl.
swing cylinder rear cpl.

B 63 0 104

Waitzinger
Baumaschinen GmbH



PARTS LIST

05.07.05 11:31:25

part list	description	created	index	valid from	valid to
B630104	swing cylinder cpl.	16.09.03 Mi	a	02.06.05	

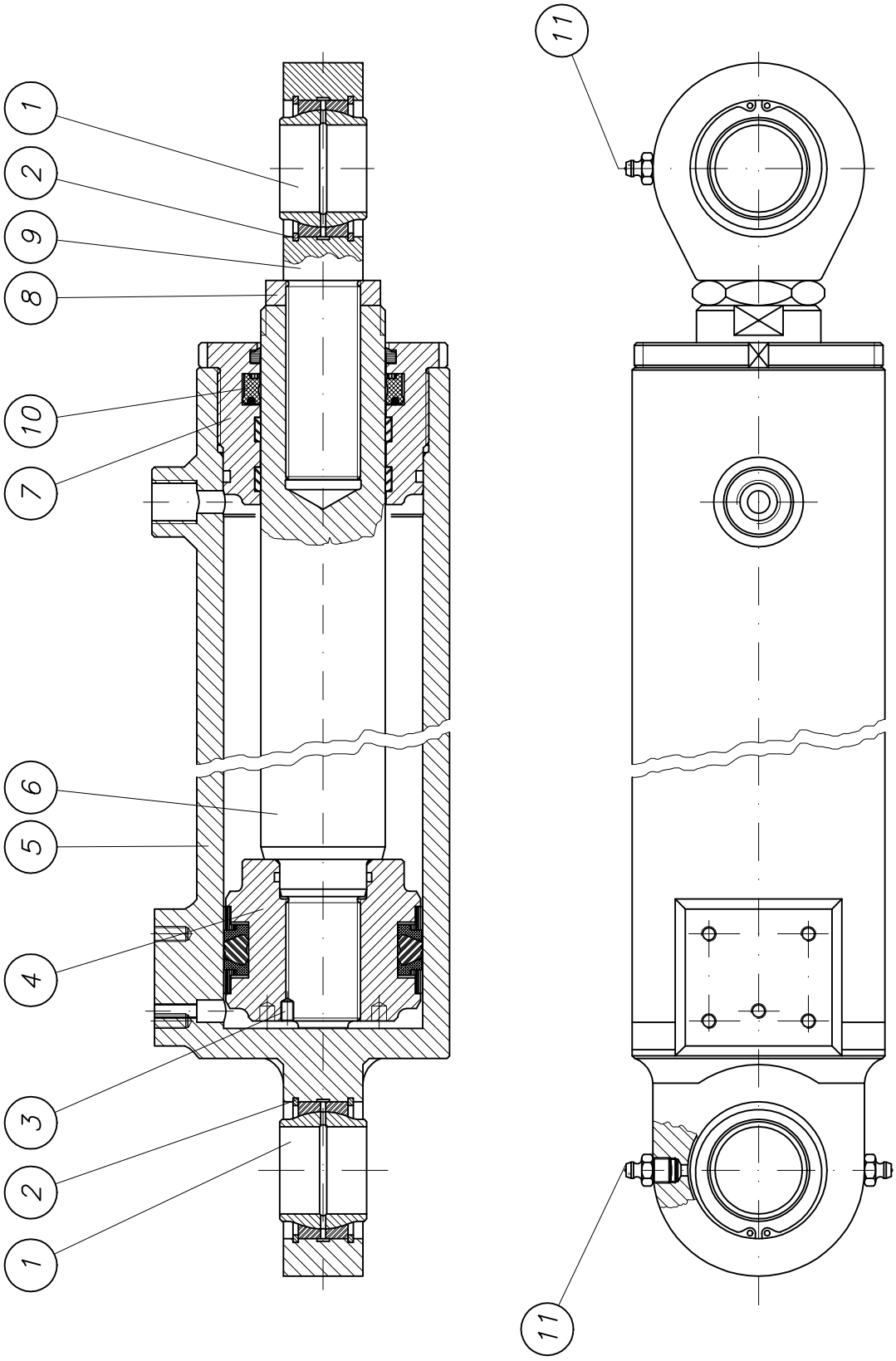
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	swing cylinder 80 x 50 x 370 St36 own parts list	WAI106235			27,00	1,00 Stk
2	pilot operated twin check valve	WAI106410				1,00 Stk
11	banjo coupling L12 RD	WAI103684				1,00 Stk
12	straight male stud couplings L12D	WAI100548				1,00 Stk
13	locking screw G 3/8	WAI100521				2,00 Stk
14	straight male stud couplings L12R 1.2 own parts list	WAI107456			0,13	1,00 Stk
15	straight male stud couplings L12R 1.5 own parts list	WAI106427			0,13	1,00 Stk
16	swivel elbow L12	WAI103794				2,00 Stk
20	hydr. pipe 12 x 2	WAI102022			0,49	0,40 Mtr

Ausschwenkzylinder

swing cylinder

WAI 106235

Waitzinger
Baumaschinen GmbH



PARTS LIST

05.07.05 11:34:19

part list	description	created	index	valid from	valid to
WAI106235	swing cylinder 80 x 50 x 370 St36	26.03.01 Mi			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	joint bearing	WAI103626			1,50	2,00 Stk
2	clamping ring	WAI106780			0,02	4,00 Stk
3	set screw M 6 x 8	WAI103646				1,00 Stk
4	piston	WAI106781				1,00 Stk
5	housing	WAI106794				1,00 Stk
6	piston rod	WAI106795				1,00 Stk
7	head for drive cylinder	WAI106796				1,00 Stk
8	piston nut	WAI106785				1,00 Stk
9	piston head	WAI106797				1,00 Stk
10	sealing kit for rear swing cylinder	WAI104039				1,00 Stk
11	grease nipple H1 M10 X 1 DIN 71412	WAI100805			0,01	3,00 Stk

Abstützung vorne rechts kpl.
outrigger front right cpl.

B 63 9 170c

Waitzinger
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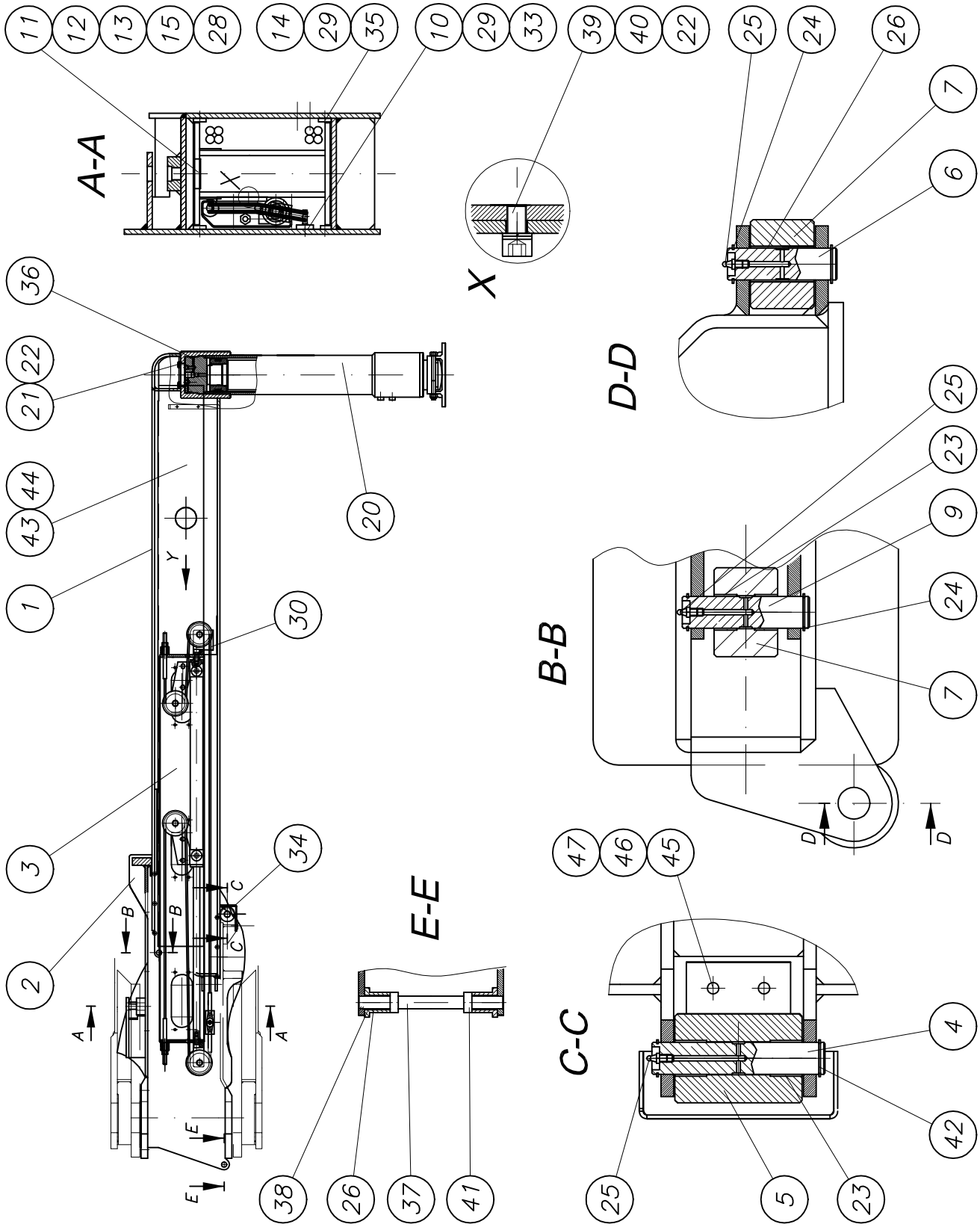

PARTS LIST

28.09.05 09:14:28

part list	description	created	index	valid from	valid to
B639170	front right stabilizer 32/36XXT cpl.	04.01.01 Mi	c	01.06.04	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	telecopic 32/36 XXT tooling own parts list	B639051			314,00	1,00 Stk
2	outrigger XXT tooled own parts list	B639070		a 31.10.03	216,00	1,00 Stk
3	synchron cylinder cpl. own parts list	B639090		b 25.11.04		1,00 Stk
4	pin 25 x 136, 3P206	B610023 Rd 25 x 140	669 St50-2K		0,50	1,00 Stk
5	roller 70 x 100, 2H105	B610024 Rd 70 x 105	669 St50-2K		2,50	1,00 Stk
6	pin 25 x 085 4P201	B610026 Rd 25 x 90	669 St50-2K		0,32	1,00 Stk
7	roller 70 x 050, 4H102	B610027 Rd 70 x 55	669 St50-2K		0,80	2,00 Stk
9	pin 25 x 100	B610068 Rd 25x105	669 St50-2K		0,50	1,00 Stk
10	holder for rope own parts list	B639074			0,50	1,00 Stk
11	strip	B639211 Fl 70x15x1190	1017 St52-3		1,16	1,00 Stk
12	spacer plate 2,0 mm	B639212 Bl 2x70x880	1623/EN10131 ST02Z	a 15.02.05	0,96	2,00 Stk
13	spacer plate 2,0 mm	B639214 Bl 2x70x110	1541 St52-3		0,12	2,00 Stk
14	guide profil	B639217				4,00 Stk
15	sheet	B639243 Bl 1x70x150	1541/EN10121 S355J2G3			5,00 Stk
20	jack cylinder own parts list	WAI106344		c 25.07.05	150,00	1,00 Stk
21	hexagon bolt M16 x 50	WAI106269			0,17	4,00 Stk
22	spring washer A16	WAI102072			0,01	8,00 Stk
23	bushing CD025-028025	WAI105017				2,00 Stk
24	locking ring A 25 X 1.2 DIN 471	WAI103006				4,00 Stk
25	grease nipple M6 DIN 71412	WAI103355				3,00 Stk

PARTS LIST

part list	description	created	index	valid from	valid to
B639170	front right stabilizer 32/36XXT cpl.	04.01.01 Mi	c	01.06.04	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
26	bushing DU 25 X 28 X 50	WAI106236				4,00 Stk
28	cylinder head screw M 12 x 25	WAI103698				5,00 Stk
29	sunk screw M 10 x 20	WAI104689				14,00 Stk
30	bracket	B639248 Bl 3x129.1x44	EN 10029 S235J2G3		0,10	1,00 Stk
33	clamping sleeve 10 x 20	WAI102881				1,00 Stk
34	cover for roller	B951043 Bl 3x238.1x192.	 Alu	a 30.04.04	0,20	1,00 Stk
35	plate	B639219 Bl 30x320x1	1541 S235 J2G3			4,00 Stk
36	O-ring 129,2 x 5,7	WAI101441				1,00 Stk
37	shaft	B639233 Rd 25x 290	669 S235J2G3	c 26.04.05	1,00	1,00 Stk
38	roller	B639235 Rd50x60	1013 S235J2G3		0,20	2,00 Stk
39	cheese head screw M 16 x 25	WAI103488				4,00 Stk
40	washer 17, DIN 125	WAI102893				4,00 Stk
41	fixing ring	WAI108884 Di25 Da40 B16	DIN 705		0,05	2,00 Stk
42	locking ring A 25 X 1.2 DIN 471	WAI103006				2,00 Stk
43	side cover 36 xxt telescope	B951035 Bl 3x255,5x2794	EN10029 Alu	b 22.03.04	6,50	1,00 Stk
44	sunk screw M 8 x 25	WAI104070				2,00 Stk
45	hexagon bolt M 8 x 20	WAI101837				2,00 Stk
46	hex. nut M8 DIN 934 8. VERZ.	WAI102880				2,00 Stk
47	spring washer A8 DIN 127 VERZ.	WAI102205			0,00	2,00 Stk
48	sunk screw M 10 x 20	WAI104689				2,00 Stk

PARTS LIST

part list	description	created	index	valid from	valid to
B639170	front right stabilizer 32/36XXT cpl.	04.01.01 Mi	c	01.06.04	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
49	cheese head screw M 6x10	WAI103324				4,00 Stk
50	spring washer A6	WAI103000				4,00 Stk
51	bolt right own parts list	B639254				1,00 Stk
52	energie chain	WAI109227			0,01	1,00 Stk

Abstützzylinder

jack cylinder

WAI 109673

Waitzinger
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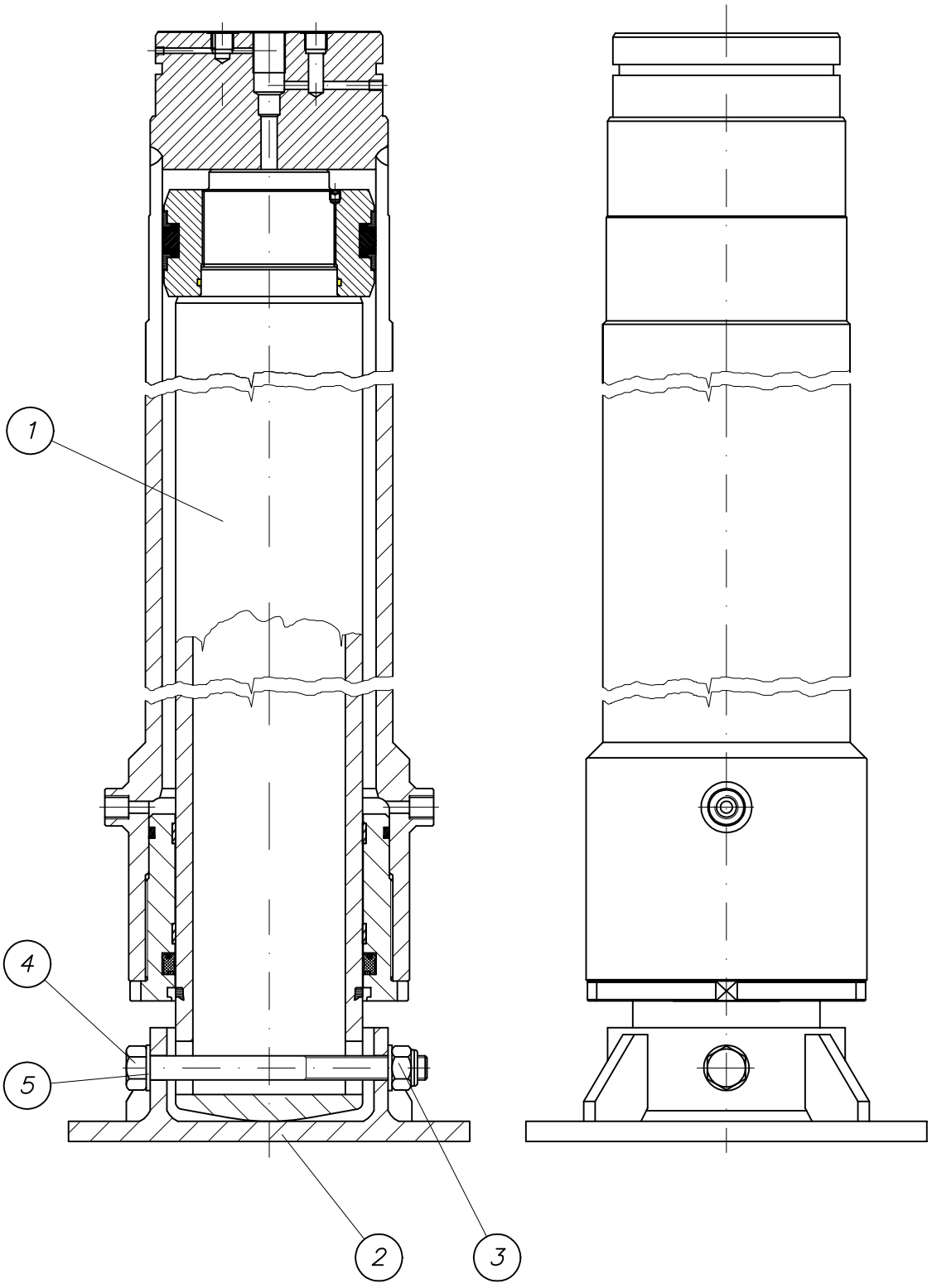


06.06.2005

PARTS LIST

22.06.05 11:51:01

part list	description	created	index	valid from	valid to
WAI109673	jack cylinder	31.05.05 RAINER			

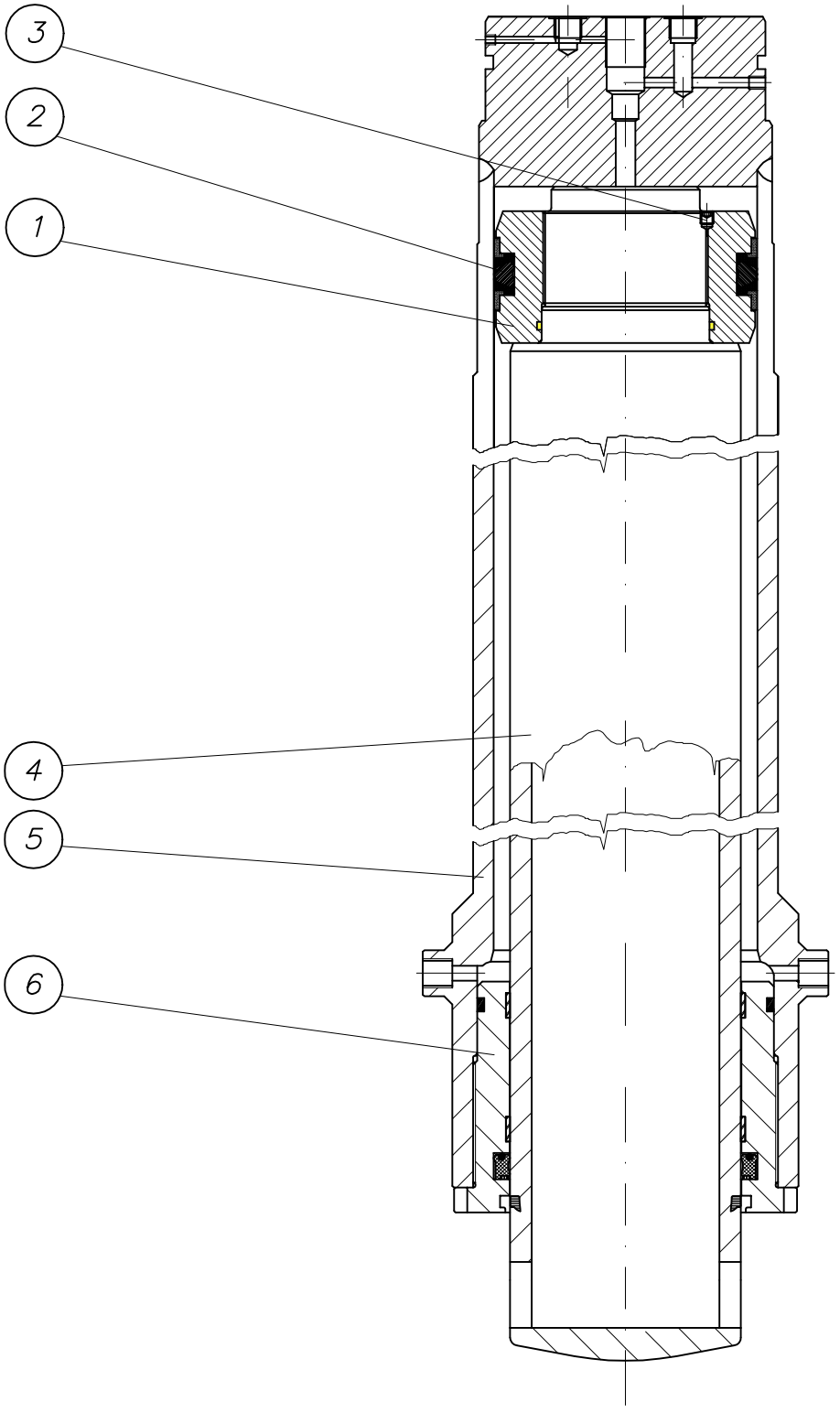
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	jack cylinder own parts list	wai109669				1,00 Stk
2	foot	wai106778				1,00 Stk
3	hex. nut M18 DIN 985 8. VERZ.	wai109671				1,00 Stk
4	washer 19	wai109672				1,00 Stk
5	hexagon screw M 18 x 220	wai109670				1,00 Stk

Abstützzylinder

jack cylinder

WAI 109669

Waitzinger
Baumaschinen GmbH



PARTS LIST

22.06.05 11:52:18

part list	description	created	index	valid from	valid to
wai109669	jack cylinder	31.05.05 RAINER			

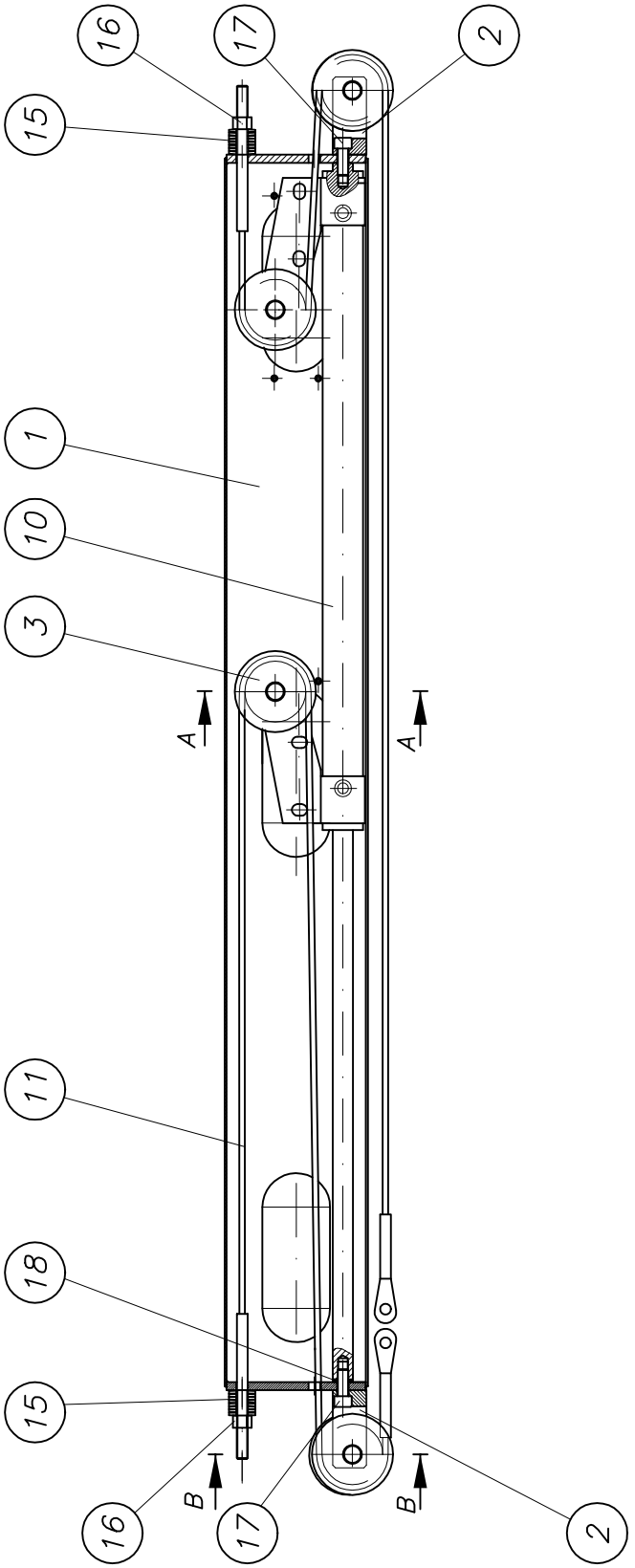
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	piston	WAI106770				1,00 Stk
2	sealing kit for front and rear	WAI104040				1,00 Stk
3	set screw	WAI106771				1,00 Stk
4	piston rod	WAI106772				1,00 Stk
5	cylinder	WAI106773				1,00 Stk
6	piston nut	WAI106774				1,00 Stk

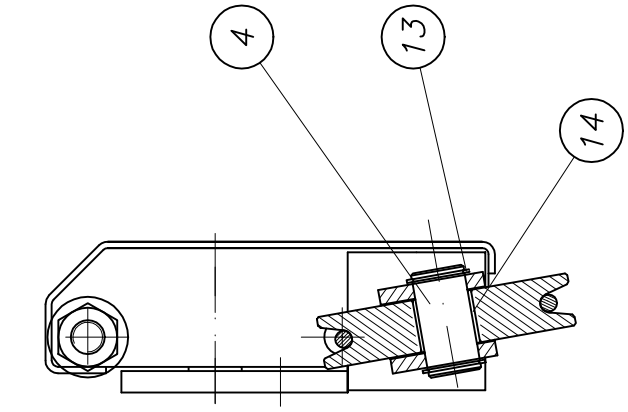
Gleichlaufzylinder kpl.

synchron cylinder cpl.

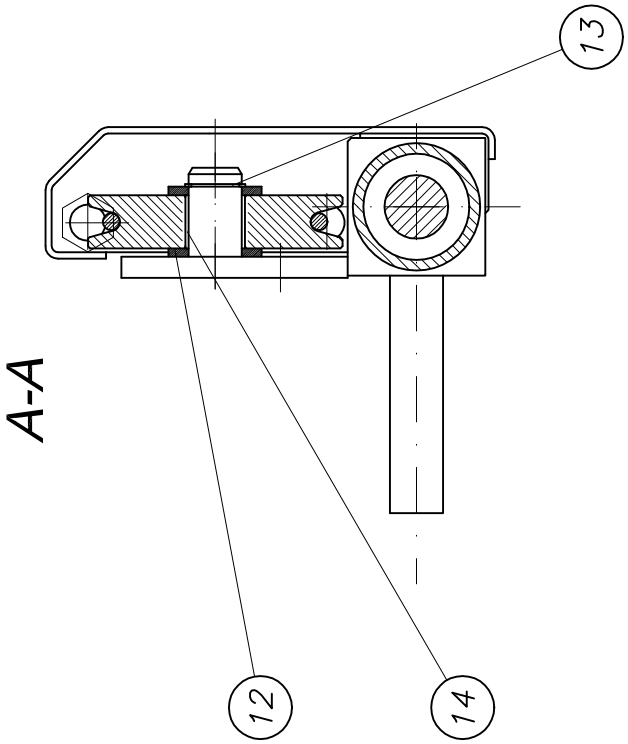
B 63 9 090b

Waitzinger
Baumaschinen GmbH





B-B



A-A

PARTS LIST

23.06.05 10:49:21

part list	description	created	index	valid from	valid to
B639090	synchron cylinder cpl.	14.12.00 Mi	b	25.11.04	

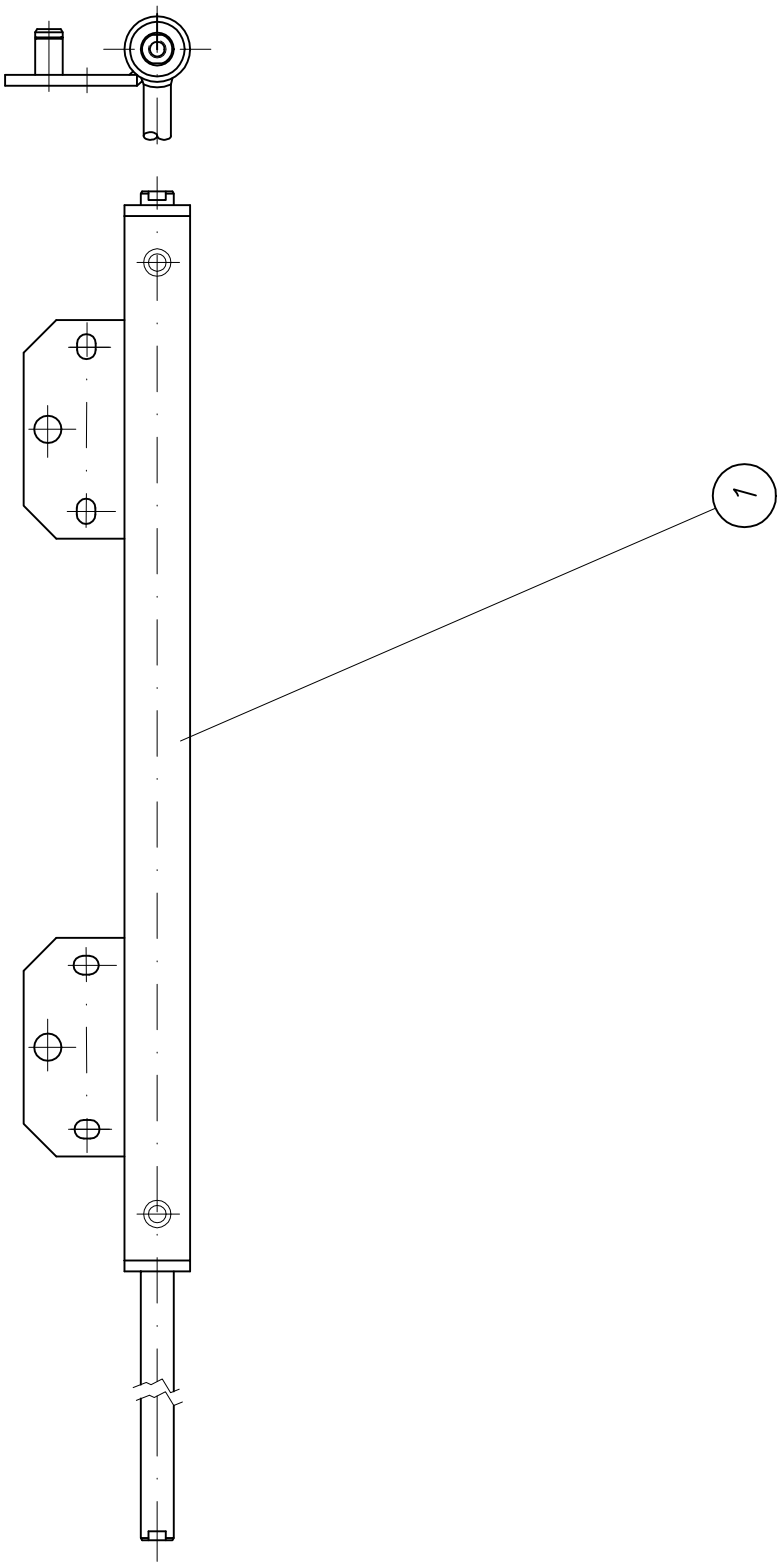
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	cover cpl. own parts list	B639085				1,00 Stk
2	fork	B639082 VK 50x50x115	1014 St52-3		1,00	2,00 Stk
3	rope roller	B639084 Rd 120x25	 PA6+MoS2		0,02	4,00 Stk
4	pin 25 x 050	B639086 Rd 25x55	669 St50-2K		0,25	2,00 Stk
10	synchron cylinder 50 x 30 x 800 St36 own parts list	WAI106512				1,00 Stk
11	rope 8mm complete, L=2750 mm	WAI106548				2,00 Stk
12	washer 25, DIN 125	WAI103298				4,00 Stk
13	locking ring A 25 X 1.2 DIN 471	WAI103006				6,00 Stk
14	bushing CD025-028025	WAI105017				4,00 Stk
15	conical spring washer	WAI100506				16,00 Stk
16	nut M16 DIN 934	WAI101555				2,00 Stk
17	cheese head screw M 16 x 40	WAI102859				2,00 Stk
18	washer DIN 6916 17	WAI101558			0,02	1,00 Stk

Gleichlaufzylinder

synchron cylinder

WAI 106512

Waitzinger
Baumaschinen GmbH



12.03.2001

PARTS LIST

23.06.05 10:52:23

part list	description	created	index	valid from	valid to
WAI106512	synchron cylinder 50 x 30 x 800 St36	26.03.01 Mi			

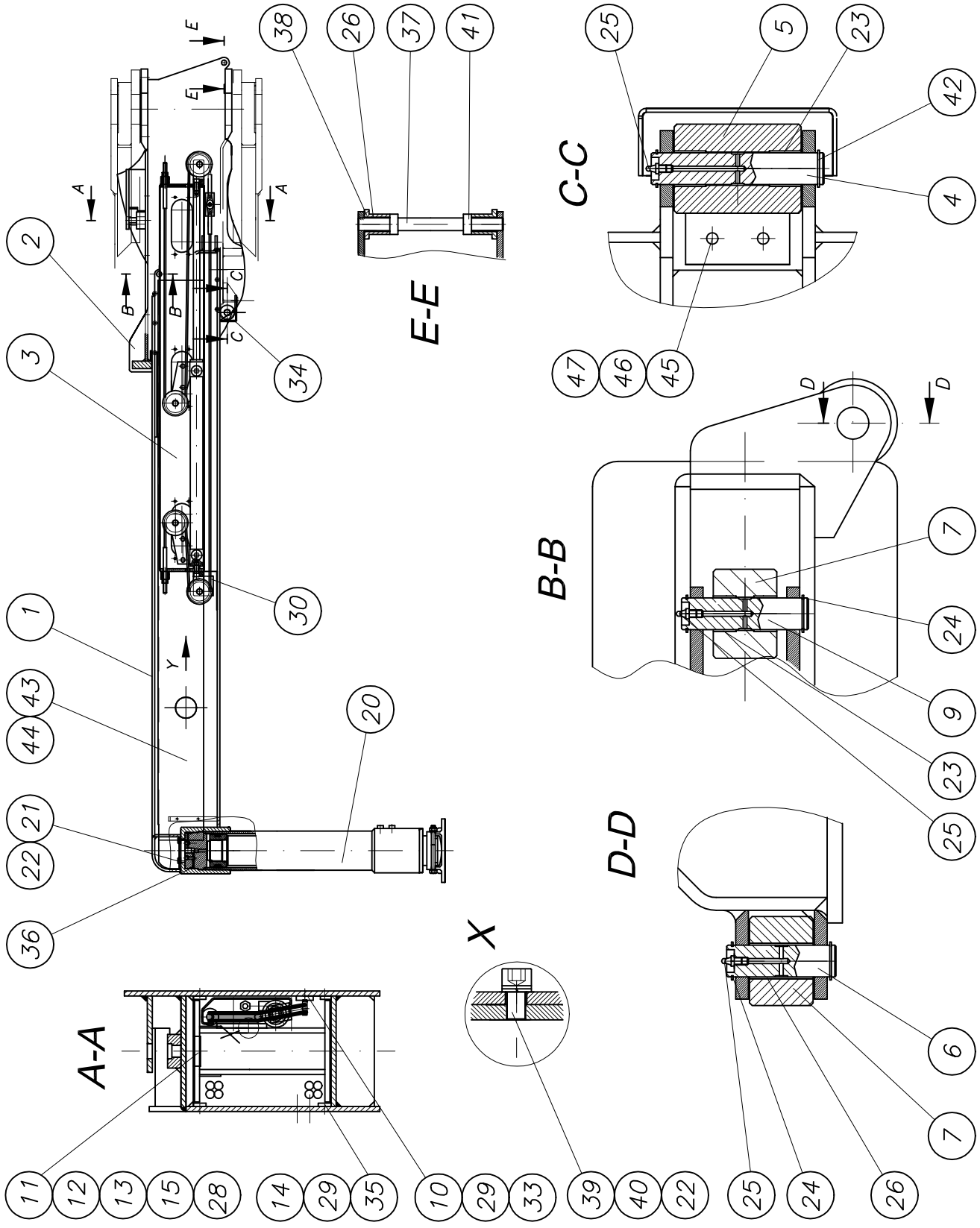
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	sealing set for synchron cylinder	WAI106787				1,00 Stk

Abstützung vorne links kpl.

outrigger front left cpl.

B 63 9 180c

Waitzinger
Baumaschinen GmbH



PARTS LIST

28.09.05 09:15:07

part list	description	created	index	valid from	valid to
B639180	front left stabilizer 32/36XXT cpl.	04.01.01 Mi	c	01.06.04	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	teleskope 32/36 XXT tooling own parts list	B639041			314,00	1,00 Stk
2	outrigger XXT left tooled own parts list	B639071		a 31.10.03	216,00	1,00 Stk
3	synchron cylinder cpl. own parts list	B639090		b 25.11.04		1,00 Stk
4	pin 25 x 136, 3P206	B610023 Rd 25 x 140	669 St50-2K		0,50	1,00 Stk
5	roller 70 x 100, 2H105	B610024 Rd 70 x 105	669 St50-2K		2,50	1,00 Stk
6	pin 25 x 085 4P201	B610026 Rd 25 x 90	669 St50-2K		0,32	1,00 Stk
7	roller 70 x 050, 4H102	B610027 Rd 70 x 55	669 St50-2K		0,80	2,00 Stk
9	pin 25 x 100	B610068 Rd 25x105	669 St50-2K		0,50	1,00 Stk
10	holder for rope own parts list	B639074			0,50	1,00 Stk
11	strip	B639211 Fl 70x15x1190	1017 St52-3		1,16	1,00 Stk
12	spacer plate 2,0 mm	B639212 Bl 2x70x880	1623/EN10131 ST02Z	a 15.02.05	0,96	2,00 Stk
13	spacer plate 2,0 mm	B639214 Bl 2x70x110	1541 St52-3		0,12	2,00 Stk
14	guide profil	B639217				4,00 Stk
15	sheet	B639243 Bl 1x70x150	1541/EN10121 S355J2G3			5,00 Stk
20	jack cylinder own parts list	WAI106344		c 25.07.05	150,00	1,00 Stk
21	hexagon bolt M16 x 50	WAI106269			0,17	4,00 Stk
22	spring washer A16	WAI102072			0,01	8,00 Stk
23	bushing CD025-028025	WAI105017				2,00 Stk
24	locking ring A 25 X 1.2 DIN 471	WAI103006				6,00 Stk
25	grease nipple M6 DIN 71412	WAI103355				3,00 Stk

PARTS LIST

part list	description	created	index	valid from	valid to
B639180	front left stabilizer 32/36XXT cpl.	04.01.01 Mi	c	01.06.04	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
26	bushing DU 25 X 28 X 50	WAI106236				4,00 Stk
28	cylinder head screw M 12 x 25	WAI103698				5,00 Stk
29	sunk screw M 10 x 20	WAI104689				14,00 Stk
30	bracket	B639247 Bl 3x129.1x44	EN 10029 S235J2G3		0,10	1,00 Stk
33	clamping sleeve 10 x 20	WAI102881				2,00 Stk
34	cover for roller	B951043 Bl 3x238.1x192.	 Alu	a 30.04.04	0,20	1,00 Stk
35	plate	B639219 Bl 30x320x1	1541 S235 J2G3			4,00 Stk
36	O-ring 129,2 x 5,7	WAI101441				1,00 Stk
37	shaft	B639233 Rd 25x 290	669 S235J2G3	c 26.04.05	1,00	1,00 Stk
38	roller	B639235 Rd50x60	1013 S235J2G3		0,20	2,00 Stk
39	cheese head screw M 16 x 25	WAI103488				4,00 Stk
40	washer 17, DIN 125	WAI102893				4,00 Stk
41	fixing ring	WAI108884 Di25 Da40 B16	DIN 705		0,05	2,00 Stk
42	locking ring A 25 X 1.2 DIN 471	WAI103006				2,00 Stk
43	side cover 36 xxt telescope	B951036 Bl 3x255,5x2794	EN10029 ALU	b 22.03.04	6,50	1,00 Stk
44	sunk screw M 8 x 25	WAI104070				2,00 Stk
45	hexagon bolt M 8 x 20	WAI101837				2,00 Stk
46	hex. nut M8 DIN 934 8. VERZ.	WAI102880				2,00 Stk
47	spring washer A8 DIN 127 VERZ.	WAI102205			0,00	2,00 Stk
48	sunk screw M 10 x 20	WAI104689				2,00 Stk

PARTS LIST

part list	description	created	index	valid from	valid to
B639180	front left stabilizer 32/36XXT cpl.	04.01.01 Mi	c	01.06.04	

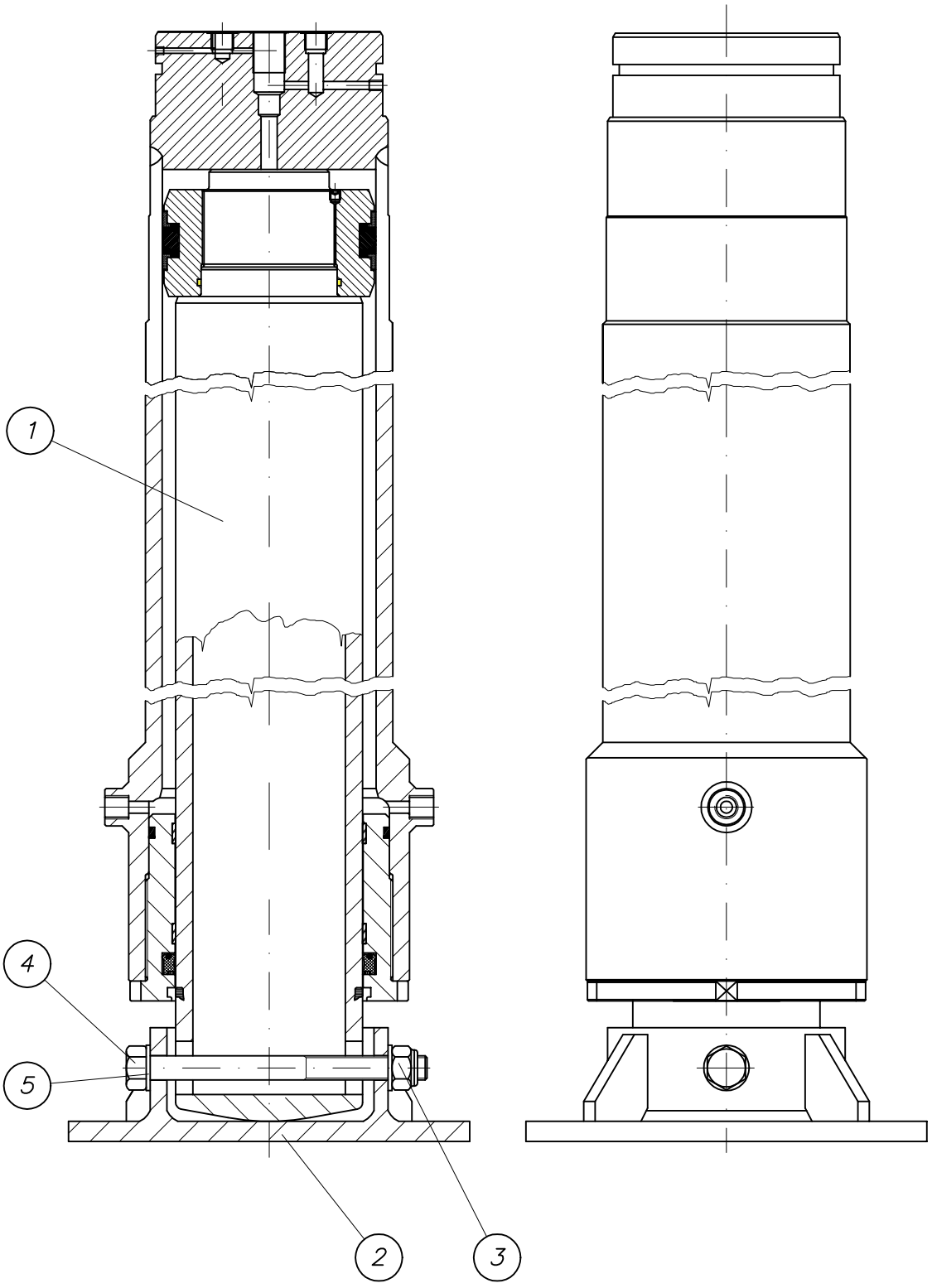
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
49	cheese head screw M 6x10	WAI103324				4,00 Stk
50	spring washer A6	WAI103000				4,00 Stk
51	bolt right own parts list	B639254				1,00 Stk
52	energie chain	WAI109227			0,01	1,00 Stk

Abstützzylinder

jack cylinder

WAI 109673

Waitzinger
Baumaschinen GmbH



06.06.2005

PARTS LIST

22.06.05 11:51:01

part list	description	created	index	valid from	valid to
WAI109673	jack cylinder	31.05.05 RAINER			

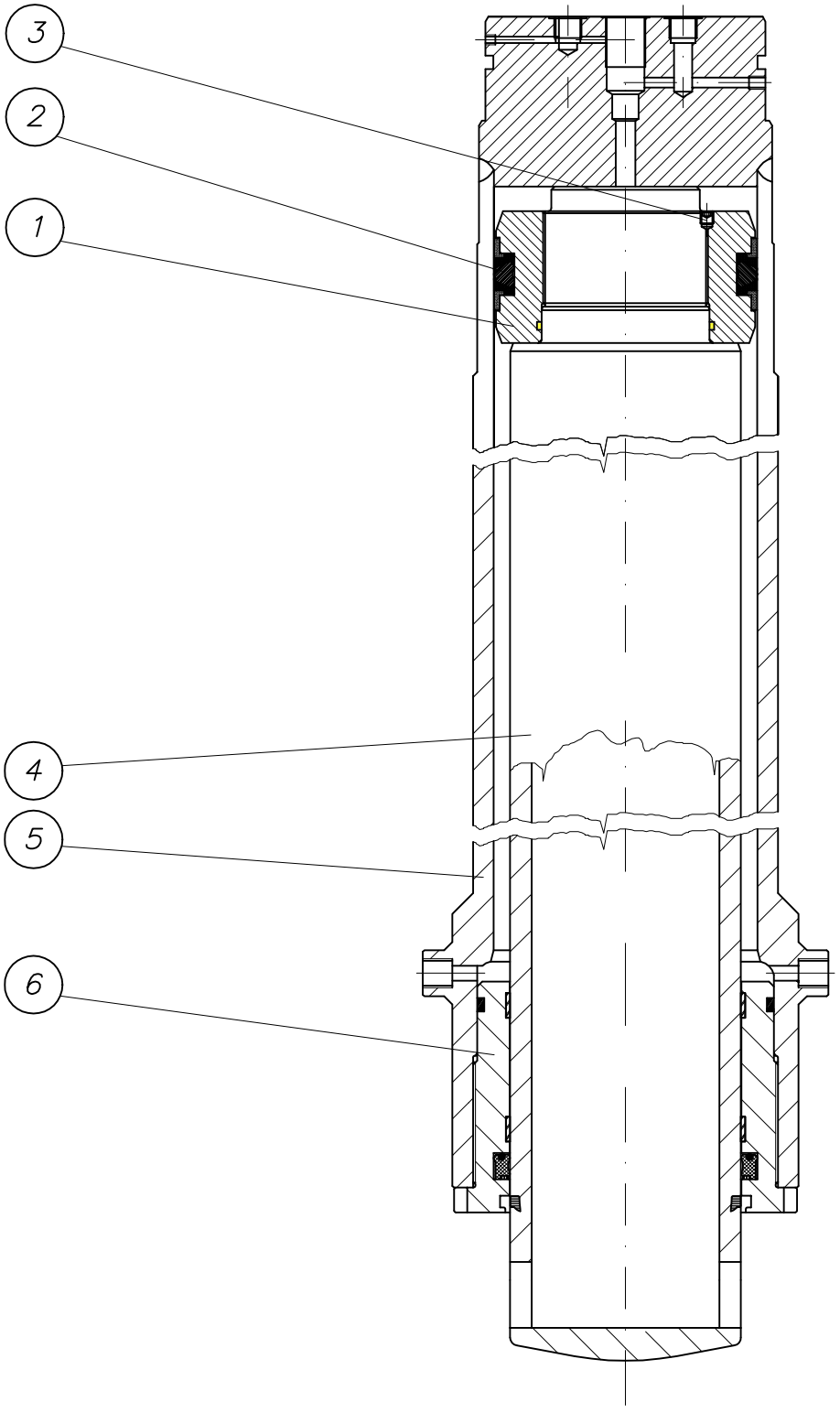
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	jack cylinder own parts list	wai109669				1,00 Stk
2	foot	wai106778				1,00 Stk
3	hex. nut M18 DIN 985 8. VERZ.	wai109671				1,00 Stk
4	washer 19	wai109672				1,00 Stk
5	hexagon screw M 18 x 220	wai109670				1,00 Stk

Abstützzylinder

jack cylinder

WAI 109669

Waitzinger
Baumaschinen GmbH



PARTS LIST

22.06.05 11:52:18

part list	description	created	index	valid from	valid to
wai109669	jack cylinder	31.05.05 RAINER			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	piston	WAI106770				1,00 Stk
2	sealing kit for front and rear	WAI104040				1,00 Stk
3	set screw	WAI106771				1,00 Stk
4	piston rod	WAI106772				1,00 Stk
5	cylinder	WAI106773				1,00 Stk
6	piston nut	WAI106774				1,00 Stk

Abstützung hinten rechts kpl.
outrigger rear right cpl.

B 63 9 190a

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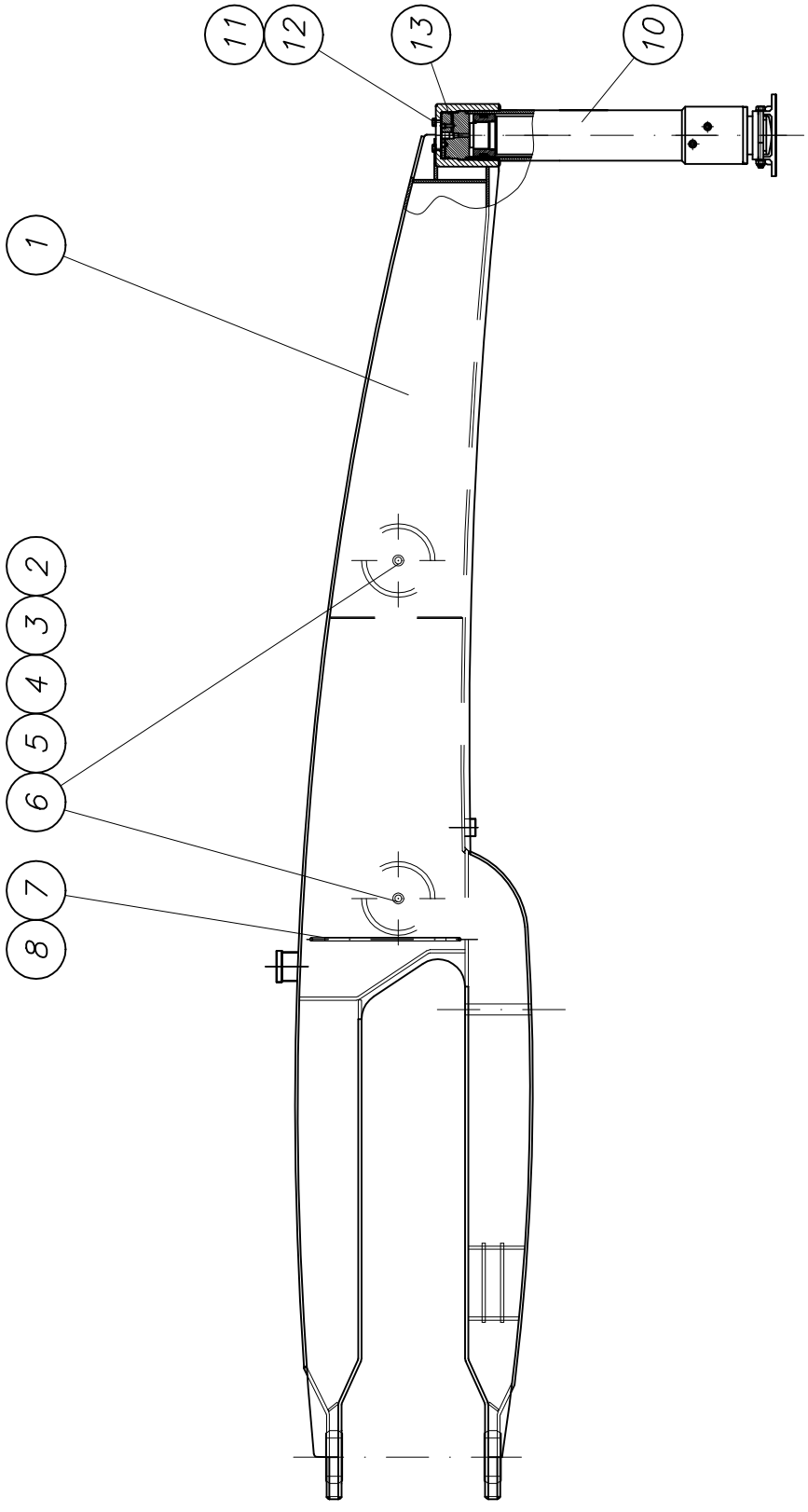


PARTS LIST

25.08.05 08:53:20

part list	description	created	index	valid from	valid to
B639190	rear right stabilizer 32/36XXT cpl.	04.01.01 Mi	a	02.12.03	

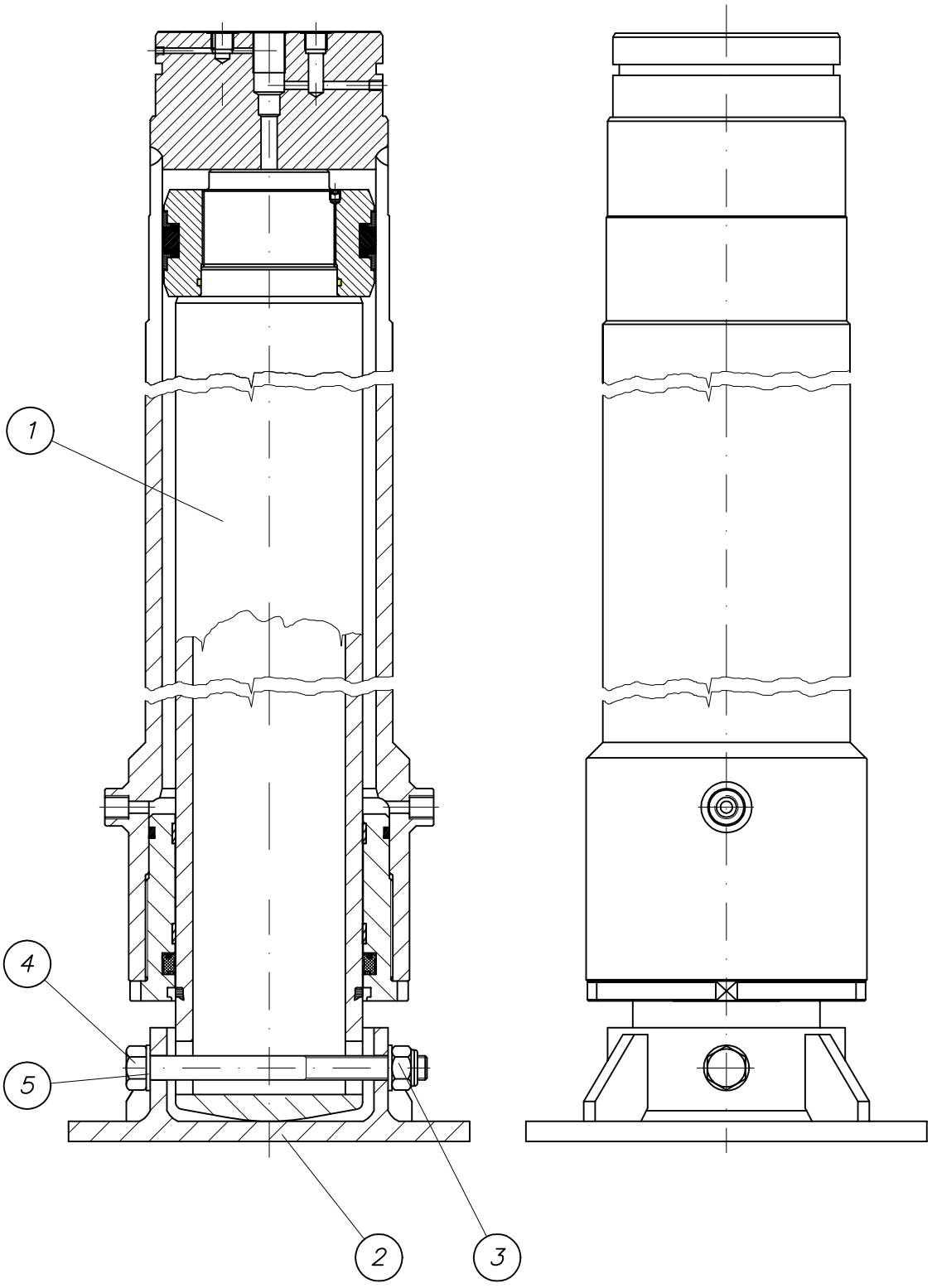
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	rear outrigger XXT 36/32 right own parts list	B639160		a 18.07.05	655,00	1,00 Stk
2	cover for oiltank D236 X 27 36XT	B610033 RD 240x30	1747 Al99		1,80	2,00 Stk
3	star for oilcover FL 15X 220X 220	B610034 Fl 220x220x15	1017 S235JR	a 12.02.03	2,00	2,00 Stk
4	O-ring 217x5, No. A0120.371	WAI106011				2,00 Stk
5	cheese head screw M 16 x 65	WAI103388				2,00 Stk
6	u-seal 16,7 x 24 x 1,5T	WAI101572				2,00 Stk
7	fuel hose DN 12	WAI103104				1,00 Mtr
8	hose clamp 15mm	WAI103103				2,00 Stk
10	jack cylinder own parts list	WAI106344		c 25.07.05	150,00	1,00 Stk
11	hexagon bolt M16 x 50	WAI106269			0,17	4,00 Stk
12	spring washer A16	WAI102072			0,01	4,00 Stk
13	O-ring 129,2 x 5,7	WAI101441				1,00 Stk

Abstützzylinder

jack cylinder

WAI 109673

Waitzinger
Baumaschinen GmbH



06.06.2005

PARTS LIST

22.06.05 11:51:01

part list	description	created	index	valid from	valid to
WAI109673	jack cylinder	31.05.05 RAINER			

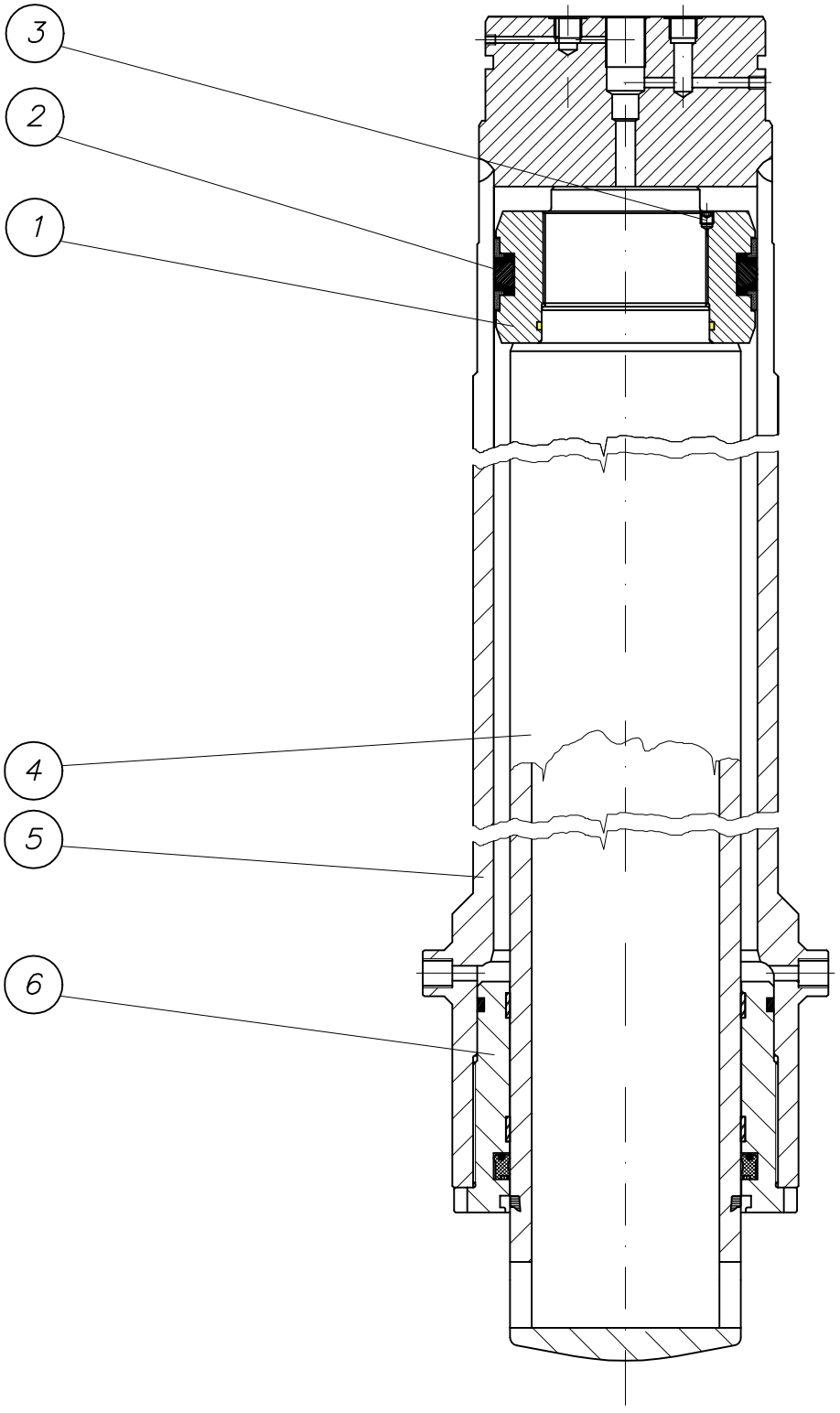
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	jack cylinder own parts list	wai109669				1,00 Stk
2	foot	wai106778				1,00 Stk
3	hex. nut M18 DIN 985 8. VERZ.	wai109671				1,00 Stk
4	washer 19	wai109672				1,00 Stk
5	hexagon screw M 18 x 220	wai109670				1,00 Stk

Abstützzylinder

jack cylinder

WAI 109669

Waitzinger
Baumaschinen GmbH



PARTS LIST

22.06.05 11:52:18

part list	description	created	index	valid from	valid to
wai109669	jack cylinder	31.05.05 RAINER			

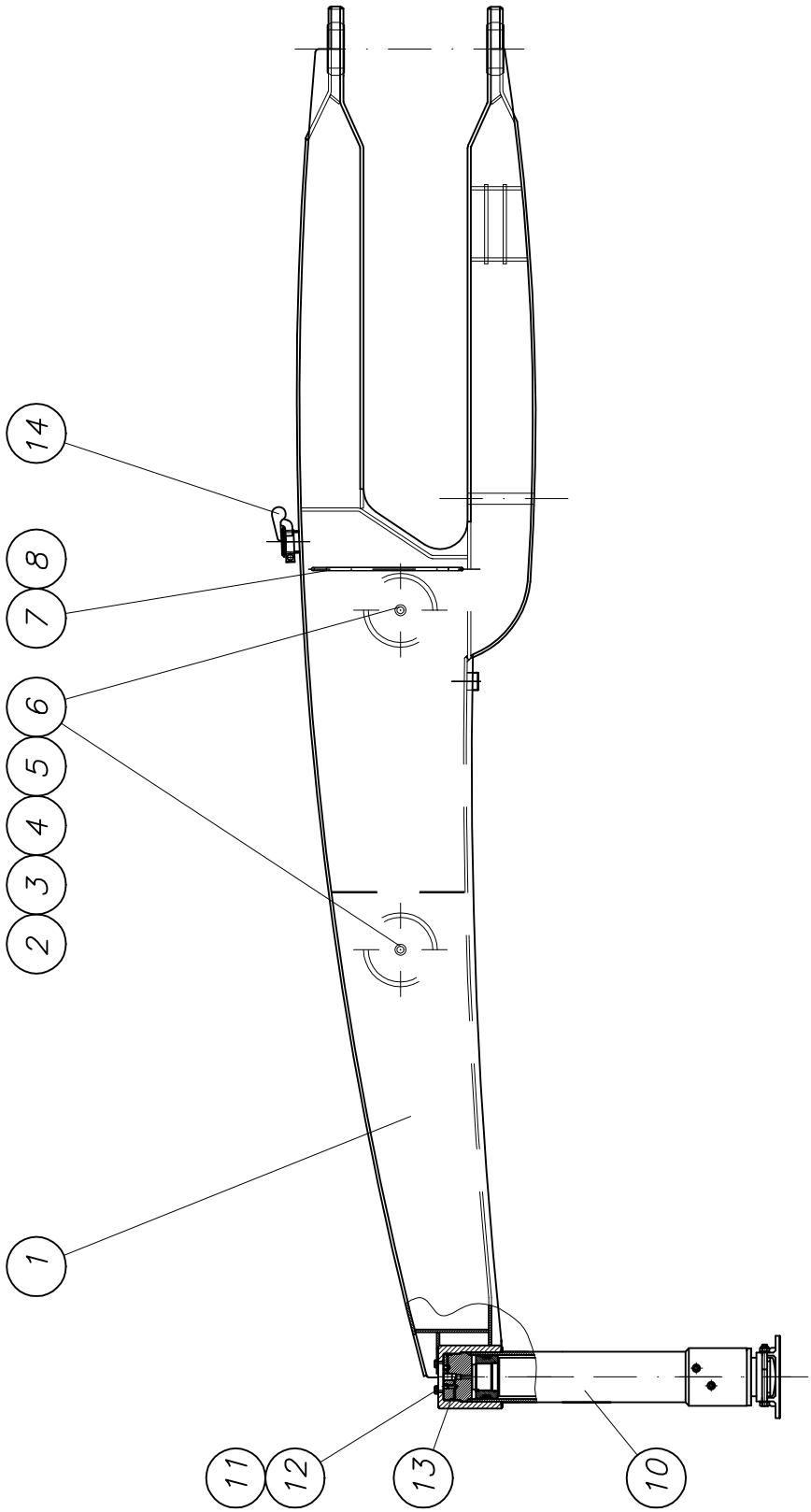
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	piston	WAI106770				1,00 Stk
2	sealing kit for front and rear	WAI104040				1,00 Stk
3	set screw	WAI106771				1,00 Stk
4	piston rod	WAI106772				1,00 Stk
5	cylinder	WAI106773				1,00 Stk
6	piston nut	WAI106774				1,00 Stk

Abstützung hinten links kpl.

outrigger rear left cpl.

B 63 9 210b

Waitzinger
Baumaschinen GmbH



PARTS LIST

25.08.05 08:53:55

part list	description	created	index	valid from	valid to
B639210	rear left stabilizer 32/36XXT cpl.	04.01.01 Mi	b	14.03.05	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	rear outrigger XXT 32 left own parts list	B639130		a 18.07.05	655,00	1,00 Stk
2	cover for oiltank D236 X 27 36XT	B610033 RD 240x30	1747 Al99		1,80	2,00 Stk
3	star for oilcover FL 15X 220X 220	B610034 Fl 220x220x15	1017 S235JR	a 12.02.03	2,00	2,00 Stk
4	O-ring 217x5, No. A0120.371	WAI106011				2,00 Stk
5	cheese head screw M 16 x 65	WAI103388				2,00 Stk
6	u-seal 16,7 x 24 x 1,5T	WAI101572				2,00 Stk
7	fuel hose DN 12	WAI103104				1,00 Mtr
8	hose clamp 15mm	WAI103103				2,00 Stk
10	jack cylinder own parts list	WAI106344		c 25.07.05	150,00	1,00 Stk
11	hexagon bolt M16 x 50	WAI106269			0,17	4,00 Stk
12	spring washer A16	WAI102072			0,01	4,00 Stk
13	O-ring 129,2 x 5,7	WAI101441				1,00 Stk
14	exhaust flap	WAI102971				1,00 Stk

Abstützzylinder

jack cylinder

WAI 109673

Waitzinger
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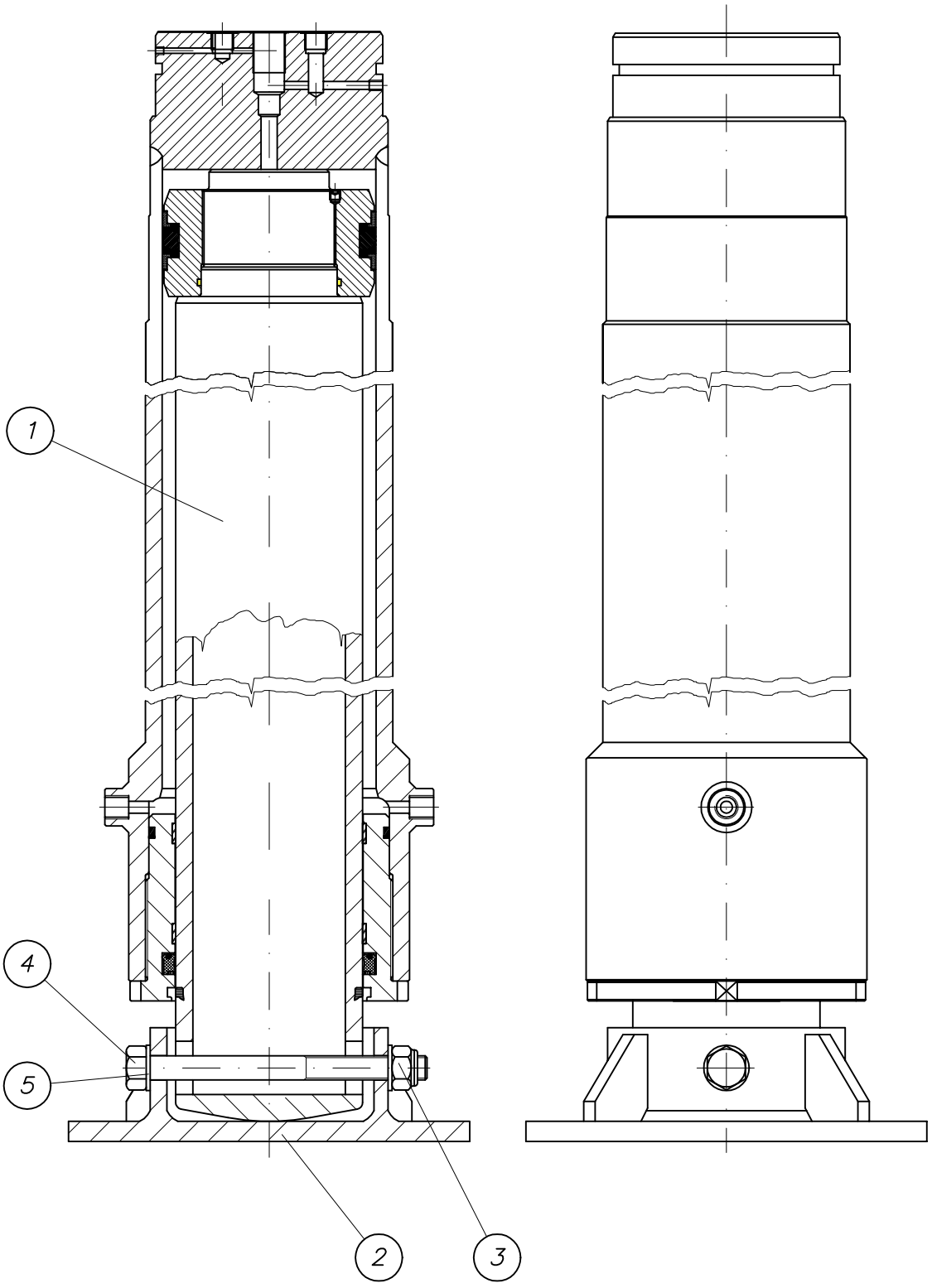

06.06.2005

PARTS LIST

22.06.05 11:51:01

part list	description	created	index	valid from	valid to
WAI109673	jack cylinder	31.05.05 RAINER			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	jack cylinder own parts list	wai109669				1,00 Stk
2	foot	wai106778				1,00 Stk
3	hex. nut M18 DIN 985 8. VERZ.	wai109671				1,00 Stk
4	washer 19	wai109672				1,00 Stk
5	hexagon screw M 18 x 220	wai109670				1,00 Stk

Abstützzylinder

jack cylinder

WAI 109669

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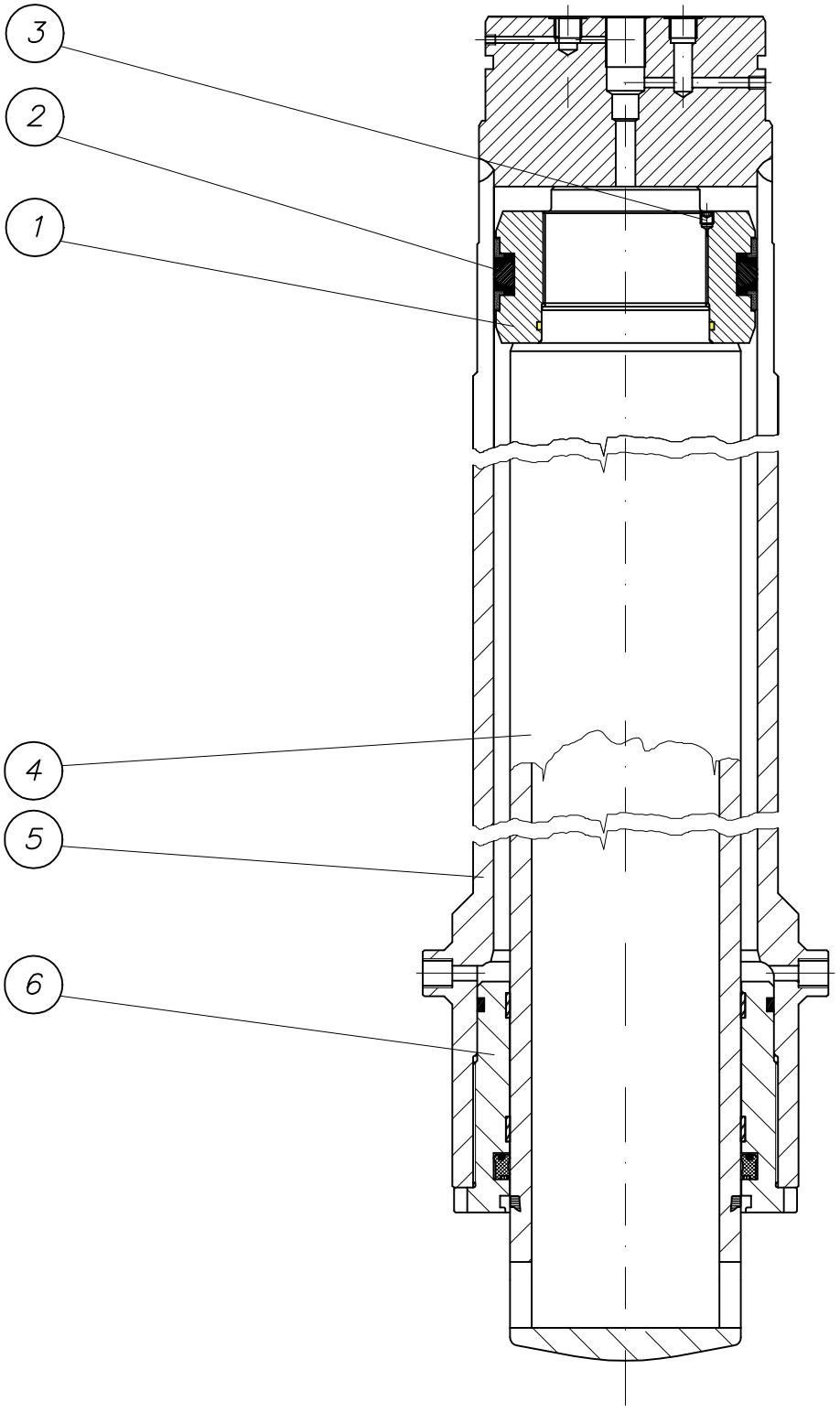

PARTS LIST

22.06.05 11:52:18

part list	description	created	index	valid from	valid to
wai109669	jack cylinder	31.05.05 RAINER			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	piston	WAI106770				1,00 Stk
2	sealing kit for front and rear	WAI104040				1,00 Stk
3	set screw	WAI106771				1,00 Stk
4	piston rod	WAI106772				1,00 Stk
5	cylinder	WAI106773				1,00 Stk
6	piston nut	WAI106774				1,00 Stk

Transportsicherung vorne
transport safety device front

B 63 9 197b

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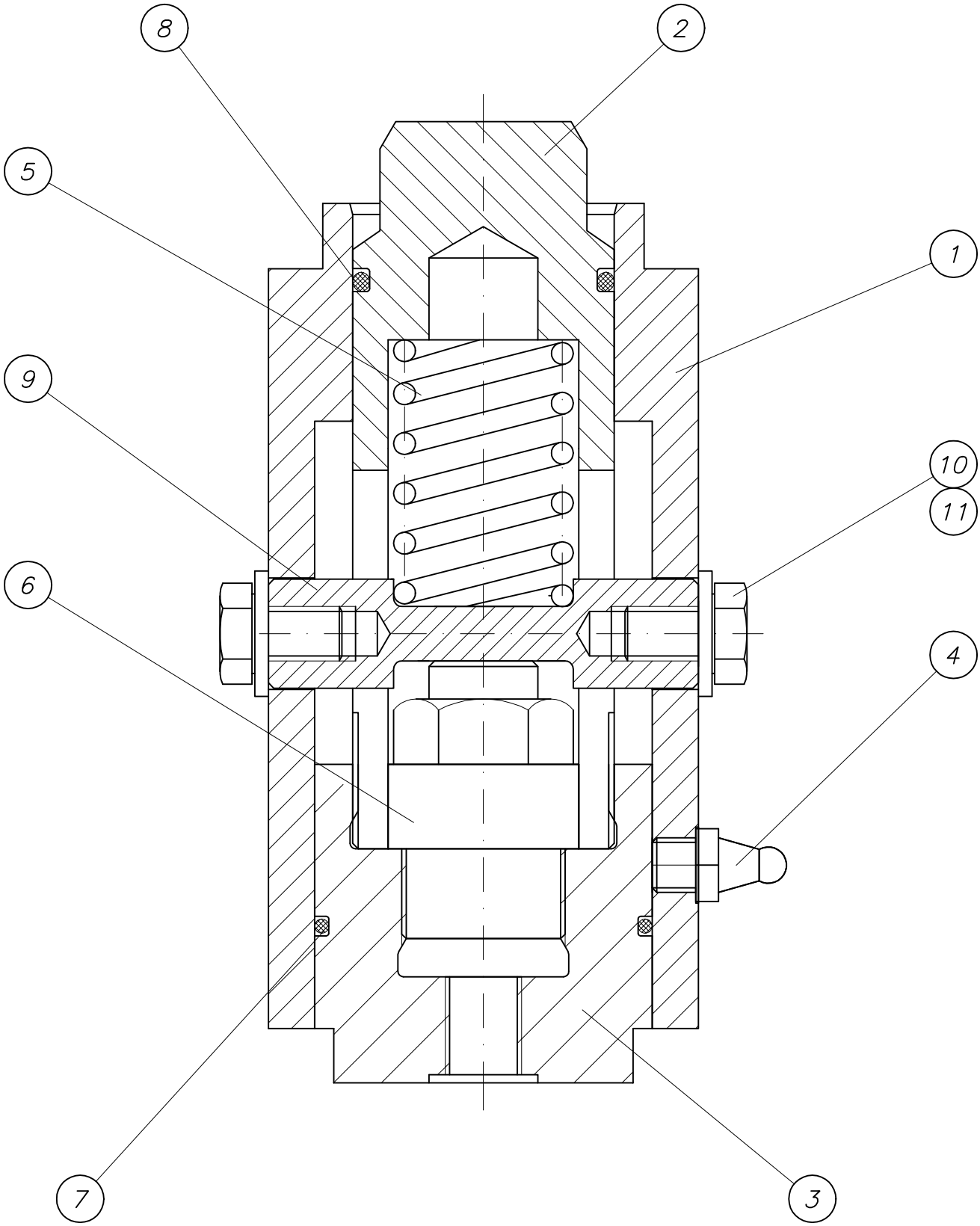

17.10.2003

PARTS LIST

23.06.05 08:21:11

part list	description	created	index	valid from	valid to
B639197	transport savety device	04.12.00 ek	b	14.10.03	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	pipe	B639198 Ro D82.5x20x155	2448 St52-3	c 16.02.04		1,00 Stk
2	bolt	B639199 Rd 50x135	1013 St52-3	a 17.09.03		1,00 Stk
3	nut	B639201 Rd 70	1013 St52-3	a 17.12.02		1,00 Stk
4	grease nipple H1 M10 X 1 DIN 71412	WAI100805			0,01	1,00 Stk
5	pressure spring	WAI106537				1,00 Stk
6	cylinder	WAI106536				1,00 Stk
7	O-ring 56.74x3	WAI106538				1,00 Stk
8	O-ring	WAI101260				1,00 Stk
9	bolt	B639215 Rd 20x80	1013 S355J2G3		0,15	1,00 Stk
10	hexagon bolt M10 x 16	WAI102886				2,00 Stk
11	washer 10.5	WAI101559			0,00	2,00 Stk

Transportsicherung hinten
transport safety device rear

B 63 9 207b

Waitzinger
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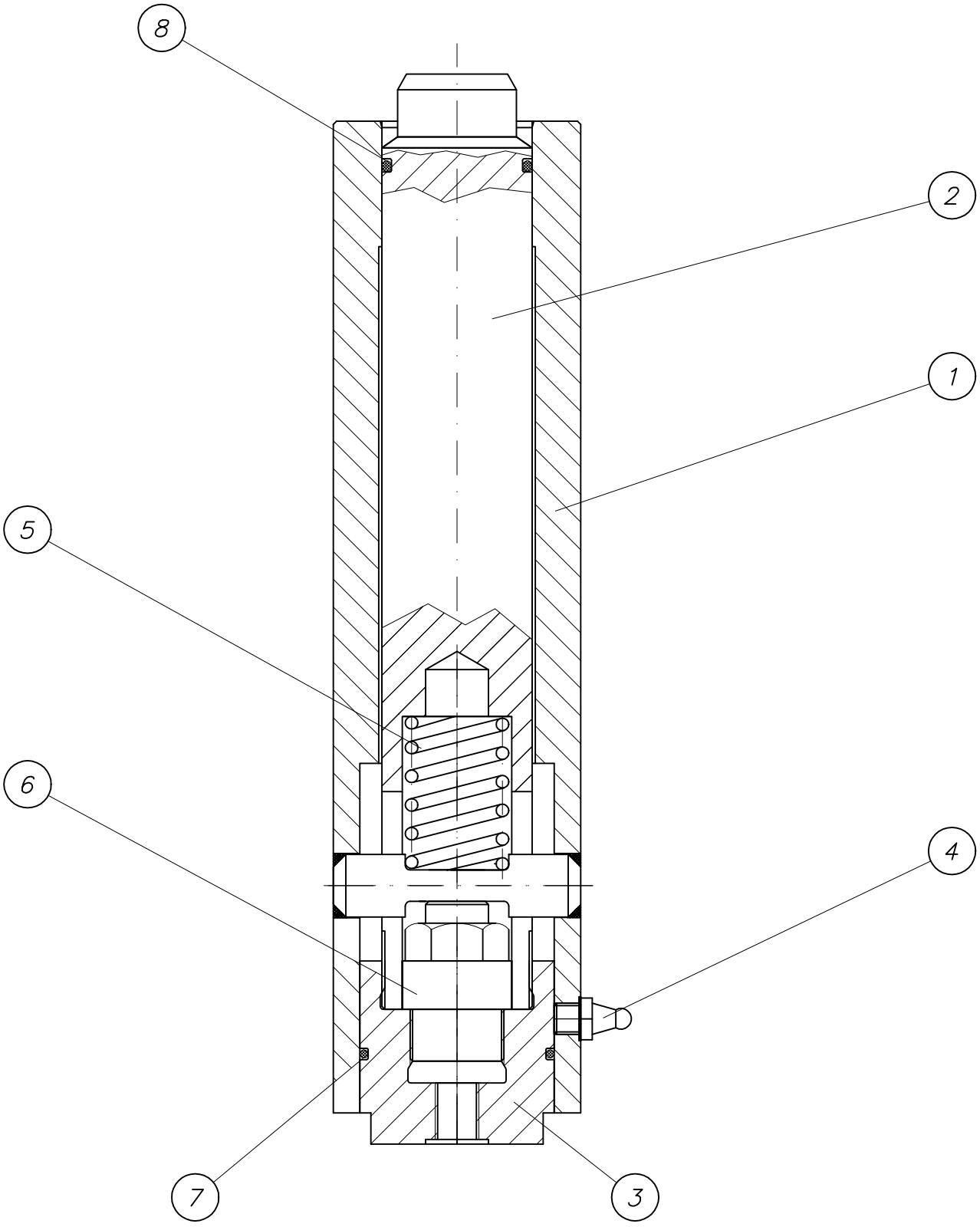

25.10.2004

PARTS LIST

23.06.05 08:20:46

part list	description	created	index	valid from	valid to
B639207	transport savety device	04.12.00 ek	b	20.10.04	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	pipe cpl. own parts list	B639218				1,00 Stk
2	bolt	B639209 Rd 50x320	1013 St52-3	b 20.10.04		1,00 Stk
3	nut	B639201 Rd 70	1013 St52-3	a 17.12.02		1,00 Stk
4	grease nipple H1 M10 X 1 DIN 71412	WAI100805			0,01	1,00 Stk
5	pressure spring	WAI106537				1,00 Stk
6	cylinder	WAI106536				1,00 Stk
7	O-ring 56.74x3	WAI106538				1,00 Stk
8	O-ring	WAI101260				1,00 Stk

Armpaket W 37-4 kpl.

boom W 37-4 cpl.

B 66 7 120

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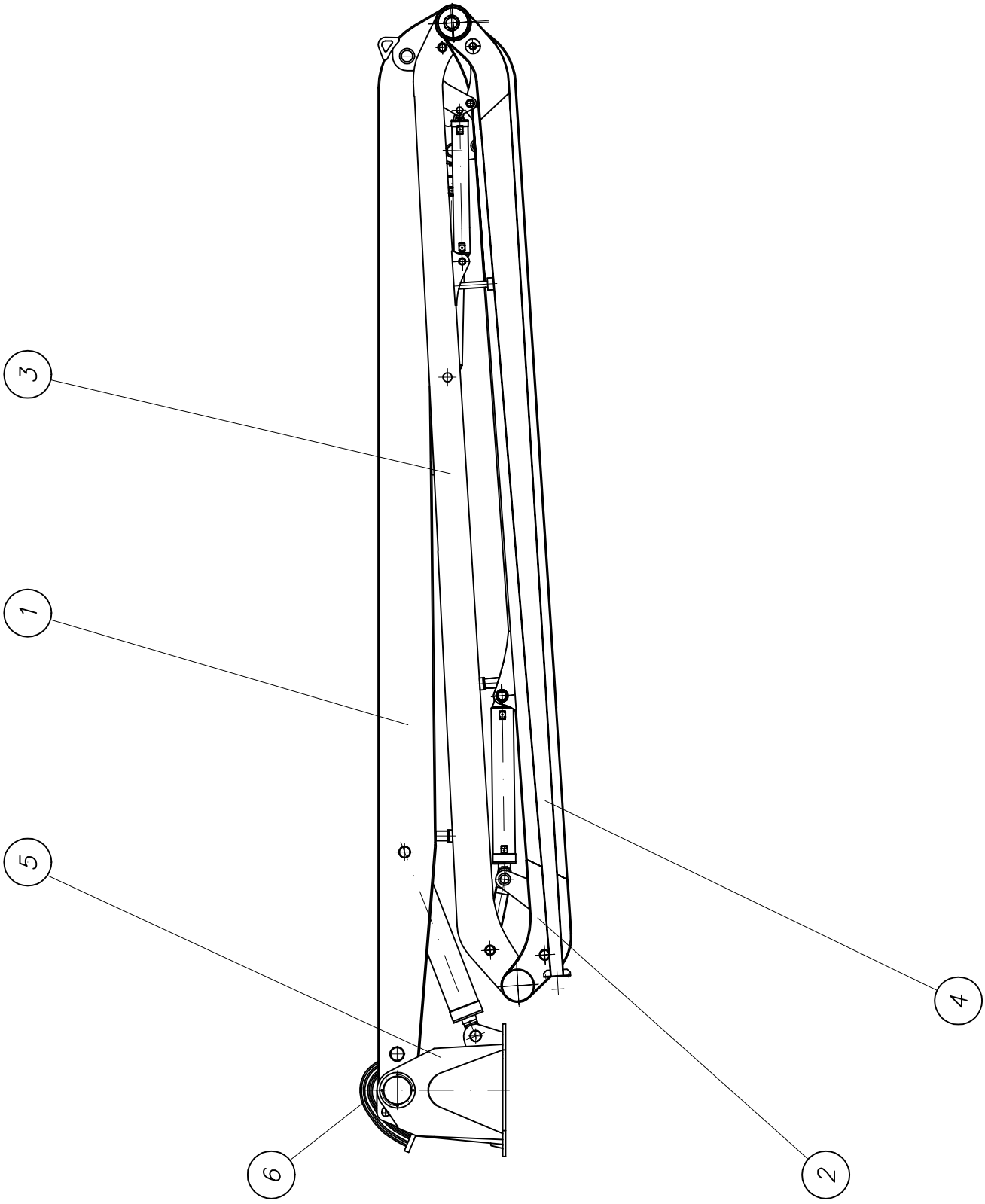


PARTS LIST

24.06.05 09:00:53

part list	description	created	index	valid from	valid to
B667120	distribution boom 37.4	11.12.03 hbk			

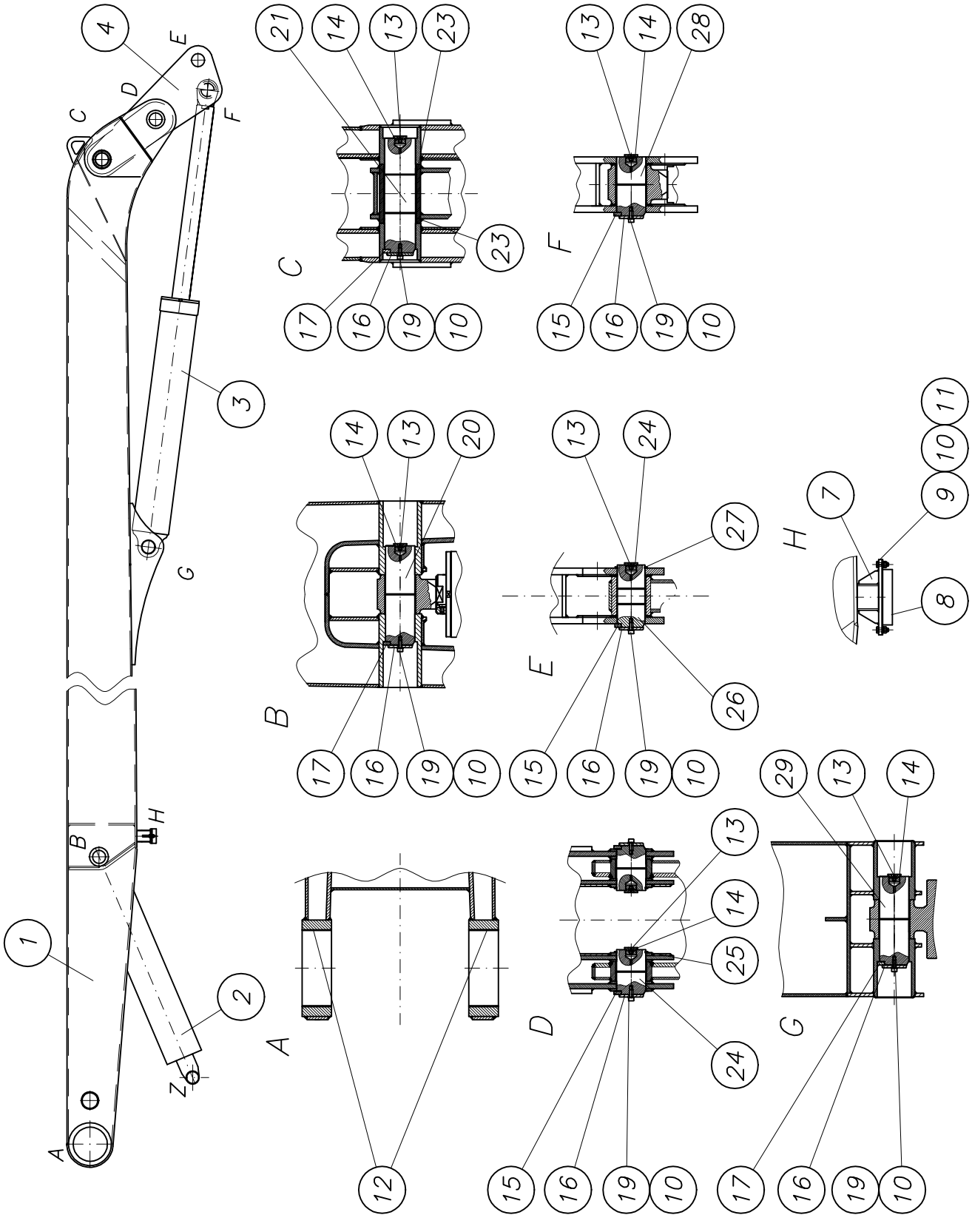
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	boom arm 1 cpl. own parts list	B667010		a 10.02.05		1,00 Stk
2	boom arm 2 cpl. own parts list	B667011				1,00 Stk
3	boom arm 3 cpl. own parts list	B667012		b 10.02.05		1,00 Stk
4	boom arm 4 cpl. own parts list	B661072				1,00 Stk
5	rotating head unit own parts list	B681002				1,00 Stk
6	piping diagram boom own parts list	B711065		c 02.09.03	77,00	1,00 Stk

Mastarm 1 kpl.

element 1 cpl.

B 66 7 010a

Waitzinger
Baumaschinen GmbH



PARTS LIST

24.06.05 09:02:16

part list	description	created	index	valid from	valid to
B667010	boom arm 1 cpl.	14.10.02 hbk	a	10.02.05	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	boom arm 1 cpl. own parts list	B677160				1,00 Stk
2	boom cylinder A cpl. with pipes own parts list	B660130				1,00 Stk
3	boom cylinder B cpl. with pipes own parts list	B660131				1,00 Stk
4	beam "B" cpl. processing drawing own parts list	B671610		a 26.01.05	98,00	1,00 Stk
7	holder for rubber buffer arm 1 cpl. own parts list	B661080			3,30	1,00 Stk
8	rubber cushion	WAI106715				1,00 Stk
9	hexagon bolt M 10 x 30	WAI101553			0,03	2,00 Stk
10	spring washer A10	WAI102070			0,00	9,00 Stk
11	hex. nut M10 DIN985 8.	WAI102125			0,01	2,00 Stk
12	bushing CD230.235090	WAI106020				2,00 Stk
13	grease nipple H1 M10 X 1 DIN 71412	WAI100805			0,01	7,00 Stk
14	locking screw M33x2 own parts list	B660085			0,10	7,00 Stk
15	pin holder	B660086 Fl 25x10x80	1017 S235J2G3		0,15	4,00 Stk
16	washer	B660087 Bl 8xd80	1543/EN10029 S235J2G3		0,20	7,00 Stk
17	pin holder	B660088 Bl 10x22x70	1543/EN10029 S235J2G3		0,10	3,00 Stk
19	cylinder head screw M 10 x 25	WAI106654				7,00 Stk
20	pin 90 x 304	B660115 Rd 95x310	1013 42CrMo4V	a 31.07.02	15,00	1,00 Stk
21	pin 95 x 350	B660113 Rd 100x355	1013 42CrMo4V	a 31.07.02	19,00	1,00 Stk
23	bushing 90 x 100 x 60	WAI106019				2,00 Stk
24	pin 90 x 137	B660118 Rd 95x141	1013 42CrMo4V	b 31.07.02	7,00	2,00 Stk
25	retaining ring A 90x4 DIN471	WAI106974			0,02	2,00 Stk
26	pin 85 x 190	B660110 Rd 90x195	1013 42CrMo4V	a 31.07.02	8,50	1,00 Stk

PARTS LIST

24.06.05 09:02:16

part list	description	created	index	valid from	valid to
B667010	boom arm 1 cpl.	14.10.02 hbk	a	10.02.05	

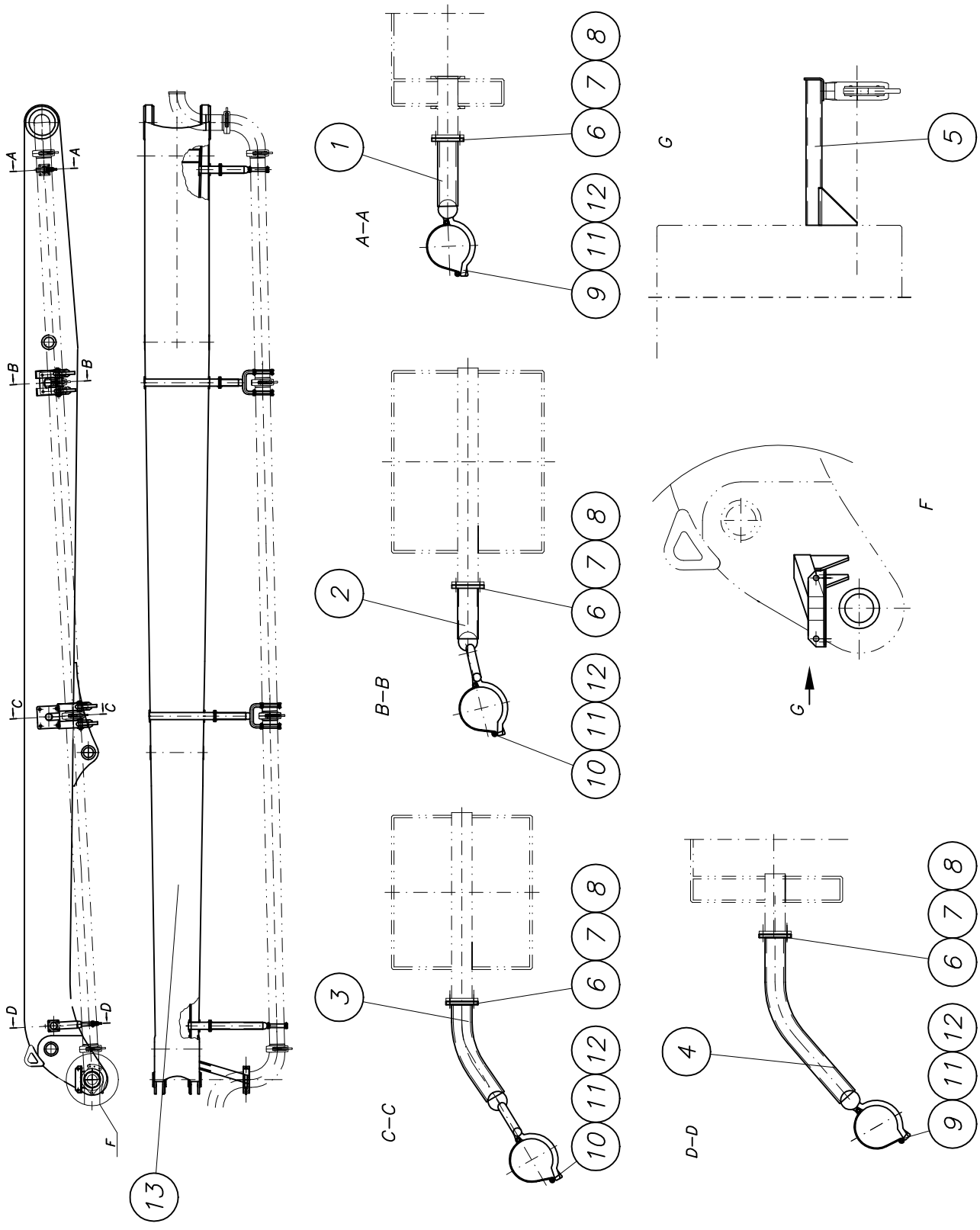
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
27	retaining ring A 85x4 DIN471	WAI106975			0,02	1,00 Stk
28	pin 90 x 180	B660112 Rd 95x180	1013 42CrMo4V	a 31.07.02	10,00	1,00 Stk
29	pin 90 x 271	B660114 Rd 95x275	1013 42CrMo4V	a 31.07.02	14,00	1,00 Stk

Mastarm 1

boom element 1

B 67 7 160

Waitzinger
Baumaschinen GmbH



17.12.2002

PARTS LIST

04.07.05 09:12:53

part list	description	created	index	valid from	valid to
B677160	boom arm 1 cpl.	09.10.02 hbk			

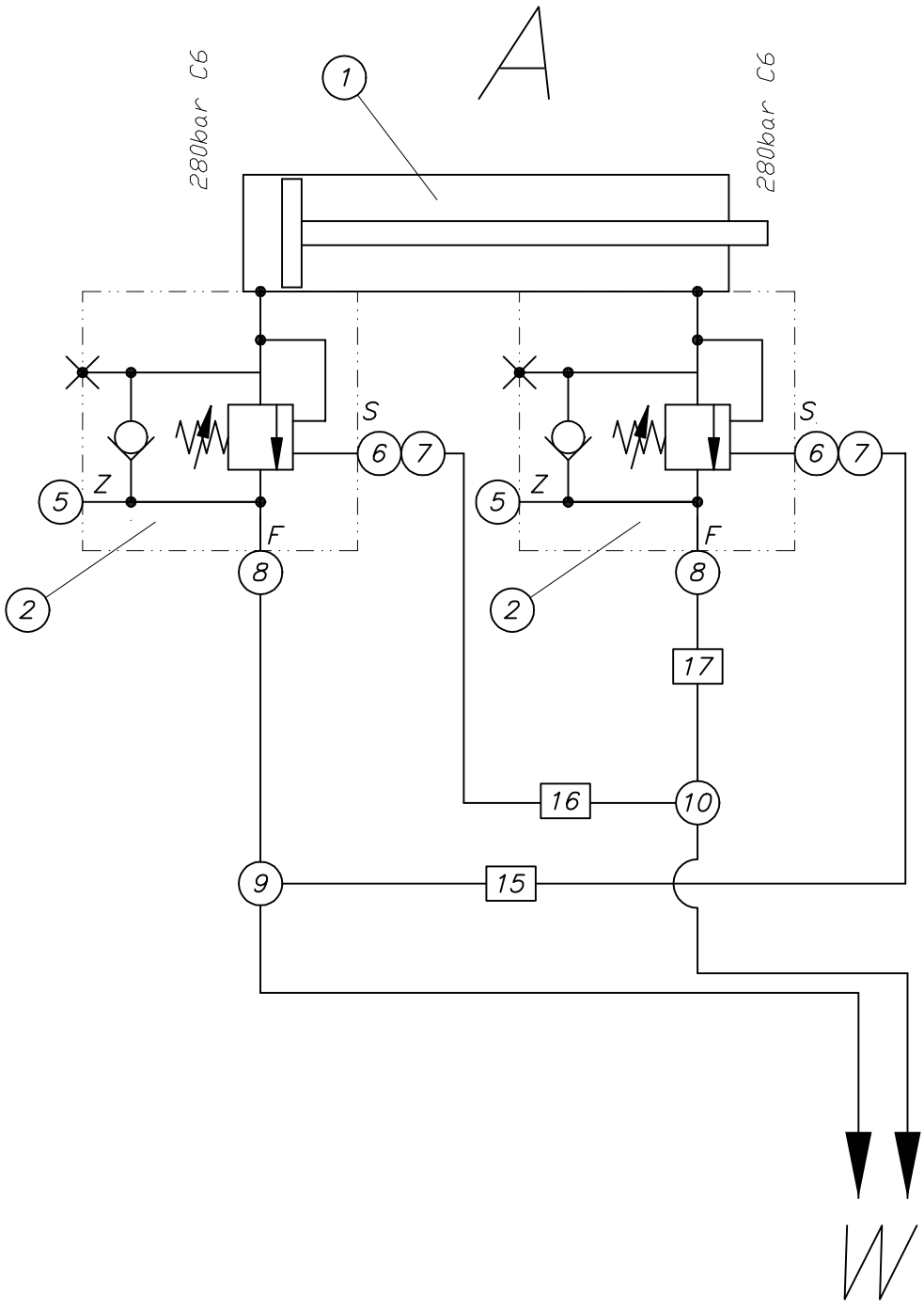
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	holder 1 cpl., element 1 own parts list	B641040			2,30	1,00 Stk
2	holder 2 cpl., element 1 own parts list	B641044			2,10	1,00 Stk
3	holder 3 cpl., element 1 own parts list	B641046			3,00	1,00 Stk
4	holder 4 cpl., element 1 own parts list	B641050			4,70	1,00 Stk
5	holder 5 cpl., element 1 own parts list	B641039		a 22.04.05	5,70	1,00 Stk
6	hexagon bolt M 10 x 35	WAI101705			0,03	16,00 Stk
7	washer 10.5	WAI101559			0,00	16,00 Stk
8	nut M10 DIN 934	WAI101556			0,01	16,00 Stk
9	pipe holder cpl. own parts list	WAI107108				2,00 Stk
10	pipe holder cpl. own parts list	WAI107109				2,00 Stk
11	conical spring washer 12 mm	WAI102877				6,00 Stk
12	hex. nut M12 DIN 985 8. VERZ.	WAI101626				6,00 Stk
13	boom arm 1 cpl. own parts list	B677150			1650,00	1,00 Stk

Mastzylinder A kpl.

boom cylinder A cpl.

B 66 0 130

Waitzinger
Baumaschinen GmbH



PARTS LIST

24.06.05 09:04:56

part list	description	created	index	valid from	valid to
B660130	boom cylinder A cpl. with pipes	12.09.03 Mi			

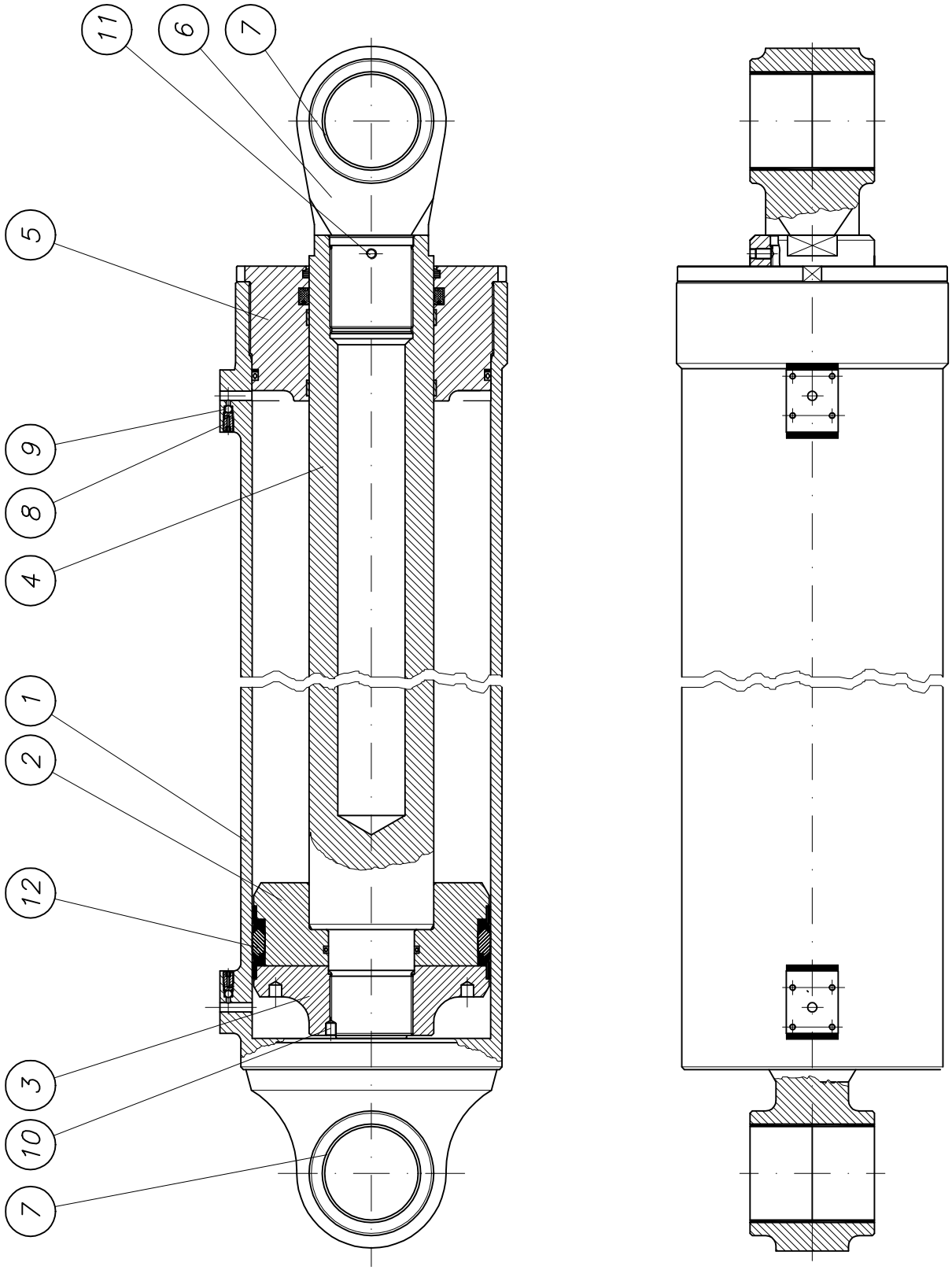
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	boom cylinder for 36-mtr., section A own parts list	WAI106189			342,00	1,00 Stk
2	locking valve 280 bar	WAI106935				2,00 Stk
5	locking screw G 1/4	WAI100520				2,00 Stk
6	straight male stud couplings L12	WAI101383				2,00 Stk
7	swivel elbow L12	WAI100590				2,00 Stk
8	straight male stud couplings L12	WAI101386				2,00 Stk
9	swivel barrel tee L12	WAI101325				1,00 Stk
10	tee coupling L12	WAI100598				1,00 Stk
15	pipe	WAI108452				1,00 Stk
16	pipe	WAI108453				1,00 Stk
17	hydr. pipe 12 x 2	WAI102022			0,49	0,20 Mtr

Mastzylinder A

boom cylinder A

WAI 106189

Waitzinger
Baumaschinen GmbH



19.02.2001

PARTS LIST

24.06.05 09:06:54

part list	description	created	index	valid from	valid to
WAI106189	boom cylinder for 36-mtr., section A	09.03.01 Mi			

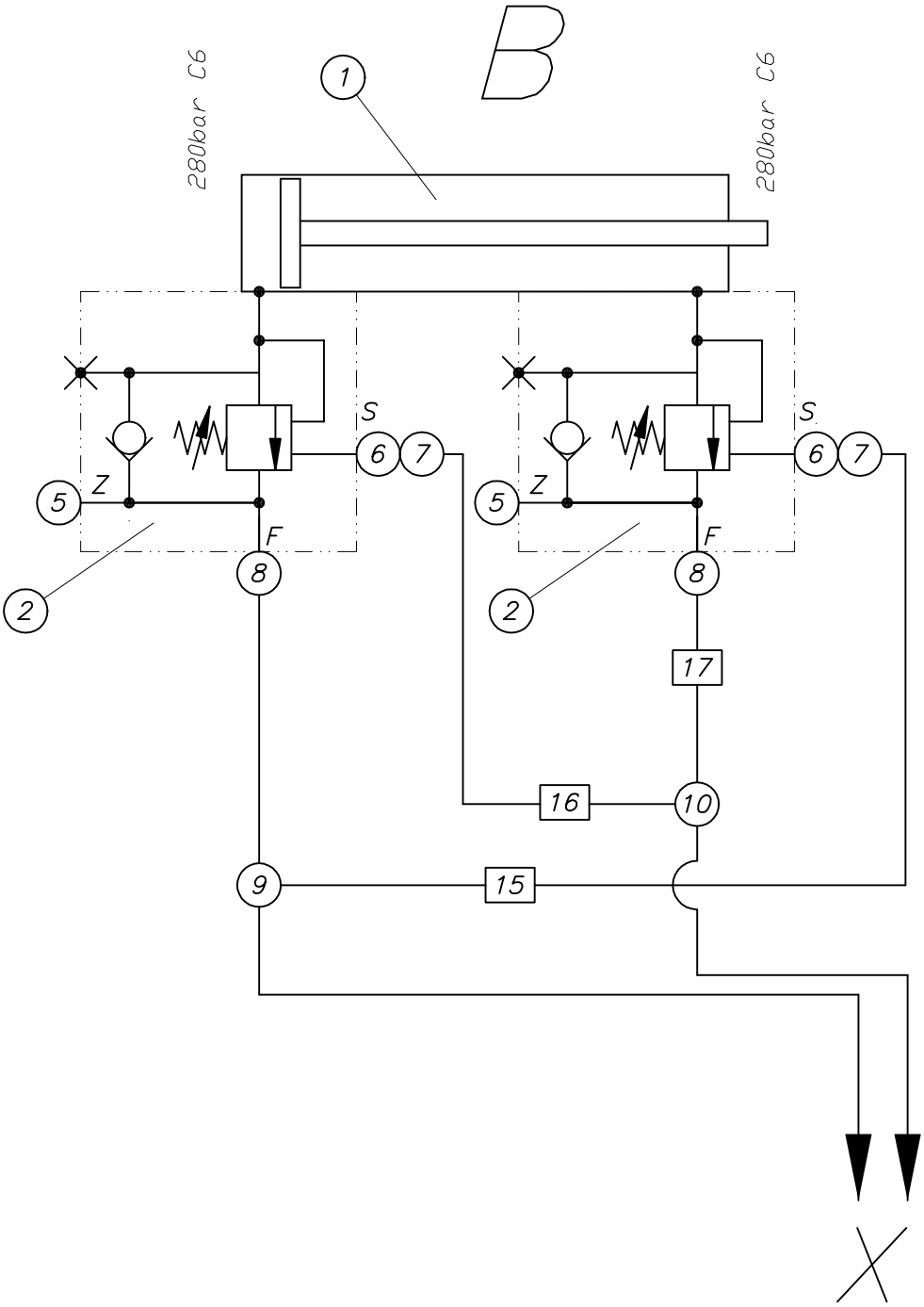
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	cylinder	WAI106716				1,00 Stk
2	piston	WAI106717				1,00 Stk
3	piston nut	WAI106718				1,00 Stk
4	piston rod	WAI106719				1,00 Stk
5	piston guide	WAI106720				1,00 Stk
6	piston head	WAI106721				1,00 Stk
7	bushing 90 x 95 x 60	WAI106018				4,00 Stk
8	Valve	WAI106722				2,00 Stk
9	steel ball	WAI106723				2,00 Stk
10	set screw	WAI106724				1,00 Stk
11	set screw	WAI106725				1,00 Stk
12	sealing set for 1st. boom cylinder	WAI104033				1,00 Stk

Mastzylinder B kpl.

boom cylinder B cpl.

B 66 0 131

Waitzinger
Baumaschinen GmbH



PARTS LIST

24.06.05 09:12:17

part list	description	created	index	valid from	valid to
B660131	boom cylinder B cpl. with pipes	12.09.03 Mi			

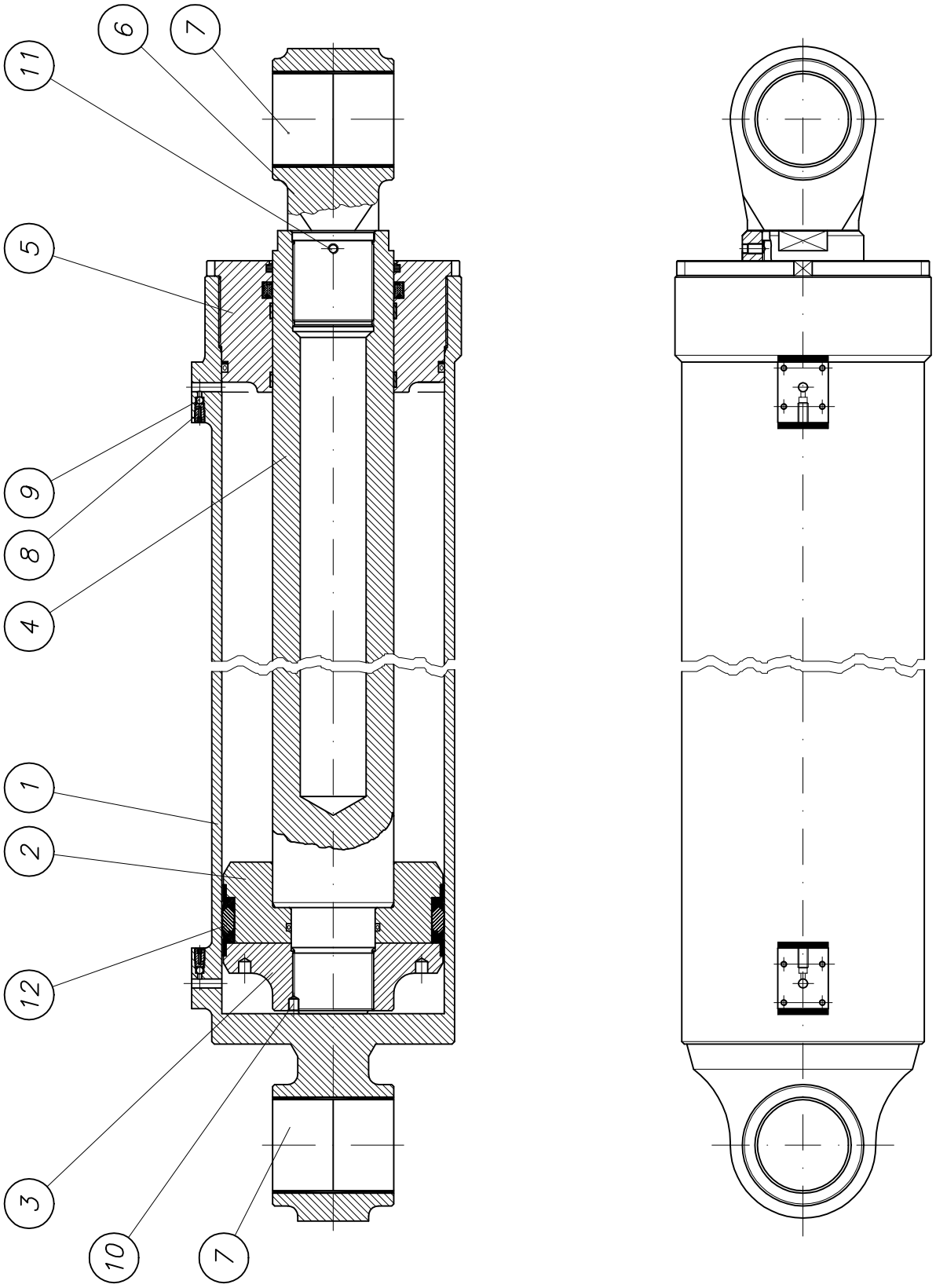
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	boom cylinder for 36-mtr., section B own parts list	WAI106190				1,00 Stk
2	locking valve 280 bar	WAI106935				2,00 Stk
5	locking screw G 1/4	WAI100520				2,00 Stk
6	straight male stud couplings L12	WAI101383				2,00 Stk
7	swivel elbow L12	WAI100590				2,00 Stk
8	straight male stud couplings L12	WAI101386				2,00 Stk
9	swivel barrel tee L12	WAI101325				1,00 Stk
10	tee coupling L12	WAI100598				1,00 Stk
15	pipe	WAI108454				1,00 Stk
16	pipe	WAI108455				1,00 Stk
17	hydr. pipe 12 x 2	WAI102022			0,49	0,20 Mtr

Mastzylinder B

boom cylinder B

WAI 106190

Waitzinger
Baumaschinen GmbH



28.02.2001

PARTS LIST

24.06.05 09:08:23

part list	description	created	index	valid from	valid to
WAI106190	boom cylinder for 36-mtr., section B	09.03.01 Mi			

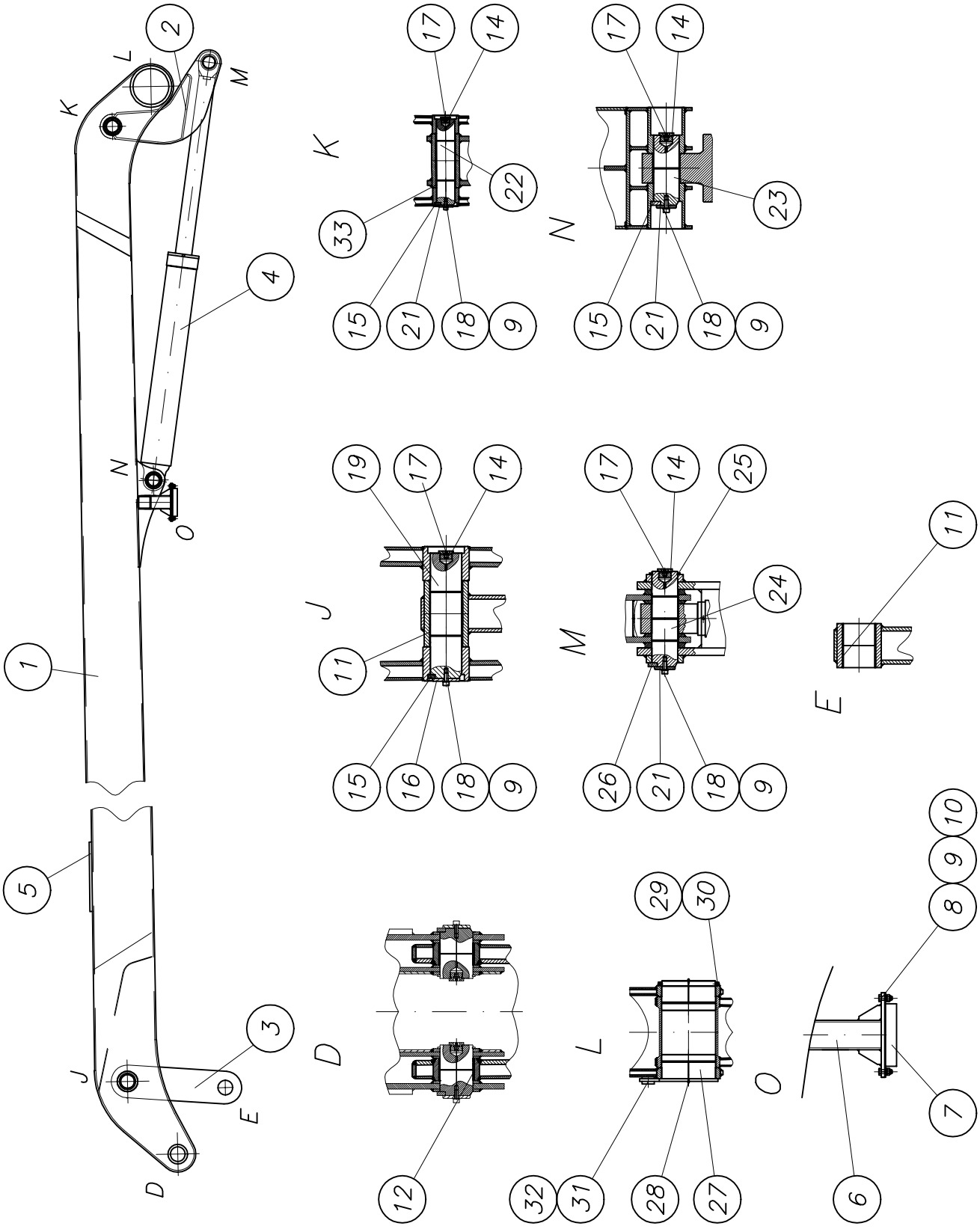
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	cylinder	WAI106727				1,00 Stk
2	piston	WAI106728				1,00 Stk
3	piston nut	WAI106729				1,00 Stk
4	piston rod	WAI106730				1,00 Stk
5	piston guide	WAI106731				1,00 Stk
6	piston head	WAI106721				1,00 Stk
7	bushing 90 x 95 x 60	WAI106018				4,00 Stk
8	Valve	WAI106722				2,00 Stk
9	steel ball	WAI106723				2,00 Stk
10	set screw	WAI106724				1,00 Stk
11	set screw	WAI106725				1,00 Stk
12	sealing set for 2nd. boom cylinder own parts list	WAI104034				1,00 Stk

Mastarm 2 kpl.

element 2 cpl.

B 66 7 011

Waitzinger
Baumaschinen GmbH



PARTS LIST

24.06.05 09:16:25

part list	description	created	index	valid from	valid to
B667011	boom arm 2 cpl.	14.10.02 hbk			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	boom arm 2 cpl. own parts list	B677200		a 10.03.03		1,00 Stk
2	Lever C cpl. own parts list	B671620			75,00	1,00 Stk
3	forcing rod B cpl. own parts list	B671710			45,00	1,00 Stk
4	boom cylinder C cpl. with pipes own parts list	B660132			165,00	1,00 Stk
5	reinforcement	B660092 Bl 8x250x350	1543/EN10029 S235J2G3		0,54	1,00 Stk
6	holder for rubber buffer arm 2 cpl. own parts list	B661085			4,20	1,00 Stk
7	rubber cushion	WAI106715				1,00 Stk
8	hexagon bolt M 10 x 30	WAI101553			0,03	2,00 Stk
9	spring washer A10	WAI102070			0,00	6,00 Stk
10	hex. nut M10 DIN985 8.	WAI102125			0,01	2,00 Stk
11	bushing 85 x 90 x 60	WAI106017			0,20	4,00 Stk
12	bushing 90 x 95 x 60	WAI106018				2,00 Stk
14	locking screw M33x2 own parts list	B660085			0,10	4,00 Stk
15	pin holder	B660088 Bl 10x22x70	1543/EN10029 S235J2G3		0,10	3,00 Stk
16	washer	B660087 Bl 8xd80	1543/EN10029 S235J2G3		0,20	1,00 Stk
17	grease nipple H1 M10 X 1 DIN 71412	WAI100805			0,01	4,00 Stk
18	cylinder head screw M 10 x 25	WAI106654				4,00 Stk
19	pin 85 x 340	B660111 Rd 90x345	1013 42CrMo4V	a 31.07.02	15,00	1,00 Stk
21	washer	B660089 Bl 8xd62	1543/EN10029 S235J2G3		0,20	3,00 Stk
22	pin 75 x 350	B660109 Rd 80x355	1013 42CrMo4V	a 31.07.02	12,00	1,00 Stk
23	pin 70 x 190	B660107 Rd 75x195	1013 42CrMo4V	a 31.07.02	5,50	1,00 Stk
24	pin 70 x 259	B660106 Rd 75x264	1013 42CrMo4V	a 31.07.02	8,00	1,00 Stk

PARTS LIST

24.06.05 09:16:25

part list	description	created	index	valid from	valid to
B667011	boom arm 2 cpl.	14.10.02 hbk			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
25	retaining ring A 70x4 DIN471	WAI106981			0,02	1,00 Stk
26	pin holder	B660086 Fl 25x10x80	1017 S235J2G3		0,15	1,00 Stk
27	pin 220x 400	B660108 Rohr 244.5x25x4	2448 S355J2G3			1,00 Stk
28	grease nipple	WAI102885				4,00 Stk
29	threaded ring	WAI105378				1,00 Stk
30	set screw M 6 x 8	WAI103646				2,00 Stk
31	pin protection	B660123 Bl 10x100x148	1543/EN10029 S355J2G3		0,45	1,00 Stk
32	pipe	B660124 Rohr 51x6.3x30	2448 S355J2G3		0,20	1,00 Stk
33	bushing 75 x 80 x 60	WAI106016				2,00 Stk

Mastarm 2

boom element 2

B 67 7 200a

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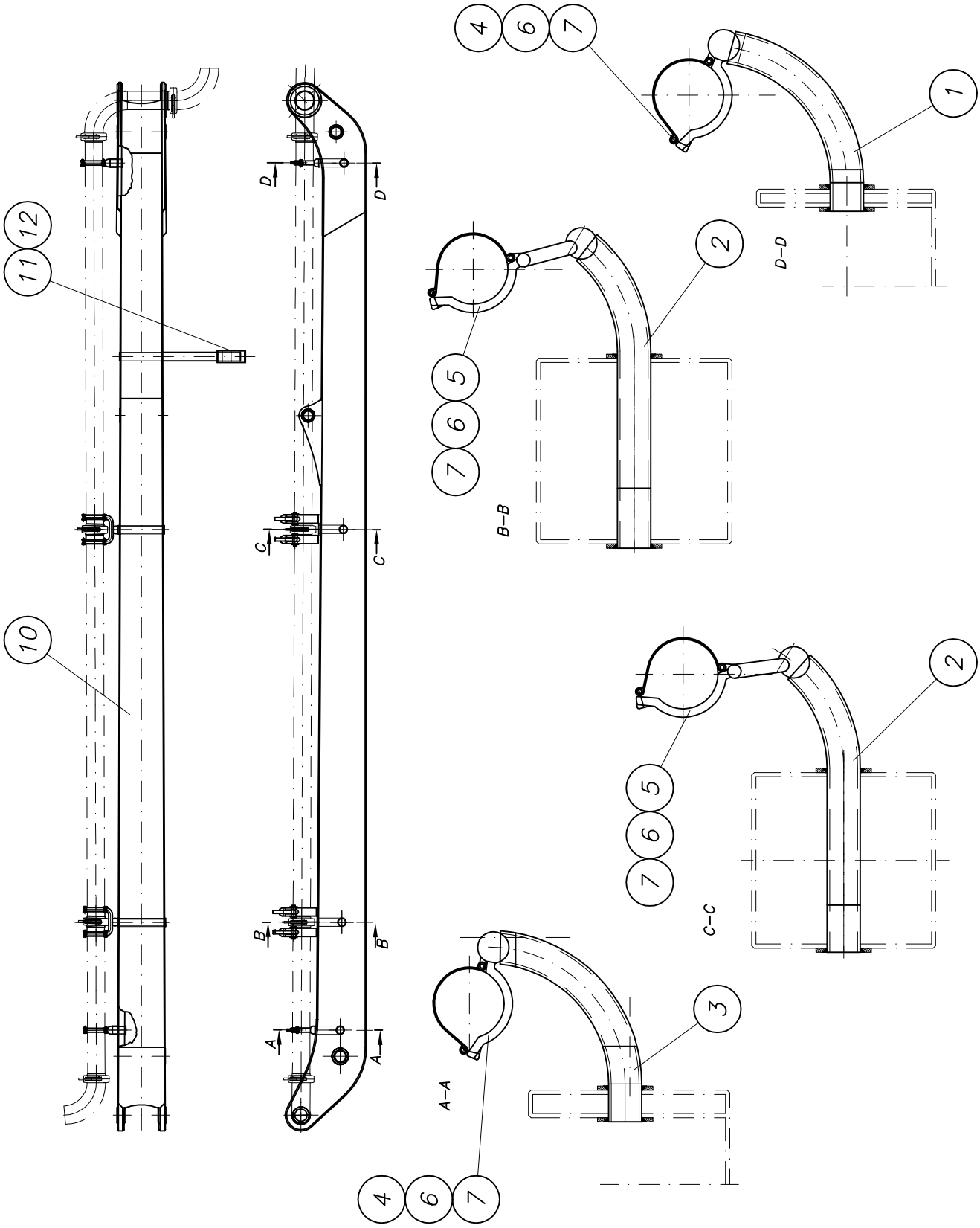


PARTS LIST

04.07.05 09:15:05

part list	description	created	index	valid from	valid to
B677200	boom arm 2 cpl.	09.10.02 hbk	a	10.03.03	

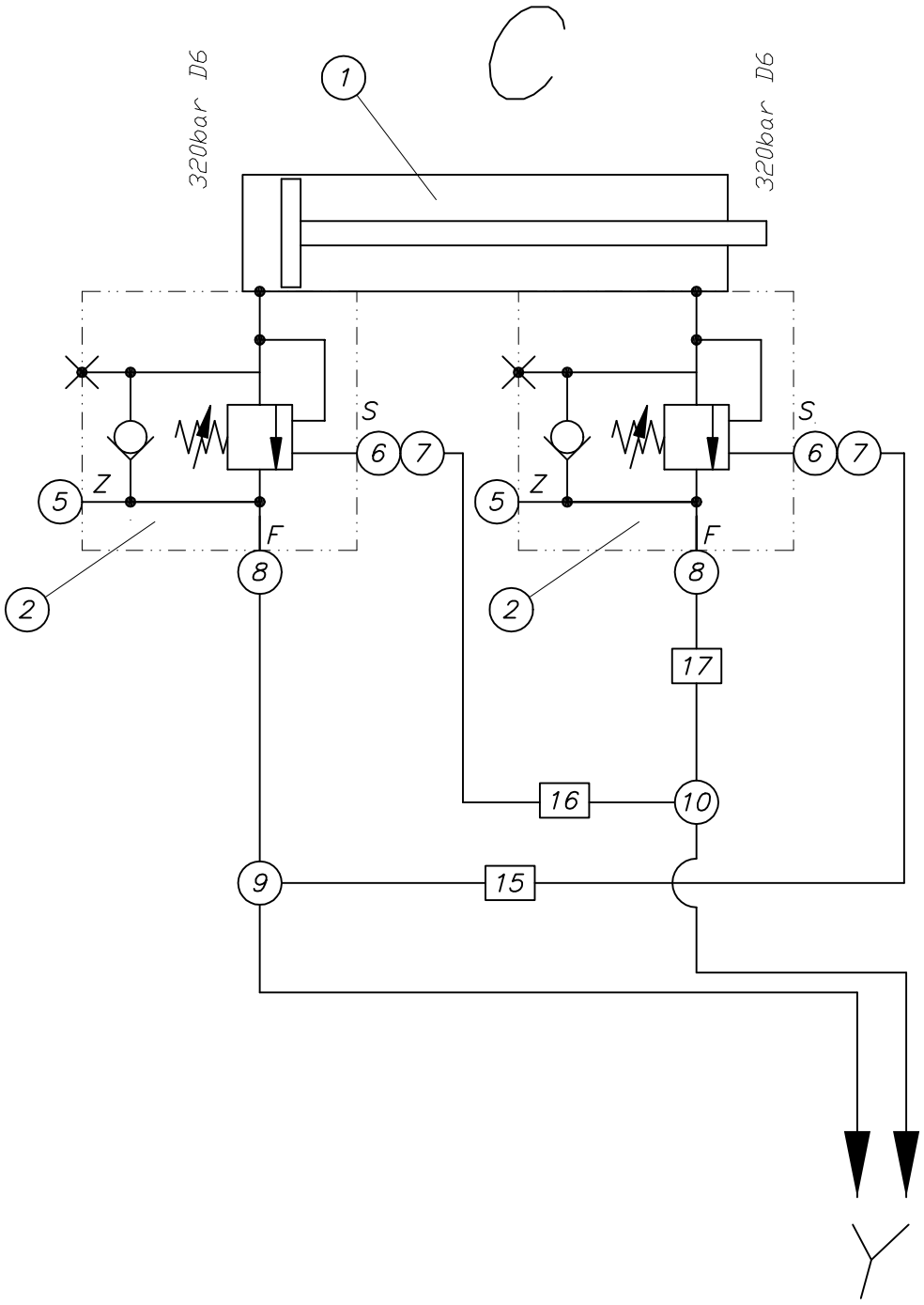
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	pipe 1, Element 2	B641041 Rohr 63.5x4x440	2448 S355J2G3	a 22.01.03	2,60	1,00 Stk
2	pipe 2+3, Element 2	B641047 Rohr 63.5x4x649	2448 S355J2G3	a 22.01.03	3,80	2,00 Stk
3	pipe 4, Element 2	B641049 Rohr 63.5x4x485	2448 S355J2G3	a 22.01.03	2,80	1,00 Stk
4	pipe holder cpl. own parts list	WAI107108				2,00 Stk
5	pipe holder cpl. own parts list	WAI107109				2,00 Stk
6	conical spring washer 12 mm	WAI102877				6,00 Stk
7	hex. nut M12 DIN 985 8. VERZ.	WAI101626				6,00 Stk
10	boom arm 2 processing cpl. own parts list	B677201		a 12.12.02	810,00	1,00 Stk
11	pipe for arm holder 4 own parts list	B671250		a 12.01.04	10,00	1,00 Stk
12	rubber cushion	WAI107199			0,50	1,00 Stk

Mastzylinder C kpl.

boom cylinder C cpl.

B 66 0 132

Waitzinger
Baumaschinen GmbH



PARTS LIST

24.06.05 09:13:31

part list	description	created	index	valid from	valid to
B660132	boom cylinder C cpl. with pipes	12.09.03 Mi			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	boom cylinder for 36-mtr., section C own parts list	WAI106191				1,00 Stk
2	locking valve 320 bar	WAI106258				2,00 Stk
5	locking screw G 1/4	WAI100520				2,00 Stk
6	straight male stud couplings L12	WAI101383				2,00 Stk
7	swivel elbow L12	WAI100590				2,00 Stk
8	straight male stud couplings L12	WAI101386				2,00 Stk
9	swivel barrel tee L12	WAI101325				1,00 Stk
10	tee coupling L12	WAI100598				1,00 Stk
15	pipe	WAI108456				1,00 Stk
16	pipe	WAI108457				1,00 Stk
17	hydr. pipe 12 x 2	WAI102022			0,49	0,20 Mtr

Mastzylinder C

boom cylinder C

WAI 106191

Waitzinger
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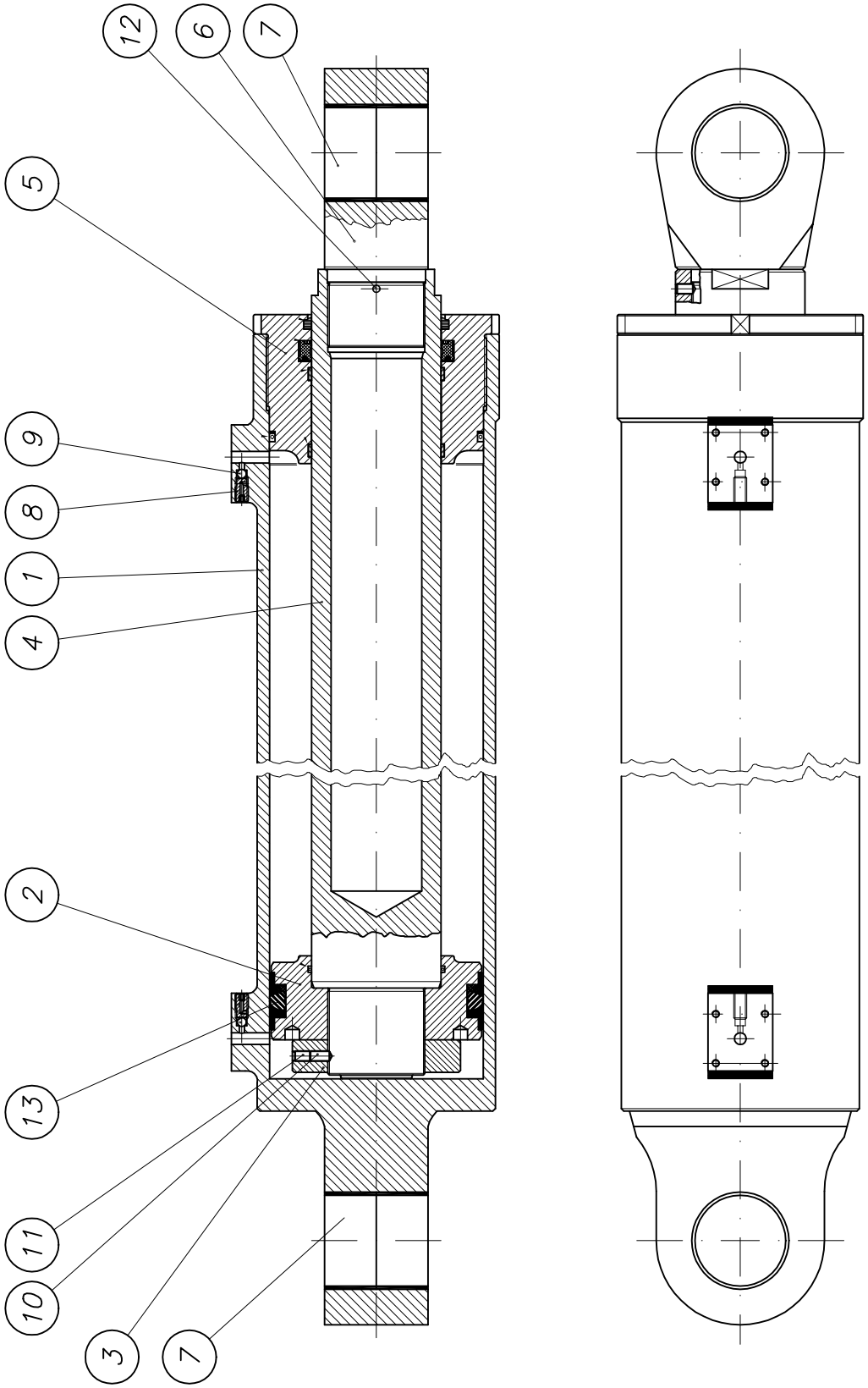

28.02.2001

PARTS LIST

24.06.05 09:09:40

part list	description	created	index	valid from	valid to
WAI106191	boom cylinder for 36-mtr., section C	09.03.01 Mi			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	cylinder	WAI106732				1,00 Stk
2	piston	WAI106733				1,00 Stk
3	piston nut	WAI106734				1,00 Stk
4	piston rod	WAI106735				1,00 Stk
5	piston guide	WAI106736				1,00 Stk
6	piston head	WAI106737				1,00 Stk
7	bushing 70 x 75 x 40	WAI106014				4,00 Stk
8	Valve	WAI106722				2,00 Stk
9	steel ball	WAI106723				2,00 Stk
10	set screw	WAI106738				1,00 Stk
11	set screw	WAI106739				1,00 Stk
12	set screw	WAI106740				1,00 Stk
13	sealing set for 3th. boom cylinder own parts list	WAI104035				1,00 Stk

Mastarm 3 kpl.

element 3 cpl.

B 66 7 012b

Waitzinger
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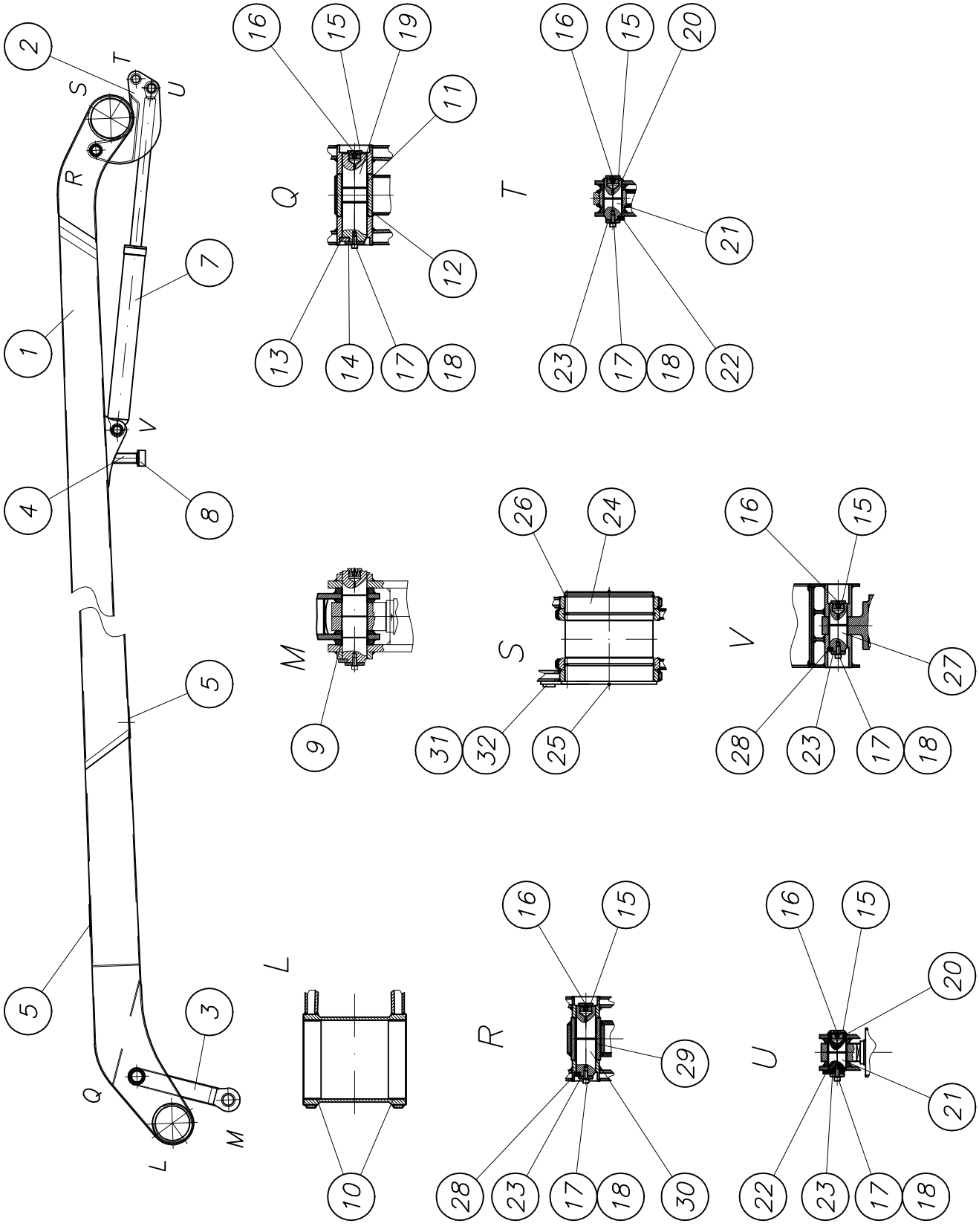

PARTS LIST

24.06.05 09:17:53

part list	description	created	index	valid from	valid to
B667012	boom arm 3 cpl.	14.10.02 hbk	b	10.02.05	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	boom arm 3 cpl. own parts list	B677300				1,00 Stk
2	lever D cpl. own parts list	B671630		a 25.02.03	30,00	1,00 Stk
3	forcing rod C cpl. own parts list	B671720			25,00	1,00 Stk
4	holder for rubber buffer arm 3 cpl. own parts list	B661090			2,00	1,00 Stk
5	plate	B661091 Bl 5x200x280	1543/EN10029 ST37-2	a 17.06.02	2,00	2,00 Stk
7	boom cylinder D cpl. with pipes own parts list	B660133				1,00 Stk
8	rubber buffer 100 x 50	WAI103478				1,00 Stk
9	bushing 70 x 75 x 40	WAI106014				2,00 Stk
10	bushing 220 x 225 x 50	WAI106023				2,00 Stk
11	bushing 70 x 75 x 70	WAI106015				1,00 Stk
12	bushing 70 x 75 x 50	WAI106659				1,00 Stk
13	pin holder	B660088 Bl 10x22x70	1543/EN10029 S235J2G3		0,10	1,00 Stk
14	washer	B660089 Bl 8xd62	1543/EN10029 S235J2G3		0,20	1,00 Stk
15	locking screw M33x2 own parts list	B660085			0,10	5,00 Stk
16	grease nipple H1 M10 X 1 DIN 71412	WAI100805			0,01	5,00 Stk
17	cylinder head screw M 10 x 25	WAI106654				5,00 Stk
18	spring washer A10	WAI102070			0,00	5,00 Stk
19	pin 70 x 249	B660105 Rd 75x255	1013 42CrMo4V	b 05.11.03	7,50	1,00 Stk
20	locking ring	WAI106988				2,00 Stk
21	pin 50 x 117	B660103 Rd 55x122	1013 42CrMo4V	a 31.07.02	1,90	2,00 Stk
22	pin holder	B660086 Fl 25x10x80	1017 S235J2G3		0,15	2,00 Stk
23	washer	B660091 Bl 8xd42	1543/EN10029 S235J2G3		0,10	4,00 Stk

PARTS LIST

24.06.05 09:17:53

part list	description	created	index	valid from	valid to
B667012	boom arm 3 cpl.	14.10.02 hbk	b	10.02.05	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
24	pin 250x 261	B660104 Rohr 273x25x265	2448 S355J2G3	a 17.06.02	23,50	1,00 Stk
25	grease nipple	WAI102885				4,00 Stk
26	circlip	WAI107121				1,00 Stk
27	pin	B660101 Rd 55x140	1013 42CrMo4V	a 31.07.02	2,00	1,00 Stk
28	pin holder	B660090 Bl 10x14x45	1543/EN10029 S235J2G3		0,10	2,00 Stk
29	bushing 55 x 60 x 60	WAI106013				2,00 Stk
30	pin 55 x 199	B660102 Rd 60x205	1013 42CrMo4V	a 31.07.02	3,50	1,00 Stk
31	pin protection	B660123 Bl 10x100x148	1543/EN10029 S355J2G3		0,45	1,00 Stk
32	pipe	B660124 Rohr 51x6.3x30	2448 S355J2G3		0,20	1,00 Stk

Mastarm 3

boom element 3

B 67 7 300

Waitzinger
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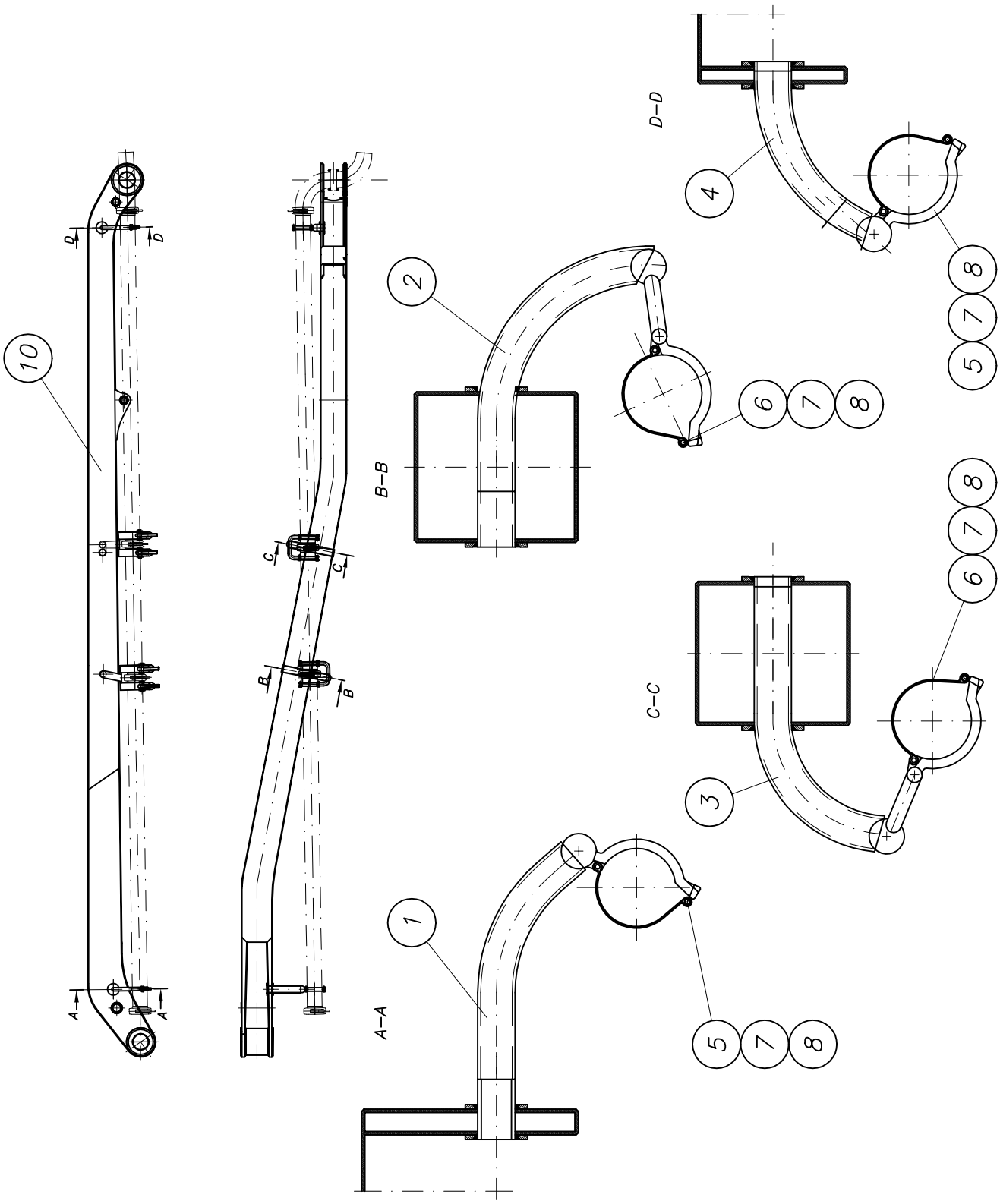


17.12.2002

PARTS LIST

04.07.05 09:16:23

part list	description	created	index	valid from	valid to
B677300	boom arm 3 cpl.	09.10.02 hbk			

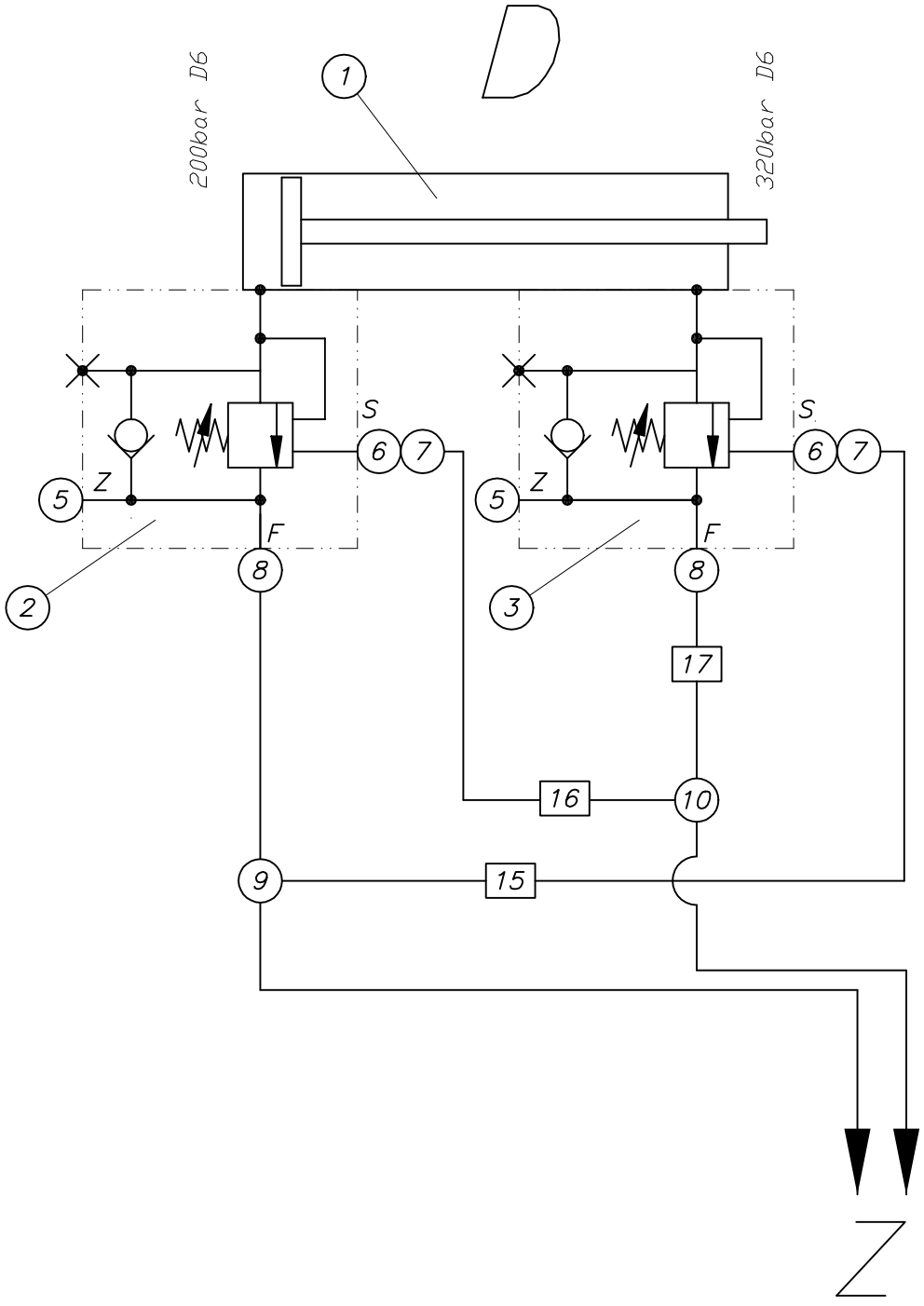
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	pipe 1, Element 3	B641051 Rohr 63.5x4x540	2448 S355J2G3	a 22.01.03	3,20	1,00 Stk
2	pipe 2, Element 3	B641052 Rohr 63.5x4x648	2448 S355J2G3	a 22.01.03	3,80	1,00 Stk
3	pipe 3, Element 3	B641053 Rohr 63.5x4x600	2448 S355J2G3	a 22.01.03	3,50	1,00 Stk
4	pipe 4, Element 3	B641054 Rohr 63.5x4x370	2448 S355J2G3	a 22.01.03	2,20	1,00 Stk
5	pipe holder cpl. own parts list	WAI107108				2,00 Stk
6	pipe holder cpl. own parts list	WAI107109				2,00 Stk
7	conical spring washer 12 mm	WAI102877				6,00 Stk
8	hex. nut M12 DIN 985 8. VERZ.	WAI101626				6,00 Stk
10	boom arm 3 processing cpl. own parts list	B677301			485,00	1,00 Stk

Mastzylinder D kpl.

boom cylinder D cpl.

B 66 0 133

Waitzinger
Baumaschinen GmbH



PARTS LIST

24.06.05 09:14:59

part list	description	created	index	valid from	valid to
B660133	boom cylinder D cpl. with pipes	12.09.03 Mi			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	boom cylinder for 36-mtr., section D own parts list	WAI106192				1,00 Stk
2	locking valve 200 bar	WAI106259				1,00 Stk
3	locking valve 320 bar	WAI106258				1,00 Stk
5	locking screw G 1/4	WAI100520				2,00 Stk
6	straight male stud couplings L12	WAI101383				2,00 Stk
7	swivel elbow L12	WAI100590				2,00 Stk
8	straight male stud couplings L12	WAI101386				2,00 Stk
9	swivel barrel tee L12	WAI101325				1,00 Stk
10	tee coupling L12	WAI100598				1,00 Stk
15	pipe	WAI108458				1,00 Stk
16	pipe	WAI108459				1,00 Stk
17	hydr. pipe 12 x 2	WAI102022			0,49	0,20 Mtr

Mastzylinder D

boom cylinder D

WAI 106192

Waitzinger
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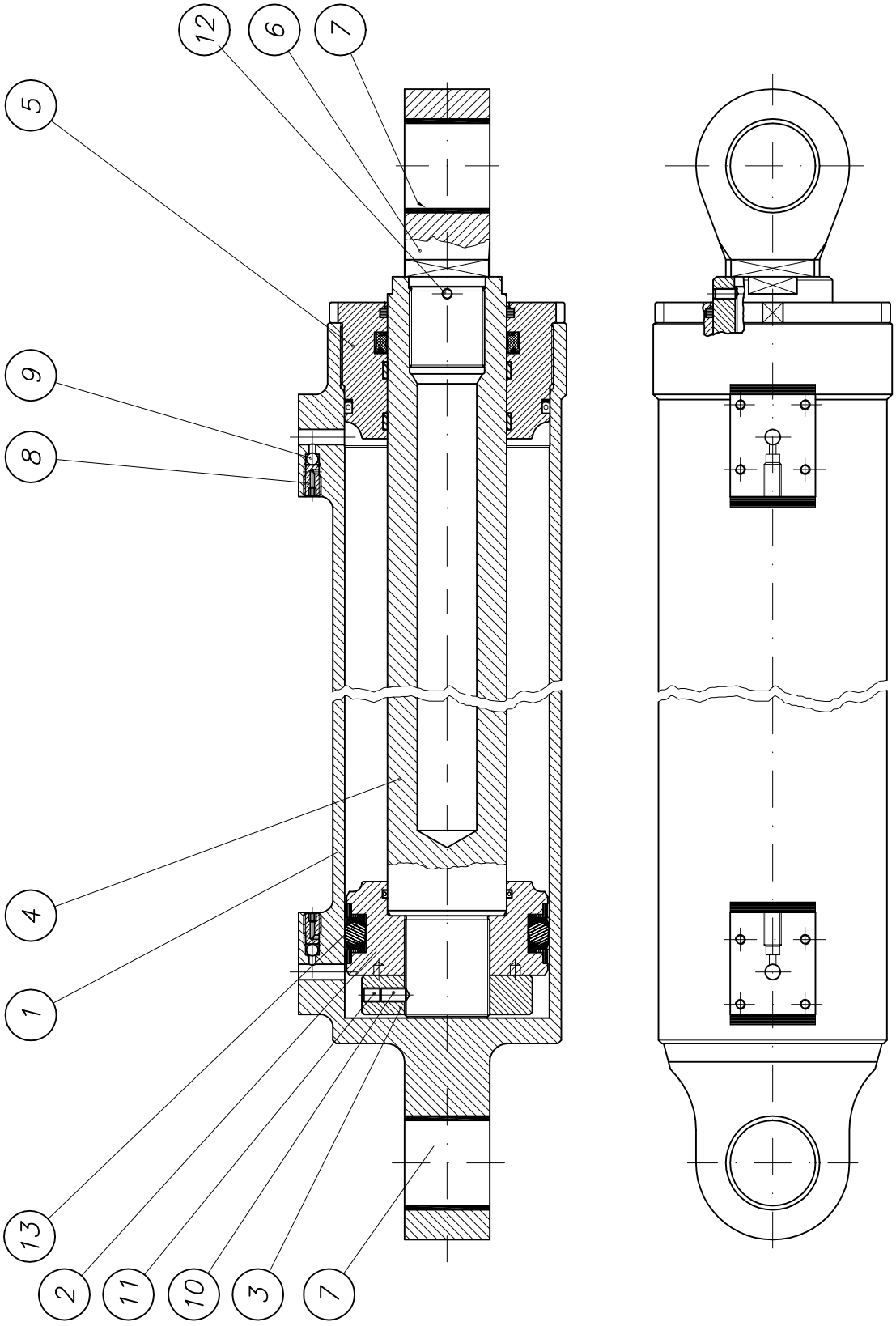


28.02.2001

PARTS LIST

24.06.05 09:10:52

part list	description	created	index	valid from	valid to
WAI106192	boom cylinder for 36-mtr., section D	09.03.01 Mi			

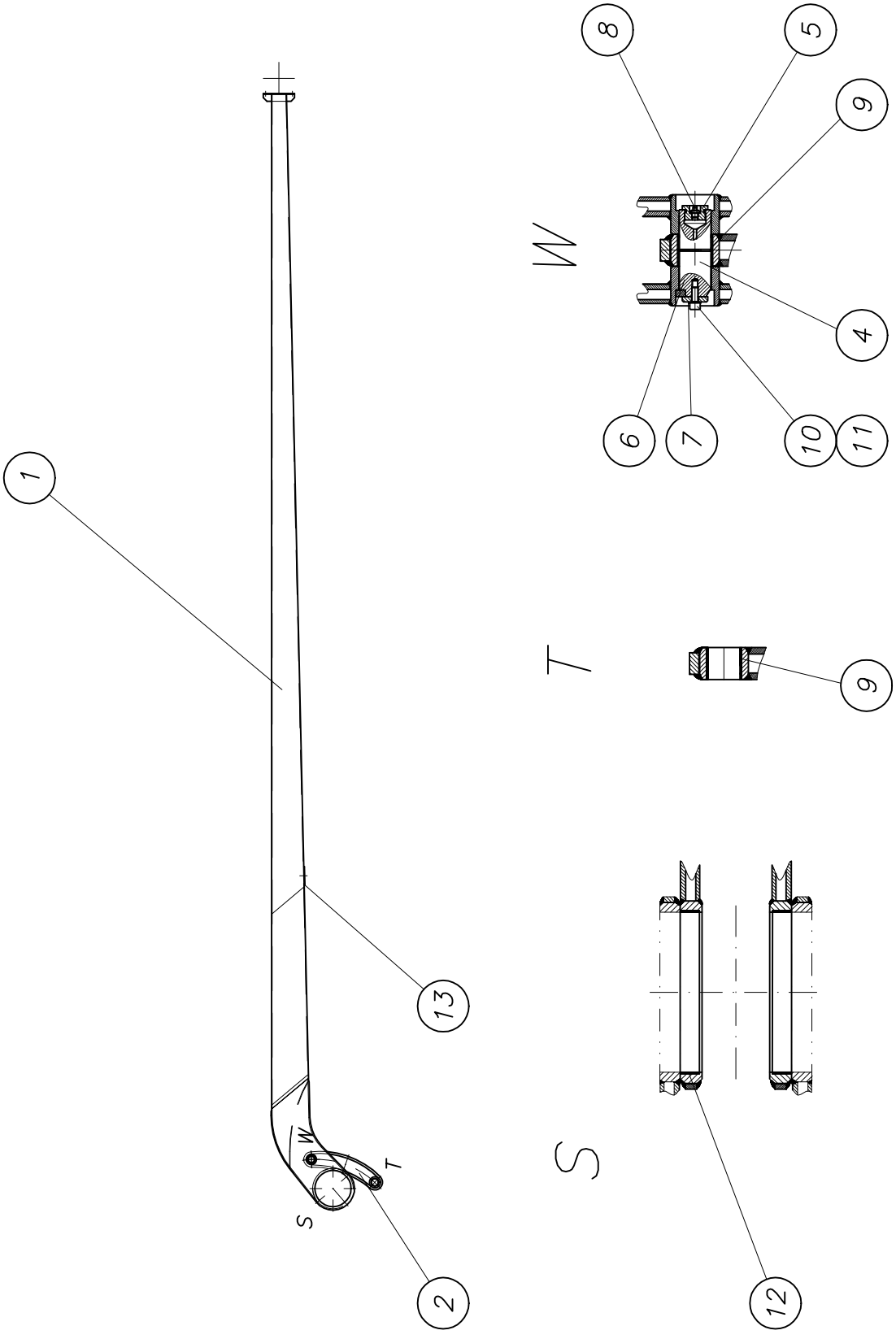
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	cylinder	WAI106741				1,00 Stk
2	piston	WAI106742				1,00 Stk
3	piston nut	WAI106743				1,00 Stk
4	piston rod	WAI106744				1,00 Stk
5	piston guide	WAI106745				1,00 Stk
6	piston head	WAI106746				1,00 Stk
7	bushing 50 x 55 x 50	WAI106012				2,00 Stk
8	Valve	WAI106722				2,00 Stk
9	steel ball	WAI106723				2,00 Stk
10	set screw	WAI106738				1,00 Stk
11	set screw	WAI106739				1,00 Stk
12	set screw	WAI106747				1,00 Stk
13	sealing set for 4th. boom cylinder	WAI104036				1,00 Stk

Mastarm 4 kpl.

element 4 cpl.

B 66 1 072

Waitzinger
Baumaschinen GmbH



03.03.2004

PARTS LIST

24.06.05 09:19:19

part list	description	created	index	valid from	valid to
B661072	boom arm 4 cpl.	11.12.03 hbk			

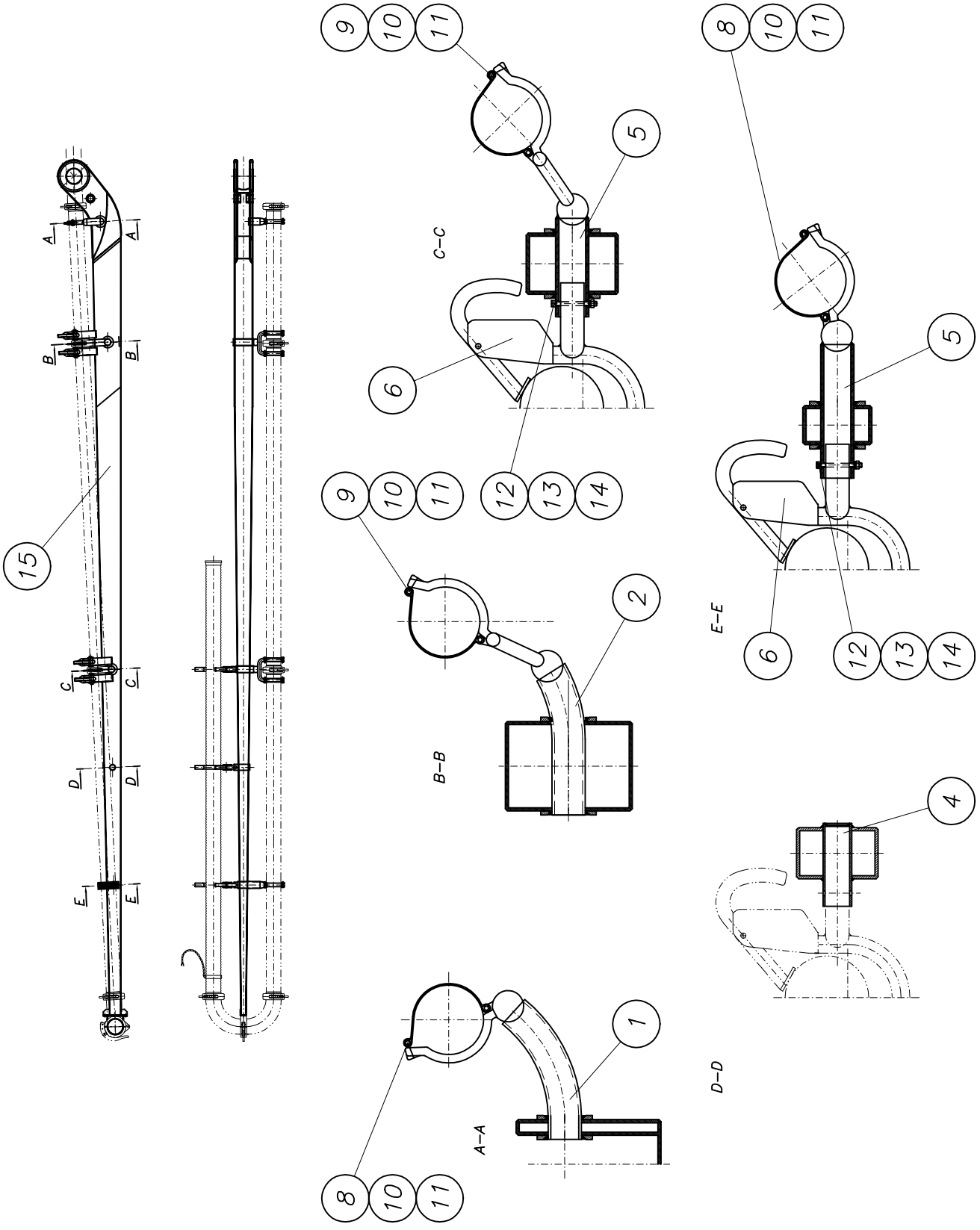
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	boom arm 4 cpl. own parts list	B671430		a 12.01.04		1,00 Stk
2	forcing rod D cpl. own parts list	B671730			14,00	1,00 Stk
4	pin	B660101 Rd 55x140	1013 42CrMo4V	a 31.07.02	2,00	1,00 Stk
5	locking screw M33x2 own parts list	B660085			0,10	1,00 Stk
6	pin holder	B660090 Bl 10x14x45	1543/EN10029 S235J2G3		0,10	1,00 Stk
7	washer	B660091 Bl 8xd42	1543/EN10029 S235J2G3		0,10	1,00 Stk
8	grease nipple H1 M10 X 1 DIN 71412	WAI100805			0,01	1,00 Stk
9	bushing 50 x 55 x 50	WAI106012				2,00 Stk
10	cylinder head screw M 10 x 25	WAI106654				1,00 Stk
11	spring washer A10	WAI102070			0,00	1,00 Stk
12	bushing 250 x 255 x 30	WAI106022			2,00	2,00 Stk
13	plate	B661089 Bl 5x130x175	1543/EN10029 St37-2		0,80	1,00 Stk

Mastarm 4

boom element 4

B 67 1 430a

Waitzinger
Baumaschinen GmbH



PARTS LIST

04.07.05 09:17:44

part list	description	created	index	valid from	valid to
B671430	boom arm 4 cpl.	11.12.03 hbk	a	12.01.04	

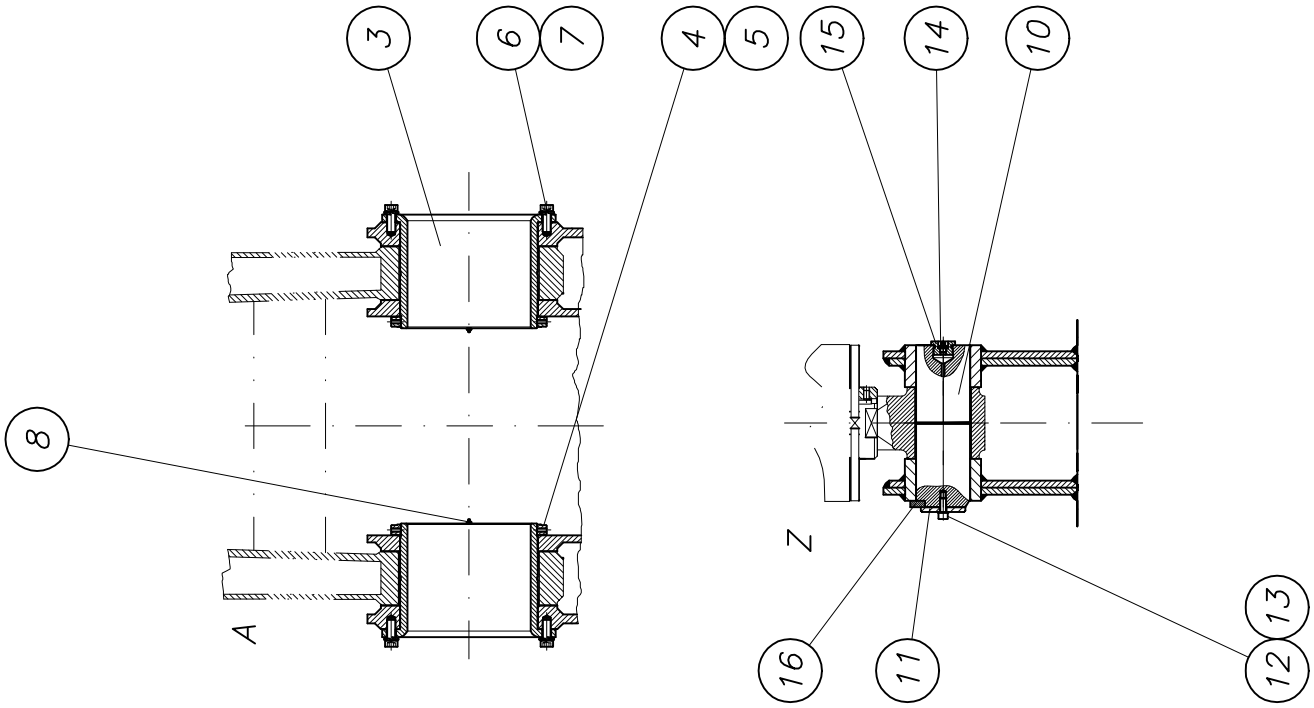
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	pipe 1, Element 4	B641056 Rohr 63.5x4x310	2448 S355J2G3	a 22.01.03	1,80	1,00 Stk
2	pipe 2, Element 4	B641057 Rohr 63.5x4x339	2448 S355J2G3	a 22.01.03	2,00	1,00 Stk
4	pipe 4, Element 4	B641059 Rohr 63.5x5x180	2448 S355J2G3	a 12.01.04	1,10	1,00 Stk
5	pipe 5, Element 4	B641060 Rohr 63.5x5x280	2448 S355J2G3		2,00	2,00 Stk
6	flexible hose support cpl own parts list	B641061				2,00 Stk
8	pipe holder cpl. own parts list	WAI107108				2,00 Stk
9	pipe holder cpl. own parts list	WAI107109				2,00 Stk
10	conical spring washer 12 mm	WAI102877				6,00 Stk
11	hex. nut M12 DIN 985 8. VERZ.	WAI101626				10,00 Stk
12	alien bolt M 8x75 DIN 912 8.8	WAI107115				2,00 Stk
13	spring washer A8 DIN 127 VERZ.	WAI102205			0,00	2,00 Stk
14	hex. nut M8 DIN 934 8. VERZ.	WAI102880				2,00 Stk
15	boom arm 4 processing cpl. own parts list	B671431			158,00	1,00 Stk

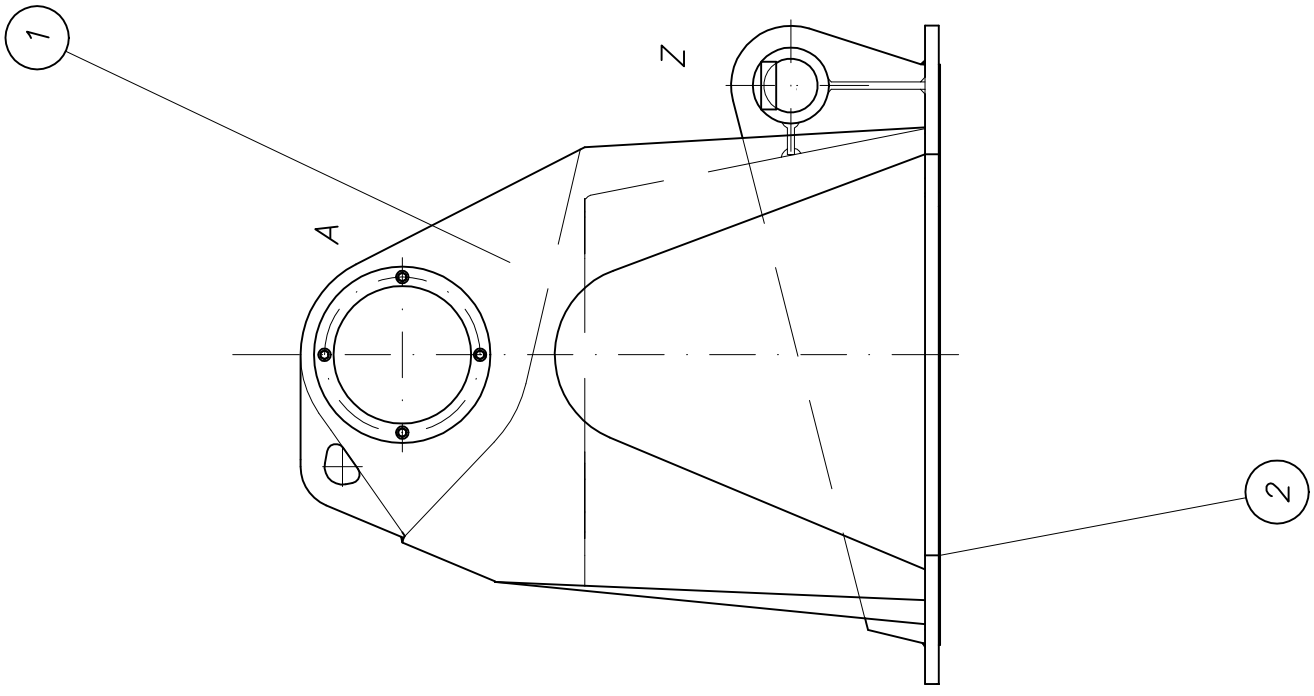
Drehkopf kpl.

rotating head cpl.

B 68 1 002

Waitzinger
Baumaschinen GmbH





PARTS LIST

24.06.05 09:20:46

part list	description	created	index	valid from	valid to
B681002	rotating head unit	04.12.01 Mi			

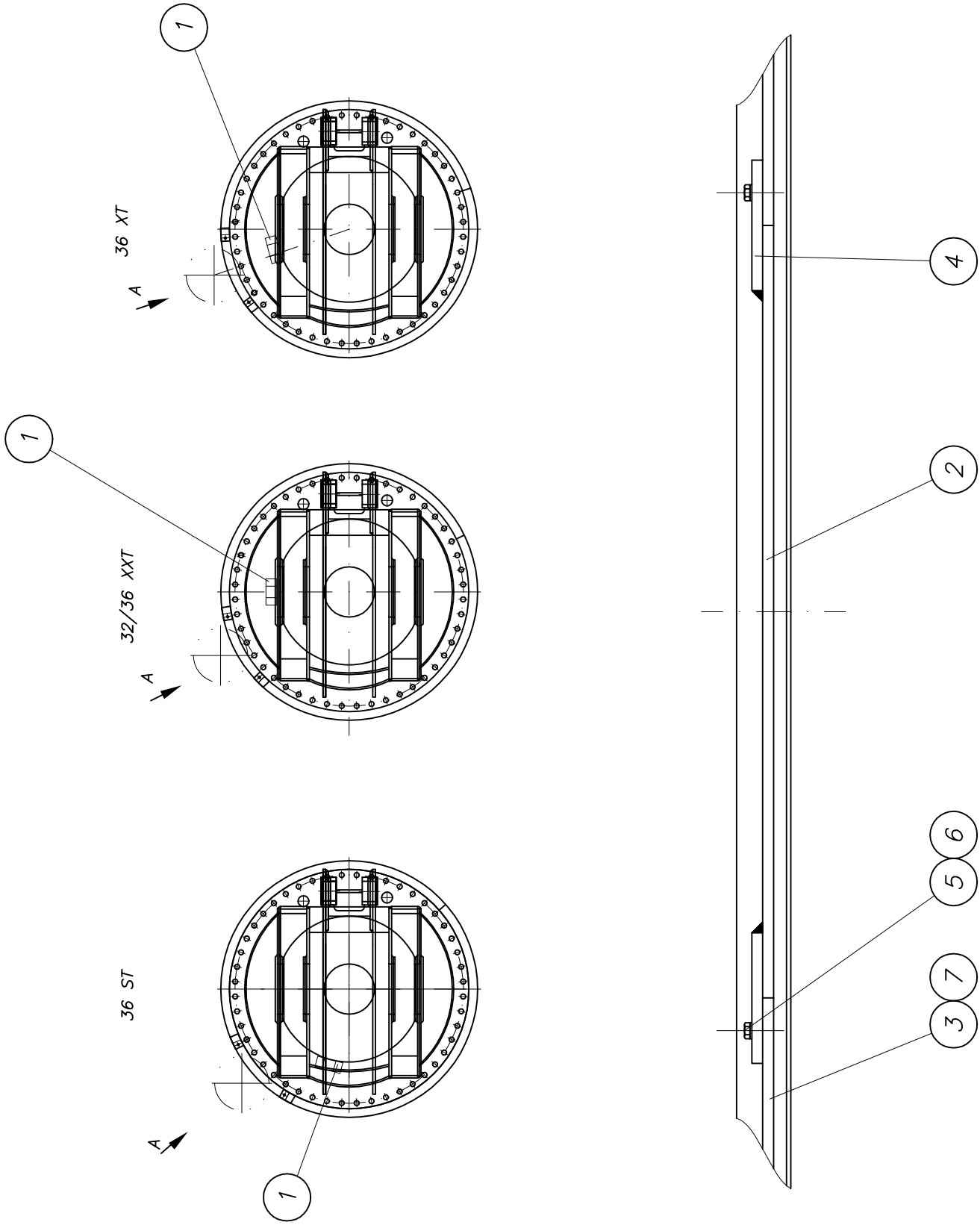
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	rotating head unit own parts list	B681010			530,00	1,00 Stk
2	turning unit cpl. own parts list	B681045		a 09.12.04		1,00 Stk
3	pin 230x190 own parts list	B660117				2,00 Stk
4	threaded ring	WAI106624				2,00 Stk
5	set screw M 6 x 8	WAI103646				4,00 Stk
6	cheese head screw	WAI106664				8,00 Stk
7	spring washer	WAI101976			0,00	8,00 Stk
8	grease nipple	WAI102885				4,00 Stk
10	pin 90 x 271	B660114 Rd 95x275	1013 42CrMo4V	a 31.07.02	14,00	1,00 Stk
11	washer	B660087 Bl 8xd80	1543/EN10029 S235J2G3		0,20	1,00 Stk
12	cylinder head screw M 10 x 25	WAI106654				1,00 Stk
13	spring washer A10	WAI102070			0,00	1,00 Stk
14	grease nipple H1 M10 X 1 DIN 71412	WAI100805			0,01	1,00 Stk
15	locking screw M33x2 own parts list	B660085			0,10	1,00 Stk
16	pin holder	B660086 Fl 25x10x80	1017 S235J2G3		0,15	1,00 Stk

Drehwerk Schutz kpl.

turning unit safety device cpl.

B 68 1 045a

Waitzinger
Baumaschinen GmbH



PARTS LIST

24.06.05 09:22:01

part list	description	created	index	valid from	valid to
B681045	turning unit cpl.	25.09.01 Mi	a	09.12.04	

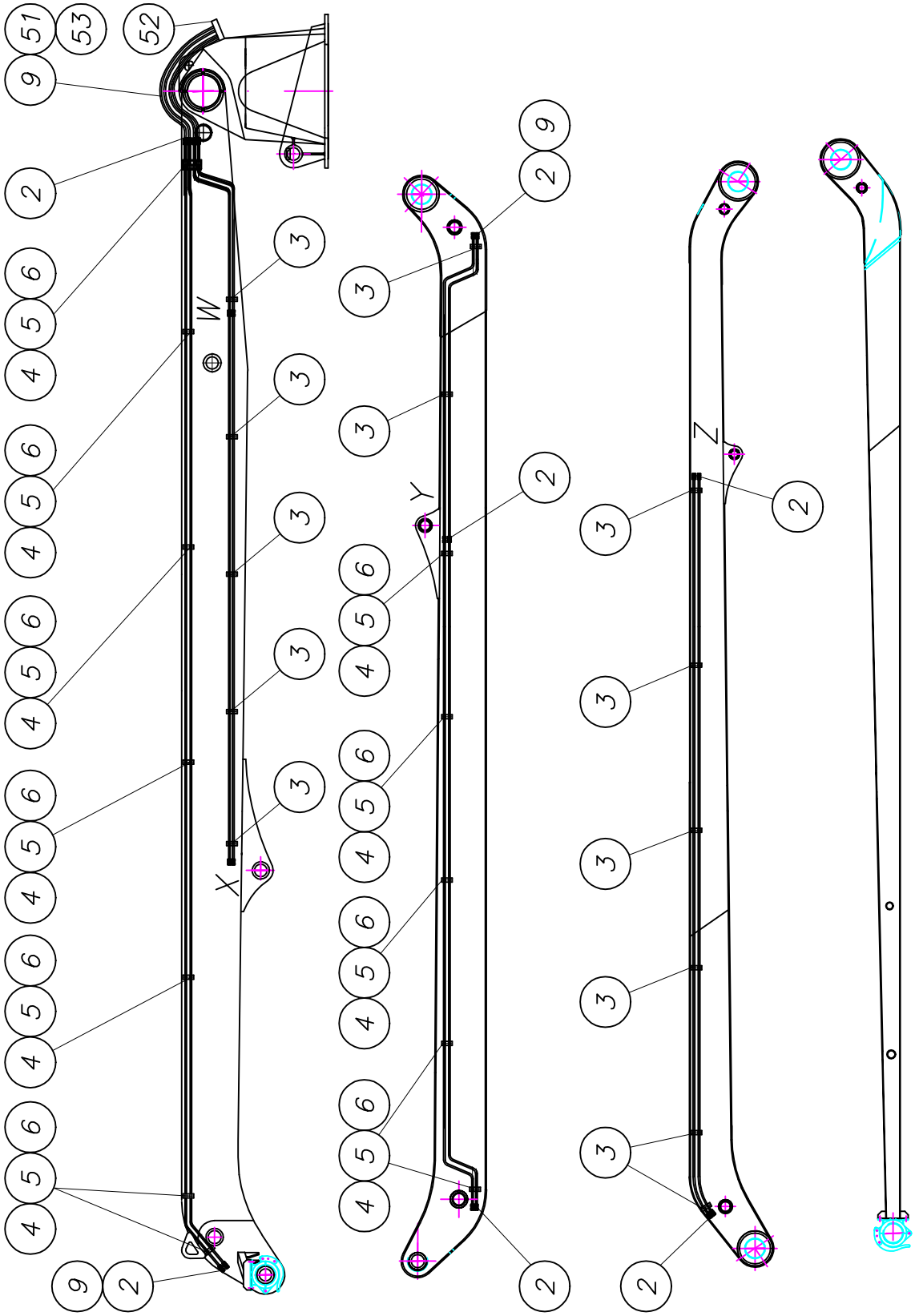
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	stop	B661087 Bl 50x93x120	1543/EN10029 St52-3	a 25.02.02	3,00	1,00 Stk
2	bow	B661107 Bl 5 x 80 x 400	1543/EN10029 S355J2G3	a 25.09.01	0,40	1,00 Stk
3	bow	B661124 Bl 5 xR550xR590	1543/EN10029 S355J2G3		0,50	2,00 Stk
4	plate	B661109 Bl 5 x 60 x 40	1543/EN10029 S355J2G3		0,10	2,00 Stk
5	hexagon bolt M 8 x 12 DIN 933 8.8	WAI103274				2,00 Stk
6	spring washer A8 DIN 127 VERZ.	WAI102205			0,00	2,00 Stk
7	bow	B661123 Bl 5 xR550xR590	1543/EN10029 S355J2G3		0,50	2,00 Stk

Verrohrung Armpaket

piping diagram arms

B 71 1 065c

Waitzinger
Baumaschinen GmbH



PARTS LIST

24.06.05 09:23:28

part list	description	created	index	valid from	valid to
B711065	piping diagram boom	10.07.01 ek	c	02.09.03	

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
2	straight couplings L12	WAI100603				30,00 Stk
3	pipe clip 12 mm, own parts list	WAI105146			0,07	40,00 Stk
4	pipe clip 12mm	WAI108642				60,00 Stk
5	cover plate DP-1A	WAI108643				30,00 Stk
6	hexagon screw M 6 x 55	WAI103512				60,00 Stk
9	hydraulic hose DN10 x 1250	WAI106508				14,00 Stk
49	hydr. pipe 12 x 2	WAI102022			0,49	90,00 Mtr
51	hydraulic hose DN10 x 700	WAI101605				8,00 Stk
52	bulkhead coupling L12	WAI101384				9,00 Stk
53	Pvc Hose 100mm, blue	WAI106517				1,00 Mtr

Übersicht B 70 - B 79

over view B 70 - B 79

Waitzinger
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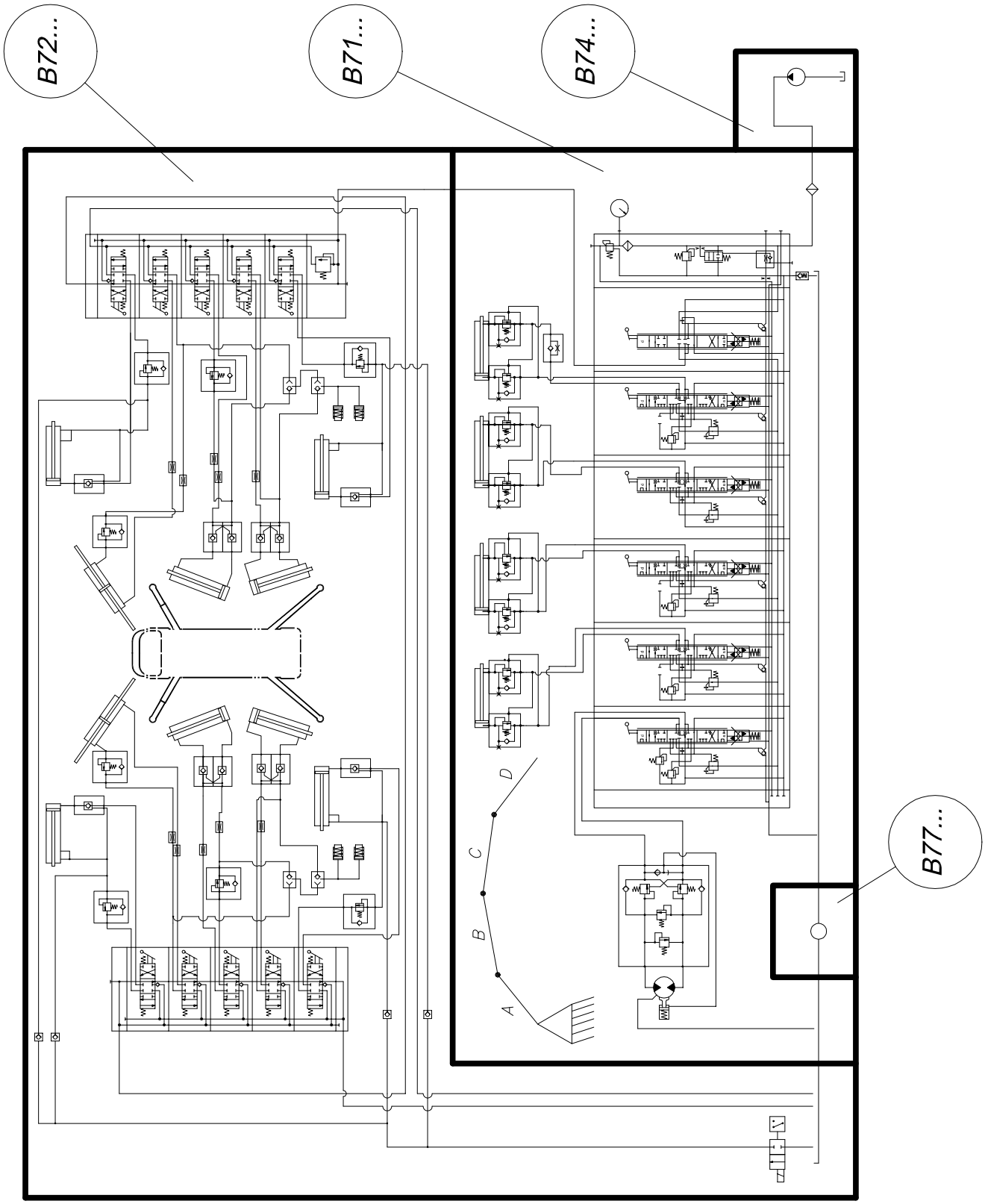
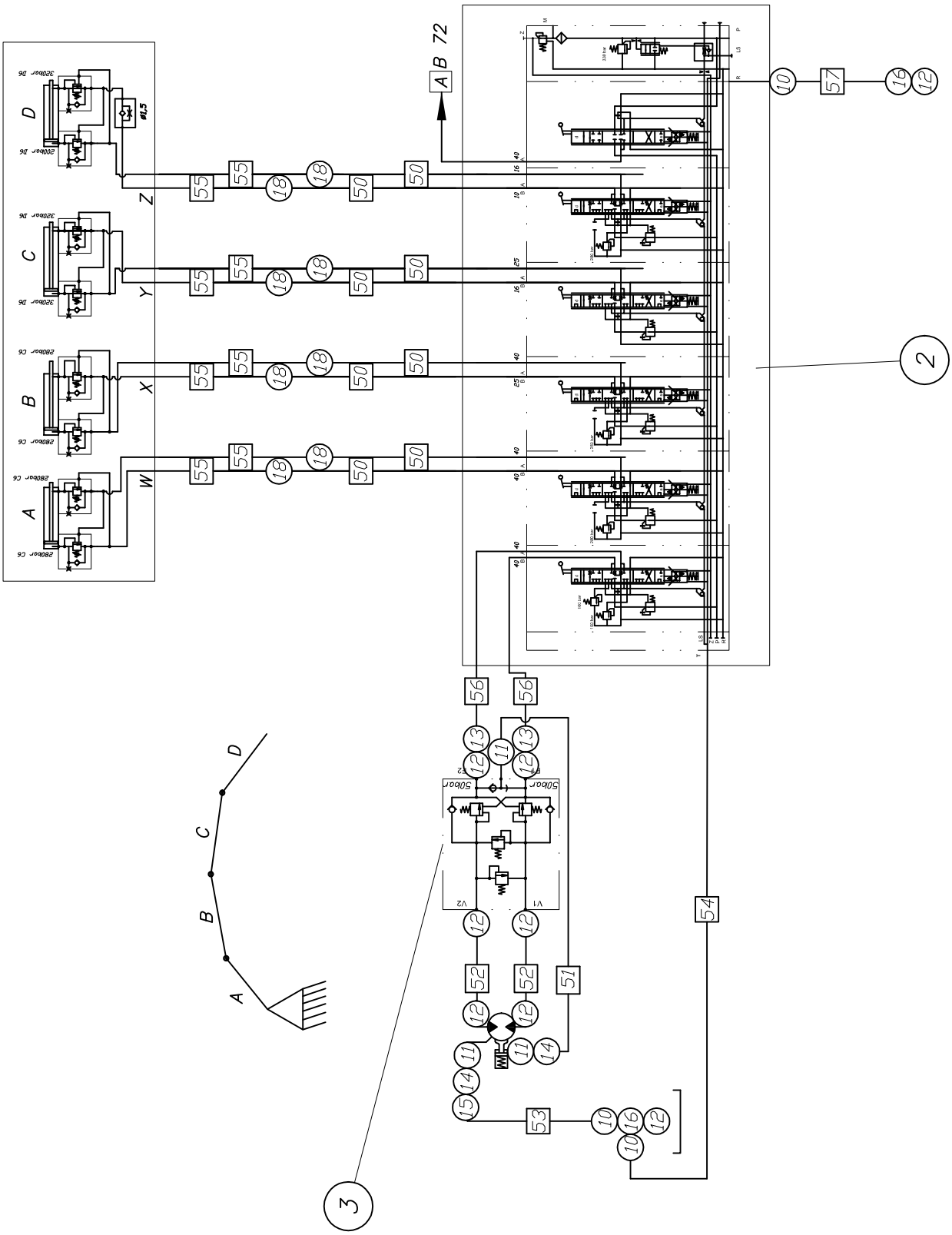


Hydrauliksystem Mast kpl.

hydraulic system boom cpl.

B 71 9 001c

Waitzinger
Baumaschinen GmbH



PARTS LIST

28.09.05 11:02:08

part list	description	created	index	valid from	valid to
B719001R1	hydr. system boom 36m XXT cpl.	01.09.04 HF			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
3	locking valve LHDV33H-25W-B6-150/150-1	WAI106290				1,00 Stk
10	standpipe reducers L12-8	WAI101727				1,00 Stk
11	straight male stud couplings L8	WAI103740				3,00 Stk
12	straight male stud couplings L12 RD 1/2"	WAI105400				7,00 Stk
13	swivel elbow L12	WAI103794				2,00 Stk
14	adjustable elbow bodies L8	WAI103793				2,00 Stk
15	swivel barrel tee L8	WAI103787				1,00 Stk
16	swivel barrel tee L12	WAI103788				1,00 Stk
17	straight couplings L12	WAI103752				1,00 Stk
18	bulkhead coupling L12	WAI103778				8,00 Stk
50	hydraulic hose DN10 x 3400	WAI106869				8,00 Stk
51	hydraulic hose DN06 x 450	WAI106504				1,00 Stk
52	hydraulic hose DN10 x 700	WAI101605				2,00 Stk
53	hydraulic hose DN06 x 900	WAI106506				1,00 Stk
55	hydraulic hose DN10 x 1250	WAI106508				8,00 Stk

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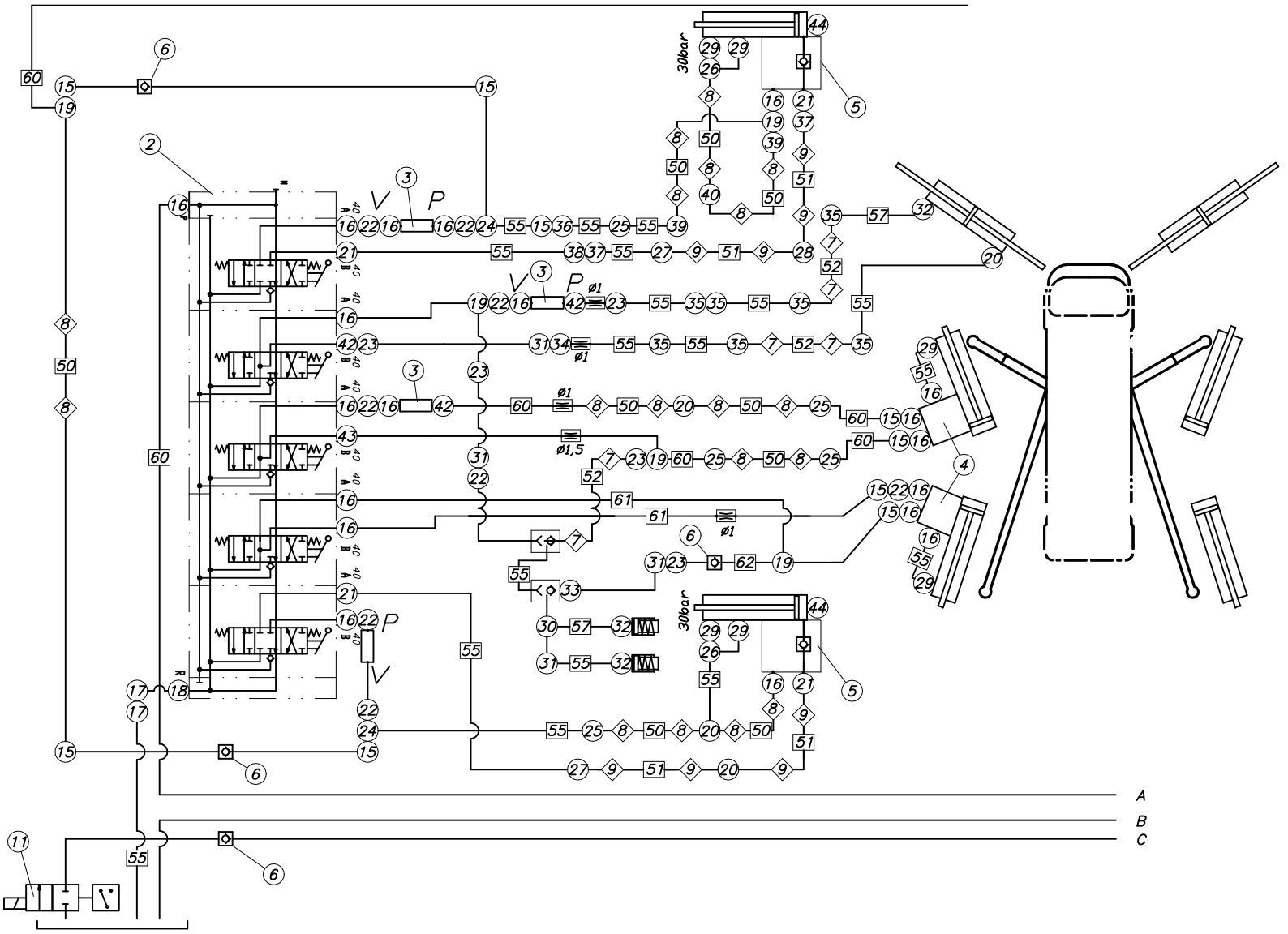
Hydraulikplan Mastbock
piping diagram boom

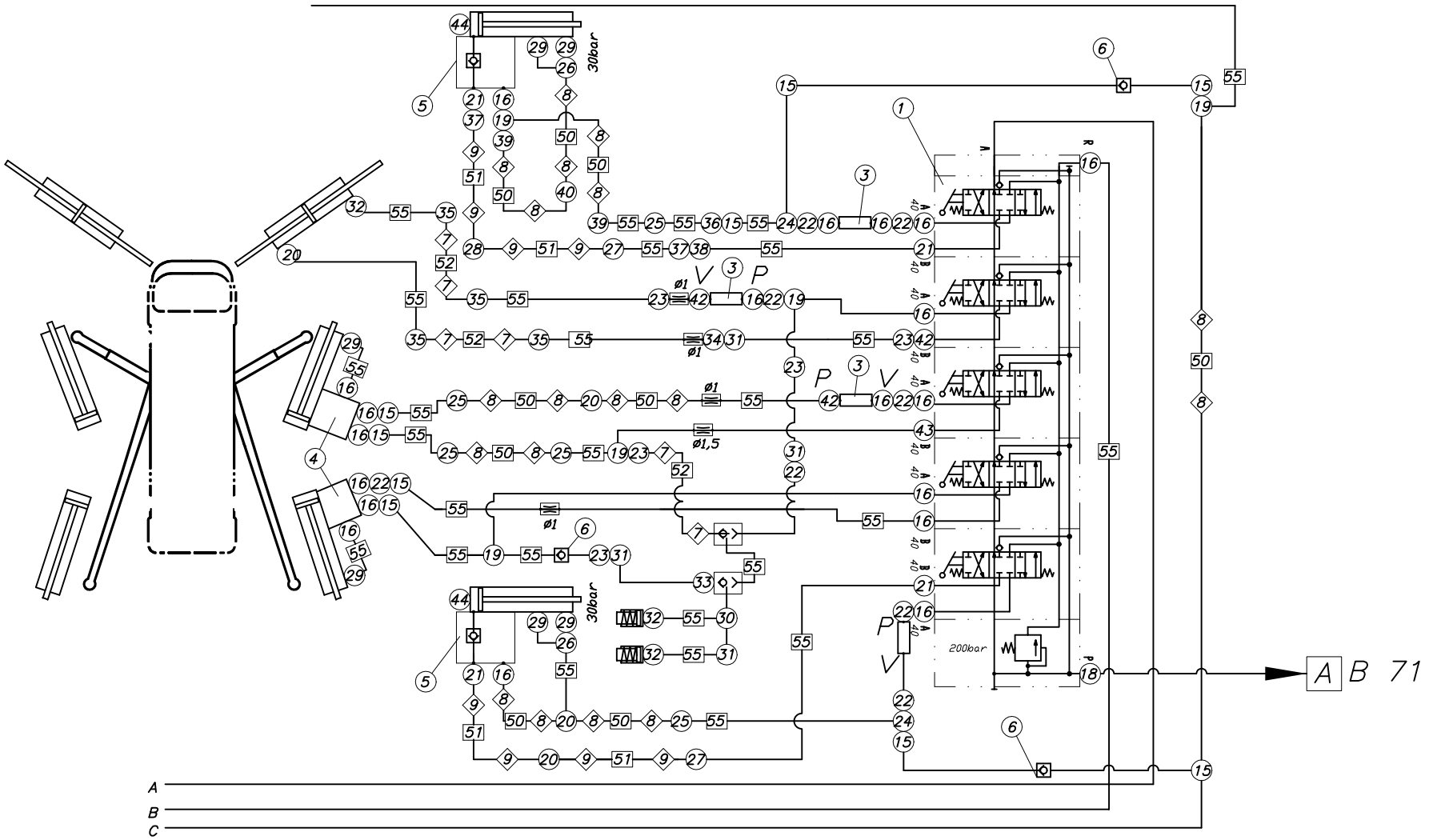
B 72 9 011a 1



Waitzinger
Baumaschinen GmbH

Hydraulikplan Mastbock
piping diagram boom

B 72 9 011a 2



PARTS LIST

28.09.05 11:07:39

part list	description	created	index	valid from	valid to
B729011R2	piping diagram 36XXT boom	03.08.04 HF			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
3	valve SVC 46 F-30	WAI106335				6,00 Stk
4	pilot operated twin check valve	WAI106410				4,00 Stk
5	valve RHC 31	WAI106698				4,00 Stk
6	non return valve	WAI106598				8,00 Stk
7	pipe clip 8mm complete	WAI103396				20,00 Stk
8	pipe clip 12mm complete	WAI102295				40,00 Stk
9	pipe clip 15mm complete	WAI102296				24,00 Stk
10	mounting for control block cpl. own parts list	B721008				1,00 Stk
11	valve BVG 1 RK-G24-3/8	WAI106617				1,00 Stk
12	valve WV 8-S	WAI105212				4,00 Stk
15	swivel elbow L12	WAI103794				8,00 Stk
16	straight male stud couplings L12D	WAI100548				20,00 Stk
17	standpipe elbows L22V	WAI101207			0,42	2,00 Stk
18	straight male stud couplings L22-G 3/4"	WAI101407				1,00 Stk
19	swivel barrel tee L12	WAI101325				5,00 Stk
20	swivel elbow L12	WAI100590				1,00 Stk
21	straight male stud couplings L15-G 1/2"	WAI103742				4,00 Stk
22	straight coupling SNV 12L	WAI101949				8,00 Stk
23	standpipe reducers L12-8	WAI101727				5,00 Stk
24	swivel branch tee L12	WAI101774				1,00 Stk

PARTS LIST

28.09.05 11:07:39

part list	description	created	index	valid from	valid to
B729011R2	piping diagram 36XXT boom	03.08.04 HF			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
25	straight couplings L12	WAI100603				6,00 Stk
26	tee coupling L12	WAI100598				3,00 Stk
27	straight couplings L 15	WAI100828			0,14	2,00 Stk
28	elbow couplings L15	WAI100829				2,00 Stk
29	banjo coupling L12 RD	WAI103684				6,00 Stk
30	swivel barrel tee L8	WAI103787				1,00 Stk
31	adjustable elbow bodies L8	WAI103793				4,00 Stk
32	banjo coupling L8R	WAI101196				4,00 Stk
33	straight coupling SNV 8L	WAI101938				1,00 Stk
34	bulkhead elbows L8	WAI101380				1,00 Stk
35	straight couplings L8	WAI100538				4,00 Stk
36	bulkhead elbows L12	WAI101385				1,00 Stk
37	swivel elbow L15	WAI101333				2,00 Stk
38	bulkhead elbows L15	WAI101390				1,00 Stk
39	elbow couplings L12	WAI100604				2,00 Stk
40	bulkhead coupling L12	WAI101384				1,00 Stk
42	straight male stud couplings L12R 1.0 own parts list	WAI106426			0,13	3,00 Stk
43	straight male stud couplings L12R 1.5 own parts list	WAI106427			0,13	1,00 Stk
44	socket head port plugs M24x1.5	WAI106699			0,04	4,00 Stk
45	energie chain	WAI108645			0,01	2,00 Stk

Übersicht B 80 - B 99

over view B 80 - B 99

Waitzinger
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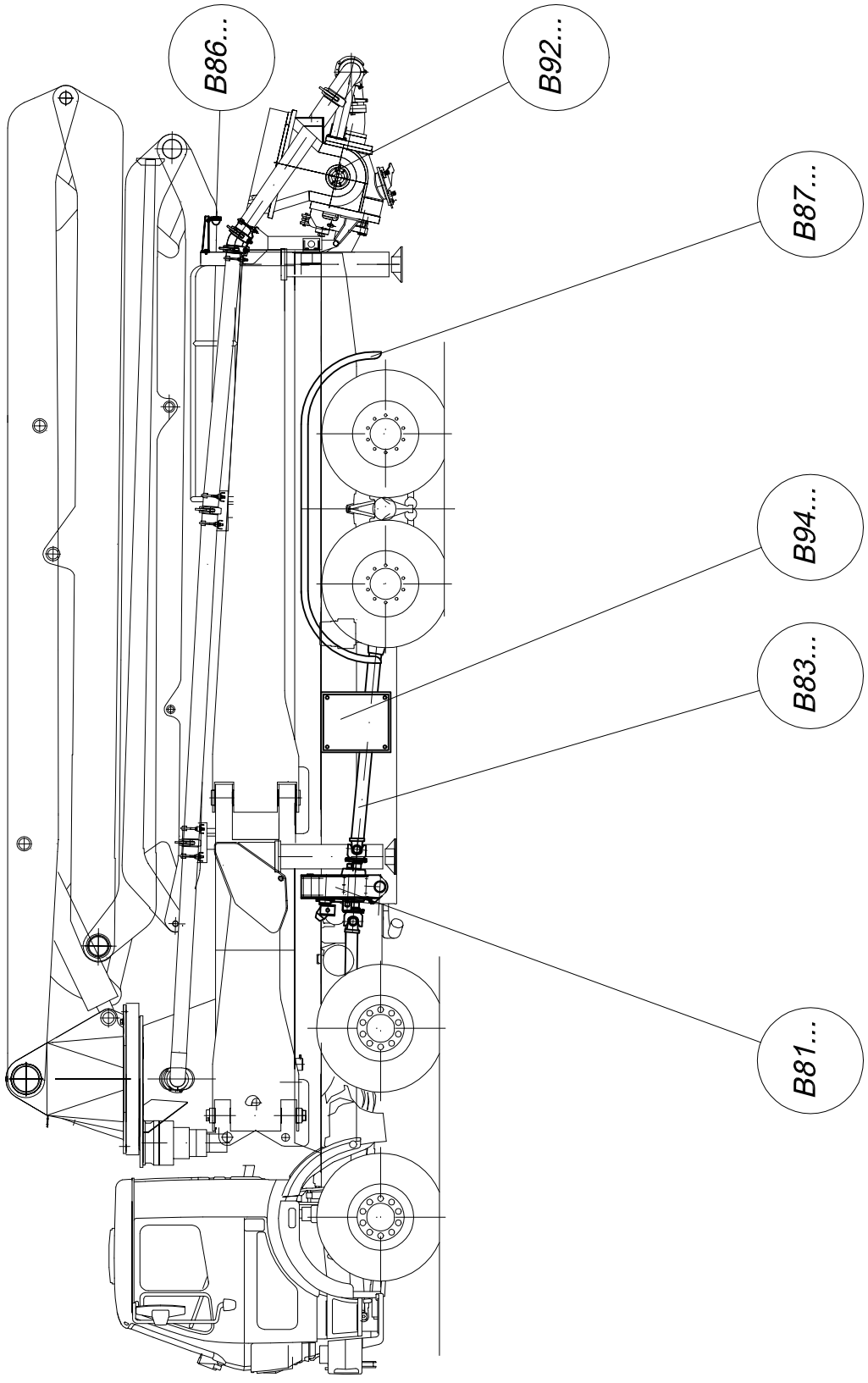
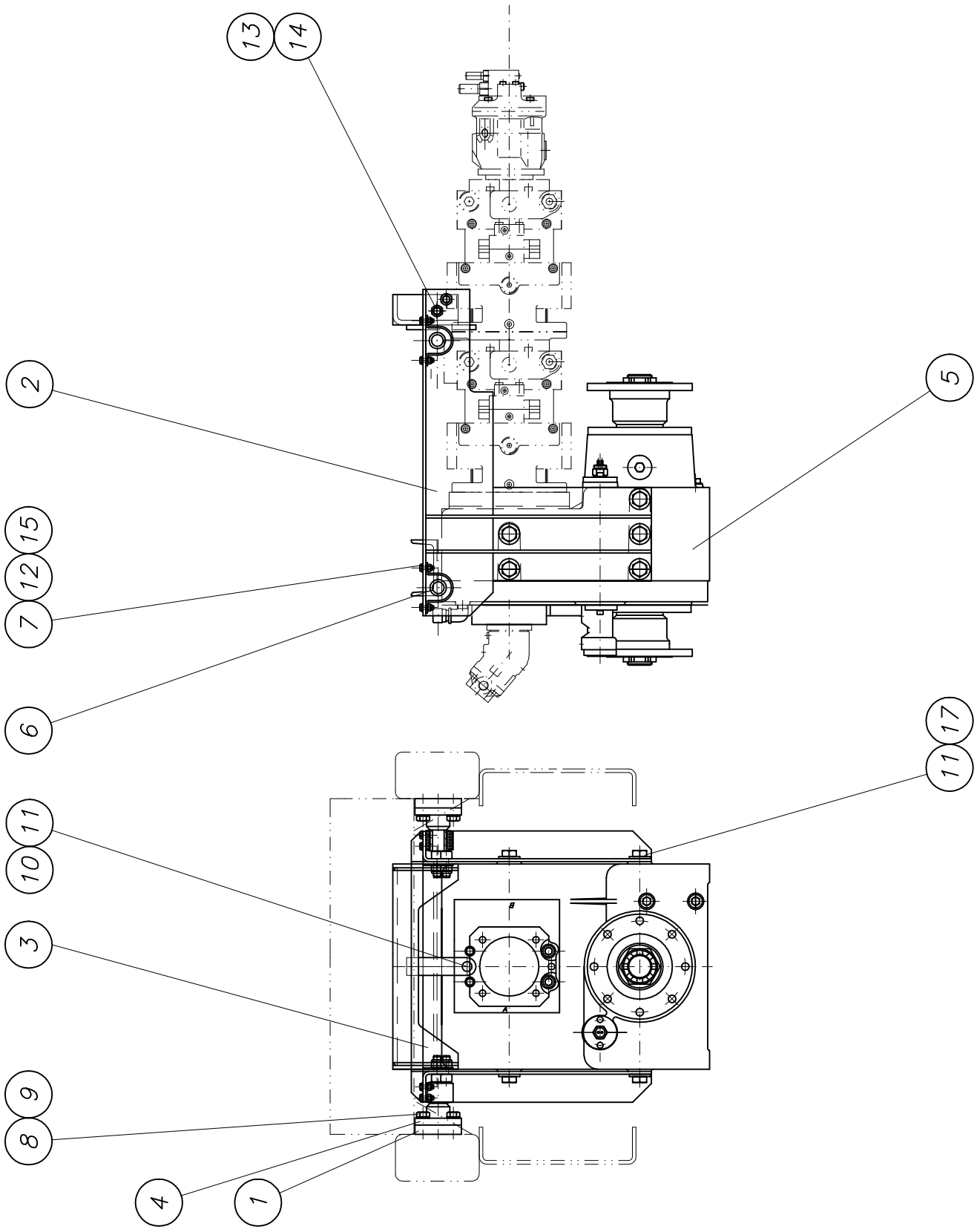


Verteilergetriebe kpl.

gear box cpl.

B 81 4 077a

Waitzinger
Baumaschinen GmbH



PARTS LIST

28.09.05 11:03:13

part list	description	created	index	valid from	valid to
B814077R1	distributor gear box 4496.xx	29.01.04 hbk			

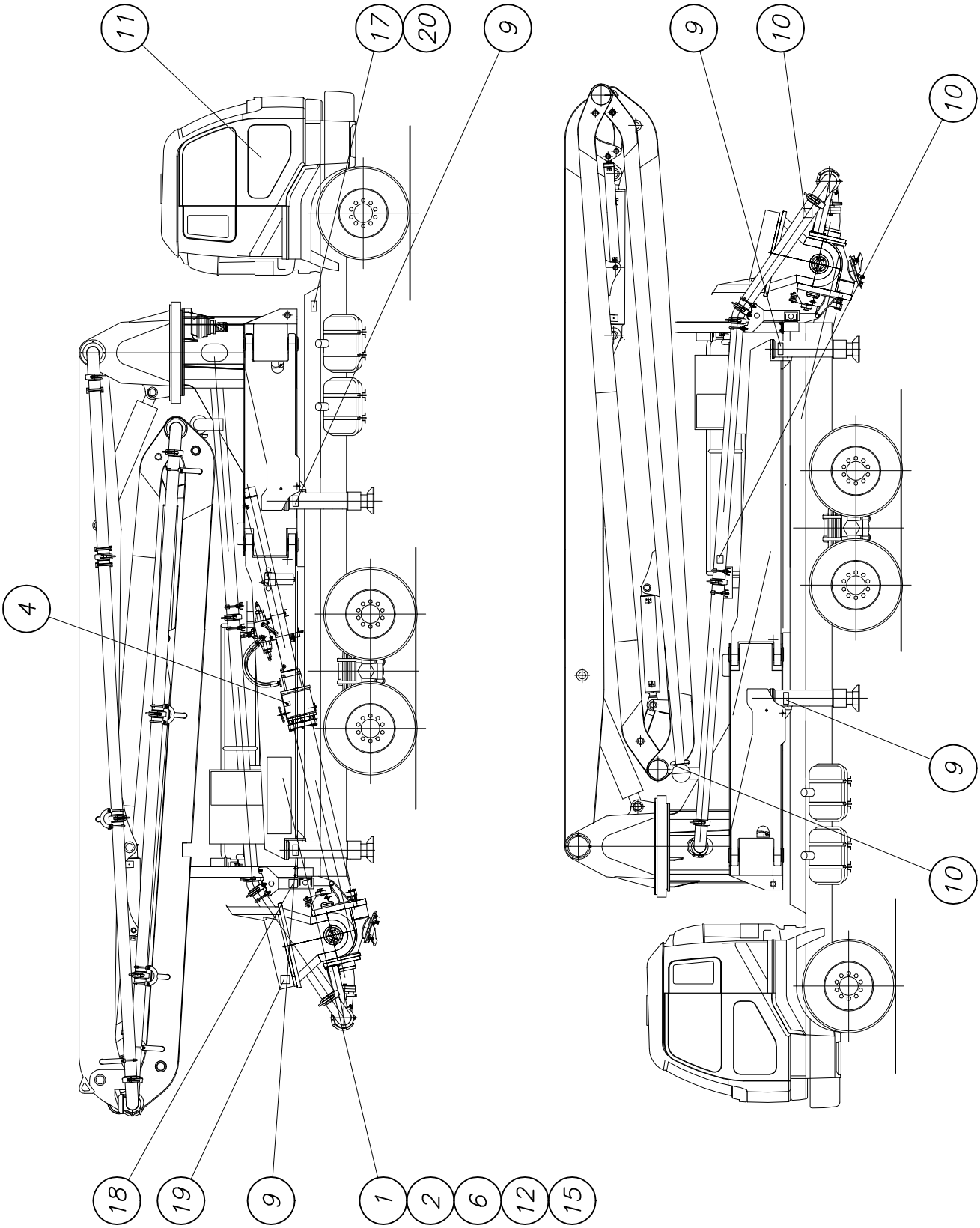
pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
5	PTO gearbox 4496. own parts list	WAI107139				1,00 Stk
6	buffer	WAI103414				4,00 Stk
7	hexagon bolt M8 x 25 DIN 933 8.8	WAI101621				16,00 Stk
11	hexagon bolt M 20 x 50	WAI102860				11,00 Stk
12	stop nut M8 DIN985 8. VERZ.	WAI102111			5,00	16,00 Stk
15	washer 8.4	WAI101625				16,00 Stk
17	conical spring washer	WAI102110			0,05	11,00 Stk
18	sealing ring 165 x 5	WAI102903				1,00 Stk
19	O-ring	WAI105771				1,00 Stk

Schildersatz Betonpumpe

sticker set concrete pump

B 92 1 004

Waitzinger
Baumaschinen GmbH



PARTS LIST

28.06.05 13:48:18

part list	description	created	index	valid from	valid to
B921004	sticker set CP english without boom	21.09.00 hbk			

pos	description stock	ident-no dimensions	DIN material	index	weigth Kg	quantity unit
1	sticker operation eng.	WAI105932				1,00 Stk
2	sticker electrocution hazard d/e	WAI105934				1,00 Stk
4	sticker danger of bruise d/e	WAI105936				1,00 Stk
6	sticker remote control d/e	WAI105938				1,00 Stk
7	sticker hopper d/e	WAI105939				1,00 Stk
9	sticker outrigger d/e	WAI105941				4,00 Stk
10	sticker coupling d/e	WAI105942				3,00 Stk
11	sticker gearbox switch system d/e	WAI105943				1,00 Stk
12	sticker person protection d/e	WAI105944				1,00 Stk
15	sticker electrocution hazard 2 d/e	WAI105974				1,00 Stk
17	identification badge	WAI106179				1,00 Stk
18	sign AL agitator	WAI106030				1,00 Stk
19	sign AL water pump	WAI106031				1,00 Stk
20	sign AL delivery line	WAI106032				1,00 Stk

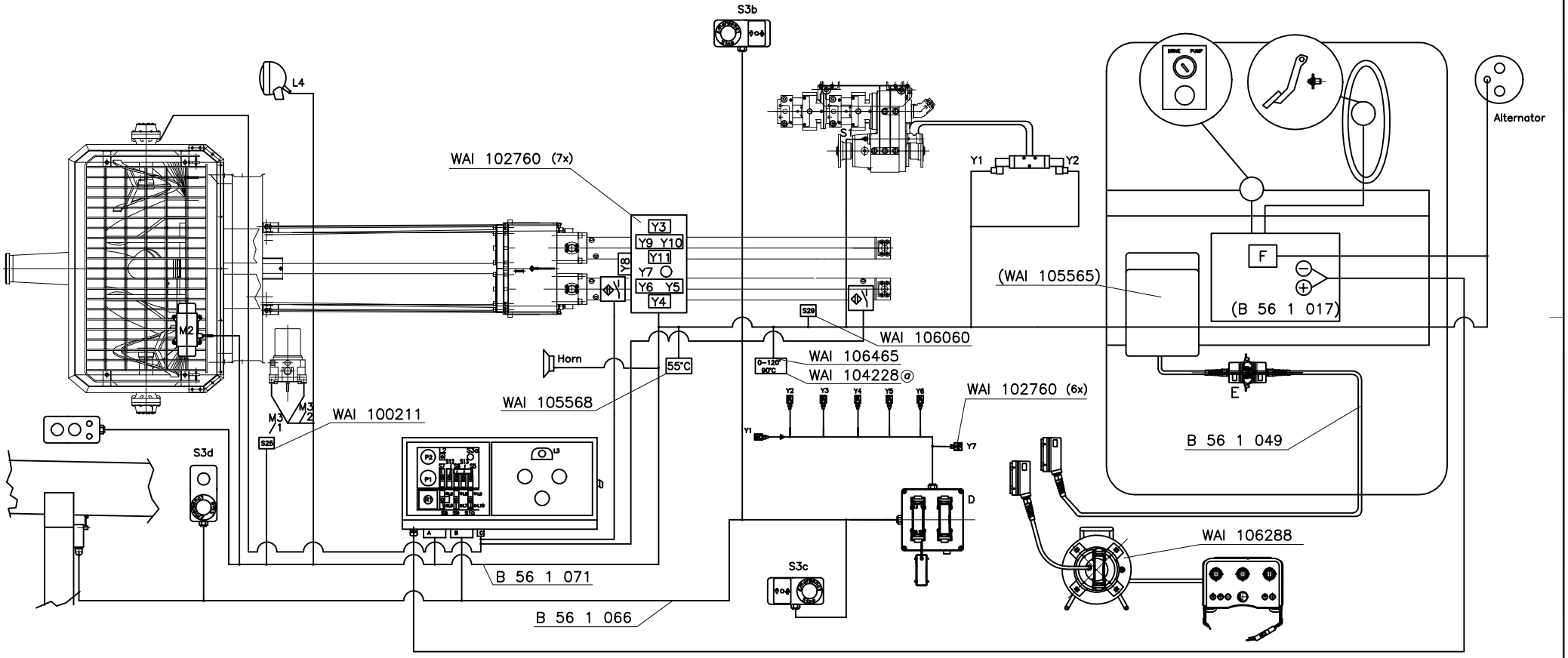
REED SCHEMATIC LIST-MODEL XXT37.4R

CONCRETE BOOM PUMP

CUSTOMER INFO:

M&M CONCRETE PUMPING
MODEL: XXT37.4R CONCRETE BOOM PUMP
REED-SN 07-260-XXT37.4R
BOOM-SN:205244

DRAWING No.
B 51 3 017
B 56 1 049
B 56 1 066
B 56 2 066
B 56 1 070
B 56 1 071



PLUG A

1	Y3+L4+M3/1+ Y4+Y7+FAN	brn
2	S1>F1	blk/whi
3	Y3−1	red/yel
4	temp. switch	yel/whi
5	L4	grn/whi
6	Y4−1	blu/whi
7	F3	blu
8	F2	blk
9	Horn	blk
10	Y5−1/hopper Y6/Y8/Y9	blk/grn
11	Y5− 2	blk/red
12	Y7	gry/red
13	Y8	whi/brn
14	Y9	vio
15	M2	blk
16	M2	blu
17	M3/1 −1	gry
18	M3/1−3	grn
19	M3/2 −2	yel
20	Y6	whi
21	temp switch	whi
22	temp switch	whi
23	Y10	grn
24	free	free
	F5	red
	F6	gry/blk

PLUG B

1	D10	brn	ground
2	S3b	gry	emergency stop
3	S3c	blk	emergency stop
4	D13	blu	emergency stop
5	D 22	gry/red	emergency stop
6	S3b−d	white	emergency stop
7	D 20	whi/grn	horn
8	D 15	grn	RPM +
9	D 16	blk/whi	RPM −
10	D 24	vio	Pot
11	D 17	blk/grn	pumping on
12	D 19	gry/blk	reverse
13	free	free	free
14	D 18	blu/whi	pumping
15	D 21	blk/red	flashing light
16	free	free	free

PLUG C

pin No.	wire No.	function
1	brown	+
2	blue	−
3	black	Sensor 1
4	black	Sensor 2
5		
6		
7		
8		

PLUG D

⏚	A 1	brn	ground
1	Y3/3	brn/whi	boom 1 up
2	Y3/2	blu	boom 1 down
3	Y4/3	grn/whi	boom 2 up
4	Y4/2	blk/grn	boom 2 down
5	Y5/3	gry/blk	boom 3 up
6	Y5/2	blk/whi	boom 3 down
7	Y6/3	blk/red	boom 4 up
8	Y6/2	gry/red	boom 4 down
9	free	free	free
10	⊣⊢	brn	ground
11	Y2/2	vio	turn clockwise
12	Y2/3	blu/whi	turn anticlockw.
13	B4	red	plus
14	Y1/2/3 Y7	gry	pilot valve
15	B 8	grn	RPM +
16	B 9	blk/whi	RPM −
17	B 11	blk/grn	pumping on
18	B 14	blu/whi	pumping
19	B 12	gry/blk	reverse
20	B 7	whi/grn	horn
21	B 15	blk/red	free
22	B 5	gry/red	emergency stop
23	Y7	brn/whi	free
24	B 10	vio	POT

PLUG E

pin No.	wire No.	function	pin No.	wire No.	function
1	1	power supply 12V	17	34	boom 4 up
2	3	emergency stop	18	31	boom 3 down
3	4	12 V+	19	32	boom 3 up
4	5	RPM−	20	29	turn clockwise
5	6	free	21	30	turn anticlockw.
6	8	horn	22	28	boom 1 down
7	11	RPM+	23	27	boom 1 up
8	13	pump on	24	39	boom 2 down
9	9	GND	25	40	boom 2 up
10	14	reverse	26	–	free
11	25	pilot valve	27	–	free
12	–	free	28	35	pump speed pot
13	–	free	29	–	free
14	–	free	30	–	free
15	–	free	31	–	free
16	33	boom 4 down	32	–	free

TERMINAL F

blk/whi	A2
whi	S1
grn	Y1
gry/whi	Y2
blu	A7
blk	A8
vio	Lima D
brn	⊖
red	reserve
gry/blk	reserve

Waitzinger Baumaschinen Vertrieb und Service GmbH

FREE DIMENSION TOLERANCE DIN 7168 MEDIUM

	DATE	NAME
DRAWN	2000/03/28	MI
CHKD.		
APPD.		

CHANGE ONLY WITH CAD

a siehe B_561070.doc 29.08.05 Kilmer

MODIFICATION | DATE | NAME

ORIGINAL

SCALE without | WEIGHT

own parts list

Cable harness / accessories REED V4

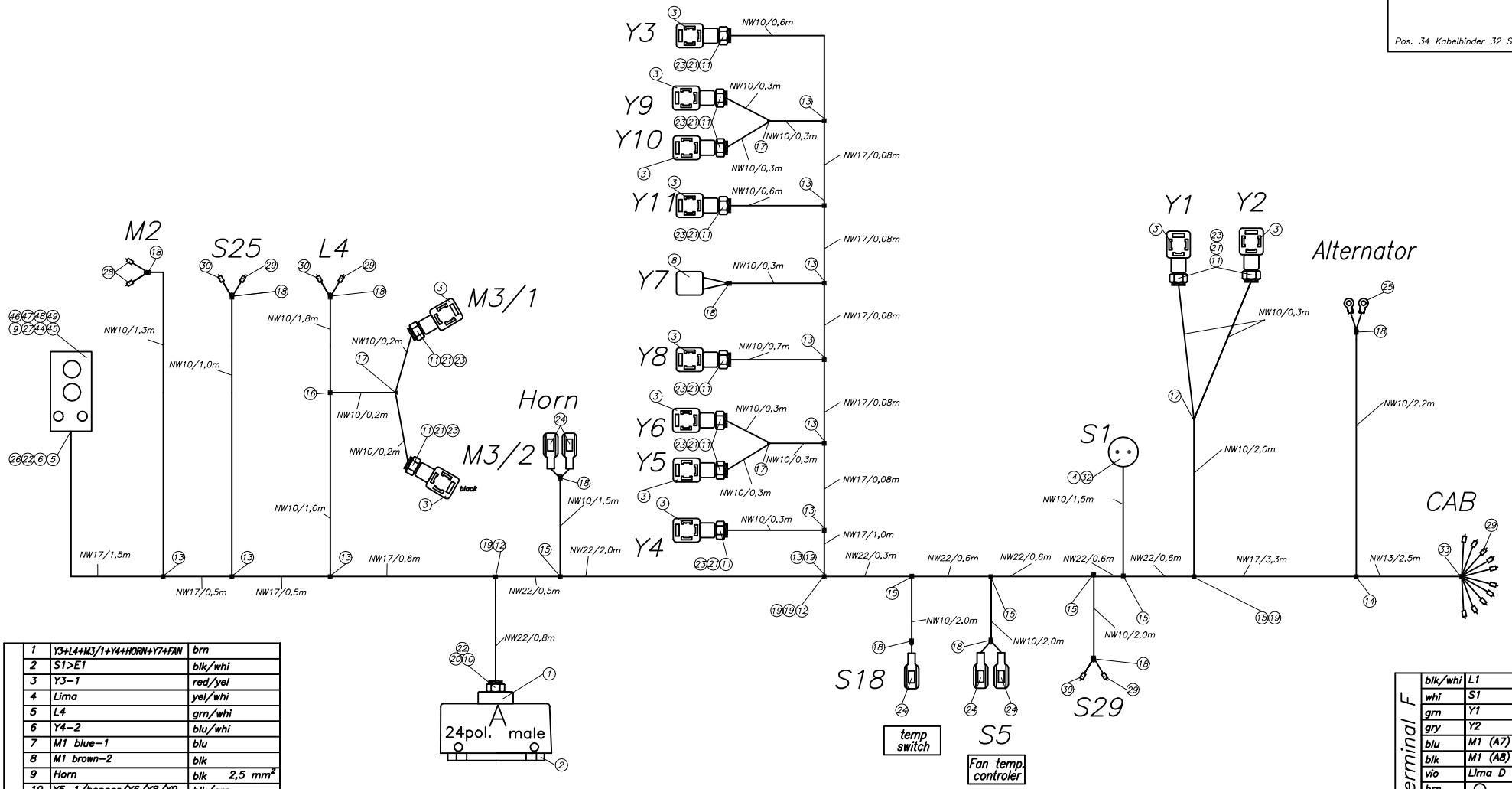
B 56 1 070

SHEET | OF

REPLACEMENT FOR | REPLACEMENT BY

Lose Teile:

Pos. 34 Kabelbinder 32 Stück



PLUG A			
	1	Y3+L4+M3/1+Y4+HORN+Y7+FAN	brn
	2	S1>E1	blk/whi
	3	Y3–1	red/yel
	4	Lima	yel/whi
	5	L4	grn/whi
	6	Y4–2	blu/whi
	7	M1 blue–1	blu
	8	M1 brown–2	blk
	9	Horn	blk 2,5 mm²
	10	Y5–1/hopper/Y6/Y8/Y9	blk/grn
	11	Y5–2	blk/red
	12	Y7	gry/red
	13	Y8	whi/brn
	14	Y9	vio
	15	M2	blk 2,5 mm²
	16	M2	blu 2,5 mm²
	17	M3/1 –1	gry
	18	M3/1–3	grn
	19	M3/2 –2	yel
	20	Y6	whi
	21		
	22		
	23	Fan	grn
	24	S5	yel/whi
		Res. F	red
		Res. F	gry/blk

Terminal F	
blk/whi	L1
whi	S1
grn	Y1
gry	Y2
blu	M1 (A7)
blk	M1 (A8)
vio	Lima D
brn	⊖
red	reserve
gry/blk	reserve

Waitzinger Baumaschinen Vertrieb und Service GmbH

free dimension tolerance DIN 7168 medium

issue	MODIFICATION	date	name

	date	name
drawn	1998/07/13	Mi
chkd.		
appd.		

change only with CAD

original

scale 1:1 weight 00 N

semi–finished product
Material

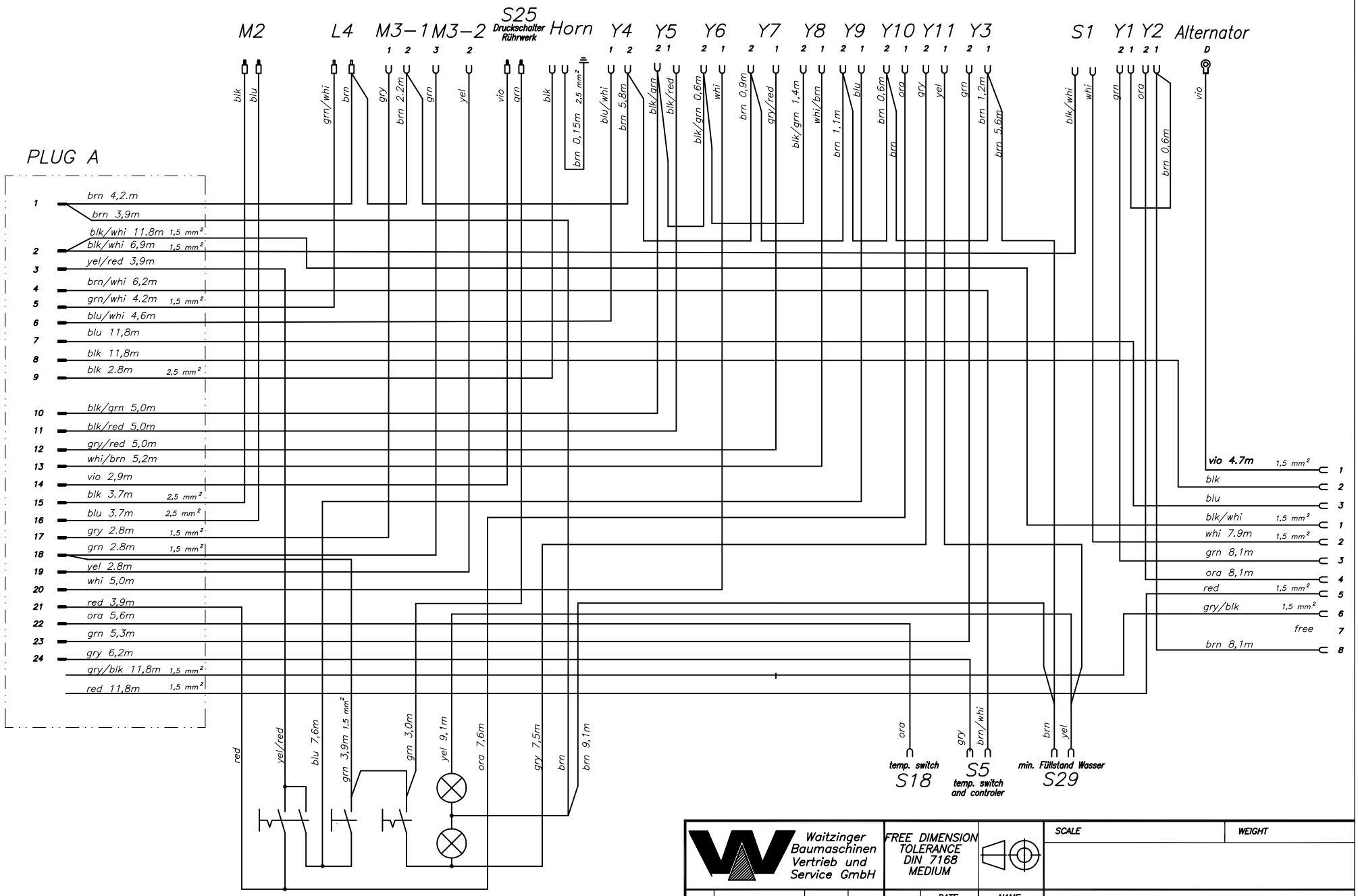
cable loop pump
REED cl 37m

B 56 1 071

sheet 1 of 2

replacement for

replacement by



Alle nicht bezeichneten Kabel sind 1mm²
Kabel um 10% länger als angegeben zuschneiden

ISSUE	MODIFICATION	DATE	NAME

Waitzinger Baumaschinen Vertrieb und Service GmbH

FREE DIMENSION TOLERANCE DIN 7168 MEDIUM

	DATE	NAME
DRAWN	1999/03/24	Fetzer
CHKD.		
APPD.		

CHANGE ONLY WITH CAD

ORIGINAL

SCALE | WEIGHT

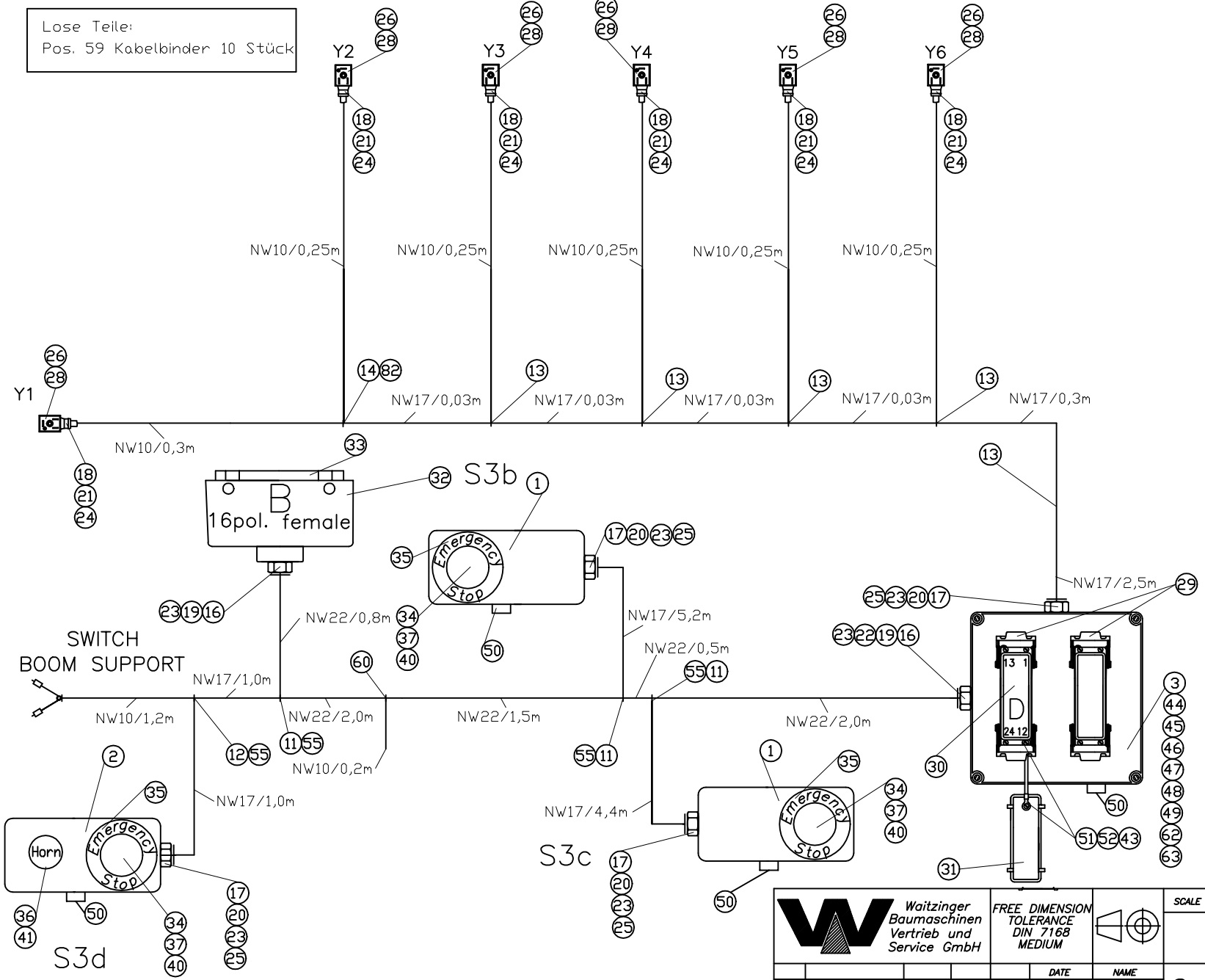
cable loop pump REED cl 37m

B 56 1 071

SHEET 2 OF 2

REPLACEMENT FOR | REPLACEMENT BY

Lose Teile:
Pos. 59 Kabelbinder 10 Stück



PLUG B

1	D10 ⊣⊪	brn	ground
2	S3d	gry/brn	emergency stop
3	S3c	blk	emergency stop
4	D13	blu	emergency stop
5	D 22	gry/red	emergency stop
6	S3d	whi	emergency stop
7	D 20	whi/grn	horn
8	D 15	grn	RPM +
9	D 16	blk/whi	RPM –
10	D 24	vio	Pot
11	D 17	blk/grn	pumping on
12	D 19	whi/gry	reverse
13	D 23	brn/whi	outrigger
14	D 18	blu/whi	pumping
15	D 21	blk/red	free
16			free

PLUG D

⏚	B 1	brn	ground
1	Y3/3	brn/whi	boom 1 up
2	Y3/2	blu	boom 1 down
3	Y4/3	grn/whi	boom 2 up
4	Y4/2	blk/grn	boom 2 down
5	Y5/3	gry/blk	boom 3 up
6	Y5/2	blk/whi	boom 3 down
7	Y6/3	blk/red	boom 4 up
8	Y6/2	gry/red	boom 4 down
9	free	free	free
10	⊣⊪	brn	ground
11	Y2/2	vio	turn clockwise
12	Y2/3	blu/whi	turn anticlockw.
13	B4	red	plus
14	Y1/3 Y1/2 Y7	gry	pilot valve
15	B 8	grn	RPM +
16	B 9	blk/whi	RPM –
17	B 11	blk/grn	pumping on
18	B 14	blu/whi	pumping
19	B 12	gry/blk	reverse
20	B 7	whi/grn	horn
21	B 15	blk/red	free
22	A 5	gry/red	emergency stop
23	B13	brn/whi	free
24	B 10	vio	POT

ISSUE	MODIFICATION	DATE	NAME
d	siehe B 561066.doc	02.06.05	Körner
c	siehe B 561066.doc	26.08.04	Körner
b	siehe B 561066.doc	03/09/19	Hoh.
a	siehe B 561066.oen	08/03/20	Mi

Waitzinger Baumaschinen Vertrieb und Service GmbH

FREE DIMENSION TOLERANCE DIN 7168 MEDIUM

	DATE	NAME
DRAWN	1998/10/05	Fetzer
CHKD.		
APPD.		

CHANGE ONLY WITH CAD

ORIGINAL

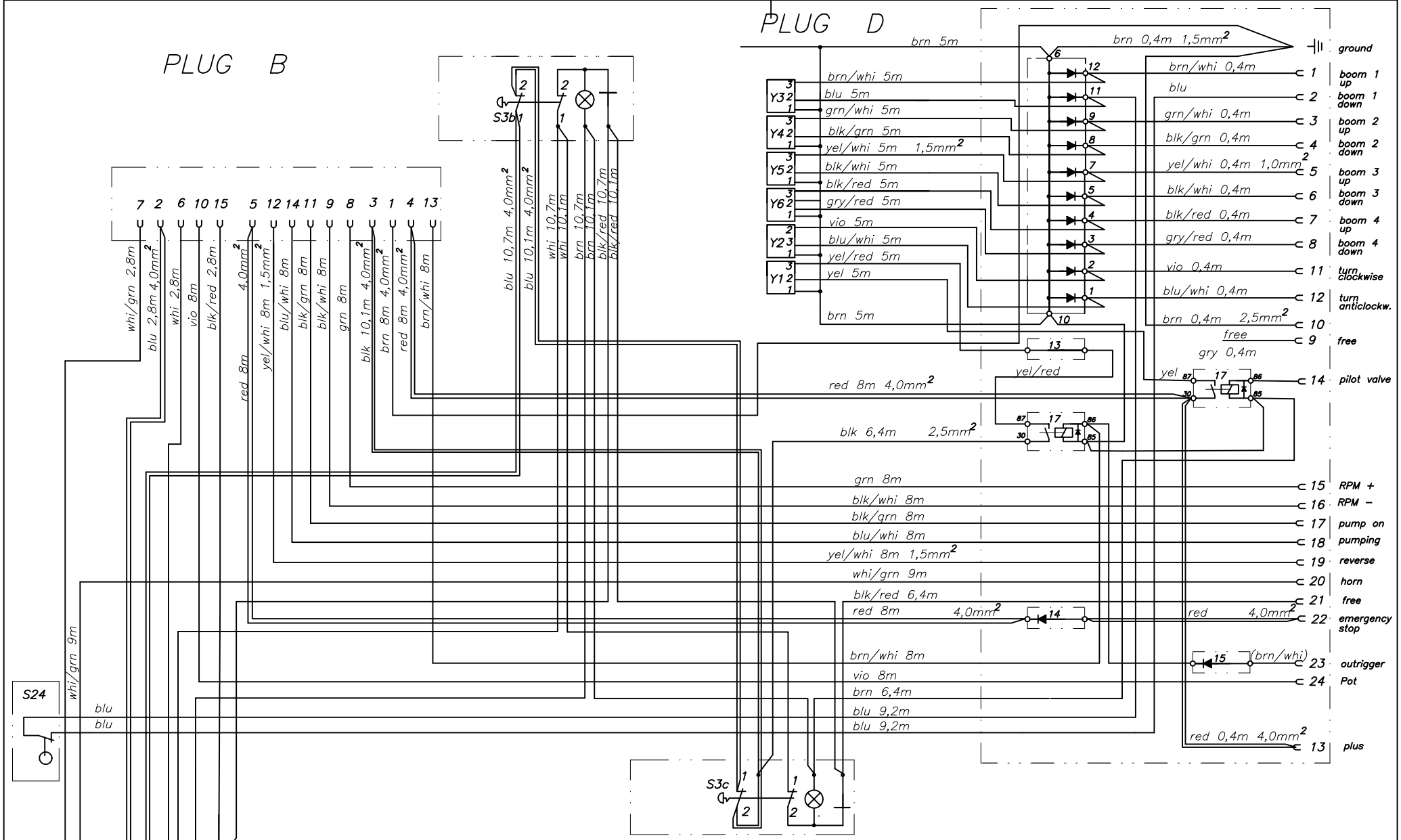
SCALE | WEIGHT

Cable harness boom
REED 37m

B 56 1 066

SHEET 1 OF 3

REPLACEMENT FOR | REPLACEMENT BY



all cables which are not dimensioned are 1 mm²

Waitzinger Baumaschinen Vertrieb und Service GmbH

FREE DIMENSION TOLERANCE DIN 7168 MEDIUM

	DATE	NAME
DRAWN	1998/10/05	Fetzer
CHKD.		
APPD.		

ISSUE	MODIFICATION	DATE	NAME
d	siehe B 561066.aen	02.06.05	Körner
c	siehe B 561066.aen	26.08.04	Körner
b	siehe B 561066.aen	03/09/19	Hoh.
a	siehe B 561066.aen	[illegible]	Mi

ORIGINAL

CHANGE ONLY WITH CAD

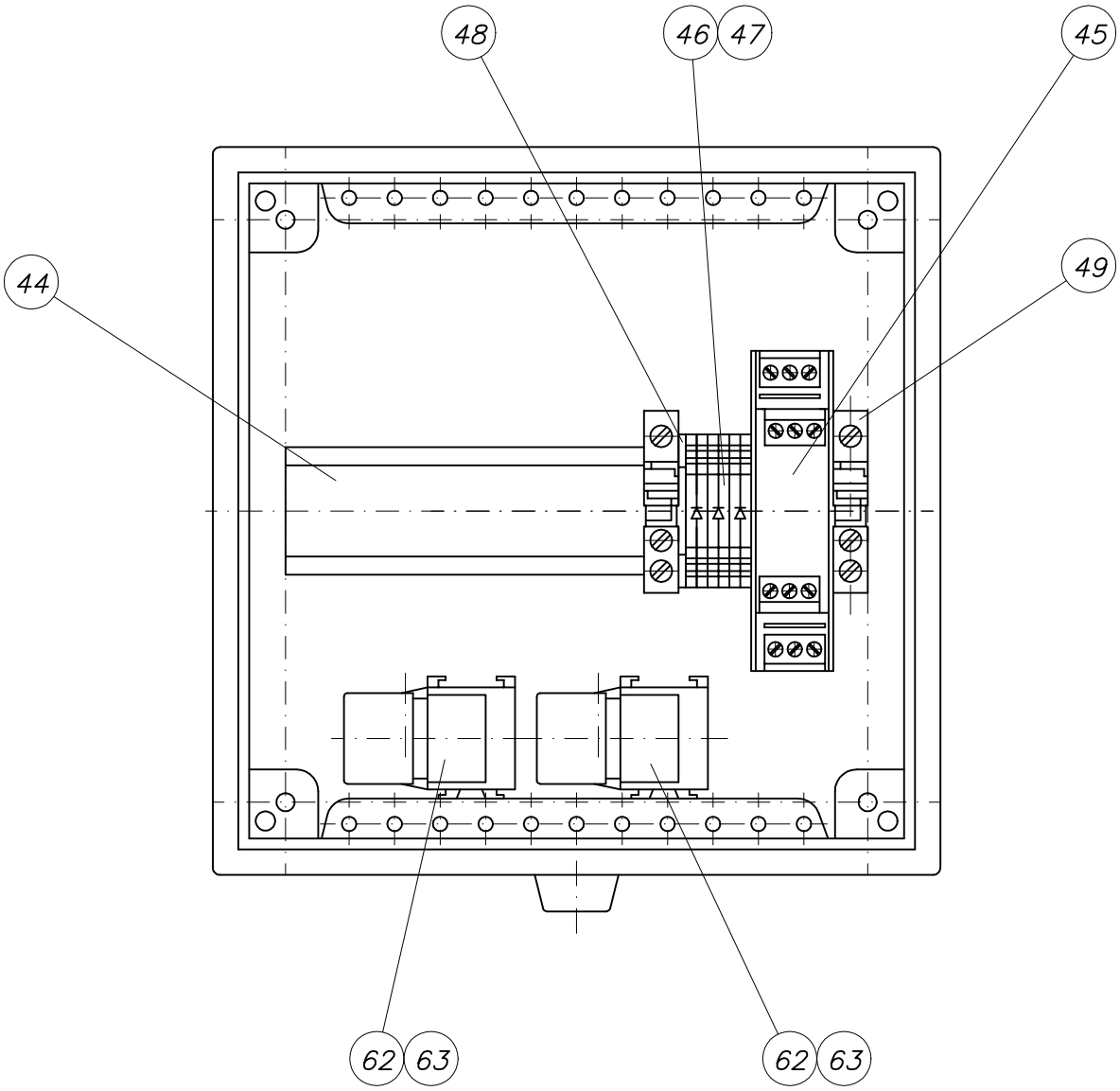
SCALE | WEIGHT

Cable harness boom REED 37m

B 56 1 066

SHEET 2 OF 3

REPLACEMENT FOR | REPLACEMENT BY



Waitzinger Baumaschinen Vertrieb und Service GmbH

FREE DIMENSION TOLERANCE DIN 7168 MEDIUM

	DATE	NAME
DRAWN	1998/10/05	Fetzer
CHKD.		
APPD.		

SCALE

WEIGHT

Cable harness boom REED V3

B 56 1 066

SHEET 3 OF 3

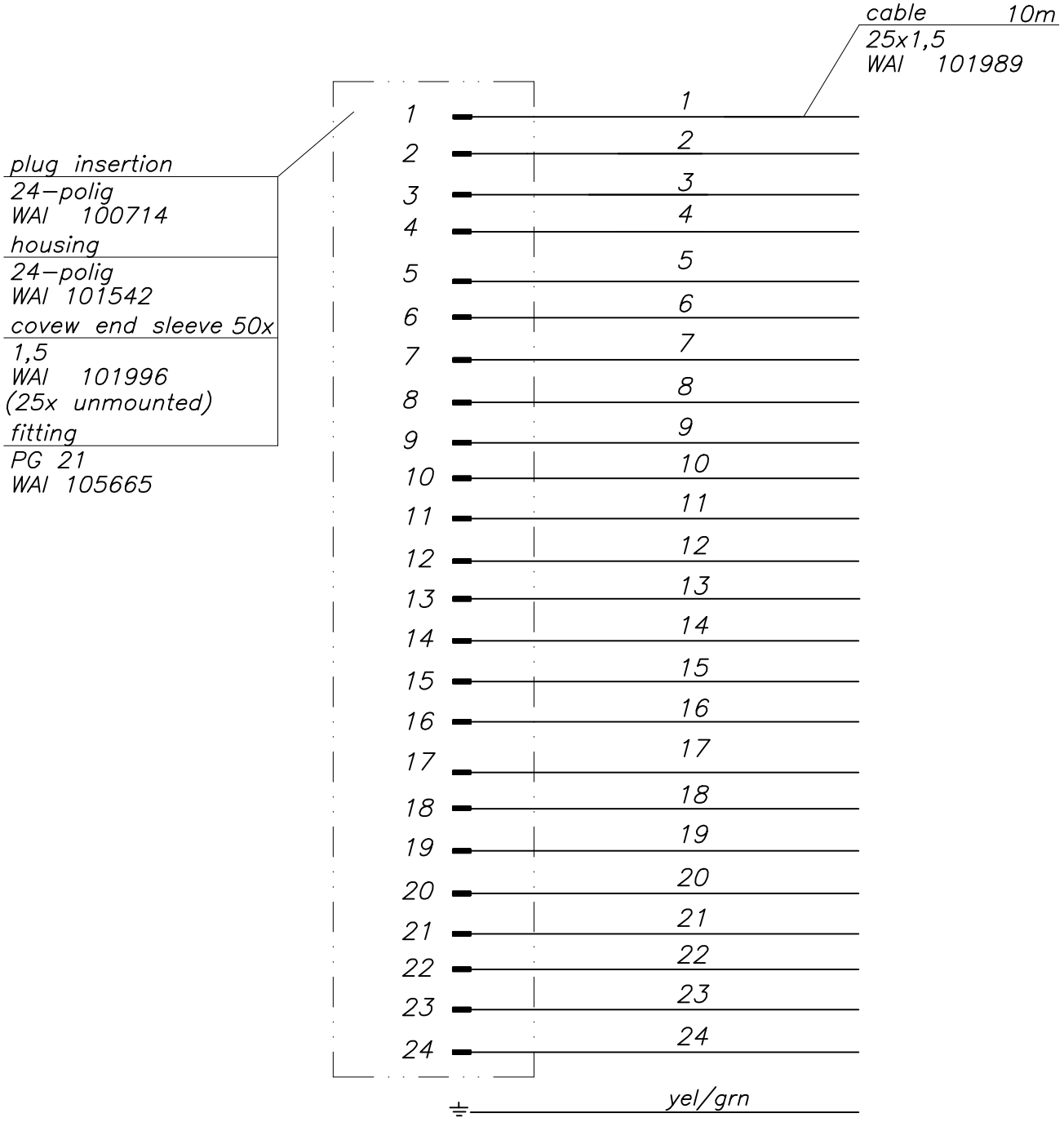
CHANGE ONLY WITH CAD

ISSUE	MODIFICATION	DATE	NAME
d	siehe B 561066.aen	05/06/02	Körner
c	siehe B 561066.aen	04/08/26	Körner
b	siehe B 561066.aen	03/09/19	Hoh.
a	siehe B 561066.aen	02/03/28	Mi

ORIGINAL

REPLACEMENT FOR

REPLACEMENT BY



Waitzinger Baumaschinen Vertrieb und Service GmbH

free dimension tolerance DIN 7168 medium

	date	name
drawn	1999/07/20	Mi
chekd.		
appd.		

scale | weight

own parts list

cable cpl. for cable control

change only with CAD

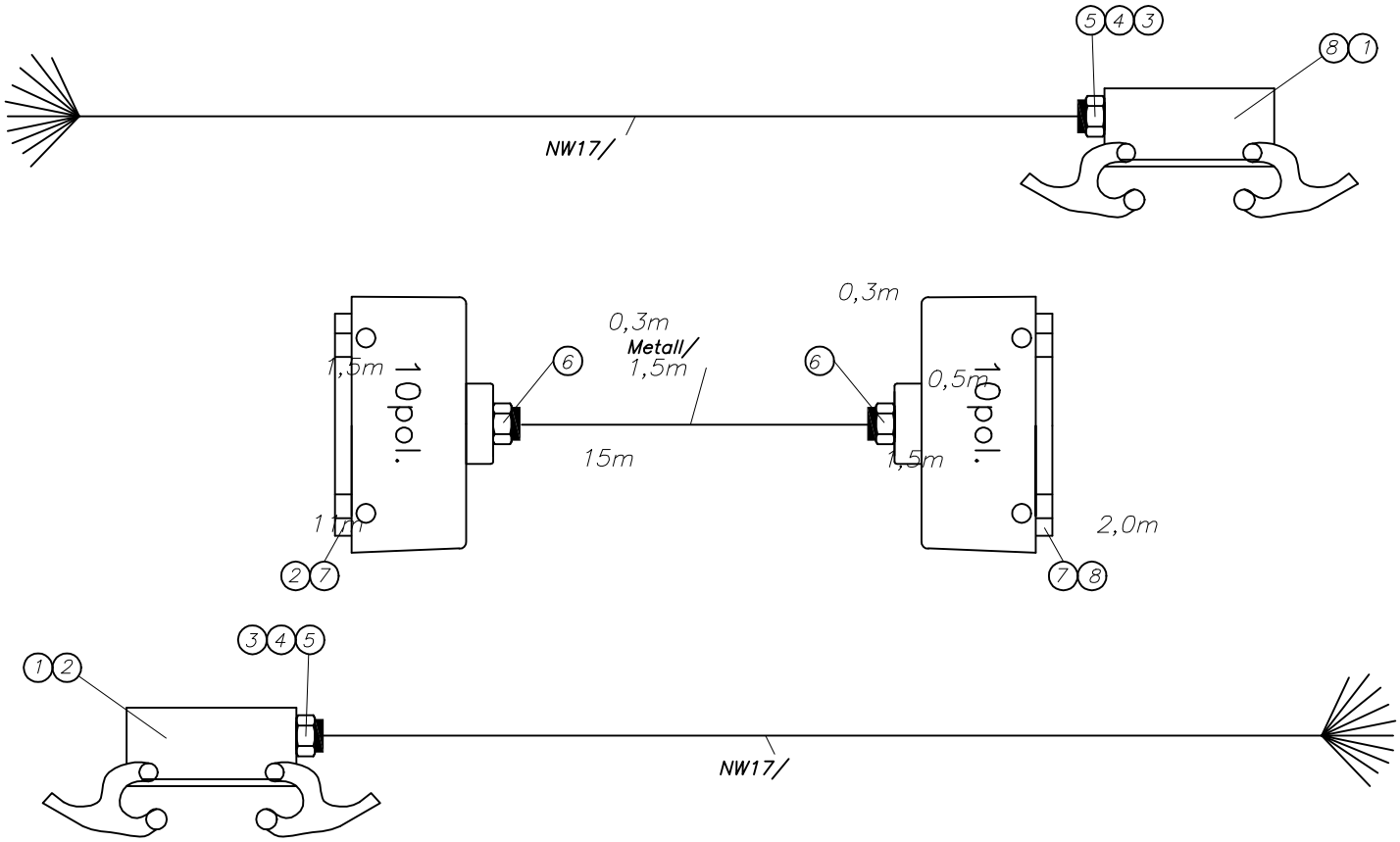
B 56 1 049

sheet

of

issue	modification	date	name

original | replacement for | replacement by



Waitzinger Baumaschinen Vertrieb und Service GmbH				Freimaßtoleranz DIN 7168 mittel		Maßstab	Gewicht
						eigene Stückliste	
					Datum / Name		
				Bearb.	06.09.2004 Körner	Kabelbaum Mast 37m REED	
				Gepr.			
				Norm			
				Änderung nur auf CAD		B 56 2 066	Blatt 2 von 2 Bl.
Zust.	Änderung	Datum	Name	Urspr.		Ers. für	Ers. durch

Drehkopf

Zust.	Änderung	Datum	Name

Waitzinger Baumaschinen Vertrieb und Service GmbH

Freimaßtoleranz DIN 7168 mittel

	Datum	Name
Bearb.	06.09.2004	Körner
Gepr.		
Norm		

Änderung nur auf CAD

Ursprung

Maßstab

Gewicht

eigene Stückliste

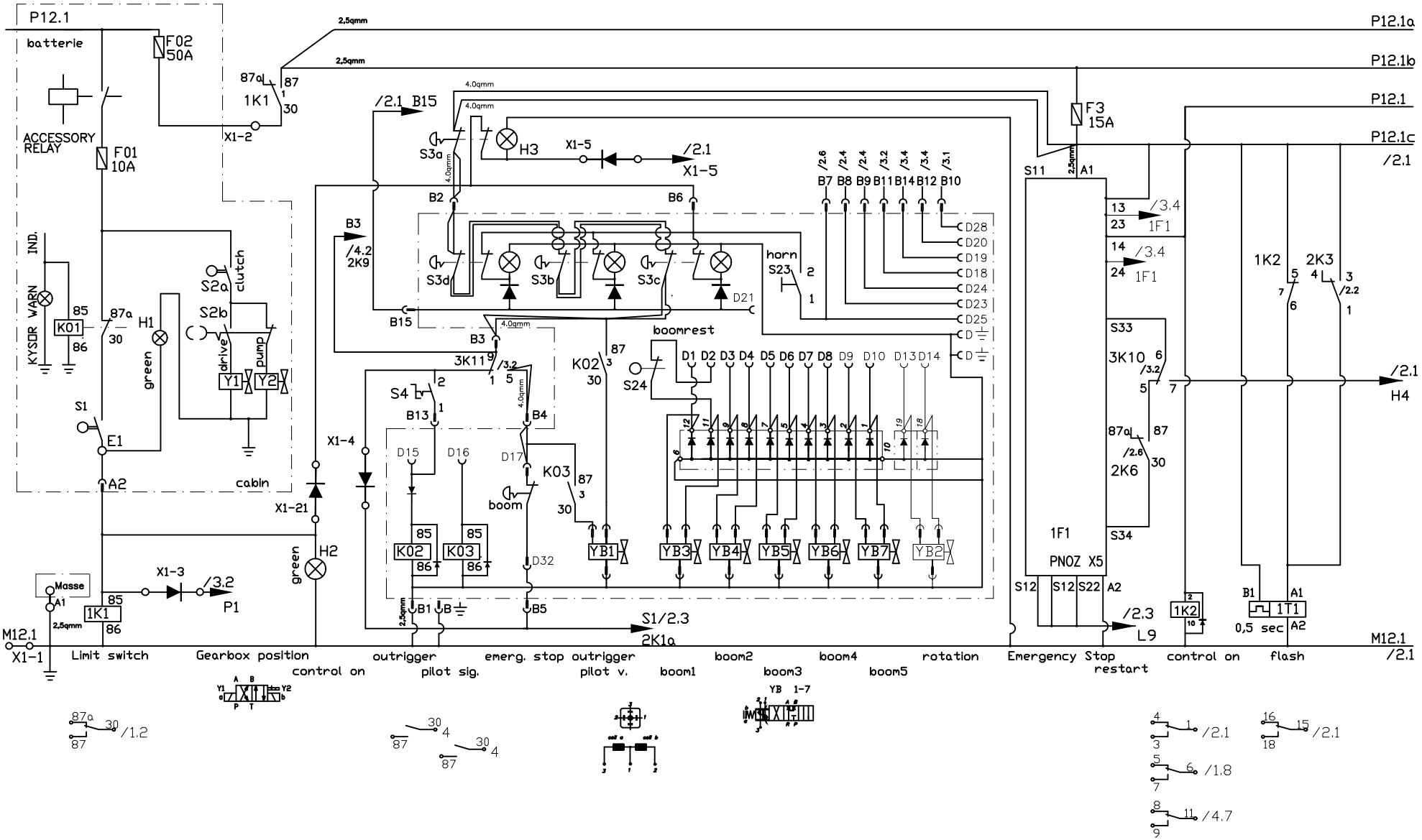
Kabelbaum Mast 37m REED

B 56 2 066

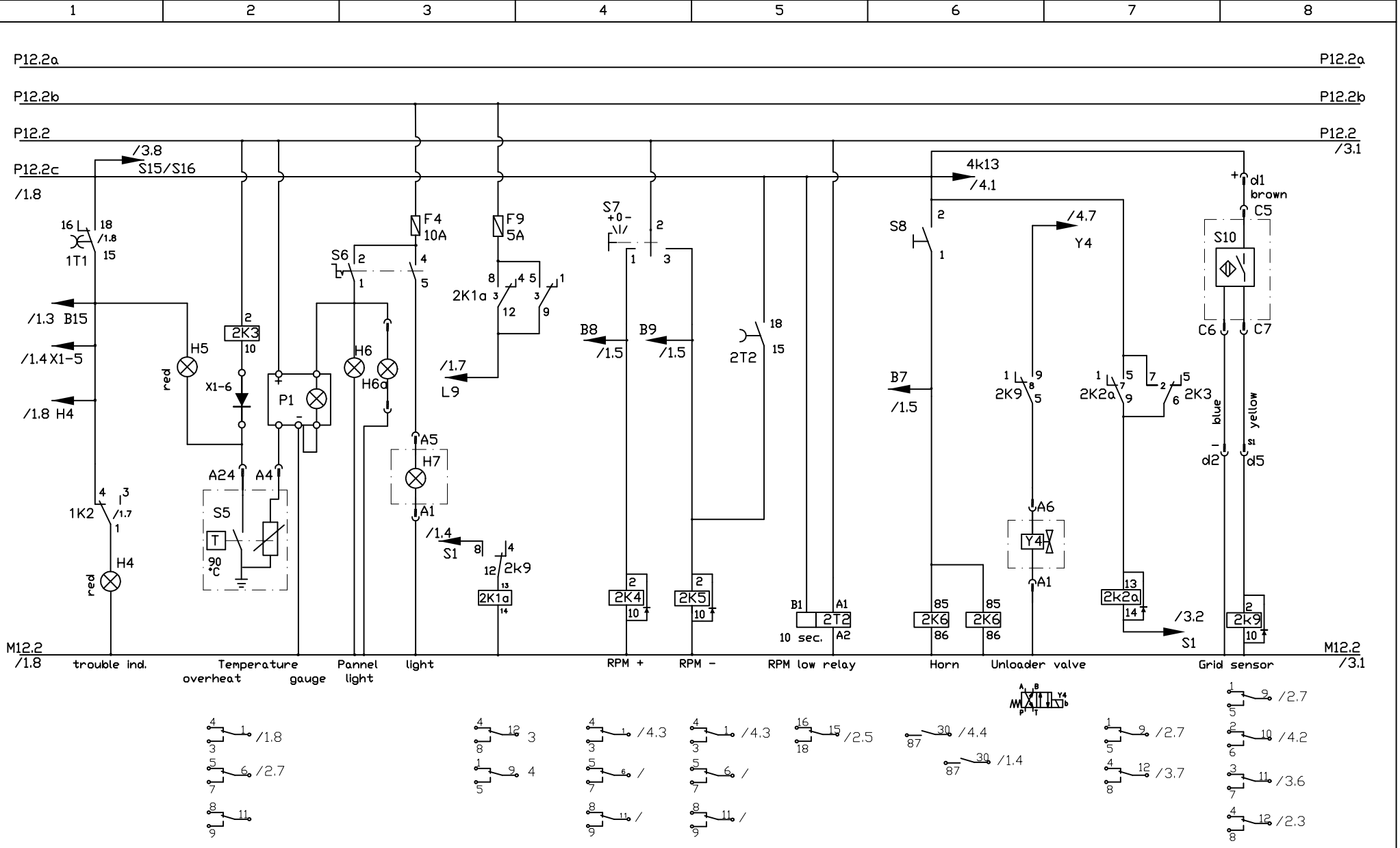
Blatt 1 von 2 Bl.

Ers. für

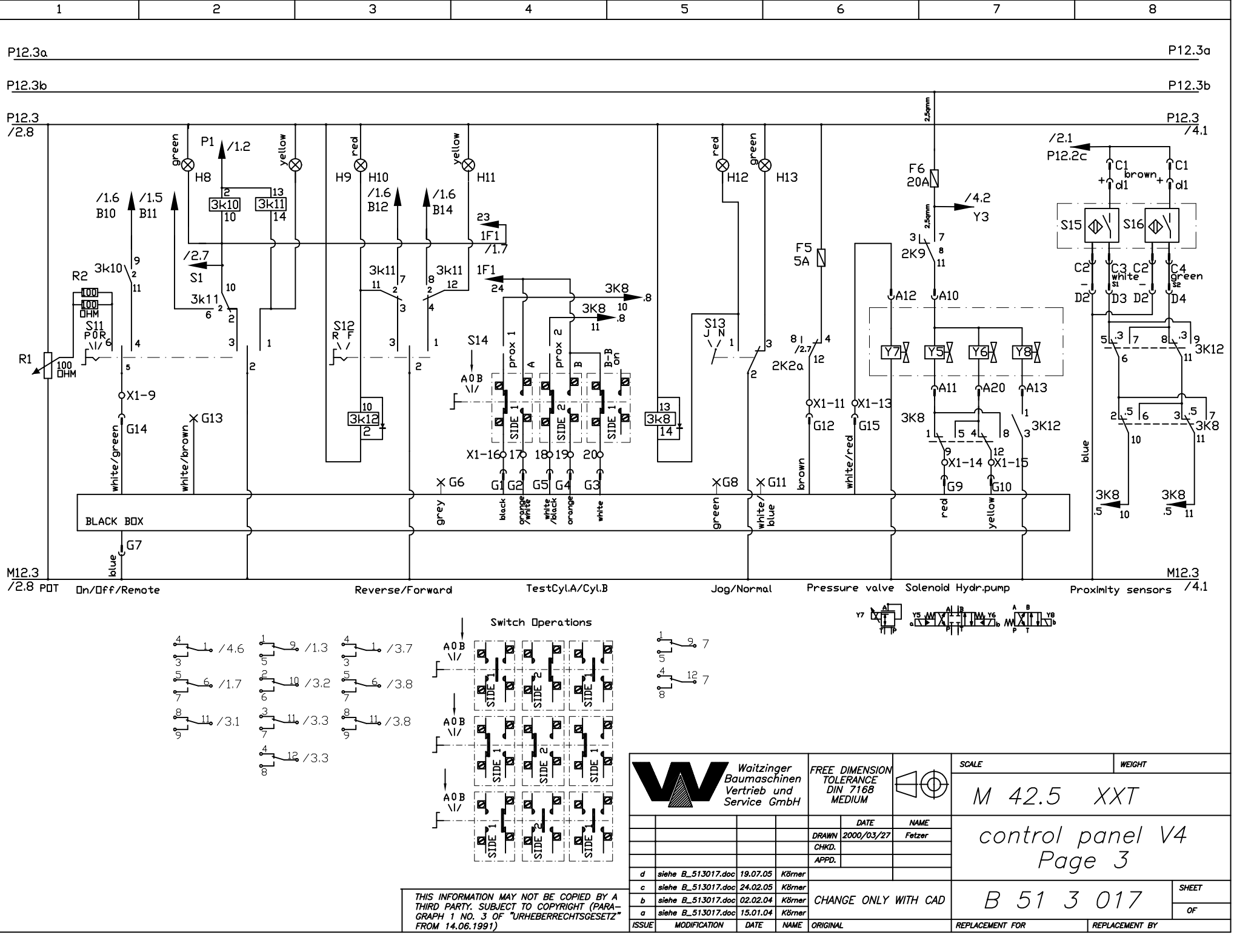
Ers. durch



Waitzinger Baumaschinen Vertrieb und Service GmbH				FREE DIMENSION TOLERANCE DIN 7168 MEDIUM			SCALE	WEIGHT
					DATE	NAME	M 42.5 XXT	
				DRAWN	2000/03/27	Fetzer	control panel V4 Page 1	
				CHKD.				
				APPD.				
d	siehe B_513017.doc	19.07.05	Körner					
c	siehe B_513017.doc	24.02.05	Körner					
b	siehe B_513017.doc	02.02.04	Körner	CHANGE ONLY WITH CAD			B 51 3 017	SHEET
a	siehe B_513017.doc	15.01.04	Körner					OF
ISSUE	MODIFICATION	DATE	NAME	ORIGINAL			REPLACEMENT FOR	REPLACEMENT BY



Waitzinger Baumaschinen Vertrieb und Service GmbH				FREE DIMENSION TOLERANCE DIN 7168 MEDIUM			SCALE / WEIGHT
					DATE	NAME	M 42.5 XXT
				DRAWN	2000/03/27	Fetzer	control panel V4 Page 2
				CHKD.			
				APPD.			
d	siehe B_513017.doc	19.07.05	Körner				
c	siehe B_513017.doc	24.02.05	Körner	CHANGE ONLY WITH CAD			B 51 3 017
b	siehe B_513017.doc	02.02.04	Körner				SHEET / OF
a	siehe B_513017.doc	15.01.04	Körner				
ISSUE	MODIFICATION	DATE	NAME	ORIGINAL			REPLACEMENT FOR / REPLACEMENT BY



1	2	3	4	5	6	7	8

Waitzinger Baumaschinen Vertrieb und Service GmbH

FREE DIMENSION TOLERANCE DIN 7168 MEDIUM

	DATE	NAME
DRAWN	2000/03/27	Fetzer
CHKD.		
APPD.		

ISSUE	MODIFICATION	DATE	NAME
d	siehe B_513017.doc	19.07.05	Körner
c	siehe B_513017.doc	24.02.05	Körner
b	siehe B_513017.doc	02.02.04	Körner
a	siehe B_513017.doc	15.01.04	Körner
ORIGINAL			

CHANGE ONLY WITH CAD

SCALE

WEIGHT

M 42.5 XXT

control panel V4
Page 3

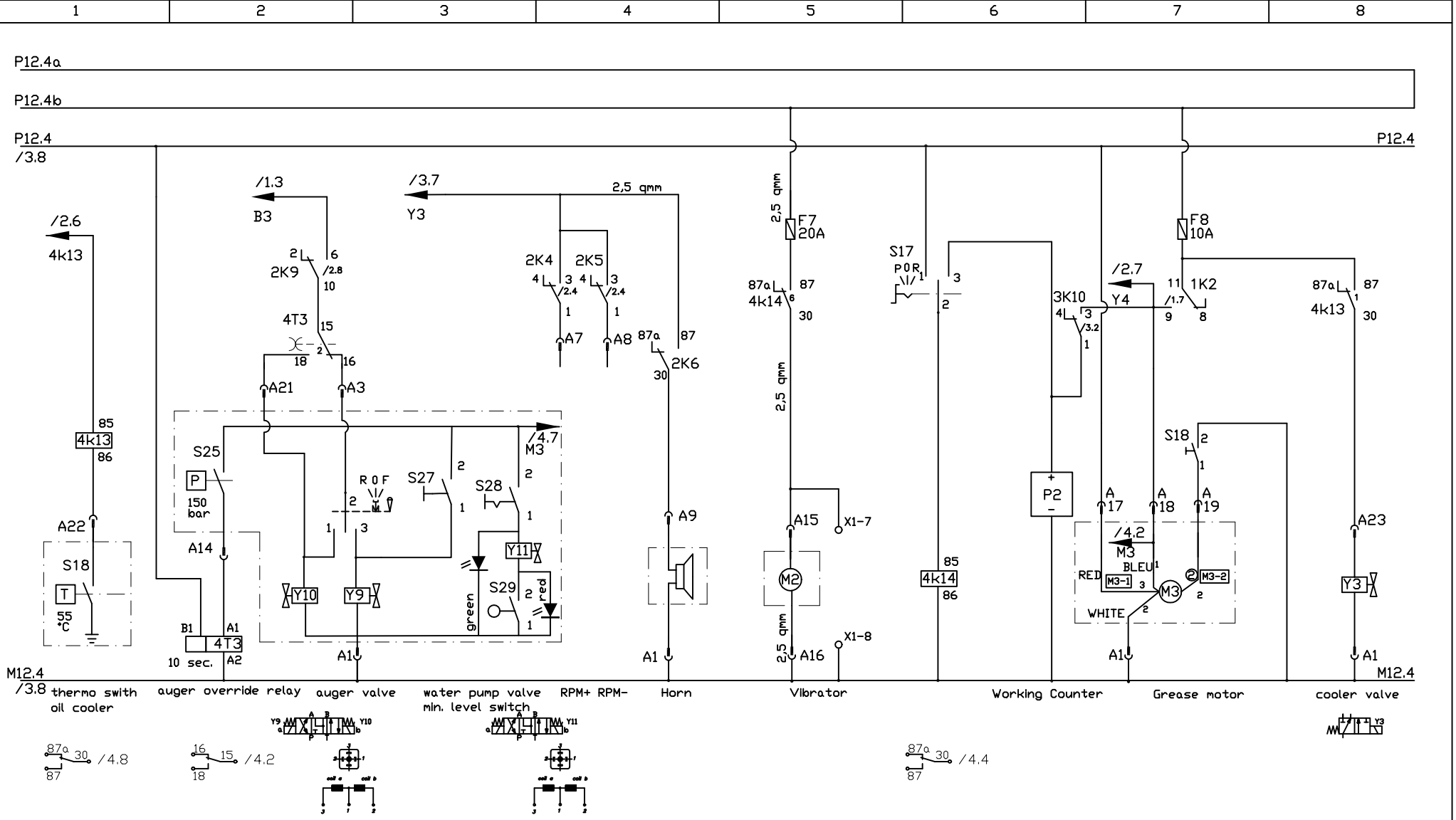
B 51 3 017

SHEET

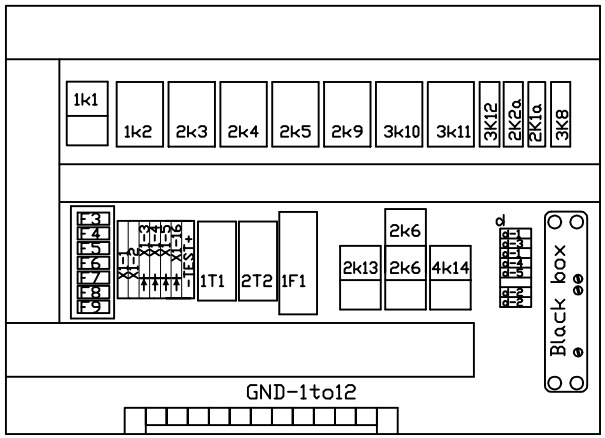
OF

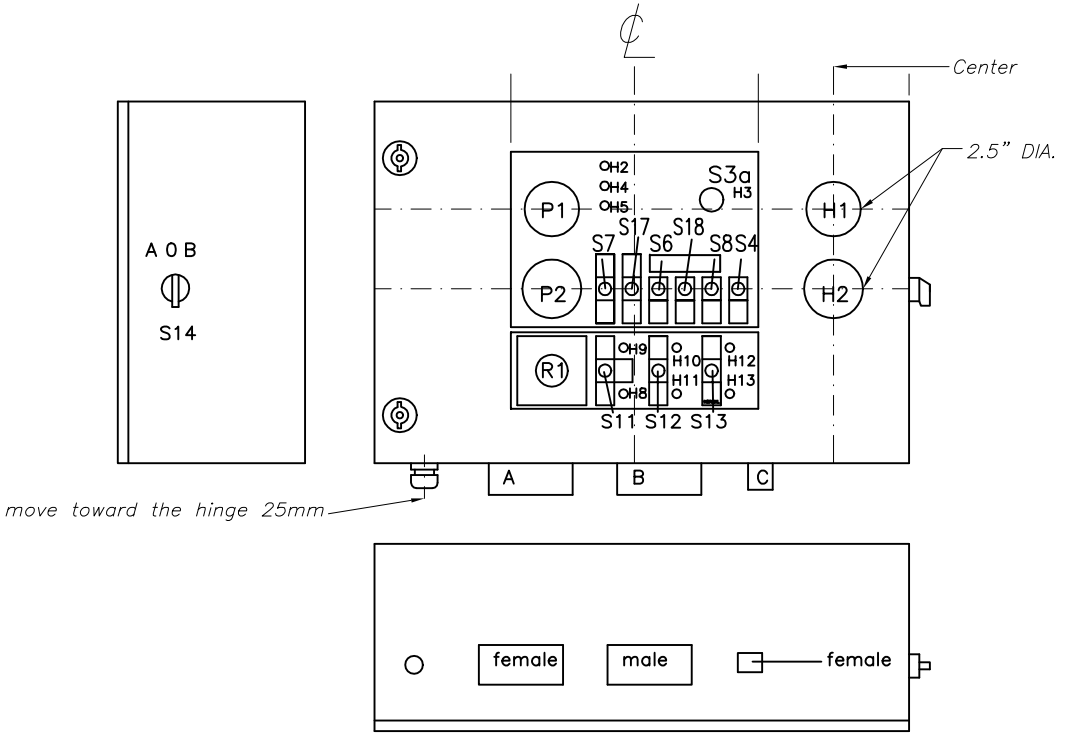
REPLACEMENT FOR

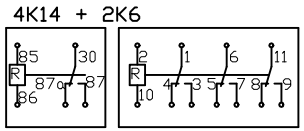
REPLACEMENT BY



Waitzinger Baumaschinen Vertrieb und Service GmbH				FREE DIMENSION TOLERANCE DIN 7168 MEDIUM			SCALE / WEIGHT
					DATE	NAME	M 42.5 XXT
				DRAWN	2000/03/27	Fetzer	control panel V4 Page 4
				CHKD.			
				APPD.			
d	siehe B_513017.doc	19.07.05	Körner				
c	siehe B_513017.doc	24.02.05	Körner	CHANGE ONLY WITH CAD			B 51 3 017
b	siehe B_513017.doc	02.02.04	Körner				SHEET / OF
a	siehe B_513017.doc	15.01.04	Körner				
ISSUE	MODIFICATION	DATE	NAME	ORIGINAL			REPLACEMENT FOR / REPLACEMENT BY







ISSUE	MODIFICATION	DATE	NAME
d	siehe B_513017.doc	19.07.05	Körner
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b	siehe B_513017.doc	02.02.04	Körner
a	siehe B_513017.doc	15.01.04	Körner

Waitzinger Baumaschinen Vertrieb und Service GmbH

FREE DIMENSION TOLERANCE DIN 7168 MEDIUM

CHANGE ONLY WITH CAD

ORIGINAL

	DATE	NAME
DRAWN	2000/03/27	Fetzer
CHKD.		
APPD.		

SCALE

WEIGHT

M 42.5 XXT

control panel V4
Page 5

B 51 3 017

SHEET

OF

REPLACEMENT FOR

REPLACEMENT BY

Waitzinger
Baumaschinen GmbH

Check book for REED Concrete pump

Concrete pump:

Type:	**Serial No.**
THP 150	**VL9220**

Placing boom:

Type:	**Serial No.**
37R4XXT	**REED-SN 07-260**

Truck:

Manufacturer

Type:	**Serial No.**

Record sheet for regular inspections by the competent inspection personnel

Instection report No.: ..... Date: .....

There are – are no – reasons why the machine should not continue to be operated.

Reinspection is – is not – required for .....

Conpetent inspector:

....

(Date, City) (Name)

.....

(Signature)

Instection report No.: ..... Date: .....

There are – are no – reasons why the machine should not continue to be operated.

Reinspection is – is not – required for .....

Conpetent inspector:

....

(Date, City) (Name)

.....

(Signature)

Instection report No.: ..... Date: .....

There are – are no – reasons why the machine should not continue to be operated.

Reinspection is – is not – required for .....

Conpetent inspector:

....

(Date, City) (Name)

.....

(Signature)

Record sheet for regular inspections by the competent inspection personnel

Instection report No.: ..... Date: .....

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Reinspection is – is not – required for .....

Conpetent inspector:

....

(Date, City) (Name)

.....

(Signature)

Instection report No.: ..... Date: .....

There are – are no – reasons why the machine should not continue to be operated.

Reinspection is – is not – required for .....

Conpetent inspector:

....

(Date, City) (Name)

.....

(Signature)

Instection report No.: ..... Date: .....

There are – are no – reasons why the machine should not continue to be operated.

Reinspection is – is not – required for .....

Conpetent inspector:

....

(Date, City) (Name)

.....

(Signature)

Record sheet for regular inspections by the competent inspection personnel

Instection report No.: ..... Date: .....

There are – are no – reasons why the machine should not continue to be operated.

Reinspection is – is not – required for .....

Conpetent inspector:

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(Date, City) (Name)

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There are – are no – reasons why the machine should not continue to be operated.

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Conpetent inspector:

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(Date, City) (Name)

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Conpetent inspector:

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(Date, City) (Name)

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(Signature)

Record sheet for regular inspections by the competent inspection personnel

Instection report No.: ..... Date: .....

There are – are no – reasons why the machine should not continue to be operated.

Reinspection is – is not – required for .....

Conpetent inspector:

....

(Date, City) (Name)

.....

(Signature)

Instection report No.: ..... Date: .....

There are – are no – reasons why the machine should not continue to be operated.

Reinspection is – is not – required for .....

Conpetent inspector:

....

(Date, City) (Name)

.....

(Signature)

Instection report No.: ..... Date: .....

There are – are no – reasons why the machine should not continue to be operated.

Reinspection is – is not – required for .....

Conpetent inspector:

....

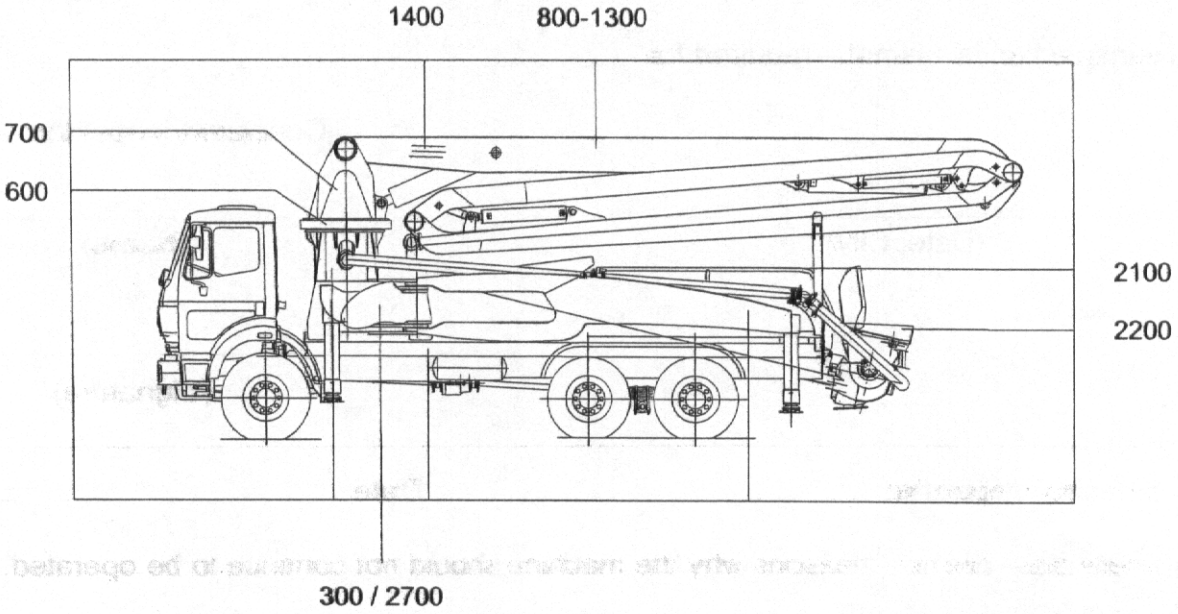
(Date, City) (Name)

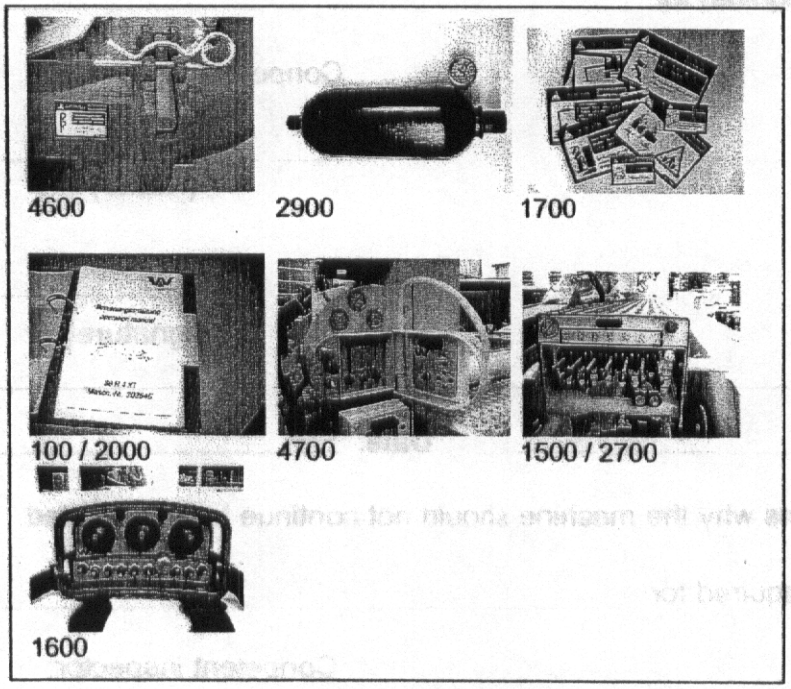
.....

(Signature)

assembly groupes - structuring

with description from the assemby groups and parts respectively





concrete boom:

100	documents
200	sub frame
300	outrigger front R+L
400	outrigger rear L+R
500	pedestal
	slewing head with ball pivot
700	slewing head with slewing column
800-1300	boom (joint A-E)
1400	concrete delivery line
1500	hydraulic system and hydraulic valves
1600	electric equipment
1700	sticker sets

concrete pump:

2000	documents
2100	drive assembly
2200	gear box
2300	hydraulic pump (main)
2400	oil-tank
2500	drive shaft
2600	fuel equipment
2700	hydraulic control system
2800	oil-cooler
2900	acccumulator
3000	central lubrication
3100	hydraulic motor
3200	hydraulic lines
3300	air compressor
3400	control panel
3500	concrete pump
3700	S-valve
3800	hopper
4000	vacuum pump aggregate
4100	sub frame
4200	water tank
4300	axle
4400	water pump
4500	vibrator
4600	safety guards, equipment
4700	elecrical system

Inspection report for concrete booms

Inspection report –Nr:	Machine-Nr	Hours of operation:	
		Concrete output m³:	
Company:	Post code:	City:	
Boom Type:	Boom Nr.	NL	WV

Proof – Result of the Tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date:.....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

100 documents

101 instruction manual ☐☐☐☐☐

102 spare parts list ☐☐☐☐☐

200 sub frame

201 frame connection cpl. ☐☐☐☐☐

300 outrigger front R+L

301 transportation safety device ☐☐☐☐☐

302 outrigger ☐☐☐☐☐

303 extension box ☐☐☐☐☐

304 locking device ☐☐☐☐☐

305 slewing bearing ☐☐☐☐☐

306 turn locking device ☐☐☐☐☐

307 support safeguard ☐☐☐☐☐

308 support plate ☐☐☐☐☐

309 fixing of jack cylinder ☐☐☐☐☐

310 jack cylinder ☐☐☐☐☐

311 swing cylinder ☐☐☐☐☐

312 telescopic-cylinder ☐☐☐☐☐

313 pressure adjustment ☐☐☐☐☐

400 outrigger rear L+R

401 transportation safety device ☐☐☐☐☐

402 outrigger ☐☐☐☐☐

403 extension box ☐☐☐☐☐

405 locking device ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

406 slewing bearing ☐☐☐☐☐

407 turn locking device ☐☐☐☐☐

408 support safeguard ☐☐☐☐☐

409 support plate ☐☐☐☐☐

410 fixing of jack cylinder ☐☐☐☐☐

411 jack cylinder ☐☐☐☐☐

412 swing cylinder ☐☐☐☐☐

413 telescopic cylinder ☐☐☐☐☐

500 pedestal

501 pedestal mounting ☐☐☐☐☐

502 sub frame ☐☐☐☐☐

503 truck frame ☐☐☐☐☐

504 pedestal (structure) ☐☐☐☐☐

505 boom valve without leaking ☐☐☐☐☐

506 boom rest ☐☐☐☐☐

507 transportation safety device ☐☐☐☐☐

508 hydraulic line ☐☐☐☐☐

600 slewing head with ball pivot

601 slewing head ☐☐☐☐☐

602 ball pivot ring ☐☐☐☐☐

603 mounting ball pivot ring ☐☐☐☐☐

604 drive pinion ☐☐☐☐☐

605 slewing drive mounting ☐☐☐☐☐

606 slewing stop device ☐☐☐☐☐

607 slewing drive (tooth backlash) ☐☐☐☐☐

608 slewing drive ☐☐☐☐☐

609 brake function ☐☐☐☐☐

610 speed ☐☐☐☐☐

611 pressure setting ☐☐☐☐☐

612 hydraulic lines ☐☐☐☐☐

700 slewing head with slewing column

701 slewing head ☐☐☐☐☐

702 slewing column bearing ☐☐☐☐☐

703 slewing drive (tooth backlash) ☐☐☐☐☐

704 speed ☐☐☐☐☐

705 pressure settings ☐☐☐☐☐

706 hydraulic lines ☐☐☐☐☐

707 swivel cylinder ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
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05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

800 boom
801 „Arm1“
802 bracket conveying line
803 Drop hook
804 „Arm 2“
805 bracket conveying line
806 Drop hook
807 „Arm 3“
808 bracket conveying line
809 guidance and interlock of the arm
810 „Arm 4“
811 bracket conveying line
812 guidance and interlock of the arm
813 „Arm 5“
814 bracket conveying line
815 guidance and interlock of the arm

900 joint „A“
901 boom
902 link lever
903 forcing rod
904 pin
905 cylinder
906 boom speed
907 pressure settings
908 hydraulic lines
909 load holding valve (piston side)
910 load holding valve (rod side)

1000 joint „B“
1001 boom
1002 link lever
1003 forcing rod
1004 pin
1005 cylinder
1006 boom speed
1007 pressure settings
1008 hydraulic lines
1009 load holding valve (piston side)
1010 load holding valve (rod side)

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
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03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1100 joint "C"

1101 boom	☐	☐	☐	☐	☐
1102 link lever	☐	☐	☐	☐	☐
1103 forcing rod	☐	☐	☐	☐	☐
1104 pin	☐	☐	☐	☐	☐
1105 cylinder	☐	☐	☐	☐	☐
1106 boom speed	☐	☐	☐	☐	☐
1107 pressure settings	☐	☐	☐	☐	☐
1108 hydraulic lines	☐	☐	☐	☐	☐
1109 load holding valve (piston side)	☐	☐	☐	☐	☐
1110 load hokding valve (rod side)	☐	☐	☐	☐	☐

1200 joint "D"

1201 boom	☐	☐	☐	☐	☐
1202 link lever	☐	☐	☐	☐	☐
1203 forcing rod	☐	☐	☐	☐	☐
1204 pin	☐	☐	☐	☐	☐
1205 cylinder	☐	☐	☐	☐	☐
1206 boom speed	☐	☐	☐	☐	☐
1207 pressure settings	☐	☐	☐	☐	☐
1208 hydraulic lines	☐	☐	☐	☐	☐
1209 load holding valve (piston side)	☐	☐	☐	☐	☐
1210 load holding valve (rod side)	☐	☐	☐	☐	☐

1300 joint „E"

1301 boom	☐	☐	☐	☐	☐
1302 link lever	☐	☐	☐	☐	☐
1303 forcing rod	☐	☐	☐	☐	☐
1304 pin	☐	☐	☐	☐	☐
1305 cylinder	☐	☐	☐	☐	☐
1306 boom speed	☐	☐	☐	☐	☐
1307 pressure settings	☐	☐	☐	☐	☐
1308 hydraulic lines	☐	☐	☐	☐	☐
1309 load holding valve (piston side)	☐	☐	☐	☐	☐
1310 load holding valve (rod side)	☐	☐	☐	☐	☐

1400 concrete delivery line

1401 assembly of delivery line DN	☐	☐	☐	☐	☐
1402 end hose DN+lenght	☐	☐	☐	☐	☐
1403 delivery line DN	☐	☐	☐	☐	☐
1404 rotating joints of - delivery line	☐	☐	☐	☐	☐
1405 locking pin of the coupling	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1406 end hose safety device ☐☐☐☐☐

1407 reducer ☐☐☐☐☐

1408 gate elbow, elbow 6" ☐☐☐☐☐

1500 hydraulic system and hydraulic valves

1501 Pressure relief valve ☐☐☐☐☐

1502 pressure settings ☐☐☐☐☐

1503 hydraulic lines ☐☐☐☐☐

1504 hand oprerating-(function) ☐☐☐☐☐

1505 boom control valve ☐☐☐☐☐

1506 hydraulic pump ☐☐☐☐☐

1600 electric equipment

1601 remote control (functions) ☐☐☐☐☐

1602 emergency stop (function) ☐☐☐☐☐

1603 switch for outrigger function ☐☐☐☐☐

1604 switch for boom function ☐☐☐☐☐

1605 wiring harness ☐☐☐☐☐

1606 central lubrication ☐☐☐☐☐

1700 sticker sets

1701 safety hints ☐☐☐☐☐

1702 description ☐☐☐☐☐

1703 operating ☐☐☐☐☐

1704 short operating instruction ☐☐☐☐☐

1705 sticker „ don't use the boom as crane" ☐☐☐☐☐

1706 sticker „guideline operating with boom- and concrete pump" ☐☐☐☐☐

1707 name plate ☐☐☐☐☐

1708 sticker „danger high voltage" ☐☐☐☐☐

Competent inspector:

Date: _____

Name: _____

Signature: _____
(stamp)

Customer:

Signature: _____
(stamp)

Inspection report for concrete pump

Inspection report Nr:	Machine-Nr:	Hours of operation:
		Concrete output m³:
Company:	Post code:	City:

NL	WV

Proof – Result of the tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date: .....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
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04 no fuction	12 bendet	20 sawing	28 missing components
05 low livetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

2000 documents	**2700 hydraulic control system**
2001 operating manual ☐☐☐☐☐	2701 pressure relief valve ☐☐☐☐☐
2002 spare parts list ☐☐☐☐☐	2702 pressure setting ☐☐☐☐☐
2100 drive assembly	2703 hydraulic line ☐☐☐☐☐
2101 coupling and flange ☐☐☐☐☐	2704 mechanical operation by hand ☐☐☐☐☐
2200 gear box ☐☐☐☐☐	**2800 oil –cooler** ☐☐☐☐☐
2300 hydraulic pump (main) ☐☐☐☐☐	**2900 accumulator** ☐☐☐☐☐
2400 oil-tank ☐☐☐☐☐	2901 proofs of the required tests according to accumulator regulation ☐☐☐☐☐
2500 drive shaft ☐☐☐☐☐	2902 pressure gauge ☐☐☐☐☐
	Notes:

Inspection report for concrete pump

Inspection report Nr:

Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
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06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

3000 central lubrication	☐	☐	☐	☐	☐	
3100 hydraulic motor	☐	☐	☐	☐	☐	
3200 hydraulic lines	☐	☐	☐	☐	☐	
3300 air compressor	☐	☐	☐	☐	☐	
3400 control panel	☐	☐	☐	☐	☐	
3500 concrete pump	☐	☐	☐	☐	☐	
3700 S-valve	☐	☐	☐	☐	☐	
3800 hopper	☐	☐	☐	☐	☐	
4100 sub frame	☐	☐	☐	☐	☐	
4200 water tank	☐	☐	☐	☐	☐	
4300 axle	☐	☐	☐	☐	☐	
4400 water pump	☐	☐	☐	☐	☐	
4500 vibrator	☐	☐	☐	☐	☐	

4600 safety guards, equipment					
4601 stair	☐	☐	☐	☐	☐
4602 safety for stair	☐	☐	☐	☐	☐
4603 handrail	☐	☐	☐	☐	☐
4604 hopper grid (fixing device)	☐	☐	☐	☐	☐
4606 distance of grid rods	☐	☐	☐	☐	☐
4607 distance from grid to agitator	☐	☐	☐	☐	☐
4609 agitator have to stop if grid is open	☐	☐	☐	☐	☐
4610 accumulator have to dump if grid is open	☐	☐	☐	☐	☐
4612 cleaning flap hopper	☐	☐	☐	☐	☐
4613 safety grid into water box	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete pump

Inspection report Nr: | Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
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06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

4614 cover for rotating wave ☐☐☐☐☐

4616 cover for chains ☐☐☐☐☐

4617 cover for shift cylinder ☐☐☐☐☐

4618 cover for moving parts ☐☐☐☐☐

4619 cover for the exhaust pipe ☐☐☐☐☐

4700 electrical system

4701 function of actuator component ☐☐☐☐☐

4702 emergency stop function ☐☐☐☐☐

4703 ground connections ☐☐☐☐☐

4704 cables and wiring harness ☐☐☐☐☐

4705 temperature switch ☐☐☐☐☐

4800 outtrigger - system

4801 transportation lock ☐☐☐☐☐

4802 locking device ☐☐☐☐☐

4803 backing plate ☐☐☐☐☐

4804 jack cylinder connections ☐☐☐☐☐

4805 pressure adjustment of jack cylinder ☐☐☐☐☐

4900 miscellaneous

4901 additional assembled part from operator ☐☐☐☐☐

4902 changes through operator ☐☐☐☐☐

Competent inspector:

Date: .....

Name: .....

Signature: .....
(stamp)

Customer:

Signature: .....
(stamp)

This test report is filed into the test book

Inspection report for concrete booms

Inspection report –Nr:	Machine-Nr	Hours of operation:	
		Concrete output m³:	
Company:	Post code:	City:	
Boom Type:	Boom Nr.	NL	WV

Proof – Result of the Tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date:.....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

100 documents						
101 instruction manual	☐	☐	☐	☐	☐	
102 spare parts list	☐	☐	☐	☐	☐	
200 sub frame						
201 frame connection cpl.	☐	☐	☐	☐	☐	
300 outrigger front R+L						
301 transportation safety device	☐	☐	☐	☐	☐	
302 outrigger	☐	☐	☐	☐	☐	
303 extension box	☐	☐	☐	☐	☐	
304 locking device	☐	☐	☐	☐	☐	
305 slewing bearing	☐	☐	☐	☐	☐	
306 turn locking device	☐	☐	☐	☐	☐	
307 support safeguard	☐	☐	☐	☐	☐	
308 support plate	☐	☐	☐	☐	☐	
309 fixing of jack cylinder	☐	☐	☐	☐	☐	
310 jack cylinder	☐	☐	☐	☐	☐	
311 swing cylinder	☐	☐	☐	☐	☐	
312 telescopic-cylinder	☐	☐	☐	☐	☐	
313 pressure adjustment	☐	☐	☐	☐	☐	
400 outrigger rear L+R						
401 transportation safety device	☐	☐	☐	☐	☐	
402 outrigger	☐	☐	☐	☐	☐	
403 extension box	☐	☐	☐	☐	☐	
405 locking device	☐	☐	☐	☐	☐	

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
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406 slewing bearing ☐☐☐☐☐

407 turn locking device ☐☐☐☐☐

408 support safeguard ☐☐☐☐☐

409 support plate ☐☐☐☐☐

410 fixing of jack cylinder ☐☐☐☐☐

411 jack cylinder ☐☐☐☐☐

412 swing cylinder ☐☐☐☐☐

413 telescopic cylinder ☐☐☐☐☐

500 pedestal

501 pedestal mounting ☐☐☐☐☐

502 sub frame ☐☐☐☐☐

503 truck frame ☐☐☐☐☐

504 pedestal (structure) ☐☐☐☐☐

505 boom valve without leaking ☐☐☐☐☐

506 boom rest ☐☐☐☐☐

507 transportation safety device ☐☐☐☐☐

508 hydraulic line ☐☐☐☐☐

600 slewing head with ball pivot

601 slewing head ☐☐☐☐☐

602 ball pivot ring ☐☐☐☐☐

603 mounting ball pivot ring ☐☐☐☐☐

604 drive pinion ☐☐☐☐☐

605 slewing drive mounting ☐☐☐☐☐

606 slewing stop device ☐☐☐☐☐

607 slewing drive (tooth backlash) ☐☐☐☐☐

608 slewing drive ☐☐☐☐☐

609 brake function ☐☐☐☐☐

610 speed ☐☐☐☐☐

611 pressure setting ☐☐☐☐☐

612 hydraulic lines ☐☐☐☐☐

700 slewing head with slewing column

701 slewing head ☐☐☐☐☐

702 slewing column bearing ☐☐☐☐☐

703 slewing drive (tooth backlash) ☐☐☐☐☐

704 speed ☐☐☐☐☐

705 pressure settings ☐☐☐☐☐

706 hydraulic lines ☐☐☐☐☐

707 swivel cylinder ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

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05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

800 boom					
801 „Arm1“	☐	☐	☐	☐	☐
802 bracket conveying line	☐	☐	☐	☐	☐
803 Drop hook	☐	☐	☐	☐	☐
804 „Arm 2“	☐	☐	☐	☐	☐
805 bracket conveying line	☐	☐	☐	☐	☐
806 Drop hook	☐	☐	☐	☐	☐
807 „Arm 3“	☐	☐	☐	☐	☐
808 bracket conveying line	☐	☐	☐	☐	☐
809 guidance and interlock of the arm	☐	☐	☐	☐	☐
810 „Arm 4“	☐	☐	☐	☐	☐
811 bracket conveying line	☐	☐	☐	☐	☐
812 guidance and interlock of the arm	☐	☐	☐	☐	☐
813 „Arm 5“	☐	☐	☐	☐	☐
814 bracket conveying line	☐	☐	☐	☐	☐
815 guidance and interlock of the arm	☐	☐	☐	☐	☐
900 joint „A“	☐	☐	☐	☐	☐
901 boom	☐	☐	☐	☐	☐
902 link lever	☐	☐	☐	☐	☐
903 forcing rod	☐	☐	☐	☐	☐
904 pin	☐	☐	☐	☐	☐
905 cylinder	☐	☐	☐	☐	☐
906 boom speed	☐	☐	☐	☐	☐
907 pressure settings	☐	☐	☐	☐	☐
908 hydraulic lines	☐	☐	☐	☐	☐
909 load holding valve (piston side)	☐	☐	☐	☐	☐
910 load holding valve (rod side)	☐	☐	☐	☐	☐
1000 joint „B“					
1001 boom	☐	☐	☐	☐	☐
1002 link lever	☐	☐	☐	☐	☐
1003 forcing rod	☐	☐	☐	☐	☐
1004 pin	☐	☐	☐	☐	☐
1005 cylinder	☐	☐	☐	☐	☐
1006 boom speed	☐	☐	☐	☐	☐
1007 pressure settings	☐	☐	☐	☐	☐
1008 hydraulic lines	☐	☐	☐	☐	☐
1009 load holding valve (piston side)	☐	☐	☐	☐	☐
1010 load holding valve (rod side)	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
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04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1100 joint "C"

1101 boom	☐	☐	☐	☐	☐
1102 link lever	☐	☐	☐	☐	☐
1103 forcing rod	☐	☐	☐	☐	☐
1104 pin	☐	☐	☐	☐	☐
1105 cylinder	☐	☐	☐	☐	☐
1106 boom speed	☐	☐	☐	☐	☐
1107 pressure settings	☐	☐	☐	☐	☐
1108 hydraulic lines	☐	☐	☐	☐	☐
1109 load holding valve (piston side)	☐	☐	☐	☐	☐
1110 load hokding valve (rod side)	☐	☐	☐	☐	☐

1200 joint "D"

1201 boom	☐	☐	☐	☐	☐
1202 link lever	☐	☐	☐	☐	☐
1203 forcing rod	☐	☐	☐	☐	☐
1204 pin	☐	☐	☐	☐	☐
1205 cylinder	☐	☐	☐	☐	☐
1206 boom speed	☐	☐	☐	☐	☐
1207 pressure settings	☐	☐	☐	☐	☐
1208 hydraulic lines	☐	☐	☐	☐	☐
1209 load holding valve (piston side)	☐	☐	☐	☐	☐
1210 load holding valve (rod side)	☐	☐	☐	☐	☐

1300 joint „E"

1301 boom	☐	☐	☐	☐	☐
1302 link lever	☐	☐	☐	☐	☐
1303 forcing rod	☐	☐	☐	☐	☐
1304 pin	☐	☐	☐	☐	☐
1305 cylinder	☐	☐	☐	☐	☐
1306 boom speed	☐	☐	☐	☐	☐
1307 pressure settings	☐	☐	☐	☐	☐
1308 hydraulic lines	☐	☐	☐	☐	☐
1309 load holding valve (piston side)	☐	☐	☐	☐	☐
1310 load holding valve (rod side)	☐	☐	☐	☐	☐

1400 concrete delivery line

1401 assembly of delivery line DN	☐	☐	☐	☐	☐
1402 end hose DN+lenght	☐	☐	☐	☐	☐
1403 delivery line DN	☐	☐	☐	☐	☐
1404 rotating joints of - delivery line	☐	☐	☐	☐	☐
1405 locking pin of the coupling	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
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05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1406 end hose safety device	☐	☐	☐	☐	☐
1407 reducer	☐	☐	☐	☐	☐
1408 gate elbow, elbow 6"	☐	☐	☐	☐	☐
1500 hydraulic system and hydraulic valves					
1501 Pressure relief valve	☐	☐	☐	☐	☐
1502 pressure settings	☐	☐	☐	☐	☐
1503 hydraulic lines	☐	☐	☐	☐	☐
1504 hand oprerating-(function)	☐	☐	☐	☐	☐
1505 boom control valve	☐	☐	☐	☐	☐
1506 hydraulic pump	☐	☐	☐	☐	☐
1600 electric equipment					
1601 remote control (functions)	☐	☐	☐	☐	☐
1602 emergency stop (function)	☐	☐	☐	☐	☐
1603 switch for outrigger function	☐	☐	☐	☐	☐
1604 switch for boom function	☐	☐	☐	☐	☐
1605 wiring harness	☐	☐	☐	☐	☐
1606 central lubrication	☐	☐	☐	☐	☐

1700 sticker sets					
1701 safety hints	☐	☐	☐	☐	☐
1702 description	☐	☐	☐	☐	☐
1703 operating	☐	☐	☐	☐	☐
1704 short operating instruction	☐	☐	☐	☐	☐
1705 sticker „ don´t use the boom as crane"	☐	☐	☐	☐	☐
1706 sticker „guideline operating with boom- and concrete pump"	☐	☐	☐	☐	☐
1707 name plate	☐	☐	☐	☐	☐
1708 sticker „danger high voltage"	☐	☐	☐	☐	☐

Competent inspector:

Date: _____

Name: _____

Signature: _____
(stamp)

Customer:

Signature: _____
(stamp)

Inspection report for concrete pump

Inspection report Nr:	Machine-Nr:	Hours of operation:
		Concrete output m³:
Company:	Post code:	City:

NL	WV

Proof – Result of the tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date:.....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
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2000 documents	**2700 hydraulic control system**
2001 operating manual ☐☐☐☐☐	2701 pressure relief valve ☐☐☐☐☐
2002 spare parts list ☐☐☐☐☐	2702 pressure setting ☐☐☐☐☐
2100 drive assembly	2703 hydraulic line ☐☐☐☐☐
2101 coupling and flange ☐☐☐☐☐	2704 mechanical operation by hand ☐☐☐☐☐
2200 gear box ☐☐☐☐☐	**2800 oil –cooler** ☐☐☐☐☐
2300 hydraulic pump (main) ☐☐☐☐☐	**2900 accumulator** ☐☐☐☐☐
2400 oil-tank ☐☐☐☐☐	2901 proofs of the required tests according to accumulator regulation ☐☐☐☐☐
2500 drive shaft ☐☐☐☐☐	2902 pressure gauge ☐☐☐☐☐
	Notes:

Inspection report for concrete pump

Inspection report Nr:

Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
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3000 central lubrication	☐	☐	☐	☐	☐	
3100 hydraulic motor	☐	☐	☐	☐	☐	
3200 hydraulic lines	☐	☐	☐	☐	☐	
3300 air compressor	☐	☐	☐	☐	☐	
3400 control panel	☐	☐	☐	☐	☐	
3500 concrete pump	☐	☐	☐	☐	☐	
3700 S-valve	☐	☐	☐	☐	☐	
3800 hopper	☐	☐	☐	☐	☐	
4100 sub frame	☐	☐	☐	☐	☐	
4200 water tank	☐	☐	☐	☐	☐	
4300 axle	☐	☐	☐	☐	☐	
4400 water pump	☐	☐	☐	☐	☐	
4500 vibrator	☐	☐	☐	☐	☐	

4600 safety guards, equipment					
4601 stair	☐	☐	☐	☐	☐
4602 safety for stair	☐	☐	☐	☐	☐
4603 handrail	☐	☐	☐	☐	☐
4604 hopper grid (fixing device)	☐	☐	☐	☐	☐
4606 distance of grid rods	☐	☐	☐	☐	☐
4607 distance from grid to agitator	☐	☐	☐	☐	☐
4609 agitator have to stop if grid is open	☐	☐	☐	☐	☐
4610 accumulator have to dump if grid is open	☐	☐	☐	☐	☐
4612 cleaning flap hopper	☐	☐	☐	☐	☐
4613 safety grid into water box	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete pump

Inspection report Nr:

Machine-Nr:

Error code:

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4614 cover for rotating wave ☐☐☐☐☐

4616 cover for chains ☐☐☐☐☐

4617 cover for shift cylinder ☐☐☐☐☐

4618 cover for moving parts ☐☐☐☐☐

4619 cover for the exhaust pipe ☐☐☐☐☐

4700 electrical system

4701 function of actuator component ☐☐☐☐☐

4702 emergency stop function ☐☐☐☐☐

4703 ground connections ☐☐☐☐☐

4704 cables and wiring harness ☐☐☐☐☐

4705 temperature switch ☐☐☐☐☐

4800 outtrigger - system

4801 transportation lock ☐☐☐☐☐

4802 locking device ☐☐☐☐☐

4803 backing plate ☐☐☐☐☐

4804 jack cylinder connections ☐☐☐☐☐

4805 pressure adjustment of jack cylinder ☐☐☐☐☐

4900 miscellaneous

4901 additional assembled part from operator ☐☐☐☐☐

4902 changes through operator ☐☐☐☐☐

Competent inspector:

Date: .....

Name: .....

Signature: .....
(stamp)

Customer:

Signature: .....
(stamp)

This test report is filed into the test book

Inspection report for concrete booms

Inspection report –Nr:	Machine-Nr	Hours of operation:	
		Concrete output m³:	
Company:	Post code:	City:	
Boom Type:	Boom Nr.	NL	WV

Proof – Result of the Tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date:.....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
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06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

100 documents

101 instruction manual ☐☐☐☐☐

102 spare parts list ☐☐☐☐☐

200 sub frame

201 frame connection cpl. ☐☐☐☐☐

300 outrigger front R+L

301 transportation safety device ☐☐☐☐☐

302 outrigger ☐☐☐☐☐

303 extension box ☐☐☐☐☐

304 locking device ☐☐☐☐☐

305 slewing bearing ☐☐☐☐☐

306 turn locking device ☐☐☐☐☐

307 support safeguard ☐☐☐☐☐

308 support plate ☐☐☐☐☐

309 fixing of jack cylinder ☐☐☐☐☐

310 jack cylinder ☐☐☐☐☐

311 swing cylinder ☐☐☐☐☐

312 telescopic-cylinder ☐☐☐☐☐

313 pressure adjustment ☐☐☐☐☐

400 outrigger rear L+R

401 transportation safety device ☐☐☐☐☐

402 outrigger ☐☐☐☐☐

403 extension box ☐☐☐☐☐

405 locking device ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

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406 slewing bearing ☐☐☐☐☐
407 turn locking device ☐☐☐☐☐
408 support safeguard ☐☐☐☐☐
409 support plate ☐☐☐☐☐
410 fixing of jack cylinder ☐☐☐☐☐
411 jack cylinder ☐☐☐☐☐
412 swing cylinder ☐☐☐☐☐
413 telescopic cylinder ☐☐☐☐☐

500 pedestal
501 pedestal mounting ☐☐☐☐☐
502 sub frame ☐☐☐☐☐
503 truck frame ☐☐☐☐☐
504 pedestal (structure) ☐☐☐☐☐
505 boom valve without leaking ☐☐☐☐☐
506 boom rest ☐☐☐☐☐
507 transportation safety device ☐☐☐☐☐
508 hydraulic line ☐☐☐☐☐

600 slewing head with ball pivot
601 slewing head ☐☐☐☐☐
602 ball pivot ring ☐☐☐☐☐
603 mounting ball pivot ring ☐☐☐☐☐
604 drive pinion ☐☐☐☐☐

605 slewing drive mounting ☐☐☐☐☐
606 slewing stop device ☐☐☐☐☐
607 slewing drive (tooth backlash) ☐☐☐☐☐
608 slewing drive ☐☐☐☐☐
609 brake function ☐☐☐☐☐
610 speed ☐☐☐☐☐
611 pressure setting ☐☐☐☐☐
612 hydraulic lines ☐☐☐☐☐

700 slewing head with slewing column
701 slewing head ☐☐☐☐☐
702 slewing column bearing ☐☐☐☐☐
703 slewing drive (tooth backlash) ☐☐☐☐☐
704 speed ☐☐☐☐☐
705 pressure settings ☐☐☐☐☐
706 hydraulic lines ☐☐☐☐☐
707 swivel cylinder ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

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06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

800 boom	
801 „Arm1“	
802 bracket conveying line	
803 Drop hook	
804 „Arm 2“	
805 bracket conveying line	
806 Drop hook	
807 „Arm 3“	
808 bracket conveying line	
809 guidance and interlock of the arm	
810 „Arm 4“	
811 bracket conveying line	
812 guidance and interlock of the arm	
813 „Arm 5“	
814 bracket conveying line	
815 guidance and interlock of the arm	
900 joint „A“	
901 boom	
902 link lever	
903 forcing rod	
904 pin	
905 cylinder	
906 boom speed	
907 pressure settings	
908 hydraulic lines	
909 load holding valve (piston side)	
910 load holding valve (rod side)	
1000 joint „B“	
1001 boom	
1002 link lever	
1003 forcing rod	
1004 pin	
1005 cylinder	
1006 boom speed	
1007 pressure settings	
1008 hydraulic lines	
1009 load holding valve (piston side)	
1010 load holding valve (rod side)	

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

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03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1100 joint "C"

1101 boom	☐	☐	☐	☐	☐
1102 link lever	☐	☐	☐	☐	☐
1103 forcing rod	☐	☐	☐	☐	☐
1104 pin	☐	☐	☐	☐	☐
1105 cylinder	☐	☐	☐	☐	☐
1106 boom speed	☐	☐	☐	☐	☐
1107 pressure settings	☐	☐	☐	☐	☐
1108 hydraulic lines	☐	☐	☐	☐	☐
1109 load holding valve (piston side)	☐	☐	☐	☐	☐
1110 load hokding valve (rod side)	☐	☐	☐	☐	☐

1200 joint "D"

1201 boom	☐	☐	☐	☐	☐
1202 link lever	☐	☐	☐	☐	☐
1203 forcing rod	☐	☐	☐	☐	☐
1204 pin	☐	☐	☐	☐	☐
1205 cylinder	☐	☐	☐	☐	☐
1206 boom speed	☐	☐	☐	☐	☐
1207 pressure settings	☐	☐	☐	☐	☐
1208 hydraulic lines	☐	☐	☐	☐	☐
1209 load holding valve (piston side)	☐	☐	☐	☐	☐
1210 load holding valve (rod side)	☐	☐	☐	☐	☐

1300 joint „E"

1301 boom	☐	☐	☐	☐	☐
1302 link lever	☐	☐	☐	☐	☐
1303 forcing rod	☐	☐	☐	☐	☐
1304 pin	☐	☐	☐	☐	☐
1305 cylinder	☐	☐	☐	☐	☐
1306 boom speed	☐	☐	☐	☐	☐
1307 pressure settings	☐	☐	☐	☐	☐
1308 hydraulic lines	☐	☐	☐	☐	☐
1309 load holding valve (piston side)	☐	☐	☐	☐	☐
1310 load holding valve (rod side)	☐	☐	☐	☐	☐

1400 concrete delivery line

1401 assembly of delivery line DN	☐	☐	☐	☐	☐
1402 end hose DN+lenght	☐	☐	☐	☐	☐
1403 delivery line DN	☐	☐	☐	☐	☐
1404 rotating joints of - delivery line	☐	☐	☐	☐	☐
1405 locking pin of the coupling	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1406 end hose safety device ☐☐☐☐☐

1407 reducer ☐☐☐☐☐

1408 gate elbow, elbow 6" ☐☐☐☐☐

1500 hydraulic system and hydraulic valves

1501 Pressure relief valve ☐☐☐☐☐

1502 pressure settings ☐☐☐☐☐

1503 hydraulic lines ☐☐☐☐☐

1504 hand oprerating-(function) ☐☐☐☐☐

1505 boom control valve ☐☐☐☐☐

1506 hydraulic pump ☐☐☐☐☐

1600 electric equipment

1601 remote control (functions) ☐☐☐☐☐

1602 emergency stop (function) ☐☐☐☐☐

1603 switch for outrigger function ☐☐☐☐☐

1604 switch for boom function ☐☐☐☐☐

1605 wiring harness ☐☐☐☐☐

1606 central lubrication ☐☐☐☐☐

1700 sticker sets

1701 safety hints ☐☐☐☐☐

1702 description ☐☐☐☐☐

1703 operating ☐☐☐☐☐

1704 short operating instruction ☐☐☐☐☐

1705 sticker „ don´t use the boom as crane" ☐☐☐☐☐

1706 sticker „guideline operating with boom- and concrete pump" ☐☐☐☐☐

1707 name plate ☐☐☐☐☐

1708 sticker „danger high voltage" ☐☐☐☐☐

Competent inspector:

Date: _____

Name: _____

Signature: _____
(stamp)

Customer:

Signature: _____
(stamp)

Inspection report for concrete pump

Inspection report Nr:	Machine-Nr:	Hours of operation:
		Concrete output m³:
Company:	Post code:	City:

NL WV

Proof – Result of the tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date:.....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no fuction	12 bendet	20 sawing	28 missing components
05 low livetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

2000 documents					**2700 hydraulic control system**					
2001 operating manual	☐	☐	☐	☐	☐	2701 pressure relief valve	☐	☐	☐	☐	☐
2002 spare parts list	☐	☐	☐	☐	☐	2702 pressure setting	☐	☐	☐	☐	☐
2100 drive assembly						2703 hydraulic line	☐	☐	☐	☐	☐
2101 coupling and flange	☐	☐	☐	☐	☐	2704 mechanical operation by hand	☐	☐	☐	☐	☐
2200 gear box	☐	☐	☐	☐	☐	**2800 oil –cooler**	☐	☐	☐	☐	☐
2300 hydraulic pump (main)	☐	☐	☐	☐	☐	**2900 accumulator**	☐	☐	☐	☐	☐
2400 oil-tank	☐	☐	☐	☐	☐	2901 proofs of the required tests according to accumulator regulation	☐	☐	☐	☐	☐
2500 drive shaft	☐	☐	☐	☐	☐	2902 pressure gauge	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete pump

Inspection report Nr:

Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

3000 central lubrication	☐	☐	☐	☐	☐	
3100 hydraulic motor	☐	☐	☐	☐	☐	
3200 hydraulic lines	☐	☐	☐	☐	☐	
3300 air compressor	☐	☐	☐	☐	☐	
3400 control panel	☐	☐	☐	☐	☐	
3500 concrete pump	☐	☐	☐	☐	☐	
3700 S-valve	☐	☐	☐	☐	☐	
3800 hopper	☐	☐	☐	☐	☐	
4100 sub frame	☐	☐	☐	☐	☐	
4200 water tank	☐	☐	☐	☐	☐	
4300 axle	☐	☐	☐	☐	☐	
4400 water pump	☐	☐	☐	☐	☐	
4500 vibrator	☐	☐	☐	☐	☐	

4600 safety guards, equipment					
4601 stair	☐	☐	☐	☐	☐
4602 safety for stair	☐	☐	☐	☐	☐
4603 handrail	☐	☐	☐	☐	☐
4604 hopper grid (fixing device)	☐	☐	☐	☐	☐
4606 distance of grid rods	☐	☐	☐	☐	☐
4607 distance from grid to agitator	☐	☐	☐	☐	☐
4609 agitator have to stop if grid is open	☐	☐	☐	☐	☐
4610 accumulator have to dump if grid is open	☐	☐	☐	☐	☐
4612 cleaning flap hopper	☐	☐	☐	☐	☐
4613 safety grid into water box	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete pump

Inspection report Nr: | Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

4614 cover for rotating wave ☐☐☐☐☐

4616 cover for chains ☐☐☐☐☐

4617 cover for shift cylinder ☐☐☐☐☐

4618 cover for moving parts ☐☐☐☐☐

4619 cover for the exhaust pipe ☐☐☐☐☐

4700 electrical system

4701 function of actuator component ☐☐☐☐☐

4702 emergency stop function ☐☐☐☐☐

4703 ground connections ☐☐☐☐☐

4704 cables and wiring harness ☐☐☐☐☐

4705 temperature switch ☐☐☐☐☐

4800 outtrigger - system

4801 transportation lock ☐☐☐☐☐

4802 locking device ☐☐☐☐☐

4803 backing plate ☐☐☐☐☐

4804 jack cylinder connections ☐☐☐☐☐

4805 pressure adjustment of jack cylinder ☐☐☐☐☐

4900 miscellaneous

4901 additional assembled part from operator ☐☐☐☐☐

4902 changes through operator ☐☐☐☐☐

Competent inspector:

Date: .....

Name: .....

Signature: .....
(stamp)

Customer:

Signature: .....
(stamp)

This test report is filed into the test book

Inspection report for concrete booms

Inspection report –Nr:	Machine-Nr	Hours of operation:	
		Concrete output m³:	
Company:	Post code:	City:	
Boom Type:	Boom Nr.	NL	WV

Proof – Result of the Tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date:.....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

100 documents						
101 instruction manual	☐	☐	☐	☐	☐	
102 spare parts list	☐	☐	☐	☐	☐	
200 sub frame						
201 frame connection cpl.	☐	☐	☐	☐	☐	
300 outrigger front R+L						
301 transportation safety device	☐	☐	☐	☐	☐	
302 outrigger	☐	☐	☐	☐	☐	
303 extension box	☐	☐	☐	☐	☐	
304 locking device	☐	☐	☐	☐	☐	
305 slewing bearing	☐	☐	☐	☐	☐	
306 turn locking device	☐	☐	☐	☐	☐	
307 support safeguard	☐	☐	☐	☐	☐	
308 support plate	☐	☐	☐	☐	☐	
309 fixing of jack cylinder	☐	☐	☐	☐	☐	
310 jack cylinder	☐	☐	☐	☐	☐	
311 swing cylinder	☐	☐	☐	☐	☐	
312 telescopic-cylinder	☐	☐	☐	☐	☐	
313 pressure adjustment	☐	☐	☐	☐	☐	
400 outrigger rear L+R						
401 transportation safety device	☐	☐	☐	☐	☐	
402 outrigger	☐	☐	☐	☐	☐	
403 extension box	☐	☐	☐	☐	☐	
405 locking device	☐	☐	☐	☐	☐	

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

406 slewing bearing ☐☐☐☐☐

407 turn locking device ☐☐☐☐☐

408 support safeguard ☐☐☐☐☐

409 support plate ☐☐☐☐☐

410 fixing of jack cylinder ☐☐☐☐☐

411 jack cylinder ☐☐☐☐☐

412 swing cylinder ☐☐☐☐☐

413 telescopic cylinder ☐☐☐☐☐

500 pedestal

501 pedestal mounting ☐☐☐☐☐

502 sub frame ☐☐☐☐☐

503 truck frame ☐☐☐☐☐

504 pedestal (structure) ☐☐☐☐☐

505 boom valve without leaking ☐☐☐☐☐

506 boom rest ☐☐☐☐☐

507 transportation safety device ☐☐☐☐☐

508 hydraulic line ☐☐☐☐☐

600 slewing head with ball pivot

601 slewing head ☐☐☐☐☐

602 ball pivot ring ☐☐☐☐☐

603 mounting ball pivot ring ☐☐☐☐☐

604 drive pinion ☐☐☐☐☐

605 slewing drive mounting ☐☐☐☐☐

606 slewing stop device ☐☐☐☐☐

607 slewing drive (tooth backlash) ☐☐☐☐☐

608 slewing drive ☐☐☐☐☐

609 brake function ☐☐☐☐☐

610 speed ☐☐☐☐☐

611 pressure setting ☐☐☐☐☐

612 hydraulic lines ☐☐☐☐☐

700 slewing head with slewing column

701 slewing head ☐☐☐☐☐

702 slewing column bearing ☐☐☐☐☐

703 slewing drive (tooth backlash) ☐☐☐☐☐

704 speed ☐☐☐☐☐

705 pressure settings ☐☐☐☐☐

706 hydraulic lines ☐☐☐☐☐

707 swivel cylinder ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

800 boom					
801 „Arm1“	☐	☐	☐	☐	☐
802 bracket conveying line	☐	☐	☐	☐	☐
803 Drop hook	☐	☐	☐	☐	☐
804 „Arm 2“	☐	☐	☐	☐	☐
805 bracket conveying line	☐	☐	☐	☐	☐
806 Drop hook	☐	☐	☐	☐	☐
807 „Arm 3“	☐	☐	☐	☐	☐
808 bracket conveying line	☐	☐	☐	☐	☐
809 guidance and interlock of the arm	☐	☐	☐	☐	☐
810 „Arm 4“	☐	☐	☐	☐	☐
811 bracket conveying line	☐	☐	☐	☐	☐
812 guidance and interlock of the arm	☐	☐	☐	☐	☐
813 „Arm 5“	☐	☐	☐	☐	☐
814 bracket conveying line	☐	☐	☐	☐	☐
815 guidance and interlock of the arm	☐	☐	☐	☐	☐
900 joint „A“	☐	☐	☐	☐	☐
901 boom	☐	☐	☐	☐	☐
902 link lever	☐	☐	☐	☐	☐
903 forcing rod	☐	☐	☐	☐	☐
904 pin	☐	☐	☐	☐	☐
905 cylinder	☐	☐	☐	☐	☐
906 boom speed	☐	☐	☐	☐	☐
907 pressure settings	☐	☐	☐	☐	☐
908 hydraulic lines	☐	☐	☐	☐	☐
909 load holding valve (piston side)	☐	☐	☐	☐	☐
910 load holding valve (rod side)	☐	☐	☐	☐	☐
1000 joint „B“					
1001 boom	☐	☐	☐	☐	☐
1002 link lever	☐	☐	☐	☐	☐
1003 forcing rod	☐	☐	☐	☐	☐
1004 pin	☐	☐	☐	☐	☐
1005 cylinder	☐	☐	☐	☐	☐
1006 boom speed	☐	☐	☐	☐	☐
1007 pressure settings	☐	☐	☐	☐	☐
1008 hydraulic lines	☐	☐	☐	☐	☐
1009 load holding valve (piston side)	☐	☐	☐	☐	☐
1010 load holding valve (rod side)	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1100 joint "C"

1101 boom	☐	☐	☐	☐	☐
1102 link lever	☐	☐	☐	☐	☐
1103 forcing rod	☐	☐	☐	☐	☐
1104 pin	☐	☐	☐	☐	☐
1105 cylinder	☐	☐	☐	☐	☐
1106 boom speed	☐	☐	☐	☐	☐
1107 pressure settings	☐	☐	☐	☐	☐
1108 hydraulic lines	☐	☐	☐	☐	☐
1109 load holding valve (piston side)	☐	☐	☐	☐	☐
1110 load hokding valve (rod side)	☐	☐	☐	☐	☐

1200 joint "D"

1201 boom	☐	☐	☐	☐	☐
1202 link lever	☐	☐	☐	☐	☐
1203 forcing rod	☐	☐	☐	☐	☐
1204 pin	☐	☐	☐	☐	☐
1205 cylinder	☐	☐	☐	☐	☐
1206 boom speed	☐	☐	☐	☐	☐
1207 pressure settings	☐	☐	☐	☐	☐
1208 hydraulic lines	☐	☐	☐	☐	☐
1209 load holding valve (piston side)	☐	☐	☐	☐	☐
1210 load holding valve (rod side)	☐	☐	☐	☐	☐

1300 joint „E"

1301 boom	☐	☐	☐	☐	☐
1302 link lever	☐	☐	☐	☐	☐
1303 forcing rod	☐	☐	☐	☐	☐
1304 pin	☐	☐	☐	☐	☐
1305 cylinder	☐	☐	☐	☐	☐
1306 boom speed	☐	☐	☐	☐	☐
1307 pressure settings	☐	☐	☐	☐	☐
1308 hydraulic lines	☐	☐	☐	☐	☐
1309 load holding valve (piston side)	☐	☐	☐	☐	☐
1310 load holding valve (rod side)	☐	☐	☐	☐	☐

1400 concrete delivery line

1401 assembly of delivery line DN	☐	☐	☐	☐	☐
1402 end hose DN+lenght	☐	☐	☐	☐	☐
1403 delivery line DN	☐	☐	☐	☐	☐
1404 rotating joints of - delivery line	☐	☐	☐	☐	☐
1405 locking pin of the coupling	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1406 end hose safety device ☐☐☐☐☐	**1700 sticker sets**
1407 reducer ☐☐☐☐☐	1701 safety hints ☐☐☐☐☐
1408 gate elbow, elbow 6" ☐☐☐☐☐	1702 description ☐☐☐☐☐
1500 hydraulic system and hydraulic valves	1703 operating ☐☐☐☐☐
1501 Pressure relief valve ☐☐☐☐☐	1704 short operating instruction ☐☐☐☐☐
1502 pressure settings ☐☐☐☐☐	1705 sticker „ don´t use the boom as crane" ☐☐☐☐☐
1503 hydraulic lines ☐☐☐☐☐	1706 sticker „guideline operating with boom- and concrete pump" ☐☐☐☐☐
1504 hand oprerating- (function) ☐☐☐☐☐	1707 name plate ☐☐☐☐☐
1505 boom control valve ☐☐☐☐☐	1708 sticker „danger high voltage" ☐☐☐☐☐
1506 hydraulic pump ☐☐☐☐☐	
1600 electric equipment	
1601 remote control (functions) ☐☐☐☐☐	**Competent inspector:**
1602 emergency stop (function) ☐☐☐☐☐	Date: _____
1603 switch for outrigger function ☐☐☐☐☐	Name: _____
1604 switch for boom function ☐☐☐☐☐	Signature: _____ (stamp)
1605 wiring harness ☐☐☐☐☐	**Customer:**
1606 central lubrication ☐☐☐☐☐	Signature: _____ (stamp)

Inspection report for concrete pump

Inspection report Nr:	Machine-Nr:	Hours of operation:
		Concrete output m³:
Company:	Post code:	City:

NL	WV

Proof – Result of the tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date:.....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no fuction	12 bendet	20 sawing	28 missing components
05 low livetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

2000 documents					
2001 operating manual	☐	☐	☐	☐	☐
2002 spare parts list	☐	☐	☐	☐	☐
2100 drive assembly					
2101 coupling and flange	☐	☐	☐	☐	☐
2200 gear box	☐	☐	☐	☐	☐
2300 hydraulic pump (main)	☐	☐	☐	☐	☐
2400 oil-tank	☐	☐	☐	☐	☐
2500 drive shaft	☐	☐	☐	☐	☐

2700 hydraulic control system					
2701 pressure relief valve	☐	☐	☐	☐	☐
2702 pressure setting	☐	☐	☐	☐	☐
2703 hydraulic line	☐	☐	☐	☐	☐
2704 mechanical operation by hand	☐	☐	☐	☐	☐
2800 oil –cooler	☐	☐	☐	☐	☐
2900 accumulator	☐	☐	☐	☐	☐
2901 proofs of the required tests according to accumulator regulation	☐	☐	☐	☐	☐
2902 pressure gauge	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete pump

Inspection report Nr:

Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

3000 central lubrication	☐	☐	☐	☐	☐	
3100 hydraulic motor	☐	☐	☐	☐	☐	
3200 hydraulic lines	☐	☐	☐	☐	☐	
3300 air compressor	☐	☐	☐	☐	☐	
3400 control panel	☐	☐	☐	☐	☐	
3500 concrete pump	☐	☐	☐	☐	☐	
3700 S-valve	☐	☐	☐	☐	☐	
3800 hopper	☐	☐	☐	☐	☐	
4100 sub frame	☐	☐	☐	☐	☐	
4200 water tank	☐	☐	☐	☐	☐	
4300 axle	☐	☐	☐	☐	☐	
4400 water pump	☐	☐	☐	☐	☐	
4500 vibrator	☐	☐	☐	☐	☐	

4600 safety guards, equipment

4601 stair	☐	☐	☐	☐	☐
4602 safety for stair	☐	☐	☐	☐	☐
4603 handrail	☐	☐	☐	☐	☐
4604 hopper grid (fixing device)	☐	☐	☐	☐	☐
4606 distance of grid rods	☐	☐	☐	☐	☐
4607 distance from grid to agitator	☐	☐	☐	☐	☐
4609 agitator have to stop if grid is open	☐	☐	☐	☐	☐
4610 accumulator have to dump if grid is open	☐	☐	☐	☐	☐
4612 cleaning flap hopper	☐	☐	☐	☐	☐
4613 safety grid into water box	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete pump

Inspection report Nr: | Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

4614 cover for rotating wave ☐☐☐☐☐

4616 cover for chains ☐☐☐☐☐

4617 cover for shift cylinder ☐☐☐☐☐

4618 cover for moving parts ☐☐☐☐☐

4619 cover for the exhaust pipe ☐☐☐☐☐

4700 electrical system

4701 function of actuator component ☐☐☐☐☐

4702 emergency stop function ☐☐☐☐☐

4703 ground connections ☐☐☐☐☐

4704 cables and wiring harness ☐☐☐☐☐

4705 temperature switch ☐☐☐☐☐

4800 outtrigger - system

4801 transportation lock ☐☐☐☐☐

4802 locking device ☐☐☐☐☐

4803 backing plate ☐☐☐☐☐

4804 jack cylinder connections ☐☐☐☐☐

4805 pressure adjustment of jack cylinder ☐☐☐☐☐

4900 miscellaneous

4901 additional assembled part from operator ☐☐☐☐☐

4902 changes through operator ☐☐☐☐☐

Competent inspector:

Date: .....

Name: .....

Signature: .....
(stamp)

Customer:

Signature: .....
(stamp)

This test report is filed into the test book

Inspection report for concrete booms

Inspection report –Nr:	Machine-Nr	Hours of operation:	
		Concrete output m³:	
Company:	Post code:	City:	
Boom Type:	Boom Nr.	NL	WV

Proof – Result of the Tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date:.....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

100 documents

101 instruction manual ☐☐☐☐☐

102 spare parts list ☐☐☐☐☐

200 sub frame

201 frame connection cpl. ☐☐☐☐☐

300 outrigger front R+L

301 transportation safety device ☐☐☐☐☐

302 outrigger ☐☐☐☐☐

303 extension box ☐☐☐☐☐

304 locking device ☐☐☐☐☐

305 slewing bearing ☐☐☐☐☐

306 turn locking device ☐☐☐☐☐

307 support safeguard ☐☐☐☐☐

308 support plate ☐☐☐☐☐

309 fixing of jack cylinder ☐☐☐☐☐

310 jack cylinder ☐☐☐☐☐

311 swing cylinder ☐☐☐☐☐

312 telescopic-cylinder ☐☐☐☐☐

313 pressure adjustment ☐☐☐☐☐

400 outrigger rear L+R

401 transportation safety device ☐☐☐☐☐

402 outrigger ☐☐☐☐☐

403 extension box ☐☐☐☐☐

405 locking device ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

406 slewing bearing ☐☐☐☐☐

407 turn locking device ☐☐☐☐☐

408 support safeguard ☐☐☐☐☐

409 support plate ☐☐☐☐☐

410 fixing of jack cylinder ☐☐☐☐☐

411 jack cylinder ☐☐☐☐☐

412 swing cylinder ☐☐☐☐☐

413 telescopic cylinder ☐☐☐☐☐

500 pedestal

501 pedestal mounting ☐☐☐☐☐

502 sub frame ☐☐☐☐☐

503 truck frame ☐☐☐☐☐

504 pedestal (structure) ☐☐☐☐☐

505 boom valve without leaking ☐☐☐☐☐

506 boom rest ☐☐☐☐☐

507 transportation safety device ☐☐☐☐☐

508 hydraulic line ☐☐☐☐☐

600 slewing head with ball pivot

601 slewing head ☐☐☐☐☐

602 ball pivot ring ☐☐☐☐☐

603 mounting ball pivot ring ☐☐☐☐☐

604 drive pinion ☐☐☐☐☐

605 slewing drive mounting ☐☐☐☐☐

606 slewing stop device ☐☐☐☐☐

607 slewing drive (tooth backlash) ☐☐☐☐☐

608 slewing drive ☐☐☐☐☐

609 brake function ☐☐☐☐☐

610 speed ☐☐☐☐☐

611 pressure setting ☐☐☐☐☐

612 hydraulic lines ☐☐☐☐☐

700 slewing head with slewing column

701 slewing head ☐☐☐☐☐

702 slewing column bearing ☐☐☐☐☐

703 slewing drive (tooth backlash) ☐☐☐☐☐

704 speed ☐☐☐☐☐

705 pressure settings ☐☐☐☐☐

706 hydraulic lines ☐☐☐☐☐

707 swivel cylinder ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

800 boom					
801 „Arm1“	☐	☐	☐	☐	☐
802 bracket conveying line	☐	☐	☐	☐	☐
803 Drop hook	☐	☐	☐	☐	☐
804 „Arm 2“	☐	☐	☐	☐	☐
805 bracket conveying line	☐	☐	☐	☐	☐
806 Drop hook	☐	☐	☐	☐	☐
807 „Arm 3“	☐	☐	☐	☐	☐
808 bracket conveying line	☐	☐	☐	☐	☐
809 guidance and interlock of the arm	☐	☐	☐	☐	☐
810 „Arm 4“	☐	☐	☐	☐	☐
811 bracket conveying line	☐	☐	☐	☐	☐
812 guidance and interlock of the arm	☐	☐	☐	☐	☐
813 „Arm 5“	☐	☐	☐	☐	☐
814 bracket conveying line	☐	☐	☐	☐	☐
815 guidance and interlock of the arm	☐	☐	☐	☐	☐
900 joint „A“	☐	☐	☐	☐	☐
901 boom	☐	☐	☐	☐	☐
902 link lever	☐	☐	☐	☐	☐
903 forcing rod	☐	☐	☐	☐	☐
904 pin	☐	☐	☐	☐	☐
905 cylinder	☐	☐	☐	☐	☐

906 boom speed	☐	☐	☐	☐	☐
907 pressure settings	☐	☐	☐	☐	☐
908 hydraulic lines	☐	☐	☐	☐	☐
909 load holding valve (piston side)	☐	☐	☐	☐	☐
910 load holding valve (rod side)	☐	☐	☐	☐	☐
1000 joint „B“					
1001 boom	☐	☐	☐	☐	☐
1002 link lever	☐	☐	☐	☐	☐
1003 forcing rod	☐	☐	☐	☐	☐
1004 pin	☐	☐	☐	☐	☐
1005 cylinder	☐	☐	☐	☐	☐
1006 boom speed	☐	☐	☐	☐	☐
1007 pressure settings	☐	☐	☐	☐	☐
1008 hydraulic lines	☐	☐	☐	☐	☐
1009 load holding valve (piston side)	☐	☐	☐	☐	☐
1010 load holding valve (rod side)	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1100 joint "C"

1101 boom	☐☐☐☐☐
1102 link lever	☐☐☐☐☐
1103 forcing rod	☐☐☐☐☐
1104 pin	☐☐☐☐☐
1105 cylinder	☐☐☐☐☐
1106 boom speed	☐☐☐☐☐
1107 pressure settings	☐☐☐☐☐
1108 hydraulic lines	☐☐☐☐☐
1109 load holding valve (piston side)	☐☐☐☐☐
1110 load hokding valve (rod side)	☐☐☐☐☐

1200 joint "D"

1201 boom	☐☐☐☐☐
1202 link lever	☐☐☐☐☐
1203 forcing rod	☐☐☐☐☐
1204 pin	☐☐☐☐☐
1205 cylinder	☐☐☐☐☐
1206 boom speed	☐☐☐☐☐
1207 pressure settings	☐☐☐☐☐
1208 hydraulic lines	☐☐☐☐☐
1209 load holding valve (piston side)	☐☐☐☐☐
1210 load holding valve (rod side)	☐☐☐☐☐

1300 joint „E"

1301 boom	☐☐☐☐☐
1302 link lever	☐☐☐☐☐
1303 forcing rod	☐☐☐☐☐
1304 pin	☐☐☐☐☐
1305 cylinder	☐☐☐☐☐
1306 boom speed	☐☐☐☐☐
1307 pressure settings	☐☐☐☐☐
1308 hydraulic lines	☐☐☐☐☐
1309 load holding valve (piston side)	☐☐☐☐☐
1310 load holding valve (rod side)	☐☐☐☐☐

1400 concrete delivery line

1401 assembly of delivery line DN	☐☐☐☐☐
1402 end hose DN+lenght	☐☐☐☐☐
1403 delivery line DN	☐☐☐☐☐
1404 rotating joints of - delivery line	☐☐☐☐☐
1405 locking pin of the coupling	☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1406 end hose safety device	☐	☐	☐	☐	☐
1407 reducer	☐	☐	☐	☐	☐
1408 gate elbow, elbow 6"	☐	☐	☐	☐	☐
1500 hydraulic system and hydraulic valves					
1501 Pressure relief valve	☐	☐	☐	☐	☐
1502 pressure settings	☐	☐	☐	☐	☐
1503 hydraulic lines	☐	☐	☐	☐	☐
1504 hand oprerating-(function)	☐	☐	☐	☐	☐
1505 boom control valve	☐	☐	☐	☐	☐
1506 hydraulic pump	☐	☐	☐	☐	☐
1600 electric equipment					
1601 remote control (functions)	☐	☐	☐	☐	☐
1602 emergency stop (function)	☐	☐	☐	☐	☐
1603 switch for outrigger function	☐	☐	☐	☐	☐
1604 switch for boom function	☐	☐	☐	☐	☐
1605 wiring harness	☐	☐	☐	☐	☐
1606 central lubrication	☐	☐	☐	☐	☐

1700 sticker sets					
1701 safety hints	☐	☐	☐	☐	☐
1702 description	☐	☐	☐	☐	☐
1703 operating	☐	☐	☐	☐	☐
1704 short operating instruction	☐	☐	☐	☐	☐
1705 sticker „ don't use the boom as crane"	☐	☐	☐	☐	☐
1706 sticker „guideline operating with boom- and concrete pump"	☐	☐	☐	☐	☐
1707 name plate	☐	☐	☐	☐	☐
1708 sticker „danger high voltage"	☐	☐	☐	☐	☐

Competent inspector:

Date: _____

Name: _____

Signature: _____
(stamp)

Customer:

Signature: _____
(stamp)

Inspection report for concrete pump

Inspection report Nr:	Machine-Nr:	Hours of operation:
		Concrete output m³:
Company:	Post code:	City:

NL	WV

Proof – Result of the tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date: .....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no fuction	12 bendet	20 sawing	28 missing components
05 low livetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

2000 documents						
2001 operating manual	☐	☐	☐	☐	☐	
2002 spare parts list	☐	☐	☐	☐	☐	
2100 drive assembly						
2101 coupling and flange	☐	☐	☐	☐	☐	
2200 gear box	☐	☐	☐	☐	☐	
2300 hydraulic pump (main)	☐	☐	☐	☐	☐	
2400 oil-tank	☐	☐	☐	☐	☐	
2500 drive shaft	☐	☐	☐	☐	☐	

2700 hydraulic control system						
2701 pressure relief valve	☐	☐	☐	☐	☐	
2702 pressure setting	☐	☐	☐	☐	☐	
2703 hydraulic line	☐	☐	☐	☐	☐	
2704 mechanical operation by hand	☐	☐	☐	☐	☐	
2800 oil –cooler	☐	☐	☐	☐	☐	
2900 accumulator	☐	☐	☐	☐	☐	
2901 proofs of the required tests according to accumulator regulation	☐	☐	☐	☐	☐	
2902 pressure gauge	☐	☐	☐	☐	☐	

Notes:

Inspection report for concrete pump

Inspection report Nr:

Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
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04 no function	12 bendet	20 sawing	28 missing components
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06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

3000 central lubrication ☐☐☐☐☐	**4600 safety guards, equipment**
3100 hydraulic motor ☐☐☐☐☐	4601 stair ☐☐☐☐☐
3200 hydraulic lines ☐☐☐☐☐	4602 safety for stair ☐☐☐☐☐
3300 air compressor ☐☐☐☐☐	4603 handrail ☐☐☐☐☐
3400 control panel ☐☐☐☐☐	4604 hopper grid (fixing device) ☐☐☐☐☐
3500 concrete pump ☐☐☐☐☐	4606 distance of grid rods ☐☐☐☐☐
3700 S-valve ☐☐☐☐☐	4607 distance from grid to agitator ☐☐☐☐☐
3800 hopper ☐☐☐☐☐	4609 agitator have to stop if grid is open ☐☐☐☐☐
4100 sub frame ☐☐☐☐☐	4610 accumulator have to dump if grid is open ☐☐☐☐☐
4200 water tank ☐☐☐☐☐	4612 cleaning flap hopper ☐☐☐☐☐
4300 axle ☐☐☐☐☐	4613 safety grid into water box ☐☐☐☐☐
4400 water pump ☐☐☐☐☐	
4500 vibrator ☐☐☐☐☐	

Notes:

Inspection report for concrete pump

Inspection report Nr:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
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05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

4614 cover for rotating wave ☐☐☐☐☐

4616 cover for chains ☐☐☐☐☐

4617 cover for shift cylinder ☐☐☐☐☐

4618 cover for moving parts ☐☐☐☐☐

4619 cover for the exhaust pipe ☐☐☐☐☐

4700 electrical system

4701 function of actuator component ☐☐☐☐☐

4702 emergency stop function ☐☐☐☐☐

4703 ground connections ☐☐☐☐☐

4704 cables and wiring harness ☐☐☐☐☐

4705 temperature switch ☐☐☐☐☐

4800 outtrigger - system

4801 transportation lock ☐☐☐☐☐

4802 locking device ☐☐☐☐☐

4803 backing plate ☐☐☐☐☐

4804 jack cylinder connections ☐☐☐☐☐

4805 pressure adjustment of jack cylinder ☐☐☐☐☐

4900 miscellaneous

4901 additional assembled part from operator ☐☐☐☐☐

4902 changes through operator ☐☐☐☐☐

Competent inspector:

Date: .....

Name: .....

Signature: .....
(stamp)

Customer:

Signature: .....
(stamp)

This test report is filed into the test book

Inspection report for concrete booms

Inspection report –Nr:	Machine-Nr	Hours of operation:	
		Concrete output m³:	
Company:	Post code:	City:	
Boom Type:	Boom Nr.	NL	WV

Proof – Result of the Tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date:.....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

100 documents

101 instruction manual ☐☐☐☐☐

102 spare parts list ☐☐☐☐☐

200 sub frame

201 frame connection cpl. ☐☐☐☐☐

300 outrigger front R+L

301 transportation safety device ☐☐☐☐☐

302 outrigger ☐☐☐☐☐

303 extension box ☐☐☐☐☐

304 locking device ☐☐☐☐☐

305 slewing bearing ☐☐☐☐☐

306 turn locking device ☐☐☐☐☐

307 support safeguard ☐☐☐☐☐

308 support plate ☐☐☐☐☐

309 fixing of jack cylinder ☐☐☐☐☐

310 jack cylinder ☐☐☐☐☐

311 swing cylinder ☐☐☐☐☐

312 telescopic-cylinder ☐☐☐☐☐

313 pressure adjustment ☐☐☐☐☐

400 outrigger rear L+R

401 transportation safety device ☐☐☐☐☐

402 outrigger ☐☐☐☐☐

403 extension box ☐☐☐☐☐

405 locking device ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

406 slewing bearing ☐☐☐☐☐

407 turn locking device ☐☐☐☐☐

408 support safeguard ☐☐☐☐☐

409 support plate ☐☐☐☐☐

410 fixing of jack cylinder ☐☐☐☐☐

411 jack cylinder ☐☐☐☐☐

412 swing cylinder ☐☐☐☐☐

413 telescopic cylinder ☐☐☐☐☐

500 pedestal

501 pedestal mounting ☐☐☐☐☐

502 sub frame ☐☐☐☐☐

503 truck frame ☐☐☐☐☐

504 pedestal (structure) ☐☐☐☐☐

505 boom valve without leaking ☐☐☐☐☐

506 boom rest ☐☐☐☐☐

507 transportation safety device ☐☐☐☐☐

508 hydraulic line ☐☐☐☐☐

600 slewing head with ball pivot

601 slewing head ☐☐☐☐☐

602 ball pivot ring ☐☐☐☐☐

603 mounting ball pivot ring ☐☐☐☐☐

604 drive pinion ☐☐☐☐☐

605 slewing drive mounting ☐☐☐☐☐

606 slewing stop device ☐☐☐☐☐

607 slewing drive (tooth backlash) ☐☐☐☐☐

608 slewing drive ☐☐☐☐☐

609 brake function ☐☐☐☐☐

610 speed ☐☐☐☐☐

611 pressure setting ☐☐☐☐☐

612 hydraulic lines ☐☐☐☐☐

700 slewing head with slewing column

701 slewing head ☐☐☐☐☐

702 slewing column bearing ☐☐☐☐☐

703 slewing drive (tooth backlash) ☐☐☐☐☐

704 speed ☐☐☐☐☐

705 pressure settings ☐☐☐☐☐

706 hydraulic lines ☐☐☐☐☐

707 swivel cylinder ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

800 boom
801 „Arm1“
802 bracket conveying line
803 Drop hook
804 „Arm 2“
805 bracket conveying line
806 Drop hook
807 „Arm 3“
808 bracket conveying line
809 guidance and interlock of the arm
810 „Arm 4“
811 bracket conveying line
812 guidance and interlock of the arm
813 „Arm 5“
814 bracket conveying line
815 guidance and interlock of the arm

900 joint „A“
901 boom
902 link lever
903 forcing rod
904 pin
905 cylinder
906 boom speed
907 pressure settings
908 hydraulic lines
909 load holding valve (piston side)
910 load holding valve (rod side)

1000 joint „B“
1001 boom
1002 link lever
1003 forcing rod
1004 pin
1005 cylinder
1006 boom speed
1007 pressure settings
1008 hydraulic lines
1009 load holding valve (piston side)
1010 load holding valve (rod side)

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1100 joint "C"

1101 boom	☐	☐	☐	☐	☐
1102 link lever	☐	☐	☐	☐	☐
1103 forcing rod	☐	☐	☐	☐	☐
1104 pin	☐	☐	☐	☐	☐
1105 cylinder	☐	☐	☐	☐	☐
1106 boom speed	☐	☐	☐	☐	☐
1107 pressure settings	☐	☐	☐	☐	☐
1108 hydraulic lines	☐	☐	☐	☐	☐
1109 load holding valve (piston side)	☐	☐	☐	☐	☐
1110 load hokding valve (rod side)	☐	☐	☐	☐	☐

1200 joint "D"

1201 boom	☐	☐	☐	☐	☐
1202 link lever	☐	☐	☐	☐	☐
1203 forcing rod	☐	☐	☐	☐	☐
1204 pin	☐	☐	☐	☐	☐
1205 cylinder	☐	☐	☐	☐	☐
1206 boom speed	☐	☐	☐	☐	☐
1207 pressure settings	☐	☐	☐	☐	☐
1208 hydraulic lines	☐	☐	☐	☐	☐
1209 load holding valve (piston side)	☐	☐	☐	☐	☐
1210 load holding valve (rod side)	☐	☐	☐	☐	☐

1300 joint „E"

1301 boom	☐	☐	☐	☐	☐
1302 link lever	☐	☐	☐	☐	☐
1303 forcing rod	☐	☐	☐	☐	☐
1304 pin	☐	☐	☐	☐	☐
1305 cylinder	☐	☐	☐	☐	☐
1306 boom speed	☐	☐	☐	☐	☐
1307 pressure settings	☐	☐	☐	☐	☐
1308 hydraulic lines	☐	☐	☐	☐	☐
1309 load holding valve (piston side)	☐	☐	☐	☐	☐
1310 load holding valve (rod side)	☐	☐	☐	☐	☐

1400 concrete delivery line

1401 assembly of delivery line DN	☐	☐	☐	☐	☐
1402 end hose DN+lenght	☐	☐	☐	☐	☐
1403 delivery line DN	☐	☐	☐	☐	☐
1404 rotating joints of - delivery line	☐	☐	☐	☐	☐
1405 locking pin of the coupling	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1406 end hose safety device ☐☐☐☐☐

1407 reducer ☐☐☐☐☐

1408 gate elbow, elbow 6" ☐☐☐☐☐

1500 hydraulic system and hydraulic valves

1501 Pressure relief valve ☐☐☐☐☐

1502 pressure settings ☐☐☐☐☐

1503 hydraulic lines ☐☐☐☐☐

1504 hand oprerating-(function) ☐☐☐☐☐

1505 boom control valve ☐☐☐☐☐

1506 hydraulic pump ☐☐☐☐☐

1600 electric equipment

1601 remote control (functions) ☐☐☐☐☐

1602 emergency stop (function) ☐☐☐☐☐

1603 switch for outrigger function ☐☐☐☐☐

1604 switch for boom function ☐☐☐☐☐

1605 wiring harness ☐☐☐☐☐

1606 central lubrication ☐☐☐☐☐

1700 sticker sets

1701 safety hints ☐☐☐☐☐

1702 description ☐☐☐☐☐

1703 operating ☐☐☐☐☐

1704 short operating instruction ☐☐☐☐☐

1705 sticker „ don´t use the boom as crane" ☐☐☐☐☐

1706 sticker „guideline operating with boom- and concrete pump" ☐☐☐☐☐

1707 name plate ☐☐☐☐☐

1708 sticker „danger high voltage" ☐☐☐☐☐

Competent inspector:

Date: _____

Name: _____

Signature: _____
(stamp)

Customer:

Signature: _____
(stamp)

Inspection report for concrete pump

Inspection report Nr:	Machine-Nr:	Hours of operation:
		Concrete output m³:
Company:	Post code:	City:

NL | WV

Proof – Result of the tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date: .....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no fuction	12 bendet	20 sawing	28 missing components
05 low livetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

2000 documents					
2001 operating manual	☐	☐	☐	☐	☐
2002 spare parts list	☐	☐	☐	☐	☐
2100 drive assembly					
2101 coupling and flange	☐	☐	☐	☐	☐
2200 gear box	☐	☐	☐	☐	☐
2300 hydraulic pump (main)	☐	☐	☐	☐	☐
2400 oil-tank	☐	☐	☐	☐	☐
2500 drive shaft	☐	☐	☐	☐	☐

2700 hydraulic control system					
2701 pressure relief valve	☐	☐	☐	☐	☐
2702 pressure setting	☐	☐	☐	☐	☐
2703 hydraulic line	☐	☐	☐	☐	☐
2704 mechanical operation by hand	☐	☐	☐	☐	☐
2800 oil –cooler	☐	☐	☐	☐	☐
2900 accumulator	☐	☐	☐	☐	☐
2901 proofs of the required tests according to accumulator regulation	☐	☐	☐	☐	☐
2902 pressure gauge	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete pump

Inspection report Nr:

Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

3000 central lubrication	
3100 hydraulic motor	
3200 hydraulic lines	
3300 air compressor	
3400 control panel	
3500 concrete pump	
3700 S-valve	
3800 hopper	
4100 sub frame	
4200 water tank	
4300 axle	
4400 water pump	
4500 vibrator	

4600 safety guards, equipment	
4601 stair	
4602 safety for stair	
4603 handrail	
4604 hopper grid (fixing device)	
4606 distance of grid rods	
4607 distance from grid to agitator	
4609 agitator have to stop if grid is open	
4610 accumulator have to dump if grid is open	
4612 cleaning flap hopper	
4613 safety grid into water box	

Notes:

Inspection report for concrete pump

Inspection report Nr:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

4614 cover for rotating wave	☐	☐	☐	☐	☐
4616 cover for chains	☐	☐	☐	☐	☐
4617 cover for shift cylinder	☐	☐	☐	☐	☐
4618 cover for moving parts	☐	☐	☐	☐	☐
4619 cover for the exhaust pipe	☐	☐	☐	☐	☐
4700 electrical system					
4701 function of actuator component	☐	☐	☐	☐	☐
4702 emergency stop function	☐	☐	☐	☐	☐
4703 ground connections	☐	☐	☐	☐	☐
4704 cables and wiring harness	☐	☐	☐	☐	☐
4705 temperature switch	☐	☐	☐	☐	☐
4800 outtrigger - system					
4801 transportation lock	☐	☐	☐	☐	☐
4802 locking device	☐	☐	☐	☐	☐
4803 backing plate	☐	☐	☐	☐	☐
4804 jack cylinder connections	☐	☐	☐	☐	☐
4805 pressure adjustment of jack cylinder	☐	☐	☐	☐	☐
4900 miscellaneous					
4901 additional assembled part from operator	☐	☐	☐	☐	☐
4902 changes through operator	☐	☐	☐	☐	☐

Competent inspector:

Date: .....

Name: .....

Signature: .....
(stamp)

Customer:

Signature: .....
(stamp)

This test report is filed into the test book

Inspection report for concrete booms

Inspection report –Nr:	Machine-Nr	Hours of operation:	
		Concrete output m³:	
Company:	Post code:	City:	
Boom Type:	Boom Nr.	NL	WV

Proof – Result of the Tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date:.....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

100 documents

101 instruction manual ☐☐☐☐☐

102 spare parts list ☐☐☐☐☐

200 sub frame

201 frame connection cpl. ☐☐☐☐☐

300 outrigger front R+L

301 transportation safety device ☐☐☐☐☐

302 outrigger ☐☐☐☐☐

303 extension box ☐☐☐☐☐

304 locking device ☐☐☐☐☐

305 slewing bearing ☐☐☐☐☐

306 turn locking device ☐☐☐☐☐

307 support safeguard ☐☐☐☐☐

308 support plate ☐☐☐☐☐

309 fixing of jack cylinder ☐☐☐☐☐

310 jack cylinder ☐☐☐☐☐

311 swing cylinder ☐☐☐☐☐

312 telescopic-cylinder ☐☐☐☐☐

313 pressure adjustment ☐☐☐☐☐

400 outrigger rear L+R

401 transportation safety device ☐☐☐☐☐

402 outrigger ☐☐☐☐☐

403 extension box ☐☐☐☐☐

405 locking device ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
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03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

406 slewing bearing ☐☐☐☐☐

407 turn locking device ☐☐☐☐☐

408 support safeguard ☐☐☐☐☐

409 support plate ☐☐☐☐☐

410 fixing of jack cylinder ☐☐☐☐☐

411 jack cylinder ☐☐☐☐☐

412 swing cylinder ☐☐☐☐☐

413 telescopic cylinder ☐☐☐☐☐

500 pedestal

501 pedestal mounting ☐☐☐☐☐

502 sub frame ☐☐☐☐☐

503 truck frame ☐☐☐☐☐

504 pedestal (structure) ☐☐☐☐☐

505 boom valve without leaking ☐☐☐☐☐

506 boom rest ☐☐☐☐☐

507 transportation safety device ☐☐☐☐☐

508 hydraulic line ☐☐☐☐☐

600 slewing head with ball pivot

601 slewing head ☐☐☐☐☐

602 ball pivot ring ☐☐☐☐☐

603 mounting ball pivot ring ☐☐☐☐☐

604 drive pinion ☐☐☐☐☐

605 slewing drive mounting ☐☐☐☐☐

606 slewing stop device ☐☐☐☐☐

607 slewing drive (tooth backlash) ☐☐☐☐☐

608 slewing drive ☐☐☐☐☐

609 brake function ☐☐☐☐☐

610 speed ☐☐☐☐☐

611 pressure setting ☐☐☐☐☐

612 hydraulic lines ☐☐☐☐☐

700 slewing head with slewing column

701 slewing head ☐☐☐☐☐

702 slewing column bearing ☐☐☐☐☐

703 slewing drive (tooth backlash) ☐☐☐☐☐

704 speed ☐☐☐☐☐

705 pressure settings ☐☐☐☐☐

706 hydraulic lines ☐☐☐☐☐

707 swivel cylinder ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

800 boom	
801 „Arm1“	
802 bracket conveying line	
803 Drop hook	
804 „Arm 2“	
805 bracket conveying line	
806 Drop hook	
807 „Arm 3“	
808 bracket conveying line	
809 guidance and interlock of the arm	
810 „Arm 4“	
811 bracket conveying line	
812 guidance and interlock of the arm	
813 „Arm 5“	
814 bracket conveying line	
815 guidance and interlock of the arm	
900 joint „A“	
901 boom	
902 link lever	
903 forcing rod	
904 pin	
905 cylinder	
906 boom speed	
907 pressure settings	
908 hydraulic lines	
909 load holding valve (piston side)	
910 load holding valve (rod side)	
1000 joint „B“	
1001 boom	
1002 link lever	
1003 forcing rod	
1004 pin	
1005 cylinder	
1006 boom speed	
1007 pressure settings	
1008 hydraulic lines	
1009 load holding valve (piston side)	
1010 load holding valve (rod side)	

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1100 joint "C"

1101 boom	☐	☐	☐	☐	☐
1102 link lever	☐	☐	☐	☐	☐
1103 forcing rod	☐	☐	☐	☐	☐
1104 pin	☐	☐	☐	☐	☐
1105 cylinder	☐	☐	☐	☐	☐
1106 boom speed	☐	☐	☐	☐	☐
1107 pressure settings	☐	☐	☐	☐	☐
1108 hydraulic lines	☐	☐	☐	☐	☐
1109 load holding valve (piston side)	☐	☐	☐	☐	☐
1110 load hokding valve (rod side)	☐	☐	☐	☐	☐

1200 joint "D"

1201 boom	☐	☐	☐	☐	☐
1202 link lever	☐	☐	☐	☐	☐
1203 forcing rod	☐	☐	☐	☐	☐
1204 pin	☐	☐	☐	☐	☐
1205 cylinder	☐	☐	☐	☐	☐
1206 boom speed	☐	☐	☐	☐	☐
1207 pressure settings	☐	☐	☐	☐	☐
1208 hydraulic lines	☐	☐	☐	☐	☐
1209 load holding valve (piston side)	☐	☐	☐	☐	☐
1210 load holding valve (rod side)	☐	☐	☐	☐	☐

1300 joint „E"

1301 boom	☐	☐	☐	☐	☐
1302 link lever	☐	☐	☐	☐	☐
1303 forcing rod	☐	☐	☐	☐	☐
1304 pin	☐	☐	☐	☐	☐
1305 cylinder	☐	☐	☐	☐	☐
1306 boom speed	☐	☐	☐	☐	☐
1307 pressure settings	☐	☐	☐	☐	☐
1308 hydraulic lines	☐	☐	☐	☐	☐
1309 load holding valve (piston side)	☐	☐	☐	☐	☐
1310 load holding valve (rod side)	☐	☐	☐	☐	☐

1400 concrete delivery line

1401 assembly of delivery line DN	☐	☐	☐	☐	☐
1402 end hose DN+lenght	☐	☐	☐	☐	☐
1403 delivery line DN	☐	☐	☐	☐	☐
1404 rotating joints of - delivery line	☐	☐	☐	☐	☐
1405 locking pin of the coupling	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1406 end hose safety device	☐	☐	☐	☐	☐
1407 reducer	☐	☐	☐	☐	☐
1408 gate elbow, elbow 6"	☐	☐	☐	☐	☐
1500 hydraulic system and hydraulic valves					
1501 Pressure relief valve	☐	☐	☐	☐	☐
1502 pressure settings	☐	☐	☐	☐	☐
1503 hydraulic lines	☐	☐	☐	☐	☐
1504 hand oprerating-(function)	☐	☐	☐	☐	☐
1505 boom control valve	☐	☐	☐	☐	☐
1506 hydraulic pump	☐	☐	☐	☐	☐
1600 electric equipment					
1601 remote control (functions)	☐	☐	☐	☐	☐
1602 emergency stop (function)	☐	☐	☐	☐	☐
1603 switch for outrigger function	☐	☐	☐	☐	☐
1604 switch for boom function	☐	☐	☐	☐	☐
1605 wiring harness	☐	☐	☐	☐	☐
1606 central lubrication	☐	☐	☐	☐	☐

1700 sticker sets					
1701 safety hints	☐	☐	☐	☐	☐
1702 description	☐	☐	☐	☐	☐
1703 operating	☐	☐	☐	☐	☐
1704 short operating instruction	☐	☐	☐	☐	☐
1705 sticker „ don't use the boom as crane"	☐	☐	☐	☐	☐
1706 sticker „guideline operating with boom- and concrete pump"	☐	☐	☐	☐	☐
1707 name plate	☐	☐	☐	☐	☐
1708 sticker „danger high voltage"	☐	☐	☐	☐	☐

Competent inspector:

Date: _____

Name: _____

Signature: _____
(stamp)

Customer:

Signature: _____
(stamp)

Inspection report for concrete pump

Inspection report Nr:	Machine-Nr:	Hours of operation:
		Concrete output m³:
Company:	Post code:	City:

	NL	WV

Proof – Result of the tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date:.....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no fuction	12 bendet	20 sawing	28 missing components
05 low livetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

2000 documents						**2700 hydraulic control system**						
2001 operating manual	☐	☐	☐	☐	☐	2701 pressure relief valve	☐	☐	☐	☐	☐
2002 spare parts list	☐	☐	☐	☐	☐	2702 pressure setting	☐	☐	☐	☐	☐
2100 drive assembly						2703 hydraulic line	☐	☐	☐	☐	☐
2101 coupling and flange	☐	☐	☐	☐	☐	2704 mechanical operation by hand	☐	☐	☐	☐	☐
2200 gear box	☐	☐	☐	☐	☐	**2800 oil –cooler**	☐	☐	☐	☐	☐
2300 hydraulic pump (main)	☐	☐	☐	☐	☐	**2900 accumulator**	☐	☐	☐	☐	☐
2400 oil-tank	☐	☐	☐	☐	☐	2901 proofs of the required tests according to accumulator regulation	☐	☐	☐	☐	☐
2500 drive shaft	☐	☐	☐	☐	☐	2902 pressure gauge	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete pump

Inspection report Nr:

Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

3000 central lubrication	
3100 hydraulic motor	
3200 hydraulic lines	
3300 air compressor	
3400 control panel	
3500 concrete pump	
3700 S-valve	
3800 hopper	
4100 sub frame	
4200 water tank	
4300 axle	
4400 water pump	
4500 vibrator	

4600 safety guards, equipment	
4601 stair	
4602 safety for stair	
4603 handrail	
4604 hopper grid (fixing device)	
4606 distance of grid rods	
4607 distance from grid to agitator	
4609 agitator have to stop if grid is open	
4610 accumulator have to dump if grid is open	
4612 cleaning flap hopper	
4613 safety grid into water box	

Notes:

Inspection report for concrete pump

Inspection report Nr:

Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

4614 cover for rotating wave	☐	☐	☐	☐	☐
4616 cover for chains	☐	☐	☐	☐	☐
4617 cover for shift cylinder	☐	☐	☐	☐	☐
4618 cover for moving parts	☐	☐	☐	☐	☐
4619 cover for the exhaust pipe	☐	☐	☐	☐	☐
4700 electrical system					
4701 function of actuator component	☐	☐	☐	☐	☐
4702 emergency stop function	☐	☐	☐	☐	☐
4703 ground connections	☐	☐	☐	☐	☐
4704 cables and wiring harness	☐	☐	☐	☐	☐
4705 temperature switch	☐	☐	☐	☐	☐
4800 outtrigger - system					
4801 transportation lock	☐	☐	☐	☐	☐
4802 locking device	☐	☐	☐	☐	☐
4803 backing plate	☐	☐	☐	☐	☐
4804 jack cylinder connections	☐	☐	☐	☐	☐
4805 pressure adjustment of jack cylinder	☐	☐	☐	☐	☐
4900 miscellaneous					
4901 additional assembled part from operator	☐	☐	☐	☐	☐
4902 changes through operator	☐	☐	☐	☐	☐

Competent inspector:

Date: .....

Name: .....

Signature: .....
(stamp)

Customer:

Signature: .....
(stamp)

This test report is filed into the test book

Inspection report for concrete booms

Inspection report –Nr:	Machine-Nr	Hours of operation:	
		Concrete output m³:	
Company:	Post code:	City:	
Boom Type:	Boom Nr.	NL	WV

Proof – Result of the Tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date:.....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

100 documents

101 instruction manual ☐☐☐☐☐

102 spare parts list ☐☐☐☐☐

200 sub frame

201 frame connection cpl. ☐☐☐☐☐

300 outrigger front R+L

301 transportation safety device ☐☐☐☐☐

302 outrigger ☐☐☐☐☐

303 extension box ☐☐☐☐☐

304 locking device ☐☐☐☐☐

305 slewing bearing ☐☐☐☐☐

306 turn locking device ☐☐☐☐☐

307 support safeguard ☐☐☐☐☐

308 support plate ☐☐☐☐☐

309 fixing of jack cylinder ☐☐☐☐☐

310 jack cylinder ☐☐☐☐☐

311 swing cylinder ☐☐☐☐☐

312 telescopic-cylinder ☐☐☐☐☐

313 pressure adjustment ☐☐☐☐☐

400 outrigger rear L+R

401 transportation safety device ☐☐☐☐☐

402 outrigger ☐☐☐☐☐

403 extension box ☐☐☐☐☐

405 locking device ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

406 slewing bearing ☐☐☐☐☐

407 turn locking device ☐☐☐☐☐

408 support safeguard ☐☐☐☐☐

409 support plate ☐☐☐☐☐

410 fixing of jack cylinder ☐☐☐☐☐

411 jack cylinder ☐☐☐☐☐

412 swing cylinder ☐☐☐☐☐

413 telescopic cylinder ☐☐☐☐☐

500 pedestal

501 pedestal mounting ☐☐☐☐☐

502 sub frame ☐☐☐☐☐

503 truck frame ☐☐☐☐☐

504 pedestal (structure) ☐☐☐☐☐

505 boom valve without leaking ☐☐☐☐☐

506 boom rest ☐☐☐☐☐

507 transportation safety device ☐☐☐☐☐

508 hydraulic line ☐☐☐☐☐

600 slewing head with ball pivot

601 slewing head ☐☐☐☐☐

602 ball pivot ring ☐☐☐☐☐

603 mounting ball pivot ring ☐☐☐☐☐

604 drive pinion ☐☐☐☐☐

605 slewing drive mounting ☐☐☐☐☐

606 slewing stop device ☐☐☐☐☐

607 slewing drive (tooth backlash) ☐☐☐☐☐

608 slewing drive ☐☐☐☐☐

609 brake function ☐☐☐☐☐

610 speed ☐☐☐☐☐

611 pressure setting ☐☐☐☐☐

612 hydraulic lines ☐☐☐☐☐

700 slewing head with slewing column

701 slewing head ☐☐☐☐☐

702 slewing column bearing ☐☐☐☐☐

703 slewing drive (tooth backlash) ☐☐☐☐☐

704 speed ☐☐☐☐☐

705 pressure settings ☐☐☐☐☐

706 hydraulic lines ☐☐☐☐☐

707 swivel cylinder ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

800 boom						
801 „Arm1“						
802 bracket conveying line						
803 Drop hook						
804 „Arm 2“						
805 bracket conveying line						
806 Drop hook						
807 „Arm 3“						
808 bracket conveying line						
809 guidance and interlock of the arm						
810 „Arm 4“						
811 bracket conveying line						
812 guidance and interlock of the arm						
813 „Arm 5“						
814 bracket conveying line						
815 guidance and interlock of the arm						
900 joint „A“						
901 boom						
902 link lever						
903 forcing rod						
904 pin						
905 cylinder						
906 boom speed						
907 pressure settings						
908 hydraulic lines						
909 load holding valve (piston side)						
910 load holding valve (rod side)						
1000 joint „B“						
1001 boom						
1002 link lever						
1003 forcing rod						
1004 pin						
1005 cylinder						
1006 boom speed						
1007 pressure settings						
1008 hydraulic lines						
1009 load holding valve (piston side)						
1010 load holding valve (rod side)						

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1100 joint "C"

1101 boom	☐	☐	☐	☐	☐
1102 link lever	☐	☐	☐	☐	☐
1103 forcing rod	☐	☐	☐	☐	☐
1104 pin	☐	☐	☐	☐	☐
1105 cylinder	☐	☐	☐	☐	☐
1106 boom speed	☐	☐	☐	☐	☐
1107 pressure settings	☐	☐	☐	☐	☐
1108 hydraulic lines	☐	☐	☐	☐	☐
1109 load holding valve (piston side)	☐	☐	☐	☐	☐
1110 load hokding valve (rod side)	☐	☐	☐	☐	☐

1200 joint "D"

1201 boom	☐	☐	☐	☐	☐
1202 link lever	☐	☐	☐	☐	☐
1203 forcing rod	☐	☐	☐	☐	☐
1204 pin	☐	☐	☐	☐	☐
1205 cylinder	☐	☐	☐	☐	☐
1206 boom speed	☐	☐	☐	☐	☐
1207 pressure settings	☐	☐	☐	☐	☐
1208 hydraulic lines	☐	☐	☐	☐	☐
1209 load holding valve (piston side)	☐	☐	☐	☐	☐
1210 load holding valve (rod side)	☐	☐	☐	☐	☐

1300 joint „E"

1301 boom	☐	☐	☐	☐	☐
1302 link lever	☐	☐	☐	☐	☐
1303 forcing rod	☐	☐	☐	☐	☐
1304 pin	☐	☐	☐	☐	☐
1305 cylinder	☐	☐	☐	☐	☐
1306 boom speed	☐	☐	☐	☐	☐
1307 pressure settings	☐	☐	☐	☐	☐
1308 hydraulic lines	☐	☐	☐	☐	☐
1309 load holding valve (piston side)	☐	☐	☐	☐	☐
1310 load holding valve (rod side)	☐	☐	☐	☐	☐

1400 concrete delivery line

1401 assembly of delivery line DN	☐	☐	☐	☐	☐
1402 end hose DN+lenght	☐	☐	☐	☐	☐
1403 delivery line DN	☐	☐	☐	☐	☐
1404 rotating joints of - delivery line	☐	☐	☐	☐	☐
1405 locking pin of the coupling	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1406 end hose safety device ☐☐☐☐☐

1407 reducer ☐☐☐☐☐

1408 gate elbow, elbow 6" ☐☐☐☐☐

1500 hydraulic system and hydraulic valves

1501 Pressure relief valve ☐☐☐☐☐

1502 pressure settings ☐☐☐☐☐

1503 hydraulic lines ☐☐☐☐☐

1504 hand oprerating-(function) ☐☐☐☐☐

1505 boom control valve ☐☐☐☐☐

1506 hydraulic pump ☐☐☐☐☐

1600 electric equipment

1601 remote control (functions) ☐☐☐☐☐

1602 emergency stop (function) ☐☐☐☐☐

1603 switch for outrigger function ☐☐☐☐☐

1604 switch for boom function ☐☐☐☐☐

1605 wiring harness ☐☐☐☐☐

1606 central lubrication ☐☐☐☐☐

1700 sticker sets

1701 safety hints ☐☐☐☐☐

1702 description ☐☐☐☐☐

1703 operating ☐☐☐☐☐

1704 short operating instruction ☐☐☐☐☐

1705 sticker „ don't use the boom as crane" ☐☐☐☐☐

1706 sticker „guideline operating with boom- and concrete pump" ☐☐☐☐☐

1707 name plate ☐☐☐☐☐

1708 sticker „danger high voltage" ☐☐☐☐☐

Competent inspector:

Date: _____

Name: _____

Signature: _____
(stamp)

Customer:

Signature: _____
(stamp)

Inspection report for concrete pump

Inspection report Nr:	Machine-Nr:	Hours of operation:
		Concrete output m³:
Company:	Post code:	City:

NL | WV

Proof – Result of the tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date:.....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no fuction	12 bendet	20 sawing	28 missing components
05 low livetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

2000 documents						**2700 hydraulic control system**						
2001 operating manual	☐	☐	☐	☐	☐	2701 pressure relief valve	☐	☐	☐	☐	☐
2002 spare parts list	☐	☐	☐	☐	☐	2702 pressure setting	☐	☐	☐	☐	☐
2100 drive assembly						2703 hydraulic line	☐	☐	☐	☐	☐
2101 coupling and flange	☐	☐	☐	☐	☐	2704 mechanical operation by hand	☐	☐	☐	☐	☐
2200 gear box	☐	☐	☐	☐	☐	**2800 oil –cooler**	☐	☐	☐	☐	☐
2300 hydraulic pump (main)	☐	☐	☐	☐	☐	**2900 accumulator**	☐	☐	☐	☐	☐
2400 oil-tank	☐	☐	☐	☐	☐	2901 proofs of the required tests according to accumulator regulation	☐	☐	☐	☐	☐
2500 drive shaft	☐	☐	☐	☐	☐	2902 pressure gauge	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete pump

Inspection report Nr:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
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06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

3000 central lubrication ☐☐☐☐☐	**4600 safety guards, equipment**
3100 hydraulic motor ☐☐☐☐☐	4601 stair ☐☐☐☐☐
3200 hydraulic lines ☐☐☐☐☐	4602 safety for stair ☐☐☐☐☐
3300 air compressor ☐☐☐☐☐	4603 handrail ☐☐☐☐☐
3400 control panel ☐☐☐☐☐	4604 hopper grid (fixing device) ☐☐☐☐☐
3500 concrete pump ☐☐☐☐☐	4606 distance of grid rods ☐☐☐☐☐
3700 S-valve ☐☐☐☐☐	4607 distance from grid to agitator ☐☐☐☐☐
3800 hopper ☐☐☐☐☐	4609 agitator have to stop if grid is open ☐☐☐☐☐
4100 sub frame ☐☐☐☐☐	4610 accumulator have to dump if grid is open ☐☐☐☐☐
4200 water tank ☐☐☐☐☐	4612 cleaning flap hopper ☐☐☐☐☐
4300 axle ☐☐☐☐☐	4613 safety grid into water box ☐☐☐☐☐
4400 water pump ☐☐☐☐☐	
4500 vibrator ☐☐☐☐☐	

Notes:

Inspection report for concrete pump

Inspection report Nr:

Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

4614 cover for rotating wave ☐☐☐☐☐

4616 cover for chains ☐☐☐☐☐

4617 cover for shift cylinder ☐☐☐☐☐

4618 cover for moving parts ☐☐☐☐☐

4619 cover for the exhaust pipe ☐☐☐☐☐

4700 electrical system

4701 function of actuator component ☐☐☐☐☐

4702 emergency stop function ☐☐☐☐☐

4703 ground connections ☐☐☐☐☐

4704 cables and wiring harness ☐☐☐☐☐

4705 temperature switch ☐☐☐☐☐

4800 outtrigger - system

4801 transportation lock ☐☐☐☐☐

4802 locking device ☐☐☐☐☐

4803 backing plate ☐☐☐☐☐

4804 jack cylinder connections ☐☐☐☐☐

4805 pressure adjustment of jack cylinder ☐☐☐☐☐

4900 miscellaneous

4901 additional assembled part from operator ☐☐☐☐☐

4902 changes through operator ☐☐☐☐☐

Competent inspector:

Date: .....

Name: .....

Signature: .....
(stamp)

Customer:

Signature: .....
(stamp)

This test report is filed into the test book

Inspection report for concrete booms

Inspection report –Nr:	Machine-Nr	Hours of operation:	
		Concrete output m³:	
Company:	Post code:	City:	
Boom Type:	Boom Nr.	NL	WV

Proof – Result of the Tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date:.....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

100 documents

101 instruction manual ☐☐☐☐☐

102 spare parts list ☐☐☐☐☐

200 sub frame

201 frame connection cpl. ☐☐☐☐☐

300 outrigger front R+L

301 transportation safety device ☐☐☐☐☐

302 outrigger ☐☐☐☐☐

303 extension box ☐☐☐☐☐

304 locking device ☐☐☐☐☐

305 slewing bearing ☐☐☐☐☐

306 turn locking device ☐☐☐☐☐

307 support safeguard ☐☐☐☐☐

308 support plate ☐☐☐☐☐

309 fixing of jack cylinder ☐☐☐☐☐

310 jack cylinder ☐☐☐☐☐

311 swing cylinder ☐☐☐☐☐

312 telescopic-cylinder ☐☐☐☐☐

313 pressure adjustment ☐☐☐☐☐

400 outrigger rear L+R

401 transportation safety device ☐☐☐☐☐

402 outrigger ☐☐☐☐☐

403 extension box ☐☐☐☐☐

405 locking device ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

406 slewing bearing ☐☐☐☐☐

407 turn locking device ☐☐☐☐☐

408 support safeguard ☐☐☐☐☐

409 support plate ☐☐☐☐☐

410 fixing of jack cylinder ☐☐☐☐☐

411 jack cylinder ☐☐☐☐☐

412 swing cylinder ☐☐☐☐☐

413 telescopic cylinder ☐☐☐☐☐

500 pedestal

501 pedestal mounting ☐☐☐☐☐

502 sub frame ☐☐☐☐☐

503 truck frame ☐☐☐☐☐

504 pedestal (structure) ☐☐☐☐☐

505 boom valve without leaking ☐☐☐☐☐

506 boom rest ☐☐☐☐☐

507 transportation safety device ☐☐☐☐☐

508 hydraulic line ☐☐☐☐☐

600 slewing head with ball pivot

601 slewing head ☐☐☐☐☐

602 ball pivot ring ☐☐☐☐☐

603 mounting ball pivot ring ☐☐☐☐☐

604 drive pinion ☐☐☐☐☐

605 slewing drive mounting ☐☐☐☐☐

606 slewing stop device ☐☐☐☐☐

607 slewing drive (tooth backlash) ☐☐☐☐☐

608 slewing drive ☐☐☐☐☐

609 brake function ☐☐☐☐☐

610 speed ☐☐☐☐☐

611 pressure setting ☐☐☐☐☐

612 hydraulic lines ☐☐☐☐☐

700 slewing head with slewing column

701 slewing head ☐☐☐☐☐

702 slewing column bearing ☐☐☐☐☐

703 slewing drive (tooth backlash) ☐☐☐☐☐

704 speed ☐☐☐☐☐

705 pressure settings ☐☐☐☐☐

706 hydraulic lines ☐☐☐☐☐

707 swivel cylinder ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

800 boom
801 „Arm1“
802 bracket conveying line
803 Drop hook
804 „Arm 2“
805 bracket conveying line
806 Drop hook
807 „Arm 3“
808 bracket conveying line
809 guidance and interlock of the arm
810 „Arm 4“
811 bracket conveying line
812 guidance and interlock of the arm
813 „Arm 5“
814 bracket conveying line
815 guidance and interlock of the arm

900 joint „A“
901 boom
902 link lever
903 forcing rod
904 pin
905 cylinder
906 boom speed
907 pressure settings
908 hydraulic lines
909 load holding valve (piston side)
910 load holding valve (rod side)

1000 joint „B“
1001 boom
1002 link lever
1003 forcing rod
1004 pin
1005 cylinder
1006 boom speed
1007 pressure settings
1008 hydraulic lines
1009 load holding valve (piston side)
1010 load holding valve (rod side)

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1100 joint "C"

1101 boom	☐	☐	☐	☐	☐
1102 link lever	☐	☐	☐	☐	☐
1103 forcing rod	☐	☐	☐	☐	☐
1104 pin	☐	☐	☐	☐	☐
1105 cylinder	☐	☐	☐	☐	☐
1106 boom speed	☐	☐	☐	☐	☐
1107 pressure settings	☐	☐	☐	☐	☐
1108 hydraulic lines	☐	☐	☐	☐	☐
1109 load holding valve (piston side)	☐	☐	☐	☐	☐
1110 load hokding valve (rod side)	☐	☐	☐	☐	☐

1200 joint "D"

1201 boom	☐	☐	☐	☐	☐
1202 link lever	☐	☐	☐	☐	☐
1203 forcing rod	☐	☐	☐	☐	☐
1204 pin	☐	☐	☐	☐	☐
1205 cylinder	☐	☐	☐	☐	☐
1206 boom speed	☐	☐	☐	☐	☐
1207 pressure settings	☐	☐	☐	☐	☐
1208 hydraulic lines	☐	☐	☐	☐	☐
1209 load holding valve (piston side)	☐	☐	☐	☐	☐
1210 load holding valve (rod side)	☐	☐	☐	☐	☐

1300 joint „E"

1301 boom	☐	☐	☐	☐	☐
1302 link lever	☐	☐	☐	☐	☐
1303 forcing rod	☐	☐	☐	☐	☐
1304 pin	☐	☐	☐	☐	☐
1305 cylinder	☐	☐	☐	☐	☐
1306 boom speed	☐	☐	☐	☐	☐
1307 pressure settings	☐	☐	☐	☐	☐
1308 hydraulic lines	☐	☐	☐	☐	☐
1309 load holding valve (piston side)	☐	☐	☐	☐	☐
1310 load holding valve (rod side)	☐	☐	☐	☐	☐

1400 concrete delivery line

1401 assembly of delivery line DN	☐	☐	☐	☐	☐
1402 end hose DN+lenght	☐	☐	☐	☐	☐
1403 delivery line DN	☐	☐	☐	☐	☐
1404 rotating joints of - delivery line	☐	☐	☐	☐	☐
1405 locking pin of the coupling	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1406 end hose safety device ☐☐☐☐☐

1407 reducer ☐☐☐☐☐

1408 gate elbow, elbow 6" ☐☐☐☐☐

1500 hydraulic system and hydraulic valves

1501 Pressure relief valve ☐☐☐☐☐

1502 pressure settings ☐☐☐☐☐

1503 hydraulic lines ☐☐☐☐☐

1504 hand oprerating-(function) ☐☐☐☐☐

1505 boom control valve ☐☐☐☐☐

1506 hydraulic pump ☐☐☐☐☐

1600 electric equipment

1601 remote control (functions) ☐☐☐☐☐

1602 emergency stop (function) ☐☐☐☐☐

1603 switch for outrigger function ☐☐☐☐☐

1604 switch for boom function ☐☐☐☐☐

1605 wiring harness ☐☐☐☐☐

1606 central lubrication ☐☐☐☐☐

1700 sticker sets

1701 safety hints ☐☐☐☐☐

1702 description ☐☐☐☐☐

1703 operating ☐☐☐☐☐

1704 short operating instruction ☐☐☐☐☐

1705 sticker „ don´t use the boom as crane" ☐☐☐☐☐

1706 sticker „guideline operating with boom- and concrete pump" ☐☐☐☐☐

1707 name plate ☐☐☐☐☐

1708 sticker „danger high voltage" ☐☐☐☐☐

Competent inspector:

Date: _____

Name: _____

Signature: _____
(stamp)

Customer:

Signature: _____
(stamp)

Inspection report for concrete pump

Inspection report Nr:	Machine-Nr:	Hours of operation:
		Concrete output m³:
Company:	Post code:	City:

NL | WV

Proof – Result of the tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date:.....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no fuction	12 bendet	20 sawing	28 missing components
05 low livetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

2000 documents						**2700 hydraulic control system**						
2001 operating manual	☐	☐	☐	☐	☐	2701 pressure relief valve	☐	☐	☐	☐	☐
2002 spare parts list	☐	☐	☐	☐	☐	2702 pressure setting	☐	☐	☐	☐	☐
2100 drive assembly						2703 hydraulic line	☐	☐	☐	☐	☐
2101 coupling and flange	☐	☐	☐	☐	☐	2704 mechanical operation by hand	☐	☐	☐	☐	☐
2200 gear box	☐	☐	☐	☐	☐	**2800 oil –cooler**	☐	☐	☐	☐	☐
2300 hydraulic pump (main)	☐	☐	☐	☐	☐	**2900 accumulator**	☐	☐	☐	☐	☐
2400 oil-tank	☐	☐	☐	☐	☐	2901 proofs of the required tests according to accumulator regulation	☐	☐	☐	☐	☐
2500 drive shaft	☐	☐	☐	☐	☐	2902 pressure gauge	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete pump

Inspection report Nr:

Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

3000 central lubrication	
3100 hydraulic motor	
3200 hydraulic lines	
3300 air compressor	
3400 control panel	
3500 concrete pump	
3700 S-valve	
3800 hopper	
4100 sub frame	
4200 water tank	
4300 axle	
4400 water pump	
4500 vibrator	

4600 safety guards, equipment	
4601 stair	
4602 safety for stair	
4603 handrail	
4604 hopper grid (fixing device)	
4606 distance of grid rods	
4607 distance from grid to agitator	
4609 agitator have to stop if grid is open	
4610 accumulator have to dump if grid is open	
4612 cleaning flap hopper	
4613 safety grid into water box	

Notes:

Inspection report for concrete pump

Inspection report Nr: | Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

4614 cover for rotating wave ☐☐☐☐☐

4616 cover for chains ☐☐☐☐☐

4617 cover for shift cylinder ☐☐☐☐☐

4618 cover for moving parts ☐☐☐☐☐

4619 cover for the exhaust pipe ☐☐☐☐☐

4700 electrical system

4701 function of actuator component ☐☐☐☐☐

4702 emergency stop function ☐☐☐☐☐

4703 ground connections ☐☐☐☐☐

4704 cables and wiring harness ☐☐☐☐☐

4705 temperature switch ☐☐☐☐☐

4800 outtrigger - system

4801 transportation lock ☐☐☐☐☐

4802 locking device ☐☐☐☐☐

4803 backing plate ☐☐☐☐☐

4804 jack cylinder connections ☐☐☐☐☐

4805 pressure adjustment of jack cylinder ☐☐☐☐☐

4900 miscellaneous

4901 additional assembled part from operator ☐☐☐☐☐

4902 changes through operator ☐☐☐☐☐

Competent inspector:

Date: .....

Name: .....

Signature: .....
(stamp)

Customer:

Signature: .....
(stamp)

This test report is filed into the test book

Inspection report for concrete booms

Inspection report –Nr:	Machine-Nr	Hours of operation:	
		Concrete output m³:	
Company:	Post code:	City:	
Boom Type:	Boom Nr.	NL	WV

Proof – Result of the Tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date: .....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

100 documents

101 instruction manual ☐☐☐☐☐

102 spare parts list ☐☐☐☐☐

200 sub frame

201 frame connection cpl. ☐☐☐☐☐

300 outrigger front R+L

301 transportation safety device ☐☐☐☐☐

302 outrigger ☐☐☐☐☐

303 extension box ☐☐☐☐☐

304 locking device ☐☐☐☐☐

305 slewing bearing ☐☐☐☐☐

306 turn locking device ☐☐☐☐☐

307 support safeguard ☐☐☐☐☐

308 support plate ☐☐☐☐☐

309 fixing of jack cylinder ☐☐☐☐☐

310 jack cylinder ☐☐☐☐☐

311 swing cylinder ☐☐☐☐☐

312 telescopic-cylinder ☐☐☐☐☐

313 pressure adjustment ☐☐☐☐☐

400 outrigger rear L+R

401 transportation safety device ☐☐☐☐☐

402 outrigger ☐☐☐☐☐

403 extension box ☐☐☐☐☐

405 locking device ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

406 slewing bearing ☐☐☐☐☐

407 turn locking device ☐☐☐☐☐

408 support safeguard ☐☐☐☐☐

409 support plate ☐☐☐☐☐

410 fixing of jack cylinder ☐☐☐☐☐

411 jack cylinder ☐☐☐☐☐

412 swing cylinder ☐☐☐☐☐

413 telescopic cylinder ☐☐☐☐☐

500 pedestal

501 pedestal mounting ☐☐☐☐☐

502 sub frame ☐☐☐☐☐

503 truck frame ☐☐☐☐☐

504 pedestal (structure) ☐☐☐☐☐

505 boom valve without leaking ☐☐☐☐☐

506 boom rest ☐☐☐☐☐

507 transportation safety device ☐☐☐☐☐

508 hydraulic line ☐☐☐☐☐

600 slewing head with ball pivot

601 slewing head ☐☐☐☐☐

602 ball pivot ring ☐☐☐☐☐

603 mounting ball pivot ring ☐☐☐☐☐

604 drive pinion ☐☐☐☐☐

605 slewing drive mounting ☐☐☐☐☐

606 slewing stop device ☐☐☐☐☐

607 slewing drive (tooth backlash) ☐☐☐☐☐

608 slewing drive ☐☐☐☐☐

609 brake function ☐☐☐☐☐

610 speed ☐☐☐☐☐

611 pressure setting ☐☐☐☐☐

612 hydraulic lines ☐☐☐☐☐

700 slewing head with slewing column

701 slewing head ☐☐☐☐☐

702 slewing column bearing ☐☐☐☐☐

703 slewing drive (tooth backlash) ☐☐☐☐☐

704 speed ☐☐☐☐☐

705 pressure settings ☐☐☐☐☐

706 hydraulic lines ☐☐☐☐☐

707 swivel cylinder ☐☐☐☐☐

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
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04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

800 boom
801 „Arm1“
802 bracket conveying line
803 Drop hook
804 „Arm 2“
805 bracket conveying line
806 Drop hook
807 „Arm 3“
808 bracket conveying line
809 guidance and interlock of the arm
810 „Arm 4“
811 bracket conveying line
812 guidance and interlock of the arm
813 „Arm 5“
814 bracket conveying line
815 guidance and interlock of the arm

900 joint „A“
901 boom
902 link lever
903 forcing rod
904 pin
905 cylinder
906 boom speed
907 pressure settings
908 hydraulic lines
909 load holding valve (piston side)
910 load holding valve (rod side)

1000 joint „B“
1001 boom
1002 link lever
1003 forcing rod
1004 pin
1005 cylinder
1006 boom speed
1007 pressure settings
1008 hydraulic lines
1009 load holding valve (piston side)
1010 load holding valve (rod side)

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
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03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1100 joint "C"

1101 boom
1102 link lever
1103 forcing rod
1104 pin
1105 cylinder
1106 boom speed
1107 pressure settings
1108 hydraulic lines
1109 load holding valve (piston side)
1110 load hokding valve (rod side)

1200 joint "D"

1201 boom
1202 link lever
1203 forcing rod
1204 pin
1205 cylinder
1206 boom speed
1207 pressure settings
1208 hydraulic lines
1209 load holding valve (piston side)
1210 load holding valve (rod side)

1300 joint „E"

1301 boom
1302 link lever
1303 forcing rod
1304 pin
1305 cylinder
1306 boom speed
1307 pressure settings
1308 hydraulic lines
1309 load holding valve (piston side)
1310 load holding valve (rod side)

1400 concrete delivery line

1401 assembly of delivery line DN
1402 end hose DN+lenght
1403 delivery line DN
1404 rotating joints of - delivery line
1405 locking pin of the coupling

Notes:

Inspection report for concrete booms

Inspection report Nr:	Boom type:	Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
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03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

1406 end hose safety device	☐	☐	☐	☐	☐
1407 reducer	☐	☐	☐	☐	☐
1408 gate elbow, elbow 6"	☐	☐	☐	☐	☐
1500 hydraulic system and hydraulic valves					
1501 Pressure relief valve	☐	☐	☐	☐	☐
1502 pressure settings	☐	☐	☐	☐	☐
1503 hydraulic lines	☐	☐	☐	☐	☐
1504 hand oprerating-(function)	☐	☐	☐	☐	☐
1505 boom control valve	☐	☐	☐	☐	☐
1506 hydraulic pump	☐	☐	☐	☐	☐
1600 electric equipment					
1601 remote control (functions)	☐	☐	☐	☐	☐
1602 emergency stop (function)	☐	☐	☐	☐	☐
1603 switch for outrigger function	☐	☐	☐	☐	☐
1604 switch for boom function	☐	☐	☐	☐	☐
1605 wiring harness	☐	☐	☐	☐	☐
1606 central lubrication	☐	☐	☐	☐	☐

1700 sticker sets					
1701 safety hints	☐	☐	☐	☐	☐
1702 description	☐	☐	☐	☐	☐
1703 operating	☐	☐	☐	☐	☐
1704 short operating instruction	☐	☐	☐	☐	☐
1705 sticker „ don´t use the boom as crane"	☐	☐	☐	☐	☐
1706 sticker „guideline operating with boom- and concrete pump"	☐	☐	☐	☐	☐
1707 name plate	☐	☐	☐	☐	☐
1708 sticker „danger high voltage"	☐	☐	☐	☐	☐

Competent inspector:

Date: _____

Name: _____

Signature: _____
(stamp)

Customer:

Signature: _____
(stamp)

Inspection report for concrete pump

Inspection report Nr:	Machine-Nr:	Hours of operation:
		Concrete output m³:
Company:	Post code:	City:

NL	WV

Proof – Result of the tests

without defects	defects	reinspection required	**shut down**
☐	☐	☐	☐

Reinspection until date:.....

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
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04 no fuction	12 bendet	20 sawing	28 missing components
05 low livetime	13 noises	21 contaminated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

2000 documents					
2001 operating manual	☐	☐	☐	☐	☐
2002 spare parts list	☐	☐	☐	☐	☐
2100 drive assembly					
2101 coupling and flange	☐	☐	☐	☐	☐
2200 gear box	☐	☐	☐	☐	☐
2300 hydraulic pump (main)	☐	☐	☐	☐	☐
2400 oil-tank	☐	☐	☐	☐	☐
2500 drive shaft	☐	☐	☐	☐	☐

2700 hydraulic control system					
2701 pressure relief valve	☐	☐	☐	☐	☐
2702 pressure setting	☐	☐	☐	☐	☐
2703 hydraulic line	☐	☐	☐	☐	☐
2704 mechanical operation by hand	☐	☐	☐	☐	☐
2800 oil –cooler	☐	☐	☐	☐	☐
2900 accumulator	☐	☐	☐	☐	☐
2901 proofs of the required tests according to accumulator regulation	☐	☐	☐	☐	☐
2902 pressure gauge	☐	☐	☐	☐	☐

Notes:

Inspection report for concrete pump

Inspection report Nr:

Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
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05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

3000 central lubrication	☐☐☐☐☐
3100 hydraulic motor	☐☐☐☐☐
3200 hydraulic lines	☐☐☐☐☐
3300 air compressor	☐☐☐☐☐
3400 control panel	☐☐☐☐☐
3500 concrete pump	☐☐☐☐☐
3700 S-valve	☐☐☐☐☐
3800 hopper	☐☐☐☐☐
4100 sub frame	☐☐☐☐☐
4200 water tank	☐☐☐☐☐
4300 axle	☐☐☐☐☐
4400 water pump	☐☐☐☐☐
4500 vibrator	☐☐☐☐☐

4600 safety guards, equipment	
4601 stair	☐☐☐☐☐
4602 safety for stair	☐☐☐☐☐
4603 handrail	☐☐☐☐☐
4604 hopper grid (fixing device)	☐☐☐☐☐
4606 distance of grid rods	☐☐☐☐☐
4607 distance from grid to agitator	☐☐☐☐☐
4609 agitator have to stop if grid is open	☐☐☐☐☐
4610 accumulator have to dump if grid is open	☐☐☐☐☐
4612 cleaning flap hopper	☐☐☐☐☐
4613 safety grid into water box	☐☐☐☐☐

Notes:

Inspection report for concrete pump

Inspection report Nr: | Machine-Nr:

Error code:

00 no objections	08 corrosion	16 porous	24 deformation
01 cracks	09 lacquer failures	17 burned through	25 bear movement
02 broken	10 fraying	18 not fixed	26 lubrication
03 leaky	11 scratched	19 clemp	27 readability
04 no function	12 bendet	20 sawing	28 missing components
05 low lifetime	13 noises	21 contamitated	29 hydraulical
06 worn out	14 vibration	22 bad contact	30 electrical
07 dirt	15 miscellaneous	23 temperature	31 reinspection required

4614 cover for rotating wave ☐☐☐☐☐

4616 cover for chains ☐☐☐☐☐

4617 cover for shift cylinder ☐☐☐☐☐

4618 cover for moving parts ☐☐☐☐☐

4619 cover for the exhaust pipe ☐☐☐☐☐

4700 electrical system

4701 function of actuator component ☐☐☐☐☐

4702 emergency stop function ☐☐☐☐☐

4703 ground connections ☐☐☐☐☐

4704 cables and wiring harness ☐☐☐☐☐

4705 temperature switch ☐☐☐☐☐

4800 outtrigger - system

4801 transportation lock ☐☐☐☐☐

4802 locking device ☐☐☐☐☐

4803 backing plate ☐☐☐☐☐

4804 jack cylinder connections ☐☐☐☐☐

4805 pressure adjustment of jack cylinder ☐☐☐☐☐

4900 miscellaneous

4901 additional assembled part from operator ☐☐☐☐☐

4902 changes through operator ☐☐☐☐☐

Competent inspector:

Date: .....

Name: .....

Signature: .....
(stamp)

Customer:

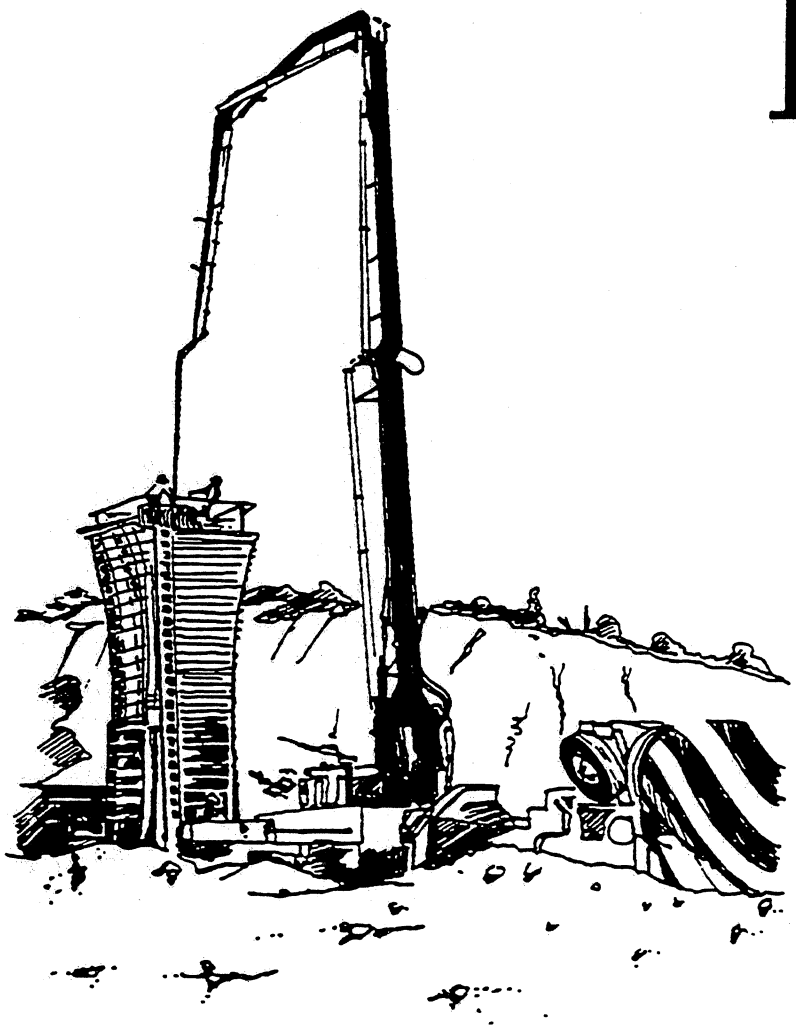
Signature: .....
(stamp)

This test report is filed into the test book

NOTE: FULL CONTENT COPY GIVEN TO CUSTOMER

AMERICAN CONCRETE PUMPING ASSOCIATION

Boom Inspection Book



AMERICAN CONCRETE PUMPING ASSOCIATION

A guide for the prevention of accidents when driving, operating, cleaning, and maintaining concrete pumps, placing booms, and related equipment.

REED

REED, LLC
13822 Oaks Avenue
Chino, CA 91710 USA
www.reedpumps.com

Version 5.0.1

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

SAFETY MANUAL

A GUIDE FOR THE PREVENTION OF ACCIDENTS WHEN DRIVING, OPERATING, CLEANING, AND MAINTAINING CONCRETE PUMPS, PLACING BOOMS AND RELATED EQUIPMENT

Introduction

Safety is one of the major concerns of every person involved in the concrete pumping industry. Although much of the responsibility for everyday safety rests upon the pump operator, it is vital that everyone involved makes safety the top priority. This includes the owners, the mechanics, the ready mix drivers, the placing crew, the concrete contractors and the machine manufacturers.

Although this Safety Manual covers a great deal of information regarding the prevention of accidents while operating a concrete pump or placing boom, it is unlikely that every conceivable circumstance has been covered. Regardless of how thorough a manual like this may be, there is always the unexpected. Please understand that there is no substitute for **common sense** and dedication to the idea that **you are responsible for your own safety**, and affect the safety of those around you. You have to know the rules first, but you must keep your mind on the job if knowledge of the rules is going to keep you and your co-workers alive and well. No attempt has been made in this Safety Manual to provide the highly specialized knowledge of the workings of the individual machines that is also critical for safe and proper operation. For that, you must **read and understand the operation manual for the machine(s) that you operate**!

This Safety Manual is a guide for the prevention of accidents and is to be used in conjunction with **professional training**. Additional information and materials are available through the American Concrete Pumping Association, including, specifically, an Operators Certification Program. Make the commitment to be professional - get your certification!

Version 5.0.1
January, 2006

SAFETY MANUAL

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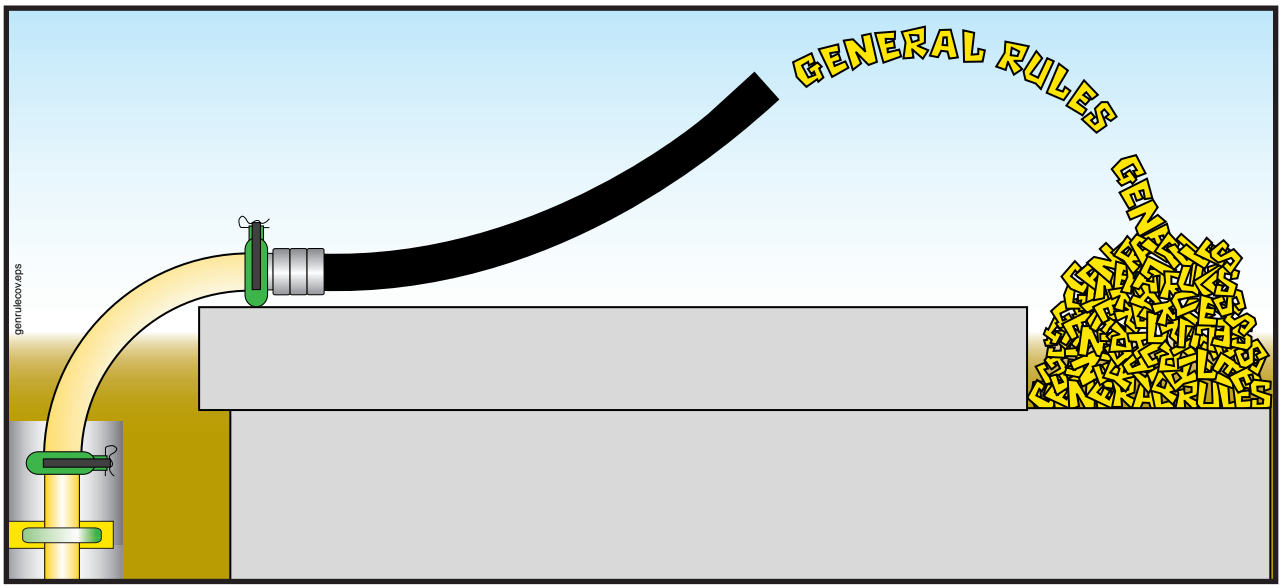


General Rules
Table of Contents

I. Before You Leave The Yard

1. Safety Alert Symbol And Signal Word Explanation

1.1

The triangle with the exclamation point inside is used to alert you to an important safety point, and is called a *Safety Alert Symbol*. One of the following color-coded signal words will appear after the safety alert symbol:

- If the safety alert symbol is followed by the signal word **DANGER** with white letters in a red box (DANGER), it indicates a hazardous situation which, if not avoided, **WILL** lead to **death or serious injury.**
- If the safety alert symbol is followed by the signal word **WARNING** with black letters in an orange box (WARNING), it indicates a potentially hazardous situation which, if not avoided, **COULD** result in **death or serious injury.**
- If the safety alert symbol is followed by the signal word **CAUTION** with black letters in a yellow box (CAUTION), it indicates a potentially hazardous situation which, if not avoided, **COULD** result in **minor to moderate injury.**
- The signal word **CAUTION,** used in a yellow box, but **without the safety alert symbol** (CAUTION), means the point addresses a hazard which, if not avoided, **COULD** cause **damage to equipment or property.**

2. What To Do Before You Arrive At Work

2.1

Get enough sleep to be ready for the day's work. Accidents can happen when the body is on the job, but the mind is not.

Dress in appropriate apparel and Personal Protective Equipment (P.P.E.) (see Figure 1). You should always wear these items when pumping concrete:

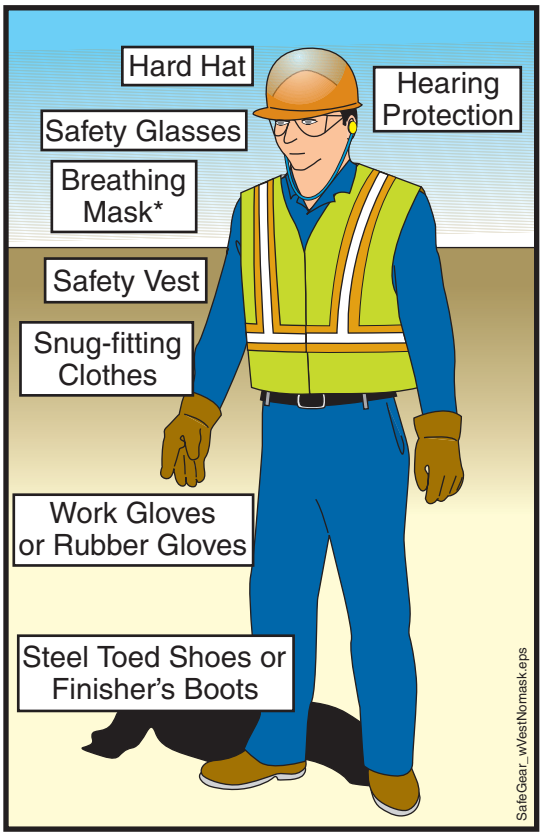
- hard hat
- safety glasses or goggles
- snug fitting clothes
- gloves
- steel toed shoes

In addition, you should wear:

- hearing protection if you stand near the pump
- breathing mask when mixing slurry or whenever there is cement dust in the air

- rubber gloves during cleanout
- rubber boots anytime you have to stand in concrete

Jewelry, athletic shoes, sandals, and shorts are examples of clothing that should NOT be worn when pumping.



* Breathing mask needed when cement dust (or other toxic dust) is present in the air.

Figure 1
Personal Protective Equipment (P.P.E.)

2.2

⚠WARNING Be sure that any clothing you wear does not have strings, fringes, or other external tightening means that could be caught in moving parts (Figure 2).

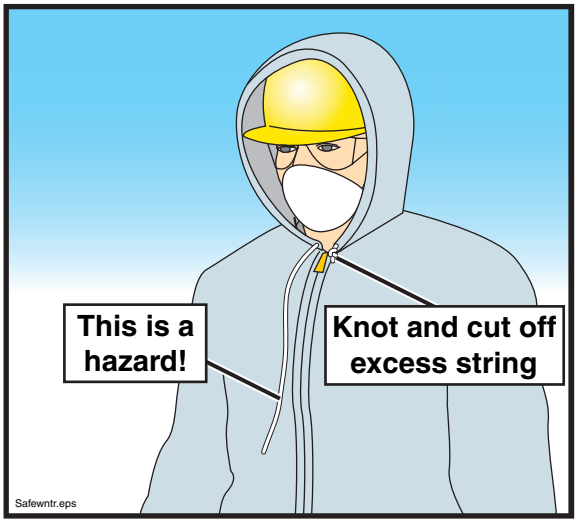


Figure 2
No strings attached

2.3 Arrive to work on time. Accidents can be caused by hurrying through procedures.

2.4 **⚠WARNING** **Never** go to work on a construction site or work on, around or near a piece of machinery when under the influence of drugs or alcohol. Beware of "over the counter" drugs, many of which have specific warnings about operating machinery after taking the medication (Figure 3).

Figure 3
Your co-workers depend upon you for their safety

2.5 **⚠WARNING** Don't bring your personal problems to work with you. In an office setting this may be annoying to co-workers, but on a construction site it can be deadly. The workers around you depend on you for their safety.

3. What To Check Before You Leave The Yard

3.1 **⚠WARNING** Do not operate the machine until you read and understand the unit's operation manual. Lack of understanding of proper operating procedures could result in unsafe operation. Operation manuals are issued with each new unit. If you haven't seen it, ask your supervisor. Replacements are available from the manufacturer.

3.2 **⚠WARNING** Inspect delivery pipes, concrete delivery hoses, and end hoses for wear. Never use a worn hose or worn or dented pipe. **Know the maximum pressure that your machine can exert on the concrete, and be sure that the pipes, hoses and clamps are capable of handling the pressure**. Maximum pressure on concrete is stated in operation manuals, service manuals, and on the serial number plate of the machine. A chart showing the minimum wall thickness of pipeline versus maximum pressure is found on page 73 in the appendix section of this Safety Manual.

3.3 **⚠WARNING** If you will need to use compressed air to clean out the boom or system pipeline, BE SURE that you have the proper training, equipment, and attachments to do this procedure safely! Proper attachments include:

- A blow out head with properly sized air discharge regulator valve and separate water/air inlet. The two openings should be spaced apart far enough that a blowout ball could not cover both openings at once.
- A *go devil*, or a hard sponge ball. Regardless of which is used, it **must** fit into the pipeline tight enough that air cannot escape ahead of it.
- A ball or go devil catcher that will catch the go devil or ball when the line has been purged of all concrete. There are two types of catchers (see paragraph 7.23 on page 31).
- A hose that is rated for the pressure of the air compressor you will use and that is able to connect with both the air compressor and the blow out head. The hose must be in good working condition and must be free of cracks, frays, tears or other damage. Do **NOT** improvise on this. **Make sure** that you have the right part (Figure 4).

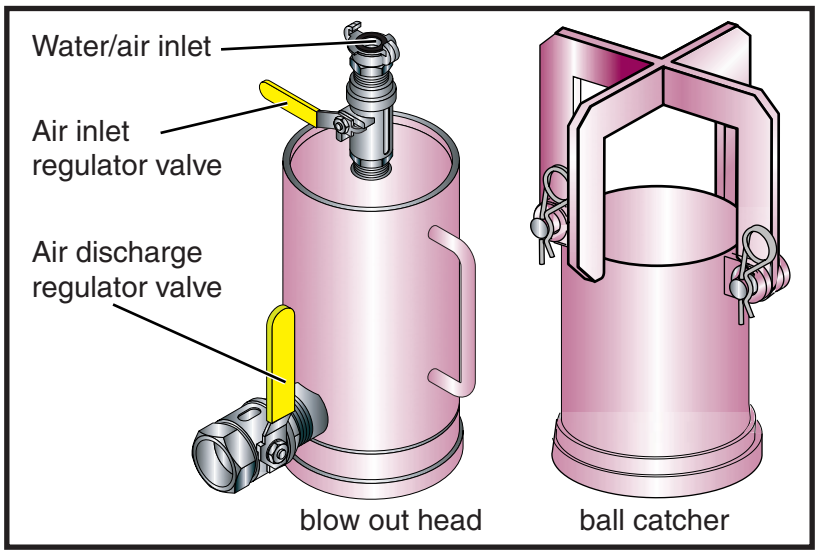


Figure 4
Compressed air accessories

3.4 ⚠**WARNING** Be sure that the unit is equipped with all the pipes, clamps, gaskets and hoses, blow out adapters, ball catchers, and other accessories that you will need for the day's work. "Making do" with inappropriate equipment could cause accidents.

3.5 On trailer mounted units, check the oil and cooling system (air or water cooled systems) of the pump drive engine. Accidents could occur when lack of maintenance is causing a distraction while operating the equipment.

3.6 Be sure the battery has enough charge to start the pump drive engine. You will be rushed on the job if you have to do repair work before you can begin operation.

3.7 **⚠WARNING** The operator is responsible for checking to see that the concrete pump, placing boom, and delivery system are in safe and proper working condition. If an unsafe condition exists, **work must not begin** until necessary repairs have been completed, or until the machine can be operated safely.

3.8 **⚠WARNING** The operator is responsible for checking that all safety equipment and guards are in place and in good condition. If found to be missing, incomplete, or damaged, **work must not begin** until the situation has been made safe.

3.9 **⚠WARNING** The operator is responsible for checking that all safety decals are in place and are in readable condition. If found to be missing or unreadable for any reason, steps should be taken to obtain replacements.

3.10 **⚠WARNING** Inspect the tires and brakes on the truck. Never drive a truck with bald or cracked tires, or with weak or worn brakes. If you have air brakes, be sure that the air system is free from leaks and will maintain pressure when driving. Loss of air pressure will cause the brakes to be applied while driving. If driving continues after the brakes are applied, the resulting friction could cause enough heat to start a fire.

3.11 Drain moisture from the air tanks that supply the unit's brakes (if so equipped). This is especially important if weather conditions could cause the moisture to freeze. If you lose air pressure because of frozen moisture, the brakes will apply themselves, and you will have to stop driving until the unit is repaired.

3.12 **⚠WARNING** (See Figure 5.) Mount or dismount the pump or truck using the *3 Point Rule* (i.e. keep two hands and one foot or one hand and two feet in contact with a secure surface at ALL times).

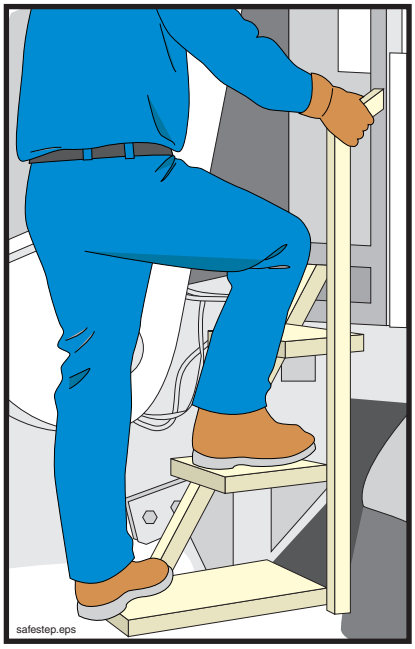


Figure 5
The 3 Point Rule

3.13 **⚠WARNING** Never mount or dismount the truck or pump while carrying objects that prevent you from using the "3 Point Rule." Move the objects separately, if needed.

3.14 **⚠WARNING** Be sure that outriggers are pinned and locked before traveling. If the locking device is damaged or worn, it should be repaired immediately and the unit **must not be driven until the outriggers can be positively locked** against accidental opening (see Figure 6).

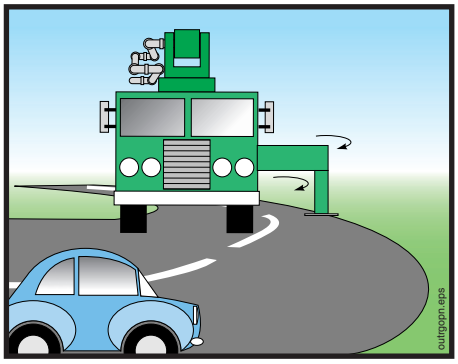


Figure 6
Before driving, be sure outriggers cannot open

3.15 **⚠WARNING** Be sure there is nothing in the cab of the truck (such as empty soda cans, loose tools, etc.) that could interfere with the operation of the vehicle.

3.16 Be sure that all road-related safety devices (warning signs, flares, fire extinguisher, etc.) are present and secured for travel.

3.17 Be sure all personal protective equipment (hard hat, safety goggles, rubber gloves, etc.) are secured for travel.

3.18 **⚠WARNING** Be sure the windshield and mirrors are clean and free of frost or ice, and that the mirrors are properly adjusted.

3.19 **⚠WARNING** Verify that head lights, tail lights, turn signals, brake lights, backup warning horn, and backup lights are operational.

3.20 In some cases you may be asked to operate a machine other than the one with which you are familiar. In these cases, be sure to:

- Know the weight, height, and width of the machine.
- Have a copy of the operation manual with you.
- Ask the machine's normal operator, the dispatcher, or your supervisor questions regarding any unusual or unique operational characteristics of the machine.
- Familiarize yourself with the machine by setting it up in the yard and running the functions, and by familiarizing yourself with the operation manual. This is especially important if the new machine is significantly different than the one you normally operate. Your co-workers depend on you to know the machine.

3.21 **⚠WARNING** Before driving the unit, be sure the boom is securely in its cradle, resting on approved boom rests that are in good condition, and secured by the tie-down strap (if so equipped). On some makes and models, the boom can be damaged by the bouncing motion that occurs while driving, but this damage is easily avoided by using the strap (Figure 7).

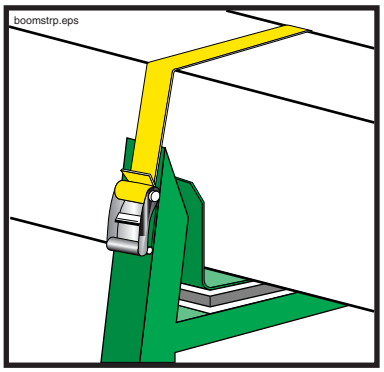


Figure 7
If your unit has a boom strap, use it

3.22 **⚠WARNING** Be certain that all loose items on the unit are secured for travel before driving.

4. Safety Rules For Driving Truck Mounted Concrete Pumps

4.1 **⚠WARNING** **Electrocution hazard!** (See figure 8.) If you're going to drive under low-hanging overhead power lines and it is not possible to maintain adequate safety distance between the pump and the wires, **you should look for another route!** If none is available, contact the power company responsible for the lines and have them de-energized.

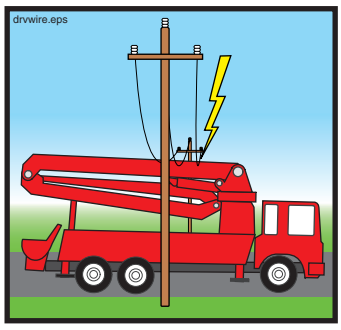
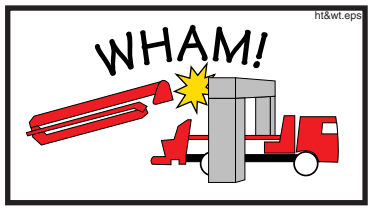


Figure 8
Watch for low-hanging power lines

4.2 Carefully select your route of travel. Avoid steep hills, residential areas, construction, low overpass clearances and narrow bridges whenever possible. **The driver is responsible for knowing the weight and height** of the machine.

4.3 **⚠WARNING** **Collision/falling hazard!** Before driving on bridge or elevated roadways, **be sure that they can support the weight of the vehicle** (Figure 9).



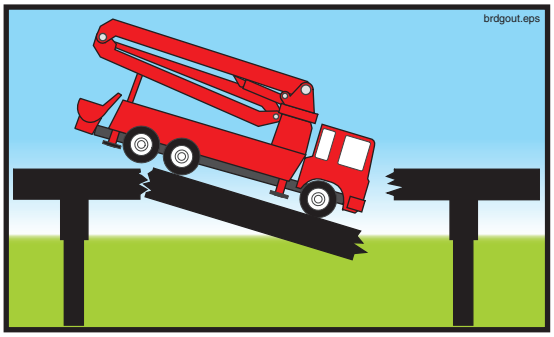


Figure 9
Know your height and weight

4.4 **⚠WARNING** **Collision hazard!** Before driving under ANY structure, **BE SURE** that the machine will clear (Figure 9).

4.5 **⚠WARNING** **Explosion hazard!** Never refuel the unit near hot surfaces, sparks, or open flames (Figure 10).

Figure 10
Be careful when refueling

4.6 **⚠WARNING** **Tipping hazard!** The vehicle must **not** be driven with an unfolded placing boom.

4.7 **⚠WARNING** **Possible boom movement.** Before driving the unit be sure that the distribution gearcase (PTO) has **disconnected** the hydraulic pumps. **Driving with the hydraulic pumps engaged creates a hazard** and is destructive to the pumps.

4.8 **CAUTION** Never drive the unit with concrete in the hopper. Concrete could splash out and damage other cars or property.

4.9 **⚠WARNING** **Runaway truck hazard!** When going down a hill, use one gear lower going down than it would take to go up.

4.10 **⚠WARNING** Truck mounted concrete pumps are generally top-heavy. Use caution when making sharp turns with the vehicle (Figure 11).

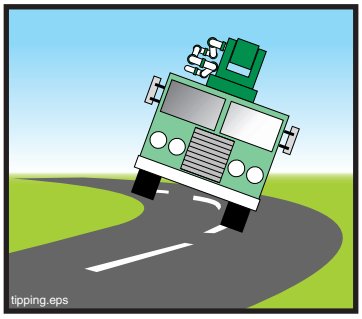


Figure 11
Maintain control on the curves

4.11 **⚠WARNING** Slow down at intersections, near playgrounds, residential areas, and near schools. Children have no knowledge of the increased stopping distances required by heavy vehicles.

4.12 **⚠CAUTION** Be familiar with your emergency equipment. Know how to light a flare, etc.

4.13 **⚠WARNING** Drive defensively. You are at a distinct disadvantage when it comes to maneuverability and stopping distance.

4.14 **CAUTION!** If you must tow the unit, know the correct places to hook the towing cable(s). Improper towing can damage the vehicle or pump.

4.15 **⚠WARNING** **Never** back up without a guide.

4.16 **⚠CAUTION** Know the rules and laws that apply to your state and locality. They have been enacted for your protection and the protection of those around you.

5. Safety Rules For Towing Trailer Mounted Concrete Pumps

5.1 **⚠WARNING** Be sure the towing vehicle is heavy enough and has enough horsepower and braking ability to tow the trailer. This is critical to maintaining control at highway speeds and to braking ability. If the trailer is heavier than the towing vehicle, braking distances will be greatly increased (Figure 12).

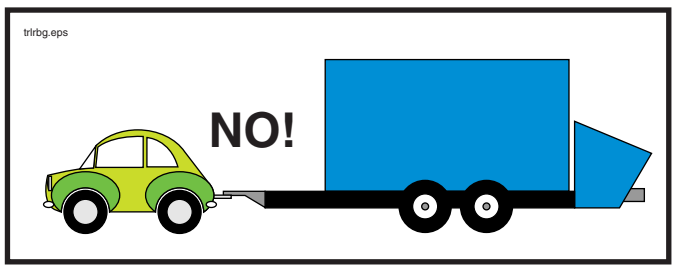


Figure 12
Do not under size the towing vehicle

5.2 **⚠WARNING** Check the tires, tire pressure, and brakes on the trailer before towing. Never tow a vehicle with cracked or bald tires. A trailer tire blowout can cause loss of control in the towing vehicle.

5.3 **⚠WARNING** Be especially careful on ice or slippery roads when towing a trailer. A skid that would normally be easily correctable can be multiplied by the trailer, causing loss of control.

5.4 **⚠WARNING** Be sure that the electrical connections between the towing vehicle and the trailer are sturdy and reliable, and that the lights on the towing vehicle and trailer are working.

5.5 **⚠WARNING** Always use safety chains and break-away protection when towing a trailer.

5.6 **⚠CAUTION** Be aware of local or state regulations regarding mirrors and lights when towing a trailer.

5.7 **⚠WARNING** When towing a trailer, your stopping distance and turning radius are greatly increased. Be aware of this **at all times**.

5.8 **⚠WARNING** When towing a trailer long distances, it is important to check the hitch, wiring, and safety chains frequently.

5.9 **⚠WARNING** Be aware of your length when towing a trailer. A common cause of trailer accidents is turning too close to curbs or objects.

5.10 **⚠WARNING** Never back up a trailer without a guide.

II. On The Job site

6. Safety Rules For Job Setup

SETTING UP A TRUCK MOUNTED BOOM PUMP

6.1 **The job setup phase can set the stage for accidents.** Taking a few extra moments to correctly set up the job will improve your chances of having a safe, trouble-free day.

6.2 **The operator is responsible for the safe operation of the machine**. Notify your employer, the job superintendent, and/or O.S.H.A. if you are being asked to set up in an unsafe manner. **You are never required to take a chance with safety.** You are the **only** person who can determine that the job circumstances under your control are safe.

6.3 Canadian law requires that the boom remains a minimum of 7 meters from electric wires. To conform to the Canadian law, any text in this manual that refers to a 17 foot or 5 meter safety distance from electric wires should be read as 7 meters for use in Canada.

6.4 **⚠ DANGER** **When overhead wires are in the area that the boom will be moving to complete a pour, a spotter must be employed whose only job is to warn the operator if the boom comes within 17 feet of the wires.** The spotter must understand the responsibilities assigned, and must be able to judge a 17 foot distance.

6.5 **⚠ DANGER** **You MUST avoid hazardous proximity or contact with electric lines at all times!** Position the machine so a minimum safety distance of **17 feet (5 meters)** is maintained in all boom positions needed to do the job (Figure 13). **Never decrease the safety distance to reach an unsafe area with the boom.**

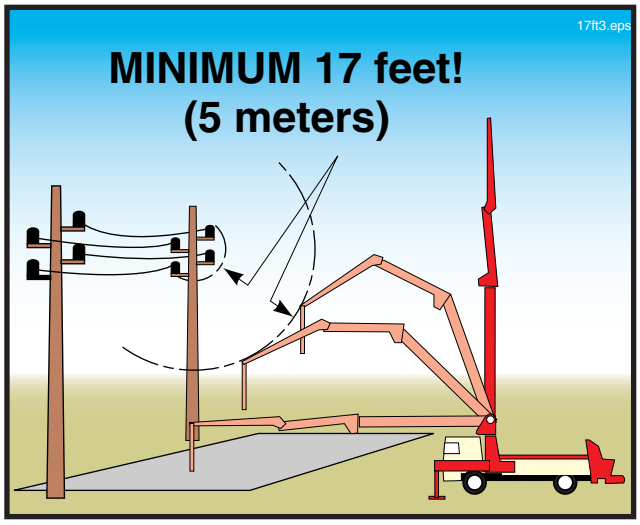


Figure 13
Always maintain the safety distance

6.6 **⚠ DANGER** If you are in doubt about your proximity to high voltage wires, or if it is not possible to maintain 17 feet of clearance, you must lay a separate pipeline or use a different placement method. **Never take chances with high voltage!** (See Figure 14.)

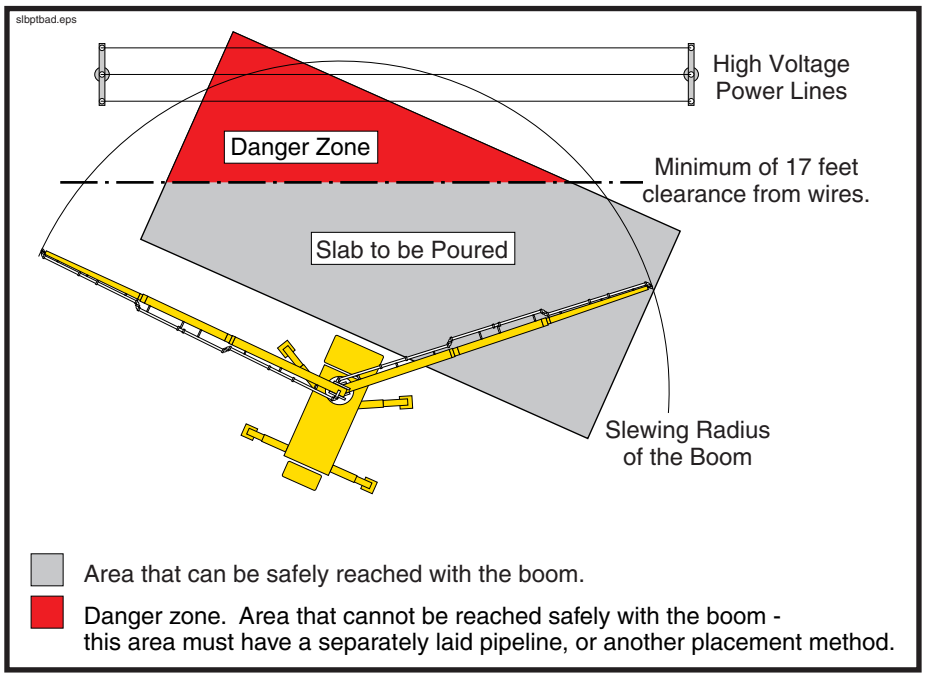


Figure 14
Lay a separate pipeline if you can't maintain the safety distance

6.7 **⚠ DANGER** Do not put the boom on top of electrical wires, even if you can maintain 17 feet of clearance. Mechanical or hydraulic malfunction may cause the boom to move down (Figure 15).

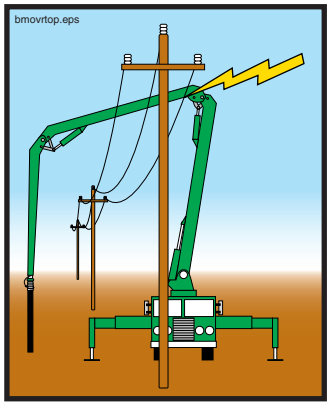


Figure 15
Never boom over wires

6.8 **⚠ DANGER** **It is crucial to take electric wires into consideration during setup, even if they are away from the area to be pumped!** Accidents may occur during cleanout and moving that can be avoided by proper initial setup. In the illustrations below, the pour is outside of the minimum safety distance, but the danger still exists. You **must** be aware of the wires at all times! (See Figure 16.)

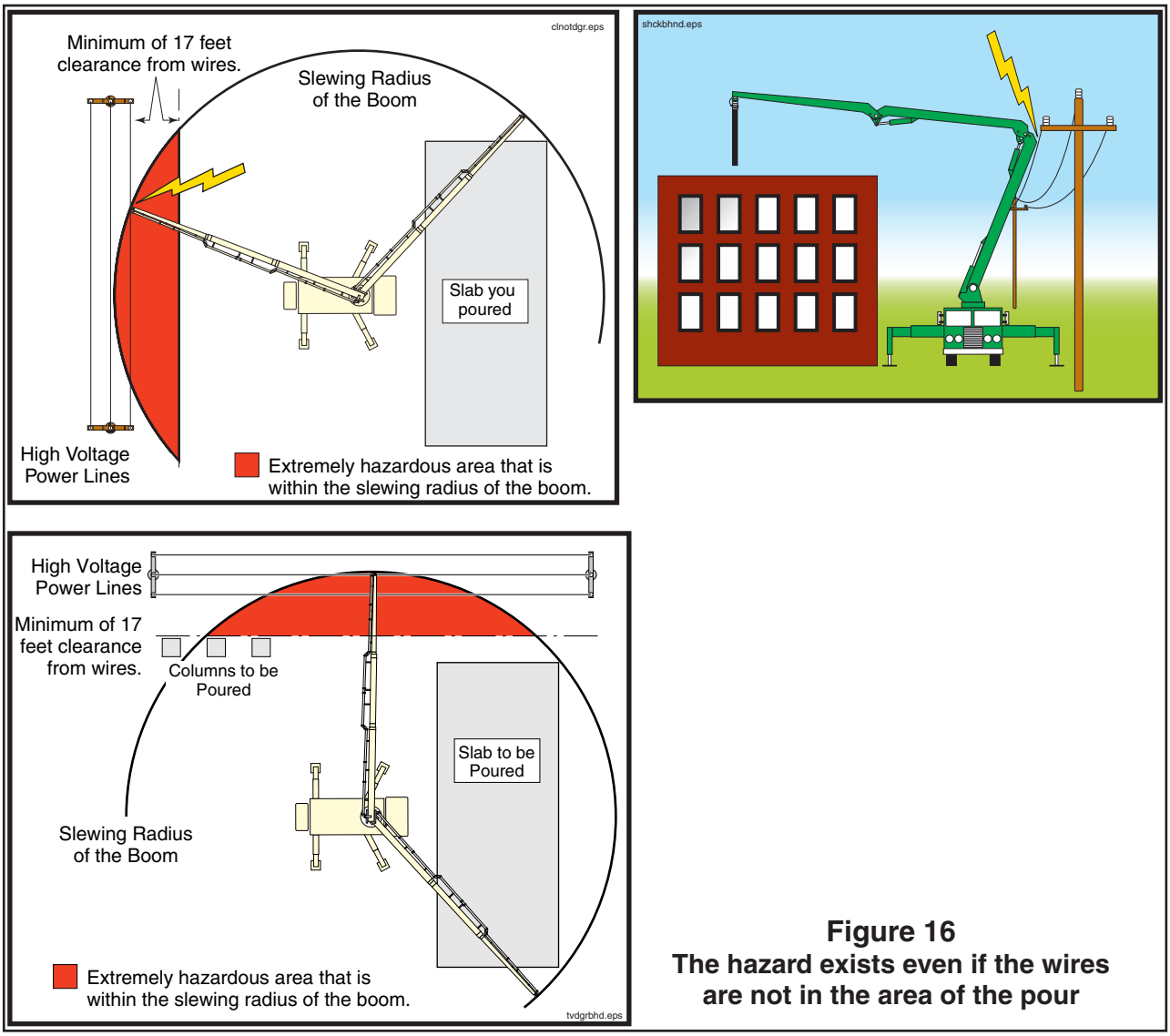
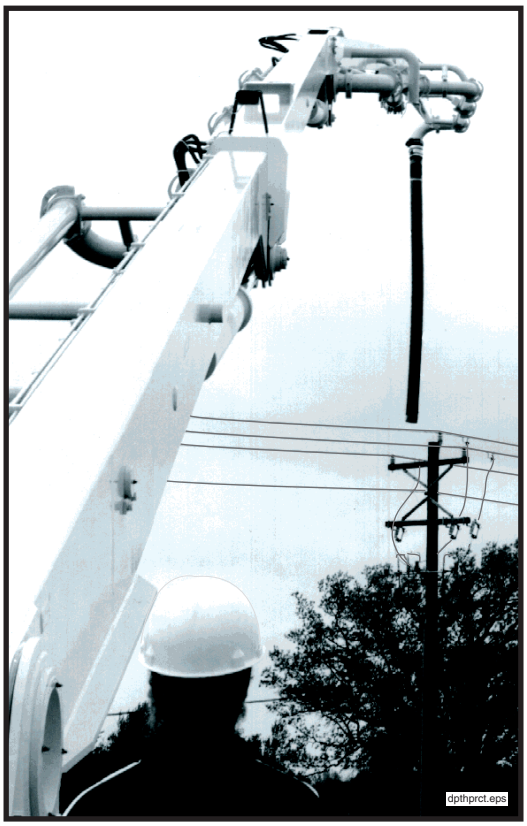


Figure 16
The hazard exists even if the wires are not in the area of the pour

6.9 **⚠ DANGER** Depth perception varies from person to person and is affected by the distance from the objects being observed. Minimum distances from electrical wires and other obstructions should always be judged by placing yourself in a viewing position that does not require depth perception judgements. If this is not possible, a spotter **must** be used! See the glossary for the definition of spotter (Figure 17).



Will it hit the wires?
You can't tell from here.

Get the best possible vantage point

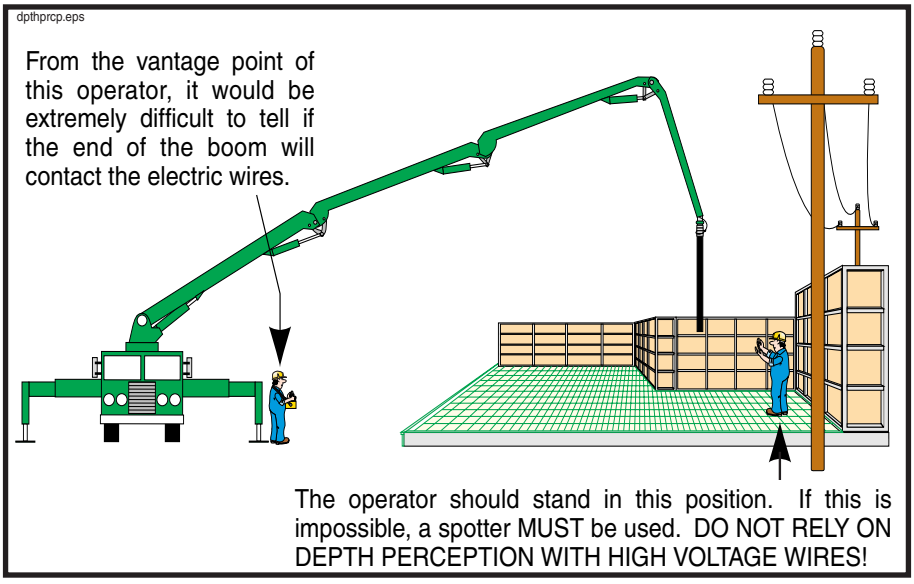


Figure 17
Never rely on depth perception with electric wires

6.10 **⚠ DANGER** Always assume that a power line is live. Never take the word of someone on the job site that it has been de-energized. **Only a qualified representative of the responsible power company can verify that a line has been de-energized** (see Figure 18).

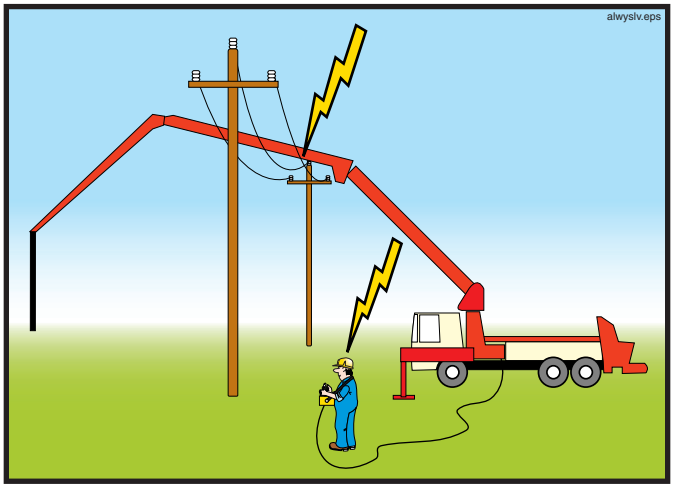


Figure 18
Assume the wires are energized

6.11 **⚠WARNING** Maintain a safe distance from obstructions, such as cranes, scaffolding, and buildings (Figure 19).

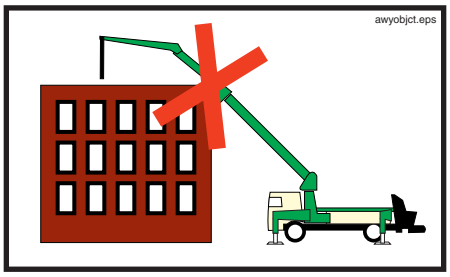


Figure 19
Maintain a safe distance from obstructions

6.12 **⚠WARNING** Place wheel chocks under the tires on sloping terrain. Release the brakes and allow the machine to settle against the chocks, then reapply the brakes.

6.13 **⚠CAUTION** Remove any snow, ice, oil, or dirt from steps and platforms.

6.14 **⚠WARNING** Possible boom damage! Never add extensions to the end of the placing boom! If continuation pipes are connected to the end hose, they must **NOT** impose any load on the boom (Figure 20).

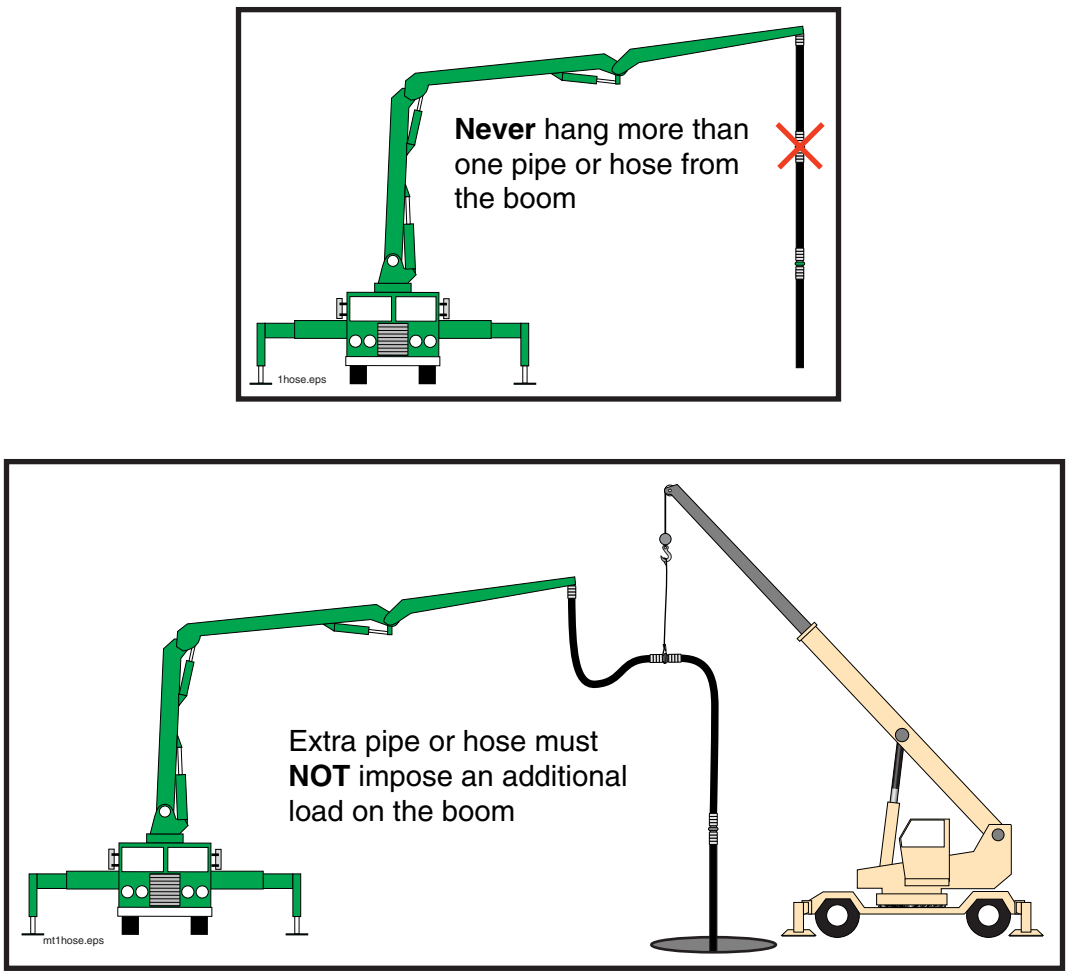


Figure 20
Know and do not exceed the maximum weight allowed to hang from the boom

6.15 **⚠WARNING** The length of a 125mm boom end hose may not exceed 13 feet (4 meters). Certain machines may require a shorter length or smaller diameter end hose. Check with the boom manufacturer.

6.16 **⚠WARNING** Possible structural damage. If you remove the supplied tip hose and replace it with a combination of reducers and hoses, the total weight of all hanging pieces (including the weight of the concrete) must not exceed the weight of the supplied tip hose (including concrete). The supplied tip hose is typically 12 feet long and 125mm (or 5 inch) diameter. When filled with normal, hard rock concrete it weighs 376 pounds. Certain units may have a lower allowable weight and, thus, a different tip hose. The operation manual included with the unit will inform you of the specification if the unit requires a smaller than standard tip hose. It is the operator's duty to know the specification of the unit in operation (Figure 21). **Find out if your unit has special requirements!**

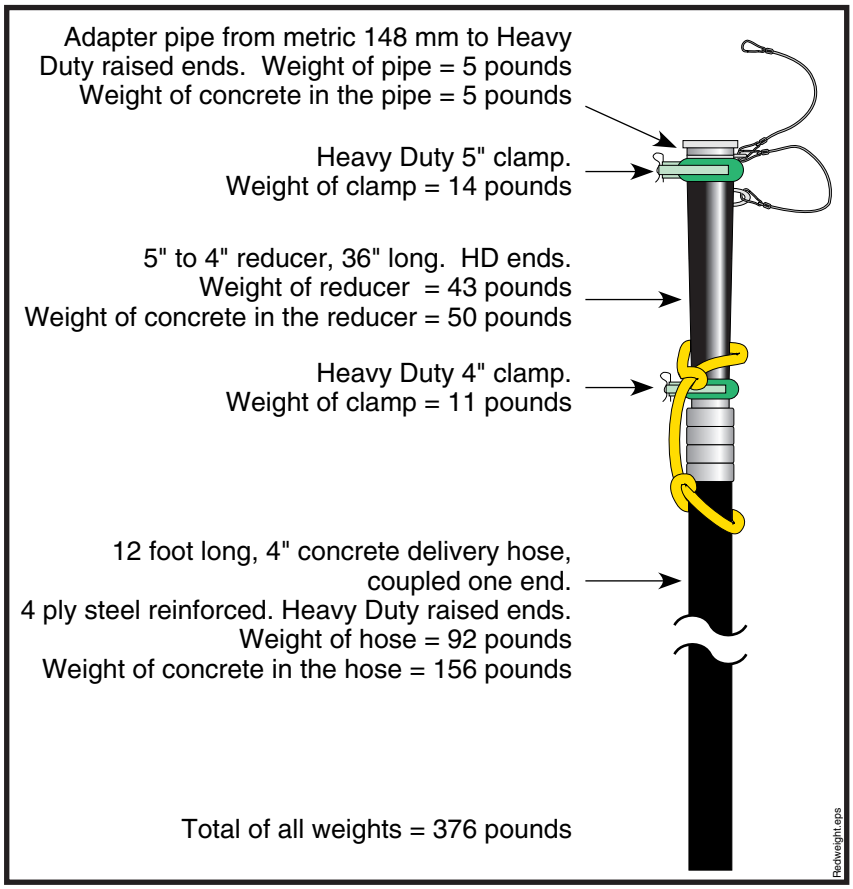


Figure 21
A typical reducer/hose combination

6.17 **⚠WARNING** A *concrete delivery hose* is a flexible concrete hose that has two end couplings. An *end hose* is a flexible concrete hose that has one end coupling. In normal usage, it is preferable to have an end hose as the last piece of delivery system. If you will be swinging the full boom over workers or property you must be able to plug the delivery system. See the instructions for plugging the delivery hose on page 43.

6.18 **⚠WARNING** All hanging system components must be fastened with safety cables or straps, and **each component must be capable of handling the maximum concrete pressure of the machine** (see Figure 22).

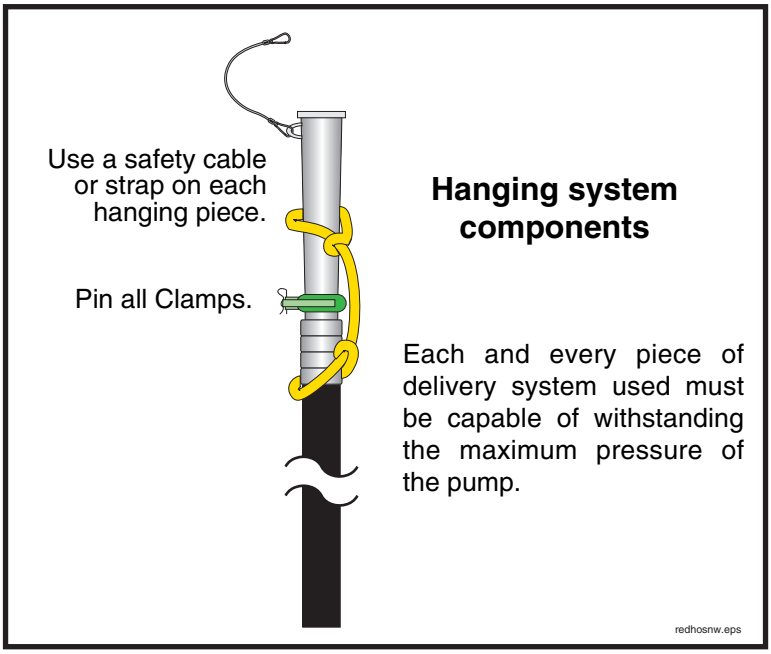


Figure 22
Assure the safety of hanging system components

6.19 **⚠WARNING** Placing booms possess a very wide effective operating range. Due to this high degree of mobility, some placing booms can reach a position unsuitable for practical operation. Under certain circumstances **overloading, tipping, or damage to the boom is possible**. These unsuitable areas are documented on safety decals and in operation manuals (see Figure 23). **Be aware of these areas if they apply to your unit and set up the pump taking these areas into consideration**.

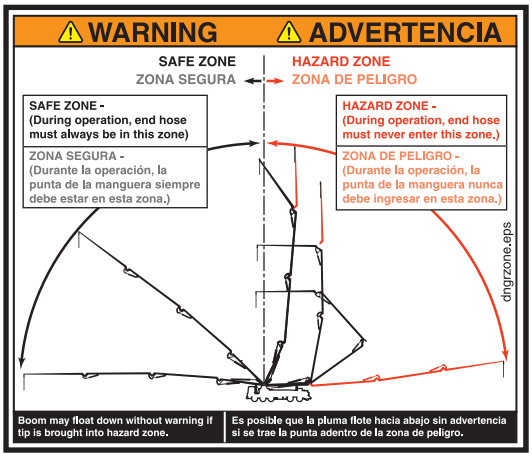


Figure 23
An example of a hazard area decal

6.20 **⚠WARNING** Collision hazard! Secure the immediate area of the machine from public traffic in accordance with all applicable regulations (warning lights, safety cones, barricades with flashers, etc.).

6.21 **⚠WARNING** Consider the safe approach and departure of the ready-mix trucks and adjust your setup accordingly. Adjusting your setup position by a few degrees one way or another could mean the difference between a safe approach and an unsafe approach. Some examples of unsafe approaches are: too near an excavation or sticking out into traffic.

6.22 **⚠WARNING** If you set up the unit with one or more outriggers not fully extended on the side away from the pour (shortrigging), you will tip the machine if you forget and rotate the boom over the side with the unextended outriggers. That being said, it is known that under certain circumstances, shortrigging is unavoidable (see Figure 24). If no alternatives are practical and you must shortrig for a particular job, keep these points in mind.

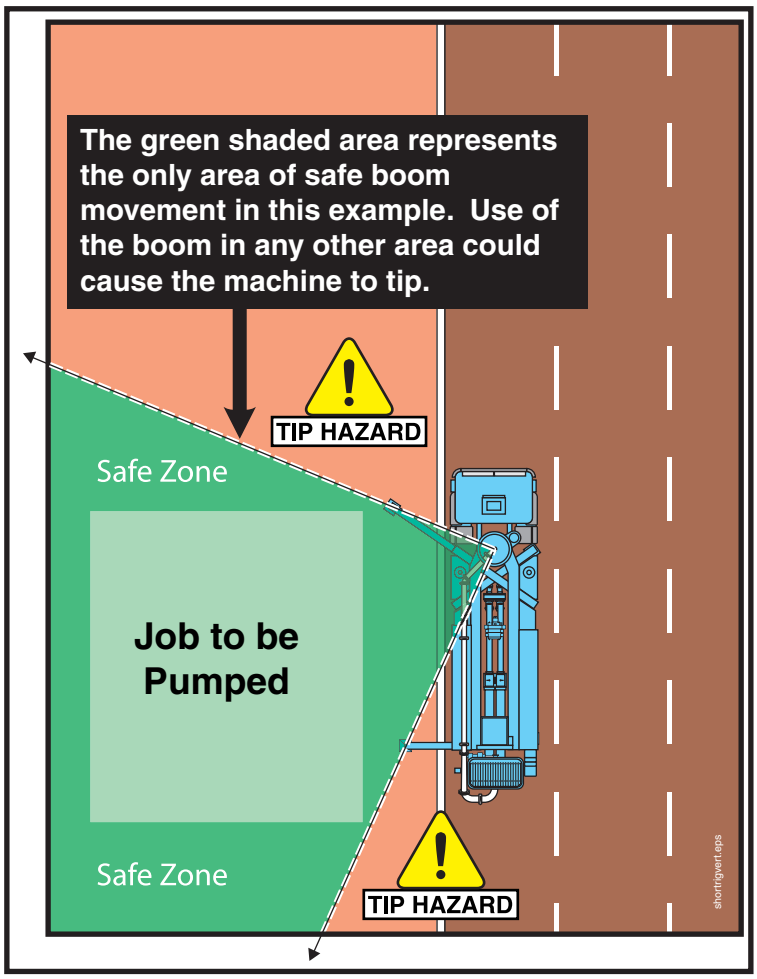
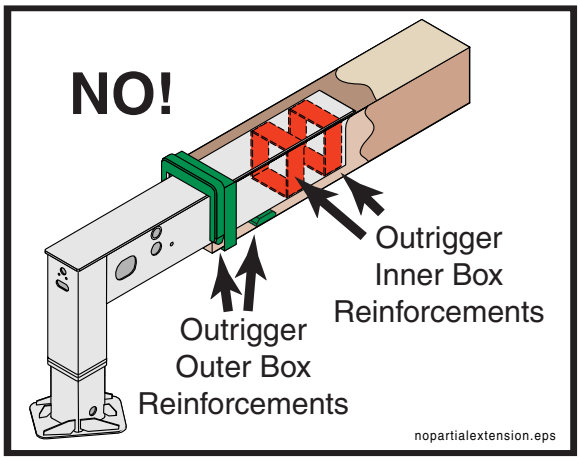


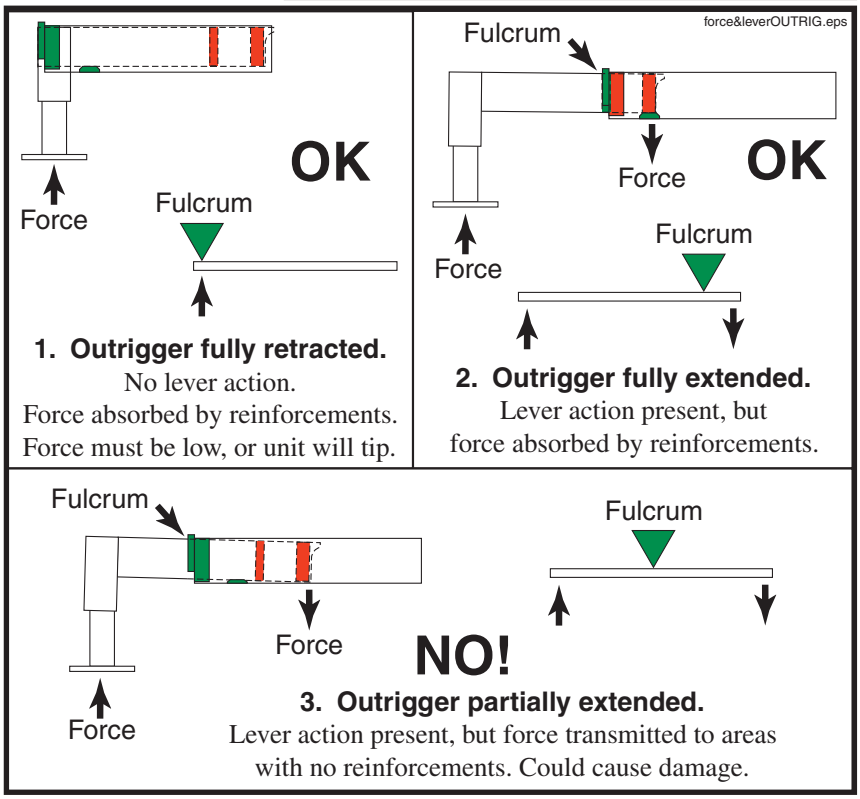
Figure 24
Shortrigging

- You may only operate the boom when it is placed between outriggers that are completely extended; you may tip if the boom is placed anywhere else.

- You should still jack the outriggers that are not fully extended. This will assist in stabilizing and preventing the unit from rocking. The margin of safety this gives you is very small; and won't prevent you from tipping.
- Don't get lazy! If it is possible to extend all of the outriggers, do it!
- Don't forget that you didn't fully extend all the outriggers. Explain to other workers on the job what will happen if you forget and slew the boom over unextended outriggers. That way, if they see you are moving the boom into a tipping area, they may be able to warn you.
- Outriggers that cannot be fully extended should NOT be partially extended unless specifically allowed by the manufacturer. The inner and outer outrigger box reinforcements will not align in intermediate positions. (Figure 25.)

Figure 25
Partial extension is not allowed





⚠WARNING When setting the outriggers, jack the unit to within 3° of level, or according to the operation manual of your unit. If the unit is not set up within the specification for level, the boom brakes could fail, causing the boom to rotate downhill by the force of gravity.

6.23 **⚠WARNING** Tipping hazard! Do not unfold the boom until the outriggers have been correctly positioned and secured! The outriggers must be completely extended and opened as described in the operation manual. Do not partially extend the outriggers because intermediate positions are **not safe!** See the information regarding shortrigging (paragraph 6.22).

6.24 **⚠WARNING** Tipping hazard! Check soil conditions before jacking the outriggers. If necessary, use cribbing or suitable pads under the outrigger legs to increase the area of soil contact. See the chart in Figure 26 for examples of load bearing capacities of various soil types and for an example of how to calculate how much cribbing is needed. If in doubt, the site management may be able to supply the load bearing capacity of the soil.

APPROXIMATE PRESSURE SUPPORTING CAPABILITY OF VARIOUS TYPES OF SOIL

Virgin ground	22 PSI
Asphalt, min. 8" thick	29 PSI
Compressed crushed stone	36 PSI
Clay/silt soil, firm	43 PSI
Mixed granular soil	51 PSI
Firm compacted gravel	58 PSI
more compacted	72 PSI
more compacted (e.g. class 5)	109 PSI
Brittle weathered rock	145 PSI

To calculate soil pressure: Divide the force on the outrigger leg (from the decal) by the number of square inches of soil contact.

PSI = LOAD÷AREA

PSI = pressure on the soil
Load = force in pounds
Area = square inches of soil contact.

EXAMPLE: Load bearing capacity of the soil (8 inches of asphalt) = 29 PSI
Force on the soil by the outrigger leg = 40,000 Pounds (from decal)
Pad on outrigger = 12" x 12" (144 square inches)
40,000 ÷ 144 = 278 PSI.
In this example you could expect the outrigger to sink into the asphalt and possibly cause a tip-over. To prevent this, you install additional cribbing:
Additional cribbing = 40" x 40" (1600 square inches)
40,000 ÷ 1600 = 25 PSI
Now the asphalt should support the outrigger.

soilpres.eps

Figure 26
Calculating load bearing capacity

6.25 **⚠WARNING** Tipping hazard! Regardless of whether you know the load bearing capacity of the soil or not, you must test your setup by slowly moving the empty boom over each outrigger (Figure 27). If the outrigger begins to sink, retract the boom or move it back in the direction from which it came, until the weight of the boom is removed from the outrigger. Add more cribbing under the outrigger pads and retest until the outriggers are stable. When you put concrete in the boom, again check the outriggers for sinking. Continue to add more cribbing until the soil can support the load. After the pour begins, continue to check the outriggers for sinking throughout the course of the day. The stability of the unit **must** be ensured.

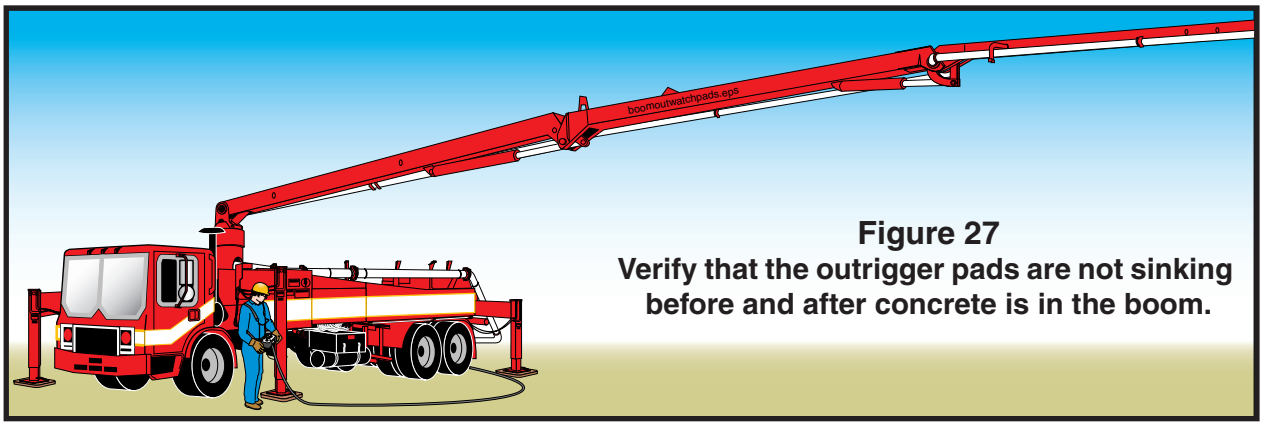


Figure 27
Verify that the outrigger pads are not sinking before and after concrete is in the boom.

6.26

⚠WARNING TIPPING HAZARD! Maintain a safe distance between the unit and the edge of a cliff or any excavation. The rule of thumb is: for every foot of drop, stay back from the base edge at least 1 foot (the one to one rule). (See Figure 28.) Note that the forces on the outriggers are transferred to the soil at a 45° angle. Watch out for the condition shown in Figure 29.

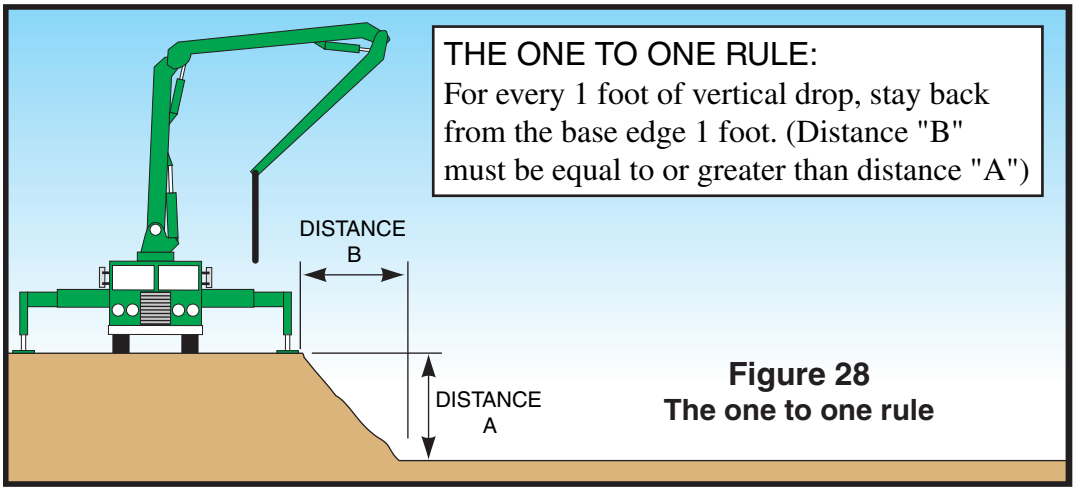


Figure 28
The one to one rule

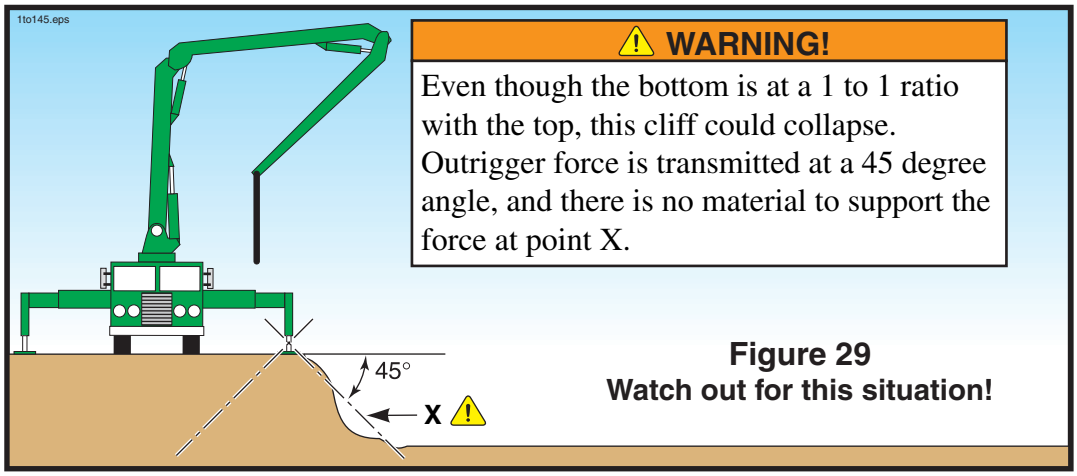


Figure 29
Watch out for this situation!

6.27 **⚠WARNING** Tipping hazard! Take care when setting the outriggers (Figure 30). Never set up on uneven or hilly soil or try to bridge a hole with cribbing. In these cases, you could dig a flat spot in the soil (A, B, & C). Be sure that the outrigger pad contacts all pieces of cribbing. Run cribbing in the opposite direction, if needed (D).

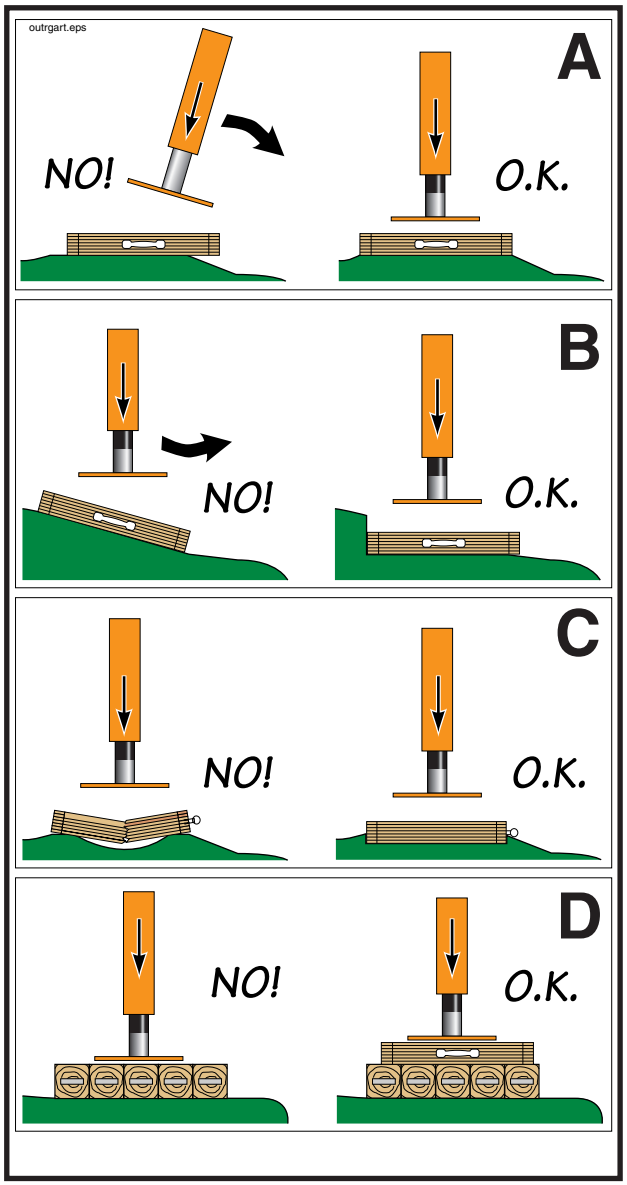


Figure 30
Beware of these outrigger hazards

6.28 **⚠WARNING** When you have the outriggers positioned correctly, close all outrigger hydraulic shutoff valves (if your machine is so equipped).

6.29 **⚠WARNING** Do not unfold or operate the placing boom when lightning is present in the immediate area. If you are operating and lightning moves into the area, put the boom into the transport position, or another low position, and seek shelter until the lightning is gone.

6.30 **⚠WARNING** Tipping hazard! Do not operate the placing boom when wind velocity exceeds 48 m.p.h. (77 k.p.h.)! When wind velocity exceeds 48 m.p.h. the machine could tip, and the boom may not be able to slew into or resist slewing away from the wind.

6.31 **⚠WARNING** If you will be unable to see the point of placement, establish a system of communications with the workmen who will be there. Arrange for radio communications, a system of visual or auditory signals (lights or bells), or a spotter. If a spotter is used, **agree on hand signals before beginning the pour!** If the boom will be moved extensively, arrange for a workman to stay with the pump and to put yourself in a position to see the end of the boom (Figure 31).

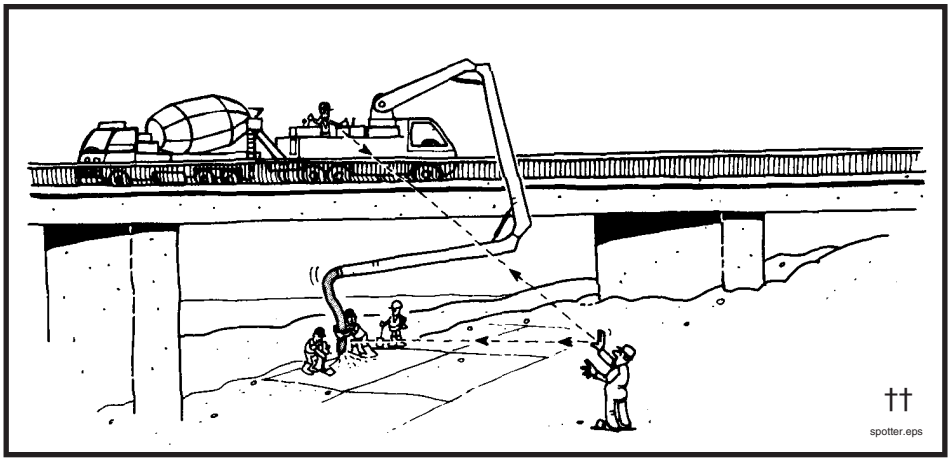


Figure 31
Arrange communications before starting

6.32 **⚠WARNING** **Possible boom damage**! If you will be pumping out of the boom into a separately laid pipeline, you must use a flexible hose to connect them. Do not connect steel pipe directly to the boom. **Be sure that the hose is capable of handling the maximum concrete pressure of the pump**. Do not let the end of the boom rest on the ground when connected to a separately laid pipeline.

6.33 **⚠WARNING** **It is extremely important to verify that the material delivery system of the boom is capable of handling the pressure of the concrete pump.** In some cases, you may not be able to use the boom if you are pumping on piston side. It is up to the machine owner and operator to determine if the boom can be used when pumping on piston side. Keep in mind that pipeline wears out with each stroke of the pump. Verify pipe wall thickness and compare it to pressure handling capabilities of that pipe style. The chart for this comparison is found in the appendix of this manual.

6.34 **⚠WARNING** **Use only material delivery system components in good condition.** The useful life of delivery system components is affected by pumping pressure, concrete composition, pipeline material, velocity of moving concrete, and other factors. The use of ultrasonic equipment for determining pipe wall thickness is highly recommended (Figure 32). Read and understand the minimum wall thickness chart in the appendix section of this manual. If you don't understand the chart, contact the service department of the manufacturer of your machine; they will assist you.

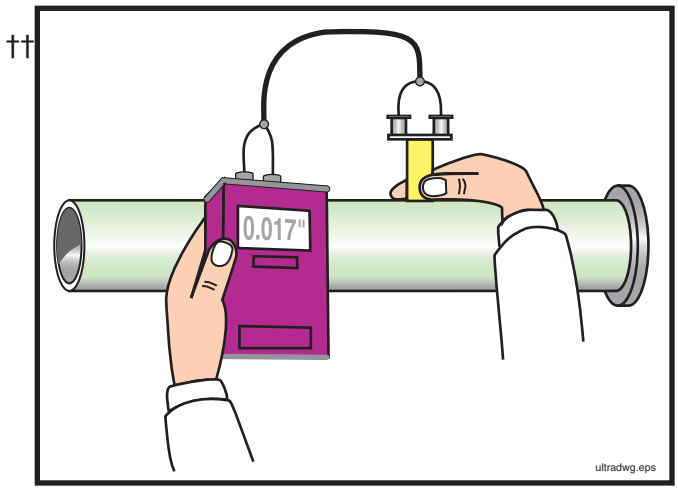


Figure 32
Check for wear on the delivery system components

6.35 **⚠WARNING** **When the machine is ready to work, secure it against unauthorized use!** Either stay with the unit or make sure no one can start it without you. This could be accomplished, for example, by activating the emergency stop switch of the remote control box (cable or radio, whichever is active), then locking it in the cab of the truck. Another way would be to take the transmission out of gear, lock the cab of the truck, and take the key with you.

6.36 **⚠WARNING** **Watch for children!** When the machine outriggers are jacked up, it is very easy for children to access the space underneath the machine. The rotating driveline(s) and hot components pose serious hazards. Do not let anyone remain under the machine while it is running.

6.37 **⚠WARNING** If spectators will be near the pour, cordon off an area where they will be safe. Never operate the machine if it is not safe to do so, even if the spectators just want to see a certain operation or function.

7. Setting Up A Trailer Mounted Pump and/or A Separate Pipeline

7.1 **The job setup phase sets the stage for most accidents.** Taking a few extra moments to correctly set up the job will improve your chances of having a safe, trouble free day.

7.2 **The operator is responsible for the safe operation of the machine**. Notify your employer, the job superintendent, and/or O.S.H.A. if you are being asked to set up in an unsafe manner. **You are never required to take a chance with safety.** You are the **only** person who can determine that the job circumstances under your control are safe.

7.3 **⚠WARNING** The **power connections for electrically driven concrete pumps or separate placing booms must be made by a licensed electrician.** The supply power and appropriate disconnect boxes are the responsibility of the contractor.

7.4 **⚠WARNING** **Electrical power on the job site may be taken only from a fused, grounded disconnect box with a disconnect switch that can be locked against activation.** If you will be making repairs to the concrete pump or separate placing boom, first lock out the power at the disconnect box**.**

7.5 **⚠WARNING** On units equipped with electric motors, **check the power cables every day.** If they are frayed or have open spots in the insulation, replace the wire. If the connectors are worn or loose, have repairs made by a licensed electrician.

7.6 **⚠WARNING** **Consider the safe approach and departure of the ready-mix trucks and adjust your setup accordingly.** Adjusting your setup position by a few degrees one way or another could mean the difference between a safe approach and an unsafe approach. Some examples of unsafe approaches are: too near an excavation or sticking out into traffic.

7.7 **⚠WARNING** **Avoid collisions!** Secure the immediate area of the machine from public traffic in accordance with all applicable regulations (warning lights, safety cones, barricades with flashers, etc.).

7.8 **⚠WARNING** Pipelines, end hoses, couplings, and all other **material delivery components must be able to withstand the maximum concrete pressure of the pump. Be sure** of it! Read and understand the minimum wall thickness chart found in the appendix of this manual.

7.9 **⚠WARNING** Do not use a piece of pipeline, end hose, coupling, or any other material delivery component that is not in good condition. **Replace, do not repair damaged pipes and hoses.** Concrete pipeline system is subject to wear, and the rate of wear is affected by pumping pressure, concrete composition, pipeline

material, and other factors. Read and understand the minimum wall thickness chart in the appendix of this manual. **Bursting pipes and concrete escaping under pressure is a serious safety hazard!** (See Figure 33.)

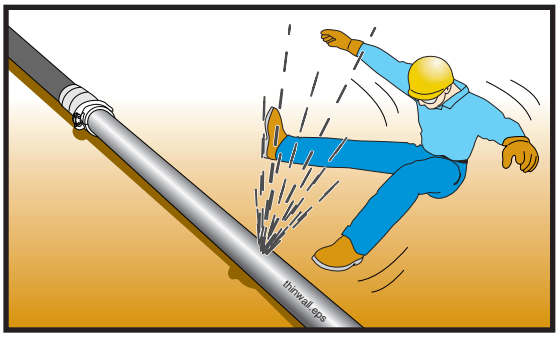


Figure 33
Delivery system components must be able to withstand maximum pump pressure

7.10 When laying out a pipeline, it is preferable to use an elbow instead of a hose to make direction changes. Elbows have less resistance to flow than hoses, and will therefore reduce the overall pressure required to push the concrete.

7.11 Always use the largest diameter pipeline that is practical, and use steel pipe instead of rubber hose. This will keep the pressure required to push the concrete to a minimum.

7.12 Support the delivery pipeline. Either an "S" transition pipe should be used to bring the pipe to ground level, or **each** section of the pipeline should be supported at the pump outlet level.

7.13 **⚠WARNING** The sections of pipe nearest the pump are subjected to the highest pressure and the greatest wear. Because of this increase of pressure near the pump, you should install only thick walled pipe, in "like new" condition there. Read and understand the minimum wall thickness chart in the appendix of this manual.

7.14 **⚠WARNING** **The maximum concrete pressure of the pump must be the only factor used to determine what thickness of pipe and what type of ends are needed**. In the case of a rock jam or any other type of blockage, **the maximum pressure of the pump will be exerted**.

7.15 Grooved (Victaulic) ends are **not recommended** for concrete pumping. Read and understand the comparison between heavy duty raised, metric, and grooved ends in the appendix of this manual.

7.16 **⚠WARNING** If the pipeline remains on the job (as is the case when pumping a high rise building), **the operator is responsible for checking the pipeline for dents, cracks, wear, and continuity each day before the pour begins**.

7.17 **⚠WARNING** In vertical runs, the weight of the vertical sections of pipe must be supported by a thrust block (often called a *deadman,* Figure 34) or other load-bearing device. **Each section of pipeline in a vertical run must be secured from lateral and horizontal movement.**

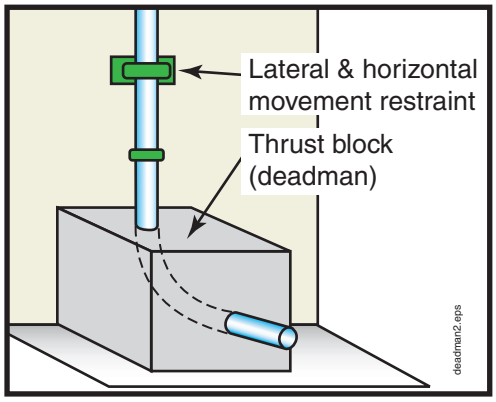


Figure 34
A thrust block (deadman)

7.18 **⚠WARNING** If you will be unable to see the point of placement, establish a system of communications with the workmen who will be there. Arrange for radio communications, a system of visual or auditory signals (lights or bells), or a spotter (Figure 35). If a spotter is used, **agree on hand signals before beginning the pour!**

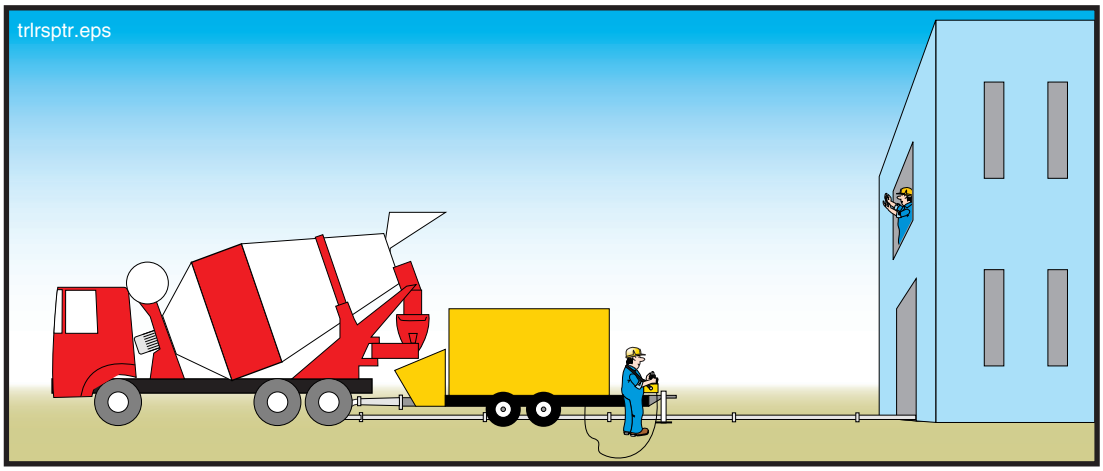


Figure 35
Arrange communications before starting

7.19 **⚠WARNING** Never leave the machine unattended when it is running or ready to run. Stop the engine and remove the key if you must leave the area. Make sure no one can start the machine without you. If you're unsure that the engine would restart, you must leave someone to monitor the unit. This is especially critical if there are children in the vicinity.

7.20 **⚠WARNING** Watch for children! It is easy for children to access the space underneath the machine, but it is not safe for them to do so.

7.21 **⚠WARNING** If spectators will be near the job, cordon off an area where they will be safe.

7.22 **⚠WARNING** If you will be cleaning the pipeline with compressed air at the completion of the job, **be sure that you have all the necessary accessories to do the job safely.** If you don't have all of them, make arrangements to get them before you begin to pump. **Do not improvise on this. Make sure** that you have the right parts. The minimum accessories include:

- A blow out head with properly sized air discharge regulator valve, and separate water/air inlet. The two openings should be spaced apart far enough that a blowout ball could not cover both openings at once.
- A *go devil*, or a hard sponge ball. Regardless of which is used, it **must** fit into the pipeline tight enough that air cannot escape ahead of it.
- A ball or "go devil" catcher that will catch the go devil or ball, or some other method of controlling the discharge while the line is being purged of material. There are two types of catchers (see paragraph 7.23).
- A hose that is rated for the pressure of the air compressor you will use and that is able to connect with both the air compressor and the blow out head. The hose must be in good working condition and must be free of cracks, frays, tears or other damage.
- If you will be cleaning the pipeline with compressed air at the completion of the job, be sure an adequate air compressor is available before starting the job.
- If you will be cleaning a vertical pipeline with compressed air at the completion of the job, you **must have a shutoff valve or switching valve installed at the bottom of the vertical run!**

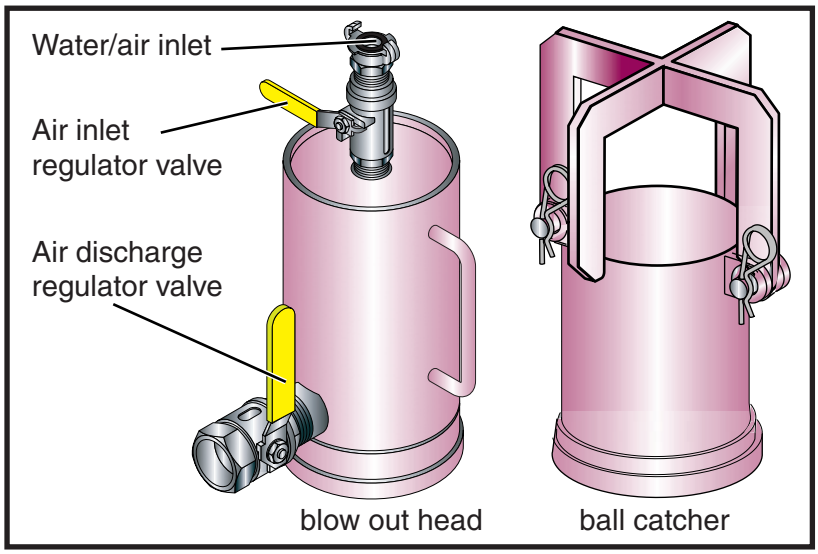


Figure 36
Ball catcher and blow out head

7.23

⚠WARNING There are two types of ball catchers. Know which type of catcher you are using. You may need to adjust your clean out procedure according to which type you have. The two types are as follows.

1. Catchers that stop the ball or go devil before air can escape, and
2. Catchers that allow the air out of the pipeline after the ball or go devil has reached the end.

Each type has advantages and disadvantages (Figure 37).

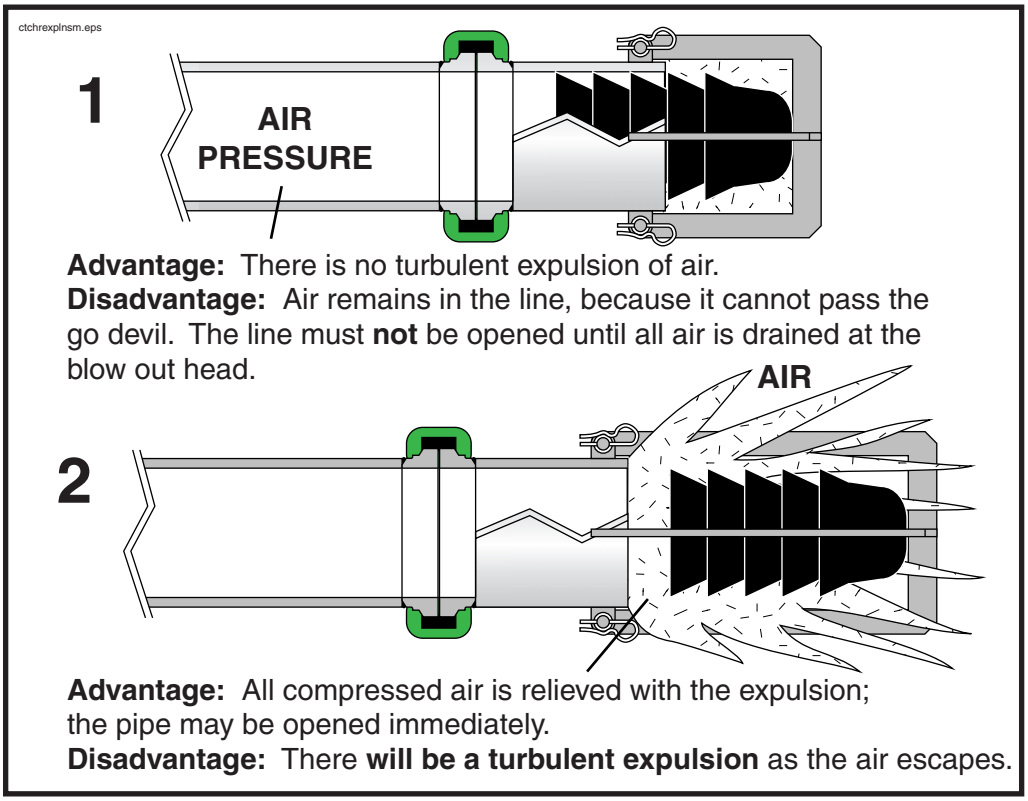


Figure 37
Types of catchers

With catcher type 1, the go devil stops, but air is still trapped behind it. The advantage is prevention of the sometimes violent expulsion of air at the end of the pipe. The disadvantage is that the air must be drained from the blow out head before the pipe line is safe to open. The pipeline must be controlled; allow no one to open it until all compressed air is relieved.

Catcher type 2 is long enough that the compressed air escapes behind the go devil. **Note!** This would happen with either catcher when used with a ball instead of a go devil. The advantage of this is that once you hear the turbulent expulsion, there is no pressurized air remaining in the line, and the line may be opened immediately. The disadvantage is the expulsion itself. In this case, the end of the line must be controlled because flying concrete and aggregate pose a hazard.

Both catchers can be safely used if care is given to the hazards involved.

III. Concrete Pump Operation

8. Safety Rules For Pump Operators

8.1 **⚠WARNING** Only qualified operators are allowed to operate the pump. A "Qualified Operator" is defined as someone who:

- has reached the age of 18 years (21 for interstate travel),
- is physically and mentally capable,
- has been trained in the operation and maintenance of the pump and the placing boom (if applicable),
- has demonstrated his/her capabilities to the employer in respect to the operation and maintenance of the pump and placing boom, and
- can be expected to perform these duties, as assigned, in a reliable manner.

8.2 **⚠WARNING** Because the operator is responsible for the safe operation of the machine, it is crucial that he/she understands the proper operation of the machine and the safety rules that apply to the job at hand, so the course of action taken in unforeseen circumstances will be a safe one. Only thorough training and supervised job experience can supply the necessary understanding.

8.3 **⚠WARNING** When operating the machine, **wear Personal Protective Equipment.** (See Figure 38.)

* Needed when exposed to airborne cement particles (or any other toxic dust).

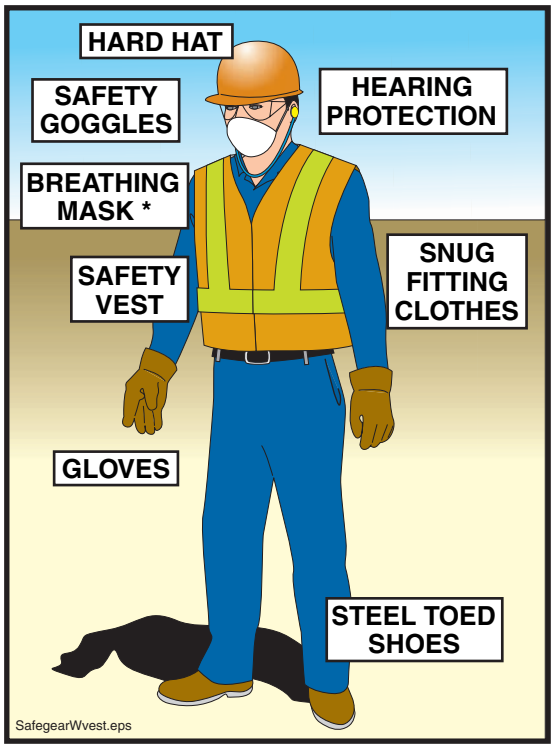


Figure 38
Wear Personal Protective Equipment (P.P.E.)

8.4 **⚠WARNING** All guards, covers, and service flaps must be closed and locked during operation.

8.5 **⚠WARNING** **Electrocution hazard!** If you are operating and lightning moves into the area, put the boom into the transport position, or another low position, and seek shelter until the lightning is gone.

8.6 **⚠WARNING** **Crushing hazard! Never, ever** position yourself between a ready mix truck and the pump! Stand off to the side, so the ready mix driver can see you at all times (Figure 39).

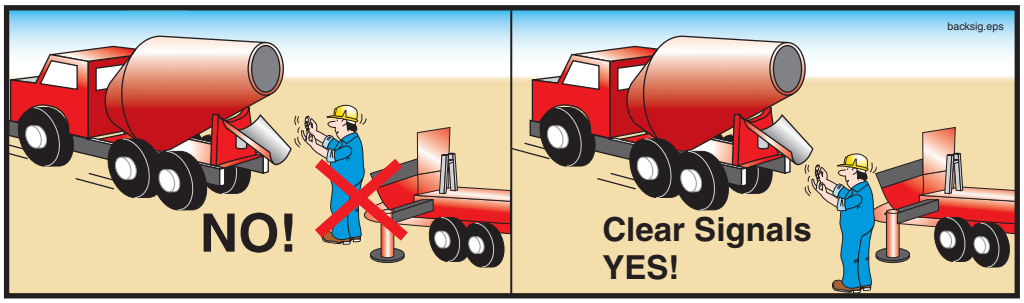


Figure 39
Never stand between the ready mix truck and the pump
Use clear and concise hand signals

8.7 **⚠WARNING** When backing in ready mix trucks, use clear and concise hand signals (Figure 39).

8.8 **⚠ DANGER** You must avoid hazardous proximity or contact with power lines under all circumstances. **Be <u>sure</u>** that you maintain 17 ft. (5 meter) clearance! The 17 foot clearance allows room for the movement of the wires and the boom by wind force, electrical arcing, and human error (Figure 40). **Do not take chances with high voltage; it is the number one killer of concrete pump operators!**

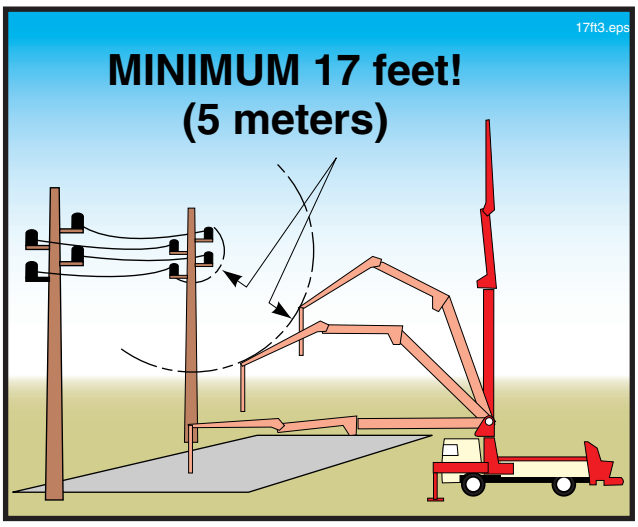


Figure 40
Maintain a clearance of at least 17 feet from wires

8.9 **DANGER** **When overhead wires are in the area that the boom will be moving to complete a pour, a spotter must be employed whose only job is to warn the operator if the boom comes within 17 feet of the wires.** The spotter must understand the responsibilities assigned, and must be able to judge a 17 foot distance.

8.10 **DANGER** Direct contact with a live power line is always dangerous to everyone and anyone electrically connected to the machine (Figure 41). **Use extreme caution** near high voltage wires.

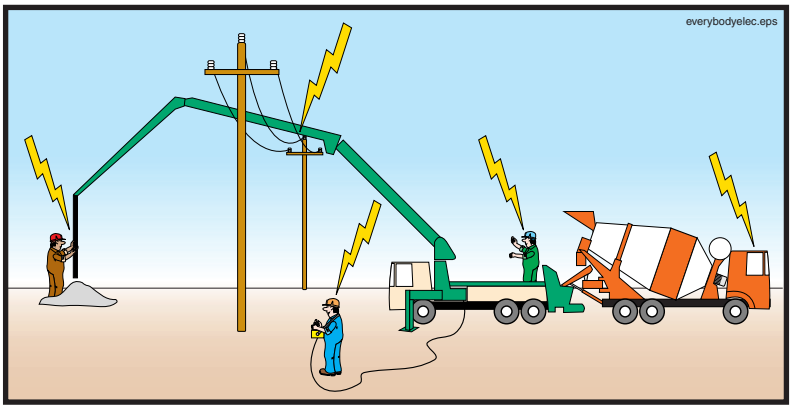


Figure 41
If the pump is energized, everything that touches the pump is also energized

8.11 **DANGER** Do not rely on depth perception when working near high voltage lines. Put yourself at the best possible vantage point to see the distance between the boom and the wires. If that is not possible, then **you must use a spotter!** (See Figure 42.) See the definition of "spotter" in the glossary found in the appendix of this manual.

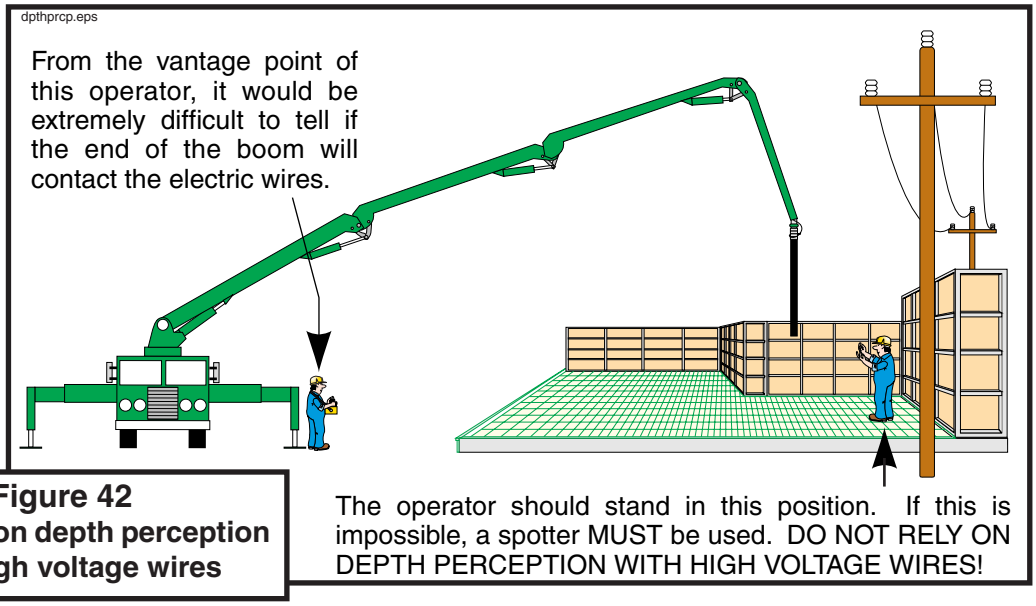
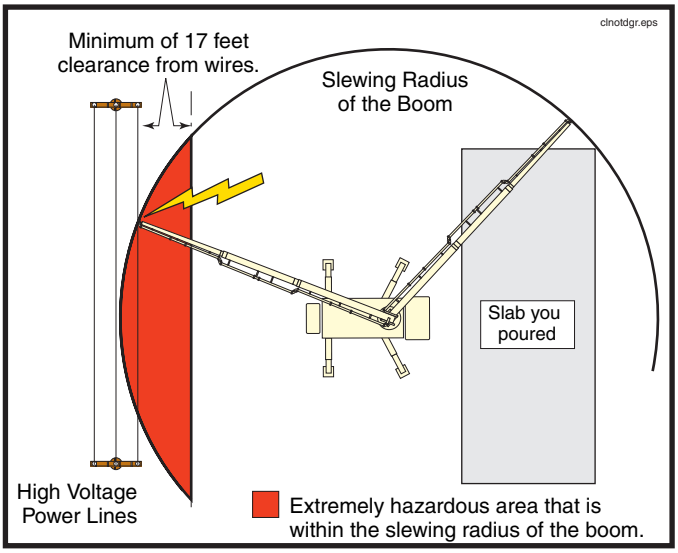


Figure 42
Never rely on depth perception with high voltage wires

8.12 **⚠ DANGER** Watch for wires that are not directly in the area of the pour. Accidents can happen when moving between points of placement, or when moving the boom after the pour is completed (Figure 43). **Never let down your guard when the boom is in the air!**



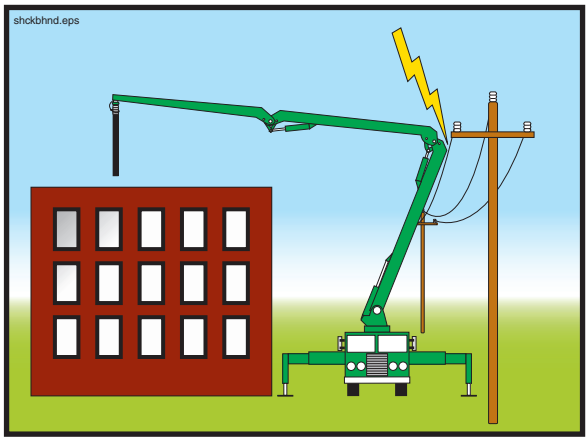


Figure 43
Never let down your guard when moving the boom

8.13 **⚠ DANGER** **High voltage makes conductors out of materials that would normally not conduct**! Many nonconductors will conduct enough current to kill you if you contact the 8000 volts to ground that is normally found on power poles in the United States (Figure 44). Voltage in the wires may be higher than 8000, especially in industrial areas.

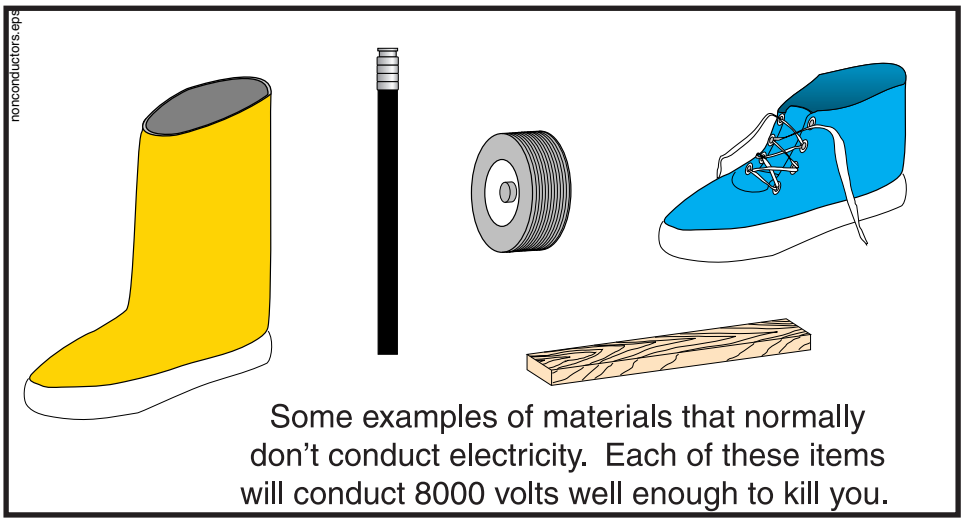


Figure 44
Even poor conductors will conduct high voltage

8.14 **⚠CAUTION** **Loss of hearing!** While standing near a working concrete pump, sound pressure levels may exceed O.S.H.A. standards for constant exposure (Figure 45).

PERMISSIBLE NOISE EXPOSURES*

*Under part 1910.95 "Occupational Noise Exposure," (Dept. of Labor) of the Code of Federal Regulations, Chap. XVII of Title 29 (39 F.R. 7006).

DURATION per DAY in HOURS	Sound level in dB (A) Slow response
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
1/2	110
1/4 or LESS	115

††

WEAR HEARING PROTECTION!

Figure 45
Noise level and exposure time limits

8.15 **⚠WARNING** Do not allow unauthorized persons in the operational area of the pump and boom. Warn unauthorized persons present in the area to leave and stop work if they do not comply.

8.16 **⚠WARNING** Do not use the boom as a hoist or crane! (Figure 46.)

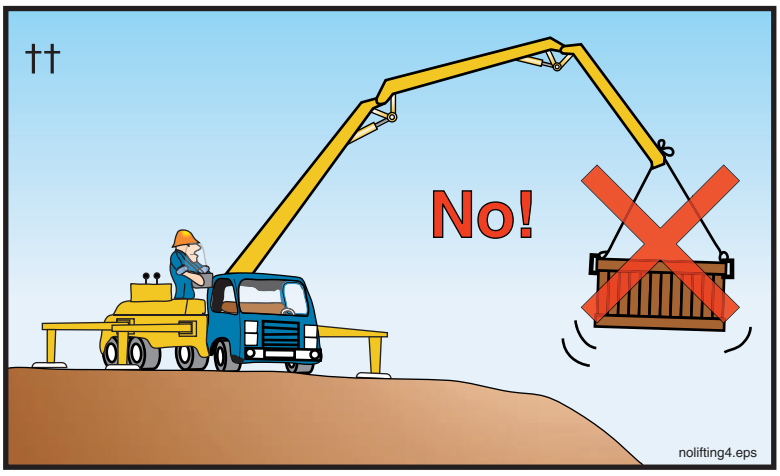


Figure 46
No lifting with the boom

8.17 **⚠WARNING** **Explosion hazard.** Never remove the fuel cap or refuel the unit near hot surfaces, sparks, or open flames. Never smoke while refueling.

8.18

⚠WARNING **Do not let the concrete level in the hopper become low!** If air is sucked into the material cylinders, the pump will compress the air. Compressed air always poses a hazard as it is expelled from the hopper or the delivery pipeline (Figure 47). If air is taken into the material cylinders, take the following steps to minimize the hazard:

1. Stop the pump immediately. Hit the emergency stop button if that is the quickest way to stop the pump. There will be an expulsion of compressed air the next time the concrete valve shifts, which can be safely absorbed by filling the hopper with concrete.
2. Pump slowly in reverse for a couple of strokes. This will not remove all the air, but it should minimize the amount left in the pipeline.
3. Persons standing at the discharge end or near the delivery line must be warned to move away until all of the air has been purged. Personnel should move a prudent and reasonable distance beyond the end-hose movement area or the point of discharge, and personal protective equipment (PPE) should be worn (Figure 47).
4. When the pump is restarted, the slowest possible speed should be used until **all** air is removed from the pipeline. Don't assume that the first little air bubble is the end of the compressed air.
5. Do not allow anyone near the discharge until concrete runs steadily from the end and there is no movement of the delivery system.

If workers are positioned in high or precarious places, warn them to expect a loud sound as the air escapes the pipeline. (Warn them even if they are well away from the discharge.) That way, we can prevent the worker from falling as a result of being startled by the noise.

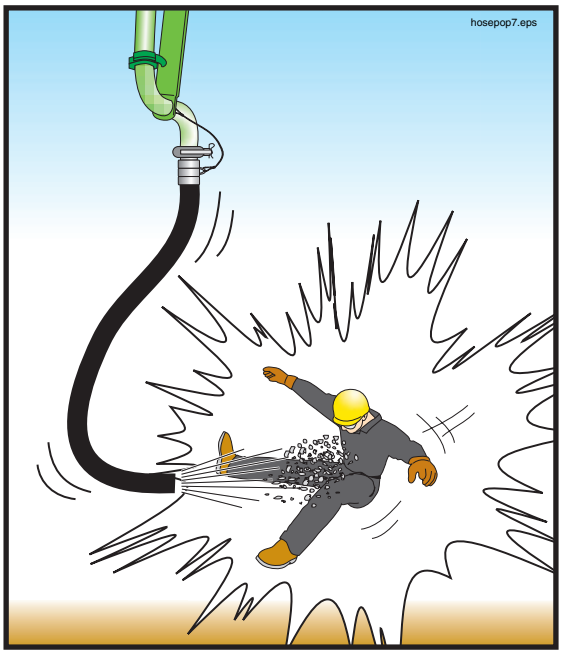


Figure 47
Remove everyone from the discharge area whenever air is in the line

8.19 **⚠WARNING** When initially priming the delivery system, when restarting after moving, when restarting after adding or removing hoses, when attempting to remove a blockage by "rocking" the concrete, or whenever air has been introduced into the line, warn everyone to stay away from the discharge until material runs steadily. Personnel should move a prudent and reasonable distance beyond the end-hose movement area or the point of discharge, and personal protective equipment (PPE) should be worn (Figure 47).

8.20 **⚠WARNING** A bulk density of approximately 150 pounds per cubic foot is assumed for the material to be pumped with a placing boom (normal concrete). If you intend to pump material with a higher bulk density (e.g., steel fiber entrained concrete), you must contact the manufacturer for advice. Failure to do so may result in damage to the boom and/or instability in certain operating positions.

8.21 **⚠WARNING** **Blockages in the pump or delivery pipeline can create an unsafe condition.** Blockages are caused by many different factors, as outlined below.

CAUSES OF BLOCKAGES

- **Faulty concrete mix design.** The concrete that is being supplied may not be a pumpable mix, for example there may be too much sand or too little cement. There may be bleeding or segregation. Some admixtures adversely affect pumpability (e.g., too much air entrainment). If the mix is not pumpable, no amount of operator expertise will make it so.
- **The line size may be inadequate.** The line size should always be at least 4 times larger than the largest aggregate being pumped, or blockages could occur.
- **Worn concrete valve parts.** Worn parts allow the finest material and water to escape back into the hopper when pressure is applied.
- **Pipeline and joint deficiencies.** This would include dirty pipes (pipes that have not been cleaned properly), worn and leaking pipe joints that allow loss of concrete fines and water, pipes that haven't been properly primed before starting, and too many sections of rubber hose, which increases friction. These are all causes of blockages that can be controlled by the operator.
- **Pump inadequate for the application.** The pump selected for the job may not have enough pressure or horsepower available for the required duty.
- **Concrete setting up in the pipeline.** This may be caused by delays on site (e.g., repairing a broken form), or by attempting to pump "old" concrete (concrete that was batched hours before pumping and is being kept alive only by adding water and constant agitation). Weather conditions can also affect how quickly the concrete becomes hard. Companies should establish procedures for these situations. A good rule of thumb is: **If in doubt...wash out**.
- **Foreign matter in the concrete.** Pieces of old concrete that break away from mixer fins, unmixed clumps of cement, mixer fins, hammers, and furry mammals are examples of foreign matter that have caused blockages.
- **An inexperienced operator can cause blockages by setting up the job improperly.** For example, if the placing crew is forced to add hose or pipe to reach a far point after the pour is already in progress, there is a great chance of creating a blockage due to the dry conditions inside the pipe or hose. It is for this reason that the job should be set up so pipe or hose need only be removed (never

added) as the day progresses. If dry pipe or hose must be added, it must be lubricated just like the rest of the pipe was lubricated when you first started.

- **An inexperienced placing crew can cause blockages by kinking the end hose.** This type of blockage can lead to serious accidents because the hose may un-kink by the force of the pump.
- **The concrete becomes segregated in the hopper.** When it's raining hard, the cement and fine material get washed from the stone and course sand. This mix will not pump. **Cover the hopper** as you wait out the passing storm. It is also for this reason that you should **never allow a truck mixer to wash out in your hopper!**

8.22 **⚠WARNING** Never try to remove a pipeline blockage by applying high pressure to it, because that will cause the blockage to become a plug. If you have a blockage, immediately stop the pump. Stroke the pump a couple of times in reverse. Slowly stroke the pump in forward, and try to dislodge the blockage. If you are moving the blockage, continue to do so slowly and gently. While attempting to clear the blockage, remove all personnel from the discharge area, as air may be introduced into the placing line during this process.

8.23 **⚠WARNING** If the pump or associated equipment develops a problem that creates an unsafe condition, you must stop pumping immediately! Do not restart until the unsafe condition has been remedied.

8.24 **⚠WARNING** The following points must be observed when locating a blockage.

- Pump in **reverse** for **at least two stroke**s, then stop the pump. **Do not allow anyone to open the pipeline** until this is done (Figure 48).
- Wear personal protective equipment when opening a blocked pipeline.
- Clear the area of nonessential personnel before opening the line.
- Plugs will be found in (in the order of likelihood) reducers, hoses, elbows, and pipe.
- If you are tapping the pipe to find the plug, the sound will be a dull thud (tik-tik) rather than a ringing sound (tong-tong) at the spot of the plug, because the jammed material will keep the pipeline from vibrating. (This method won't find a plug in a hose.)

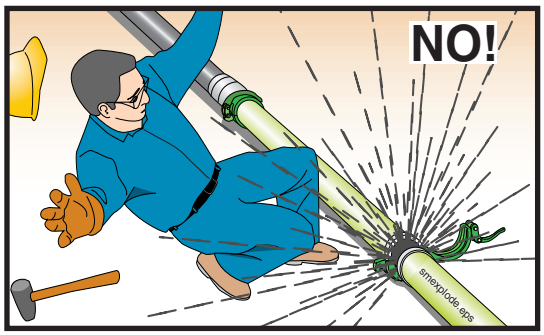


Figure 48
Never open a pressurized pipeline

8.25 **⚠WARNING** It is possible that some pressure will remain in the pipeline after reversing the pump. Use a shovel or pry bar to open the clamps on a blocked pipeline. Wear face protection, and turn away from the pipeline when opening the clamp.

8.26 **⚠WARNING** It would be better to let the pipe be ruined by setting concrete than to risk injury by ignoring safe procedures. Always use safe practices when cleaning pipe. Remember, pipeline is replaceable, you are not.

8.27 **⚠WARNING** **Do not kink hoses**. Kinking will cause the pump to create maximum concrete pressure. **The pump may unkink the hose with force!** (See Figure 49.)

Figure 49
Kinking the hose creates a hazard

8.28 **⚠WARNING** Never use compressed air to clear a blockage! It is unsafe and unnecessary. The pump can develop much more pressure than an air compressor. If the pump pressure can't move it, air pressure won't either.

8.29 **⚠WARNING** Never stand on, sit on, or straddle a pipeline while it's in use, or whenever it is pressurized. Pipeline wears out with each stroke of the pump. If the pipe bursts, you want to be to the side of it, not on top of it (Figure 50).

Figure 50
Never straddle or sit on a pressurized pipeline

8.30 **⚠WARNING** Crushing/amputation hazard. Do not remove the water box covers or grates when the machine is stroking (Figure 51). If you must remove the water box cover (to add water, for example), and there is not a bolt-down grate over the water box, then stop the pump, take the transmission out of gear, and lock the cab so the pump cannot be restarted until you are finished and the covers are back in place. If a bolt-down grate is installed, you may simply stop the pump from stroking before removing the water box covers. Replace the covers before restarting the pump.

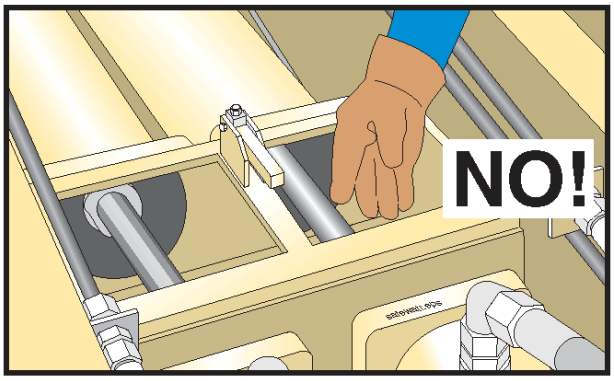


Figure 51
Keep your body out of the waterbox

8.31 **⚠WARNING** **Never leave the pump unattended!** Before you leave a laborer, ready mix driver, or any other worker alone with the pump for any reason, make sure the worker who you leave with the pump knows:

- the safety rules for a person stationed at the pump (the rules are listed in this Safety Manual, beginning on page 57)
- how to stop the pump
- the location of the emergency stop switches
- how to signal you.

8.32 **⚠WARNING** To prevent any unintentional movements of the machine, **all** control devices on the operator's panel and the remote control box must be switched off before changing from remote control to local control, or vice-versa. Whenever you are connecting or disconnecting the remote cable, push in the emergency stop button.

8.33 **⚠WARNING** Crushing/amputation hazard. Never put your hands, feet, or any other body part into the water box, concrete valve, or hopper when the hydraulic system is operational or ready to operate! (See Figure 52.)

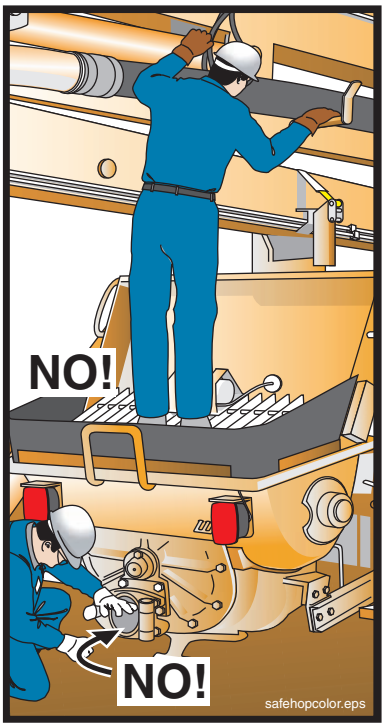


Figure 52
Don't put your body in the machine

8.34 **⚠WARNING** Do not work on the hopper, water box, concrete valve, or the hydraulic system unless the drive engine is turned off and the accumulator pressure (if so equipped) has been released! On units with internal combustion engines, the key must be removed. If there is more than one key, you should tag the ignition. On units driven by electric motors, the main disconnect must be locked out according to applicable standards.

8.35 **⚠WARNING** Never operate the boom "blind." If you can't see the point of placement, you must establish a system of communications with the workmen who can see the point of placement. Arrange for radio communications, a system of visual or auditory signals (lights or bells), or a spotter. If a spotter is used, **agree on hand signals before beginning the pour!** (Use of the ACPA standardized hand signals is highly recommended.) If the boom will be moved extensively, arrange for a workman to stay with the pump and put yourself in a position to see the end of the boom (Figure 53).

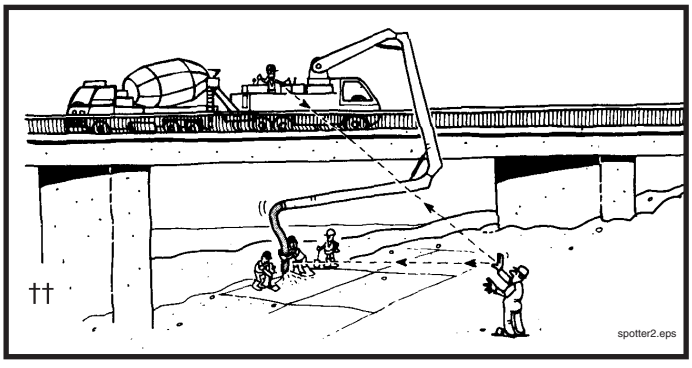


Figure 53
Never pump blind

8.36

⚠WARNING Always block the discharge end when you must swing a full boom over workers or property. You must stop concrete from falling out of the boom. This can be done with a shut-off valve, or by removing the hose and putting a blanking plug on the last elbow (Figure 54), or by kinking the end hose and securing it in the kinked position. Please note— hoses that can be easily kinked may not be strong enough to withstand the pressure of the pump. Verify the working pressure of the hose against the maximum pressure of the pump before using this type of hose.

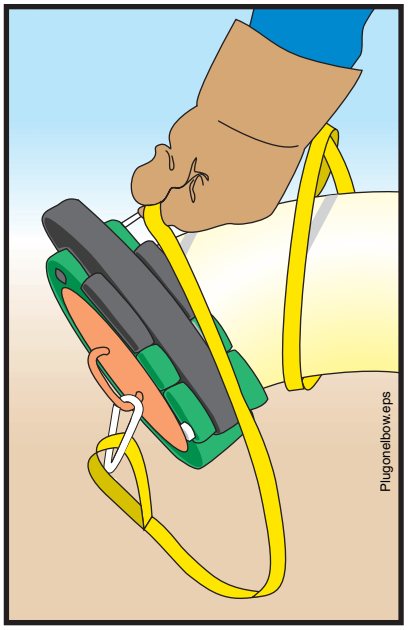


Figure 54
A blanking plug in place on a tip elbow with safety sling

IV. Cleaning The Pump And System

9. Safety Rules For Cleaning The Boom

9.1 **⚠WARNING** Do not let down your guard when the pour is completed. Accidents also happen during cleanout and the drive back to the yard. It is important not to become relaxed about job safety until you are no longer on the job.

9.2 **⚠WARNING** Watch for electric wires when moving the boom for cleanout or folding the boom for transport!

9.3 **⚠WARNING** Using compressed air to clean the boom delivery system should only be done when no other method is practical or as recommended by the manufacturer.

9.4 **⚠WARNING** If you have to use compressed air for cleaning the boom you **must** have all of the necessary accessories. Read and understand the complete safety rules regarding cleaning out with compressed air (point 12.4 on page 47 of this Safety Manual). Cleaning with compressed air should only be done by a qualified person.

9.5 **⚠WARNING** **Never** use compressed air to blow through rubber hoses or short sections of pipe. In the case of rubber hoses, their flexibility will allow them to "whip" wildly with the force of the air and moving concrete. Short sections of pipe will not have sufficient mass to allow the concrete to move slowly, so there will be rapid expulsion of the material.

9.6 **⚠WARNING** If the ball or go devil doesn't come out of the delivery system after applying compressed air, **you must relieve the pipe of air pressure before opening it.** If the bleed off valve plugs when you are draining the air, the only safe way to proceed is to drill small holes into the pipeline, which will then allow the air to escape. Wear a full face shield when drilling the holes. Pipe you have drilled into is ruined and must be replaced. Drill the holes to relieve the air pressure even if the concrete has set up in the pipe. The pipe is hazardous until the pressure is relieved.

9.7 **⚠WARNING** Exercise care when "tapping" on the pipeline to find the location of the cleanout ball. Applying too much force will dent a standard pipe (making it weak and unsafe) and could break the carbide insert of double wall pipe.

9.8 **⚠WARNING** It is better to let the pipe be ruined by setting concrete than to risk injury by ignoring safe procedures. Remember, pipeline is replaceable, you are not.

10. Safety Rules For Cleaning The Concrete Valve & Hopper

10.1 **⚠WARNING** Tipping hazard! Before moving the unit for cleaning, **fold the boom and secure the outriggers into the travel position.**

10.2 **⚠WARNING** Wear protective clothing and equipment when cleaning the concrete pump. Protect against concrete burns and concrete poisoning by wearing rubber boots and gloves during cleanout or any other time that you will be **in** contact with the concrete.

10.3 **⚠WARNING** Crushing and amputation hazard! **Never put your hands or any other body part into the concrete valve.** Instead, use water jets and the supplied rake (Figure 55).

10.4 **⚠WARNING** **Never put your hands or any other body part into the machine when the hydraulic system is operational.** If you must remove the grate to chip at hardened concrete, you must first disable the system by taking the transmission out of gear and locking the cab door, or stopping the engine, relieving pressure in the accumulator circuit (if so equipped) and securing the controls against unintended operation. Reinstall the grate before restarting the engine (Figure 55).

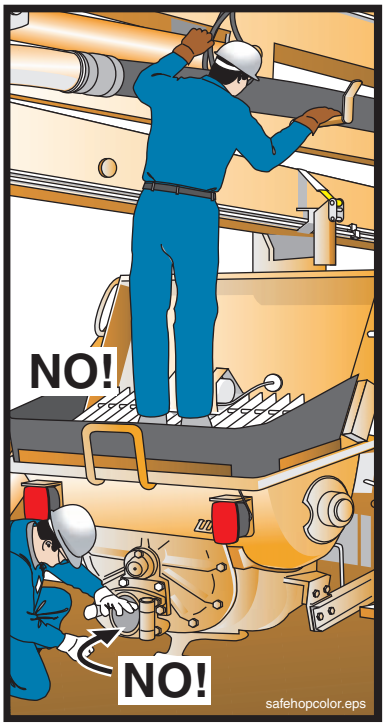


Figure 55
Keep your body parts out of the machine

11. Safety Rules For Cleaning The Water Box

11.1 **⚠WARNING** Crushing and amputation hazard! Stop the concrete pump before removing the water box covers. If your unit has bolt down guards, do not remove them for cleaning. If there is not a bolt-down guard over the water box, then stop the pump, take the transmission out of gear, and lock the cab so the pump cannot be restarted until you are finished cleaning and the covers are back in place. If a bolt-down grate is installed, you may simply stop the pump from stroking before removing the water box covers. Replace the covers before restarting the pump.

11.2 **⚠WARNING** If possible, position the folded boom in a slightly raised position when cleaning the water box (watch for wires when raising the boom). The outriggers must be extended and jacked. If the boom is raised, it will be unnecessary to bend over the water box for cleaning.

11.3 **⚠WARNING** Falling hazard! Be sure of your footing when cleaning the water box.

11.4 **⚠WARNING** Crushing and amputation hazard! Do not remove the water box guards for cleaning. Clean the water box with water jets only. **Do not put your hands or any other body part into the water box for cleaning, or at any other time when the machine is running or ready to start.**

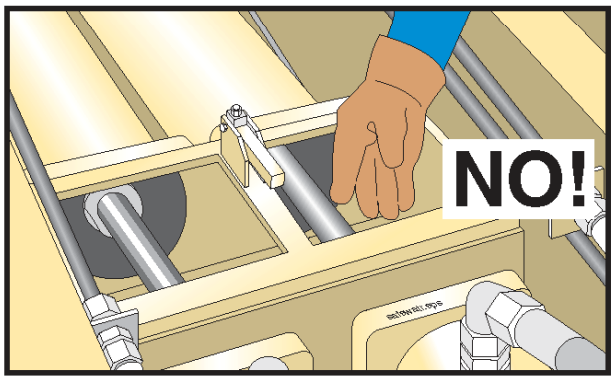


Figure 56
Keep your hands out of the waterbox

12. Safety Rules For Cleaning A Separately Laid Pipeline

12.1 **⚠WARNING** Flying particle hazard! Clear the discharge area of personnel and equipment before forcing a ball or go devil through the pipeline, even if you are cleaning with water. Some air will be trapped in the pipeline, and the trapped air will become compressed before discharge.

12.2 **⚠WARNING** Short pipelines and single pipe sections should be cleaned by removing the clamps and dumping the pipe sections. Remember to lift with your legs, not with your back.

12.3 **⚠WARNING** The point of discharge must be controlled. Use a ball catcher or some other containment device at the point of discharge, even when cleaning with water.

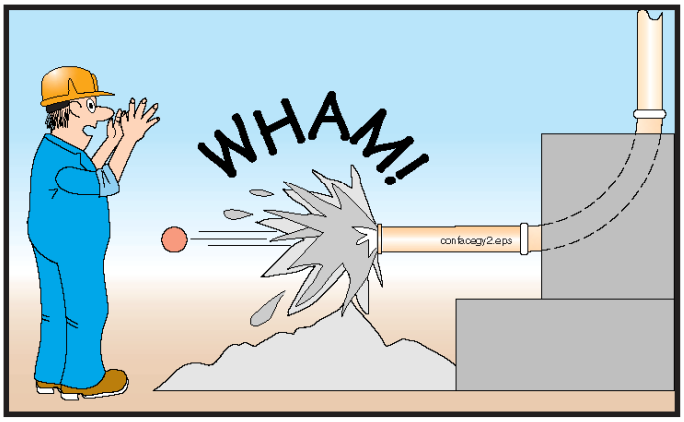


Figure 57
Cleaning with compressed air can be extremely hazardous if you don't follow the safety rules

12.4 **⚠WARNING Blowing out with compressed air creates potential hazards! Serious injury or death could result** if you do not adhere to these safety points.

- **Blowing out must be performed under the supervision of a qualified person.** (See the glossary for the definition of *qualified person*.)
- **Blowing out requires two people!** One trained person must be at the inlet end to operate the air insertion, and the other trained person must be near (but safely back from) the discharge point to monitor the discharge and to make sure that no one enters the hazard area.
- **No pipe bends or flexible delivery hoses may be connected to the end of the pipeline during the blowing out process,** unless there is a pre-planned cleanout station erected to route the discharge into the ready mix truck.
- **The point of discharge must be controlled. Clear the discharge area of personnel and equipment** before beginning the blowing out process. Do not allow anyone to enter the area during the blow out process. If a ball catcher is used, be aware of which type you have, and adjust your procedure accordingly. Ball catcher types are described in paragraph 7.23 on page 31.
- **The concrete outlet must be positioned high enough to permit easy discharge of the material**.
- If you are going to divert the discharge into a discharge pipe system, **you must lubricate the discharge line with slurry, or a plug could occur.**
- **The pipe cleaning blow out head must be equipped with a properly sized air discharge regulator valve and a separate water/air inlet.** The two openings should be spaced apart far enough that a blowout ball could not cover both openings at once (Figure 58).

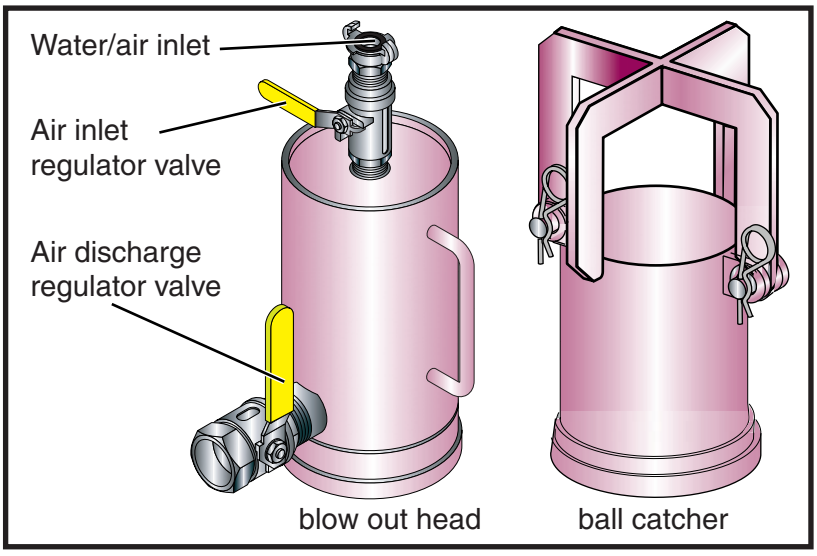


Figure 58
Ball catcher and blow out head

- The plug or go devil must be thick enough to prevent compressed air flow around the plug into the concrete.

- **The pipeline must not be disassembled until it has been completely relieved of air.** Be **sure** of this! (See Figure 59.)

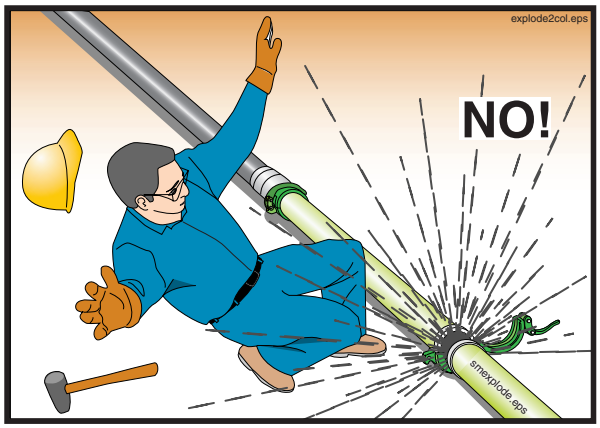


Figure 59
Never open a pressurized pipeline

- **Do not use compressed air to blow out concrete delivery hose, single pipe sections and short pipelines up to a length of 40 feet.** Hoses will jump and move unpredictably; short pipelines don't have enough concrete to resist the force of the air, causing it to discharge too quickly, like a cannon (Figure 60).

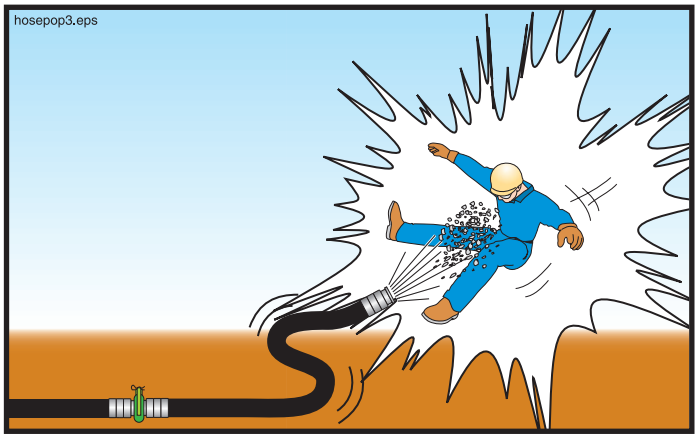


Figure 60
Never use air to blow out hoses or short pipelines

- **When air pressure begins to drop rapidly, shut off the air supply from the compressor, and immediately begin bleeding air out of the pipeline.** (The drop in pressure signifies that the pipeline is almost empty of concrete.)

12.5 **⚠WARNING** When blowing out a vertical line, a shutoff valve is required to prevent the following scenario.

1. (See diagram A in Figure 61.) Without a shutoff valve installed, the pipeline is disconnected from the pump. Immediately, the concrete drains out of the vertical sections of pipe, leaving concrete in both horizontal sections, and air trapped in between.

2. (See diagram B in Figure 61.) The ball is inserted, and pushed with compressed air. This also compresses the air that is trapped in the vertical sections of pipe. The trapped air will be violently expelled when it reaches the end of the pipe, but the pipe will not yet be empty.

A shutoff valve installed at the bottom of the vertical run will prevent this hazardous situation. The shutoff valve must be capable of handling the maximum concrete pressure of the pump and, of course, must be installed before the pour begins. Several different styles are available, ranging from a manually operated flat gate that is put into place with a hammer to fully hydraulic types that will also divert the concrete to a different pipeline. With a shutoff valve installed, you can proceed as indicated below.

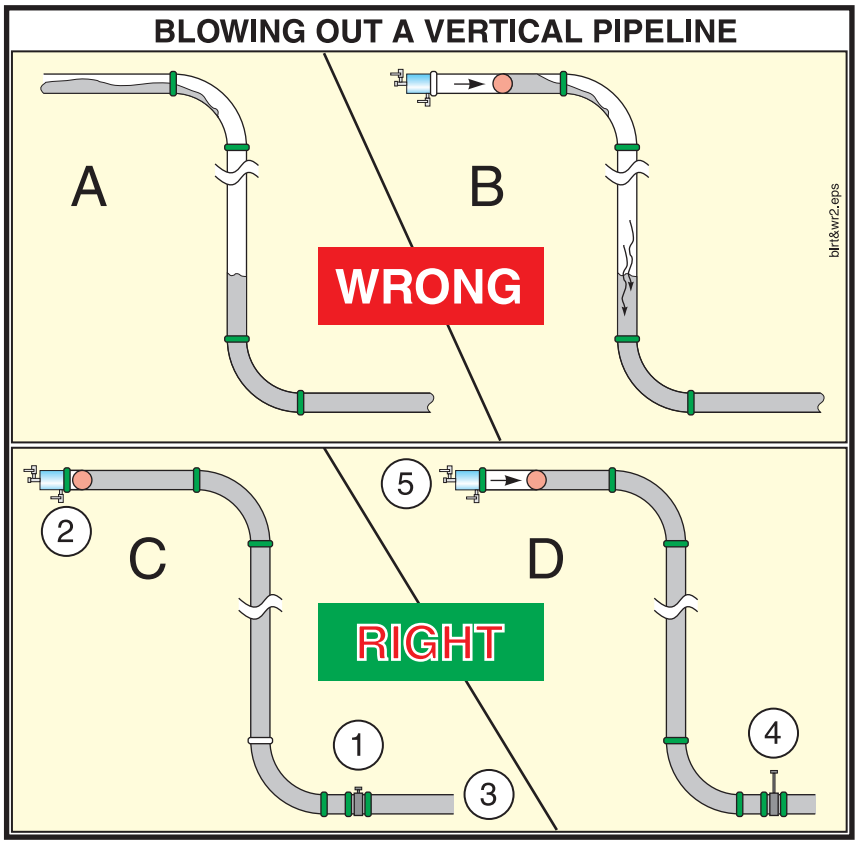


Figure 61
Blowout of a vertical line

12.6 **⚠WARNING** **Blowing out vertical sections of pipe** (for example on a high rise building) **requires additional safety precautions.**

1. **Know where the discharge area for blowing out will be before the pour begins**. Ready the area and accessories before the pour begins so you will not waste time when pumping is completed.
2. **Blowing out with compressed air requires two qualified persons.**

3. **The persons at both ends of the pipeline must be able to communicate without delays**, which means you must establish communications (for example, with a radio).
4. **When pumping is complete, close the shutoff valve before disconnecting the pipeline from the pump** (item 1, Figure 61). Failure to do this will cause the concrete to fall out of the vertical sections of pipe, leaving concrete in the horizontal sections of pipe and an air pocket in the vertical sections. This does not apply if you are using a switching (diversion) valve.
5. Install the ball(s) in the pipeline, secure the blow out head and hook up the air compressor. **Do not apply the air yet!** (Item 2, Figure 61.)
6. If you will be diverting the discharge to a cleanout area, lubricate the discharge line with slurry, or a plug could occur.
7. **Position the ready mix truck at the cleanout standpipe**, or install the ball catcher or other containment device at the end of the discharge line. (Item 3, Figure 61.)
8. **Clear the discharge area of personnel.** You must allow no one to enter the discharge area until the pipeline is depressurized.
9. **Divert the vertical pipe line to the clean out area, or open the shutoff valve in the delivery pipe line now.** Allow gravity to start the concrete moving through the discharge line. As the concrete falls from the vertical sections, it will take the ball with it, making it impossible to trap air in the line. (Item 4, Figure 61.)
10. **Apply the compressed air to the pipeline.** Close communications must be maintained at this time. Add only enough air to keep the concrete moving. Do not allow the concrete to accelerate. (Item 5, Figure 61.)
11. **When concrete starts to accelerate, shut-off the air supply from the compressor, and open the air regulator to bleed air from the line.** Rapidly accelerating concrete indicates that the pipeline is almost empty. After the ball has been expelled from the pipeline, leave the air regulator open to be sure that all air is removed from the system.
12. All the rules for blowing out found in point 12.4 on page 47 also apply to blowing out a vertical pipe line. These rules are in addition to the general "cleaning a pipeline with compressed air" rules.

12.7 **⚠WARNING** **Never use compressed air to attempt to clear a blockage!** It is unsafe and unnecessary. If the pump pressure can't move it, air pressure won't either.

V. Maintenance Of The Machinery

13. Safety Rules Regarding Inspection

13.1 **⚠WARNING** It is imperative that your boom, outriggers, and other structural members be inspected by a certified boom inspector on a regular basis. The results should be documented carefully and a record kept. Consult the manufacturers recommendations for the proper interval for your machine.

13.2 **⚠WARNING** Visually inspect your unit each day before it is put into operation. If any problem is found that will affect the safe operation of the pump, don't use the pump until it is repaired!

13.3 **⚠WARNING** Any structural problem found on the placing boom, outriggers, or tower section of the unit should be reported to the manufacturer so that proper repair procedures can be designed and implemented. You do not need to report any structural problem that has been previously reported and for which a repair procedure has already been designed and implemented.

13.4 **⚠WARNING** If safety decals are faded, missing, damaged, or otherwise unreadable, they must be replaced immediately. Contact the manufacturer of your unit to obtain replacements.

13.5 **⚠WARNING** If safety devices or guards are removed for inspection purposes, they must be replaced before someone uses the machine.

13.6 **⚠WARNING** Pay attention to the *Operation Manual* and manufacturer's service bulletins regarding maintenance and inspection procedures and intervals.

13.7 **⚠WARNING** If inspection reveals something that looks wrong, or even suspicious, report it to the manufacturer for consideration. Don't just assume that it's OK.

13.8 **⚠WARNING** Inspect the tip hose safety cable and mounting hardware on a regular basis. Replace it if it becomes old, frayed, or rusted.

13.9 **⚠WARNING** Inspect the boom tie down and boom rest assemblies regularly (if your unit is so equipped). The boom must not be allowed to bounce during travel.

13.10 **⚠WARNING** Visual inspection of the concrete pump circuits and safety devices should be done daily. Hands on inspection and documentation of results should be done weekly, or at least when preventive maintenance is scheduled.

13.11 **⚠WARNING** Do not neglect the delivery pipeline, clamps, or hoses. Check them often for wear, dents, and frays. Never send a unit to a job with a worn or damaged delivery system. Ultrasonic thickness testers are more accurate than the tap method.

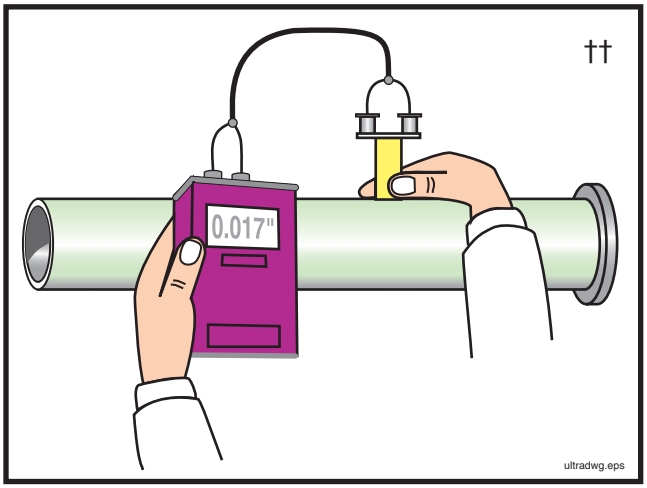


Figure 62
Check delivery system wall thickness with an ultrasonic thickness tester

14. Safety Rules Regarding Scheduled Maintenance

14.1 **⚠WARNING** Proper and timely maintenance is important to the safe operation of a concrete pump and placing boom. The proper procedures are outlined in the operation manual supplied with the pump. Do not put it off. Do not treat it lightly. Do not "fudge" results. The lives of the operator, oiler, and workers on the job are depending on it.

14.2 **⚠WARNING** Keep the machine clean! Oil spills, grease, loose tools, and displaced accessories are hazards.

14.3 **⚠WARNING** Pins should be used on all delivery system clamps. Clamps that will hang over workers, and clamps used on system that will be dragged shall be pinned (Figure 63).

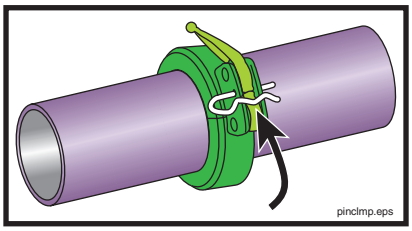


Figure 63
Pin the clamps

14.4 **⚠WARNING** Be sure that you are installing the correct clamps for the types of pipe ends used. Never try to mate dissimilar pipe ends unless using a clamp specifically made for this purpose. See the comparison regarding weld-on ends on page 72 in the appendix of this manual.

14.5 **⚠WARNING** When installing new pipe and/or hose on the machine be sure that it is capable of handling the maximum concrete pressure of the pump.

14.6 **⚠WARNING** Remember that boom pipe cannot weigh more than 10.14 pounds per foot, when empty. Certain models and brands may have different requirements. Check the operation manual for your machine.

14.7 **⚠WARNING** If safety devices or guards are removed for servicing, they must be replaced before the machine is put back in service.

14.8 **⚠WARNING** Do not change the maximum relief valve setting on any hydraulic circuit without permission from the manufacturer. **Never** change an accumulator circuit pressure setting without specific instructions from the manufacturer.

14.9 **⚠WARNING** Never make unauthorized modifications to structural members or pressure circuits.

14.10 **⚠WARNING** You must **replace, not repair** damaged hydraulic or concrete hoses or pipes.

14.11 **⚠WARNING** Never try to repair a machine using worn, damaged, or defective components.

14.12 **⚠WARNING** Welding on the boom, outriggers, tower, or any other structural member may be done **only** by a welder certified to A.W.S. D1.1 (Sections 3, 5 and paragraph 9.25 of Section 9). All structural welding must be done to the manufacturer's specifications.

14.13 **CAUTION** **Never allow welding current to travel through bearings or hydraulic cylinders**. Keep the ground cable on the component that is being welded.

14.14 **CAUTION** **Electronic components can be destroyed by welding current**. Before welding on the unit, you must disconnect the battery cables, and unplug all radio remote control power wires. If you have a proportional boom system, the proportional amplifiers must be removed from the mother board before welding. If in doubt, contact the service department of the manufacturer for instructions **before** proceeding.

15. Safety Rules When Servicing The Machinery

15.1 **⚠WARNING** **Repairs should be carried out by qualified workshop personnel** (See the glossary for the definition of *qualified personnel*.)

15.2 **⚠WARNING** **Read and understand the maintenance procedures in the *Operation Manual* of the machine before attempting any repairs.** If in doubt, call the manufacturer. Incorrectly done repairs affect the safe use of the machine.

15.3 **⚠WARNING** Burn hazard! **Never work on a hot hydraulic system.**

15.4 **⚠WARNING** **If it is necessary to unfold the placing boom to do maintenance work, the outriggers must be extended and jacked, just as if the machine were on a job site**. If you are not an operator, have the operator set up the machine for you. The need to repair the machine does not qualify you to operate the machine.

15.5 **⚠WARNING** Electrocution hazard! **If it is necessary to unfold the placing boom to do maintenance work, you must watch for overhead power lines.** You must maintain a minimum of 17 ft. (5 meters) clearance between the power line and any part of the unit.

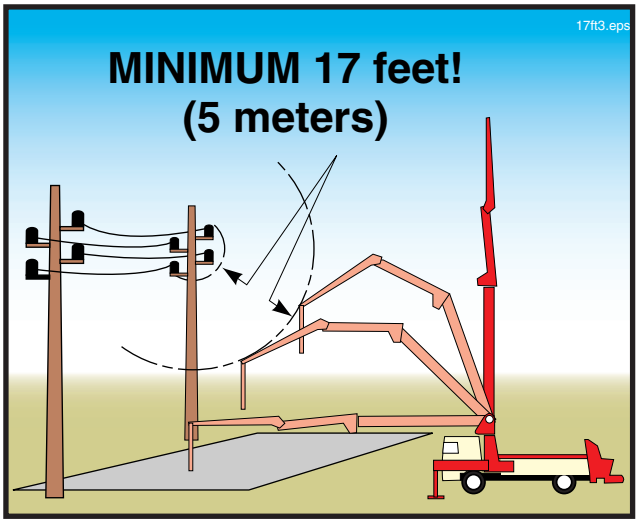


Figure 64
Watch for power lines if you must unfold the boom

15.6 **⚠WARNING** Falling hazard! If you cannot work at ground level, you must find and use a suitable work platform, a tie-off harness system, or otherwise secure yourself from falling.

15.7 **⚠WARNING** If maintenance work requires that you use a crane, hoist, fork truck, or similar machine, read and understand the safety regulations for that equipment. Remember, **the boom may not be used as a hoist or crane!**

15.8 **⚠WARNING** Crushing hazard! **Secure the placing boom and relieve all pressure before working on the boom hydraulic system.**

15.9 **⚠WARNING** **Only operators should operate the unit.** If work on the machine requires that it be operated and you are not qualified as an operator, you must get someone who is qualified to assist you.

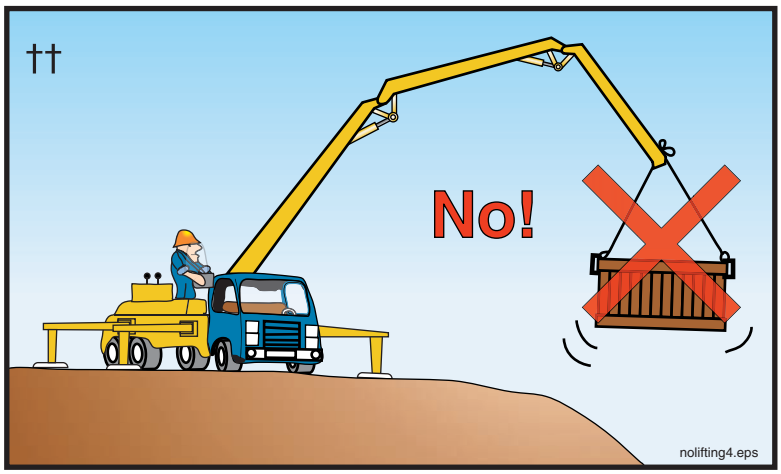


Figure 65
No lifting with the boom

15.10 **⚠WARNING** Electrocution hazard! **Repair work on high voltage electrical systems must be done by qualified electricians.** For this rule, high voltage means anything over 24 volts.

15.11 **⚠WARNING** Explosion hazard! **Be sure that you understand the potential danger of spring loaded or compressed gas components before you service them.** (Examples: nitrogen accumulators, gas springs for toolbox doors, tires, brake chambers.) If you don't know the dangers, call the manufacturer **before** beginning work!

15.12 **⚠WARNING** If you will be working in a hidden area inside the machine, lock it out as follows.

- With a gas or diesel engine, remove the ignition key and place a *Do Not Operate* sign on the controls. Carry the key with you.
- With an electrically driven pump, lock out the main breaker and tag the controls.

The above rules are one simple "Lock Out-Tag Out" procedure. There may be state or local regulations that require a more advanced or stringent Lock Out-Tag Out program. Be aware of the regulations in your area.

15.13 **⚠WARNING** **Never activate the system hydraulics without checking if another workman is in a hidden position.** Always yell "clear" before starting the engine or electric motor, and allow time for response.

15.14 **⚠WARNING** **Never work on a pressurized hydraulic system.** Stop the engine or electric motor and relieve the accumulator circuit (if so equipped) before you open the hydraulic system.

15.15 **⚠WARNING** **Never use gasoline or diesel fuel as a cleaning solvent**. This is critical to remember when cleaning hydraulic oil reservoirs, because gas and diesel fuels are highly explosive and **traces left in the oil may ignite when compressed!**

15.16 **⚠WARNING** Remember to mount and dismount the unit using the "3 Point Rule." One hand and two feet or two hands and one foot are to be in contact with a secure surface at all times (Figure 66).

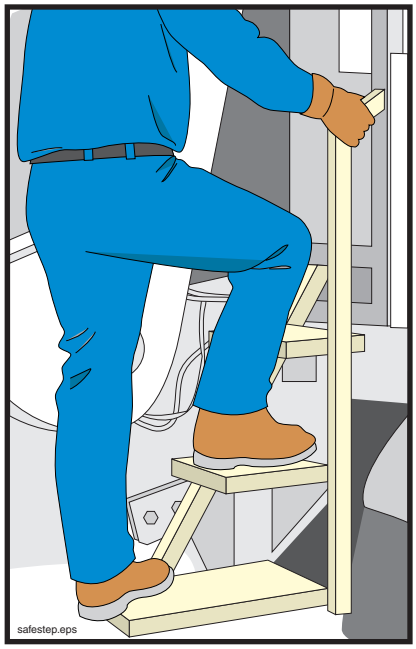


Figure 66
The 3 Point Rule

15.17 **⚠WARNING** **Inspect the repairs.** After modifications to structural members (boom, outriggers, tower, etc.) the repair must be inspected by qualified personnel before use.

15.18 **⚠WARNING** **Always use the correct tools for the job.** Tools should be kept clean and in good condition.

15.19 **⚠WARNING** If you see a co-worker engaging in an unsafe practice, warn him about the dangers. Safety is always in the hands of those on the job!

15.20 **⚠WARNING** After any repair is completed, test the function of the repaired part to be sure that repairs were done correctly.

VI. Co-worker Safety

16. Safety Rules For Workers Assigned To The Pump.

16.1 **⚠WARNING** **You must know how to stop the pump and boom.** Have the operator show you the locations of the emergency stop switches (Figure 67).

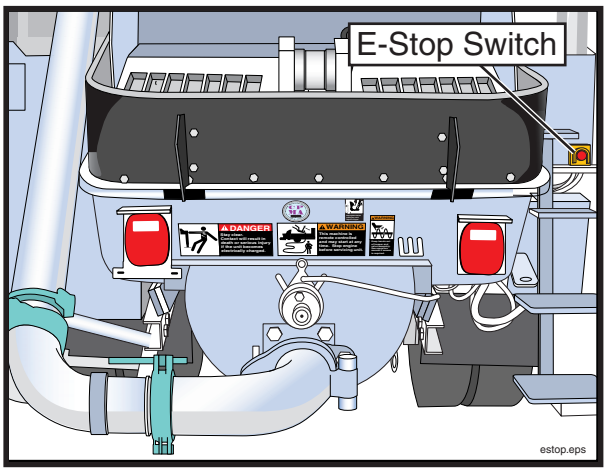


Figure 67
Know how to stop the unit in an emergency

16.2 **⚠WARNING** **You should wear the same personal protective equipment as the operator.** Goggles, hard hat, ear protection, and rubber gloves are especially important when working near the hopper (Figure 68).

* Breathing mask needed when cement dust (or other toxic dust) is present in the air.

Figure 68
Wear the same personal protective equipment as the operator

16.3 **⚠WARNING** **Electrocution hazard!** If the pump or boom becomes energized with high voltage and you are in contact with **any** part of it, you are at **risk of electrocution!** You should monitor the movement of the boom and **alert the operator if the boom comes within 17 feet of an electrical wire.** (See Figure 69.)

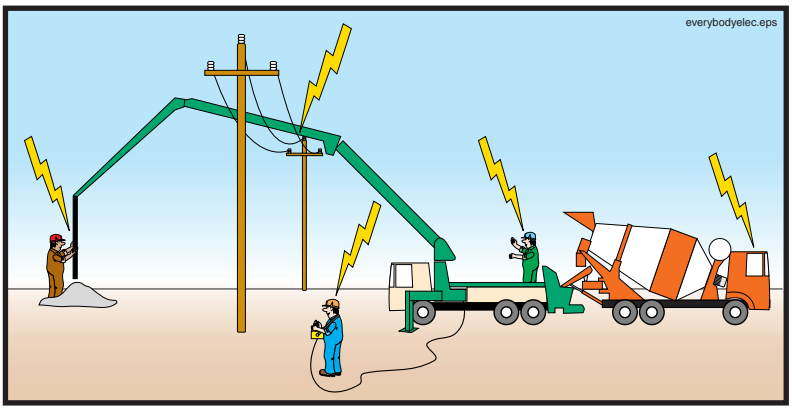


Figure 69
If the pump becomes energized, everything that touches the pump is also energized

16.4 **⚠WARNING** Keep an eye on the movements of the boom, even when there are no electrical wires nearby. Alert the operator if the boom is nearing any obstruction or hazard. Where job site safety is concerned, two sets of eyes and ears are better than one.

16.5 **⚠WARNING** **Crushing hazard. Never, ever position yourself between the ready mix truck and the pump!** Stand to the side, where the driver can see you (Figure 70).

Figure 70
Never stand between the ready mix truck and the pump

16.6 **⚠WARNING** When backing in ready mix trucks, use clear and concise hand signals (Figure 71).

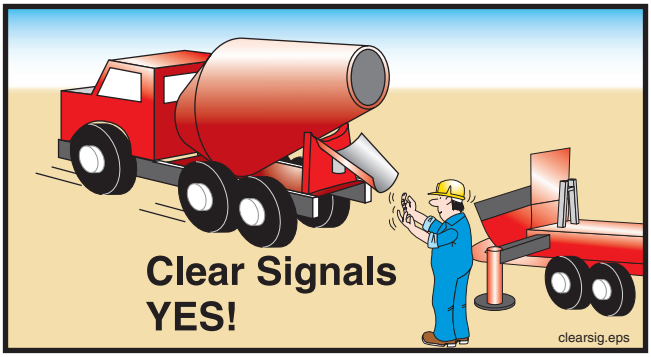


Figure 71
Use clear, concise hand signals

16.7 **⚠WARNING** Do not allow the ready mix driver to put concrete in the pump hopper until the pump operator gives him the OK. Filling the hopper early can cause the pump to plug.

16.8 **⚠WARNING** If you see foreign material that could create a blockage coming from the ready mix truck, alert the operator to stop the pump. Do not attempt to remove the material from the hopper or grate while the hydraulic system is ready to work. (See point 16.17 on page 62.) If necessary, depress the E-stop button to stop the pump and alert the operator.

16.9 **⚠WARNING** **Never allow the ready mix driver to clean out in the hopper,** because it can create a blockage. (Water will wash the cement and fine sand from the course aggregate causing segregation.)

16.10 **⚠WARNING** Do not operate the pump or boom unless you are also a trained operator and the regular operator has released the controls to you. **There must not be more than one operator at a time.** This does not apply to stopping the pump or boom if there is a need to do so.

16.11 **⚠WARNING** Do not let the concrete level in the hopper become low! If air is sucked into the material cylinders, the pump will compress the air. Compressed air always poses a hazard as it is expelled from the hopper or the delivery pipeline (Figure 72). If air is taken into the material cylinders, take the following steps to minimize the hazard:

1. Stop the pump immediately. Hit the emergency stop button if that is the quickest way to stop the pump. There will be an expulsion of compressed air the next time the concrete valve shifts. If possible, fill the hopper with concrete to help contain the expulsion.
2. Alert the operator of the problem. It is his job to know the procedures for safe removal of air from the pump and delivery system. These procedures include pumping in reverse for a couple of strokes.
3. Persons standing at the discharge end or near the delivery line must be warned to move away until all of the air has been purged. Warn them to stay

a reasonable and prudent distance beyond the reach of the end hose or point of discharge (Figure 72).

4. When the pump is restarted, the slowest possible speed should be used until **all** air is removed from the pipeline. Don't assume that the first little air bubble is the end of the compressed air.
5. Do not allow anyone near the discharge until concrete runs steadily from the end and there is no movement of the delivery system.

- If workers are positioned in high or precarious places, warn them to expect a loud sound as the air escapes the pipeline. (Warn them even if they are well away from the discharge.) That way, we can prevent the worker from falling as a result of being startled by the noise.

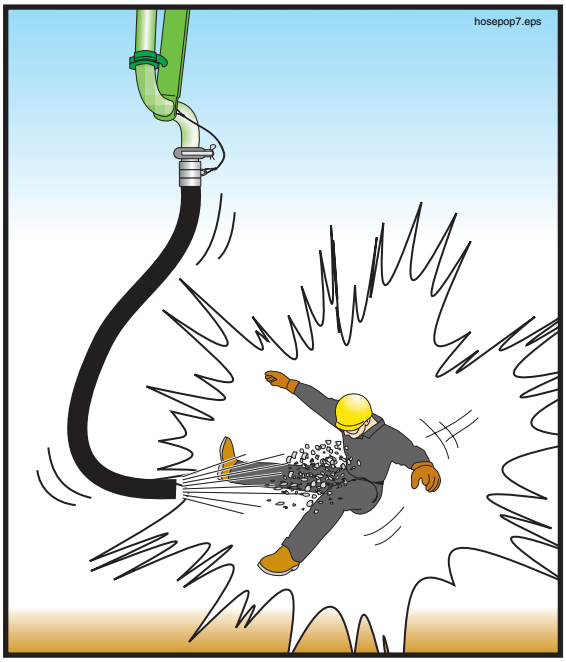


Figure 72
Remove everyone from the discharge area whenever the pump is first starting, restarting after moving, or if air has been introduced into the line

16.12

⚠WARNING When initially priming the delivery system, when restarting after moving, when restarting after adding or removing hoses, or whenever air has been introduced into the line, warn everyone to stay away from the discharge until concrete runs steadily and there is no movement of the delivery system. Personnel should stay back a reasonable and prudent distance beyond the reach of the end hose or point of discharge (Figure 72). Air will be in the line when first starting, when restarting after moving, when a blockage has been successfully removed by "rocking" the concrete, and after the line has been taken apart or opened for any reason.

16.13 **⚠WARNING** **Never use compressed air to clear a blockage!** The operator is responsible for knowing the safe blockage removal procedures. It is unsafe and unnecessary to use compressed air. If the pump pressure can't move it, air pressure won't either.

16.14 **⚠WARNING** Never stand on, sit on, or straddle a pipeline while it's in use, or whenever it is pressurized. Pipeline wears out with each stroke of the pump. If the pipe bursts, you want to be to the side of it, not on top of it (Figure 73).

Figure 73
Never straddle or sit on a pressurized pipeline

16.15 **⚠WARNING** Expulsion hazard! (See Figure 74.) **Never open a pipeline that is under pressure.** The pump must be run in reverse for at least two strokes and then stopped before opening a pipeline. If you don't know how to reverse the pump, have the operator do it. If the pipeline is pressurized with air, do not open it. The operator is responsible for knowing how to safely release the air pressure.

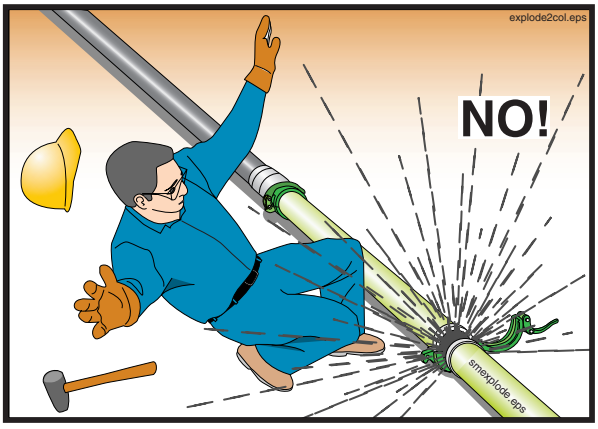


Figure 74
Never open a pressurized pipeline

16.16 **⚠CAUTION** Be careful when handling pipeline or any other heavy object. Learn how to lift without using your back. Get assistance if needed.

16.17 **⚠WARNING** Crushing/amputation hazard! Never put your hands, feet, or any other body part into the water box, concrete valve, or hopper when the hydraulic system is operational or ready to operate! Never stand on the hopper grate! (See Figure 75.)

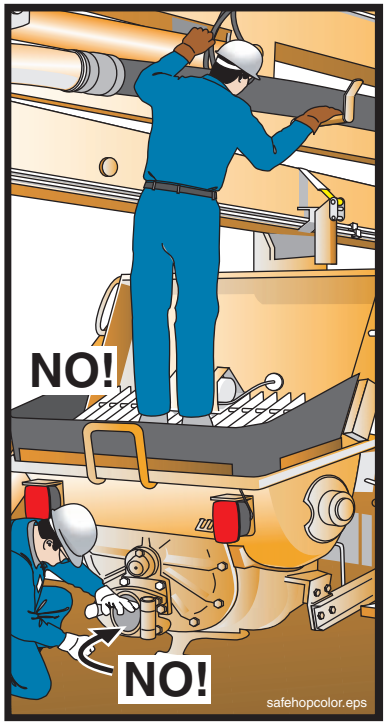


Figure 75
Never put your body in the machine!

16.18 **⚠WARNING** Never lift or remove the hopper grate for any reason (Figure 76).

Figure 76
Lifting hopper grate exposes the agitator and the concrete valve

16.19 **⚠WARNING** Do not remove the water box covers or grates when the machine is stroking (Figure 77). If you must remove the water box cover (to add water, for example), and there is not a bolt-down grate over the water box, then stop the pump and engine, and put the key in your pocket so it cannot be restarted

until you are finished and the covers are back in place. If a bolt-down grate is installed, you may simply stop the pump from stroking before removing the water box covers. Replace the covers before restarting the pump.

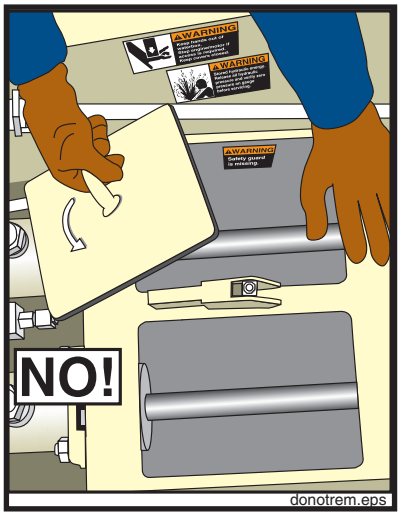


Figure 77
Do not remove the water box covers when the machine is stroking

16.20 **⚠WARNING** Mount or dismount the pump or truck using the *3 Point Rule.* One hand and two feet or two hands and one foot are to be in contact with a secure surface at all times (Figure 78).

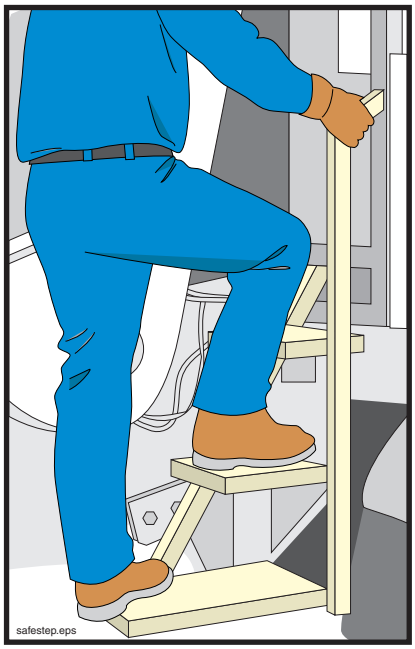


Figure 78
The 3 Point Rule

16.21 **⚠WARNING** Keep unauthorized personnel off of the pump.

17. Safety Rules For The Placing Crew

17.1 **⚠WARNING** **Electrocution hazard!** If the pump or boom becomes energized with high voltage and you are in contact with **any** part of it, you are at **risk of electrocution!** You should monitor the movement of the boom and **alert the operator if the boom comes within 17 feet of an electrical wire.** (See Figure 79.)

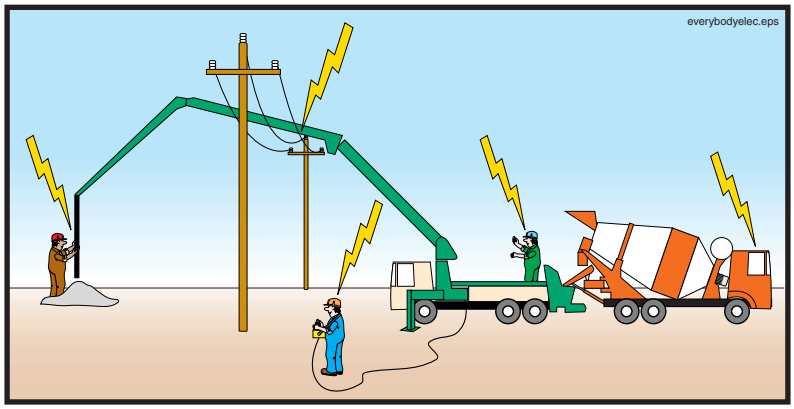


Figure 79
If the pump becomes energized, everything that touches the pump is also energized

17.2 **⚠WARNING** If the boom can contact overhead wires a spotter must be used to warn the operator if the boom is coming near the wires (Figure 80.)

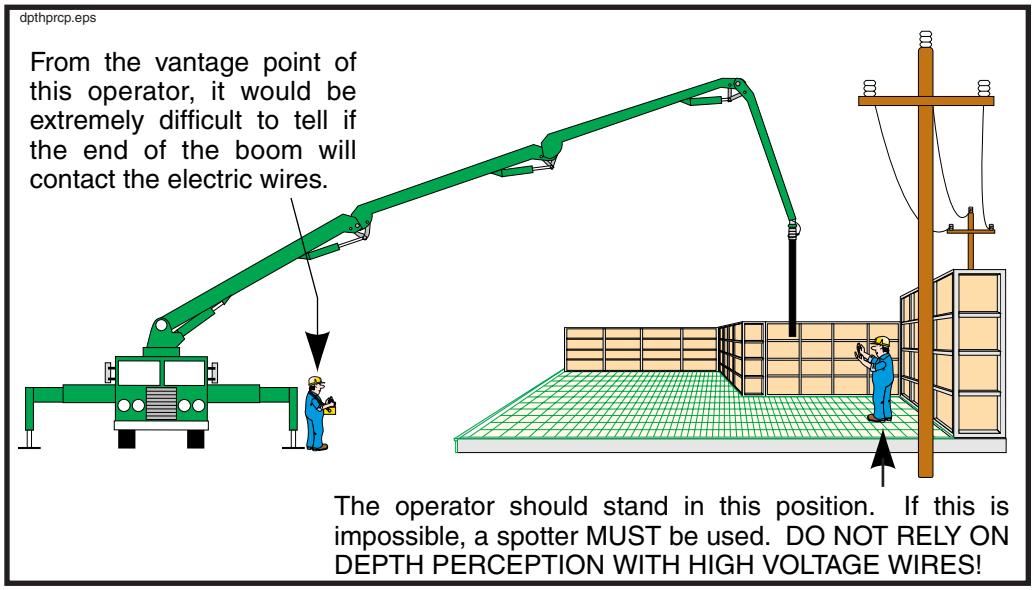


Figure 80
Use a spotter near obstructions or wires

17.3 **⚠WARNING** Keep an eye on the movements of the boom, even when there are no electrical wires nearby. Alert the operator if he is nearing any obstruction or hazard. Where job site safety is concerned, two sets of eyes and ears are better than one.

17.4 **⚠WARNING** Wear Personal Protective Equipment (P.P.E.) when working around a concrete pump (Figure 81). The gloves should resist concrete lime burns. If you will be working **in** the concrete, protect your feet and hands with rubber boots and gloves.

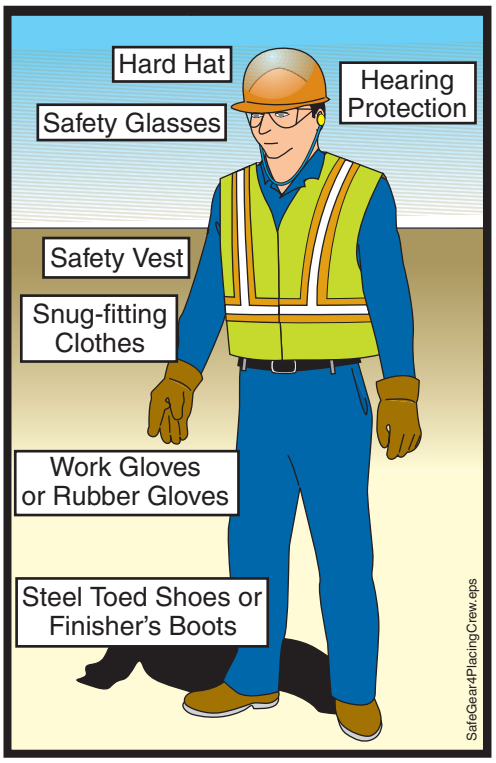


Figure 81
Wear Personal Protective Equipment (P.P.E.)

17.5 **⚠WARNING** When the operator is initially priming the delivery system, restarting after moving, restarting after adding or removing pipes or hoses, or any time that air has been introduced into the delivery system, stand a reasonable and prudent distance away from the tip hose or point of discharge. Do not get near the discharge until material runs steadily and there is no movement of the delivery system. (Figure 82). Compressed air in the line can cause rubber hose to move violently. If the operator tells you that air is coming in the delivery system, proceed as follows:

- Get to ground level (if in a high place) and remain well away from the discharge or at least take cover.
- Stay away from the discharge. Be sure that **all** the air is gone before getting near the point of discharge again. It is the operator's job to know when it's safe to go back to normal pumping.

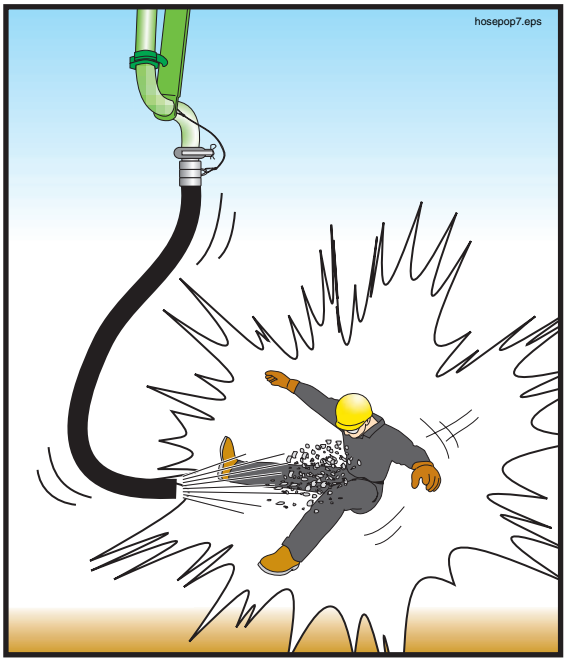


Figure 82
Stay away from the point of discharge when starting or restarting, and when there's air in the pipeline

17.6 **⚠WARNING** **Never use compressed air to clear a blockage!** It is unsafe and unnecessary. If the pump pressure can't move it, air pressure won't either. Stand away from the discharge and the line if anyone attempts to use compressed air in this manner.

17.7 **⚠WARNING** **Do not look into the end of a plugged hose or pipe!**

17.8 **⚠WARNING** When the pump crew is using compressed air to clean the boom or system pipeline, stay away from the discharge area. **Never try to hold down a pipe or hose that is being cleaned with air.**

17.9 **⚠WARNING** Never open a pressurized pipeline (Figure 83). The pump operator must release the pressure before you open the line. If the line is pressurized with compressed air, let the operator release the pressure and verify that the air has escaped before you proceed.

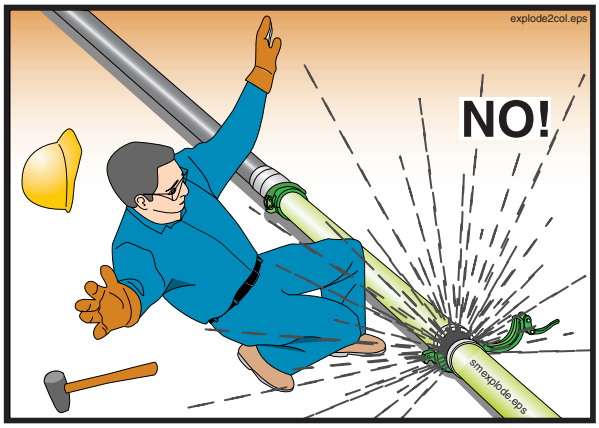


Figure 83
Never open a pressurized pipeline

17.10 **⚠WARNING** After removing pipe sections you must **reassemble using gaskets and clamps.** Pipelines assembled without gaskets will leak cement and water, which can cause a blockage.

17.11 **⚠WARNING** Concrete is being moved through the delivery system by pressure. Failure of a pipe, clamp, hose, or elbow is possible. For this reason, spend as little time as possible standing under the boom, and wear protective clothing.

17.12 **⚠WARNING** The hose man should not hug the hose, but hold it with both hands, to allow the hose to move freely (Figure 84).

Figure 84
Do not hug the boom hose

17.13 **⚠WARNING** The hose man should not walk backwards (Figure 85). Walking forward will allow him to see obstacles and avoid tripping.

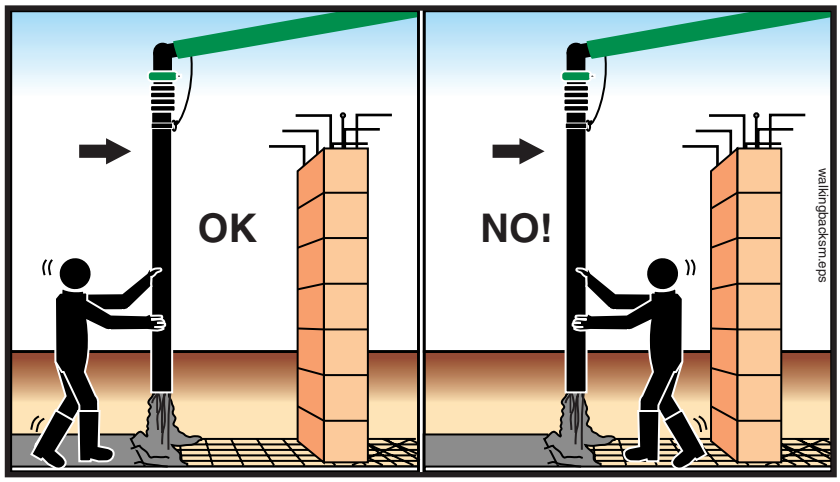


Figure 85
Do not walk backwards, stay out of the path of the boom

17.14 **⚠WARNING** The hose man should never position himself between the boom or boom hose and any fixed object like a wall or column (Figure 85).

17.15 **⚠WARNING** Do not kink the end hose. Kinking will cause the pump to create maximum concrete pressure. The pump may unkink the hose by force! (See Figure 86.)

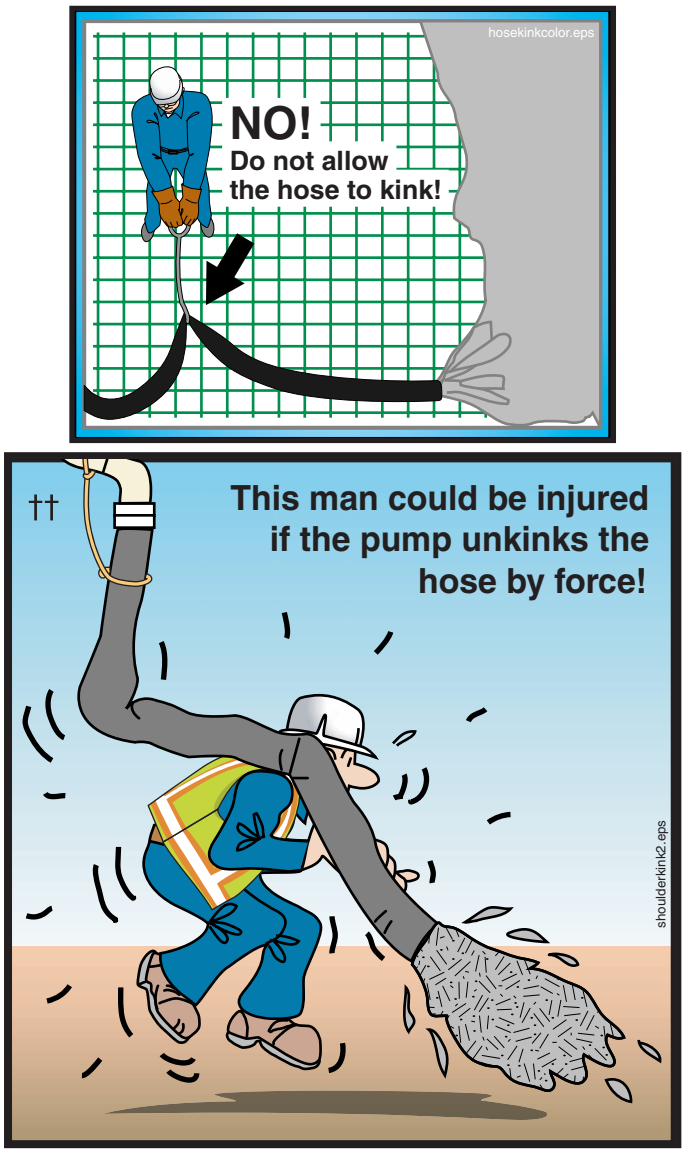


Figure 86
Never kink the hose; Never hold the hose with your shoulder

17.16 **⚠WARNING** Never try to support the tip hose with your back or shoulders. Let the hose hang from the boom (Figure 86).

17.17 **⚠CAUTION** Be careful when handling pipeline or any other heavy object. Learn how to lift without using your back. Get assistance if needed.

17.18 **⚠WARNING** Crushing hazard! Never position your hands or any body part between the end of the delivery system and a fixed object (e.g., between the tip hose and the concrete form) (Figure 87). Watch for clamps lowering with the line, because they have a larger diameter than the pipes/hoses they connect.

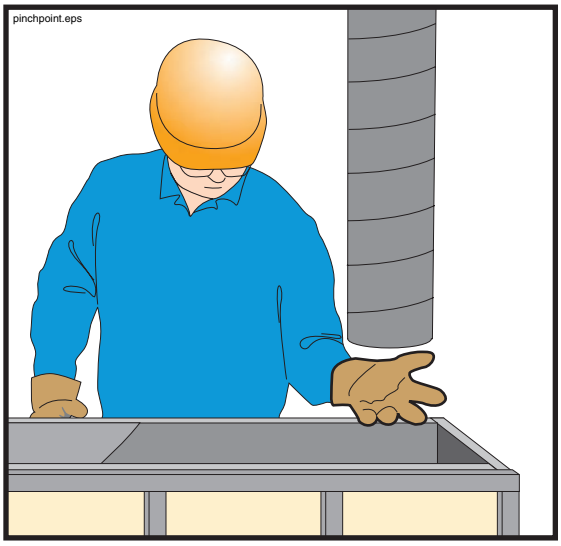


Figure 87
Watch out for the pinch points

17.19 **⚠WARNING** Do not allow the boom hose to get lower than two feet above the deck to prevent the boom hose from hitting the feet of the hose man, and to prevent the hose opening from being blocked by the deck, which could cause the hose to whip.

17.20 **⚠WARNING** Falling hazard! When pouring columns, slabs, or walls above ground, secure yourself from falling.

17.21 **⚠WARNING** Never stand on, sit on, or straddle a pipeline while it's in use, or whenever it is pressurized (Figure 88). Pipeline wears out with each stroke of the pump. If the pipe bursts, you want to be to the side of it, not on top of it.

Figure 88
Never straddle or sit on a pressurized pipeline

17.22 **⚠WARNING** To avoid confusion and conflicting signals, only one person should signal the pump operator.

17.23 **⚠WARNING** Before the pour begins, the hose man, the operator and the spotter should agree on the hand signals (Figure 89).

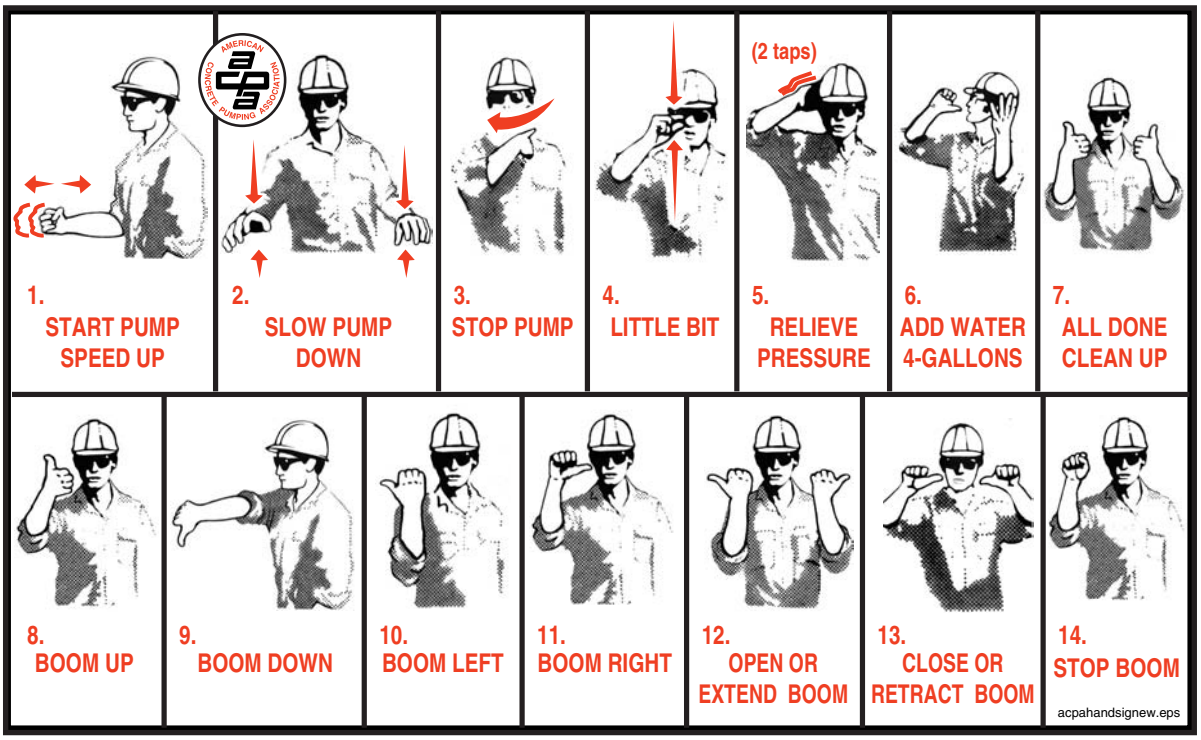
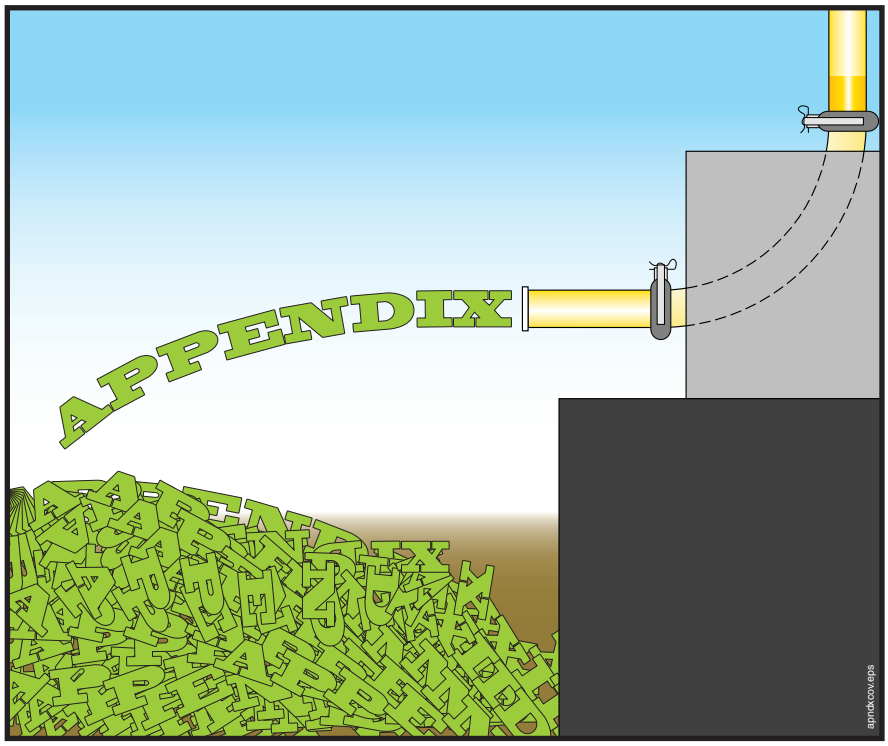


Figure 89
ACPA recommended hand signals



Appendix

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VII. Weld On Ends / Coupling Comparison

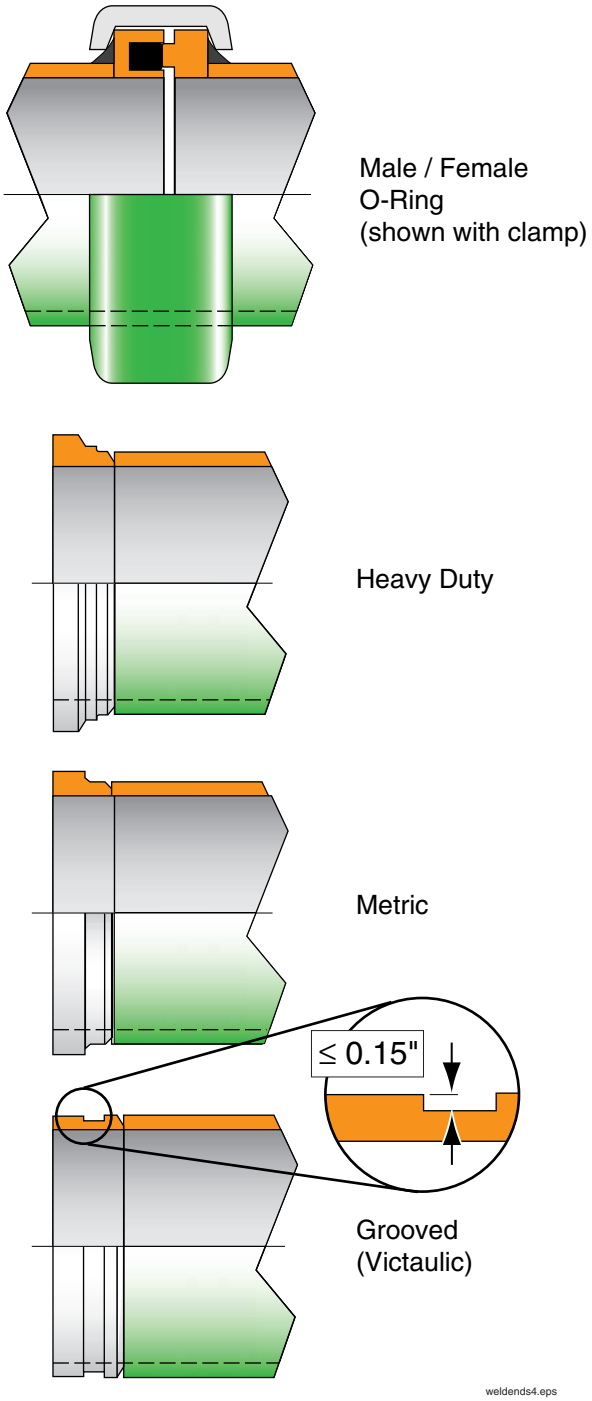
Shown is a comparison among commonly used ends/couplings. No two ends shown can be joined without the use of an adapter pipe or a special adapter clamp. Clamps and pipe strength must also be considered when determining proper system requirements. The ratios shown in the text below represent the safety factor from burst : working

1. Male / female o-ring type couplings have the highest pressure rating of the ends commonly used for concrete pumping. They can withstand 4350 PSI @ a 2:1 safety factor. They are self aligning and waterproof when used with o-rings in good condition. Typically not used on booms because of their weight. Pipes equipped with this style coupling cannot be swapped end-for-end.

2. Heavy-Duty couplings are designed for pressures up to 2250 PSI @ 2:1. They have 20% more contact area than metric couplings, and a tapered face that draws the pipe sections together during assembly. Both the ends and clamps weigh more than metric style, and therefore should not be used on booms without consulting the manufacturer.

3. Metric couplings are designed for pressures up to 1400 PSI @ 2:1. They have 85% more contact area than grooved couplings. The face is flat and will not draw pipe together. Although they have a raised edge, they are not compatible with Heavy Duty couplings unless a special clamp or an adapter pipe is used to change from one style to the other. Metric connections are standard equipment on booms because of the weight savings compared with other styles.

4. Grooved couplings (lip height of 0.15” or less) are designed for pressures only up to 750 PSI @ 2:1. The recessed groove is hard to clean when changing pipe on a job. The weld-on end fails before the pipe because the groove is cut into the pipe thickness, making it the weakest spot. Grooved couplings are not recommended for concrete pumping applications.



NOTE: All pressure ratings listed refer to 5 inch (125mm) diameters in like-new condition. Other pressures would apply to other sizes.

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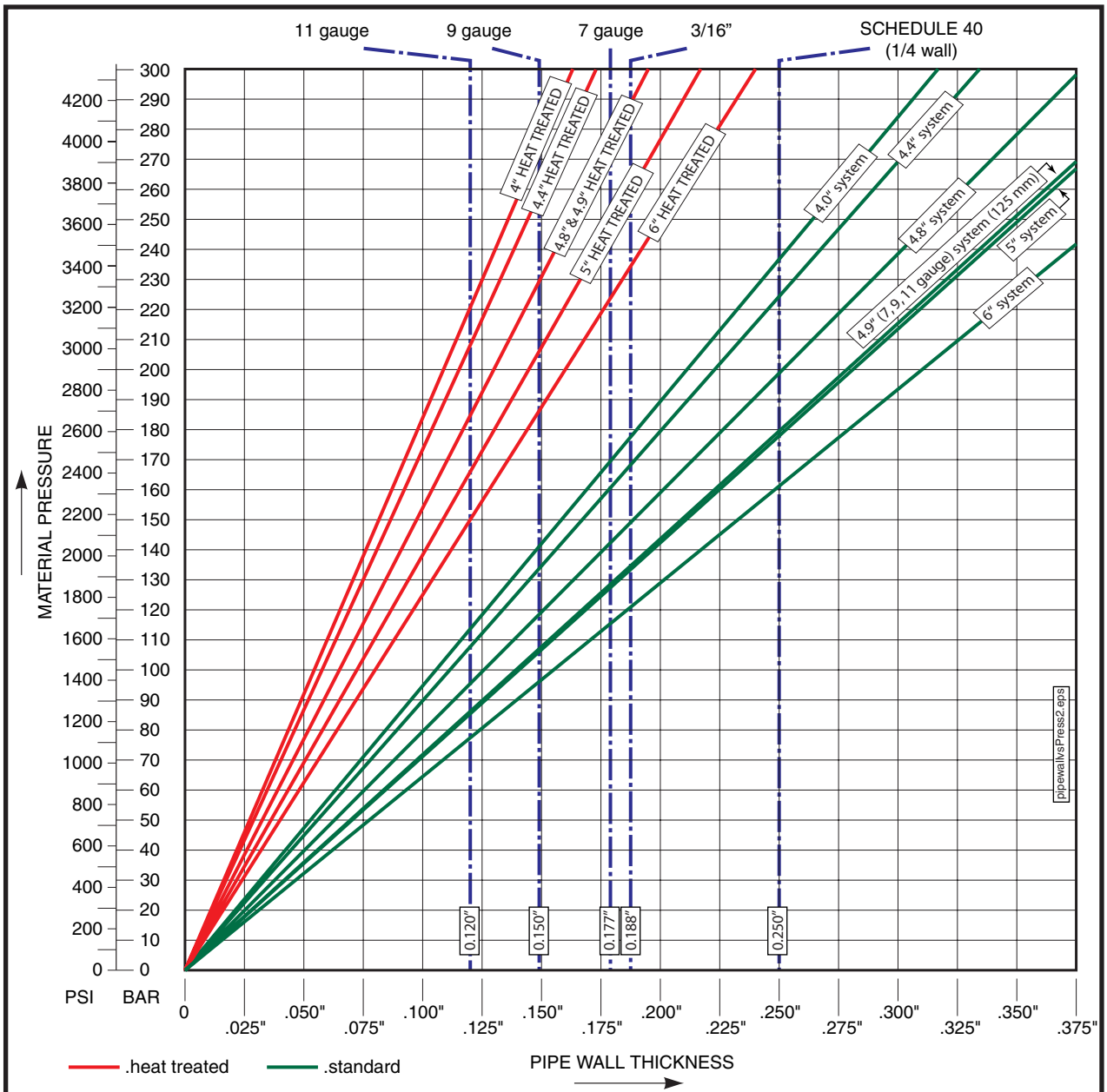
VIII. Minimum Pipe Wall Thickness Chart



1. This chart assumes a safety factor of 2:1. Higher safety factors may be required in some circumstances.
2. Wear reduces wall thickness. Thickness must be checked on a regular basis.
3. Pressures may be limited even more by clamp style or pipe end used.
4. The chart is based on 62,000 PSI tensile strength. Heat-treated calculations are based on 120,000 PSI tensile strength.
5. The chart is for pressure calculations ONLY. There is no allowance for mechanical forces other than pressure, and thicker walls may be needed for mechanical strength because of support or restraint considerations.
6. The chart does not take into account metal fatigue caused by pressure cycles.

Note! This chart is intended as a guide for concrete pumping applications and is subject to the notes, assumptions, and conditions listed above. Any other use of this chart is not recommended.

This chart does not apply to double-wall pipe. Double wall pipe can be checked by inspecting the inside of the pipe. If the insert is intact, the pipe is okay. If the insert is worn through, the pipe must be replaced. Contact your pipe supplier for the pressure capacity of your double-wall pipe.

IX. Glossary Of Terms

Accumulator

A hydraulic device that stores fluid power energy in much the same way that a battery stores electrical energy. Because an accumulator will store energy, it MUST be drained and depressurized before work begins on an accumulator equipped actuator or hydraulic system.

Agitator

A device that sits in the concrete hopper to keep concrete moving, preventing it from setting. It is typically a rotating shaft to which several paddles have been mounted. *See Also:* Hopper Grate

AWS D1.1

The code for structural welding with steel as defined by the American Welding Society. Sections 3, 5, and paragraph 9.25 of section 9 apply. *See Also:* Certified Welder and EN 287-1

Blanking Plate

Also known as a blanking plug or end cap. It's purpose is to prevent material from falling out of the delivery system (typically the end hose) when moving a boom with a full pipeline over personnel or property.

Blockage

Simply put, if the pump is pushing and concrete fails to come out at the point of discharge, it is called a blockage. Blockages can be removed with pump pressure, by rocking the pump between forward and reverse, or some other remedial measure. If the blockage can not be removed in such a manner, it's called a plug. *See Also:* Plug, Rock Jam. The causes of blockages are detailed in section 8.21 of this manual. In all cases, blockages create a hazard by causing high concrete pressure, combined with the sometimes uncoordinated efforts of untrained workmen to remedy the problem.

Bulk Density

The mass of a substance per volume. For example, one cubic foot of air weighs much less than one cubic foot of water. One cubic foot of lightweight concrete weighs less than one cubic foot of steel entrained concrete. We could say that steel entrained concrete has a higher bulk density than lightweight concrete. All calculations for the operation manuals and specifications of concrete pumps are based upon 150 pounds per cubic foot, which is the approximate mass of hard rock (normal) concrete.

Certified Operator

An operator that has been issued a certification card by the American Concrete Pumping Association. There are several classes of certification, each relating to a different category of pump. For an operator to become certified, he (she) must pass the written tests regarding operation, setup, and clean out for each category of pump, pass the safety rules test which is common to all certification categories, meet the experience requirements set forth for each category, and maintain a safe and clean driving record. The certification card only certifies that the operator has passed a written test administered by an A.C.P.A. certification tester and does not attest to their ability to operate a concrete pump. *See Also:* Qualified Person, Qualified Operator.

Certified Welder

As it relates to concrete pumping and this Safety Manual, a Certified Welder is a person that has applied for, taken and passed the American Welding Society (AWS) or the European Norm (EN) test for structural steel welding. Anyone welding on a concrete pump placing boom, outriggers, towers, etc. must be certified to AWS D1.1 sections 3, 5, and paragraph 9.25 of section 9 **and/or** EN287-1/PREN288-3.

Concrete Delivery Hose
A flexible concrete hose that has two end couplings.

Concrete Pressure
The force per square area that is exerted on the concrete. The concrete pressure will always be a ratio in direct proportion to the hydraulic oil pressure on the concrete pump circuit. *See Also*: Maximum Pressure

Conductors
Materials that will conduct electricity. Copper, silver, aluminum, gold, steel, and water are considered GOOD conductors of electricity. Air, fiberglass, rubber, ceramics and glass are considered POOR conductors. All of these conductors have a resistance to the flow of electricity that can be measured in terms of ohms per linear foot. As voltage gets higher, more current flows through the same resistance. In the case of high voltage electric wires (8000 volts, for example) even the poor conductors will carry enough current through your body to ground that you could be killed. (As little as 35 milliamps can cause fibrillation of the heart.) Some conductors, like air, resist electricity very well, but if the voltage gets high enough, current will flow (lightning is a good example of this). *See Also:* Electrocution

Decibels
One tenth of a bel. Abbreviated dB. It is a measurement of sound volume. As it applies to concrete pumps, it is a measurement of the sound pressure level one meter away from a noise source. O.S.H.A. has developed guidelines for time limits on exposure to sound at different volume levels. The chart can be found on page 36 of this manual.

Drive Engine
The primary source of power for a hydraulic system. Typically, the word “engine” denotes and internal combustion device, whereas the word “motor” denotes an electrical device.

Electrocution
Made from the words “Electric” + “Execution.” It means death by electricity. *See Also:* Conductors

EN 287-1 / PREN 288-3
The code for structural welding with steel as defined by the European Norm. *See Also:* Certified Welder, AWS D1.1.

End Hose
A flexible concrete hose that has one end coupling.

Foreign Material
Material that was never intended to be pumped, which ends up in the concrete hopper. Examples of foreign material include small animals, hammers, ready mix truck fins, unmixed clumps of cement, hardened concrete that breaks away from ready mix truck fins, and soda pop cans. These items could create a blockage if pumped.

Go Devil
A plug made from a rubber composite, usually with several fins that expand to seal when pressure is applied. They are intended to be inserted in a steel delivery pipeline and pushed with water or compressed air for the purpose of cleaning the pipe. *See Also:* Sponge Ball

Guide
An assistant brought in to help in backing up a truck or trailer, or to help in other circumstances where the driver cannot see enough to assure safety. *See Also:* Spotter

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High Voltage

For the purposes of this manual, anything over 24 volts is to be considered high voltage. In the U.S., electrically driven concrete pumps normally operate the motors at 480 volts AC (high voltage) and the controls at 24 volt DC (low voltage). When dealing with electric wires in residential or industrial areas the voltage will be approx. 8000 volts to ground, or 13,800 volts from phase to phase (distribution voltage). When dealing with electric wires that are mounted on steel towers high above the ground, the voltage will range from 100,000 to 1,000,000 volts (transmission voltage).

Hopper Grate

A meshwork placed over the concrete hopper, typically made from steel bars. It serves the functions of keeping human body parts away from the agitator (when left in it's proper position) and keeping large foreign objects from falling into the hopper, which could cause blockages if they were pumped.

Jacking the Outriggers

Adjustment of the outriggers in the vertical direction. With boom mounted concrete pumps you should strive to make the adjustments so that the unit sits within 3° of level.

Licensed Electrician

A qualified electrician licensed by the state, county or municipality where the connections are to be made. In some locations electricians are not required to be licensed, and in these cases the work should still be carried out by competent professionals. Under no circumstances should high voltage connections be made by a concrete pump operator or related personnel.

Maintenance

All procedures for service, inspection, and repair of concrete pumps and related equipment and devices. Maintenance and inspection are methods of ***maintaining*** the desired state of the equipment. Repair is the method of ***restoring*** the desired state of the equipment.

Maximum Pressure

When talking about a hydraulic system, maximum pressure refers to the highest pressure that can be achieved with the settings of the circuit relief valves. When discussing concrete output, maximum pressure refers to the pressure that will be developed if the hydraulic system pressure reaches the relief valve setting. Concrete pressure is the force at which the differential cylinders are moving, divided by the cross sectional area of the concrete cylinder. Maximum concrete pressure, then, is developed when the differential cylinders are moving with maximum force, which is determined by the hydraulic system relief valve setting. *See Also:* Concrete Pressure.

Minimum Safety Distance

In this manual, the term "minimum safety distance" refers to the closest distance that you are allowed to approach an object, electrical wires, etc. and still leave room for errors in human judgement or machine malfunction. With electrical wires in the U.S., this distance is 17 feet, as recommended by the American Concrete Pumping Association. This distance may have other values in different countries (Canada specifies 7 meters). It is up to the operator to know the value for the place of operation.

Operational Area

The area around a working piece of equipment or point of discharge where hazards can be encountered due to the nature of the machinery or process in use.

O.S.H.A.

Occupational Safety and Health Administration. A branch of the United States federal government that deals with job safety. They establish and enforce safety regulations for industry and

business. Among the areas over which they have authority are construction job sites and work shops.

Personal Protective Equipment (P.P.E.)

Things you can wear to protect yourself from potential dangers in a concrete placing environment. Examples are:

- Snug fitting work clothes
- Steel toed work boots
- Lime resistant gloves
- Safety glasses
- Ear muffs or ear plugs
- Rubber boots when you have to stand in concrete
- Hard hat
- Breathing mask when working with cement dust

Plug

A plug is a blockage that cannot be removed with the pump pressure, or by other remedial measures. A plug must be removed manually. *See Also:* Blockage.

Point of Discharge

Also known as the point of placement. The location of concrete expulsion from a delivery system. This can be the point of placement (the actual form that is being filled with concrete) or the clean out area after completion of the job.

Pour

Used by the concrete pumping industry and in this manual as a noun. It is the specific job for the pump during any given time period. (e.g. "We'll grab lunch right after the pour.")

Qualified Person

As used in this Safety Manual, a *qualified person* is defined as: a person who, by possession of a recognized degree of certificate of professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work. Other qualified persons may include master mechanics and after-sales service technicians of the manufacturer. *See Also:* Certified Operator

Qualified Operator

Operators shall be considered qualified when they have completed a program of training and supervised operation of concrete pumps and have passed a practical operating examination of their ability to operate a specific model and type of equipment as well as their understanding of the controls and operating procedures. Furthermore, the operator must meet the knowledge and physical requirement sections of the concrete pumping safety standard.

Qualified Personnel

A generic term used to describe a person who is qualified in the area of application. For example, having your boom repairs inspected by "qualified personnel" before use would refer to inspection by a certified welder or certified welding inspector. Having repairs to your hydraulic system done by "qualified personnel" would refer to repairs made by qualified workshop personnel.

Qualified Workshop Personnel

An individual who:

- has reached the age of 18 years,
- is physically and mentally capable,
- has been trained in proper repair, maintenance, and inspection procedures plus the pertinent safety rules for concrete pumps and related equipment,
- has demonstrated their capabilities to their company in regards to the above mentioned

procedures and rules, and
- can be expected to perform these duties, as assigned, in a reliable manner.

Rock Jam

A specific type of blockage caused when the cement and fines of the concrete are not present in sufficient quantity to fully coat the larger aggregates and the walls of the delivery system. In these cases, the rock (larger aggregates of the mix) will form a wedge inside of the pipe. Resistance to movement then becomes overpowering and the concrete stops. *See Also:* Blockage.

Separate Pipeline

A pipeline that is laid between the concrete pump and the point of discharge, other than the placing boom pipeline.

Shutoff Valve

In hydraulics: a valve with the ability to stop the flow or pressure of hydraulic oil. It must be able to withstand the maximum pressure of the hydraulic circuit that it controls. In concrete: A manually or hydraulically operated valve that will prevent the flow of concrete in either direction. The shutoff valve must be able to withstand the maximum pressure on the concrete of which the pump is capable of exerting.

Soil Pressure

The force per square area that is exerted on the ground by the outrigger legs. The amount of pressure that the soil will support varies with the composition and compaction of the soil. To make a determination on the stability of the soil, see the chart on page 22 of this manual.

Sponge Ball

A medium to hard sponge formed into a sphere and used to clean the inside of delivery pipelines. *See Also:* Go Devil

Spotter

A spotter is a person who stands at a vantage point where he (she) can see both the point of discharge and the operator of the pump. The spotter would then direct the operator to operate the unit as required by the job circumstances with two-way radios or hand signals. A spotter can be anyone who is familiar with the safety rules for the pump and workers and is equipped with a radio or knows the appropriate hand signals. A spotter is needed whenever the operator cannot safely see the point of placement or the distance between the unit and an unsafe area. *See Also:* Guide

Sucking Back

The act of putting the concrete pump into the reverse mode for any of several reasons.

Thrust Block

Also known as a “dead man”. This is a large block of poured concrete, usually with one or more sweep elbows cast inside, placed at the bottom of a vertical run for the purpose of supporting the weight of the vertical run and for lateral stabilization of the pipeline. It stabilizes and supports the vertical run by virtue of its enormous mass (normally one cubic yard or larger).

Towing Vehicle

In this manual, *Towing Vehicle* applies only to vehicles that tow trailer mounted concrete pumps. It is the vehicle that you will use to tow the trailer on the road, on the job site, or in the yard. See the safety rules regarding this subject on page 10 of this Safety Manual.

Transport Position

This relates to the position of the boom when you will be driving the unit. The travel position of the boom is the position of the boom when it is completely folded and lowered into the rests.

Unauthorized

Without authority, without permission. Examples: Unauthorized operation of the boom could be operation by a passer-by, unauthorized repairs to the boom could be repairs designed without the manufacturer's knowledge.

Unintentional Movement

Movement of the pump, boom or related equipment without a specific intentional command by the operator. An example of an unintentional movement would be if an operator fell while walking with the remote control box and accidentally hit a joystick, causing a boom movement.

Vertical Run

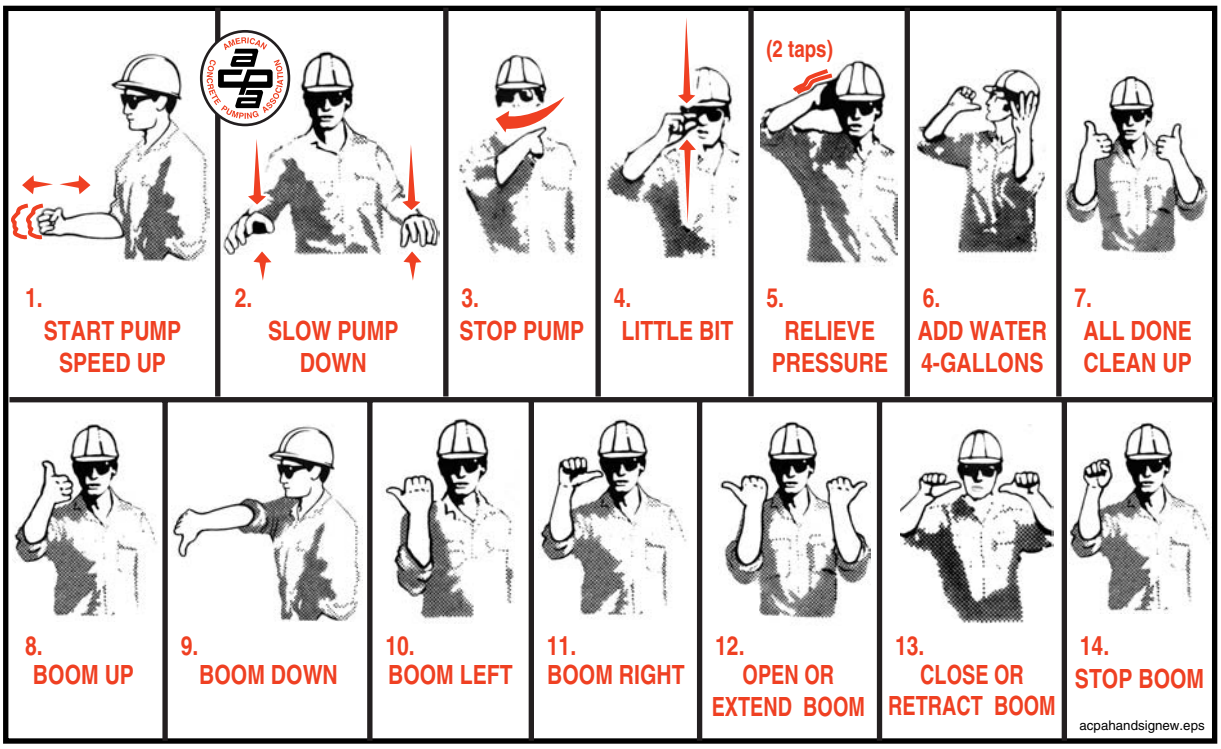
Sections of concrete delivery pipeline that are running in an up (or down) direction. Vertical runs have very specific procedures and rules for installation, support, cleaning, and inspection. Concrete pumping personnel should, therefore, have specific training in these procedures and rules before attempting to use them in a job setting.

Water Jet

The actual stream of water that comes out of the end of a water hose or pressure washer. This is the only part of the water system that needs to go into the hopper, concrete valve, or water box for cleaning.

X. Recommended Hand Signals

The American Concrete Pumping Association (ACPA) recommends using the following hand signals as standard procedure.



XI. Bibliography

Further information regarding concrete pumping is available from the sources listed below. Information for this book was gathered from several different sources, including the following books:

PUMPING CONCRETE AND CONCRETE PUMPS © F. W. Schwing, GmbH

CONCRETE PUMP OPERATOR'S GUIDE TO SAFETY © British Concrete Pumping Association

The MANUAL and ADVISORY SAFETY CODE of PRACTICE for CONCRETE PUMPING © British Concrete Pumping Association

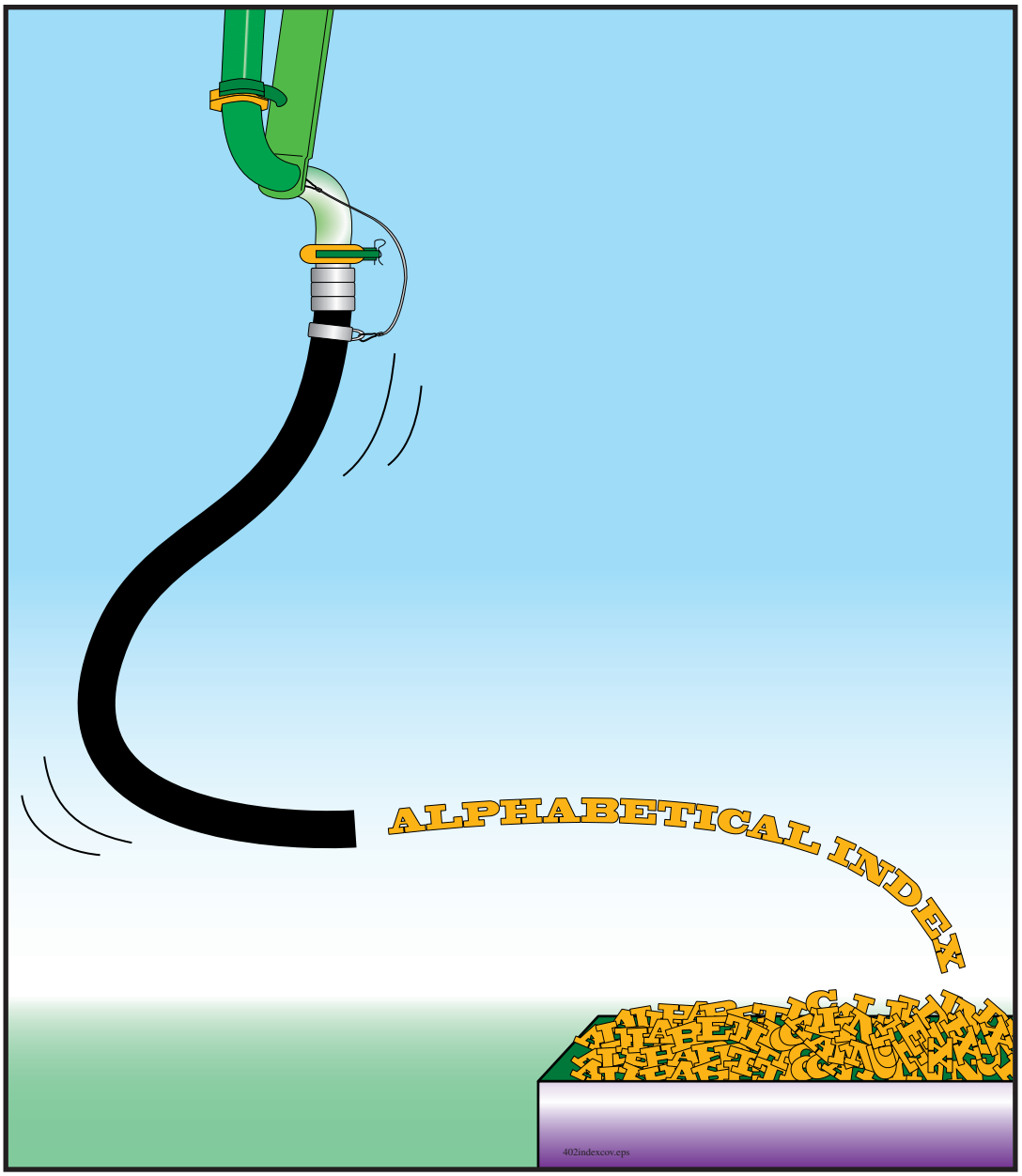
SAFETY STANDARD FOR CONCRETE PUMPS, PLACING BOOMS, AND DELIVERY SYSTEM by the Concrete Pump Manufacturers Bureau

Additional technical information and/or graphic were supplied by:

Construction Forms, Inc.

The American Concrete Pumping Association

Some cartoons were scanned from the book CONCRETE PUMP OPERATOR'S GUIDE TO SAFETY © British Concrete Pumping Association. Used by Permission.



Alphabetical Index

Guía para la prevención de accidentes al conducir, operar, limpiar y realizar el mantenimiento de las bombas de concreto, plumas de distribución y demás equipos.

REED

REED, LLC
13822 Oaks Avenue
Chino, CA 91710 USA
www.reedpumps.com

Versión 5.1.1

CALIFORNIA

Proposición 65 Advertencia

El Estado de California tiene conocimiento de que los escapes de motores diesel y algunos de sus componentes causan cáncer, defectos de nacimiento, y otros daños reproductivos.

MANUAL DE SEGURIDAD

GUÍA PARA LA PREVENCIÓN DE ACCIDENTES CUANDO SE CONDUCE, OPERA, LIMPIA Y MANTIENE BOMBAS DE HORMIGÓN, PLUMAS DE DISTRIBUCIÓN Y EQUIPOS CONEXOS

Introducción

La seguridad es una de las preocupaciones más importantes de todos aquellos que trabajan en la industria del bombeo de hormigón o también llamado concreto. Aunque gran parte de la responsabilidad diaria recae sobre el operador de la bomba, es imprescindible que la seguridad sea la prioridad número uno de todas las personas relacionadas con el bombeo. Esto incluye a los propietarios, los mecánicos, los conductores de los camiones del concreto premezclado, la cuadrilla que bombea la mezcla, los contratistas que proveen el concreto y los fabricantes de la máquina.

Aunque este Manual de Seguridad provee amplia información sobre la prevención de accidentes durante el bombeo de concreto o la colocación de la pluma, es muy posible que no se haga mención a todas las circunstancias probables de peligro. Independientemente de cuán completo pueda ser este manual, siempre puede ocurrir algo inesperado. Por favor, tenga en cuenta que no hay nada mejor que el **sentido común** y el apegarse al principio de que **usted es el responsable de su propia seguridad** y que afecta la seguridad de las personas a su alrededor. Usted primero debe conocer las reglas, pero también siempre debe prestar atención a su trabajo para que el conocimiento de las reglas sirva para que usted y sus compañeros de trabajo no corran riesgos. En este manual no se ha intentado proporcionar el conocimiento altamente especializado de cómo trabajar en las distintas máquinas, que también es crítico para el funcionamiento seguro y eficaz de las mismas. Por consiguiente, ¡usted deberá **leer y comprender el manual de funcionamiento de la máquina o máquinas que use!**

Este Manual de Seguridad es una guía para la prevención de accidentes y deberá ser usado conjuntamente con el **entrenamiento profesional.** La Asociación Americana de Bombeo de Concreto (American Concrete Pumping Association) ofrece mayor información y materiales de lectura, incluyendo además, un Programa de Certificación de Operadores. Conviértase en un profesional - ¡obtenga su certificación!

REED

Versión 5.1.1
Enero de 2006

MANUAL DE SEGURIDAD

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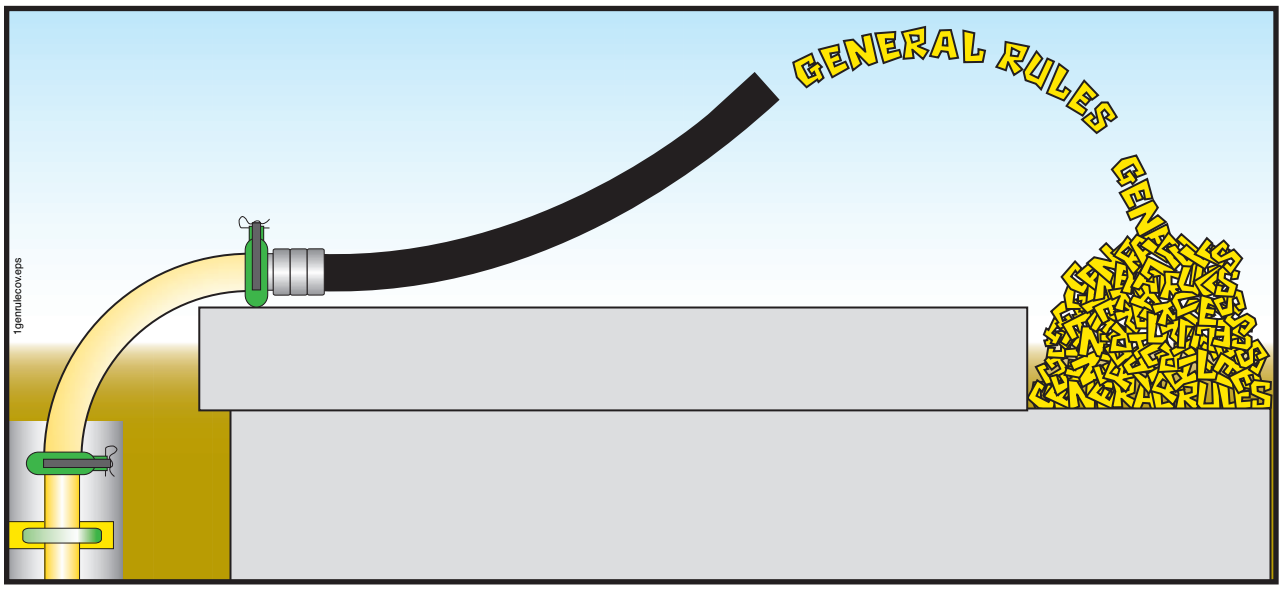


Normas generales
Índice

I. Qué se debe verificar antes de salir hacia la obra

1. Símbolo de alerta de seguridad y explicación de la palabra de aviso

1.1

El triángulo con el signo de exclamación dentro de él se utiliza para alertar sobre un punto de seguridad importante y se llama *símbolo de alerta de seguridad*. Una de las siguientes palabras que acompañan el símbolo aparecerá después del símbolo de alerta:

⚠ PELIGRO

⚠ ADVERTENCIA

⚠ PRECAUCIÓN

o - sin el símbolo: PRECAUCIÓN

- Si al símbolo de alerta de seguridad le sigue la palabra de aviso **PELIGRO** con letras blancas en un cuadro rojo (⚠ PELIGRO), indica que existe una situación peligrosa que, si no se evita, **CONDUCIRA** conducirá a **la muerte o a lesiones graves.**
- Si al símbolo de alerta de seguridad le sigue la palabra de aviso **PELIGRO** con letras negras en un cuadro naranja (⚠ ADVERTENCIA), indica que existe una situación peligrosa que, si no se evita, **PODRÍA** conducir a **la muerte o a lesiones graves.**
- Si al símbolo de alerta de seguridad le sigue la palabra de aviso **PRECAUCIÓN** con letras negras en un cuadro amarillo (⚠ PRECAUCIÓN), indica que existe una situación potencialmente peligrosa que, si no se evita, **PODRÍA** conducir a **lesiones menores a moderadas.**
- Cuando la palabra de aviso **PRECAUCIÓN** se usa en un cuadro amarillo, pero **sin el símbolo de alerta de seguridad** (PRECAUCIÓN), queire decir que el punto se ocupa de un peligro que, si no se evita, **PODRÍA** causar **daños al equipo o a la propiedad.**

2. Qué hacer antes de llegar a la obra

2.1

Duerma bien para estar listo para realizar el trabajo del día. Los accidentes pueden ocurrir cuando el cuerpo está en un lugar y la mente en otro.

Use vestimenta adecuada y equipo personal de protección (P.P.E.) (consulte la Figura 1). Ud. deberá usar siempre estas prendas cuando bombee concreto:

- casco
- gafas protectoras o de seguridad
- ropa de trabajo ajustada al cuerpo
- guantes
- botas con puntas de acero

Además, Ud. deberá usar:

- protección de los oídos si trabaja parado cerca de la bomba
- máscara de protección respiratoria cuando esté mezclando la lechada del cemento o cuando haya polvo de cemento suspendido en el aire
- guantes de goma durante la limpieza
- botas de goma en cualquier momento que usted tenga que estar parado sobre el concreto

Joyas, zapatillas para correr, sandalias y pantalones cortos son ejemplos de artículos de vestimenta que NO deberán usarse cuando se bombee el concreto.

* Hace falta una mascarilla protectora de la respiración cuando hay polvo de cemento (u otro polvo tóxico) presente en el aire.

Figura 1
Equipo Personal de Protección (P.P.E.)

2.2 ⚠ADVERTENCIA Asegúrese de que la ropa que se ponga no tenga hilos, flecos ni orlas u otros artículos para ajustar la ropa que se puedan enganchar en las piezas en movimiento (Figura 2).

Figura 2
Que no cuelguen hilos

2.3 Llegue puntualmente al trabajo. Los accidentes pueden ser causados por tener que apresurarse para realizar los procedimientos.

2.4 **ADVERTENCIA** **Nunca** vaya a trabajar a la obra ni trabaje en, cerca o alrededor de maquinarias si está bajo los efectos dedrogas o de alcohol. Tenga cuidado con los medicamentos de “venta libre”, muchos de los cuales tienen advertencias sobre el peligro del manejo de maquinarias después de haberlos tomado (Figura 3).

Figura 3
La seguridad de sus compañeros de trabajo depende de usted

2.5 **ADVERTENCIA** No traiga sus problemas personales al trabajo. En una oficina, sus problemas pueden resultar molestos para sus compañeros de trabajo, pero en una obra de construcción pueden ser fatales. La seguridad de sus compañeros de trabajo que laboran alrededor suyo depende de usted.

3. Qué debe verificar antes de salir hacia la obra

3.1 **ADVERTENCIA** No haga funcionar la máquina hasta tanto haya leído y comprendido el manual de funcionamiento de la misma La falta de entendimiento de los procedimientos de funcionamiento apropiados puede resultar en un funcionamiento peligroso. Todas las unidades tienen un manual de funcionamiento. Si no lo ha visto, pídaselo a su supervisor. También se pueden obtener más ejemplares del fabricante.

3.2 **ADVERTENCIA** Compruebe que los tubos o mangueras de descarga de concreto y las mangueras finales no estén gastadas. Nunca use una manguera gastada o un tubo gastado o abollado. **Sepa cuál es la máxima presión que su máquina puede ejercer sobre el concreto y asegúrese que los tubos, mangueras y abrazaderas sean capaces de aguantar dicha presión.** La presión máxima que se aplica al concreto se indica en los manuales de funcionamiento y de servicio y en la placa de identificación con el número de serie de la máquina. En el “Apéndice” de este manual de seguridad, en la página 73, se encuentra una tabla que compara el espesor mínimo de las paredes de los tubos con la presión máxima del concreto.

3.3 **⚠ADVERTENCIA** Si es necesario limpiar la pluma o la tubería del sistema con aire comprimido, ¡ASEGURESE de tener la capacitación, el equipo y los accesorios necesarios para llevar a cabo este procedimiento sin riesgo! Los accesorios que se necesitan incluyen:

- Un cabezal de soplado con una válvula reguladora de descarga de aire del tamaño apropiado y entrada de agua/aire independiente. Las dos aberturas deberán estar suficientemente separadas como para que una bola de soplado no pueda cubrir o tapar ambas aberturas al mismo tiempo.
- Un *"diablo de limpieza"* o una bola de esponja dura. Independientemente de cuál de los dos se emplee, **debe** caber bien ajustado dentro de la tubería para no permitir que se produzcan fugas de aire antes de ellos.
- Un captor de la bola o del diablo que los atrape cuando la línea haya sido purgada de todo el concreto. Existen dos tipos de captores (vea el párrafo 7.23 en la página 31).
- Una manguera con una capacidad nominal apropiada para la presión del compresor de aire que vaya a usar y que se pueda conectar tanto al compresor como al cabezal de soplado. La manguera debe estar en buenas condiciones de uso y no debe tener roturas, grietas, cortes u otros tipos de daños. **NO** improvise con esto. **Asegúrese** que usa las piezas correspondientes (Figura 4).

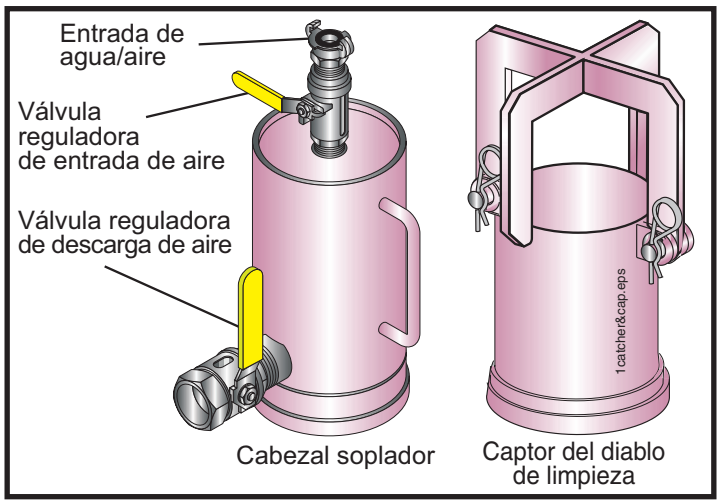


Figura 4
Accesorios para aire comprimido

3.4 **⚠ADVERTENCIA** Asegúrese de que la unidad esté equipada con todos los tubos, abrazaderas, juntas y mangueras, adaptadores de escape de aire, captores del diablo de limpieza, y otros accesorios que necesitará para las actividades del día. Tratar de "improvisar" con equipo inadecuado podría ocasionar accidentes.

3.5 En las unidades montadas sobre remolque, mida el nivel del aceite y del fluido refrigerante (sistemas de enfriamiento por aire o por agua) del motor accionador de la bomba. Podrían ocurrir accidentes cuando la falta de mantenimiento cause una distracción durante el uso del equipo.

3.6 Asegúrese de que la batería tenga suficiente carga para arrancar el motor accionador de la bomba. Usted se verá apremiado y trabajará precipitadamente si tiene que hacer reparaciones antes de poder empezar a trabajar.

3.7 ⚠ADVERTENCIA El operador es responsable de controlar que la bomba de concreto, la pluma y el sistema de descarga estén en condiciones buenas y seguras. Si existe una situación de peligro, **el trabajo no deberá comenzar** hasta que se hayan hecho las reparaciones necesarias o hasta que se pueda hacer funcionar la máquina sin peligro.

3.8 ⚠ADVERTENCIA El operador es responsable de controlar que todo el equipo de seguridad y las guardas se encuentren en su lugar y en buen estado. Si algunos de estos elementos faltan, están incompletos o dañados, **el trabajo no deberá comenzar** hasta que la situación no presente peligros.

3.9 ⚠ADVERTENCIA El operador es responsable de controlar que todas las calcomanías de seguridad estén en su lugar y en condiciones legibles. Si por cualquier razón faltan o están ilegibles, se deberá hacer lo que sea necesario para reemplazarlas.

3.10 ⚠ADVERTENCIA Inspeccione los neumáticos y los frenos del camión. Nunca maneje un camión que tenga los neumáticos lisos o partidos o si los frenos están débiles o gastados. Si su camión tiene frenos neumáticos, asegúrese que el sistema de aire no tenga pérdidas y que manenga la presión cuando se lo conduce. La pérdida de presión de aire hará que los frenos sean aplicados mientras se esté manejando el camión. Si se continúa manejando después de aplicar los frenos, la fricción resultante podría producir suficiente calor como para empezar un incendio.

3.11 Saque la humedad de los tanques de aire que alimentan a los frenos de la unidad (si los tiene). Esto es muy importante cuando las condiciones climáticas puedan hacer que la humedad se congele. Si pierde presión de aire debido a la humedad que se congeló, los frenos se aplicarán a sí mismo y Ud. tendrá que dejar de marchar hasta que la unidad sea reparada.

3.12 ⚠ADVERTENCIA (Vea la Figura 5.) Súbase o bájese de la bomba o del camión siguiendo la *"regla de los 3 puntos de apoyo"* (por ejemplo, mantenga EN TODO MOMENTO las dos manos y un pie o una mano y los dos pies en contacto con una superficie firme).

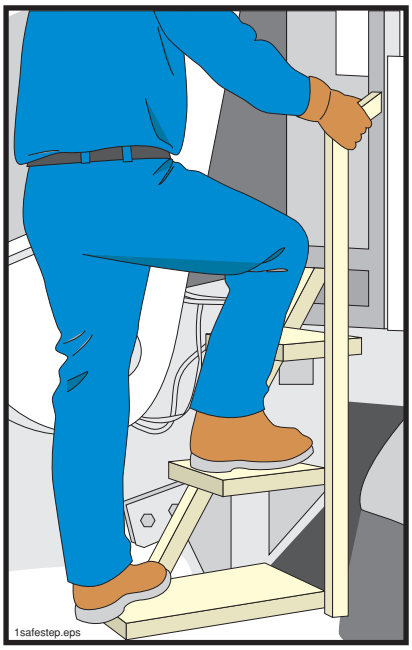


Figura 5
La regla de los 3 puntos de apoyo

3.13 ⚠ADVERTENCIA Nunca se suba o se baje de la bomba o del camión llevando objetos que le impidan usar la “regla de los 3 puntos de apoyo” Mueva los objetos por separado, si es necesario.

3.14 ⚠ADVERTENCIA Asegúrese que los estabilizadores hayan sido asegurados y enclavados antes de comenzar el viaje. Si el dispositivo de seguridad está gastado o dañado, deberá ser reparado inmediatamente y **la unidad no deberá ser manejada hasta que los estabilizadores puedan ser asegurados positivamente** contra la apertura accidental (vea la Figura 6).

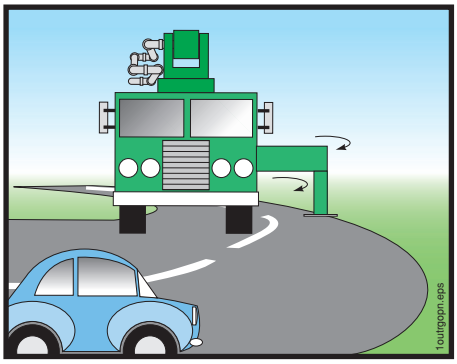


Figura 6
Antes de salir asegúrese que los estabilizadores no se puedan abrir

3.15 ⚠ADVERTENCIA Asegúrese que no haya nada en la cabina del camión (cosas como latas de refrescos vacías, herramientas sueltas, etc.) que pueda interferir con el funcionamiento del vehículo.

3.16 Asegúrese de tener todos los dispositivos de seguridad para la ruta (señales de advertencia, balizas, matafuego, etc.) y que éstos estén bien sujetados para el viaje.

3.17 Asegúrese de tener todo el equipo de protección personal (casco protector, gafas de seguridad, guantes de goma, etc.) y que éstos estén bien sujetados para el viaje.

3.18 ⚠ADVERTENCIA Asegúrese que el parabrisas y los espejos estén limpios y libres de escarcha o hielo y que los espejos estén correctamente ajustados.

3.19 ⚠ADVERTENCIA Compruebe que las luces delanteras y traseras, las direccionales, las luces indicadoras de aplicación del freno, alarma de retroceso y las luces indicadoras de retroceso funcionen bien.

3.20 En algunos casos podría pedírsele que maneje una unidad distinta a la que maneja habitualmente. En tal caso, asegúrese de que:

- Conoce el peso, la altura y el ancho de la unidad.
- Tiene consigo una copia del manual de funcionamiento.
- Hace preguntas al operador habitual de la máquina, al despachante o a su supervisor para enterarse de las características de funcionamiento inusuales o especiales de la máquina.
- Se familiariza con la máquina preparándola en la playa de estacionamiento y haciendo ejecutar las funciones y familiarizándose con el manual de funcionamiento. Esto es especialmente importante si la máquina nueva es muy diferente a la unidad que maneja normalmente. Sus compañeros de trabajo confían en que Ud. conozca bien la máquina.

3.21 **⚠ADVERTENCIA** Antes de manejar la unidad, asegúrese que la pluma esté bien sujetada en su base, sobre soportes de descanso aprobados que esté en buen estado, y sujeta con la correa de amarre apropiada (si hay una disponible). En algunas marcas y modelos de unidades, el balanceo durante el trayecto puede dañar la pluma, y este daño puede evitarse fácilmente empleando la correa de amarre (Figura 7).

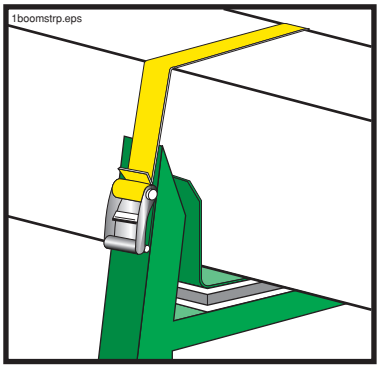


Figura 7
Si su unidad tiene una correa de amarre de la pluma, úsela

3.22 **⚠ADVERTENCIA** Asegúrese de que todos los artículos sueltos de la unidad hayan sido sujetados bien antes de comenzar el viaje.

4. Reglas de seguridad para manejar bombas de concreto montadas en un camión

4.1 **⚠ADVERTENCIA** **¡Peligro de electrocución!** (Vea la Figura 8.) Si va a manejar el camión por debajo de líneas eléctricas aéreas a poca altura y donde no sea posible mantener la distancia de seguridad adecuada entre la bomba y los cables, **¡Ud. deberá buscar otra ruta!** Si no hay otro camino disponible, llame a la compañía de electricidad y solicite que corten la corriente.

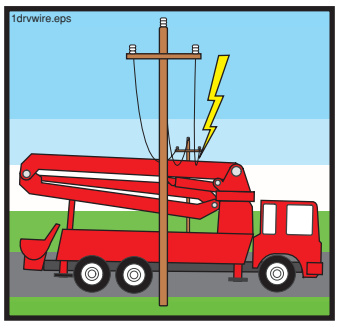
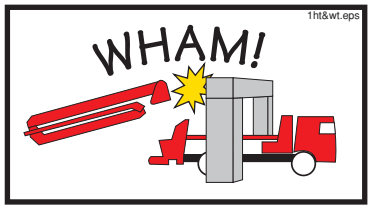


Figura 8
Tenga cuidado con los cables de transmisión de electricidad a poca altura

4.2 Estudie detenidamente el trayecto de su viaje. Evite en lo posible pendientes pronunciadas, áreas residenciales o donde haya construcción y puentes angostos o muy bajos. **El conductor es responsable de conocer el peso y la altura** de la máquina.

4.3 **ADVERTENCIA** **¡Peligro de choque/hundirse!** Antes de transitar sobre puentes o caminos elevados, **asegúrese que éstos puedan soportar el peso del vehiculo** (Figura 9).



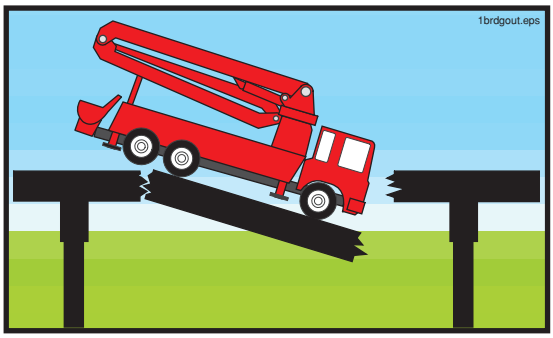


Figura 9
Conozca la altura y el peso de su vehículo

4.4 **ADVERTENCIA** **¡Peligro de choque!**Antes de pasar por debajo de CUALQUIER tipo de estructura, **ASEGÚRESE** de que sea lo suficientemente alta como para permitirle pasar sin chocar (Figura 9).

4.5 **ADVERTENCIA** **¡Peligro de explosión!** Nunca cargue combustible en la unidad cerca de superficies calientes, chispas o llamas abiertas (Figura 10).

Figura 10
Tenga cuidado cuando cargue combustible

4.6 **ADVERTENCIA** **¡Peligro de vuelco! No** maneje el vehículo con la pluma desplegada.

4.7 **ADVERTENCIA** **Posible movimiento de la pluma.** Antes de manejar la unidad asegúrese de que la toma de fuerza (PTO) de la caja de engranajes de distribución haya **desconectado** las bombas hidráulicas. **Manejar con las bombas hidráulicas engranadas crea un peligro** y daña las bombas.

4.8 **PRECAUCIÓN** Nunca maneje la unidad cuando haya concreto en la tolva. La mezcla podría salpicar y dañar a otros vehículos o bienes.

4.9 **ADVERTENCIA** **¡Peligro de pérdida de control del camión!** Cuando esté bajando una cuesta, use una velocidad menor que la que utilizaría para subirla.

4.10 **⚠ADVERTENCIA** Las bombas de concreto montadas sobre camiones son generalmente muy inestables. Tenga cuidado cuando tome una curva cerrada con el vehículo (Figura 11).

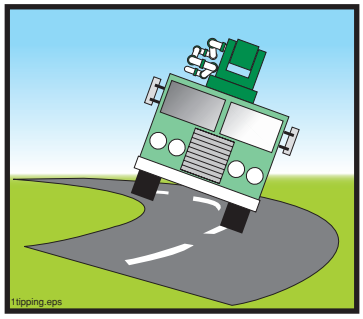


Figura 11
Mantenga el control en las curvas

4.11 **⚠ADVERTENCIA** Disminuya la velocidad en intersecciones y cerca de parques de juegos, áreas residenciales y escuelas. Los niños no saben que los vehículos pesados necesitan mayor distancia para poder frenar.

4.12 **⚠PRECAUCIÓN** Familiarícese con el equipo de emergencia. Aprenda cómo usar las balizas, etc.

4.13 **⚠ADVERTENCIA** Maneje prestando atención al tráfico a su alrededor. Usted tiene una clara desventaja en lo que se refiere a hacer maniobras súbitas y en la distancia que necesita para hacer detener el vehículo.

4.14 **¡PRECAUCIÓN!** Si va a remolcar la unidad, sepa en qué lugares deberán engancharse el o los cables de remolque. De lo contrario, se puede dañar el vehículo o la bomba.

4.15 **⚠ADVERTENCIA** **Nunca** dé marcha atrás sin un guía.

4.16 **⚠PRECAUCIÓN** Conozca los reglamentos y las leyes de su estado y localidad. Se han establecido para su protección y la protección de las personas que le rodean.

5. Reglas de seguridad para arrastrar bombas de concreto montadas sobre remolques

5.1 **⚠ADVERTENCIA** Asegúrese de que el vehículo remolcador sea lo suficientemente pesado y tenga la potencia de motor y de frenos necesaria como para arrastrar el remolque. Esto es imprescindible para mantener el control cuando se conduce a las velocidades de las carreteras y para poder frenar cuando sea necesario. Si el remolque es más pesado que el vehículo que lo remolca, la distancia que se requiere para frenar aumentará considerablemente (Figura 12).

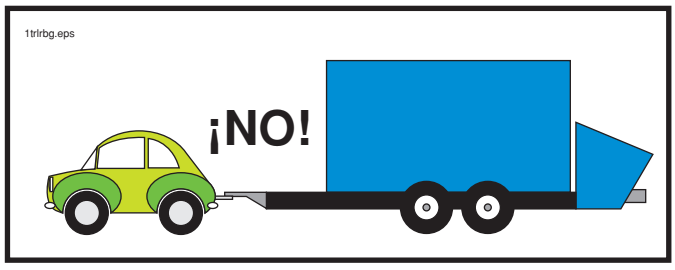


Figura 12
No remolque con un vehículo de poca potencia

5.2 ⚠ADVERTENCIA Revise los neumáticos, la presión de éstos, y los frenos del remolque antes de remolcarlo. Nunca remolque un vehículo que tenga neumáticos agrietados o lisos. Si un neumático del remolque se revienta puede hacer perder el control del vehículo remolcador.

5.3 ⚠ADVERTENCIA Tenga especial cuidado cuando maneje arrastrando un remolque sobre calles o caminos con hielo o resbaladizos. Una patinada que normalmente podría ser corregida fácilmente se hace más peligrosa cuando se arrastra un remolque, al hacer perder el control del vehículo.

5.4 ⚠ADVERTENCIA Asegúrese de que las conexiones eléctricas entre el vehículo de remolque y el remolque sean fuertes y confiables, y que funcionen las luces del vehículo de remolque y el remolque.

5.5 ⚠ADVERTENCIA Siempre use cadenas de seguridad y protección contra el zafado al arrastrar un remolque.

5.6 ⚠PRECAUCIÓN Conozca los reglamentos de seguridad locales o estatales sobre espejos y luces pertinentes al arrastre de remolques.

5.7 ⚠ADVERTENCIA Cuando se arrastra un remolque aumentan considerablemente la distancia necesaria para frenar y el radio de giro. Tenga presente esto **en todo momento.**

5.8 ⚠ADVERTENCIA Cuando se arrastra un remolque largas distancias, es importante revisar frecuentemente el enganche, los cables de las luces y las cadenas de seguridad.

5.9 ⚠ADVERTENCIA Siempre tenga presente el largo de su vehículo y del remolque. Una causa común de accidentes que involucran remolques es doblar muy cerca o sobre el cordón de la vereda o pasar sobre objetos.

5.10 ⚠ADVERTENCIA Nunca retroceda sin tener un guía que le oriente.

II. En la obra

6. Reglas de seguridad para la preparación para el trabajo

PREPARACIÓN DE UNA BOMBA MONTADA EN UN CAMIÓN

6.1 **La fase de preparación puede ayudar a que sucedan o se eviten accidentes.** Si se dedican unos minutos para preparar correctamente el trabajo, aumentarán sus probabilidades de tener un día sin riesgos ni problemas.

6.2 **El operador es responsable del funcionamiento seguro de la máquina**. Notifique a su empleador, superintendente del trabajo y/o a O.S.H.A. si a Ud. se le pide que prepare los equipos de una manera que presenta peligros. **Nunca se le puede pedir que arriesgue la seguridad.** Usted es la **única** persona que puede determinar que las circunstancias del trabajo que están bajo su control no presentan riesgos.

6.3 Las leyes canadienses establecen que la pluma debe estar como mínimo a 7 metros de los cables eléctricos. Para cumplir con esta ley, cualquier párrafo en este manual que hable de distancia de seguridad de 17 pies o 5 metros de los cables eléctricos, deberá interpretarse como 7 metros durante su aplicación en Canadá.

6.4 ⚠ PELIGRO **Cuando hay cables aéreos en el área en el que se moverá la pluma para completar el vertido, se debe emplear un observador cuyo trabajo es el de advertir al operador si la pluma se acerca a menos de 17 pies de los cables.** El observador debe entender las responsabilidades asignadas y debe ser capaz de juzgar una distancia de 17 pies.

6.5 ⚠ PELIGRO **¡SE DEBE evitar en todo momento el contacto o la proximidad peligrosa a todo tipo de cables de electricidad!** Coloque la máquina de tal manera que haya una distancia mínima de **5 metros (17 pies)** en todas las posiciones de la pluma necesarias para realizar el trabajo (Figura 13). **Nunca acorte la distancia de seguridad para llegar a una zona peligrosa con la pluma.**

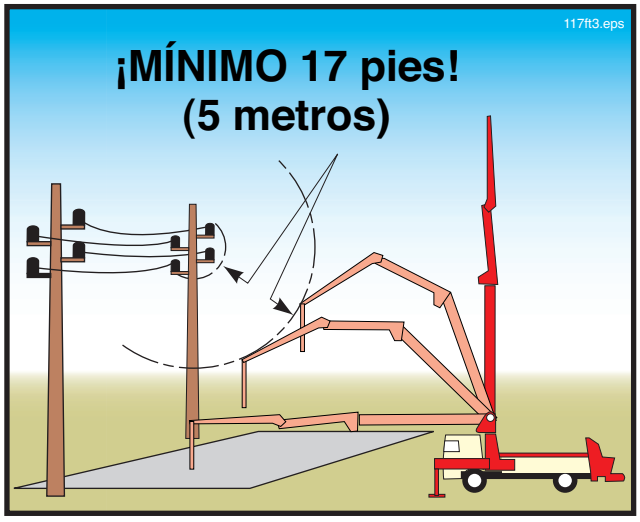


Figura 13
Mantenga siempre la distancia de seguridad

6.6 **⚠ PELIGRO** Si tiene dudas con respecto a la distancia que está de los cables de alta tensión o si no es posible mantener una distancia de 5 metros (17 pies), Ud. deberá usar una tubería adicional o deberá emplear un método de colocación distinto. **¡Nunca tome riesgos con los cables de alta tensión!** (Vea la Figura 14.)

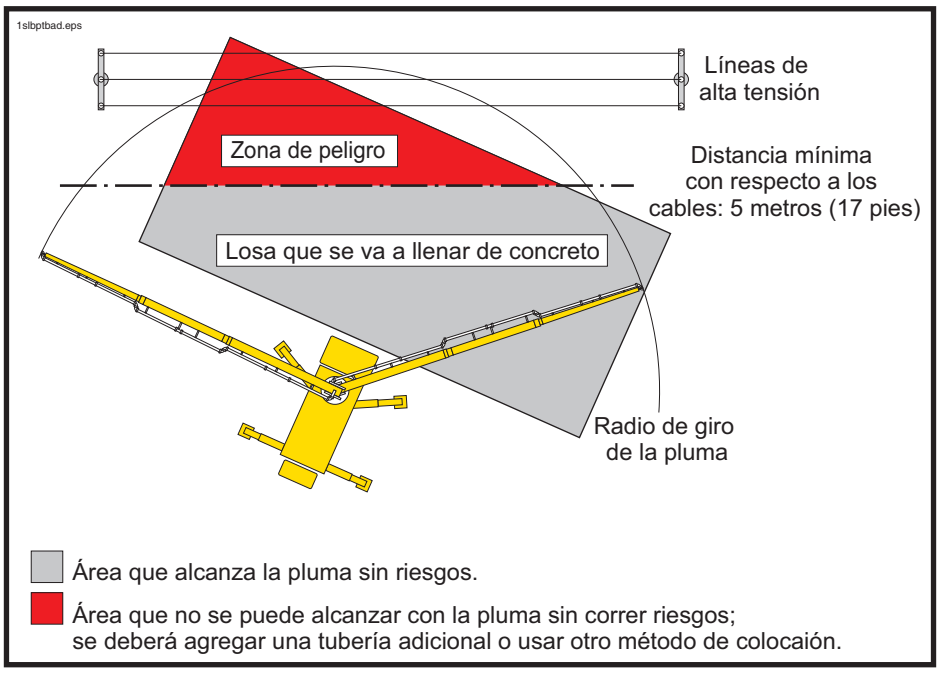


Figura 14
Instale una tubería adicional si no puede mantener la distancia de seguridad

6.7 **⚠ PELIGRO** No coloque la pluma sobre cables eléctricos incluso cuando pueda mantener 5 metros (17 pies) de distancia Desperfectos mecánicos o hidráulicos podría hacer que la pluma baje (Figura 15).

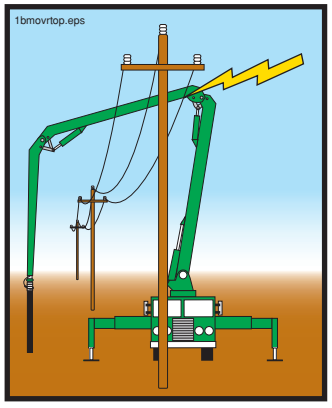


Figura 15
Nunca coloque la pluma sobre cables eléctricos

6.8 **⚠ PELIGRO** **Es de suma importancia que se tengan en cuenta los cables de alta tensión durante la preparación, ¡incluso si se encuentran lejos del área de bombeo!** Muchos accidentes que pueden ocurrir durante la limpieza y los movimientos del equipo pueden evitarse mediante la preparación previa apropiada. En las ilustraciones de abajo, el vertido queda fuera de la distancia mínima de seguridad pero el peligro, sin embargo, existe. ¡Ud. **debe** tomar en cuenta la cercanía de los cables en todo momento! (Vea la Figura 16.)

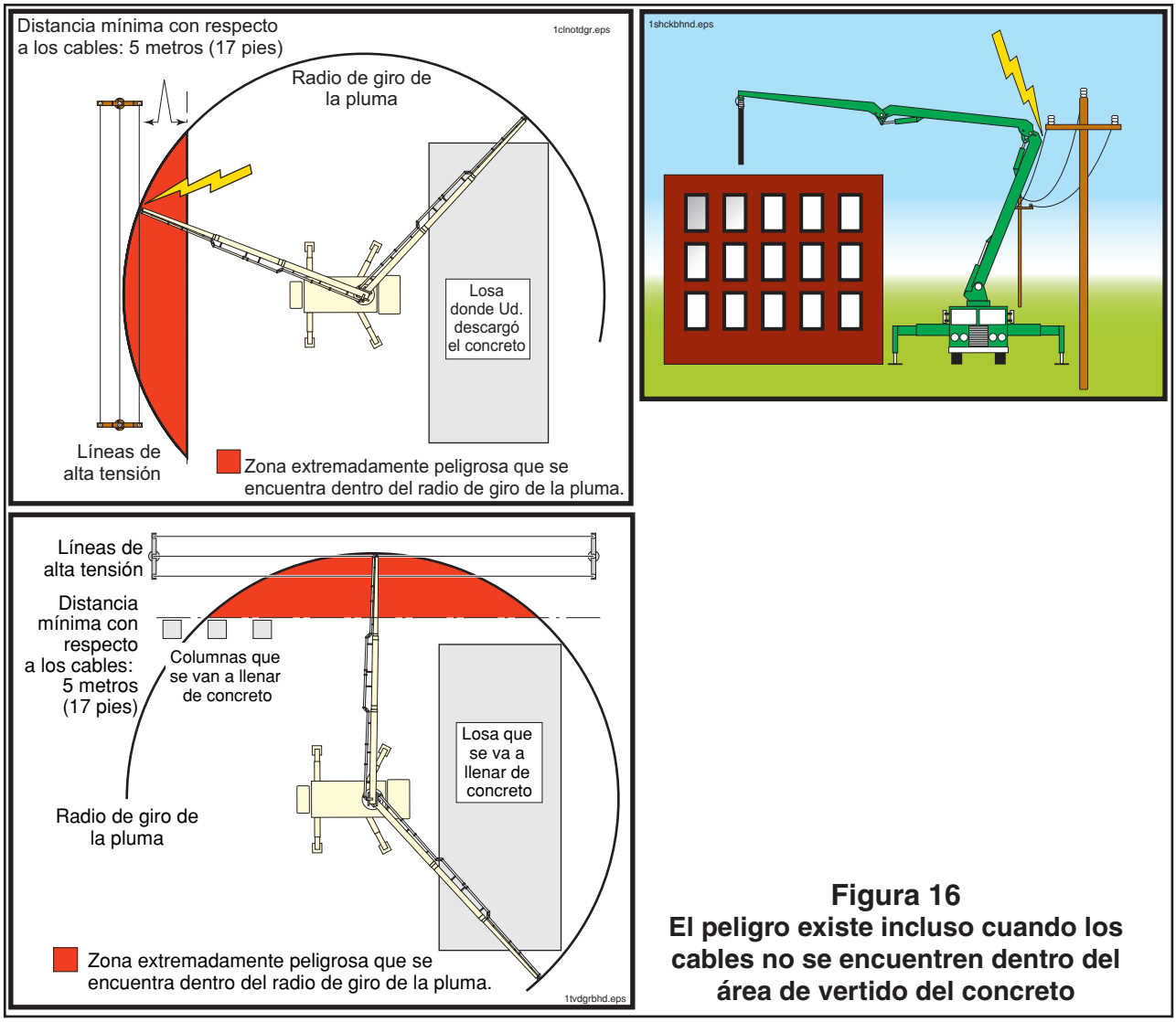
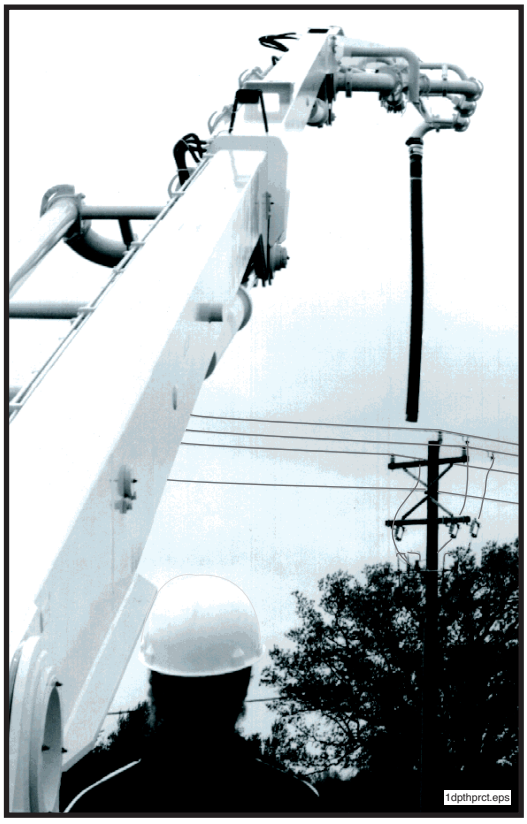


Figura 16
El peligro existe incluso cuando los cables no se encuentren dentro del área de vertido del concreto

6.9 **⚠ PELIGRO** La percepción de profundidad varía de persona a persona y se ve afectada por la distancia a la que se encuentran los objetos que se observan. Estime siempre las distancias mínimas de cables eléctricos y otras obstrucciones colocándose en una posición de observación que no requiera hacer estimaciones sobre la percepción de profundidad. Si esto no es posible, ¡deberá **usar** un observador! Consulte el glosario para obtener la definición de un observador (Figura 17).



¿Tocará la pluma los cables?
No se puede decir mirando desde aquí.

Busque el mejor posible
punto de observación

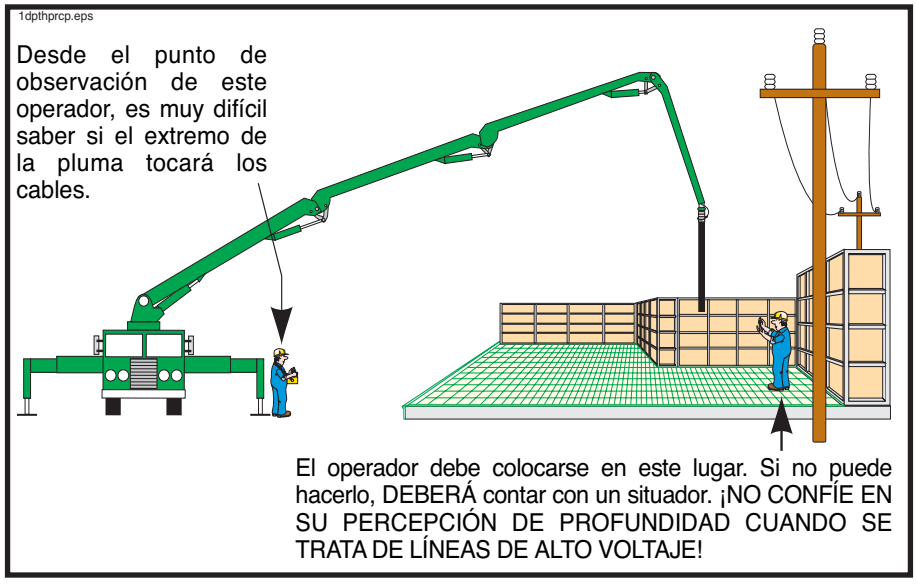


Figura 17
Nunca confíe en su percepción de profundidad cuando se trate de cables de electricidad

6.10 **⚠ PELIGRO** Siempre suponga que los cables tienen voltaje. Nunca crea en la palabra de alguien que está en la obra que le dice que los cables no tienen corriente. **Solamente un representante calificado de la empresa de electricidad correspondiente puede asegurarle si se ha cortado la corriente o no** (vea la Figura 18).

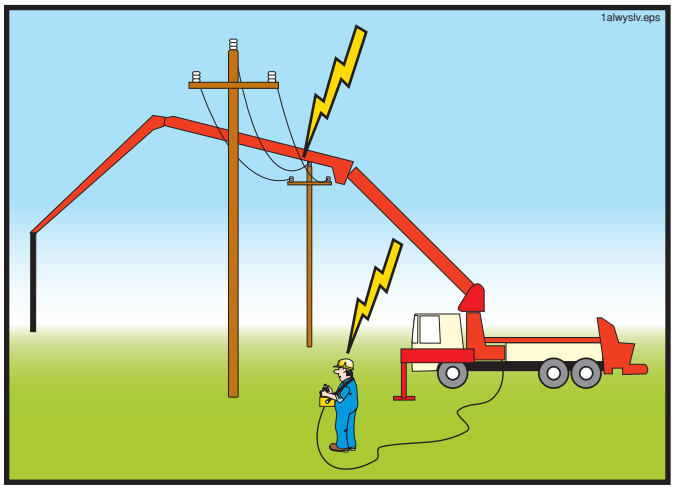


Figura 18
Suponga que los cables tienen corriente

6.11 **⚠ ADVERTENCIA** Manténgase a una distancia segura de obstrucciones tales como grúas, andamios y edificios (Figura 19).

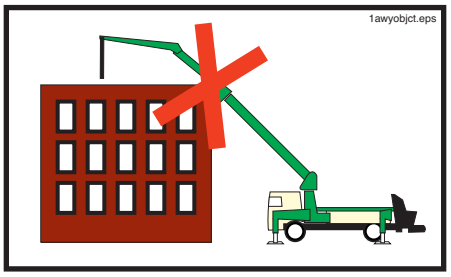


Figura 19
Manténgase a una distancia segura de las obstrucciones

6.12 **⚠ ADVERTENCIA** Coloque tacos debajo de las ruedas en terrenos inclinados. Suelte los frenos y haga que la máquina se apoye contra los tacos y a continuación vuelva a poner los frenos.

6.13 **⚠ PRECAUCIÓN** Saque la nieve, hielo, aceite o suciedad de los escalones y plataformas.

6.14 **⚠ADVERTENCIA** ¡Posible daño a la pluma! ¡Nunca agregue extensiones/alargues al final de la pluma! Si agrega tubos de extensión a la manguera final, éstos **NO DEBERÁN** agregar carga a la pluma (Figura 20).

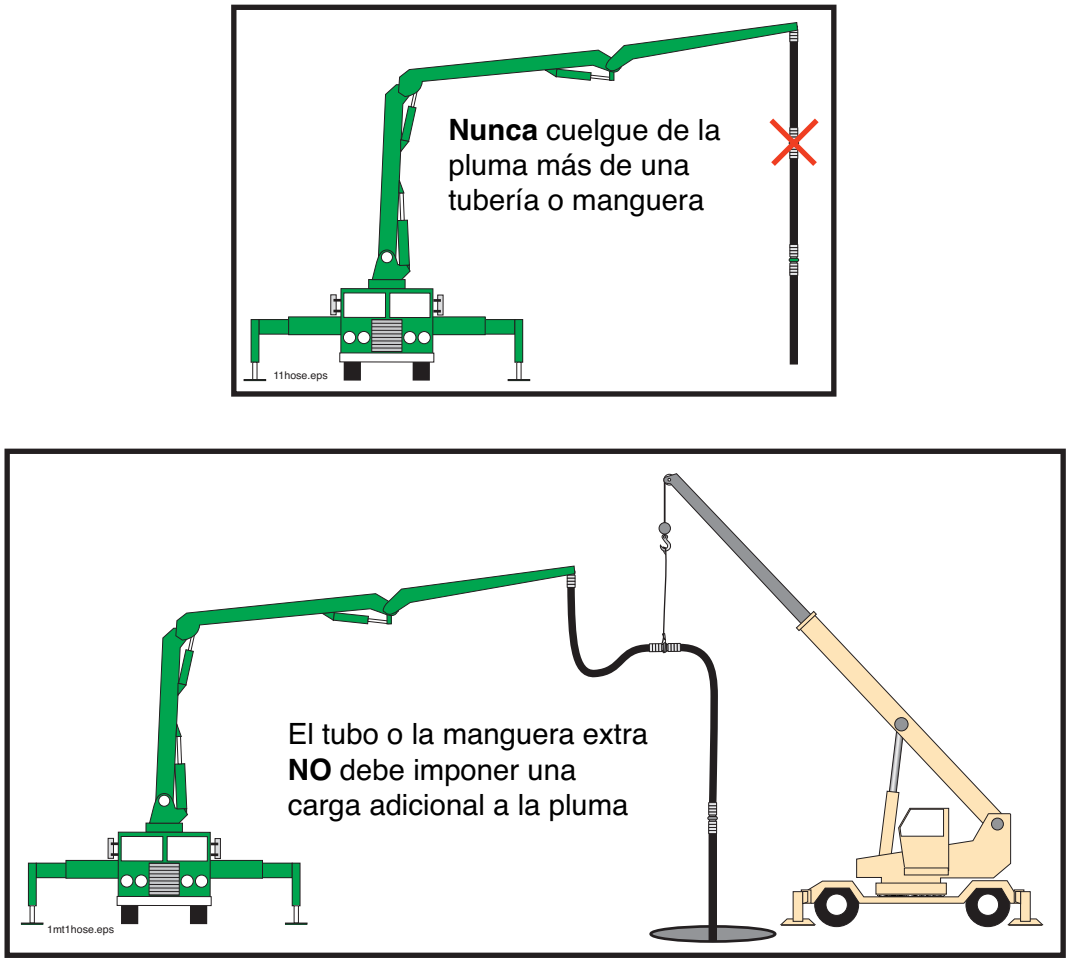


Figura 20
Conozca y no exceda el peso máximo que se permite que cuelgue de la pluma

6.15 **⚠ADVERTENCIA** La longitud de una manguera final de pluma de 125mm no puede exceder 4 metros (13 pies). Algunas máquinas podrían requerir una longitud menor o un diámetro menor de la manguera final. Consulte con el fabricante de la pluma.

6.16 **⚠ADVERTENCIA** Posible daño estructural. Si la manguera de la punta provista es reemplazada por una combinación de reductores y mangueras, el peso total de todas las piezas que cuelgan (incluyendo el peso del concreto) no debe exceder el peso de la manguera de la punta provista (incluyendo el concreto). La manguera de la punta provista típicamente mide 3,66 metros (12 pies) de largo y tiene un diámetro de 125 mm (o 5 pulgadas). Cuando está llena de concreto normal de piedra dura pesa 376 libras. Algunas unidades podrían tener un peso permitido menor y, por lo tanto, una manguera de la punta distinta. El manual del operador incluido con la unidad le informará sobre las especificaciones si la unidad requiere una manguera de la punta más pequeña que la regular. El operador debe conocer las especificaciones de la unidad que está utilizando (Figura 21). **¡Averigue si su unidad tiene requisitos especiales!**

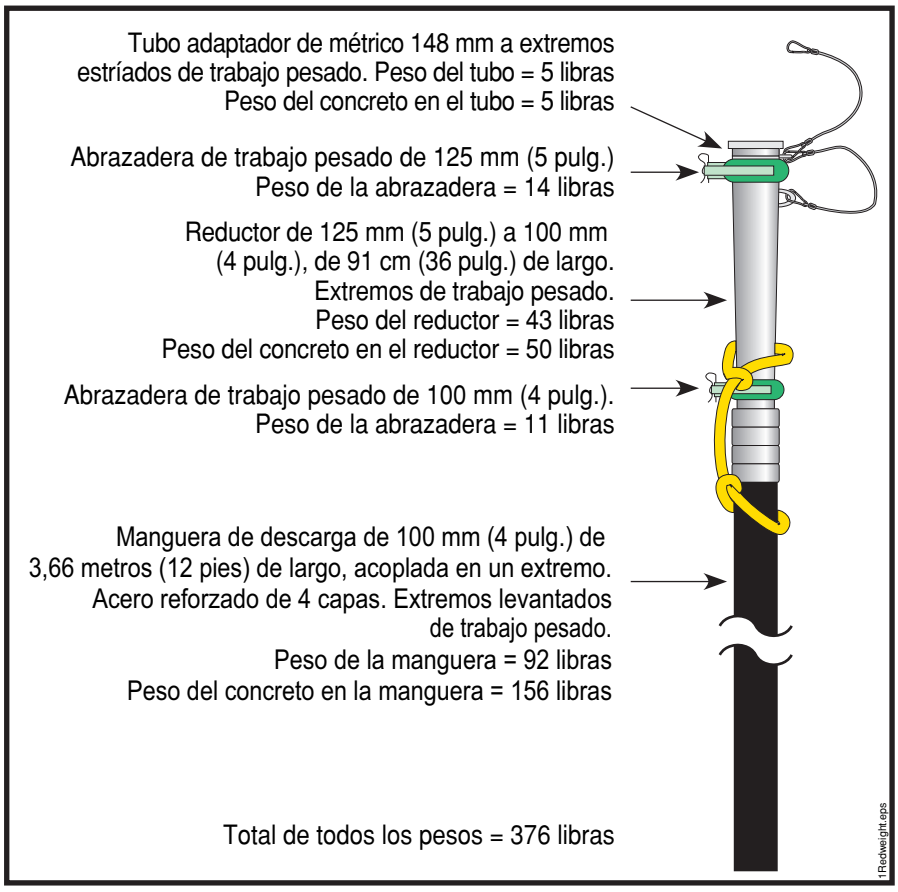


Figura 21
Combinación típica de reductor/manguera

6.17 **⚠ADVERTENCIA** Una *manguera de descarga de concreto* es una manguera flexible para descarga de concreto que tiene dos acoplamientos en los extremos. Una *manguera final* es una manguera flexible para descarga de concreto que tiene un acoplamiento en un extremo. En uso normal es preferible tener una manguera final como la última pieza del sistema de descarga. Si va a hacer que toda la pluma pase arriba de trabajadores o de propiedad tiene que poder obturar el sistema de descarga. Vea las instrucciones para tapar el sistema de descarga en la página 43.

6.18 **⚠ADVERTENCIA** Todos los componentes del sistema de colgar deberán asegurarse con cables o correas de seguridad y **cada componente deberá ser capaz de aguantar la máxima presión de concreto de la máquina** (vea la Figura 22).

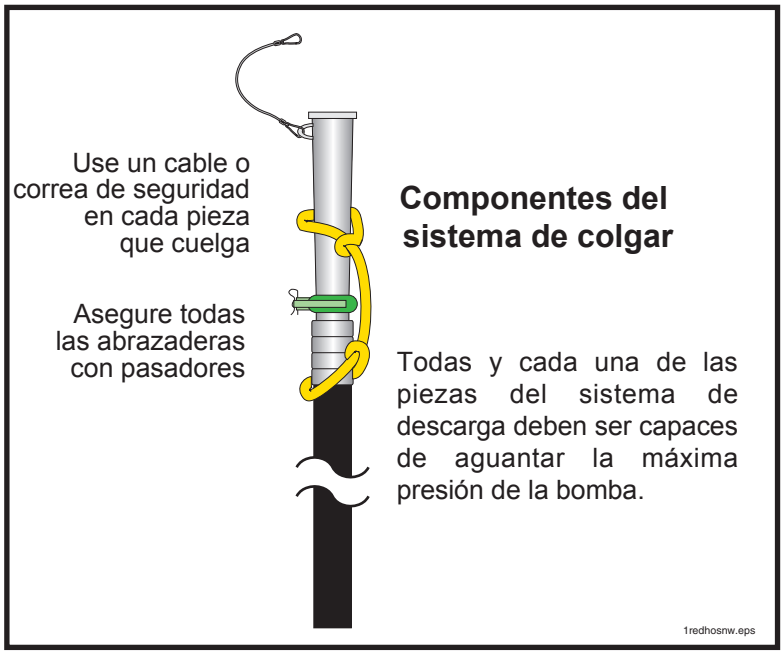


Figura 22
Asegúrese de que los componentes del sistema de colgar estén seguros

6.19 **⚠ADVERTENCIA** Las plumas de distribución tienen un radio de acción muy grande. Debido a esta gran movilidad, algunas plumas pueden colocarse en posiciones no recomendadas para un funcionamiento práctico. Bajo ciertas circunstancias, **podría producirse la sobrecarga, el vuelco o daños a la pluma.** Estas zonas no recomendadas se indican en las calcomanías de seguridad y en los manuales de funcionamiento (vea la Figura 23). **Conozca estas áreas si ellas afectan su unidad y prepare la bomba teniéndolas en cuenta**.

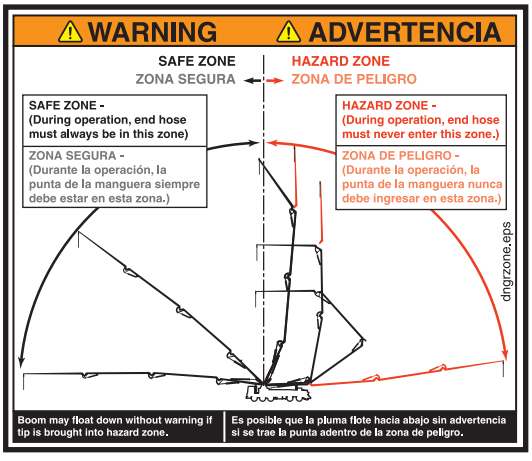


Figura 23
Ejemplo de una calcomanía advirtiendo sobre una zona de peligro

6.20 **⚠ADVERTENCIA** ¡Peligro de choque! Proteja/cerque el área de alrededor de la máquina contra el tráfico público siguiendo todas las reglamentaciones en vigencia (luces de aviso, conos de seguridad, barricadas con luces intermitentes, etc.)

6.21 **⚠ADVERTENCIA** Tome en cuenta la entrada y salida sin peligros de los camiones que transportan la mezcla de cemento y ajuste sus preparativos como sea necesario. El ajuste de su posición unos pocos grados hacia un lado o hacia el otro podría ser la diferencia entre una entrada segura y otra peligrosa. Algunos ejemplos de entradas peligrosas son: estar demasiado cerca de una excavación o sobresalir al tráfico.

6.22 **⚠ADVERTENCIA** Si instaló la unidad con uno o más estabilizadores que no están totalmente extendidos del lado contrario donde se va a colar el cemento (estabilizadores parcialmente extendidos o shortrigging en inglés), hará volcar la máquina si se olvida y gira la pluma sobre el lado que tiene los estabilizadores no extendidos. Después de haber dicho esto, se sabe que bajo ciertas circunstancias no se puede evitar tener que extender los estabilizadores sólo parcialmente (vea la Figura 24). Si no hay alternativas prácticas y debe extender los estabilizadores sólo parcialmente para un trabajo en particular, recuerde los siguientes puntos.

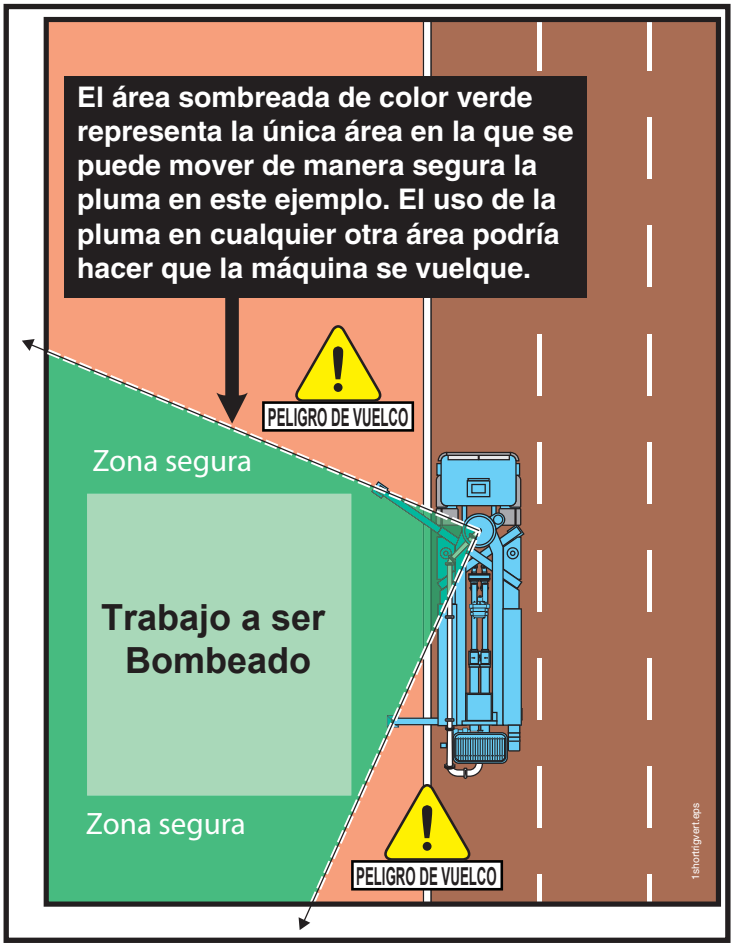
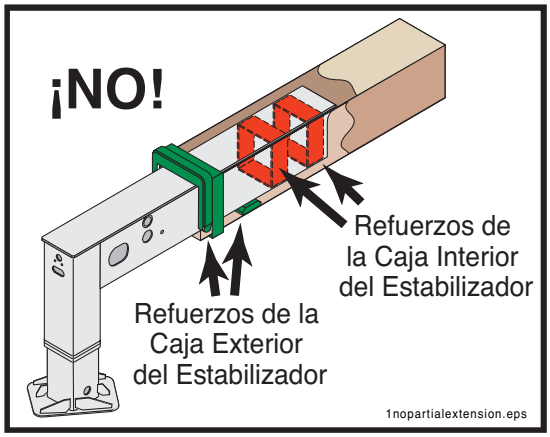


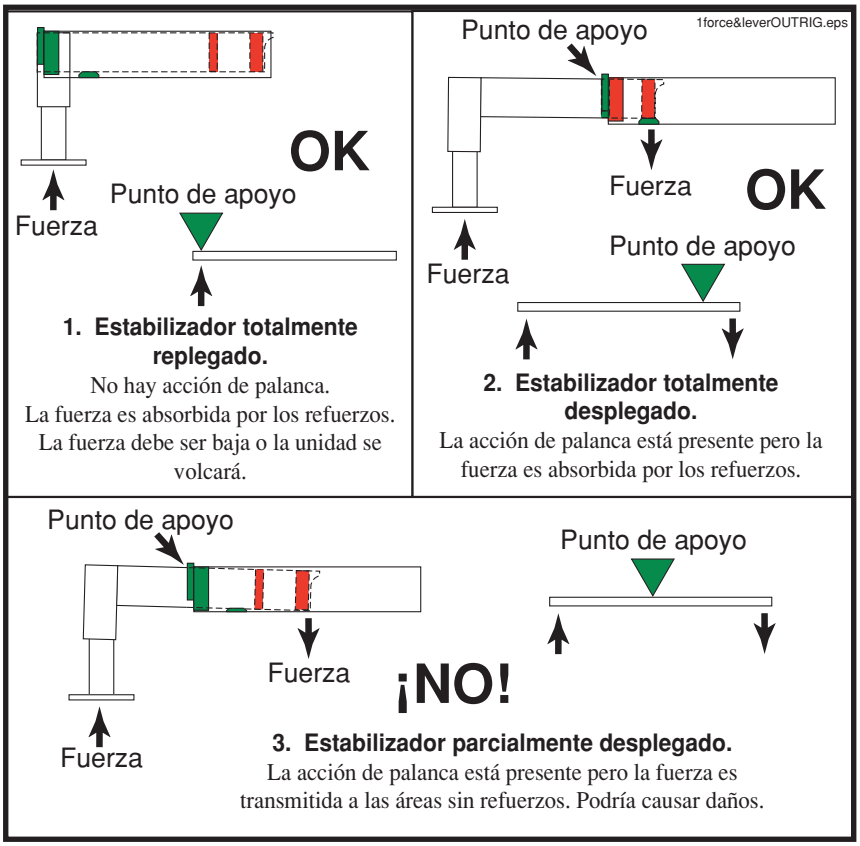
Figura 24
Estabilizadores parcialmente extendidos

- Ud. puede accionar la pluma solamente cuando ésta esté colocada entre estabilizadores que estén completamente extendidos; se podría producir el vuelco si la pluma es colocada en cualquier otra parte.

- Sin embargo Ud. deberá levantar con el gato los estabilizadores que no estén totalmente extendidos. Esto ayudará a estabilizar y evitar que la unidad oscile. El margen de seguridad que esto proporciona es mínimo; y no evitará que vuelque.
- ¡No sea perezoso! Si es posible extender los estabilizadores por completo, ¡hágalo!
- No se olvide que no extendió totalmente todos los estabilizadores. Explique a otros trabajadores en la obra qué sucederá si usted se olvida y hace girar la pluma sobre los estabilizadores no extendidos. De esa manera, si ellos ven que Ud. mueve la pluma en un área que podría causar un vuelco podrán advertirle.
- Los estabilizadores que no puedan ser extendidos totalmente NO deberán ser extendidos parcialmente a menos que esté permitido específicamente por el fabricante. Los refuerzos de la caja de los estabilizadores interiores y exteriores no se alinean en posiciones intermedias. (Figura 25.)

Figura 25
No se permite la extensión parcial





⚠ADVERTENCIA Al colocar los estabilizadores, eleve la bomba con el gato a unos 3° grados por encima del nivel del terreno o de acuerdo a lo que especifique el manual de funcionamiento de su unidad. Si la unidad no está preparada dentro de las especificaciones de nivel, los frenos de la pluma podrían fallar haciendo que la pluma gire hacia abajo por la fuerza de gravedad.

6.23

⚠ADVERTENCIA ¡Peligro de vuelco! ¡Peligro de vuelco!¡No despliegue la pluma hasta que los estabilizadores hayan sido colocados correctamente y estén bien asegurados! Éstos deberán estar completamente extendidos y abiertos tal como se describe en el manual de funcionamiento. ¡No extienda parcialmente los estabilizadores debido a que las posiciones intermedias **no son seguras!** Vea la información relacionada con los estabilizadores parcialmente extendidos (párrafo 6.22).

6.24

⚠ADVERTENCIA ¡Peligro de vuelco! Inspeccione las condiciones del terreno antes de colocar los estabilizadores. Si fuera necesario, use un enrejado o almohadillas apropiadas debajo de las patas de los estabilizadores para aumentar el área de contacto con el suelo. Vea el cuadro en la Figura 26 para obtener ejemplos de capacidad de aguante de carga en distintos tipos de suelos y un ejemplo de cómo calcular cuánto enrejado se necesita. En caso de duda, el encargado de la obra podría suministrarle información sobre la capacidad de soporte de carga del suelo.

PRESIÓN ACEPTABLE EN LOS DISTINTOS TIPOS DE TERRENOS

Tierra virgen	22 PSI
Asfalto, mín. 20 cm (8 pulgadas) de espesor	29 PSI
Piedras trituradas y comprimidas	36 PSI
Arcilla/barro, firme	43 PSI
Terreno granulado mixto	51 PSI
Pedregullo compactado y firme	58 PSI
más compactado	72 PSI
más compactado (por ejemplo, clase 5)	109 PSI
Piedras quebradizas y gastadas	145 PSI

Para calcular la presión del suelo: Divida la fuerza de la pata del estabilizador (obténgala de la calcomanía) por la cantidad de pulgadas cuadradas de la superficie de contacto con el suelo.

PSI = CARGA÷ÁREA

PSI = presión sobre el suelo

Carga = fuerza en libras

Área (superficie) = pulgadas cuadradas de contacto con el suelo

EJEMPLO: Capacidad de carga soportada por el terreno [asfalto de 20 cm (8 pulgadas)] = 29 PSI

Fuerza sobre el terreno indicada en la pata del estabilizador = 40.000 libras [18140 kg (de la calcomania)

Pata del estabilizador = 12 pulg x 12 pulg (144 pulgadas cuadradas ó 929 centímetros cuadrados)

40.000 ÷ 144 = 278 PSI.

En este ejemplo, el estabilizador podría hundirse en el asfalto y causar el vuelco del equipo. Para evitar esto, Ud. tiene que instalar un enrejado adicional:

Enrejado adicional = 40 pulg x 40 pulg (1600 pulgadas cuadradas ó 10320 centímetros cuadrados)

40.000 ÷ 1600 = 25 PSI

Ahora el asfalto podrá soportar el peso de los estabilizadores.

1soilpres.eps

Figura 26 Cálculo de la capacidad de aguante de carga del suelo

6.25

⚠ADVERTENCIA ¡Peligro de vuelco! Independientemente de si Ud. conoce la capacidad de soporte de carga del suelo o no, debe probar la colocación de la máquina, moviendo lentamente la pluma vacía sobre cada estabilizador (Figura 27). Si el estabilizador comienza a hundirse, repliegue la pluma en la dirección de donde vino hasta que el peso de la pluma haya sido eliminado del estabilizador. Agregue más enrejado debajo de las almohadillas del estabilizador y siga probando hasta que los estabilizadores queden estables. Cuando ponga concreto en la pluma inspeccione nuevamente los estabilizadores para ver si se están hundiendo. Continúe agregando más enrejado hasta que el suelo pueda aguantar la carga. Después de que comience el vertido

del concreto comience, continúe inspeccionando los estabilizadores para asegurarse que no se hundan durante el día. La estabilidad de la unidad **debe** ser asegurada.

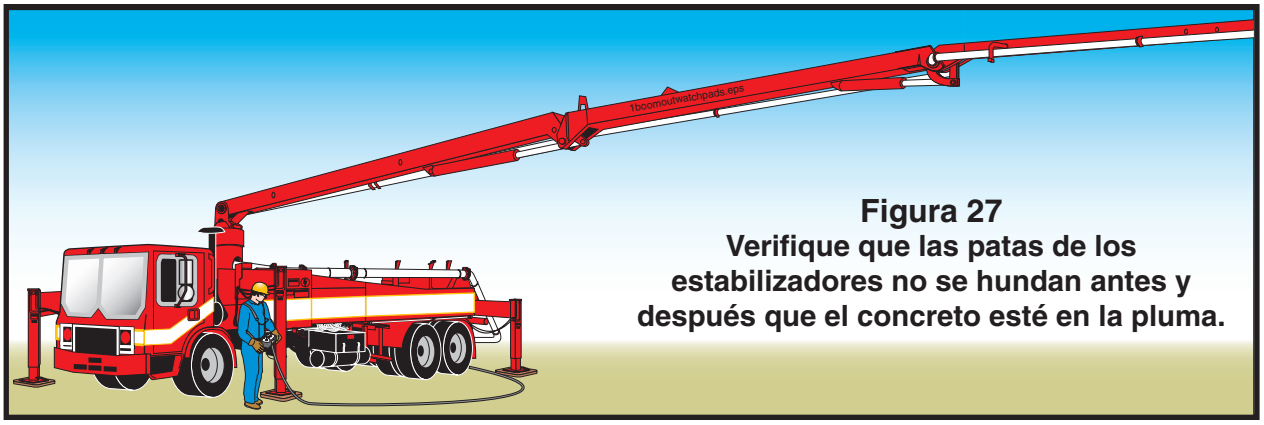


Figura 27
Verifique que las patas de los estabilizadores no se hundan antes y después que el concreto esté en la pluma.

6.26

⚠ADVERTENCIA ¡PELIGRO DE VUELCO! Mantenga una distancia segura entre el equipo y el borde de un barranco o de excavaciones. La regla básica es: por cada pie (30 cm) de declive, manténgase alejado 1 pie (30 cm) del borde (esto se llama la regla de 30 por 30 o de 1 x 1 en inglés). (Vea la Figura 28). Observe que las fuerzas en los estabilizadores sean transferidas al suelo en un ángulo de 45° Preste atención a la condición mostrada en la Figura 29.

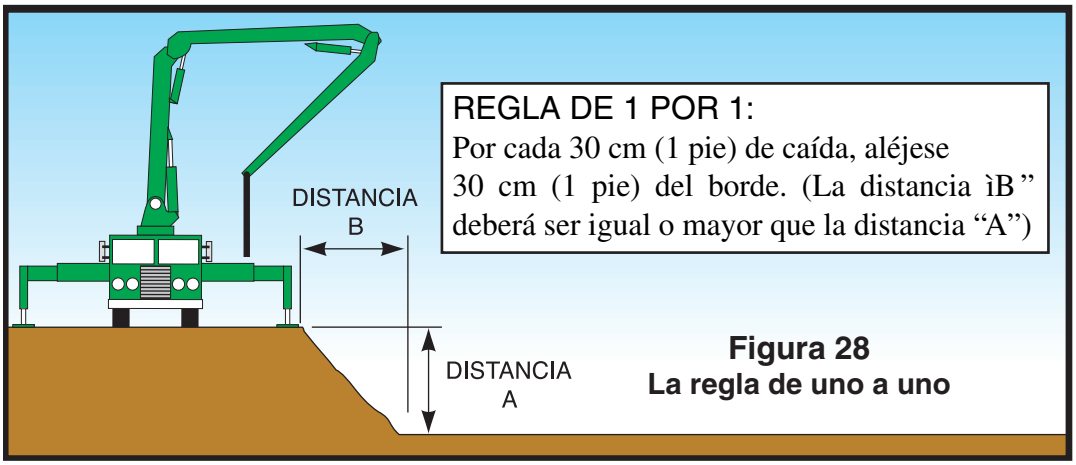


Figura 28
La regla de uno a uno

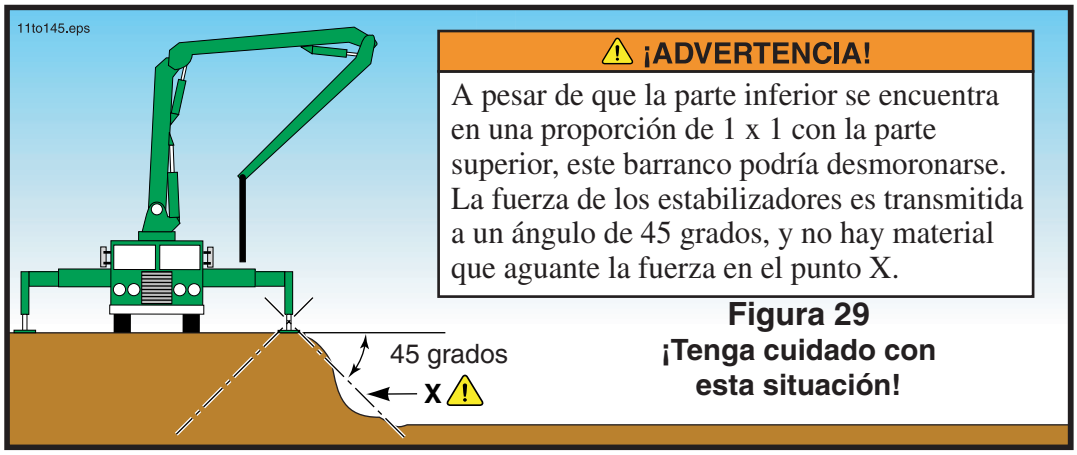


Figura 29
¡Tenga cuidado con esta situación!

⚠ADVERTENCIA ¡Peligro de vuelco! Tenga cuidado cuando coloque los estabilizadores (Figura 30). Nunca los coloque sobre suelo desnivelado u ondulado ni intente tapar un agujero con enrejado. En estos casos, Ud. podría excavar un lugar plano en el suelo (A, B y C). Asegúrese que la pata del estabilizador esté en contacto con todo el enrejado. Coloque el enrejado en la dirección opuesta, si fuera necesario (D).

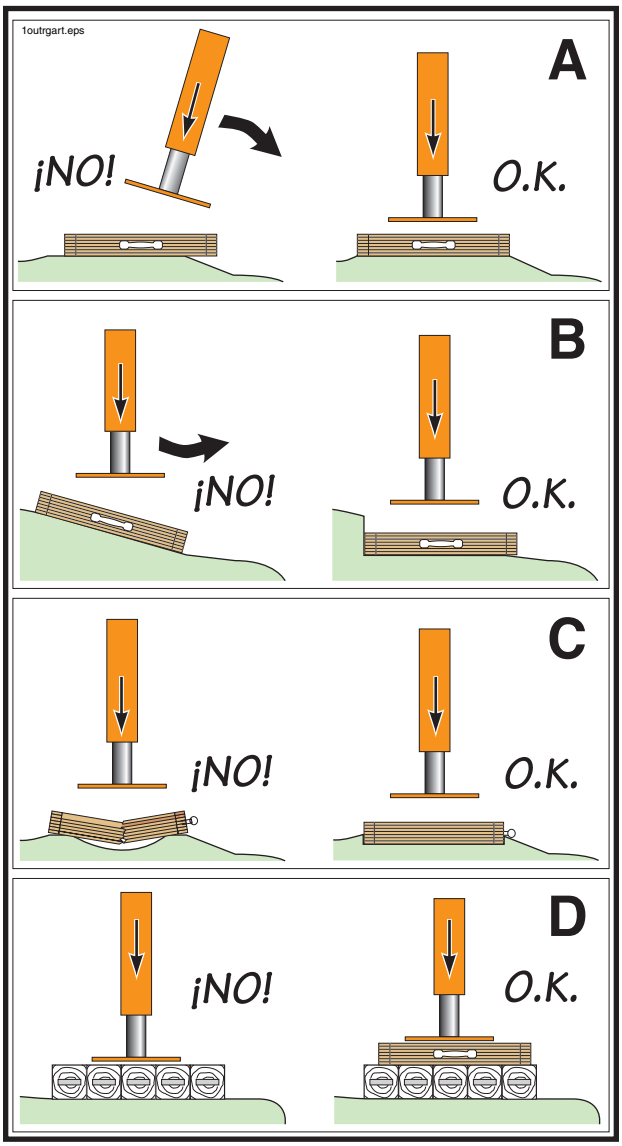


Figura 30
Tenga cuidado con estos peligros presentados por los estabilizadores

6.27 **⚠ADVERTENCIA** Una vez que haya colocado correctamente los estabilizadores, cierre todas las válvulas de cierre hidráulicas de los mismos (si su máquina tiene estas válvulas).

6.28 **⚠ADVERTENCIA** No despliegue ni haga funcionar la pluma de distribución cuando haya presentes relámpagos/rayos en el área inmediata. Si está trabajando y empieza a relampaguear/caer rayos en el área, ponga la bomba en la posición de transporte o en otra posición baja y busque refugio hasta que pasen.

6.29 **⚠ADVERTENCIA** ¡Peligro de vuelco! ¡No haga funcionar la pluma cuando la velocidad del viento exceda 77 kph (48 mph.)! Cuando la velocidad del viento exceda los 77 k.p.h. (48 m.p.h.), se podría volcar la máquina, y la pluma podría no ser capaz de girar contra el viento o de resistir girar con el viento.

6.30 **⚠ADVERTENCIA** Si no va a poder ver el lugar donde va a estar el final de la pluma, establezca un sistema de comunicación con los trabajadores que se encontrarán allí. Establezca comunicación por radio, mediante un sistema de señales visuales o auditivas (luces o campanas) o un observador. Si usa un observador, **¡pónganse de acuerdo de antemano sobre el significado de las señales antes de comenzar el vertido!** Si se va a mover mucho la pluma, sería preferible hacer que un trabajador se quede junto a la bomba y que usted se ponga en una posición donde pueda ver la punta de la pluma (Figura 31).

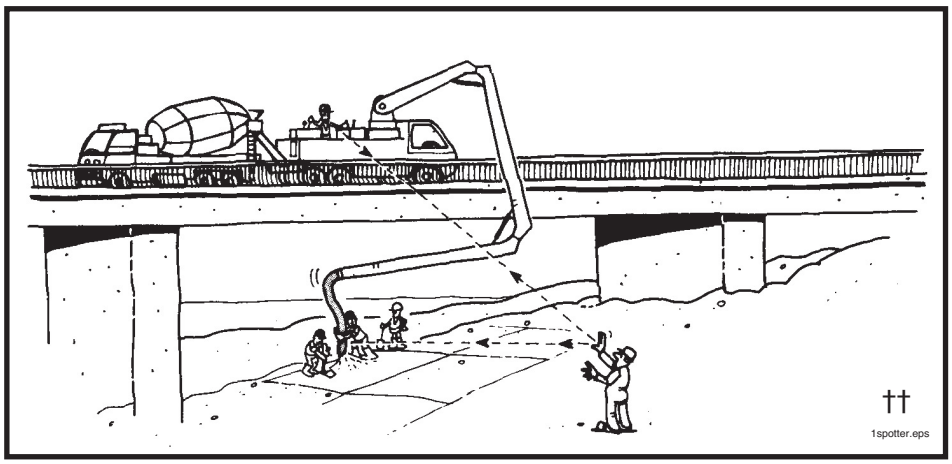


Figura 31
Pónganse de acuerdo sobre las señales antes de comenzar

6.31 **⚠ADVERTENCIA** **¡Posibilidad de ocasionar daños a la pluma!** Si va a bombear desde la pluma a una tubería separada, deberá usar una manguera flexible para conectarlas. No debe conectar directamente la tubería de acero a la pluma. **Asegúrese que la manguera sea capaz de soportar la máxima presión de concreto de la bomba.** No permita que la punta de la pluma quede sobre el suelo cuando esté conectada a una tubería separada.

6.32 **⚠ADVERTENCIA** **Es sumamente importante verificar que el sistema de descarga de concreto de la pluma sea capaz de aguantar la presión de la bomba de concreto.** En algunos casos, Ud. no va a poder utilizar la pluma si está bombeando del lado del pistón. Queda a criterio del dueño y del operador de la máquina determinar si la pluma puede ser usada cuando se esté bombeando del lado del pistón. Recuerde que la tubería se gasta con cada carrera de la bomba. Revise el espesor de la pared de la tubería y compárelo con la capacidad de aguante de presión de ese tipo de tubo. La tabla correspondiente para hacer esta comparación se encuentra en el Apéndice de este manual.

6.33 **ADVERTENCIA** **Solamente use componentes del sistema de descarga de concreto que se encuentren en buenas condiciones.** La vida útil de los componentes del sistema de descarga de concreto es afectada por la presión de bombeo, composición del concreto, material del que está hecha la tubería, velocidad a la que se mueve el concreto y otros factores. Se recomienda mucho el uso de equipo ultrasónico para determinar el grosor de la pared de la tubería (Figura 32). Lea y entienda el cuadro de espesores mínimos de las paredes de los tubos que se encuentra en el apéndice de este manual. Si Ud. no entiende esta tabla, comuníquese con el departamento de servicio del fabricante de su máquina, quienes le ayudarán.

††

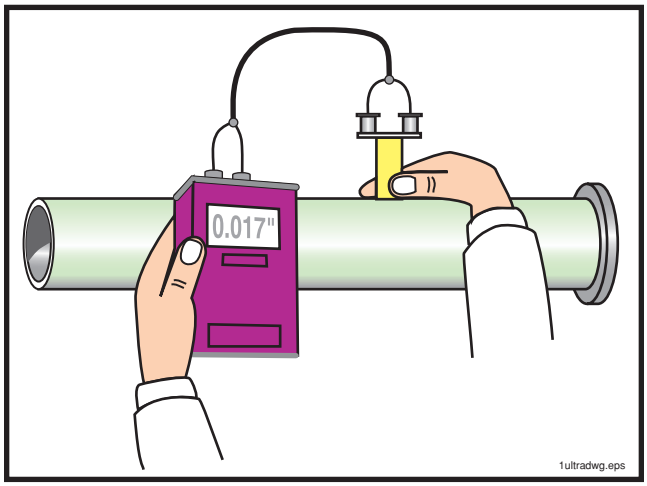


Figura 32
Revise los componentes del sistema de descarga de concreto para ver si tienen desgaste

6.34 **ADVERTENCIA** **Una vez que la máquina esté lista para trabajar, ¡asegúrese que nadie la use sin autorización!** Quédese cerca de la máquina o asegúrese que nadie la puede hacer arrancar sin su ayuda. Para ello Ud. puede, por ejemplo, activar el interruptor de parada de emergencia de la caja de control remoto (cable o radio, el que esté activo), cerrándolo con llave en la cabina del camión. Otra manera sería sacar la transmisión del cambio, cerrar la cabina del camión y llevarse con usted la llave.

6.35 **ADVERTENCIA** **¡Tenga cuidado con los niños!** Una vez que los estabilizadores de la máquina hayan sido levantados, es muy fácil para los niños poderse meter en el espacio que se crea debajo de la misma. El cardán en movimiento y los componentes calientes representan serios peligros para cualquier persona. No permita que nadie permanezca debajo de la máquina mientras esté en funcionamiento.

6.36 **ADVERTENCIA** Si van a haber espectadores cerca del área del vertido, cerque un área desde donde puedan mirar y donde no corran peligro. Nunca haga funcionar la máquina a menos que sea seguro hacerlo, aunque los espectadores simplemente quieran ver una determinada operación o función.

7. Preparación de una bomba montada sobre un remolque y/o de una tubería independiente

7.1 **La fase de preparación para el trabajo marca la tónica de la mayoría de los accidentes.** Dedicando unos minutos a la preparación correcta del trabajo mejorará sus probabilidades de tener un día sin peligro y sin problemas.

7.2 **El operador es responsable del funcionamiento seguro de la máquina**. Notifique a su empleador, superintendente del trabajo y/o a O.S.H.A. si a Ud. se le pide que prepare los equipos de una manera que presente peligros. **Nunca se le puede pedir que arriesgue la seguridad.** Usted es la **única** persona que puede determinar que las circunstancias del trabajo que están bajo su control no presentan riesgos.

7.3 ⚠ADVERTENCIA Las **conexiones eléctricas de las bombas de concreto eléctricas o de las plumas de distribución independientes deberán estar hechas solamente por un electricista autorizado.** La fuente de alimentación eléctrica y las correspondientes cajas de desconexión son la responsabilidad del contratista.

7.4 ⚠ADVERTENCIA **En la obra, la electricidad debe ser obtenida de una caja de desconexión con puesta a tierra y fusibles que tenga un interruptor de desconexión que permita bloquear su activación.** Si va a hacer reparaciones a la bomba de concreto o a una pluma de distribución independiente, primero corte la corriente en la caja de desconexión.

7.5 ⚠ADVERTENCIA En las unidades equipadas con motores eléctricos, **revise los cables todos los días.** Si están resquebrajados o tienen agujeros en el aislamiento, cámbielos. Si los conectores están gastados o flojos, haga que un electricista autorizado los repare.

7.6 ⚠ADVERTENCIA **Tenga en cuenta la entrada y salida sin peligros de los camiones que transportan la mezcla de cemento y ajuste sus preparativos como sea necesario.** El ajuste de su posición unos pocos grados hacia un lado o hacia el otro podría ser la diferencia entre una entrada segura y otra peligrosa. Algunos ejemplos de entradas peligrosas son: estar demasiado cerca de una excavación o sobresalir al tráfico.

7.7 ⚠ADVERTENCIA **¡Evite choques!** Proteja/cerque el área de alrededor de la máquina contra el tráfico público, siguiendo todas las reglamentaciones en vigencia (luces de aviso, conos de seguridad, barricadas con luces intermitentes, etc.)

7.8 ⚠ADVERTENCIA Las tuberías, mangueras finales, acoplamientos, y todos los demás **componentes del sistema de descarga de concreto deben ser capaces de aguantar la máxima presión de concreto de la bomba ¡Asegúrese** de que así sea! Lea y entienda la tabla de espesores mínimos de las paredes de los tubos que se encuentra en el apéndice de este manual.

7.9 ⚠ADVERTENCIA No use tubos, mangueras finales, acoplamientos, ni ningún otro componente del sistema de descarga del concreto que no se encuentren en buenas condiciones. **Reemplace, no repare, tubos y mangueras dañados.** El sistema de descarga del concreto está sujeto a desgaste y la rapidez del mismo está influenciada por la presión de bombeo, composición del concreto, material del que está hecha la tubería y

otros factores. Lea y entienda la tabla de espesores mínimos de las paredes de los tubos que se encuentra en el apéndice de este manual. **¡La rotura de los tubos y el concreto que se sale bajo presión es un peligro serio para la seguridad!** (Vea la Figura 33.)

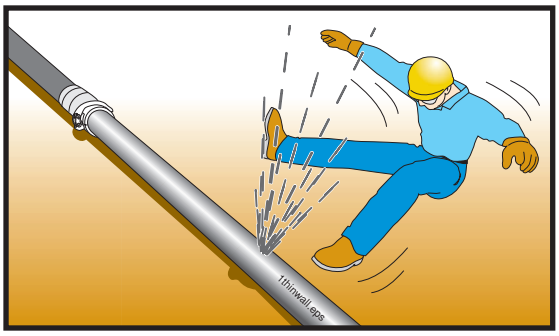


Figura 33
Los componentes del sistema de descarga de concreto deben ser capaces de aguantar la máxima presión de la bomba

7.10 Cuando tienda una tubería, para cambiar la dirección de la misma es preferible usar un codo en vez de la manguera. Los codos ofrecen menor resistencia al flujo que las mangueras y, por lo tanto, reducen la presión total requerida para empujar el concreto.

7.11 Use siempre una tubería del diámetro más grande que sea posible y use tubos de acero en vez de mangueras de caucho. Así se mantendrá al mínimo la presión que se necesita para empujar el concreto.

7.12 Soporte la tubería de descarga. Se deberá usar una tubería de transición en forma de "S" para bajar el tubo al nivel del suelo o de otra forma **cada** una de las secciones de la tubería deberá tener un soporte al nivel de la salida de la bomba.

7.13 **⚠ADVERTENCIA** Las secciones de tubo más cercanas a la bomba están sometidas a la mayor presión y el mayor desgaste. Debido a esta mayor presión cerca de la bomba, deberá instalar allí exclusivamente tubos de paredes gruesas en condiciones de “como nuevos”. Lea y entienda la tabla de espesores mínimos de las paredes de los tubos que se encuentra en el apéndice de este manual.

7.14 **⚠ADVERTENCIA** **La máxima presión del concreto de la bomba debe ser el único factor utilizado para determinar el espesor de los tubos y qué tipos de acoplamientos finales son necesarios.** En el caso de una obstrucción causada por una piedra o de cualquier otro tipo de obstrucción, **la bomba aplicará el máximo de presión.**

7.15 **No se recomiendan** los extremos estriados (Victaulic) para el bombeo de concreto. Consulte y entienda la comparación entre los extremos elevados de trabajo pesado, los extremos métricos y los extremos estriados que se encuentra en el apéndice de este manual.

7.16 **⚠ADVERTENCIA** Si la tubería debe permanecer en la obra (como sucede en el caso de la construcción de edificios altos), **el operador es responsable de verificar diariamente y antes de iniciar el vertido, que la tubería no tenga mellas, rajaduras, desgaste y que haya continuidad.**

7.17 ⚠ADVERTENCIA En los tramos verticales, el peso de las secciones verticales de tubería se deberá sostener con un bloque de empuje (llamado a menudo *hombre muerto,* Figura 34) o por medio de otro dispositivo para soportar carga. **Cada una de las secciones verticales de una tubería deberá estar asegurada para evitar movimientos laterales y horizontales.**

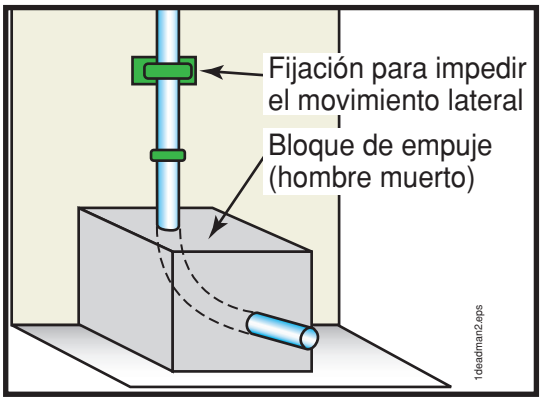


Figura 34
Bloque de empuje (hombre muerto)

7.18 ⚠ADVERTENCIA Si no va a poder ver el lugar donde va a estar el final de la pluma, establezca un sistema de comunicación con los trabajadores que se encontrarán allí. Establezca comunicación por radio, mediante un sistema de señales visuales o auditivas (luces o campanas) o un observador (Figura 35). Si usa un observador, **¡pónganse de acuerdo de antemano sobre el significado de las señales antes de comenzar el vertido!**

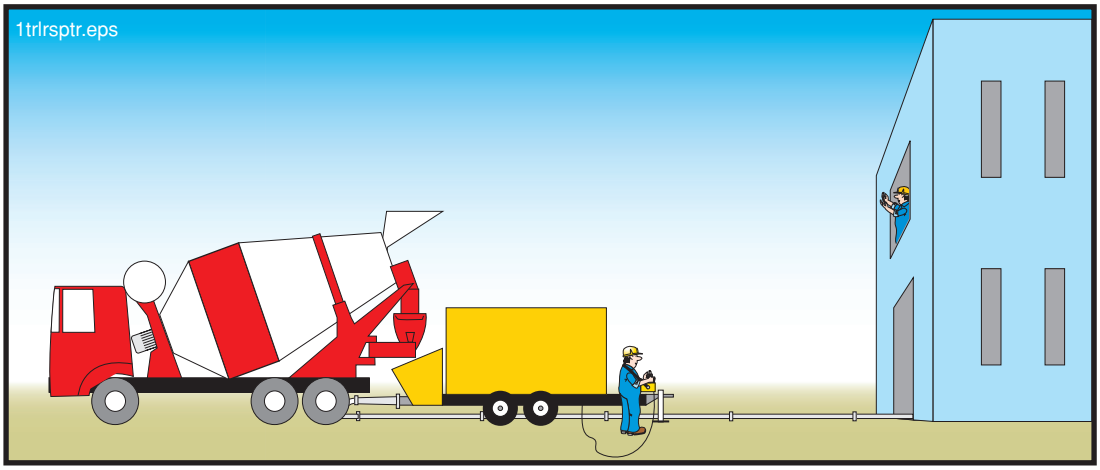


Figura 35
Pónganse de acuerdo sobre las señales antes de comenzar

7.19 ⚠ADVERTENCIA Nunca deje la máquina desatendida cuando ésta esté funcionando o esté lista para funcionar. Si Ud. debe abandonar el área, pare la máquina y saque la llave. Asegúrese que nadie pueda hacerla funcionar sin usted. Si no está seguro si el motor volverá a arrancar si lo apaga, debe hacer que alguien vigile la unidad mientras ésta está en funcionamiento. Esto es especialmente crítico si se encuentran presentes niños en las inmediaciones.

7.20 **⚠ADVERTENCIA** ¡Tenga cuidado con los niños! Es fácil para los niños meterse en el espacio que se crea debajo de la máquina, pero es peligroso si lo hacen.

7.21 **⚠ADVERTENCIA** Si van a haber espectadores cerca del área donde se descargará el concreto, cerque un área desde donde ellos puedan mirar y donde no corran peligro.

7.22 **⚠ADVERTENCIA** Si va a limpiar la tubería con aire comprimido al final del trabajo, **asegúrese de tener todos los accesorios necesarios para hacerlo sin peligro.** Si no tiene todos los accesorios que son necesarios, arregle para que se los consigan antes de empezar a bombear. **No improvise sobre esto. Asegúrese** de tener todas las piezas correctas. Los accesorios mínimos incluyen:

- Un cabezal de soplado con una válvula reguladora de aire del tamaño correspondiente y entradas de agua/aire separadas. Las dos aberturas deberán estar suficientemente separadas como para que una bola de soplado no pueda cubrir o tapar ambas aberturas al mismo tiempo.
- Un *"diablo de limpieza"* o una bola de esponja dura. Independientemente de cuál de los dos se emplee, **debe** caber bien ajustado dentro de la tubería para no permitir que se produzcan fugas de aire antes de ellos.
- Un captor de bola o "diablo de limpieza" que atrapará el diablo de limpieza, o algún otro método para controlar la descarga mientras se está purgando el material de la línea. Existen dos tipos de captores (vea el párrafo 7.23).
- Una manguera con una capacidad nominal apropiada para la presión del compresor de aire que vaya a usar y que se pueda conectar tanto al compresor como al cabezal de soplado. La manguera debe estar en buenas condiciones de uso y no debe tener roturas, grietas, cortes u otros tipos de daños.
- Si al finalizar el trabajo va a limpiar la tubería con aire comprimido, asegúrese de tener un compresor de aire adecuado disponible antes de iniciar el trabajo.
- Si al finalizar el trabajo va a limpiar con aire comprimido una tubería vertical, ¡debe **haber instalado en la parte inferior del tramo vertical una válvula de cierre o de conmutación!**

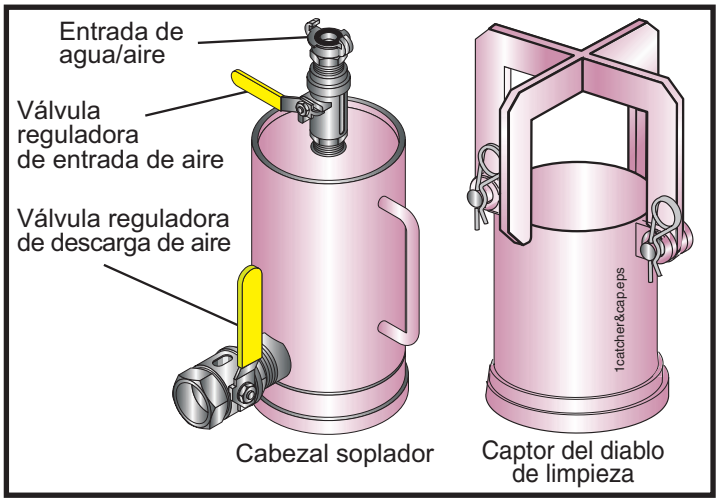


Figura 36
Captor de la bola y cabezal soplador

7.23

⚠ADVERTENCIA Hay dos tipos de captores de bola. Sepa cuál de los dos tipos usa. Usted podría tener que ajustar su procedimiento de limpieza según el tipo que tenga. Los dos tipos son los siguientes.

1. Captores que detienen la bola o el diablo de limpieza antes de que el aire pueda escapar, y
2. Captores que permiten la salida del aire de la tubería después que la bola o el diablo ha llegado a la punta.

Cada uno de estos tipos tiene sus ventajas y desventajas (Figura 37).

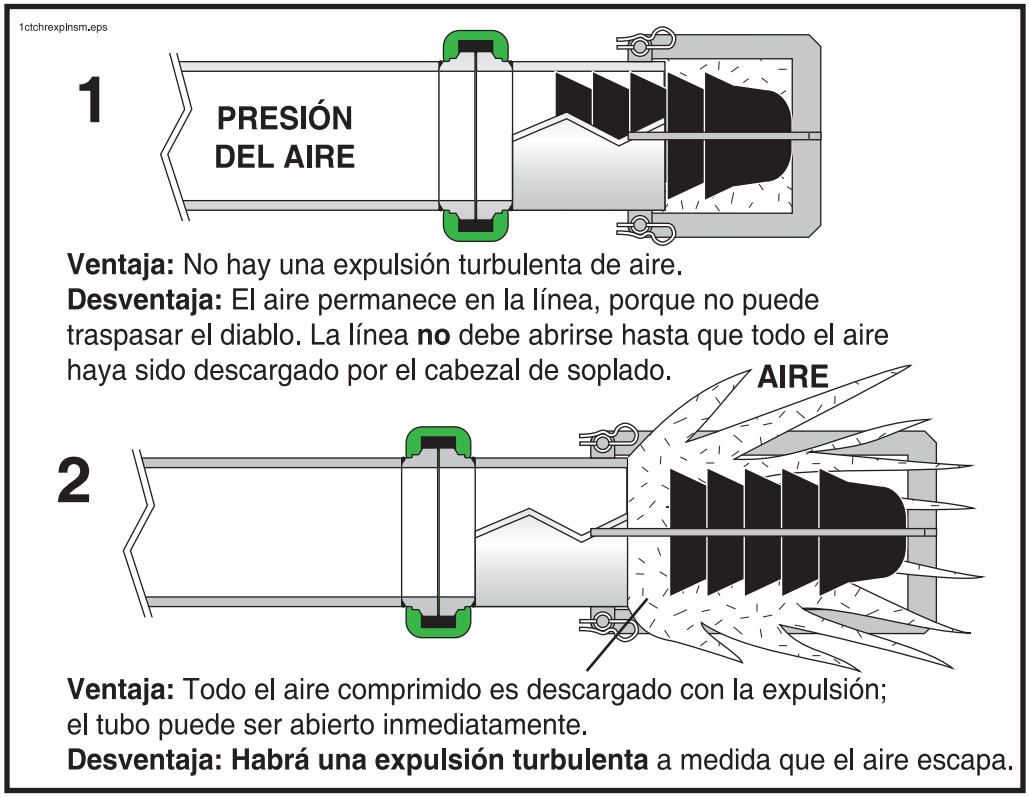


Figura 37
Tipos de captores

Con el captor del tipo 1, el diablo de limpieza se detiene pero el aire todavía sigue atrapado detrás de él. La ventaja es la prevención de la expulsión de aire que a veces es violenta al final del tubo. La desventaja es que el aire debe ser vaciado del cabezal de soplado antes de que la tubería sea segura para ser abierta. La tubería debe ser controlada continuamente; no permita que nadie la abra hasta que se haya vaciado todo el aire comprimido.

El captor tipo 2 es lo suficientemente largo como para que el aire comprimido escape detrás del diablo de limpieza. **¡Nota!** Esto sucedería con cualquiera de los dos captores cuando se lo utiliza con una bola en vez de un diablo de limpieza. La ventaja de esto es que, una vez que Ud. oiga la explosión turbulenta no queda más aire presurizado en la línea y ésta puede ser abierta inmediatamente. La desventaja es la expulsión en sí. En este caso, el final de la tubería debe ser controlado porque el concreto y el agregado que vuelan constituyen un peligro.

Ambos captores pueden ser empleados en forma segura si se presta atención a los peligros involucrados.

III. Funcionamiento de la bomba de concreto

8. Reglas de seguridad para los operadores de bombas

8.1 **⚠ADVERTENCIA** Solamente a los operadores calificados se les permite manejar la bomba. Se define como “operador calificado” a una persona que cumple con los siguientes requisitos:

- haber cumplido los 18 años (o 21 años para viajes interestatales),
- sea física y mentalmente capaz,
- haya sido capacitado en el funcionamiento y en el mantenimiento de la bomba y de la pluma de distribución (si corresponde),
- haya demostrado a su empleador su competencia en cuanto al uso y mantenimiento de la bomba y de la pluma de distribución, y
- puede esperarse que realice su trabajo, tal como le fue asignado, en forma confiable.

8.2 **⚠ADVERTENCIA** Debido a que el operador es responsable de operar la máquina con seguridad, es crucial que entienda la operación adecuada de la bomba y las reglas de seguridad que rigen el trabajo a realizar, para que las acciones que tome ante situaciones inesperadas sean seguras. Solamente la capacitación y la experiencia supervisada ganada en el trabajo pueden proporcionar esos conocimientos y pericia que son tan necesarios.

8.3 **⚠ADVERTENCIA** Cuando haga funcionar la máquina, **use equipo personal de protección.** (Vea la Figura 38.)

* Necesario cuando se verá expuesto a partículas de cemento en el aire (o a otro polvo tóxico).

Figura 38
Use Equipo Personal de Protección (P.P.E.)

8.4 **⚠ADVERTENCIA** Mientras la máquina esté en funcionamiento, todas las guardas, tapas y puertas de servicio deberán estar cerradas y trabadas.

8.5 **ADVERTENCIA** **¡Peligro de electrocución!** Si está trabajando y empieza a relampaguear/caer rayos en el área, ponga la bomba en la posición de transporte o en otra posición baja y busque refugio hasta que pasen.

8.6 **ADVERTENCIA** **¡Peligro de ser aplastado! ¡Nunca, pero absolutamente nunca,** se interponga entre el camión del concreto y la bomba! Apártese a un costado, para que el chofer del camión pueda tenerlo a su vista en todo momento (Figura 39).

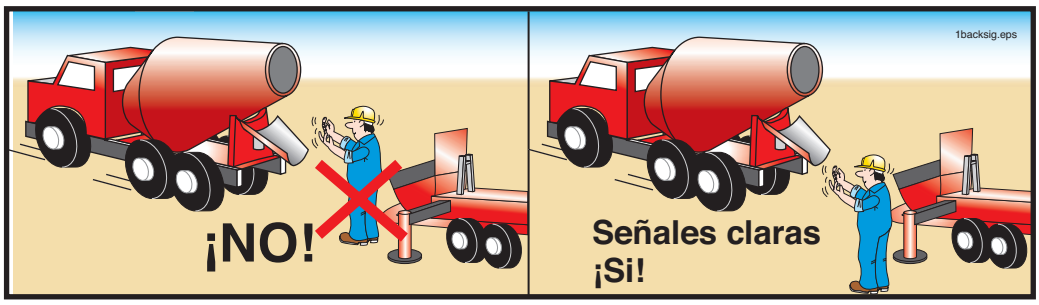


Figura 39
Nunca se interponga entre el camión del concreto y la bomba
Use señales de mano claras y concisas.

8.7 **ADVERTENCIA** Cuando esté retrocediendo camiones de concreto premezclado, use señales de mano claras y concisas (Figura 39).

8.8 **PELIGRO** Debe evitar por todos los medios la proximidad o el contacto peligroso con las líneas de energía eléctrica. **¡Asegúrese** que mantiene 5 metros (17 pies) de distancia! La distancia de 5 metros (17 pies) deja espacio para el movimiento de los cables y de la pluma causado por la fuerza del viento, arcos eléctricos y errores humanos (Figura 40). **No se arriesgue con el alto voltaje; ¡es la causa de muerte número uno de los operadores de bombas de concreto!**

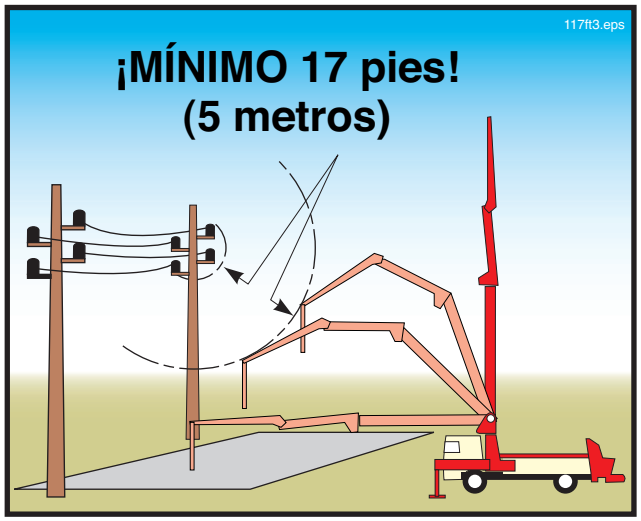


Figura 40
Mantenga una distancia de por lo menos 5 metros (17 pies) de los cables

8.9 **⚠ PELIGRO** **Cuando hay cables aéreos en el área en el que se moverá la pluma para completar el vertido, se debe emplear un observador cuyo trabajo es el de advertir al operador si la pluma se acerca a menos de 17 pies de los cables.** El observador debe entender las responsabilidades asignadas y debe ser capaz de juzgar una distancia de 17 pies.

8.10 **⚠ PELIGRO** El contacto directo con una línea eléctrica siempre es peligroso para todos, y especialmente para cualquiera que esté conectado eléctricamente a la máquina (Figura 41). **Proceda con mucho cuidado** cuando esté cerca de líneas de alto voltaje.

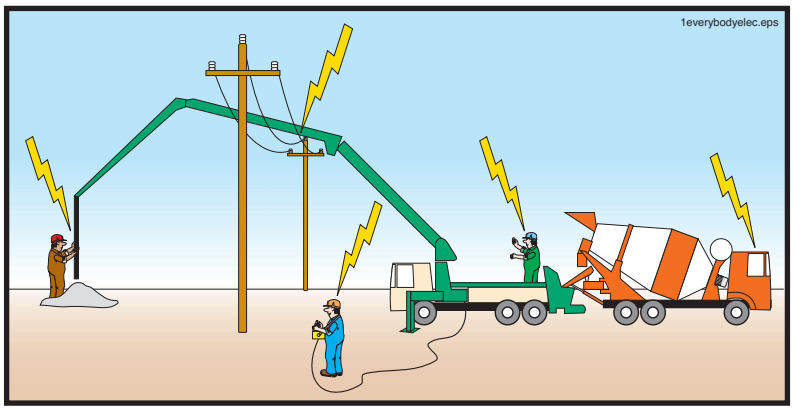


Figura 41
Si se energiza la bomba, también se energizará cualquier cosa que ésta toque

8.11 **⚠ PELIGRO** No confíe en su percepción de profundidad cuando trabaje cerca de líneas de alto voltaje. Colóquese en la mejor posición de observación posible para poder determinar la distancia que existe entre la pluma y los cables. Si esto no es posible, **¡Ud. deberá emplear un observador!** (Vea la Figura 42.) Consulte el glosario, en el apéndice de este manual, para obtener la definición de "observador".

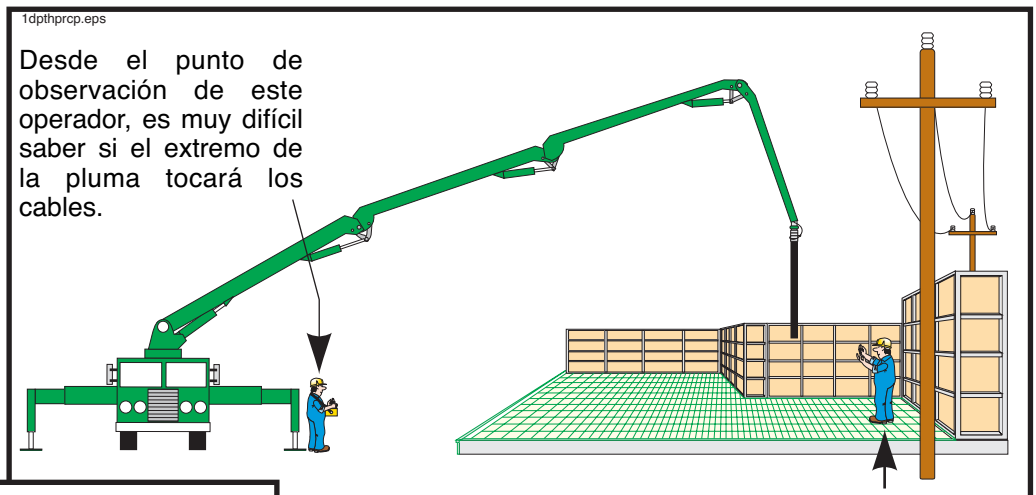
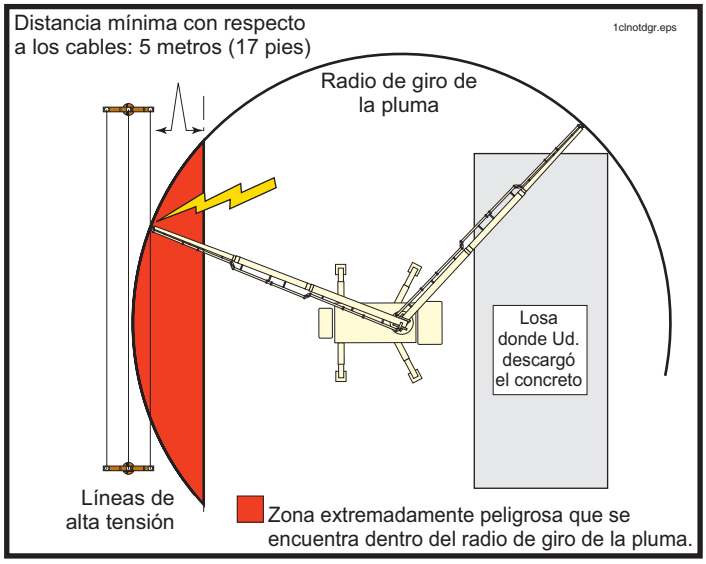


Figura 42
Nunca confíe en su percepción de profundidad cuando se trata de líneas de alto voltaje

8.12 **⚠ PELIGRO** Tenga cuidado con los cables que no se encuentren directamente en el área del vertido. Los accidentes pueden suceder aún cuando Ud. se esté desplazando entre puntos de distribución o cuando esté girando la pluma después de completar el vertido (Figura 43). **¡Nunca baje la guardia cuando la pluma esté en el aire!**



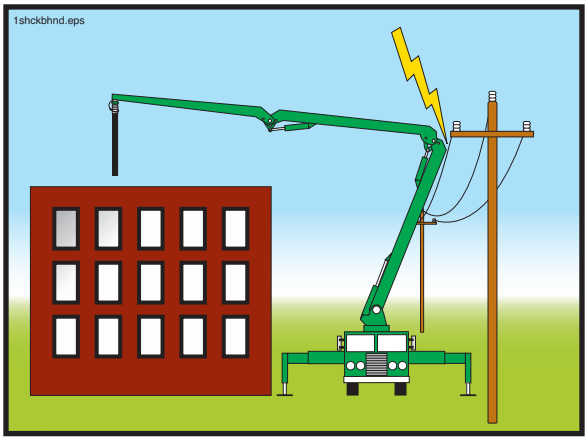


Figura 43
Nunca baje la guardia cuando esté moviendo la pluma

8.13 **⚠ PELIGRO** **¡El alto voltaje convierte en conductores a materiales que normalmente no conducirían electricidad!** Muchos materiales que no conducen electricidad conducirán suficiente corriente como para matarlo si Ud. entra en contacto con los 8000 voltios a tierra que normalmente se encuentra en los cables de alimentación de electricidad de los Estados Unidos (Figura 44). El voltaje existente en los cables puede ser mayor de 8000, especialmente en áreas industriales.

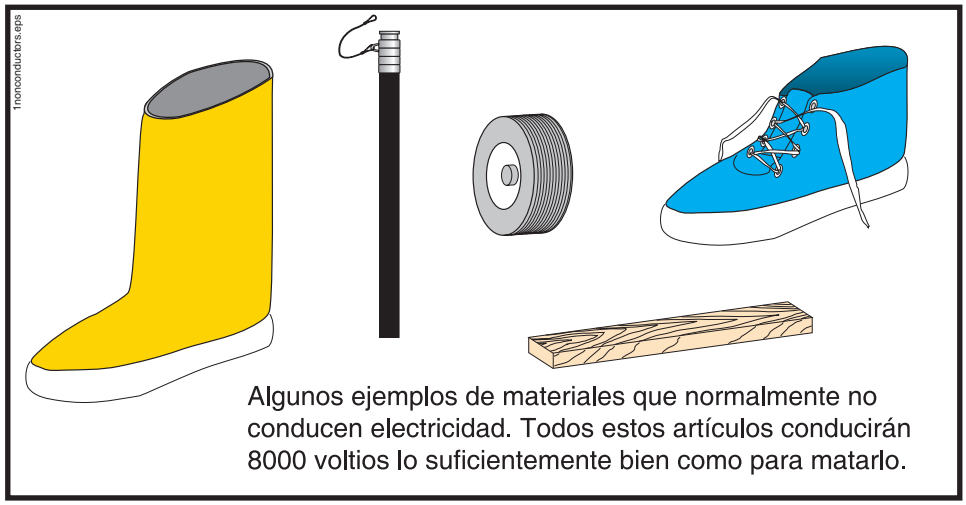


Figura 44
Incluso los malos conductores conducen altos voltajes

8.14 ⚠PRECAUCIÓN **¡Peligro de pérdida de la audición!** Al estar cerca de una bomba de concreto en funcionamiento, los niveles de presión del ruido pueden exceder las normas de la O.S.H.A. sobre exposición constante al ruido (Figura 45).

NIVELES PERMISIBLES DE EXPOSICIÓN AL RUIDO*
*Según la sección 1910.95, "Exposición a ruidos en el lugar de trabajo" (Depto. de Trabajo) del Código de Reglamentos Federales, Capítulo XVII, Título 29 (Regla Federal 39, 7006).

DURACIÓN por DÍA en HORAS	Nivel de sonido en dB (A) Respuesta lenta
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
1/2	110
1/4 ó MENOS	115

††

¡USE PROTECCIÓN ADECUADA PARA SUS OÍDOS!

Figura 45
Límites de niveles de ruido y de tiempos de exposición

8.15 ⚠ADVERTENCIA No permita que personas no autorizadas se acerquen al área de funcionamiento de la bomba y de la pluma. Pídales que se alejen del lugar e interrumpa su trabajo si no le hacen caso.

8.16 ⚠ADVERTENCIA No use la pluma como si fuera un montacargas o una grúa! (Figura 46.)

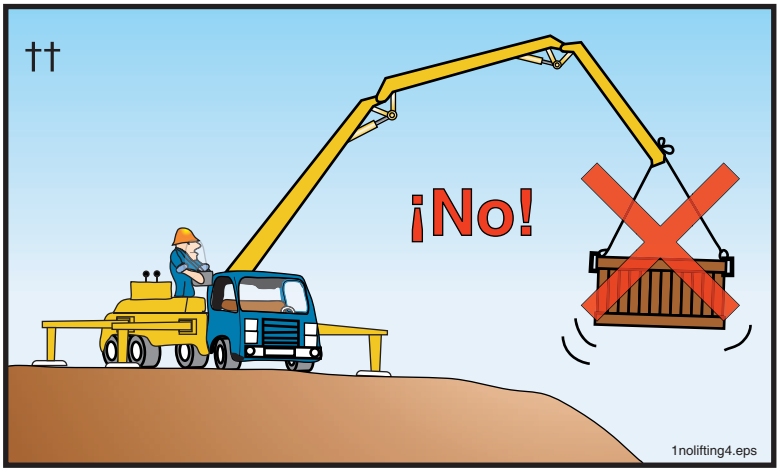


Figura 46
No levante cosas con la pluma

8.17 ⚠ADVERTENCIA **¡Peligro de explosión!** Nunca saque la tapa del combustible ni cargue combustible cerca de superficies calientes, chispas o llamas abiertas. Nunca fume mientras carga combustible.

8.18 **⚠ADVERTENCIA** **¡No deje bajar demasiado el nivel de concreto que hay en la tolva!** Si aire es absorbido en los cilindros del material, la bomba comprimirá el aire. El aire comprimido siempre representa un peligro cuando es expulsado a través de la tolva o de la tubería (Figura 47). Si entra aire en los cilindros de material, siga los pasos siguientes para eliminarlo:

1. Pare inmediatamente la bomba. Oprima el botón de parada de emergencia si ésta es la manera más rápida de parar la bomba. Habrá una expulsión de aire comprimido la próxima vez que la válvula del concreto cambie, que puede ser absorbido sin peligro llenando la tolva con concreto.
2. Bombee lentamente en marcha atrás un par de carreras. Esto no elimina todo el aire pero debiera minimizar la cantidad del mismo que queda en la tubería.
3. Las personas que se encuentren en el extremo de descarga o cerca de la línea de distribución deberán ser advertidos que se alejen hasta tanto todo el aire haya sido purgado. El personal se debe mover a una distancia prudente y razonable mas allá del área de movimiento de la manguera o del punto de descarga, y se debe usar el equipo de protección personal (PPE) (Figura 47).
4. Cuando se haga arrancar de nuevo la bomba, se debe utilizar a la menor velocidad posible hasta que se haya eliminado **todo** el aire de la tubería. No suponga que las primeras burbujas de aire que salen es el final del aire comprimido.
5. No permita que nadie esté cerca del lugar de descarga hasta que el concreto fluya en forma constante por el final de la manguera y que no haya movimiento del sistema de descarga.

Si los trabajadores están ubicados en lugares altos o de equilibrio precario, adviértales que va a haber un estruendo cuando el aire salga de la tubería. (Adviértales aunque ellos se encuentren bien lejos del punto de descarga). De esta manera, se evita que los trabajadores se caigan como consecuencia de haber sido sobresaltados por el ruido.

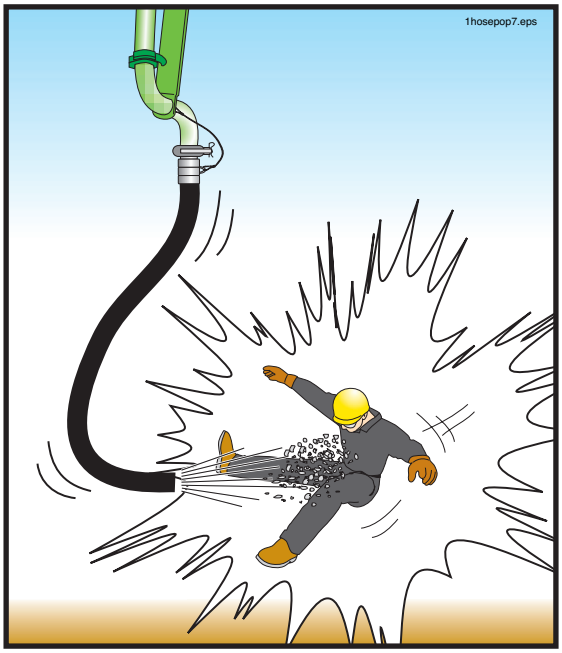


Figura 47
Haga que todo el personal se aleje del área de descarga cuando hay aire en la línea

8.19 **⚠ADVERTENCIA** Cuando esté cebando inicialmente el sistema de descarga, cuando vaya a rearrancar después de mover la máquina o después de agregar o quitar mangueras, cuando se intenta eliminar una obstrucción haciendo “oscilar” el concreto, o si ha entrado aire en la línea, advierta a todos que se mantengan alejados del extremo de descarga hasta tanto el concreto esté fluyendo constantemente y no haya

movimiento del sistema de descarga. El personal se debe mover a una distancia prudente y razonable mas allá del área de movimiento de la manguera de extremo o del punto de descarga, y se debe usar el equipo de protección personal (PPE) (Figura 47).

8.20

⚠ADVERTENCIA Se supone que la densidad volumétrica del material a bombear con una pluma de distribución es de aproximadamente 150 libras por pie cúbico (concreto normal). Si va a bombear material con una densidad volumétrica mayor (por ejemplo, concreto con fibra de acero), debe consultar al fabricante. De lo contrario, se podría dañar la pluma y/o ciertas posiciones de funcionamiento podrían resultar inestables.

8.21

⚠ADVERTENCIA **Las obstrucciones en la bomba o en la tubería de descarga pueden crear condiciones peligrosas.** Las obstrucciones son causados por factores distintos como se indica abajo:

CAUSAS DE LAS OBSTRUCCIONES

- **Mezcla de concreto de mal diseño.** El concreto provisto puede no ser apto para el bombeo: por ejemplo, puede tener demasiada arena o poco cemento. Puede haber pérdidas o segregación. Algunas mezclas afectan adversamente la capacidad de bombeo (por ejemplo, demasiado aire atrapado en el concreto). Si la mezcla no es apta para el bombeo, no hay operador, por más experto que sea, que la pueda bombear.
- **Es posible que el tamaño de la tubería no sea adecuado.** El tamaño de la tubería siempre debe ser por lo menos 4 veces mayor que el agregado más grande que se está bombeando, o se pueden producir obstrucciones.
- **Piezas de la válvula de concreto gastadas.** Las piezas gastadas permiten el escape de los materiales más finos y del agua nuevamente adentro de la tolva cuando se aplica presión.
- **Defectos en la tubería o en las uniones.** Esto incluye tuberías sucias (tuberías que no se limpiaron bien), uniones gastadas o con pérdidas que permiten la salida de cemento fino y de agua, tuberías mal cebadas antes de comenzar el bombeo, y demasiadas secciones de mangueras de caucho, que aumenta la fricción. Todas éstas son causas de obstrucciones que pueden ser controladas por el operador.
- **Tipo de bomba no adecuado para la aplicación.** Puede ser que la bomba escogida para el trabajo no tenga suficiente presión o potencia para las necesidades de la obra.
- **Concreto fraguándose en la tubería.** Esto puede ser causado por demoras en la obra (por ejemplo, reparación de un encofrado roto), o al intentar bombear concreto "viejo" (preparado muchas horas antes de ser bombeado y que se ha sido mantenido "vivo" agregándole agua y agitándolo constantemente). Las condiciones climáticas también pueden afectar el tiempo de fraguado del concreto. Las empresas deberán establecer los procedimientos que se deberán seguir en estas situaciones. Una regla práctica que da buenos resultados es: **En caso de dudas... deshágase del concreto.**
- **Materiales extraños en el concreto.** Pedazos de concreto seco que se desprenden de las aspas de la mezcladora, grumos de cemento no disueltos, aspas de mezcladoras, martillos y ciertos animales peludos son ejemplos de materiales extraños que han causado obstrucciones en el pasado.
- **Un operador inexperto puede causar obstrucciones al preparar mal el trabajo.** Por ejemplo, si la cuadrilla que coloca la pluma de distribución debe agregar mangueras o tubos para llegar a un lugar alejado después de haber iniciado el vertido, es posible que se produzcan obstrucciones debido a la sequedad del interior de las mangueras o tubos agregados. Debido a esto se recomienda que se organice el trabajo de tal manera que sólo haya que sacar (y no agregar) mangueras o tubos a medida que pasa el día y el trabajo avanza. Si hace falta agregar tubos o mangueras secos, éstos deberán ser lubricados de la misma manera que se lubricó el resto de la tubería al comenzar.

- **Una cuadrilla inexperta que coloca la pluma de distribución puede causar obstrucciones al doblar la manguera final.** Este tipo de obstrucción puede resultar en accidentes serios, ya que la manguera puede enderezarse en forma violenta debido a la fuerza de la bomba.
- **Los componentes del concreto se separan en la tolva.** Cuando llueve fuerte, el cemento y los materiales finos son lavados y separados de las piedras y arena gruesa. Esta mezcla no se puede bombear. **Tape la tolva** para protegerla de la lluvia. ¡Es también debido a esta razón que Ud. **nunca debe permitir que un camión mezclador sea lavado en su tolva!**

8.22 **⚠ADVERTENCIA** Nunca trate de eliminar una obstrucción de una tubería aplicándole alta presión, ya que ello hará que la obstrucción se convierta en taponamiento. Si existe una obstrucción, pare inmediatamente la bomba. Haga funcionar la bomba hacia atrás unas dos carreras. Haga mover la bomba lentamente hacia adelante y trate de hacer aflojar la obstrucción. Si hace desplazar la obstrucción, continúe haciéndolo lenta y suavemente. Mientras intenta eliminar la obstrucción haga salir a todo el personal del área de descarga, ya que podría haber entrado aire dentro de la tubería de distribución durante este proceso.

8.23 **⚠ADVERTENCIA** Si la bomba o equipos conexos desarrollan un problema que crea una condición insegura, ¡Ud. debe dejar de bombear inmediatamente! No vuelva a arrancarla hasta que la condición insegura haya sido solucionada.

8.24 **⚠ADVERTENCIA** Se deben seguir los siguientes pasos para localizar una obstrucción.

- Bombee **para atrás** por **lo menos dos vueltas** y, a continuación, pare la bomba. **No permita que nadie abra la tubería** hasta que haya hecho esto (Figura 48).
- Use equipo personal de protección cuando vaya a abrir una tubería con una obstrucción.
- Haga retirar personal no esencial antes de abrir la tubería.
- Los taponamientos se encontrarán (en orden de probabilidad) en los reductores, las mangueras, los codos y los tubos.
- Si Ud. golpea el tubo para encontrar el taponamiento, el sonido será un ruido sordo (tic-tic) en vez de un sonido resonante/estruendoso (tong-tong) en el lugar del taponamiento, debido a que el material atascado no permitirá que la tubería vibre. (Este método no encontrará un taponamiento en una manguera).

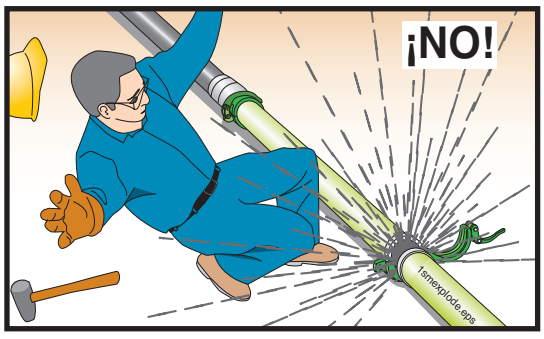


Figura 48
Nunca abra una tubería presurizada

8.25 **⚠ADVERTENCIA** Es posible que algo de presión permanezca en la tubería después de hacer mover hacia atrás la bomba. Use una pala o barra de apalancar para abrir las abrazaderas en una tubería con una obstrucción. Use protección facial y mire en dirección opuesta a la tubería cuando abra la abrazadera.

8.26 **⚠ADVERTENCIA** Sería mejor dejar que el tubo sea arruinado por el concreto que se está fraguando que arriesgar causar daños ignorando procedimientos seguros. Use siempre prácticas seguras al limpiar tuberías. Recuerde, la tubería es reemplazable, usted no.

8.27 **⚠ADVERTENCIA** **No doble las mangueras**. Doblarlas hará que la bomba cree la máxima presión en el concreto. **¡La bomba puede hacer enderezar la manguera con fuerza!** (Vea la Figura 49.)

Figura 49
Doblar la manguera crea un peligro

8.28 **⚠ADVERTENCIA** ¡Nunca use aire comprimido para eliminar una obstrucción! Es peligroso e innecesario. La bomba puede desarrollar mucha más presión que un compresor de aire. Si la presión de la bomba no la puede mover, el aire comprimido tampoco la podrá mover.

8.29 **⚠ADVERTENCIA** Nunca se pare, se siente o se monte a horcajadas sobre una tubería que está en uso o cuando está bajo presión. La tubería se desgasta con cada carrera de la bomba. Si la bomba revienta, Ud. querrá estar al costado de ella y no sobre ella (Figura 50).

Figura 50
Nunca se ponga a horcajadas o se siente sobre una tubería presurizada

8.30 **⚠ADVERTENCIA** Peligro de aplastamiento/amputación. No quite las tapas de la caja de agua o las rejillas cuando la máquina esté en funcionamiento (Figura 51). Si debe quitar la tapa de la caja de agua (para agregar agua, por ejemplo) y no hay una rejilla

atornillada sobre la caja de agua, detenga la bomba, saque la transmisión del cambio y bloquee la cabina de manera que no se puede poner el marcha la bomba hasta que usted haya terminado y las tapas estén de nuevo en su lugar. Si hay instalada una rejilla atornillada, Ud. simplemente puede parar la bomba para que deje de bombear antes de sacar las tapas de la caja de agua. Vuelva a instalar las tapas antes de volver a arrancar la bomba.

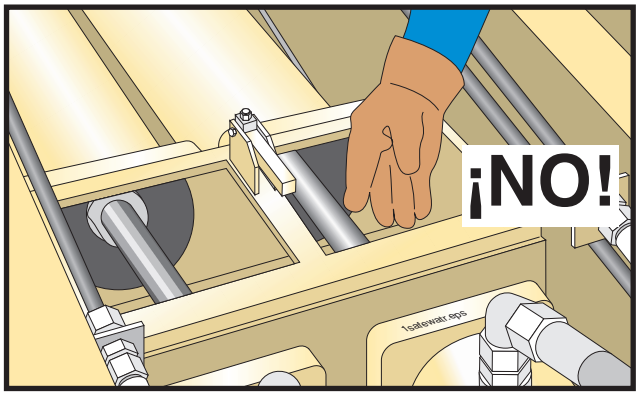


Figura 51
Mantenga su cuerpo alejado de la caja de agua

8.31 ⚠ADVERTENCIA **¡Nunca deje desatendida la máquina!** Antes de dejar sola la máquina con un obrero, chofer del camión de concreto premezclado o cualquier otro trabajador por cualquier motivo, asegúrese que esta persona conoce:

- las reglas de seguridad aplicables a una persona estacionada en la bomba (las reglas están enumeradas en este Manual de Seguridad, comenzando en la página 57)
- cómo parar la bomba
- la ubicación de los interruptores de parada de emergencia
- cómo hacerle señas a Ud.

8.32 ⚠ADVERTENCIA Para evitar movimientos accidentales o no intencionales de la máquina, **todos** los dispositivos de control del panel del operador y de la caja de control remoto deberán ser desactivados antes de cambiar de control remoto a control local o viceversa. Toda vez que conecte o desconecte el cable del control remoto, oprima el botón de parada de emergencia.

8.33 ⚠ADVERTENCIA Peligro de aplastamiento/amputación. ¡Nunca ponga las manos, pies u otra parte del cuerpo en la caja del agua, válvula de concreto o tolva si el sistema hidráulico está en marcha o listo para funcionar! (Vea la Figura 52.)

8.34 ⚠ADVERTENCIA ¡No trabaje en la tolva, caja del agua, válvula de concreto o sistema hidráulico a menos que el motor impulsor haya sido detenido y se haya descargado la presión del acumulador (si tiene uno)! En unidades con motores de combustión interna, se debe sacar la llave. Si existe más de una llave se debe poner un cartel en la ignición. En unidades accionadas por motores eléctricos, se deberá desconectar y trabar el interruptor principal siguiendo las instrucciones de las normas correspondientes.

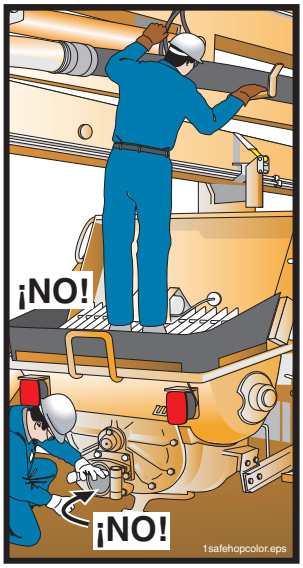


Figura 52
No coloque el cuerpo en la máquina

8.35 **⚠ADVERTENCIA** Nunca haga funcionar la pluma "a ciegas". Si no puede ver el punto de colocación, establezca un sistema de comunicación con los trabajadores que puedan verlo. Establezca comunicación por radio, mediante un sistema de señales visuales o auditivas (luces o campanas) o un observador. Si usa un observador, **¡pónganse de acuerdo de antemano sobre el significado de las señales antes de comenzar el vertido!** (Se recomienda mucho utilizar las señales de mano estandarizadas de la ACPA). Si se va a mover mucho la pluma, sería preferible hacer que un trabajador se quede junto a la bomba y que usted se ponga en una posición donde pueda ver la punta de la pluma (Figura 53).

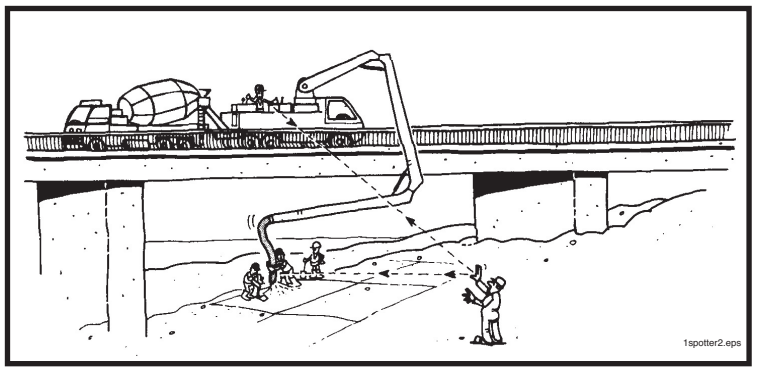


Figura 53
Nunca bombee a ciegas

8.36

⚠ADVERTENCIA Bloquee siempre el extremo de descarga cuando deba hacer girar la pluma cargada sobre trabajadores o propiedad. Debe impedir que el concreto se caiga de la pluma. Esto se puede lograr mediante una válvula de cierre de la manguera o quitando la manguera e instalando un tapón de cierre en el último codo (Figura 54) o doblando la manguera final y asegurándola en la posición doblada. Sírvase tomar nota — las mangueras que pueden ser dobladas fácilmente podrían no ser lo suficientemente fuertes como para soportar la presión de la bomba. Compare la presión de trabajo de la manguera con la máxima presión de la bomba antes de utilizar este tipo de manguera.

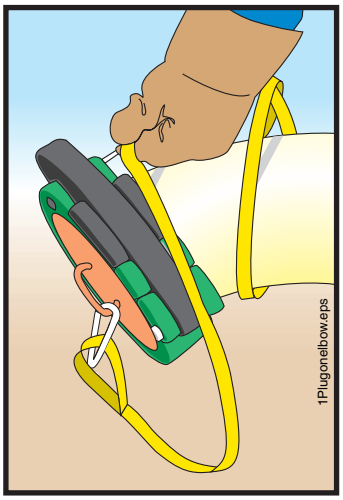


Figura 54
Un tapón de extinción (blanking plug) instalado en un codo de punta con una eslinga de seguridad

IV. Limpieza de la bomba y del sistema

9. Reglas de seguridad para la limpieza de la pluma

9.1 ⚠ADVERTENCIA No se descuide después de haber terminado el vertido. Los accidentes también suceden durante la limpieza y el trayecto de regreso al patio. Es importante no relajar la seguridad en el trabajo hasta que ya no esté ya en él.

9.2 ⚠ADVERTENCIA ¡Tenga cuidado con los cables eléctricos cuando esté moviendo la pluma para limpiarla o la esté plegando para transportarla!

9.3 ⚠ADVERTENCIA Se deberá usar aire comprimido para limpiar el sistema de distribución de concreto de la pluma solamente cuando no haya otro método que sea práctico o recomendado por el fabricante.

9.4 ⚠ADVERTENCIA Si tiene que usar aire comprimido para limpiar la pluma, **deberá** contar con todos los accesorios necesarios. Lea y entienda las reglas completas de seguridad relacionadas con los procedimientos de limpieza utilizando aire comprimido (punto 12.4 en la página 47 de este Manual de Seguridad). La limpieza con aire comprimido deberá ser realizada solamente por una persona calificada.

9.5 ⚠ADVERTENCIA **¡Nunca** use aire comprimido para limpiar el interior de mangueras de caucho o de secciones cortas de tubos. En el caso de las mangueras de caucho, su flexibilidad hará que "den latigazos" violentos con la fuerza del aire y del concreto en movimiento. Las secciones cortas de tubos no tienen suficiente masa como para permitir que el concreto pase lentamente, lo que hará que el material sea expulsado rápidamente.

9.6 ⚠ADVERTENCIA Si la bola o el diablo de limpieza no salen del sistema de descarga después de aplicar el aire comprimido, usted deberá **eliminar la presión del aire antes de abrir la tubería.** Si la válvula de purga se tapa cuando saca el aire, la única manera segura de proceder es haciendo agujeros pequeños en la tubería que permitirán que el aire escape. Póngase una máscara de cara completa cuando perfore los agujeros. Los tubos a los que les han hecho agujeros están arruinados y deben ser reemplazados. Perfore los agujeros para aliviar la presión del aire aun cuando el concreto haya comenzado a fraguarse en el tubo. El tubo es peligroso hasta tanto la presión haya sido reducida.

9.7 ⚠ADVERTENCIA Tenga cuidado cuando "da golpecitos" en la tubería para localizar la ubicación de la bola de limpieza. Si aplica demasiada fuerza puede abollar una tubería regular (dejándola débil e inservible) y en el caso de las tuberías reforzadas de doble pared podría romper el inserto de carburo de la tubería de dos paredes.

9.8 ⚠ADVERTENCIA Es preferible dejar que el tubo sea arruinado por el concreto fraguado que arriesgar lastimarse ignorando procedimientos seguros. Recuerde, la tubería es reemplazable, usted no.

10. Reglas de seguridad para la limpieza de la válvula de concreto y de la tolva

10.1 ⚠ADVERTENCIA ¡Peligro de vuelco! Antes de mover la unidad para limpiarla, **pliegue la pluma y fije los estabilizadores en la posición de transporte.**

10.2 ⚠ADVERTENCIA Póngase ropa y equipo de protección personal cuando vaya a limpiar la bomba de concreto. Protéjase contra quemaduras y envenenamiento producidos por el concreto, poniéndose botas y guantes de goma durante la limpieza o en cualquier otro momento en que vaya a estar **en** contacto con el concreto.

10.3 **⚠ADVERTENCIA** ¡Peligro de aplastamiento y de amputación! **¡Nunca ponga las manos ni ninguna otra parte del cuerpo dentro de la válvula de concreto!** En vez, utilice chorros de agua y el rastrillo provisto (Figura 55).

10.4 **⚠ADVERTENCIA** **Nunca ponga las manos ni cualquier otra parte del cuerpo dentro de la máquina cuando el sistema hidráulico esté en funcionamiento.** Si debe quitar la rejilla para romper el concreto seco, primero deberá desactivar el sistema sacando de la marcha la transmisión y bloqueando la puerta de la cabina, o deteniendo el motor, aliviando la presión del circuito del acumulador (si tiene uno) y trabando los controles contra el funcionamiento involuntario. Instale nuevamente la rejilla antes de volver a poner en funcionamiento el motor (Figura 55).

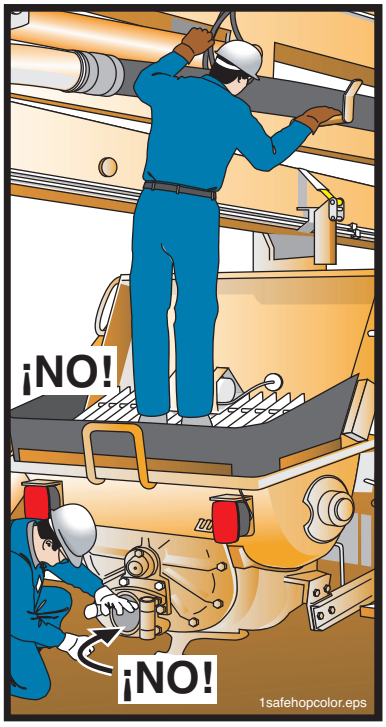


Figura 55
Mantenga las partes de su cuerpo fuera de la máquina

11. Reglas de seguridad para la limpieza de la caja de agua

11.1 **⚠ADVERTENCIA** ¡Peligro de aplastamiento y de amputación! Pare la bomba de concreto antes de sacar las tapas de la caja de agua. Si su unidad tiene guardas atornilladas no las saque para hacer la limpieza. Si no hay una rejilla atornillada sobre la caja de agua, entonces pare la bomba, saque de la marcha la transmisión, y cierre con llave la cabina de manera que no se pueda volver a arrancar la bomba hasta que haya terminado de limpiarla y las tapas estén de nuevo en su sitio. Si hay instalada una rejilla atornillada, simplemente puede parar la bomba para que deje de bombear antes de sacar las tapas de la caja de agua. Vuelva a instalar las tapas antes de volver a arrancar la bomba.

11.2 **⚠ADVERTENCIA** Si es posible, ubique la pluma plegada en una posición ligeramente levantada cuando esté limpiando la caja de agua (tenga cuidado con los cables cuando esté levantando la pluma). Los estabilizadores deben estar extendidos y elevados. Si la pluma está levantada no es necesario inclinarse sobre la caja de agua para limpiar.

11.3 **⚠ADVERTENCIA** ¡Peligro de caerse! Asegúrese que está bien parado cuando limpia la caja de agua.

11.4 **⚠ADVERTENCIA** ¡Peligro de aplastamiento y de amputación! No saque las guardas de la caja de agua para limpiar. Limpie la caja de agua con chorros de agua únicamente. **No ponga ni las manos ni ninguna otra parte del cuerpo dentro de la caja de agua para limpiar, ni en cualquier otro momento en la máquina esté funcionando o esté lista para arrancar.**

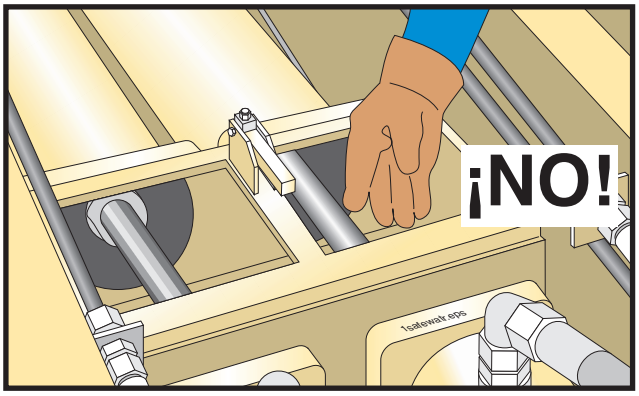


Figura 56
Mantenga las manos fuera de la caja de agua

12. Reglas de seguridad para la limpieza de una tubería independiente

12.1 **⚠ADVERTENCIA** ¡Peligro de partículas voladoras! Mantenga alejados del área de descarga al personal y al equipo antes de forzar una bola o un diablo de limpieza a través de la tubería, incluso cuando utiliza agua para limpiar. Algo de aire quedará atrapado en la tubería y se comprimirá antes de ser expulsado.

12.2 **⚠ADVERTENCIA** Las tuberías cortas y las secciones de tubo individuales deberán ser limpiadas quitando las abrazaderas y vaciando las secciones de tubos. Recuerde levantar haciendo fuerza sobre sus piernas y no con su espalda.

12.3 **⚠ADVERTENCIA** El punto de descarga debe ser controlado. Use un captor de la bola o algún otro dispositivo de contención en el punto de descarga, aún cuando esté limpiando con agua.

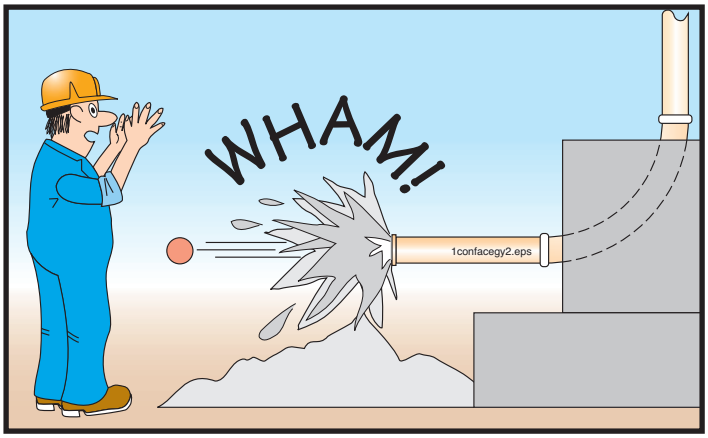


Figura 57
Limpiar con aire comprimido puede ser sumamente peligroso si no se siguen las reglas de seguridad

12.4

⚠ADVERTENCIA **¡Limpiar con aire comprimido crea peligros potenciales! Puede ocasionar heridas graves o la muerte** si no se respetan las reglas de seguridad indicadas a continuación:

- **La limpieza por soplado deberá realizarse bajo la supervisión de una persona calificada.** (Vea el glosario para obtener la definición de *persona calificada*).
- **¡La limpieza por soplado requiere dos personas!** Una persona con capacitación se situará en el extremo de la entrada de la tubería para hacer la inserción de aire, y la otra persona entrenada deberá estar cerca (pero alejada a una distancia segura) del punto de descarga, para controlar la descarga y asegurarse que nadie entre en la zona de peligro.
- **Durante el proceso de soplado no se podrán conectar ni codos ni mangueras de descarga flexibles al extremo de la tubería** a menos que se haya preparado una estación de limpieza planificada para encaminar la descarga dentro del camión de concreto premezclado.
- **El punto de descarga debe ser controlado. Despeje el área de descarga de personas y equipo** antes de iniciar el proceso de limpieza por soplado. No permita que nadie entre al área durante el proceso de limpieza por soplado. Si se utiliza un captor de bola, sepa qué tipo está usando y ajuste su procedimiento como corresponda. Los tipos de captores de bola están descritos en el párrafo 7.23 en la página 31.
- **La salida de concreto deberá estar a una altura lo suficientemente alta como para permitir la fácil descarga del material.**
- Si se va a descargar en un sistema de tubería de descarga, **se debe lubricar la tubería de descarga con lechada de cemento o podría producirse un taponamiento.**
- **El cabezal de soplado para la limpieza de los tubos debe estar equipado con una válvula reguladora de aire de tamaño adecuado y una entrada separada para el agua y el aire.** Las dos aberturas deberán estar separadas lo suficientemente como para que una bola de soplado no pueda cubrir o tapar ambas aberturas al mismo tiempo (Figura 58).

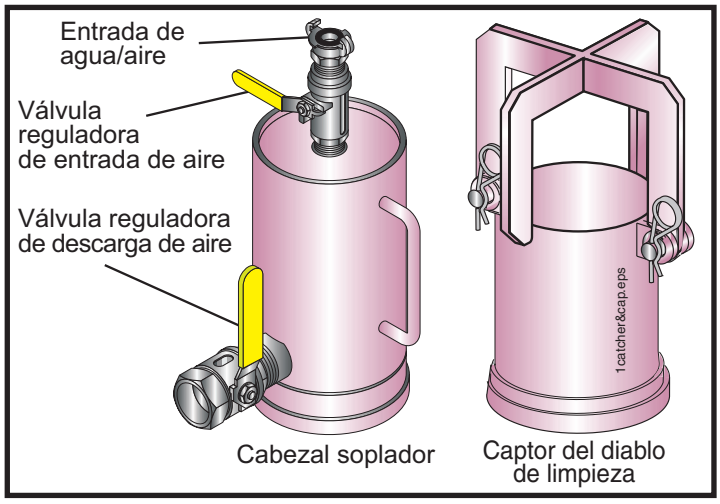


Figura 58
Captor de la bola y cabezal soplador

- El tapón o diablo de limpieza debe ser lo suficientemente grueso como para prevenir que aire comprimido circule alrededor del tapón en el concreto.
- **No se deberá desarmar la tubería hasta que no se haya sacado el aire por completo.** ¡Asegúrese de que así sea! (Vea la Figura 59.)

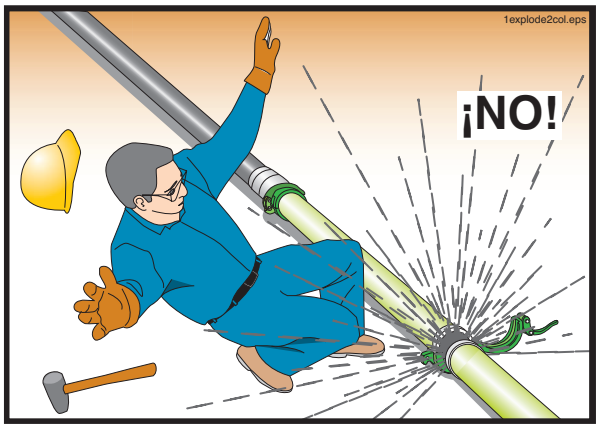


Figura 59
Nunca abra una tubería presurizada

- **No use aire comprimido para limpiar por soplado mangueras de descarga de concreto, secciones de un solo tubo, y tuberías cortas de una longitud de hasta 13 metros (40 pies).** Las mangueras saltarán y se moverán impredeciblemente; las tuberías cortas no tienen suficiente concreto como para resistir la fuerza del aire, ocasionando que lo descargue demasiado rápido, como cuando se dispara la bala de un cañón (Figura 60).

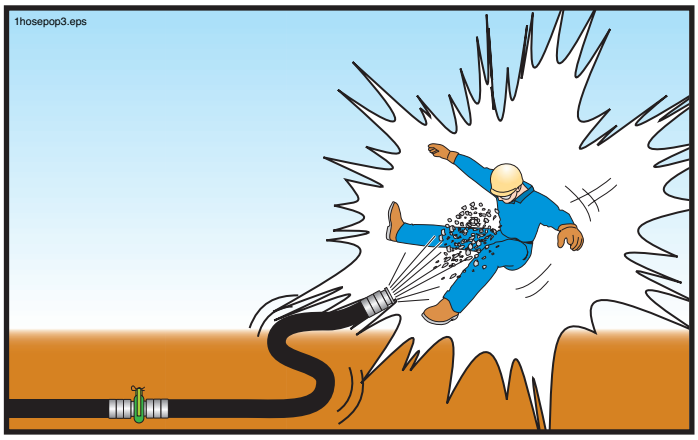


Figura 60
Nunca utilice aire comprimido para limpiar por soplado mangueras o tuberías cortas

- **Cuando la presión del aire comience a bajar rápidamente, cierre el suministro de aire que viene desde el compresor y comience inmediatamente purgar/sacar aire de la tubería.** (La baja en la presión significa que la tubería está casi vacía de concreto.)

12.5

⚠ADVERTENCIA Cuando vaya a limpiar por soplado una línea vertical se requiere contar con una válvula de cierre para evitar que suceda lo siguiente.

1. (Vea el diagrama A en la Figura 61.) Si no se instala una válvula de cierre se debe desconectar la tubería de la bomba. Inmediatamente, el concreto drena de las secciones verticales de tubo dejando concreto en ambas secciones horizontales y aire atrapado en el medio.
2. (Vea el diagrama B en la Figura 61.) Se introduce la bola y se la empuja con aire comprimido. Esto también hace que se comprima el aire que se encuentra atrapado en las secciones verticales del tubo. Se despedirá violentamente el

aire atrapado cuando llegue al final del tubo pero éste, sin embargo, todavía no estará vacío.

Una válvula de cierre instalada en la parte inferior del tramo vertical evitará esta situación peligrosa. La válvula de cierre debe ser capaz de aguantar la máxima presión del concreto de la bomba y, por supuesto, debe instalarse antes de comenzar el vertido. Se encuentran disponibles varios estilos distintos que van desde una compuerta plana que se acciona manualmente y que se instala con un martillo a tipos totalmente hidráulicos que también desvian el concreto a una tubería diferente. Teniendo instalada una válvula de cierre, Ud. puede proceder como se indica abajo.

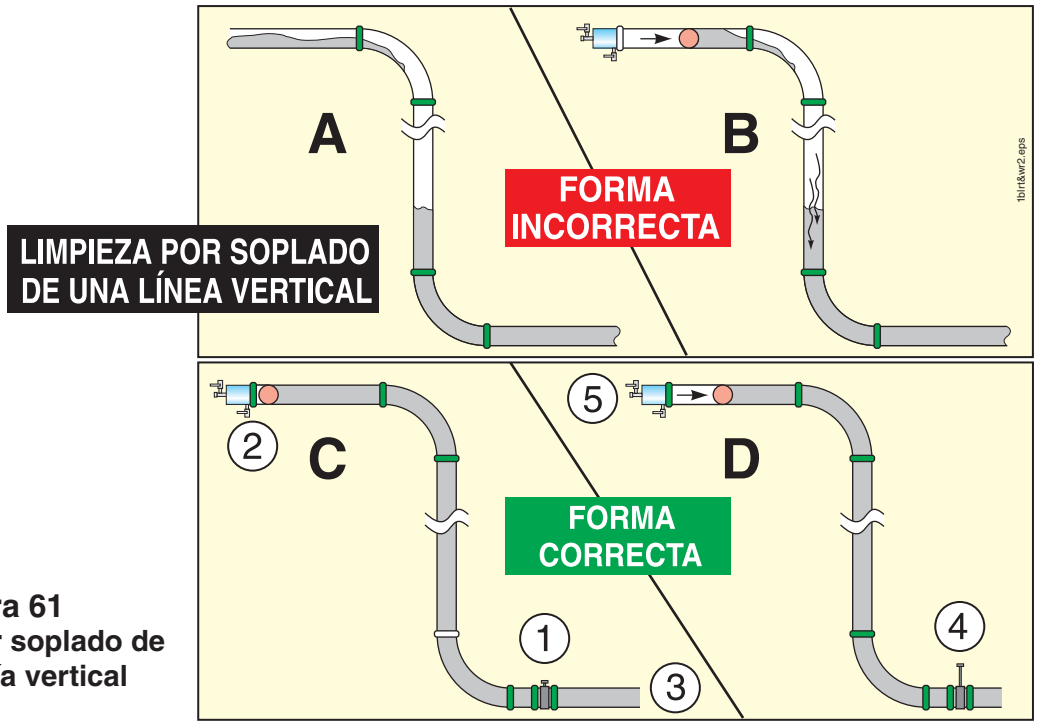


Figura 61
Limpieza por soplado de una tubería vertical

12.6

⚠ADVERTENCIA **La limpieza por soplado de secciones verticales de tubería** (por ejemplo en un edificio de muchos pisos) **requiere que se tomen precauciones de seguridad adicionales.**

1. **Sepa de antemano donde va a estar el área de descarga de la limpieza por soplado antes de comenzar a verter.** Prepare el área y los accesorios antes de comenzar el vertido de manera que no tenga que perder tiempo después que se haya terminado de bombear.
2. **La limpieza por soplado utilizando aire comprimido requiere la participación de dos personas calificadas.**
3. **Las personas a ambos extremos de la tubería deben ser capaces de poderse comunicar sin demoras,** lo que significa que Ud. debe establecer el medio de comunicación (por ejemplo, mediante una radio).
4. **Cuando se haya terminado de bombear, cierre la válvula de cierre antes de desconectar la tubería de la bomba** (artículo 1, Figura 61). Si no se hace esto, el concreto se caerá de las secciones verticales de los tubos, dejando concreto en las secciones horizontales de tubo y un bolsillo de aire en las

secciones verticales. Esto no se aplica si Ud. usa una válvula de tres vías (de desviación).

5. Instale la o las bolas en la tubería, asegure el cabezal de soplado y conecte el compresor de aire. **¡No aplique el aire todavía!** (Artículo 2, Figura 61.)
6. Si Ud. va a desviar la descarga a un área de limpieza, lubrique la línea de descarga con lechada o podría producirse un taponamiento.
7. **Haga que el camión de concreto premezclado se ubique donde está el final del tubo de limpieza** o instale el captor de la bola u otro dispositivo de contención al final de la tubería de descarga. (Artículo 3, Figura 61.)
8. **Despeje de personal el área de descarga.** Ud. no debe permitir que nadie entre en el área de descarga hasta tanto la tubería ya no esté presurizada.
9. **Desvíe la línea vertical de tubos al área de limpieza, o abra la o abra ahora la válvula de cierre en la tubería de descarga.** Permita que la gravedad haga que el concreto comience a moverse a través de la tubería de descarga. A medida que el concreto cae de las secciones verticales se llevará la bola consigo haciendo imposible que se atrape aire en la tubería. (Artículo 4, Figura 61.)
10. **Aplique el aire comprimido a la tubería.** En este momento se deben mantener comunicación estrecha. Agregue solamente suficiente aire como para mantener el concreto en movimiento. No permita que el movimiento del concreto se acelere. (Artículo 5, Figura 61.)
11. **Cuando el movimiento del concreto comience a acelerar, cierre el suministro de aire que viene desde el compresor y abra el regulador de aire para purgar aire de la tubería.** El movimiento del concreto que se acelera rápidamente indica que la tubería está casi vacía. Después que la bola haya sido expulsada de la tubería, deje abierto el regulador de aire para asegurarse que se haya sacado todo el aire del sistema.
12. Todas las reglas sobre soplado que se encuentran en el punto 12.4 en la página 47 se aplican también para el soplado de tuberías verticales. Estas reglas son suplementarias a las reglas generales sobre “limpieza de una tubería con aire comprimido”.

12.7 **⚠ADVERTENCIA** **¡Nunca use aire comprimido para intentar eliminar una obstrucción!** Es peligroso e innecesario. Si la presión de la bomba no puede moverla, el aire comprimido tampoco podrá.

V. Mantenimiento de la maquinaria

13. Reglas de seguridad para la inspección

13.1 ⚠ADVERTENCIA Es imprescindible que un inspector de plumas certificado inspeccione periódicamente la pluma, los estabilizadores y otras partes estructurales. Los resultados deberán ser bien documentados y registrados. Consulte las recomendaciones del fabricante del equipo para averiguar los intervalos de las inspecciones de su máquina.

13.2 ⚠ADVERTENCIA Inspeccione visualmente su unidad todos los días antes de ponerla en funcionamiento. Si encuentra algún problema que pudiera afectar el funcionamiento seguro de la bomba, ¡no la use hasta que haya sido reparada!

13.3 ⚠ADVERTENCIA Cualquier problema estructural que se encuentre en la pluma de distribución, los estabilizadores, o la sección de la torre de la unidad deberá ser informado al fabricante para que se puedan diseñar e implementar los procedimientos de reparación que sean necesarios. No es necesario informar nuevamente un problema estructural que haya sido informado previamente y para el cual un procedimiento de reparación haya sido diseñado e implementado.

13.4 ⚠ADVERTENCIA Si alguna calcomanía de seguridad está borrosa, dañada o de otra manera ilegible, o si falta, deberá ser reemplazada lo antes posible. Comuníquese con el fabricante de su unidad para obtener las calcomanías de reemplazo.

13.5 ⚠ADVERTENCIA Si cuando se está haciendo una inspección se desmontan los dispositivos o las guardas de seguridad, estos deberán ser instalados nuevamente antes de que alguien vuelva a usar la máquina.

13.6 ⚠ADVERTENCIA Manténgase actualizado con respecto al *Manual de Funcionamiento* y a los boletines de servicio del fabricante relacionados con los procedimientos de mantenimiento e intervalos de las inspecciones.

13.7 ⚠ADVERTENCIA Si una inspección revela algo que luce mal o sospechoso, notifique al fabricante para que lo tome en cuenta. No suponga simplemente que todo está bien.

13.8 ⚠ADVERTENCIA Inspeccione regularmente el cable de seguridad de la punta de la manguera y los herrajes de montaje Reemplácelos si están viejos, gastados u oxidados.

13.9 ⚠ADVERTENCIA Inspeccione regularmente los conjuntos de amarre de la pluma y del soporte de descanso de la pluma (si la pluma está equipada con ellos). No se debe permitir que la pluma se balancee durante su transporte.

13.10 ⚠ADVERTENCIA La inspección visual de los circuitos y dispositivos de seguridad de la bomba de concreto debe hacerse diariamente. La inspección más detallada y la documentación de dichos resultados se llevarán a cabo una vez por semana o por lo menos cuando se realice el mantenimiento preventivo.

13.11 **⚠ADVERTENCIA** No deje de inspeccionar también la tubería de descarga, las abrazaderas y las mangueras. Revíselas a menudo para ver que no estén gastadas, abolladas o agrietadas. Nunca envíe a una obra una unidad que tenga el sistema de descarga gastado o dañado. Los probadores ultrasónicos de espesor son más precisos que el método de golpear la tubería.

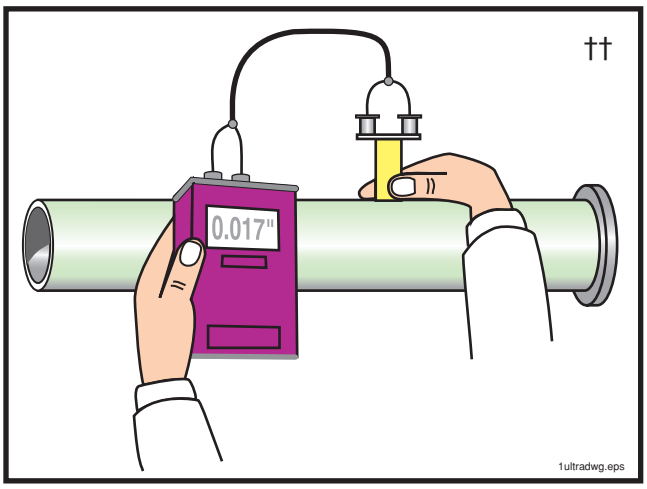


Figura 62
Mida el espesor de las paredes de las tuberías con un probador ultrasónico de espesor

14. Reglas de seguridad relacionadas con los calendarios de mantenimiento

14.1 **⚠ADVERTENCIA** El mantenimiento adecuado y oportuno es importante para el funcionamiento seguro de la bomba de concreto y de la pluma de distribución. Los procedimientos apropiados se describen en el manual de funcionamiento proporcionado junto con la bomba. No los posponga. Tómelo en serio. No “altere” los resultados. Las vidas del operador, lubricadores y trabajadores en la obra dependen del buen mantenimiento.

14.2 **⚠ADVERTENCIA** ¡Mantenga limpia la máquina! Los derrames de aceite o grasa, las herramientas sueltas y los accesorios fuera de lugar pueden causar accidentes.

14.3 **⚠ADVERTENCIA** Se deberán utilizar pasadores en todas las abrazaderas del sistema de descarga. Las abrazaderas que cuelgan sobre trabajadores y las utilizadas en el sistema que sean arrastradas deben tener pasadores (Figura 63).

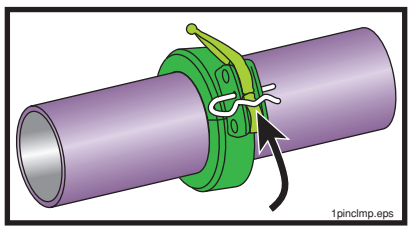


Figura 63
Póngale pasador a todas las abrazaderas

14.4 ⚠ADVERTENCIA Asegúrese de usar la abrazadera correcta para cada tipo de extremo de tubo utilizado. Nunca trate de aparear extremos de tubo distintos a menos que utilice una abrazadera específicamente hecha para este propósito. Consulte la comparación de extremos soldados que se encuentra en la página 72 en el *apéndice* de este manual.

14.5 ⚠ADVERTENCIA Cuando instale en la máquina un tubo y/o manguera nuevos, asegúrese de que sean capaces de soportar la máxima presión de concreto de la bomba.

14.6 ⚠ADVERTENCIA Recuerde que los tubos de la pluma no pueden pesar más de 10,14 libras por pie, vacíos. Ciertos modelos y marcas podrán tener distintos requisitos. Consulte el manual de funcionamiento correspondiente a su máquina.

14.7 ⚠ADVERTENCIA En caso de haber sacado los dispositivos o guardas de seguridad para el mantenimiento, ellos deberán ser instalados nuevamente antes de poner en servicio la máquina de nuevo.

14.8 ⚠ADVERTENCIA No cambie la graduación máxima de la válvula de alivio de ningún circuito hidráulico sin antes obtener el permiso del fabricante. **Nunca** cambie la graduación de presión del circuito del acumulador sin antes recibir instrucciones especificas del fabricante.

14.9 ⚠ADVERTENCIA Nunca haga modificaciones no autorizadas a los miembros estructurales o circuitos de presión.

14.10 ⚠ADVERTENCIA Ud. debe **reemplazar y no reparar** las mangueras y tubos de concreto o hidráulicos dañados.

14.11 ⚠ADVERTENCIA Nunca trate de reparar una máquina utilizando para hacer la reparación componentes gastados, dañados o defectuosos.

14.12 ⚠ADVERTENCIA Las soldaduras realizadas en la pluma, estabilizadores, torre o en cualquier otro componente estructural **solamente** podrán ser hechas por un soldador certificado según las normas A.W.S. D1.1 (American Welders Society) (Secciones 3, 5, y párrafo 9.25 de la Sección 9). Todas las soldaduras estructurales deben ser hechas conforme a las especificaciones del fabricante.

14.13 PRECAUCIÓN **Nunca permita que la corriente de la soldadura sea transmitida a través de los cojinetes o de los cilindros hidráulicos.** Mantenga la toma a tierra en el componente que va a soldar.

14.14 PRECAUCIÓN **Los componentes electrónicos pueden ser destruidos por la corriente de la soldadura.** Antes de hacer soldaduras en la unidad, es necesario desconectar los cables de la batería y desenchufar los cables de alimentación del control remoto por radio. Si Ud. tiene un sistema de pluma proporcional, se deberán sacar los amplificadores proporcionales del tablero madre (mother board) antes de comenzar a soldar. En caso de duda, póngase en contacto con el centro de servicio del fabricante para obtener más instrucciones **antes** de seguir adelante.

15. Reglas de seguridad cuando se presta servicio a la maquinaria

15.1 ⚠ADVERTENCIA **Las reparaciones deberán ser realizadas únicamente por personal calificado del taller** (Vea la definición de *personal calificado* en el glosario).

15.2 ⚠ADVERTENCIA **Lea y entienda los procedimientos de mantenimiento contenidos en el *Manual de Funcionamiento* de la máquina antes de intentar hacer reparaciones.** En caso de duda, llame al fabricante. Las reparaciones mal hechas afectan el funcionamiento seguro de la máquina.

15.3 ⚠ADVERTENCIA ¡Peligro de quemarse! **Nunca trabaje en un sistema hidráulico caliente.**

15.4 ⚠ADVERTENCIA **Si es necesario desplegar la pluma de distribución para realizar tareas de mantenimiento, los estabilizadores deberán estar desplegados y levantados como si la máquina estuviera en la obra.** Si Ud. no es un operador haga que el operador prepare la máquina. La necesidad de reparar la máquina no lo capacita a Ud. para manejarla.

15.5 ⚠ADVERTENCIA ¡Peligro de electrocución! **Si es necesario desplegar la pluma de distribución para realizar tareas de mantenimiento, Ud. debe prestar atención a la proximidad de cables de electricidad.** Ud. debe mantener un mínimo de 5 metros de distancia (17 pies) entre los cables y cualquier parte de la unidad.

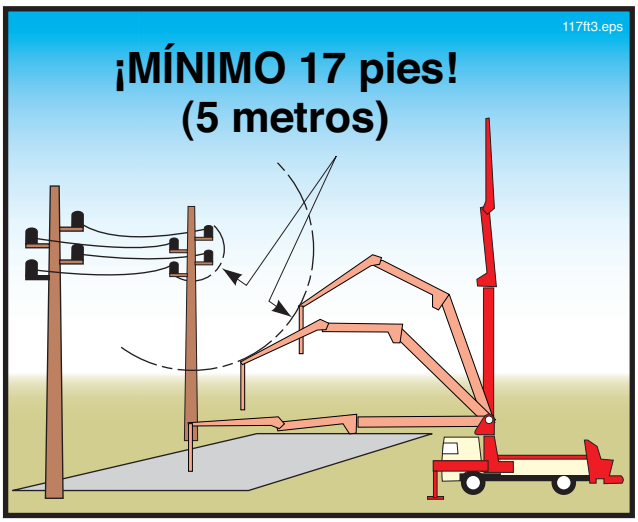


Figura 64
Tenga cuidado con las líneas eléctricas si debe desplegar la pluma

15.6 ⚠ADVERTENCIA ¡Peligro de caerse! Si no puede trabajar a nivel del piso, debe encontrar una plataforma de trabajo apropiada, un sistema de arnés de sujeción o debe sujetarse de alguna manera para evitar caerse.

15.7 ⚠ADVERTENCIA Si el trabajo de mantenimiento requiere el uso de una grúa, montacargas, horquilla elevadora, o equipo similar, lea y entienda las normas de seguridad pertinentes a dicho equipo. Recuerde, **¡nunca deberá usar la pluma como si fuera una grúa o montacargas!**

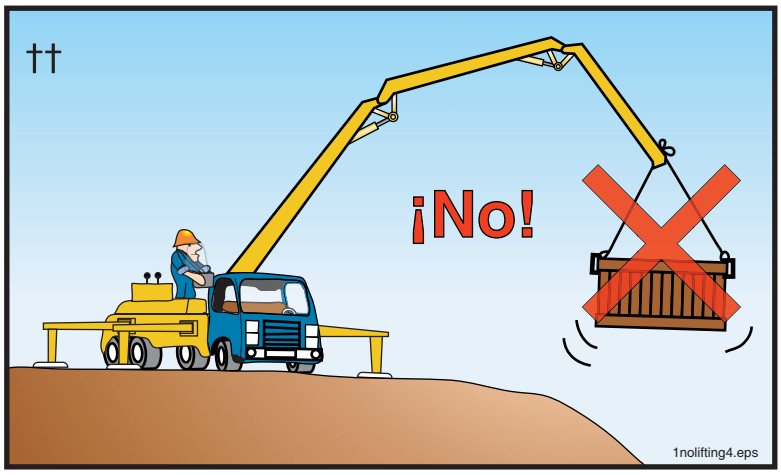


Figura 65
No levante cosas con la pluma

15.8 ⚠ADVERTENCIA ¡Peligro de aplastamiento! **Antes de trabajar en el sistema hidráulico de la pluma de distribución asegúrela y elimine toda la presión del sistema.**

15.9 ⚠ADVERTENCIA **Solamente los operadores deberán manejar la máquina.** Si el trabajo que se vaya a hacer en la máquina requiere que se la maneje y usted no es un operador calificado, llame a alguien que esté calificado para que lo ayude.

15.10 ⚠ADVERTENCIA ¡Peligro de electrocución! **El trabajo de reparación de los sistemas eléctricos de alto voltaje deberá ser hecho por electricistas calificados.** Para los efectos de esta regla, se considera alto voltaje al voltaje superior a 24 voltios.

15.11 ⚠ADVERTENCIA ¡Peligro de explosión! **Asegúrese de entender el peligro potencial de los componentes cargados a resorte o por gases comprimidos antes de efectuar tareas de mantenimiento en los mismos.** (Ejemplos: acumuladores de nitrógeno, resortes a gas para puertas de herramientas, neumáticos, cámaras de frenos.) Si no sabe cuáles son los peligros a los que se expone, ¡llame al fabricante **antes de** empezar!

15.12 ⚠ADVERTENCIA Si va a trabajar en un área escondida no visible de dentro de la máquina, trabe la máquina como se describe a continuación:

- En el caso de los motores a gasolina o Diesel, saque la llave del encendido y coloque un cartel en el panel de controles que diga *No Encender*. Llévese la llave con Ud.
- En el caso de las bombas eléctricas, desconecte el cortacircuito principal y ponga un cartel en los controles.

Las reglas mencionadas arriba son procedimientos simples de “desconectar y poner un cartel” Podrán existir reglamentaciones estatales o locales que exijan un programa de desconexión y aviso más avanzado o riguroso. Conozca cuáles son las reglamentaciones/normas que rigen en su área.

15.13 ⚠ADVERTENCIA **Nunca active el sistema hidráulico sin antes asegurarse de que no haya alguna otra persona en una posición no visible.** Siempre grite “libre” (o palabra similar, para asegurarse que el área esté despejada) antes de poner en marcha el motor eléctrico, dando tiempo para que le respondan.

15.14 ⚠ADVERTENCIA **Nunca trabaje en un sistema hidráulico presurizado.** Antes de abrir el sistema hidráulico, pare el motor principal o el motor eléctrico y alivie el circuito del acumulador (si lo hay).

15.15 ⚠ADVERTENCIA **Nunca use gasolina o combustible Diesel como solvente de limpieza.** Esto es crítico cuando se vayan a limpiar los tanques de aceite hidráulico, dado que los combustibles de gasolina y de diesel son muy explosivos y **¡los restos de éstos que queden en el aceite pueden incendiarse al comprimirse!**

15.16 ⚠ADVERTENCIA Recuerde subir y bajar de la unidad utilizando la "regla de 3 puntos". Las dos manos y un pie o una mano y los dos pies deberán estar en contacto con una superficie segura en todo momento (Figura 66).

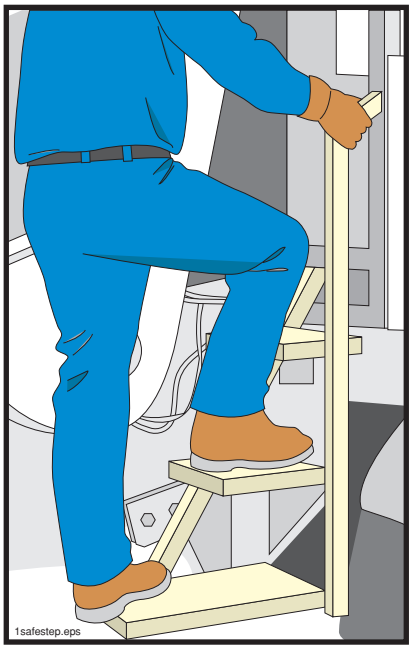


Figura 66
La regla de los 3 puntos de apoyo

15.17 ⚠ADVERTENCIA **Inspeccione las reparaciones.** Después de realizar las modificaciones hechas a los componentes estructurales (pluma, estabilizadores, torre, etc.), el trabajo de reparación realizado deberá ser inspeccionado por personal calificado antes de su uso.

15.18 ⚠ADVERTENCIA **Use siempre las herramientas apropiadas para el trabajo dado.** Consérvelas siempre limpias y en buen estado.

15.19 ⚠ADVERTENCIA Si nota que un compañero de trabajo está haciendo algo peligroso, adviértale sobre los peligros involucrados. ¡La seguridad siempre está en las manos de aquellos que están realizando el trabajo!

15.20 ⚠ADVERTENCIA Después de terminar de hacer una reparación, pruebe el funcionamiento de la pieza que se reparó para asegurarse que la reparación fue hecha correctamente.

VI. Seguridad de los compañeros de trabajo

16. Reglas de seguridad para los trabajadores asignados a la bomba.

16.1 **⚠ADVERTENCIA** **Ud. deberá saber cómo parar la bomba y la pluma.** Haga que el operador le muestre las ubicaciones de los interruptores para paradas de emergencia (Figura 67).

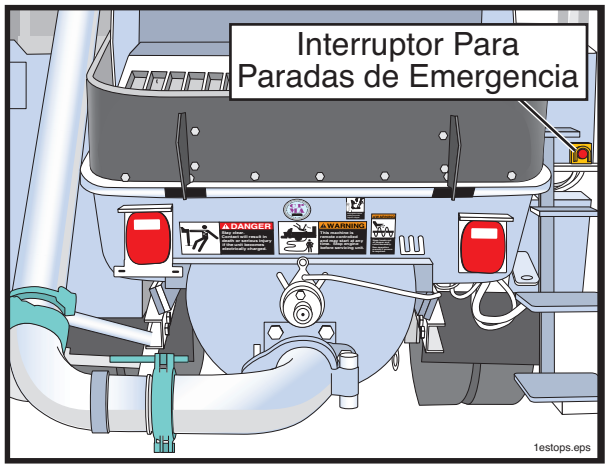


Figura 67
Sepa cómo parar la unidad si ocurre una emergencia

16.2 **⚠ADVERTENCIA** **Usted debe usar el mismo equipo personal de protección que usa el operador.** Gafas de seguridad, casco, protectores de los oídos y guantes de caucho son especialmente importantes cuando esté trabajando cerca de la tolva (Figura 68).

* Hace falta una mascarilla protectora de la respiración cuando hay polvo de cemento (u otro polvo tóxico) presente en el aire.

Figura 68
Use el mismo equipo personal de protección que el operador

16.3 **⚠ADVERTENCIA** **¡Peligro de electrocución!** Si la bomba o la pluma se electrizan con alto voltaje y Ud. está en contacto con **cualquier** parte de ellas, **¡Ud. corre el riesgo de ser electrocutado!** Deberá vigilar el movimiento de la pluma y **alertar al operador si la pluma se acerca a más de 5 metros (17 pies) de un cable eléctrico.** (Vea la Figura 69.)

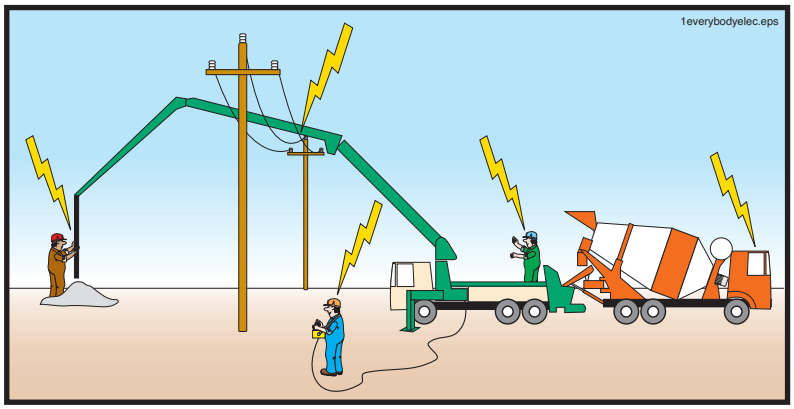


Figura 69
Si la bomba se electriza, cualquier cosa que ésta toque también se electricizará

16.4 **⚠ADVERTENCIA** Mantenga los ojos puestos en los movimientos de la pluma incluso cuando no hayan cerca cables eléctricos. Avísele al operador si la pluma se está acercando demasiado a cualquier obstrucción o peligro. En lo que se refiere a la seguridad del lugar de trabajo, dos pares de ojos y de oídos son mejores que uno.

16.5 **⚠ADVERTENCIA** **¡Peligro de aplastamiento! ¡Nunca, pero nunca se coloque entre el camión de concreto premezclado y la bomba!** Póngase a un costado donde el conductor pueda verlo (Figura 70).

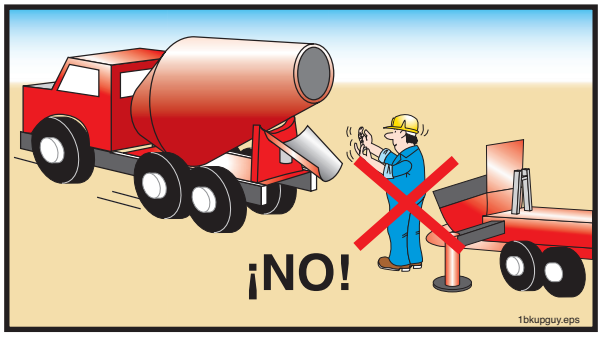


Figura 70
Nunca se interponga entre el camión del concreto y la bomba

16.6 **⚠ADVERTENCIA** Cuando haga retroceder camiones de concreto premezclado, use señales de mano claras y concisas (Figura 71).

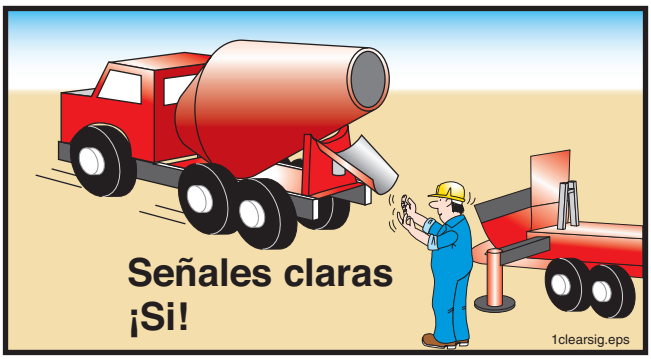


Figura 71
Use señales de mano claras y concisas

16.7 ⚠ADVERTENCIA No permita que el chofer del camión de concreto premezclado ponga concreto en la tolva de la bomba antes de que el operador de la bomba lo autorice. Si llena la tolva antes de tiempo puede hacer que la bomba se tape.

16.8 ⚠ADVERTENCIA Si ve salir materiales extraños del camión de concreto premezclado que pudiera causar una obstrucción, avísele al operador para que pare la bomba. No intente sacar el material de la tolva o de la rejilla mientras el sistema hidráulico esté listo para trabajar. (Vea el punto 16.17 en la página 62.) Si es necesario, presione el botón de parada de emergencia para detener la bomba y alertar al operador.

16.9 ⚠ADVERTENCIA **Nunca permita que el chofer del camión de concreto premezclado limpie su tambor en la tolva,** porque si lo hiciera podría crear una obstrucción. (El agua lavará el cemento y la arena fina del agregado grueso causando la separación de los elementos.)

16.10 ⚠ADVERTENCIA No haga funcionar la bomba o la pluma a menos que Ud. también sea un operador capacitado y el operador regular le haya cedido los controles. **No deberá haber más de un operador al mismo tiempo.** Esto último no se aplica para parar la bomba o la pluma si hay una situación donde haya necesidad de dos operadores.

16.11 ⚠ADVERTENCIA ¡No deje bajar demasiado el nivel de concreto que hay en la tolva! Si aire es absorbido en los cilindros de materiales, la bomba comprimirá el aire. El aire comprimido siempre representa un peligro cuando es expulsado a través de la tolva o de la tubería (Figura 72). Si entra aire en los cilindros de material, siga los pasos siguientes para eliminarlo:

1. Pare inmediatamente la bomba. Oprima el botón de parada de emergencia si ésta es la manera más rápida de parar la bomba. Se producirá una expulsión de aire comprimido la próxima vez que se desplace la válvula de concreto. Si es posible, llene la tolva con concreto para ayudar a contener la expulsión.
2. Avísele al operador sobre el problema. Es la responsabilidad del operador conocer los procedimientos a seguir para remover aire de la bomba y del sistema de distribución. Estos procedimientos incluyen bombeo hacia atrás durante un par de carreras.
3. Las personas que se encuentren en el extremo de descarga o cerca de la línea de distribución deberán ser advertidos que se alejen hasta tanto todo el aire haya sido

purgado. Avíseles que permanezcan a una distancia razonable y prudente mas allá del alcance de la manguera de extremo o del punto de descarga (Figura 72).

4. Cuando se haga arrancar de nuevo la bomba, se debe utilizar a la menor velocidad posible hasta que se haya eliminado **todo** el aire de la tubería. No suponga que las primeras burbujas de aire que salen es el final del aire comprimido.
5. No permita que nadie esté cerca del lugar de descarga hasta que el concreto fluya en forma constante por el final de la manguera y que no haya movimiento del sistema de descarga.

- Si los trabajadores están ubicados en lugares altos o de equilibrio precario, adviértales que va a haber un gran estruendo cuando el aire salga de la tubería. (Adviértales aunque ellos se encuentren bien lejos del punto de descarga.) De esta manera, se evita que los trabajadores se caigan al ser sobresaltados por el fuerte ruido.

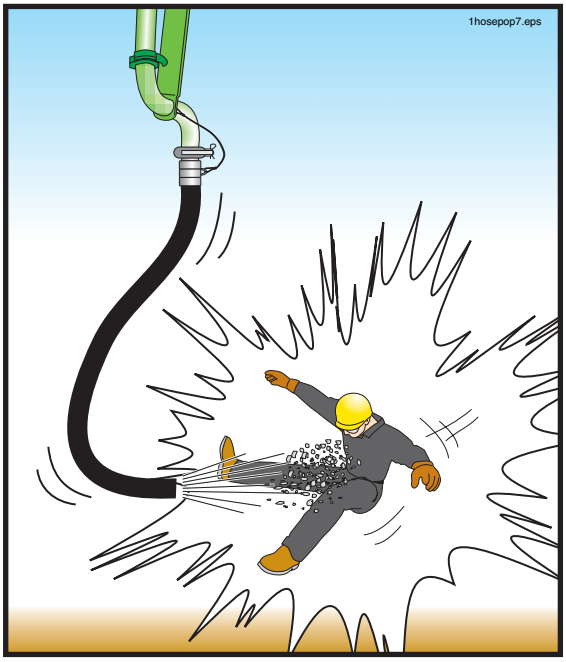


Figura 72
Advierta a todos los que se encuentren en el área de descarga que se vayan de allí cuando se arranca la bomba por primera vez, se la arranca después de moverla o si entró aire en la tubería

16.12

⚠ADVERTENCIA Cuando esté cebando inicialmente el sistema de distribución, volverá a arrancar después de mover la máquina, volverá a arrancar la máquina después de agregar o quitar mangueras o si el aire ha entrado en la tubería, advierta a todos que se mantengan alejados del extremo de descarga hasta tanto el concreto esté fluyendo constantemente y no haya movimiento del sistema de distribución. El personal debe permanecer alejado a una distancia prudente más allá del alcance de la manguera de extremo o del punto de descarga (Figura 72). Habrá aire en la línea cuando se esté arrancando por primera vez, se esté volviendo a arrancar después de mover la máquina, cuando se haya eliminado exitosamente una obstrucción al "balancear" el concreto y después que la línea haya sido desarmada o abierta por cualquier razón.

16.13 **⚠ADVERTENCIA** **¡Nunca use aire comprimido para eliminar una obstrucción!** El operador es responsable de conocer los procedimientos seguros de eliminación de obstrucciones. Es peligroso e innecesario utilizar aire comprimido. Si la presión de la bomba no la puede mover, el aire comprimido tampoco la podrá mover.

16.14 **⚠ADVERTENCIA** Nunca se pare, se siente o se monte a horcajadas sobre una tubería que está en uso o cuando está bajo presión. La tubería se desgasta con cada carrera de la bomba. Si la bomba revienta, Ud. querrá estar al costado de ella y no sobre ella (Figura 73).

Figura 73
Nunca se ponga a horcajadas o se siente sobre una tubería presurizada

16.15 **⚠ADVERTENCIA** ¡Peligro de expulsión! (Vea la Figura 74.) **Nunca abra una tubería que está bajo presión.** Se deberá hacer funcionar la bomba hacia atrás durante por lo menos dos carreras y, a continuación, se la deberá detener antes de abrir una tubería. Si Ud. no sabe como hacer andar la bomba hacia atrás, pida al operador que lo haga. Si la tubería está presurizada con aire, no la abra. El operador es responsable de saber cómo reducir en forma segura la presión del aire.

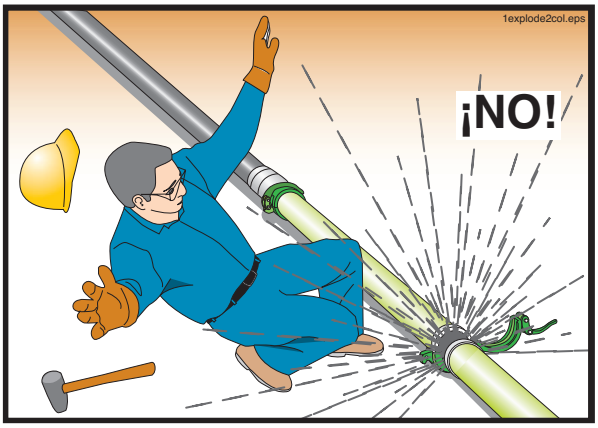


Figura 74
Nunca abra una tubería presurizada

16.16 **⚠PRECAUCIÓN** Tenga cuidado cuandomanipule tuberías o cualquier otro objeto pesado. Aprenda cómo levantarlos sin usar su espalda. Obtenga ayuda si necesita.

16.17 **⚠ADVERTENCIA** ¡Peligro de aplastamiento y de amputación! ¡Nunca ponga las manos, pies u otra parte del cuerpo en la caja del agua, válvula de concreto o tolva si el sistema hidráulico está en marcha o listo para funcionar! ¡Nunca se pare sobre la rejilla de la tolva! (Vea la Figura 75.)

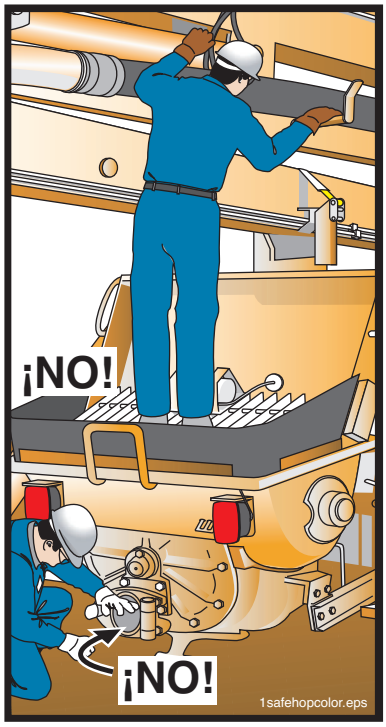


Figura 75
¡Nunca ponga su cuerpo en la máquina!

16.18 **⚠ADVERTENCIA** Nunca levante o saque la rejilla de la tolva, cualquiera que sea la razón (Figura 76).

Figura 76
Levantando la rejilla de la tolva se expone el agitador y la válvula de concreto

16.19 **⚠ADVERTENCIA** No quite las tapas de la caja de agua o las rejillas cuando la máquina esté bombeando (Figura 77). Si debe quitar la tapa de la caja de agua (para añadir agua, por ejemplo) y no hay una rejilla atornillada sobre la caja de agua, entonces pare la bomba y el motor y ponga la llave de la máquina en su bolsillo para que no pueda volver a arrancar hasta que haya terminado y las tapas vuelvan a estar en

su lugar. Si hay instalada una rejilla atornillada, simplemente puede parar la bomba para que deje de bombear antes de sacar las tapas de la caja de agua. Vuelva a instalar las tapas antes de volver a arrancar la bomba.

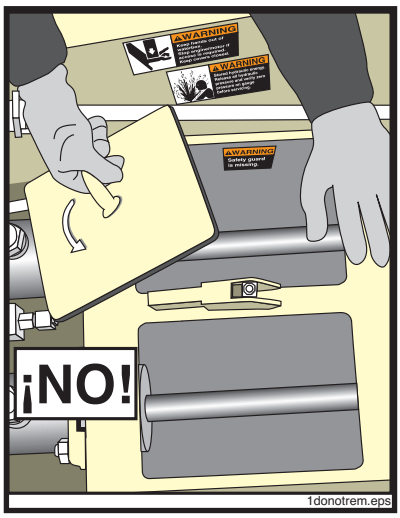


Figura 77
No retire las tapas de la caja de agua cuando la máquina esté bombeando

16.20 ⚠ADVERTENCIA Suba a o baje de la bomba o del camión siguiendo la *regla de los 3 puntos.* Las dos manos y un pie o una mano y los dos pies deberán estar en contacto con una superficie segura en todo momento (Figura 78).

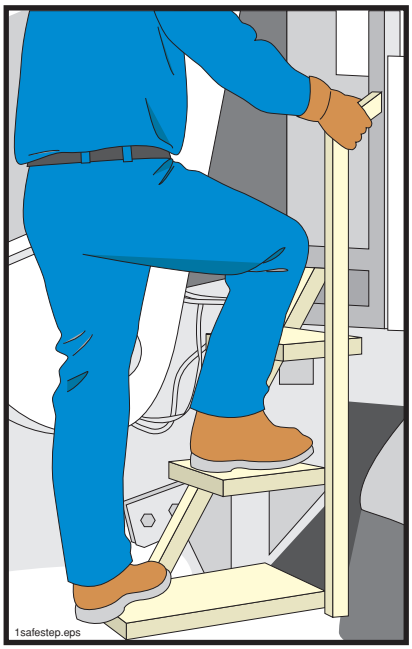


Figura 78
La regla de los 3 puntos de apoyo

16.21 ⚠ADVERTENCIA Mantenga alejado de la bomba a todo personal no autorizado.

17. Reglas de seguridad para la cuadrilla que bombea la mezcla en el punto de descarga

17.1 **⚠ADVERTENCIA** **¡Peligro de electrocución!** Si la bomba o la pluma se electrizan con alto voltaje y Ud. está en contacto con **cualquier** parte de ellas, **¡Ud. corre el riesgo de ser electrocutado!** Ud. deberá vigilar el movimiento de la pluma y **alertar al operador si la pluma se acerca a más de 5 metros (17 pies) de un cable eléctrico.** (Vea la Figura 79.)

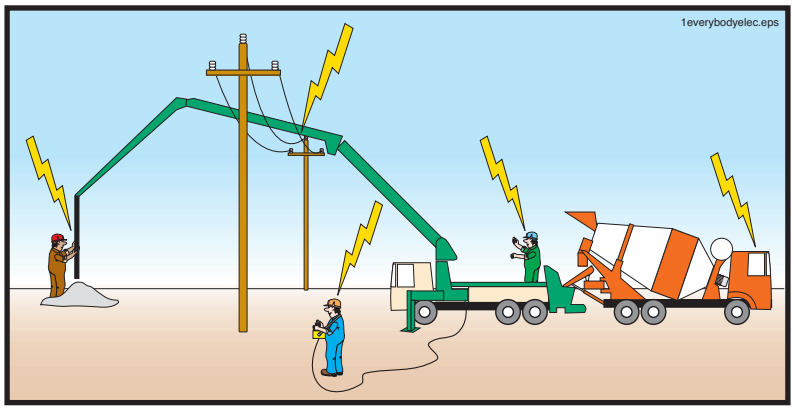


Figura 79
Si la bomba se electriza, cualquier cosa que ésta toque también se electrizará

17.2 **⚠ADVERTENCIA** Si la pluma de distribución puede tocar cables aéreos, se deberá contar con la ayuda de un observador para que advierta al operador si éste se acerca demasiado a los cables (Figura 80).

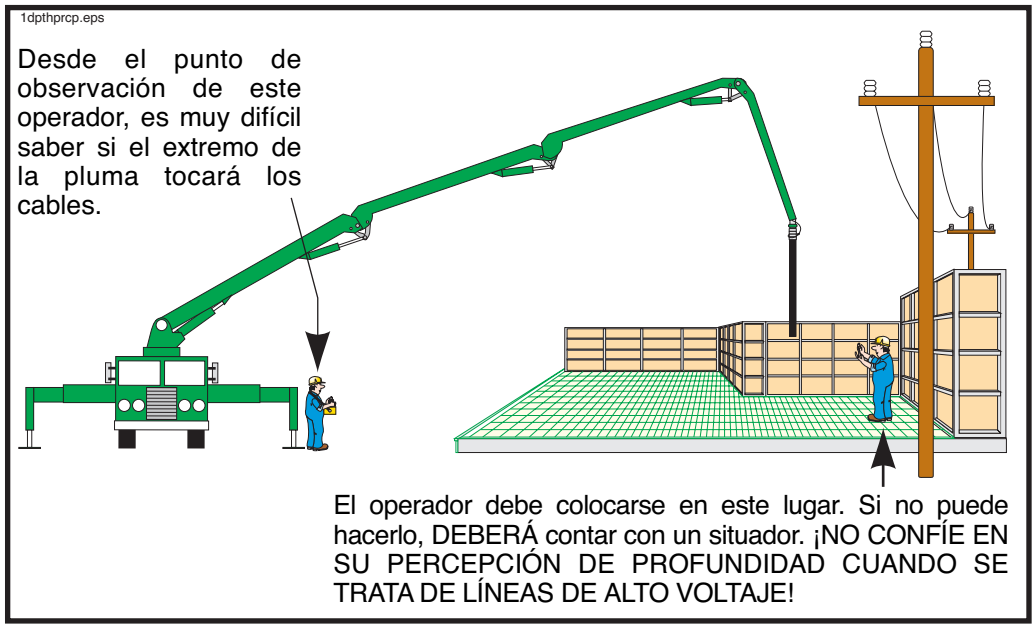


Figura 80
Utilice un observador cerca de obstrucciones o cables

17.3 ⚠ADVERTENCIA Mantenga los ojos puestos en los movimientos de la pluma incluso cuando no hayan cerca cables eléctricos. Avísele aloperador si se está acercando demasiado a cualquier obstrucción o peligro. En lo que se refiere a la seguridad del lugar de trabajo, dos pares de ojos y de oídos son mejores que uno.

17.4 ⚠ADVERTENCIA Cuando esté trabajando alrededor de una bomba de concreto, use equipo de protección personal (Figura 81). Los guantes deberán ser capaces de resistir las quemaduras causadas por la cal. Si Ud. va a trabajar **en** el concreto, proteja sus pies y manos con botas y guantes de caucho.

Figura 81
Use Equipo Personal de Protección (P.P.E.)

17.5 ⚠ADVERTENCIA Cuando el operador esté cebandoinicialmente el sistema de distribución, cuando vuelva a arrancar después de mover la máquina, cuando vuelva a arrancar la máquina después de agregar o quitar tuberías o mangueras o en cualquier momento en que haya aire en la tubería de distribución, manténgase a una distancia razonable y prudente alejado de la manguera de la punta o del punto de descarga. No se ponga cerca del extremo de descarga hasta que el material esté fluyendo constantemente y no haya movimiento del sistema de descarga (Figura 82). El aire comprimido que pueda haber en la línea podrá hacer que la manguera de caucho se mueva violentamente. Si el operador le previene que viene aire por el sistema de descarga, proceda como sigue:

- Baje al nivel del suelo (si está en un lugar alto) y permanezca bien alejado del lugar de descarga o por lo menos protéjase.
- Manténgase alejado del lugar de descarga. Asegúrese que **todo** el aire haya salido antes de volver de nuevo al punto de descarga. Es la responsabilidad del operador saber cuándo es seguro volver a bombear normalmente.

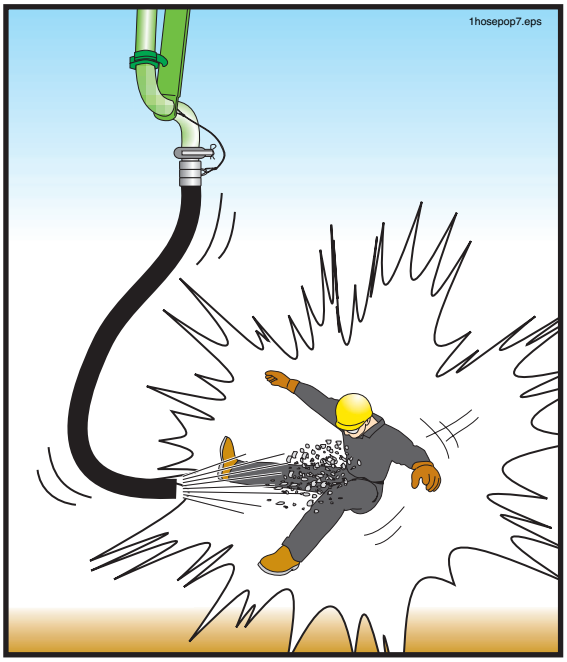


Figura 82
Manténgase alejado del punto de descarga cuando esté arrancando o vuelva a arrancar y cuando haya aire en la tubería

17.6 ⚠ADVERTENCIA **¡Nunca use aire comprimido para eliminar una obstrucción!** Es peligroso e innecesario. Si la presión de la bomba nola puede mover, el aire comprimido tampoco podrá. Aléjese de la descarga y de la tubería si alguien intenta utilizar aire comprimido de esta manera.

17.7 ⚠ADVERTENCIA **¡No mire dentro del extremo de una manguera o tubo taponado!**

17.8 ⚠ADVERTENCIA Cuando la cuadrilla de bombeo esté utilizando aire comprimido para limpiar la tubería de la pluma o del sistema, manténgase alejado del área de descarga. **Nunca trate de sujetar un tubo o una manguera que están siendo limpiados con aire.**

17.9 ⚠ADVERTENCIA Nunca abra una tubería presurizada (Figura 83). El operador de la bomba debe descargar la presión antes de que Ud. abra la tubería. Si la línea está presurizada con aire comprimido, deje que el operador descargue la presión y verifique que el aire haya escapado antes de que Ud. siga adelante.

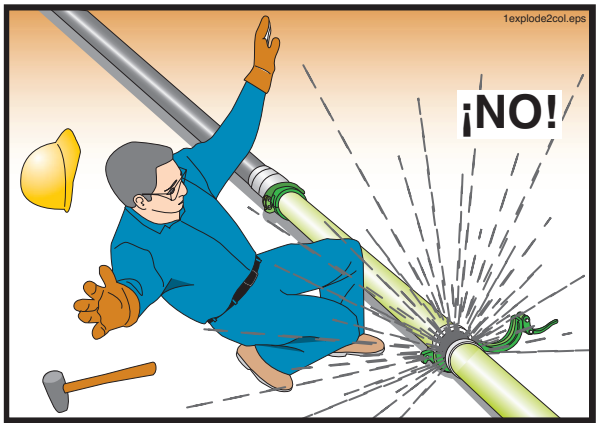


Figura 83
Nunca abra una tubería presurizada

17.10 ⚠ADVERTENCIA Después de remover secciones de tubos, usted debe **volverlas a armar utilizando juntas y abrazaderas.** Las tuberías armadas sin utilizar juntas dejarán escapar cemento y agua, lo que puede causar una obstrucción.

17.11 ⚠ADVERTENCIA Al concreto se lo mueve por presión a través del sistema de distribución. La falla de un tubo, de una abrazadera, manguera o codo es posible. Por esta razón, pase la menor cantidad de tiempo que pueda estando parado debajo de la pluma y póngase ropa de protección personal.

17.12 ⚠ADVERTENCIA El encargado de la manguera no deberá agarrarla abrazándola, sino que deberá sostenerla con ambas manos, para permitir que la manguera se mueva libremente (Figura 84).

Figura 84
No agarre la manguera de la pluma de distribución abrazándose a ella

17.13 ⚠ADVERTENCIA El encargado de la manguera no deberá caminar retrocediendo (Figura 85). Caminar hacia adelante le permitirá ver los obstáculos y le evitará tropezar.

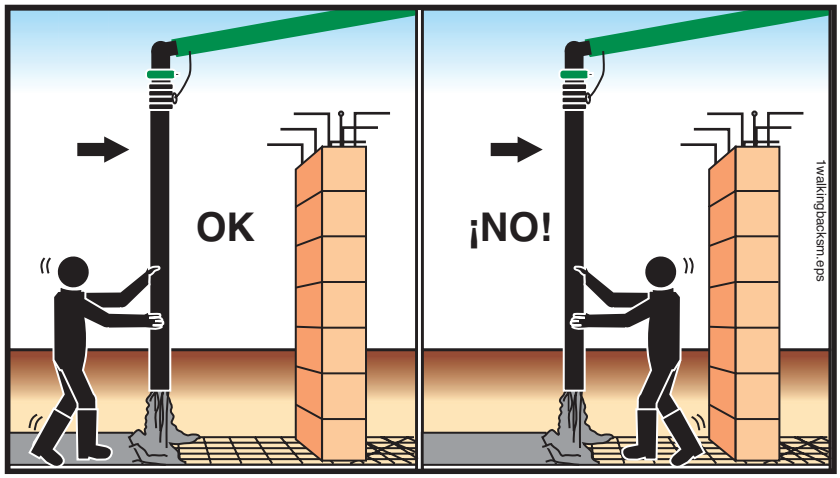


Figura 85
No camine hacia atrás, manténgase fuera del trayecto de la pluma de distribución

17.14 ⚠ADVERTENCIA El encargado de la manguera nunca deberá situarse entre la pluma de distribución o la manguera de la pluma de distribución y cualquier objeto fijo, como por ejemplo una pared o columna (Figura 85).

17.15 **⚠ADVERTENCIA** No doble la punta de la manguera. Doblarla hará que la bomba cree la máxima presión de concreto. ¡La bomba puede enderezar la manguera con la fuerza! (Vea la Figura 86.)

Figura 86
¡Nunca retuerza la manguera!
Nunca sostenga la manguera con su hombro

17.16 **⚠ADVERTENCIA** Nunca trate de sostener la punta de la manguera con su espalda u hombros. Deje que la manguera cuelgue de la pluma (Figura 86).

17.17 **⚠PRECAUCIÓN** Tenga cuidado cuandomanipule tuberías o cualquier otro objeto pesado. Aprenda cómo levantarlos sin usar su espalda. Obtenga ayuda si necesita.

17.18 **⚠ADVERTENCIA** ¡Peligro de aplastamiento! Nunca coloque las manos o cualquier otra parte del cuerpo entre el extremo del sistema de distribución y un objeto fijo (por ejemplo, entre la manguera de la punta y el encofrado del concreto) (Figura 87). Tenga cuidado con las abrazaderas que bajan con la tubería, porque ellas tienen un diámetro mayor que los tubos/mangueras que conectan.

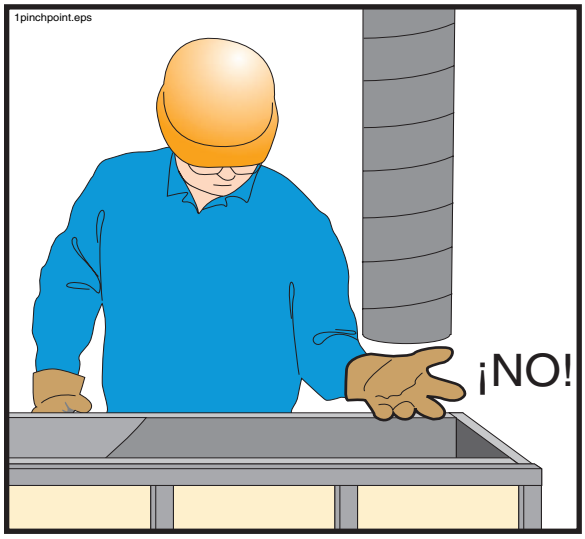


Figura 87
Tenga cuidado con los puntos de apretamiento

17.19 **⚠ADVERTENCIA** No permita que la manguera de la pluma de distribución baje a menos de dos pies de altura de la plataforma para evitar que la manguera de la pluma de distribución golpee los pies del operador encargado de la manguera y para prevenir que la abertura de la manguera sea bloqueada por la plataforma, que podría causar que la manguera "dé latigazos".

17.20 **⚠ADVERTENCIA** ¡Peligro de caerse! Cuando cuele concreto en columnas, losas o paredes por sobre el suelo, asegúrese bien para no caerse.

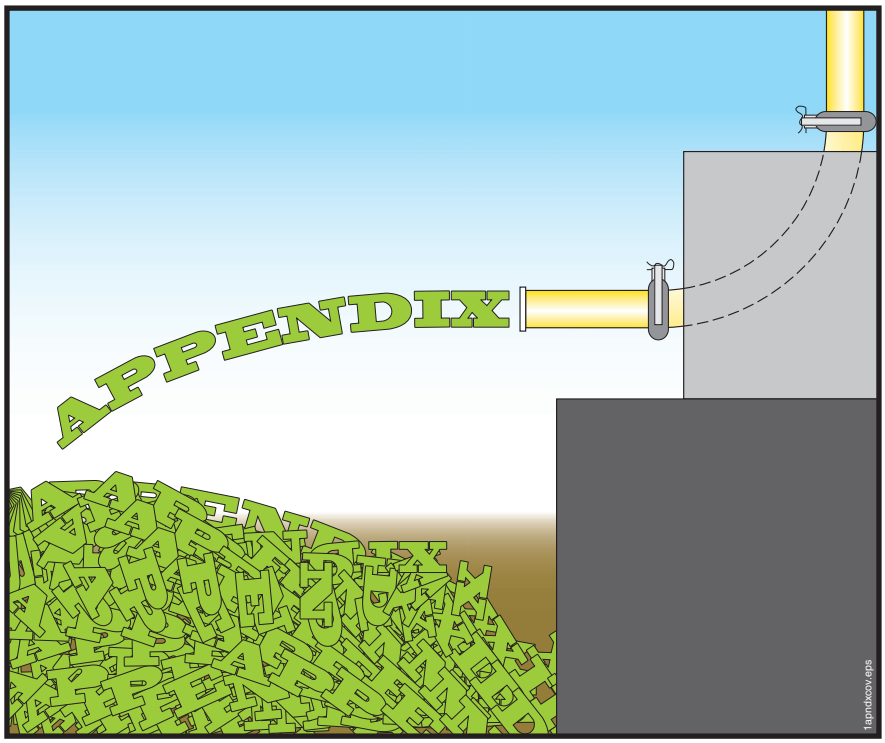
17.21 **⚠ADVERTENCIA** Nunca debe pararse, sentarse ni montarse a horcajadas sobre una tubería que está en uso o cuando esté presurizada (Figura 88). La tubería se desgasta con cada carrera de la bomba. Si la bomba revienta Ud. va a querer estar a su costado y no sobre ella.

Figura 88
Nunca se ponga a horcajadas o se siente sobre una tubería presurizada

17.22 **⚠ADVERTENCIA** Para evitar crear confusión y que el operador de la bomba reciba señales conflictivas, sólo una persona deberá hacer las señales de mano.

17.23 **⚠ADVERTENCIA** Antes de comenzar el vertido, el encargado de la manguera, el operador y el observador deberán ponerse de acuerdo sobre las señales de mano (Figura 89).

Figura 89
Señales de mano recomendadas por la ACPA
(Asociación Americana de Bombeo de Concreto)



Apéndice

Índice

MANUAL DE SEGURIDAD

VII. Comparación Entre Extremos y Acoplamientos Soldados

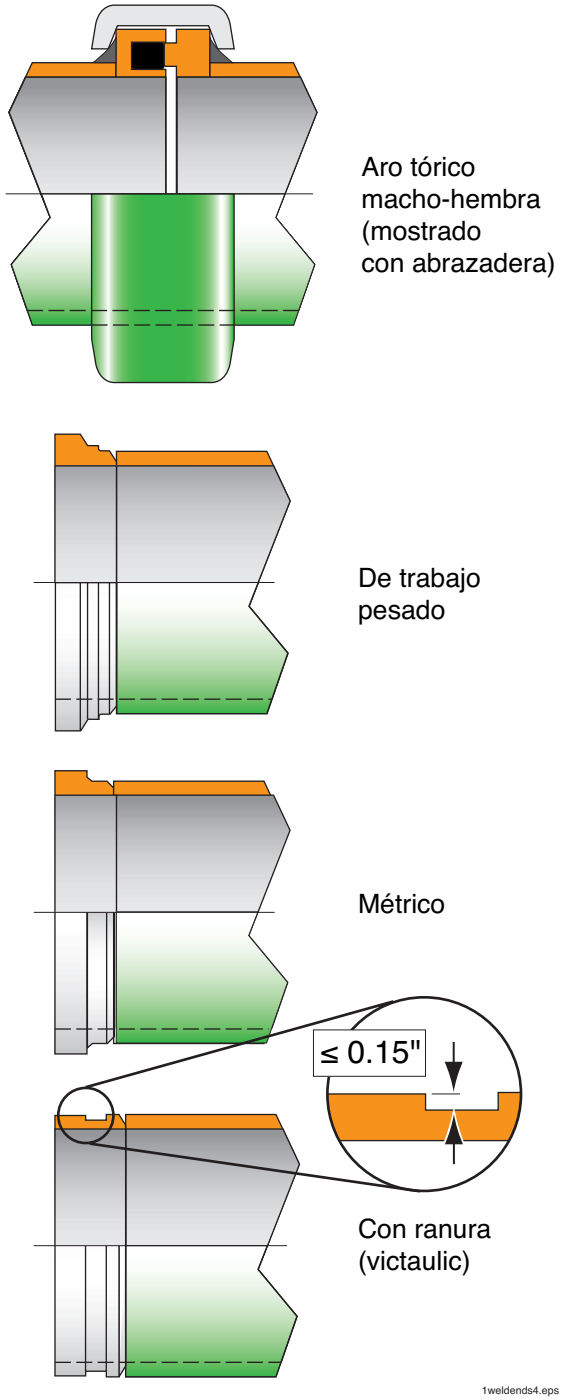
Se muestra una comparación entre extremos y acoplamientos comúnmente usados. No se puede unir ninguno de los dos extremos mostrados sin el uso de un adaptador de tubos o una abrazadera especial de adaptación. También se debe considerar la resistencia de las abrazaderas y de los tubos al determinar las necesidades apropiadas del sistema. Las proporciones mostradas en el texto de más abajo representan el factor de seguridad de explosión: presiones de trabajo.

1. Los acoplamientos macho-hembra del tipo aro tórico tienen la más alta capacidad nominal de presión de todos los extremos comúnmente utilizados para el bombeo de hormigón. Pueden resistir 4350 PSI con un factor de seguridad de 2:1. Cuando se los usa con juntas tóricas (O-rings) en buen estado se alinean automáticamente y son herméticos. Normalmente no se los usa en plumas debido a su peso. Las tuberías equipadas con este tipo de acoplamiento no se pueden invertir de extremo a extremo.

2. Los acoplamientos para servicio pesado están diseñados para presiones de hasta 2250 PSI con un factor de seguridad de 2:1. Tienen un área de contacto que es un 20% más grande que la de los acoplamientos métricos y una cara ahusada que atrae las secciones de los tubos juntándolas durante el montaje. Ambos, los extremos y las abrazaderas, pesan más que los del tipo métrico y por lo tanto no se deben usar en plumas sin consultar con el fabricante.

3. Los acoplamientos métricos están diseñados para presiones de hasta 1400 PSI con un factor de seguridad de 2:1. Tienen un área de contacto que es un 85% más grande que la de los acoplamientos ranurados. La cara es plana y no atrae las tuberías para juntarlas. Si bien tienen un borde elevado, no son compatibles con los acoplamientos de servicio pesado a menos que se utilice una abrazadera especial o una tubería adaptadora para cambiar de un estilo al otro. Las conexiones métricas son equipo estándar en las plumas debido al ahorro de peso que se logra cuando se compara con otros tipos.

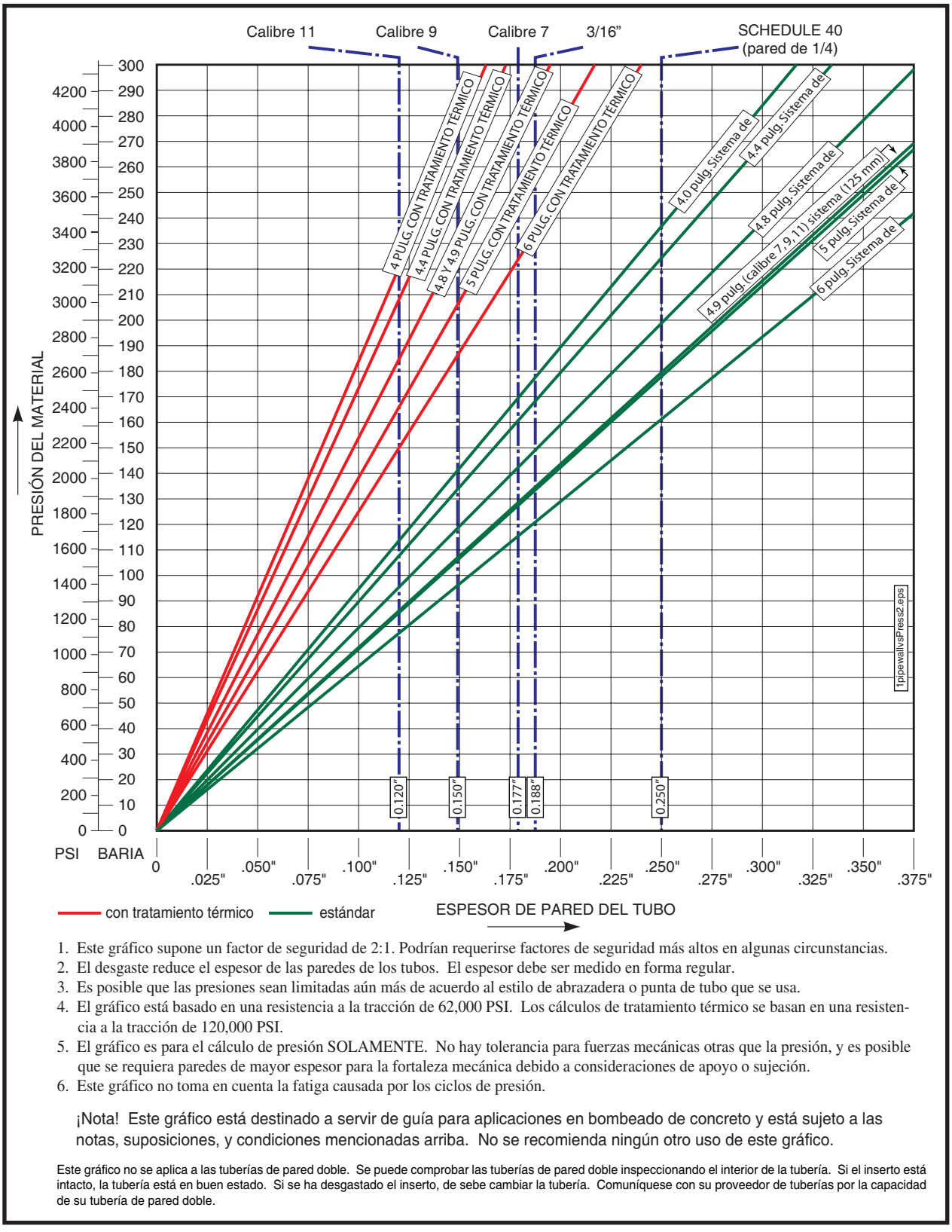
4. Los acoplamientos ranurados (altura de los bordes de 0.15 de pulg. o menos) están diseñados para presiones de hasta 750 PSI con un factor de seguridad de 2:1. La ranura en bajo relieve es difícil de limpiar al cambiar tubos en una obra. El extremo de soldar falla antes de que falle la tubería porque la ranura está cortada en el espesor de la tubería haciendo que sea el punto más débil. No se recomienda el uso de acoplamientos ranurados para aplicaciones de bombeo de concreto.



NOTA: Todas las especificaciones de presión listadas se refieren a un diámetro de 125 mm (5 pulgadas) en condición casi nueva. Otras presiones se aplicarán a otros tamaños.

MANUAL DE SEGURIDAD

VIII. Cuadro de Espesores Mínimos de las Paredes de los Tubos



1. Este gráfico supone un factor de seguridad de 2:1. Podrían requerirse factores de seguridad más altos en algunas circunstancias.
2. El desgaste reduce el espesor de las paredes de los tubos. El espesor debe ser medido en forma regular.
3. Es posible que las presiones sean limitadas aún más de acuerdo al estilo de abrazadera o punta de tubo que se usa.
4. El gráfico está basado en una resistencia a la tracción de 62,000 PSI. Los cálculos de tratamiento térmico se basan en una resistencia a la tracción de 120,000 PSI.
5. El gráfico es para el cálculo de presión SOLAMENTE. No hay tolerancia para fuerzas mecánicas otras que la presión, y es posible que se requiera paredes de mayor espesor para la fortaleza mecánica debido a consideraciones de apoyo o sujeción.
6. Este gráfico no toma en cuenta la fatiga causada por los ciclos de presión.

¡Nota! Este gráfico está destinado a servir de guía para aplicaciones en bombeado de concreto y está sujeto a las notas, suposiciones, y condiciones mencionadas arriba. No se recomienda ningún otro uso de este gráfico.

Este gráfico no se aplica a las tuberías de pared doble. Se puede comprobar las tuberías de pared doble inspeccionando el interior de la tubería. Si el inserto está intacto, la tubería está en buen estado. Si se ha desgastado el inserto, de sebe cambiar la tubería. Comuníquese con su proveedor de tuberías por la capacidad de su tubería de pared doble.

IX. Glosario de Términos

Acumulador

Dispositivo hidráulico que almacena energía de la misma manera que una pila almacena energía eléctrica. Debido a que el acumulador almacena energía, ES NECESARIO drenarlo y eliminar la presión antes de iniciar el trabajo en un actuador equipado con acumulador o en un sistema hidráulico.

Agitador

Dispositivo instalado en la tolva para mantener el concreto en movimiento e impedir que se seque. Por lo general, consta de un eje giratorio al que se le montaron varias aspas. *Ver también:* Rejilla de la Tolva

Ajuste de los Estabilizadores

Ajuste de los estabilizadores en dirección vertical. En el caso de las bombas de concreto montadas en la pluma se debe tratar de hacer los ajustes que sean necesarios para que la unidad quede dentro de los 3° de nivel.

Alto Voltaje

Para los propósitos de este manual, cualquier voltaje superior a 24 voltios es considerado alto voltaje. En los EE.UU., las bombas de concreto accionadas por electricidad normalmente hacen funcionar los motores a 480 voltios de CA (alto voltaje) y los controles a 24 voltios de CC (bajo voltaje). Si se trata de cables eléctricos en las zonas residenciales o industriales, el voltaje será aproximadamente 8.000 voltios a tierra ó 13.800 voltios de fase a fase (voltaje de distribución). Si los cables eléctricos están montados bastante alejados del suelo en torres de acero, el voltaje variará desde 100.000 a 1.000.000 de voltios (voltaje de transmisión).

Área de Funcionamiento

El área situada alrededor de un equipo en funcionamiento o del punto de descarga donde podrían existir peligros debido a la naturaleza de la máquina o del proceso en uso.

AWS D1.1

Código para soldaduras estructurales con acero según lo define la American Welding Society. Corresponde aplicar las secciones 3, 5 y el párrafo 9.25 de la sección 9. *Ver también:* Soldador certificado y EN 287-1.

Bloque de Empuje

También conocido como “hombre muerto”. Bloque de concreto vaciado, generalmente con uno o varios codos de barrido fundidos dentro del bloque, que se coloca en la parte inferior de un tramo vertical para soportar el peso del mismo y para estabilizar lateralmente la tubería. Estabiliza y soporta el tendido vertical en virtud de su enorme masa (normalmente de una yarda cúbica o más grande).

Bola de Material de Esponja

Una esponja de medio dura a dura en forma de esfera que se usa para limpiar el interior de la tubería de distribución. *Ver también:* Diablo de Limpieza

Bombeo para Atrás

Acción de poner la bomba de concreto en marcha atrás por diversas razones.

Chorro/Inyector de Agua

El chorro de agua que sale del extremo de una manguera de agua o lavador a presión. Es la única parte del sistema de agua que para su limpieza debe ir dentro de la tolva, válvula de concreto o caja de agua.

Conductores

Materiales que conducen electricidad. El cobre, plata, aluminio, oro, acero y agua se consideran ser BUENOS conductores de electricidad. El aire, fibra de vidrio, caucho, cerámica y vidrio son MALOS conductores. Todos estos conductores tienen una resistencia al flujo de la electricidad que puede

medirse en función de ohmios por pie lineal. A medida que aumenta el voltaje, más corriente pasa a través de la misma resistencia. En el caso de cables de alta tensión (8000 voltios, por ejemplo) incluso los materiales que son malos conductores transmiten suficiente electricidad a tierra a través del cuerpo de una persona como para electrocutarla. (Una cantidad tan pequeña como 35 miliamperios puede producir fibrilación del corazón). Algunos conductores como el aire resisten muy bien la electricidad, pero si el voltaje aumenta lo suficiente, fluirá la corriente (los rayos son un buen ejemplo de ésto). *Ver también:* Electrocución

Decibeles

Un décimo de un belio. Abreviado dB. Es una medida de volumen de sonido. En lo que respecta a las bombas de concreto, es la medida del nivel de presión de sonido a un metro de distancia de la fuente. Dado que la exposición prolongada al ruido intenso puede ocasionar la pérdida permanente de la audición, O.S.H.A. ha especificado pautas con respecto al límite del tiempo de exposición a ruidos de diferentes volúmenes. En la página 36 de este manual se puede encontrar el cuadro con estos valores.

Densidad Volumétrica

La masa de una sustancia por el volumen. Por ejemplo, un metro cúbico de aire pesa mucho menos que un metro cúbico de agua. De la misma manera, un metro cúbico de concreto liviano pesa menos que un metro cúbico de concreto con acero. Podríamos decir que el concreto con acero tiene una densidad volumétrica más alta que el concreto liviano. Todos los cálculos para las especificaciones y manuales de funcionamiento de las bombas de concreto se basan en 68,02 kilos por 0,028 metro cúbico (ó 150 libras por pie cúbico), que es la masa aproximada del concreto con piedras duras (normal).

Diablo de Limpieza

Un tapón hecho de un compuesto de caucho, por lo general con varias aletas que se expande para sellar cuando se le aplica presión. Está diseñado para ser introducido en tuberías de descarga de acero y es empujado con agua o aire comprimido con el propósito de limpiar la tubería. *Ver también:* Bola de Material de Esponja

Distancia de Seguridad Mínima

En este manual, el término “distancia de seguridad mínima” se refiere a la distancia más corta que se le permite acercarse a un objeto, cables eléctricos, etc., dejando un margen de error de apreciación humana o de desperfectos de la máquina. Con respecto a cables eléctricos en los EE.UU., esta distancia es 5 metros (17 pies), de acuerdo a lo que recomienda la Asociación Americana de Bombeo de Concreto (A.C.P.A.). Esta distancia puede ser distinta en otros países (Canadá especifica 7 metros). Es la responsabilidad del operador conocer el valor de la distancia correspondiente al lugar donde se encuentra.

Electricista Autorizado (Licenciado)

Electricista calificado licenciado por el Estado, Condado o Municipio en donde se hacen las conexiones. En algunos lugares los electricistas no necesitan contar con una licencia y en estos casos el trabajo sin embargo debe ser realizado por personal profesional competente. Bajo ninguna circunstancia se permitirá que el operador de la bomba de concreto u otras personas que trabajen con la misma hagan las conexiones de alto voltaje.

Electrocución

Combinación de las palabras “Eléctrico” y “Ejecución”. Significa muerte causada por electricidad. *Ver también:* Conductores

EN 287-1 / PREN 288-3

Código para soldadura estructural con acero según lo definen las Normas Europeas. *Ver también:* Soldador Certificado, AWS D1.1.

MANUAL DE SEGURIDAD

Equipo de Protección Personal (P.P.E.)

Cosas que usted puede usar para protegerse contra peligros potenciales en los lugares donde se bombea concreto. Ejemplos de estas cosas son:

- Ropa de trabajo ajustada al cuerpo
- Botas con punta de acero
- Guantes resistentes a la cal
- Gafas de seguridad
- Orejeras o tapones para los oídos
- Botas de goma cuando tenga que estar parado en el concreto
- Casco
- Máscara para respirar cuando esté trabajando con polvo de cemento

Guía

Asistente que ayuda cuando se da marcha atrás con un camión o remolque o en otras circunstancias donde el conductor no puede ver suficientemente bien para asegurar la seguridad. *Ver también:* Observador

Manguera de descarga de concreto

Una manguera flexible de concreto que tiene dos acoplamientos de extremo.

Manguera de extremo

Una manguera flexible de concreto que tiene un acoplamiento de extremo.

Mantenimiento

Todos los procedimientos de servicio, inspección y reparación de bombas de concreto y de equipos o dispositivos conexos. El mantenimiento y la inspección son métodos de ***mantener*** el equipo en buen estado. La reparación es el método de ***restaurar*** el equipo al estado deseado.

Material Extraño

Material que nunca se tuvo la intención de bombear y que termina en la tolva del concreto. Ejemplos de materiales extraños incluyen animales pequeños, martillos, aspas de la mezcladora, grumos de cemento no disueltos, trozos de concreto seco desprendido de las aspas mezcladoras de los camiones de concreto premezclado y latas de bebidas. La presencia de cualquiera de estos objetos puede crear una obstrucción al bombear.

Motor Impulsor

Fuente primaria de potencia de un sistema hidráulico. Por lo general, la palabra inglesa “engine” denota un dispositivo de combustión interna mientras que la palabra inglesa “motor” se refiere a un dispositivo eléctrico. En español, ambas palabras inglesas se traducen como motor, agregando eléctrico, de combustión interna, diesel, etc. para distinguirlos.

Movimientos Involuntarios o No Intencionados

Movimiento de la bomba, de la pluma o de equipo relacionado sin que haya habido la orden intencional por el operador. Un ejemplo de un movimiento involuntario sería si un operador se cae mientras camina llevando la caja del control remoto y accidentalmente oprime un botón o palanca haciendo que la pluma se mueva.

No Autorizado

Sin autoridad o sin permiso. Ejemplos: El manejo sin autorización de la pluma puede ser el uso de la misma por un transeúnte, reparaciones sin permiso de la pluma pueden ser reparaciones diseñadas sin el conocimiento del fabricante.

Observador

Observador es la persona que se coloca en un punto de observación dado desde donde puede ver el punto de descarga y el operador de la bomba. El observador orientará entonces al operador para que éste maneje la unidad según las circunstancias del trabajo utilizando una radio de dos vías o señales

con las manos. Cualquier persona que esté familiarizada con las reglas de seguridad de la bomba y de los trabajadores, y que esté equipado con una radio o sepa las señales de mano correspondientes podrá desempeñarse como observador. Se necesita utilizar un observador cuando el operador no pueda ver con seguridad el punto de descarga o la distancia entre la unidad y un área peligrosa. *Ver también:* Guía

Obstrucción

En pocas palabras, si se bombea y el concreto no sale por el punto de descarga es porque hay una obstrucción. Las obstrucciones pueden eliminarse con la presión de la bomba, haciendo oscilar la bomba entre hacia adelante y hacia atrás o mediante alguna otra medida correctiva. Si no se puede eliminar una obstrucción de alguna de estas maneras, ésta se llama taponamiento. *Ver también:* Tapón, atasco de piedras. Las causas de las obstrucciones se explican en la sección 8.21 de este manual. En todos los casos, las obstrucciones pueden crear un peligro al ocasionar una alta presión del concreto combinada algunas veces con los esfuerzos descoordinados de trabajadores no capacitados para solucionar el problema.

Operador Calificado

Un operador se considera calificado cuando haya completado un programa de capacitación y de manejo supervisado de bombas de concreto y haya pasado un examen práctico de manejo demostrando su habilidad de manejar un modelo y tipo específico de equipo así como su conocimiento de los controles y procedimientos de funcionamiento. Adicionalmente, el operador debe cumplir lo establecido en las secciones sobre requisitos físicos y de conocimiento de las normas de seguridad del bombeo de concreto.

Operador Certificado

Un operador que ha obtenido una tarjeta de certificación emitida por la Asociación Americana de Bombeo de Concreto (A.C.P.A.). Hay varias clases de certificaciones, cada una de ellas relacionada con una categoría distinta de bomba. Para obtener dicha certificación, el operador debe aprobar exámenes escritos sobre funcionamiento, preparación del trabajo y limpieza para cada categoría de bomba, además debe pasar el examen sobre reglas de seguridad que es común para todas las categorías de certificaciones, debe satisfacer los requisitos de experiencia establecidos para cada categoría y no debe tener infracciones ni incumplimiento de reglas de seguridad como conductor. La tarjeta o carnet de certificación sólo certifica que el operador ha pasado un examen escrito tomado por un examinador de certificación de A.C.P.A. y no certifica la habilidad del operador de manejar una bomba de concreto. *Ver también:* Persona Calificada, Operador Calificado.

O.S.H.A.

Occupational Safety and Health Administration (Administración de Seguridad y Salud Ocupacional). Agencia del gobierno de los Estados Unidos de América que se encarga de la seguridad y salud en el trabajo. Establece y hace cumplir los reglamentos de seguridad aplicables a la industria y a los negocios. Entre las áreas sobre las que tiene autoridad se encuentran los lugares de trabajo en las obras y los talleres.

Persona Calificada

Como se usa en este Manual de Seguridad, se define como *persona calificada*a: una persona quien, por poseer un título reconocido o un certificado de competencia profesional, o quien debido a sus vastos conocimientos, capacitación y experiencia ha demostrado en forma exitosa la habilidad de solucionar o resolver problemas relacionados con la materia y con el trabajo. Otras personas calificadas podrían incluir mecánicos maestros y técnicos del fabricante encargados del servicio de equipos después de la venta. *Ver también:* Operador Certificado

MANUAL DE SEGURIDAD

Personal Calificado

Término genérico usado para describir a una persona que está calificada para hacer el trabajo en el área de aplicación. Por ejemplo, hacer que las reparaciones realizadas en la pluma sean inspeccionadas por "personal calificado" antes de su uso significa que la inspección debe ser realizada por un soldador certificado o inspector de soldaduras certificado. Hacer que las reparaciones del sistema hidráulico sean hechas por "personal calificado" significa que las reparaciones deben ser hechas por personal del taller calificado.

Personal de Taller Calificado

Individuo que reúne las siguientes condiciones:

- ha cumplido los 18 años de edad,
- sea física y mentalmente capaz,
- ha sido capacitado en la reparación, mantenimiento y procedimientos de inspección correspondientes así como en las reglas de seguridad correspondientes al bombeo de concreto y al equipo,
- ha demostrado a su empresa tener la habilidad con respecto a los procedimientos y reglas mencionados anteriormente, y
- puede esperarse que realice su trabajo, tal como le fue asignado, en forma confiable.

Posición de Transporte

Se refiere a la posición de la pluma cuando se transporta la unidad. La posición de transporte de la pluma es la posición de ésta totalmente plegada y bajada sobre los descansos.

Presión del Concreto

La fuerza por superficie cuadrada que se ejerce sobre el concreto. La presión de concreto siempre será una relación en proporción directa a la presión hidráulica del aceite sobre el circuito de la bomba de concreto. *Ver también:* Presión Máxima

Presión del Suelo

La fuerza por superficie cuadrada que ejercen las patas de los estabilizadores sobre el suelo. La cantidad de presión que el suelo aguantará varía con la composición y el grado de compactación del mismo. Para hacer una determinación de la estabilidad del suelo, vea el cuadro en la pagina 22 de este manual.

Presión Máxima

La presión máxima de un sistema hidráulico se refiere a la presión más alta que pueda lograrse con las graduaciones de las válvulas de alivio de presión del circuito. Al hablar de la descarga de concreto, la máxima presión se refiere a la presión que resultará si la presión del sistema hidráulico alcanza el valor de la graduación de la válvula de alivio. La presión del concreto es la fuerza a la que se mueven los cilindros diferenciales, dividida por la superficie transversal del cilindro del concreto. La presión máxima del concreto, entonces, se obtiene cuando los cilindros diferenciales se mueven con la máxima fuerza, la que está determinada por el valor de la graduación de la válvula de alivio de presión del sistema hidráulico. *Ver también:* Presión del Concreto.

Punto de Descarga

También se le conoce como punto de colocación. Lugar de expulsión del concreto de un sistema de distribución o descarga. Puede ser el punto de colocación (el encofrado que se llena con el concreto) o el área de limpieza después de terminar el bombeo.

Rejilla de la Tolva

Enrejado generalmente fabricado con barras de acero que se coloca sobre la tolva de concreto. Su función es evitar que alguna parte del cuerpo entre en contacto con el agitador (si se la deja en su puesto) e impedir la entrada de materiales extraños grandes en la tolva que causarían obstrucciones si fueran bombeados.

MANUAL DE SEGURIDAD

Soldador certificado

En lo que se refiere al bombeado de concreto y a este Manual de Seguridad, un soldador certificado es una persona que ha presentado una solicitud para tomar, ha rendido y ha pasado el examen de soldadura de acero estructural de la American Welding Society (AWS) o de la European Norm (EN). Cualquier persona que suelde en una pluma de distribución de bombeo de concreto, en los estabilizadores, torres, etc. deberá ser certificada según las cláusulas de las secciones 3 y 5 y párrafo 9.25 de la sección 9 de la AWS Dl.l, **y/o** las Normas EN287-1/PREN288-3.

Taponamiento

Un taponamiento es una obstrucción que no puede eliminarse mediante presión de la bomba o por otros medios. Un taponamiento debe ser eliminado manualmente. *Ver también:* Obstrucción.

Taponamiento Causado por Piedras

Tipo específico de obstrucción que ocurre cuando la cantidad de cemento y de partículas finas del concreto no es suficiente para recubrir los agregados de mayor tamaño y las paredes del sistema de distribución. En estos casos, las piedras (o agregados más grandes de la mezcla) formarán una cuña dentro de la tubería. La resistencia al movimiento se vuelve entonces demasiado intensa y el concreto deja de moverse. *Ver también:* Obstrucción.

Tapón de Manguera Final

También conocido como tapón de supresión o tapa de extremo. Su propósito es impedir que se escape material del sistema de descarga (generalmente de la manguera final) y se caiga sobre personas o propiedades al transportar la pluma con una tubería llena.

Tramo Vertical

Secciones de las tuberías de distribución de concreto que van hacia arriba o hacia abajo. Estas secciones requieren procedimientos y reglas específicas para su instalación, soporte, limpieza e inspección. Por lo tanto, el personal dedicado al bombeo de concreto deberá tener capacitación específica sobre estos procedimientos y reglas antes de tratar de usarlos en la obra.

Tubería Independiente o Separada

Tubería que se agrega entre la bomba de concreto y el punto de descarga, distinta a la tubería de la pluma de colocación.

Vaciado/Descarga

Es usado por la industria de bombeo de concreto y en este manual como sustantivo. Es el trabajo específico para la bomba durante un período de tiempo dado. (“Comeremos después del vertido.”)

Válvula de Cierre

En hidráulica: válvula con capacidad de interrumpir el flujo o la presión del aceite hidráulico. Debe ser capaz de aguantar la máxima presión del circuito hidráulico que controla. En el concreto: válvula accionada hidráulica o manualmente que impide el flujo del concreto en cualquiera de las dos direcciones. La válvula de cierre debe ser capaz de soportar la máxima presión del concreto que pueda aplicar la bomba.

Vehículo Remolcador

En este manual *Vehículo Remolcador* se aplica solamente a los vehículos que arrastran bombas de concreto montadas sobre un remolque. Es el vehículo que se usa para remolcar la unidad en la ruta, en la obra o en el patio. Vea las reglas de seguridad relacionadas con este tema en la pagina 10 de este manual.

X. Señales de Mano Recomendadas

La Asociación Americana de Bombeo de Concreto (ACPA) recomienda utilizar las siguientes señales de mano como procedimiento estándar.

XI. Bibliografía

Para obtener mayor información sobre el bombeo de concreto consulte las obras que se mencionan a continuación. Los datos utilizados en la confección de este manual han sido extraídos de diversas fuentes, incluyendo los siguientes libros:

PUMPING CONCRETE AND CONCRETE PUMPS (BOMBEO DE CONCRETO Y BOMBAS DE CONCRETO) © F. W. Schwing, GmbH

CONCRETE PUMP OPERATOR'S GUIDE TO SAFETY (GUÍA DE SEGURIDAD DEL OPERADOR DE UNA BOMBA DE CONCRETO) © British Concrete Pumping Association

The MANUAL and ADVISORY SAFETY CODE of PRACTICE for CONCRETE PUMPING (El MANUAL Y CÓDIGO CONSULTOR DE SEGURIDAD de PRÁCTICA para el BOMBEO DE CONCRETO) © British Concrete Pumping Association

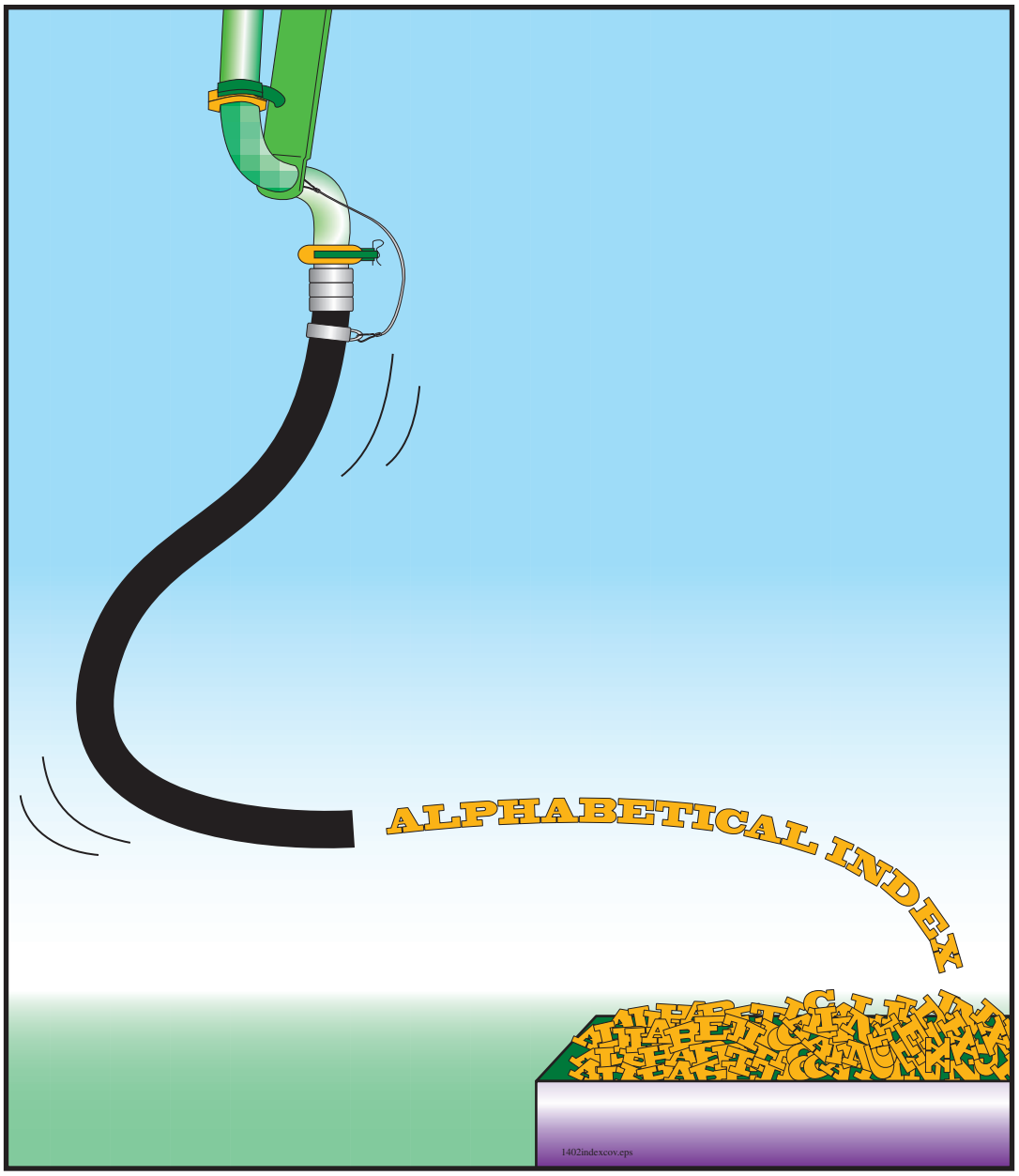
SAFETY STANDARD FOR CONCRETE PUMPS (NORMAS DE SEGURIDAD PARA BOMBAS DE CONCRETO, PLUMAS DE DISTRIBUCIÓN Y SISTEMA DE DESCARGA) publicado por el Concrete Pump Manufacturers Bureau.

Información técnica y/o gráficos adicionales fueron proporcionados por:

Construction Forms, Inc.

The American Concrete Pumping Association

Algunos dibujos cómicos fueron escaneados del libro CONCRETE PUMP OPERATOR'S GUIDE TO SAFETY © British Concrete Pumping Association. Usados con permiso.



Índice Alfabético

MANUAL DE SEGURIDAD

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C

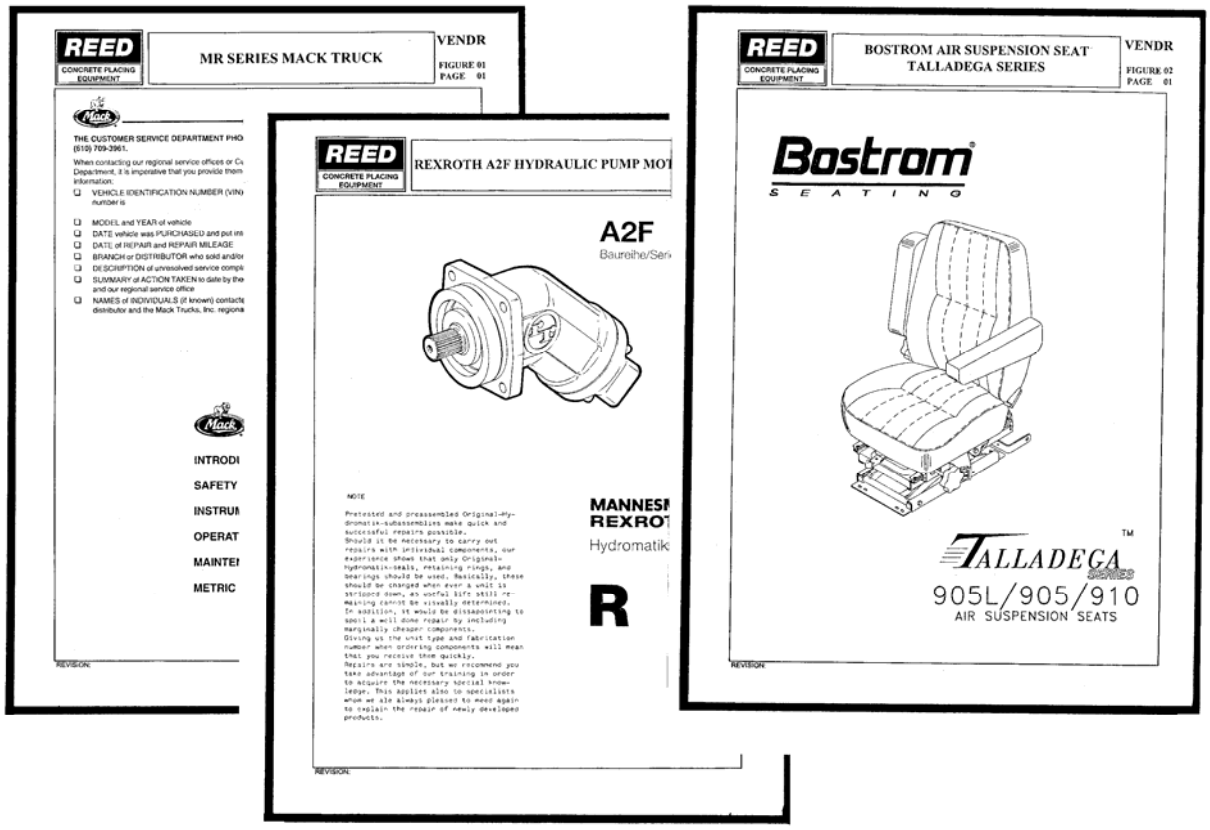
D

BOOM TRUCK

VENDOR INFORMATION

MACK TRUCK
BOSTROM SEATING
REXROTH A2F HYDRAULIC PUMP MOTOR
NBB NANO RADIO REMOTE CONTROL
REXROTH A4VG 71-180 HYDRAULIC PUMP
STIEBEL PTO GEAR BOX
CRK WASH WATER PUMP
PNN SYSTEM CABLE REMOTE CONTROL

REED TRUCK MOUNTED CONCRETE BOOM PUMP MODEL ***XXT37R***
VENDOR SECTION CONTAINS THE FOLLOWING FIGURES:


REED
CONCRETE PLACING EQUIPMENT
MR SERIES MACK TRUCK
VENDR
FIGURE 01
PAGE 01
THE CUSTOMER SERVICE DEPARTMENT PHO
(610) 709-3961.
When contacting our regional service offices or Cu
Department, it is imperative that you provide them
information:
VEHICLE IDENTIFICATION NUMBER (VIN)
number is
MODEL and YEAR of vehicle
DATE vehicle was PURCHASED and put int
DATE of REPAIR and REPAIR MILEAGE
BRANCH or DISTRIBUTOR who sold and/or
DESCRIPTION of unresolved service compla
SUMMARY of ACTION TAKEN to date by the
and our regional service office
NAMES of INDIVIDUALS (if known) contacte
distributor and the Mack Trucks, Inc. regiona
INTRODU
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OPERAT
MAINTE
METRIC
REVISION:
REED
CONCRETE PLACING EQUIPMENT
REXROTH A2F HYDRAULIC PUMP MOT
A2F
Baureihe/Seri
NOTE
Pretested and preassembled Original-Hy-
dromatik-subassemblies make quick and
successful repairs possible.
Should it be necessary to carry out
repairs with individual components, our
experience shows that only Original-
Hydromatik-seals, retaining rings, and
bearings should be used. Basically, these
should be changed when ever a unit is
stripped down, as useful life still re-
maining cannot be visually determined.
In addition, it would be dissapointing to
spoil a well done repair by including
marginally cheaper components.
Giving us the unit type and fabrication
number when ordering components will mean
that you receive them quickly.
Repairs are simple, but we recommend you
take advantage of our training in order
to acquire the necessary special know-
ledge. This applies also to specialists
whom we ale always pleased to meet again
to explain the repair of newly developed
products.
MANNESM
REXROT
Hydromatik
R
REVISION:
REED
CONCRETE PLACING EQUIPMENT
BOSTROM AIR SUSPENSION SEAT
TALLADEGA SERIES
VENDR
FIGURE 02
PAGE 01
Bostrom
SEATING
TALLADEGA SERIES
905L/905/910
AIR SUSPENSION SEATS
REVISION:

REVISION:

THE CUSTOMER SERVICE DEPARTMENT PHONE NUMBER IS (610) 709-3961.

When contacting our regional service offices or Customer Service Department, it is imperative that you provide them with the following information:

- ❑ VEHICLE IDENTIFICATION NUMBER (VIN) — This 17-digit number is
- ❑ MODEL and YEAR of vehicle
- ❑ DATE vehicle was PURCHASED and put into service
- ❑ DATE of REPAIR and REPAIR MILEAGE
- ❑ BRANCH or DISTRIBUTOR who sold and/or serviced the vehicle
- ❑ DESCRIPTION of unresolved service complaint or inquiry
- ❑ SUMMARY of ACTION TAKEN to date by the branch or distributor and our regional service office
- ❑ NAMES of INDIVIDUALS (if known) contacted at the branch or distributor and the Mack Trucks, Inc. regional service office

TABLE OF CONTENTS

THE VEHICLE

Basic Configuration

The MR has a low-entry, cab-forward-style operator's compartment. The low profile and excellent visibility are features that make this model popular throughout the refuse-hauling, construction and fire-fighting industries.

Vehicle Management and Control System (V-MAC)

The Vehicle Management and Control System, referred to as V-MAC, is an electronic engine control system with the ability to control and manage certain functions of the vehicle as well as monitor and store information.

Your vehicle may or may not be equipped with V-MAC. Vehicles equipped with V-MAC may have switches or controls located in slightly different locations than vehicles without V-MAC.

A complete description of the system components, their functions and locations on the vehicle is contained in the V-MAC Operator's Guide, TS725 (V-MAC) or TS780 (V-MAC II). If your vehicle has V-MAC, refer to TS725/TS780 for specific V-MAC information not found in this handbook.

⚠ WARNING

Never cut into the V-MAC system harness to power additional equipment.

INTRODUCTION

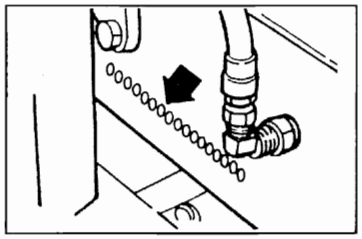
UNIT IDENTIFICATION

Locate the following serial numbers and write them in the boxes provided next to each illustration.

VIN Locations

The Vehicle Identification Number (VIN) in the two locations shown here must be the same.

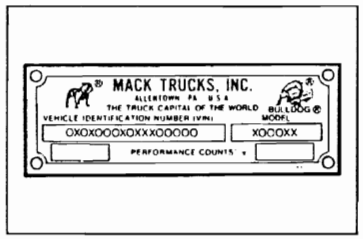
The **VIN frame stamping** is located on the right front frame rail.



Vehicle Identification Number

000038a

The **VIN plate** is located on the driver side, mounted on the seat riser.



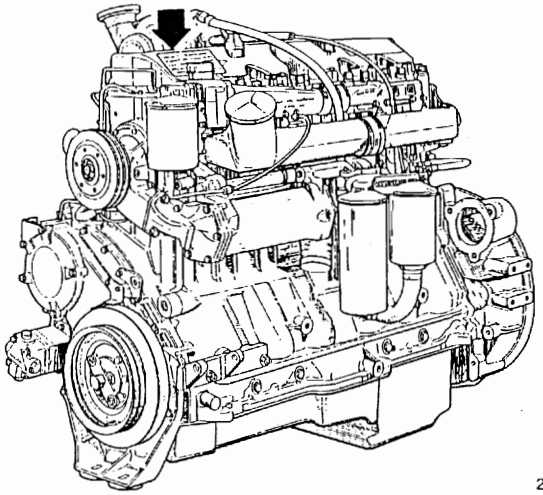
Vehicle Identification Number

000037a

Engine Information Plate

In compliance with the emissions standards requirements, an engine exhaust emissions control plate is affixed to one of the engine cylinder head covers for all MACK E7 and E9 (if equipped) diesel engines. This plate gives basic engine identification information and specifications for injection pump-to-engine timing and valve clearances.

The MACK E7 engine is shown for example purposes, where the information plate is found on the forward cylinder head cover.



200042a

INTRODUCTION

WARRANTY

Injection Pump and Governor Settings

⚠ CAUTION

Any unauthorized adjustments of the injection pump and governor settings, other than as specified, can cause serious damage to the engine.

Please be aware of the hazards of attempting to increase the power of the diesel engine in your chassis by adjusting injection pump and governor settings. Standard specifications for injection pump and governor settings permit the maximum allowable engine output. Adjustments of the injection pump and governor settings, other than as specified, can cause serious damage to the engine. In some engines, improper adjustments generally produce visual evidence of over-fueling, excessive fuel consumption and smoke. The turbocharged diesel engine usually does not produce visual evidence. The possibility of damage from improper adjustments is greater in the turbocharged diesel engine because the usual warning signs may not be present.

In the event that damage results from such unauthorized adjustments, as evidenced by improper settings in the injection pump and governor assembly or broken fastener seals of the same, the cost of repairing such damage will NOT be covered under the MACK Standard Vehicle Warranty.

Air Brake System

The MACK Standard Vehicle Warranty applies to the air brake system, as set forth in the Warranty, but only if the air brake system has not been subjected to unauthorized additions, deletions or modifications. If any such unauthorized additions, deletions or modifications are performed to the air brake system, Mack Trucks, Inc. disclaims any and all liability for any loss or damage arising out of a malfunction of the air brake system.

The air brake system was designed and built to conform to all applicable federal motor vehicle safety standards in effect at the time of manufacture. Tractor air systems are designed for operation as a tractor only, and truck air systems are designed to be operated as a truck only. If a tractor is going to be converted for operation as a truck, the air brake system must be reconfigured to that of a truck. Conversely, if a truck is going to be converted for operation as a tractor, the air system must be reconfigured to that of a tractor. Consult your MACK trucks distributor for additional information.

If any unauthorized additions, deletions or modifications are made to any portion of the air brake system which is required by Federal Motor Vehicle Safety Standards, Mack Trucks, Inc. makes no representation as to conformity with the Standards.

For complete warranty information, refer to Pedigreed Protection Plan (TS468) or Standard Vehicle Warranty (Form F034) furnished with your truck.

INTRODUCTION

CUSTOMER SERVICE

Questions and Complaints

Your satisfaction with the vehicle or service parts you purchase, and the service you receive at a Mack Trucks, Inc. subsidiary, distributor or service dealer, are our most important concerns.

If questions or complaints arise, we suggest that you first discuss the matter with the service manager at the MACK facility involved. If you are not satisfied with the service manager's response, contact the branch manager, principal or general manager of the distributorship, explain the situation and request assistance. Those requiring assistance at a service dealer should speak with the owner of the establishment.

If, for any reason, you need further assistance after dealing with the personnel at a MACK subsidiary or distributor, contact the nearest MACK regional service office and address your problem or request to our regional service manager. The regional service manager has the responsibility and the authority to recommend action in most cases and (with the aid of relevant district service personnel) will make every effort to conduct a fair review of your situation.

Addresses

The addresses and telephone and fax numbers of the Mack Trucks, Inc. regional offices are:

United States

Northeast Region — 2166 S. 12th St., P.O. Box M, Allentown, PA 18105-5000, TEL: (610) 709-3419, FAX: (610) 709-2220

Southeast Region — 6768 Southlake Parkway, Morrow, GA 30260, TEL: (770) 960-0511, FAX: (770) 960-0593

Central Region — 900 S. Frontage Rd., Suite 100, Woodridge, IL 60517, TEL: (708) 910-3330, FAX: (708) 910-3331

Southwest Region — 5605 N. MacArthur Blvd., #550, P.O. Box 165408, Irving, TX 75016-5408, TEL: (214) 518-1614, FAX: (214) 550-0389

Western Region — 20201 Mack St., P.O. Box 56658, Hayward, CA 94545-6658, TEL: (510) 732-0680, FAX: (510) 785-3803

SAFETY STATEMENT

Mack Trucks, Inc. cannot anticipate every possible occurrence which may involve a potential hazard. An accident can be avoided by recognizing potentially hazardous situations before an accident occurs. Correctly performed service procedures are critical for technician safety and safe, reliable operation of the vehicle.

⚠ DANGER

Driver attitude is the most important part of any effective vehicle safety system. Mack Trucks, Inc. strongly encourages all drivers and passengers to use their seat belts, drive defensively, remain alert and respect the speed limits. Many accidents can also be avoided through regular vehicle maintenance.

Certain everyday procedures like washing your truck and cleaning the windshield can also be hazardous because of the vehicle's height. Mack Trucks, Inc. does NOT recommend climbing up on your truck to perform these operations! Instead, stand on the ground and use brushes and squeegees mounted on extension poles. When better access is necessary (for instance, when washing the cab roof), use sturdy ladders held in place by someone on the ground.

SAFETY INFORMATION

CERTIFICATION LABELS

Safety Certification Label

National Highway Traffic Safety Administration (NHTSA) regulations require affixing a certification label to all vehicles.

NHTSA regulations also require that the certification label be affixed to either the hinge pillar, door latch post or the door edge that meets the door latch post next to the driver seat. If none of these locations are practical, it may be attached to the left side of the instrument panel or to an inward facing surface of the driver-side door.

In compliance with NHTSA regulations, your MR has a safety certification label affixed in one of the NHTSA locations listed above. This label may be either an Incomplete Vehicle and/or Completed Vehicle label. Both labels are described below.

Incomplete Vehicles

CHASSIS-CAB MANUFACTURED BY MACK TRUCKS,INC. DATE: 03/1996

THIS CHASSIS-CAB CONFORMS TO FEDERAL MOTOR VEHICLE SAFETY STANDARDS NOS. 101, 102, 103, 104, 106, 107, 111, 113, 115, 116, 124, 205, 206, 207, 208, 209, 210, AND 302.
THIS VEHICLE WILL CONFORM TO STANDARD NOS. 108, 120, AND 121 IF IT IS COMPLETED IN ACCORDANCE WITH THE INSTRUCTIONS CONTAINED IN THE INCOMPLETE VEHICLE DOCUMENT FURNISHED PURSUANT TO 49CFR PART 568. CONFORMITY TO THE OTHER SAFETY STANDARDS APPLICABLE TO THIS VEHICLE WHEN COMPLETED IS NOT SUBSTANTIALLY AFFECTED BY THE DESIGN OF THE CHASSIS-CAB.

VEHICLE IDENTIFICATION NUMBER (VIN): 1M2AA10YXTW008682 4MR3256

000249a

A chassis-cab is an incomplete vehicle with a completed occupant compartment that requires the addition of cargo-carrying, work-performing or load-bearing components to perform its intended functions.

The chassis-cab manufacturer must affix a label to the incomplete vehicle in one of the NHTSA locations listed above. This label provides the chassis-cab date of manufacture, VIN and vehicle certification information.

Completed Vehicles

In addition to the label supplied by Mack Trucks, Inc. as the chassis-cab manufacturer, a Completed Vehicle certification label, supplied by the body manufacturer, is affixed in the same general location. This label provides information pertaining to Gross Vehicle Weight Rating (GVWR), Gross Axle Weight Rating (GAWR), tire and rim information, etc.

On **MACK-completed vehicles**, this label contains the date of manufacture, VIN, GVWR, GAWR, and tire and rim data. It is found in one of the NHTSA locations listed above.

MANUFACTURED BY MACK TRUCKS, INC IN 03/1996 GVWR 22680 KG (50000 LB)
THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE VEHICLE IDENTIFICATION NUMBER 1M1AA13Y0TW069202

	GAWR			TIRES			RIMS					
FRONT:	5443	KG (	12000LB) WITH	11R24.5	G	,	24.5 X 8.25	, AT	724 KPA (	105 PSI) COLD	SINGLE
1ST INT:	8618	KG (	19000LB) WITH	11R24.5	G	,	24.5 X 8.25	, AT	724 KPA (	105 PSI) COLD	DUAL
2ND INT:		KG (	LB) WITH			,		, AT	KPA (	PSI) COLD	
REARMOST:	8618	KG (	19000LB) WITH	11R24.5	G	,	24.5 X 8.25	, AT	724 KPA (	105 PSI) COLD	DUAL

VEHICLE TYPE: TRUCK-TRACTOR 4MR3306

U.S. VEHICLES

THIS VEHICLE CONFORMS TO ALL APPLICABLE STANDARDS PRESCRIBED UNDER THE CANADIAN MOTOR VEHICLE SAFETY REGULATIONS IN EFFECT ON THE DATE OF MANUFACTURE/CE VÉHICULE EST CONFORME À TOUTES LES NORMES QUI LUI SONT APPLICABLES EN VERTU DU RÈGLEMENT SUR LA SÉCURITÉ DES VÉHICULES AUTOMOBILES DU CANADA EN VIGUEUR À LA DATE DE SA FABRICATION.
MANUFACTURED IN 03/1996 BY MACK TRUCKS, INC VEHICLE IDENTIFICATON NUMBER 1M1AA18Y8TW062524
GVWR/PNBV 23070 KG VEHICLE TYPE: TRUCK-TRACTOR/CAMION TRACTEUR

GAWR/PNBE-FRONT:	5033	KG WITH	11R24.5	G	TIRES, 24.5 X 8.25	RIMS, AT	690 KPA	COLD	SINGLE
GAWR/PNBE-1ST INT.:	8618	KG WITH	11R24.5	G	TIRES, 24.5 X 8.25	RIMS, AT	690 KPA	COLD	DUAL
GAWR/PNBE-2ND INT.:		KG WITH			TIRES,	RIMS, AT	KPA	COLD	
GAWR/PNBE-REARMOST:	8618	KG WITH	11R24.5	G	TIRES, 24.5 X 8.25	RIMS, AT	690 KPA	COLD	DUAL

4MR3311

CANADIAN VEHICLES

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ADVISORY LABELS

Throughout this book you will find paragraphs labeled *Service Hint*, *Note*, *Caution*, *Warning* and *Danger*. *Caution* and *Warning* labels are also found in various locations on the vehicle to alert drivers, operators and service technicians to situations which can cause personal injury or equipment damage. The labels shown are applicable to the MR model chassis at the time of publication and they are representative of what can be typically found on an MR. (Your vehicle may not contain all of the labels illustrated in this handbook.) These labels are for your benefit. Please look through this section and make a mental note of the labels, their locations and what they explain. Be sure to replace any label that is damaged.

Advisory Label Location (In Handbook)

Cautionary *signal words* (Danger-Warning-Caution) may appear in various locations throughout this manual. Information accented by one of these signal words must be observed to minimize the risk of personal injury to service personnel, or the possibility of improper service methods which may damage the vehicle or render it unsafe. Additional Notes and Service Hints are utilized to emphasize areas of procedural importance and provide suggestions for ease of repair. The following definitions indicate the use of these advisory labels as they appear throughout the manual:

⚠ CAUTION

Directs attention to unsafe practices which could result in damage to equipment and possible subsequent personal injury or death if proper precautions are not taken.

⚠ WARNING

Directs attention to unsafe practices which could result in personal injury or death if proper precautions are not taken.

⚠ DANGER

Directs attention to unsafe practices and/or existing hazards which will result in personal injury or death if proper precautions are not taken.

NOTE

An operating procedure, practice, condition, etc., which is essential to emphasize.

SERVICE HINT

A helpful suggestion which will make it quicker and/or easier to perform a certain procedure, while possibly reducing overhaul cost.

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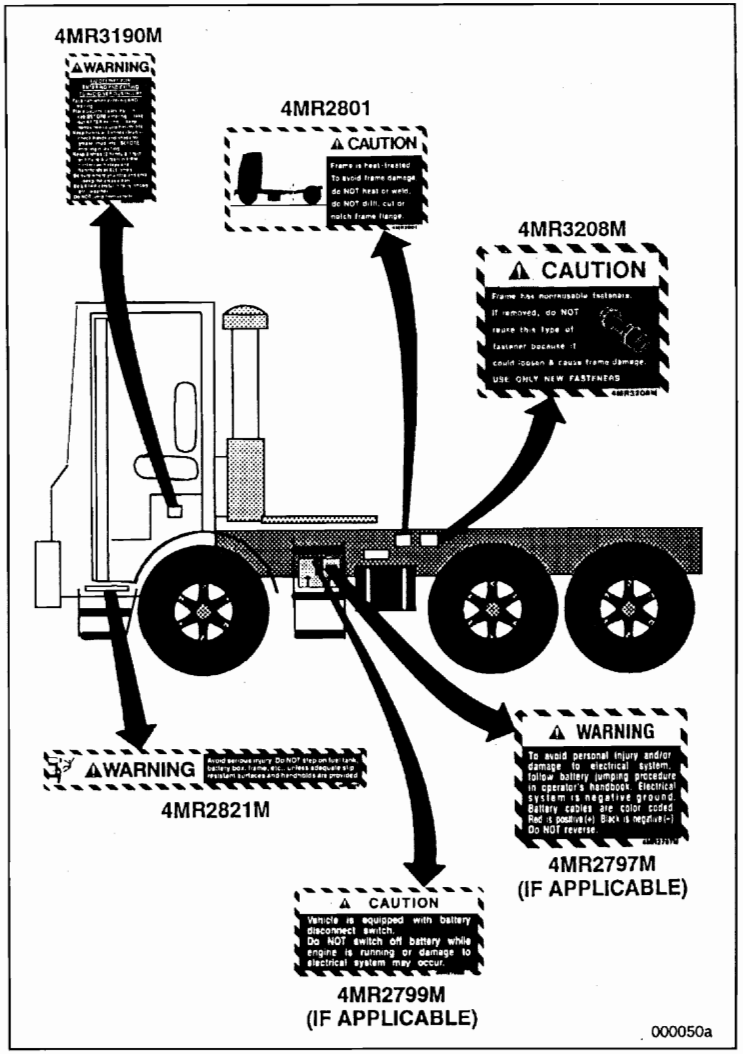
SAFETY INFORMATION

Advisory Label Location (On Truck)

Labels Found on Chassis



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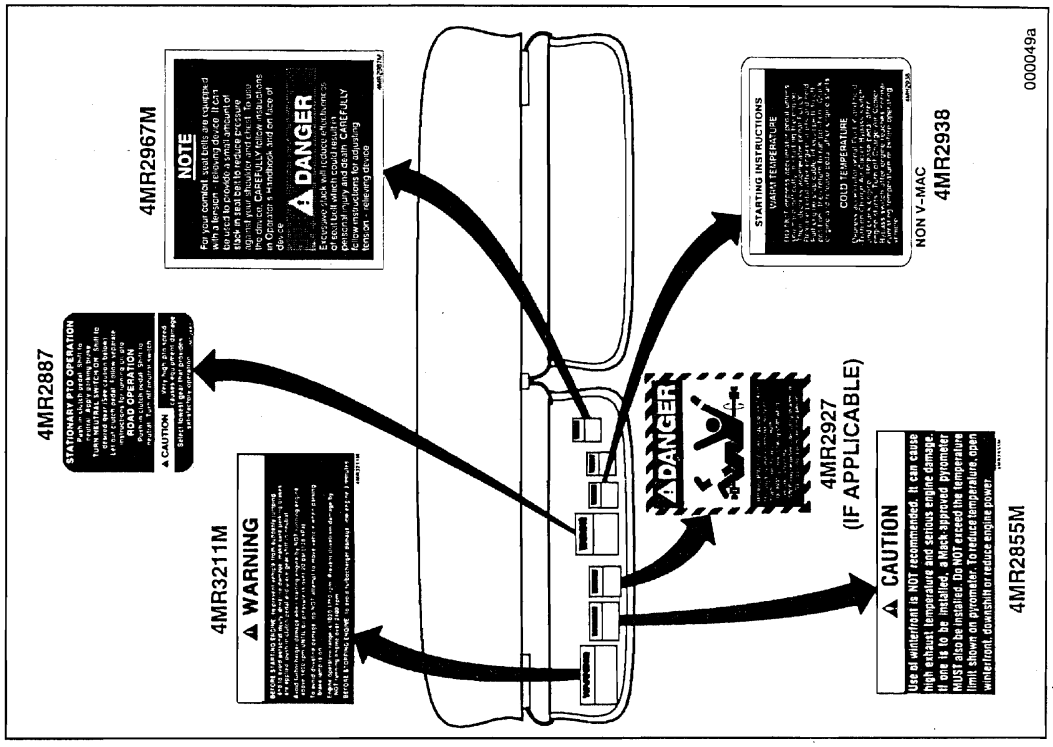
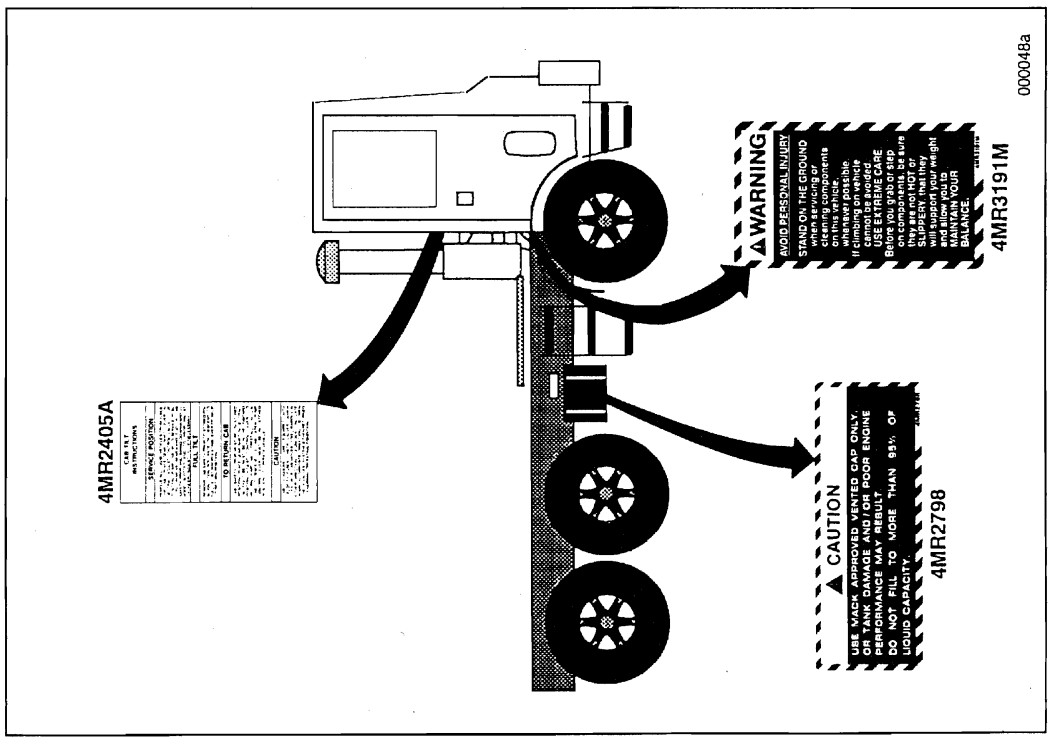
SAFETY INFORMATION

Labels Found on Driver-Side Sun Visor



SAFETY INFORMATION



REVISION:

Labels Found on Windshield

⚠ CAUTION

This tractor has an air brake system designed for TRACTOR OPERATION ONLY. If this tractor is converted for operation as a TRUCK, the air brake system MUST be changed to provide SAFE OPERATION as a TRUCK. Contact your MACK Dealer for instructions.

DO NOT remove until delivered to the ultimate consumer. 4MR21027

⚠ CAUTION

This truck has an air brake system designed for TRUCK OPERATION ONLY. If this truck is converted for operation as a TRACTOR the air brake system MUST be changed to provide SAFE OPERATION as a TRACTOR. Contact your MACK Dealer for instructions.

DO NOT remove until delivered to the ultimate consumer. 4MR21031

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NOTE

Label to be removed upon delivery to the end user.
Refer to page 11 for additional information.

SAFETY INFORMATION

CAB ENTRY/EXIT

Three-Limb Contact

When entering or exiting a cab, the driver and/or passenger must have at least three limbs in contact with the vehicle or ground at all times. This means that a minimum of two hands and one foot, or one hand and two feet must be in FIRM contact with the vehicle or ground to avoid accidents due to carelessness.

⚠ WARNING

When entering or exiting the cab, be aware of the condition of steps and handrails, especially in cold weather. During cold weather operations, ice and snow may accumulate and should be cleaned off to prevent slipping.

During cold, wet conditions when ice, slush, or snow may accumulate on the cab doorstep and other external surfaces, extra caution must be observed when entering or exiting the cab.

⚠ WARNING

To avoid injury, use the following guidelines when entering and exiting the cab:

— Face the cab when entering and exiting.

— Keep hands free to grip handholds. Place papers, coats, etc., in the cab before entering, and remove after exiting.

— Keep hands and shoes clean. Check hands and shoes for grease, mud, etc., before entering and exiting to avoid slipping.

— Do NOT jump from the vehicle.

— Do NOT step on the fuel tank, battery box, frame, etc., unless adequate slip-resistant surfaces and handholds are provided.

— Be aware of the condition of steps and handholds, especially in rainy or snowy weather. Clean grease, oil, mud, snow, ice, etc., from steps and handholds before entering and exiting to avoid slipping.

SAFETY INFORMATION

NOTE

The illustrations on the following pages are typical for purposes of emphasizing a safe method for hand/foot placement and movement during cab entry/exit. Your truck may not look exactly like the one pictured.

NOTE

The arrows in the illustrations are intended to show movement. Notice that three-limb contact is maintained even when one foot, or one hand, is moving.

Left Side

The following cab entry and exit procedures, along with the safety guidelines outlined in Three-Limb Contact earlier in this section, can be used with your MACK truck.

Entry

These entry procedures are illustrated on the following page:

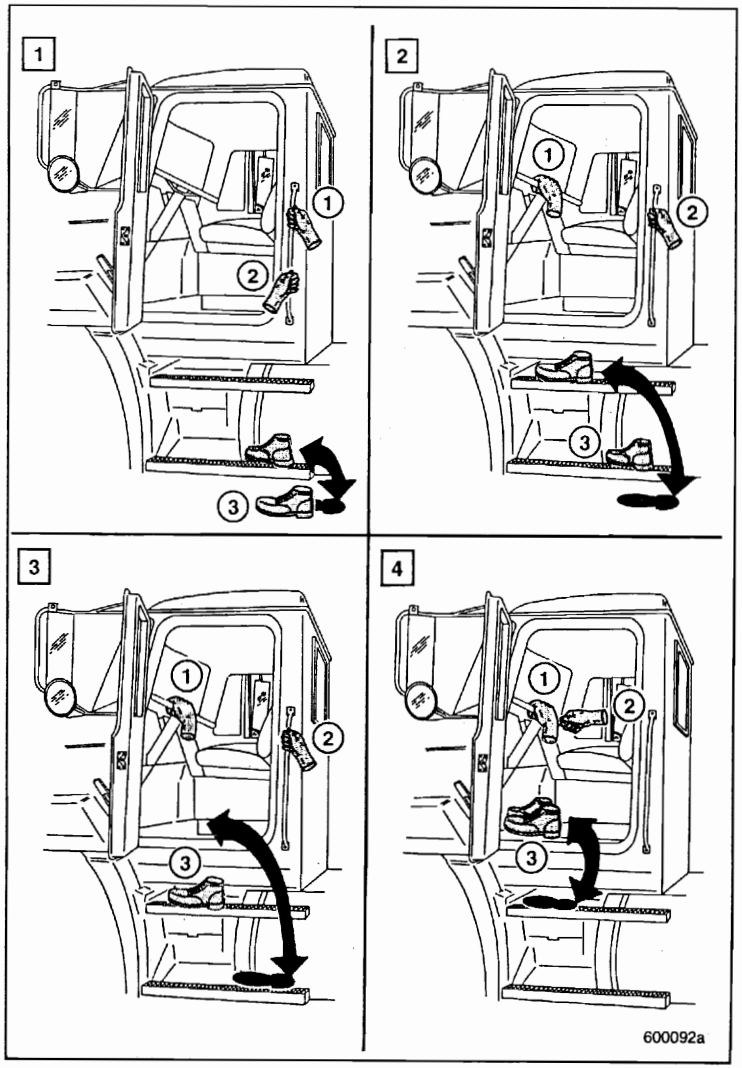
1. With both feet firmly on the ground, grab the outside handhold with both hands or grab the outside handhold with one hand and grab the steering wheel or inside handhold (if equipped) with the other hand. Then raise one foot to the bottom step. (See figure 1.)
2. Maintain a firm grip on the handholds and/or steering wheel and raise your other foot to the top step. If the truck has only one step, go on to step 3. (See figure 2.)
3. While still gripping the handholds and/or steering wheel, raise one foot to the cab floor. (See figure 3.)
4. Move one hand at a time to the steering wheel, inside handhold (if equipped) or cab interior. Bring the other foot inside the cab and sit down. (See figure 4.)

Exit

To exit, follow the illustrations in reverse order:

1. With both hands gripping the steering wheel, inside handhold (if equipped) or cab interior, stand up and face the inside of the cab. Move one foot to the top step. (See figure 4.)
2. Move one hand to the outside handhold and grip the steering wheel, inside handhold (if equipped), or cab interior with the other hand. With one foot firmly on the top step, lower the other foot to the bottom step. If the truck has only one step, lower the other foot to the ground and go on to step 4. (See figure 3.)
3. Maintain a firm grip on the handholds and/or steering wheel, and keep one foot firmly on the bottom step. Then lower the other foot to the ground. (See figure 2.)
4. With both hands firmly gripping the handholds and/or steering wheel, lower the other foot to the ground. (See figure 1.)

SAFETY INFORMATION



Right Side

The following cab entry and exit procedures, along with the safety guidelines outlined in the Three-Limb Contact section, can be used with any MACK truck. If any of the following entry/exit procedures seem unclear, or if you have any questions, please contact your MACK distributor for assistance.

Entry

These entry procedures are illustrated on the following page:

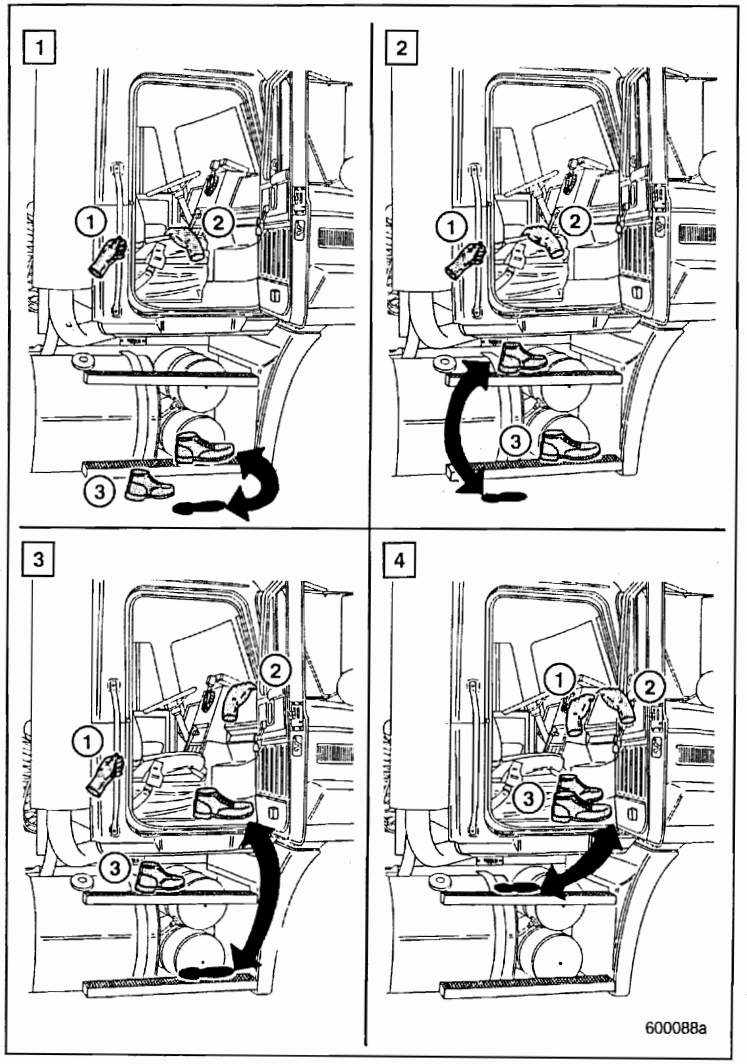
1. With both feet firmly on the ground, grab the outside handhold with both hands, or grab the outside handhold with one hand and grab the inside handhold (if equipped) or cab interior with the other hand. Then raise one foot to the bottom step. (See figure 1.)
2. Maintain a firm grip on the handholds and/or cab interior and raise your other foot to the top step. If the truck has only one step, go on to step 3. (See figure 2.)
3. While still gripping the handholds and/or cab interior, raise one foot to the cab floor. (See figure 3.)
4. Move one hand at a time to the cab interior for support, bring the other foot inside the cab and sit down. (See figure 4.)

Exit

To exit, follow the illustrations in reverse order:

1. With both hands gripping the cab interior or inside handhold (if equipped), stand up and face the inside of the cab. Move one foot to the top step. (See figure 4.)
2. Move one hand to the outside handhold and grip the inside handhold (if equipped) or cab interior with the other hand. With one foot firmly on the top step, lower the other foot to the bottom step. If the truck has only one step, lower the other foot to the ground and go on to step 4. (See figure 3.)
3. Maintain a firm grip on the handholds and/or cab interior, and keep one foot firmly on the bottom step. Then lower the other foot to the ground. (See figure 2.)
4. With both hands firmly gripping the handholds and/or cab interior, lower the other foot to the ground. (See figure 1.)

SAFETY INFORMATION



Cab Door Seals and Key Locks

Hollow-core rubber weather seals around some cab doors may lose their resilience in extremely cold temperatures (i.e., −40°F/ −40°C and below). Under these conditions, it may be necessary to drill holes to penetrate the hollow core. This allows entrapped air to escape, thereby easing the opening/closing of cab door(s).

Be sure to keep the key locks clean and dry to prevent occasional winter freeze-up. Use of antifreeze lubricants is neither required nor recommended.

Deck Plate Access

There may be a time when you will need to climb up behind the cab. If your vehicle is equipped with a deck access package, steps and a handhold are provided so you can get to this area safely. Review the rules in the Three-Limb Contact section before climbing behind the cab.

Climbing Up

These procedures are illustrated on the following page:

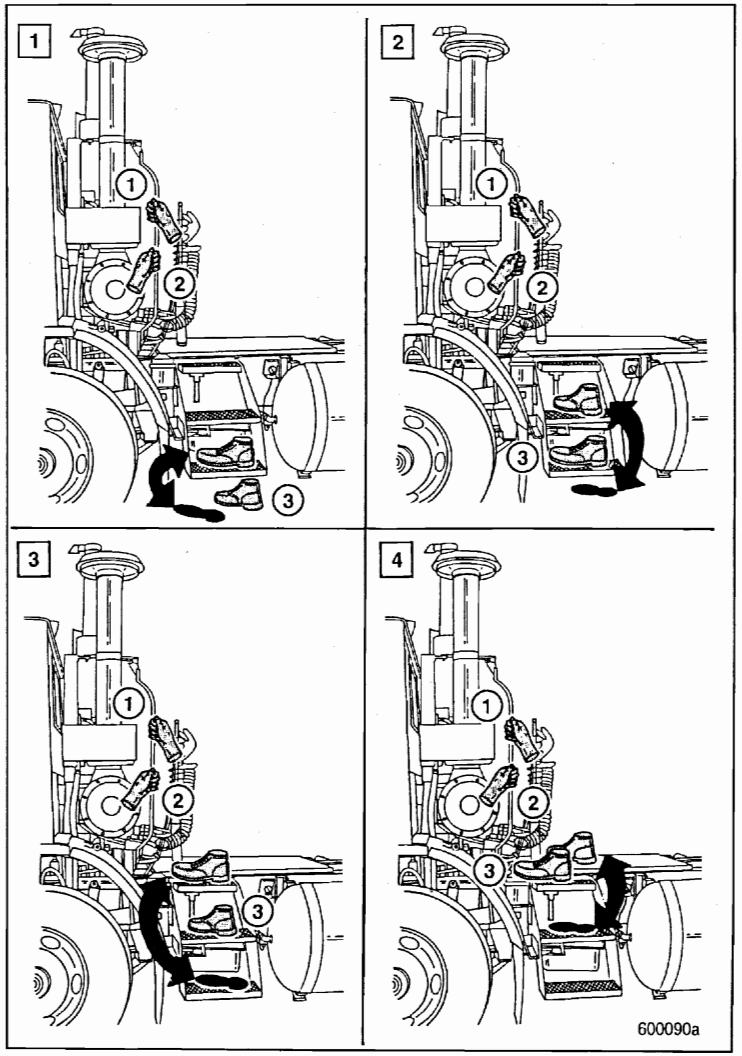
1. Grab the handhold with both hands. Then move one foot to the bottom step. (See figure 1.)
2. While still gripping the handhold, and with one foot planted firmly on the bottom step, move your other foot to the middle step. (See figure 2.)
3. Then with one foot planted firmly on the middle step, move your left foot to the top step. (See figure 3.)
4. Finally, move your other foot from the middle step onto the deck plate. (See figure 4.)

Climbing Down

To climb down from behind the cab, follow the illustrations in reverse order:

1. Grab the handhold with both hands and move one foot to the top step. (See figure 4.)
2. While firmly gripping the handhold, and with one foot on the top step, move your other foot to the middle step. (See figure 4.)
3. Then with one foot planted firmly on the middle step, place the other foot on the bottom step. (See figure 3.)
4. With both hands still gripping the handhold, move your other foot from the middle step to the ground. (See figure 2.)
5. Finally, move foot from bottom step to the ground. (See figure 1.)

SAFETY INFORMATION



SEAT BELTS

⚠ DANGER

The use of seat belts is required in some states and is strongly recommended at all times, especially during adverse road conditions associated with winter weather. Failure to use seat belts can result in SEVERE bodily injury.

Operation

MACK vehicles manufactured on or after September 1, 1990 must have locking retractable seat belts. For all seating positions on your MACK vehicle, this type of seat belt is a combination lap and shoulder belt.

This type of belt is designed to lock (that is, prevent belt travel out of the retractor) only during sudden stops or impacts. This feature allows the operator to move freely under normal conditions. The seat belts cannot be locked by jerking on the belt, except during sudden stops or harsh bumps.

Fastening

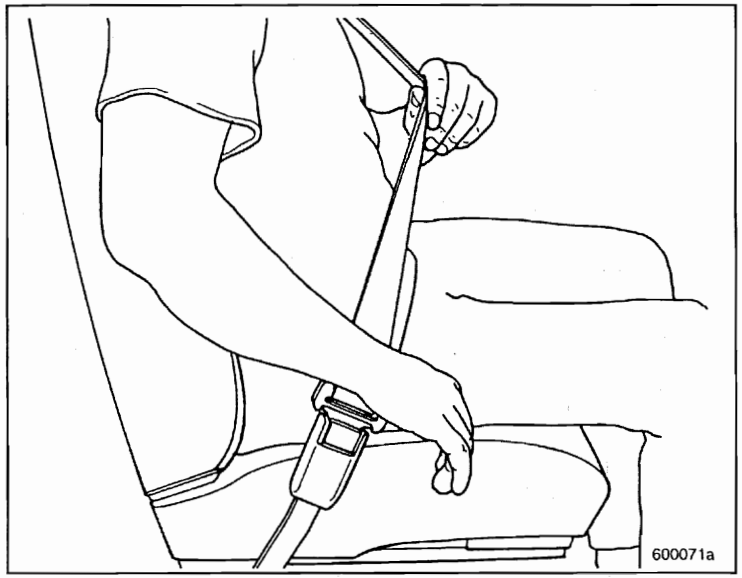
1. Pull clip so the belt crosses your shoulder and lap and insert it into the buckle until an audible snap is heard.

⚠ WARNING

Use the shoulder belt only on the shoulder that is closest to the vehicle door. Never wear the shoulder portion of the belt under your arm or behind your back. Improper use will increase your chances of injury during a collision.

2. Make sure the clip is securely fastened into the buckle.

SAFETY INFORMATION



3. To tighten the lap portion of the combination belt, pull upward on the shoulder portion until the lap portion fits you snugly. The belt should rest as low on your hips as possible.

Unfastening

Push down on the button to release the belt.

⚠ WARNING

Do NOT wear seat belt loosely. Do NOT use one belt for more than one person. Do NOT wear retractor belt with webbing wound on retractor drum. Do NOT bleach or dye belt, as this may cause severe loss of strength. Do NOT install belt in a truck with weakened floor until the floor has been replaced or reinforced.

Maintenance

- Keep belt clean and dry.
- Clean with mild soap solution and lukewarm water.
- Periodically inspect belt, retractor, and mounting points for damage or corrosion that could materially lessen effectiveness of belt installation. Replace all inadequate parts.

NOTE

Seat belt assemblies must be replaced after an accident if they have been subjected to loading by occupants (even if no damage is obvious), or if they have been damaged by an accident (bent retractor, torn webbing, etc.). If there is any question regarding belt or retractor condition, replace the appropriate part.

The Komfort® Latch System

Track III Three-Point Seat Belt Assembly

The Track III three-point seat belts installed in this chassis are designed to provide the highest degree of operator safety, comfort and convenience. Additional comfort is provided by the Komfort Latch mechanism which is incorporated into the seat belt assembly, and may be used to relieve any discomfort caused by the constant pressure of engaged seat belts.

Seat Belt Operation

To buckle the seat belt, grasp the latch portion of the buckle, bring it across your lap (from outboard to inboard) and insert it into the fixed buckle which is mounted to the floor or seat (depending on seat type). With the belt properly latched, the pelvic and upper torso restraints will be in place and automatically adjusted to provide a snug fit.

SAFETY INFORMATION

Komfort Latch Feature

If the constant tension of the buckled seat belt causes any discomfort, engage the Komfort Latch as follows:

⚠ WARNING

Do NOT attempt to engage the Komfort Latch feature while the truck is in motion.

Engagement — Pull the webbing of the shoulder belt away from the upper torso, pulling only as much slack as needed while still allowing the belt to exert slight pressure against your chest and shoulder. (Maximum amount of slack should not exceed one inch when measured from the chest to the belt.) While holding the slack, lift the lever located on top of the Komfort Latch mechanism upward to clamp the webbing in place.

Normal Release — To unfasten the seat belt, simply release the buckle and give the shoulder belt a quick tug to release the Komfort Latch mechanism. Allow the belt to retract into the retractor.

Emergency Release — In the event of an emergency, release the seat belt buckle. It is not necessary to release the Komfort Latch in an emergency situation.

NOTE

If forward movement is required while the Komfort Latch mechanism is latched, the latch automatically releases when you lean against the shoulder portion of the belt. Repeat the above steps to reset the Komfort Latch, if desired, after forward movement is no longer required.

⚠ DANGER

Excessive slack will reduce effectiveness of the seat belt, which could result in personal injury and death. CAREFULLY follow the instructions for adjusting the tension-relieving device.

SAFETY INFORMATION

SAFETY TIPS FOR COLD WEATHER OPERATION

Driver Visibility

Poor driver visibility is not only annoying, but extremely unsafe under any circumstances. Without proper maintenance of visibility-related components, adverse weather conditions such as rain, snow and frost can seriously reduce visibility. Take time before winter arrives to check the following:

- Windshield Wipers
  - — Check windshield wiper operation and speeds.
  - — Inspect condition and travel of blades. Install new refills for any blades that are cracked, brittle, torn, or coated with road oil along their wiping edge.
- Windshield Washers
  - — Check operation of windshield washer.
  - — Inspect system hoses and replace if brittle or worn.
  - — Inspect washer reservoir. Drain and flush if dirt particles are evident in washer solution.
  - — Fill reservoir with commercially available non-freezing type washer fluid.

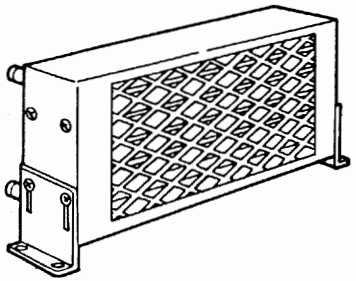
⚠ CAUTION

Do NOT fill reservoir with water only. Even though non-freezing type washer fluid is recommended, do not attempt to clear the windshield of ice by activating the windshield washer and wipers. Ice accumulations should be removed manually by using a scraper.

- Heater/Defroster
  - — Check operation and blowers for speed control, noise and temperature.
  - — Inspect heater core for signs of corrosion and/or leakage.
  - — Check that the defroster blend door is operating correctly and that all ducting is connected properly.
  - — Be sure that vents are not obstructed by debris or other objects.

Auxiliary Cab Heater

Ensure maximum in-cab comfort even under severe cold weather conditions. See your nearest MACK subsidiary or distributor for a wide range of auxiliary in-cab heaters to fit your chassis (see figure below).



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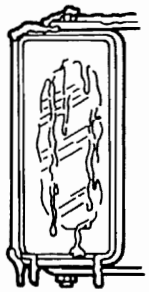
SAFETY INFORMATION

Outside Mirror Heater

In areas of frequent snowfall and ice, it may be beneficial to install heated mirrors which will defrost and de-ice cab mirrors. Heated mirrors eliminate the need to pull off the highway and stand on the roadside to scrape ice and snow from the mirrors during winter driving conditions.



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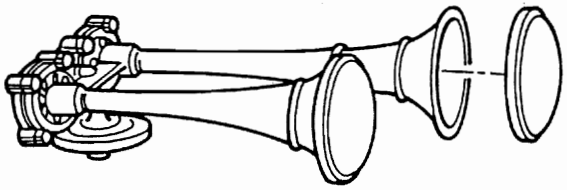
Air Horn Snow Shield

To prevent snow from clogging the air horn bell, thereby maintaining maximum sound output in snowy conditions, installation of an air horn snow shield is recommended.



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INSTRUMENT PANEL

Tell-Tales

A tell-tale, by definition, is a display that indicates, by means of a light-emitting signal, the actuation of a device, a correct or defective functioning or condition, or a failure to function.

The operator should become familiar with these symbols to recognize and react, if necessary, to the indicated condition.

Colors

To promote visual recognition internationally, specific colors for tell-tales have been established. Unless governmental regulations in the area where the vehicle is to be used, or engineering directives specify otherwise, the standard colors are:

- **Blue** — high-beam headlights
- **Flashing Green** — turn signals
- **Flashing Red** — hazard condition involving the safety of personnel
- **Steady Green** — system in operation
- **Steady Red** — warning, immediate action required
- **Amber** — early warning, such as low fuel or anti-lock malfunction

Tell-tale symbols are shown in the instrument panel illustrations on the following pages.

INSTRUMENTS AND CONTROLS

Panel Arrangement

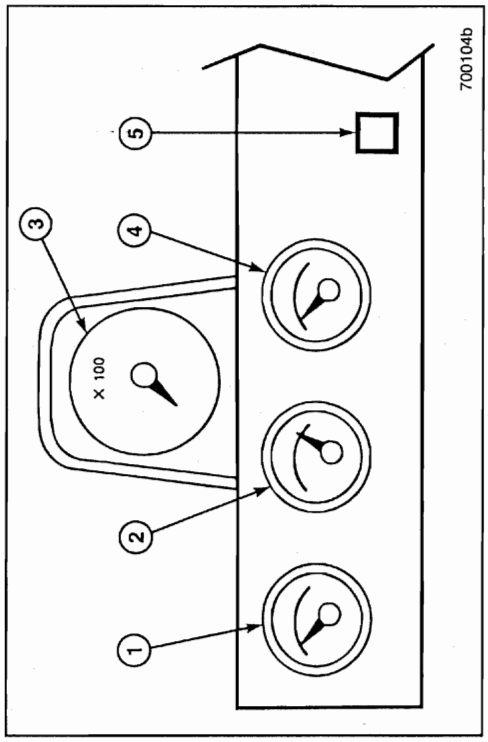
Your view from the driver seat should look something like the illustrations shown. The layout has been designed to provide the operator with a good view of the gauges and controls (which are placed so they are within easy reach). The instrument panel, as shown in the following drawing, is broken down into four or five main sections. For easy identification we will refer to them, from left to right, as Panels A, B, C, D and E (where necessary).

NOTE

This section is intended to show all the possible instruments and controls available for your truck. However, depending on the options you chose, your truck may not have all of the instruments and controls shown here, and they may not be in exactly the same position.

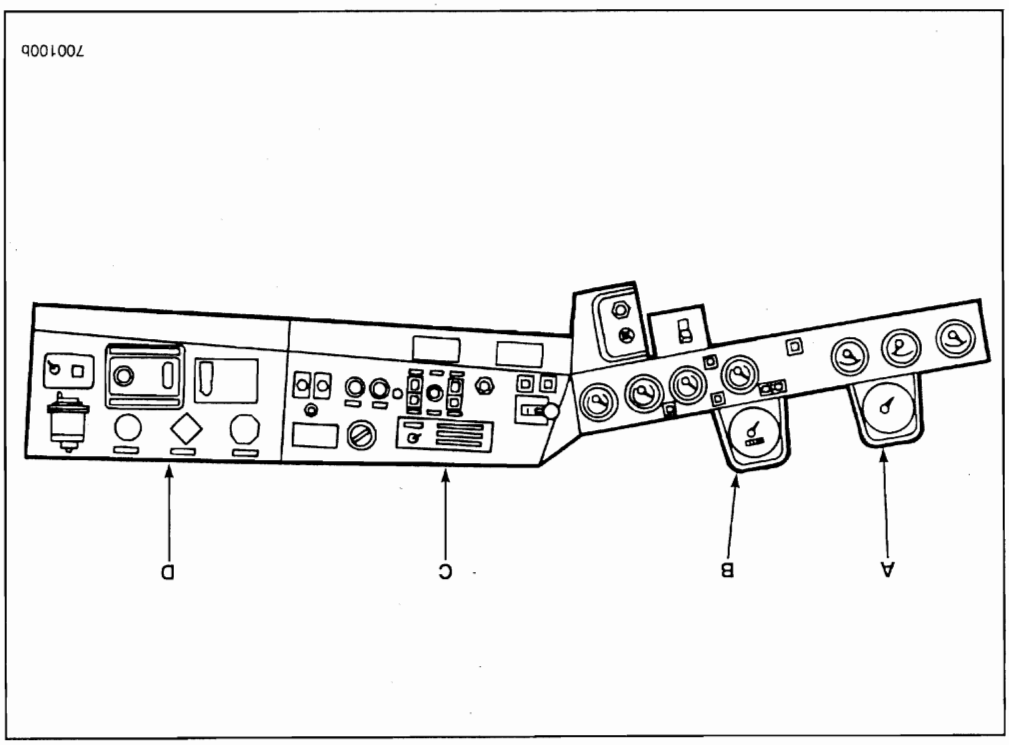
INSTRUMENTS AND CONTROLS

Panel A

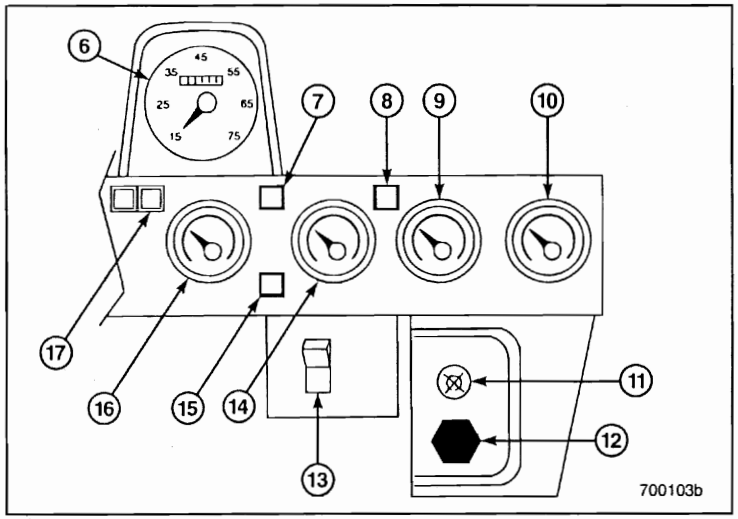


1. Voltmeter
2. Coolant Temperature Gauge
3. Tachometer
4. Oil Pressure Gauge
5. Engine Shutdown Indicator (Red)

INSTRUMENTS AND CONTROLS



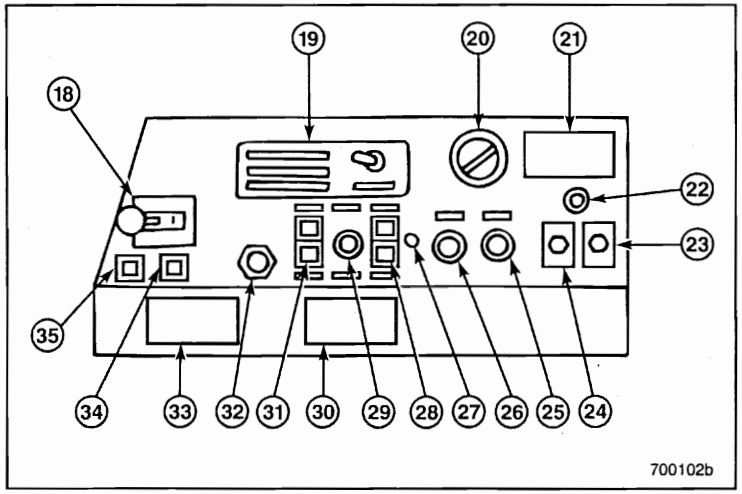
Panel B



6. Speedometer/Odometer	12. Throttle (If Equipped)
7. Parking Brake Indicator (Red)	13. Power Take-Off Switch
8. High Beam Indicator (Blue)	14. Fuel Gauge
9. Hour Meter	15. Low Air Pressure Warning Indicator (Red)
10. Engine Oil Temperature Gauge	16. Air Pressure Gauge
11. Engine Stop Control	17. Turn Signal Indicators

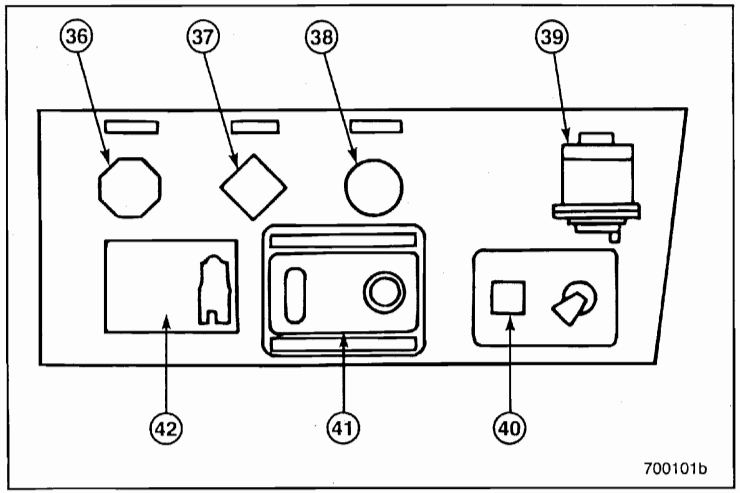
INSTRUMENTS AND CONTROLS

Panel C



18. Trailer Brake Lever	27. Cigar Lighter
19. Climate Control Panel	28. Light Switch
20. Air Vent	29. Panel Lights Rheostat
21. Battery Disconnect Switch Caution Label 4MR2799	30. Transmission Shifter Neutral Inhibitor Label 4MR2860
22. Engine Shutdown Override	31. Clearance Light Switch
23. Mirror Defroster Switch	32. Combination Starter and Electrical Switch
24. Mirror Adjustment Switch	33. PTO Overspeed Label 4MR2856
25. Right Windshield Wiper/ Washer Control	34. Power Take-Off Overspeed Warning Indicator (Amber)
26. Left Windshield Wiper/ Washer Control	35. Engine Brake Switch

Panel D



36. Trailer Air Supply Valve	40. Charge Air Cooler Bypass Switch (If Equipped)
37. Parking Brake Valve	41. Power Divider Switch
38. Tractor Parking Brake	42. Power Take-Off Switch
39. Air Filter Restriction Indicator	

INSTRUMENTS AND CONTROLS

① **Voltmeter** — This gauge indicates the surface charge of the battery with the ignition switch ON and the engine NOT running. With engine running, gauge indicates condition of charging system.

The voltmeter will provide useful information. When the reading is observed during cranking, the reading normally should not drop below 10 volts. Lower readings indicate corroded connections at the cranking motor or at the battery terminals of defective or discharged batteries.

② **Coolant Temperature Gauge** — The normal operating range of a MACK engine, as indicated by the coolant, is between 170°F and 225°F (77°C and 107°C).

Consult the appropriate vendor engine manual if your vehicle is not equipped with a MACK engine.

⚠ CAUTION

Coolant temperature must NOT exceed 225° F (107° C).

③ **Tachometer** — Engine speed is indicated in revolutions per minute (RPM). The tachometer readings should be used as a guide for shifting and to prevent engine damage due to overspeed.

④ **Oil Pressure Gauge** — Under normal operating conditions, the engine oil pressure will be between 30 and 84 psi (207 and 579 kPa) at governed speed on a MACK six-cylinder engine, depending on engine type speed and oil viscosity. Oil pressure should be between 10 and 35 psi (69 and 241 kPa) on E7 engines at idling speed.

E9 engines (if equipped) should be between 25 and 46 psi (172 and 317 kPa) at 600 RPM. At governed speed, a hot oil reading should be between 50 and 100 psi (345 and 690 kPa).

Should pressure at operating speeds drop suddenly from normal reading, stop engine immediately and determine cause. Other manufacturers' engines may have different requirements and specs. Consult the appropriate manufacturers' engine manuals for their respective pressures.

⑤ **Engine Shutdown Indicator (Red)** — If low water level, low oil pressure or high water temperature occurs, the light will go on. If the vehicle is equipped with the shutdown feature, the driver has about 15 seconds to pull to the side of the road before the engine shuts off.

⑥ **Speedometer/Odometer** — Indicates road speed in miles and/or kilometers per hour and total distance vehicle has traveled.

⑦ **Parking Brake Indicator** (Red)

⑧ **High Beam Indicator** (Blue)

⑨ **Hour Meter** — Indicates hours of engine operation. Hours of operation should be used as a guide for certain engine or PTO maintenance operations.

⑩ **Engine Oil Temperature Gauge** — Indicates the temperature of the engine oil.

⚠ CAUTION

Maximum safe oil temperature is 235° F (113° C). Continued operation with oil above this temperature will cause rapid deterioration of the oil's lubricating properties and is NOT recommended.

⑪ **Engine Stop Control** — Pull out to stop the engine (not used on electronically controlled engines, or chassis having a key switch shut-off feature).

⑫ **Throttle (If Equipped)** — Pull out to increase idling speed. Turn clockwise to lock in position.

⚠ WARNING

The throttle was designed to allow the operator to increase the idle speed of the engine. Uses other than what the throttle was designed for are strictly prohibited. Misuse may cause damage to equipment or even fatal injuries.

INSTRUMENTS AND CONTROLS

⑬ **Power Take-Off Switch** — Push top in to turn on; push bottom in to turn off.

⑭ **Fuel Gauge** — Registers fuel level in supply tank(s).

⑮ **Low Air Pressure Warning Indicator** (Red)

⑯ **Air Pressure Gauge** — Normal operating air pressure is between 105 psi (724 kPa) and 135 psi (931 kPa) in both air brake systems. If pressure drops below 75 psi (± 5 psi) in either system, the warning buzzer and warning light will go on. Determine the cause of failure before proceeding. Primary air pressure is supplied to the rear brakes and is indicated by the green pointer on the gauge. Secondary air pressure is supplied to the steering axle brakes and indicated by the orange pointer.

⑰ **Turn Signal Indicators** — Flash green when the turn signals are activated.

⑱ **Trailer Brake Lever** — Pull down to activate the trailer brakes.

⚠ WARNING

The trailer braking system must NOT be used for parking.

⑲ **Climate Control Panel** — See the CLIMATE CONTROL section for more information.

⑳ **Air Vent** — Rotate knob to open or close the air vent.

㉑ **Battery Disconnect Switch Caution Label 4MR2799** — This label states that "Vehicle is equipped with battery disconnect switch. Do NOT switch off battery while engine is running or damage to electrical system may occur."

㉒ **Engine Shutdown Override** — Allows the operator to temporarily override the engine shutdown system for the purpose of moving the vehicle to safety.

㉓ **Mirror Defroster Switch** — This is a two-position rocker switch. Push the top to activate outside rearview mirror defrosters. Push the bottom in to turn the mirror defrosters off.

㉔ **Mirror Adjustment Switch** — This two-position switch allows the operator to adjust the passenger-side rearview mirror.

㉕ and ㉖ **Windshield Wiper/Washer Control** — Push knob in to activate the washers. The 12 o'clock position is OFF. The area between OFF and LOW is intermittent wiper control. Four o'clock position is LOW speed. Five o'clock position is HIGH speed.

㉗ **Cigar Lighter**

㉘ **Light Switch** — This is a three-position switch allowing the operator to choose between parking lights (push bottom in), headlights (push top in), or OFF (middle position).

㉙ **Panel Lights Rheostat** — Clockwise rotation decreases dash light intensity.

NOTE

Panel lights will not go on unless Light Switch is ON.

㉚ **Transmission Shifter Neutral Inhibitor Label 4MR2860** — This label states, "This vehicle is equipped with a transmission shifter neutral inhibitor system. Neutral to Drive range shifts are automatically prevented at high engine speeds. After completing neutral PTO operation, reduce engine speed to below 900 RPM to allow neutral to range shift."

㉛ **Clearance Light Switch** — This is a two-position switch. Push the top to activate the clearance lights on the tractor and the trailer. Push the bottom to turn the switch OFF.

㉜ **Combination Starter and Electrical Switch** — When key is straight up and down, the switch is OFF. Turn counterclockwise to activate accessories. To start the engine, turn key clockwise. As soon as the engine starts, release the key (which will automatically return to running position). When switch is turned to ON in either direction, a warning buzzer will sound if air pressure is below 65 ± 5 psi (448 ± 34 kPa). Buzzer shuts off as soon as sufficient air pressure is restored.

V-MAC — For information on the engine protection/shutdown system as it relates to V-MAC, consult TS725 (V-MAC I) or TS780 (V-MAC II).

INSTRUMENTS AND CONTROLS

㉝ **PTO Overspeed Label 4MR2856** — This label states, "Yellow light indicates PTO overspeed. PTO system is automatically disengaged. To reset, reduce engine speed to idle." This label applies to chassis equipped with a Power-Pro system only.

㉞ **Power Take-Off Overspeed Warning Indicator (Amber)** — Indicates PTO has automatically disengaged. To reset, reduce engine speed.

㉟ **Engine Brake Switch** — E7 engines use the Jacobs compression release engine brake, or the Jacobs Stealth Retarding System™. With either system, the best braking performance is achieved in the 1800 to 2100 RPM range. For optimum retarding power, keep engine RPM as close to 2100 RPM as possible. For additional information, refer to the Jacobs driver's manual supplied with the vehicle.

⚠ CAUTION

Do NOT activate the engine brake until the engine has reached normal operating temperatures.

㊱ **Trailer Air Supply Valve** — This valve is NOT to be used for parking. Pull to apply trailer emergency brakes. Push to pressurize trailer air reservoir, releasing the trailer emergency brakes.

㊲ **Parking Brake Valve** — Pull to apply. Push to release. Applies tractor parking brakes and trailer brakes, if attached.

㊳ **Tractor Parking Brake** — Pull to apply. Push to release.

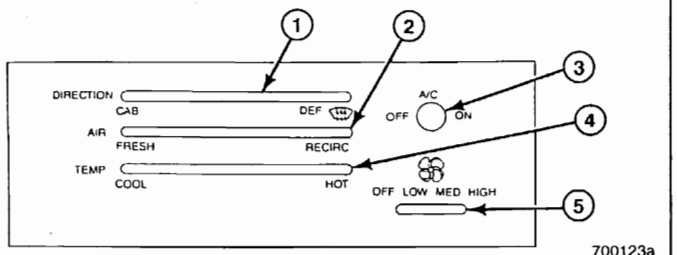
㊴ **Air Filter Restriction Indicator** — Indicator shows when the element needs servicing or replacement. When the red flag locks into position, service as soon as possible to prevent engine damage. Then reset the indicator after the filter change. Check the air filter indicator daily.

㊵ **Charge Air Cooler Bypass Switch (If Equipped)**

㊶ **Power Divider Switch** — See Inter-Axle Power Divider in the OPERATION section.

㊷ **Power Take-Off Switch** — Push top in to turn on; push bottom in to turn off.

CLIMATE CONTROL



1. Mode Selection Lever	4. Temperature Control Lever
2. Air Selection Lever	5. Fan Control Switch
3. A/C On-Off Switch	

① **Mode Selection Lever** — This lever lets you choose the air direction. The CAB position delivers air to the floor outlets, while the DEF position delivers air to the defrost louvers. Sliding the lever in between positions provides a blend of the two.

② **Air Selection Lever** — This lever lets operator choose between fresh air (from the outside) and recirculated air (within the cab).

③ **A/C On-Off Switch** — This switch turns the air conditioner on or off.

④ **Temperature Control Lever** — This sliding lever controls the temperature of air from COOL (far left) to WARM (far right).

⑤ **Fan Control Switch** — This is a four-position switch to control the amount of air delivered through the vents. Down is OFF and up is HIGH speed. The middle positions are LOW and MEDIUM speeds.

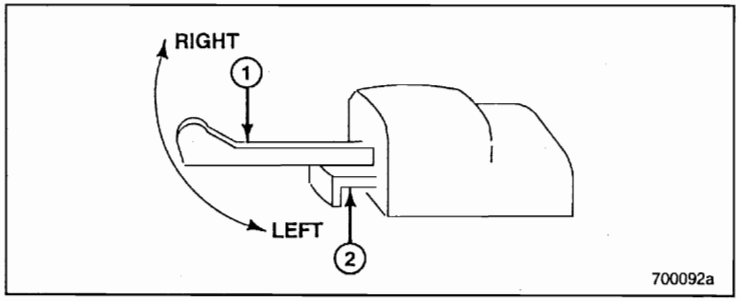
INSTRUMENTS AND CONTROLS

STEERING COLUMN

Turn Signal Lever

NOTE

The turn signals are not self-cancelling and must be returned to the middle position manually.



The turn signal lever is located on the steering column. It incorporates a hazard switch.

① **Turn Signal Lever** — Push lever clockwise to activate right turn signal and counterclockwise to activate left turn signal.

② **Hazard Switch** — Pull out to activate the four-way flasher when required. Flip-turn signal lever forward or back to release.

BEFORE OPERATING YOUR VEHICLE

Daily Walk-Around Inspection

With the proper care, your MR will work hard and give you years of efficiency and performance — and it is the operator's job to provide the proper care. Good operating habits formed early will make you and your truck a great team.

The driver for each shift should inspect safety equipment, oil and fluid levels and conditions of the following:

⚠ WARNING

To avoid serious injury, do NOT step on fuel tank, battery box, frame, etc., unless adequate slip-resistant surfaces and handholds are provided.

Check/Add Fluid

- ❑ Engine oil
- ❑ Engine coolant
- ❑ Fuel

Check for Leaks

- ❑ Air, coolant, oil, fuel

Wheels and Tires

- ❑ Tire air pressure
- ❑ Tire/wheel condition
- ❑ Wheel stud nuts
- ❑ Front wheel bearings (oil)

OPERATION

Check Fasteners

- ❑ Steering linkage
- ❑ Seat belts
- ❑ Doors and windows
- ❑ Battery box covers
- ❑ Fuel tank straps
- ❑ Hood or engine compartment covers

Air Reservoir

- ❑ Drain to remove moisture

Lights/Reflectors

- ❑ Replace bulbs that aren't working
- ❑ Replace broken lenses and reflectors

Gauges and Instruments

- ❑ Air pressure gauge
- ❑ Oil pressure gauge
- ❑ Temperature gauge
- ❑ Voltmeter

Check Operation

- ❑ Brakes (service and parking)
- ❑ Horn
- ❑ Heater and defroster
- ❑ Signaling devices
- ❑ Windshield wipers/washers
- ❑ Foot pedals
- ❑ Back-up alarms (if equipped)

Check Adjustment

- ❑ Rearview mirrors
- ❑ Seats

New Vehicle Break-In

Your new MR has been quality built, inspected, lubricated and final adjustments performed at the Mack Trucks Assembly Plant. A proper break-in, along with the following suggestions, can help ensure the long life of your truck.

- As moving parts "wear in," or as gaskets "take a set," an occasional oil, air or coolant leak may develop. Quick action to adjust and correct these minor mechanical items will prevent major repair later, saving you inconvenience and unnecessary expense. So, please stop at your nearest MACK service center as soon as any abnormal condition becomes evident.

NOTE

It is important to fill components with lubricants meeting the specifications listed in the Lubricants and Capacities section of the MAINTENANCE AND LUBRICATION manual, TS494.

NOTE

All checks and adjustments referred to in this vehicle break-in section can be found in the MAINTENANCE AND LUBRICATION manual, TS494.

During the First 3000 Miles (5000 Kilometers)

- After the first 125 miles (200 km), retorque the wheel nuts using an accurately calibrated torque wrench. Recheck this torque again after 500 miles (800 km).
- Check the oil and coolant levels frequently.
- Check brake and clutch adjustments per recommended maintenance schedule, and adjust as needed.
- Observe the instruments often, and shut down at the first sign of any abnormal readings.

OPERATION

- Report all leaks, loose fasteners, unusual noises, etc., to the service representative at your nearest branch or distributor, so they can be checked and corrected.
- Check spring clip torque (U-bolts). (On Reyco suspensions, also check equalizer nut torque.)
- Check the U-bolt torque on the MACK air suspension at the end of the first 1000 miles (1600 km).

After the First 3000 Miles (5000 Kilometers) or Before 4000 Miles (6400 Kilometers) or Before 3 to 4 Months

- Retorque spring clip (U-bolts). (On Reyco suspensions, also retorque equalizer nut.)

NOTE

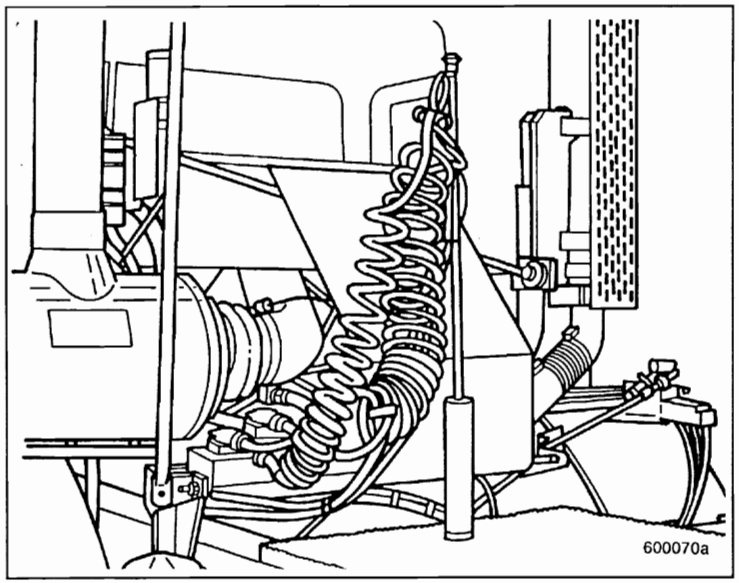
Lubricate the chassis and change the following lubricants and filters according to the Mack preventive maintenance schedules outlined in the MAINTENANCE AND LUBRICATION MANUAL, TS494:

- Gear oils — transmission, rear axle carrier(s), front drive axle carrier, transfer case, flywheel PTO.
- Engine oil, oil filters, fuel filters and coolant conditioner.

At the First A Inspection Interval

- Check front and rear axle alignment and adjust if out of specifications.

Hose Tenders



⚠ CAUTION

AVOID LOOSE HOSES. Air lines and tractor-to-trailer electrical connections must be secured to the tractor hose tenders (hose hanger, towel bar, pogo stick, etc.) to prevent them from tangling in the driveline.

OPERATION

Cab Tilt

⚠ DANGER

Before attempting to tilt the cab, be certain to take the following steps:

- Park on a level surface.
- Shut off engine.
- Secure all loose items within the cab.
- Apply parking brake.
- Place gearshift lever in NEUTRAL position.
- Close cab doors.

The MR cab is mounted on the chassis frame by two front hinges and two rear cab locks. This arrangement allows the cab to tilt forward to a maximum of 60 degrees, exposing the engine compartment for easy accessibility.

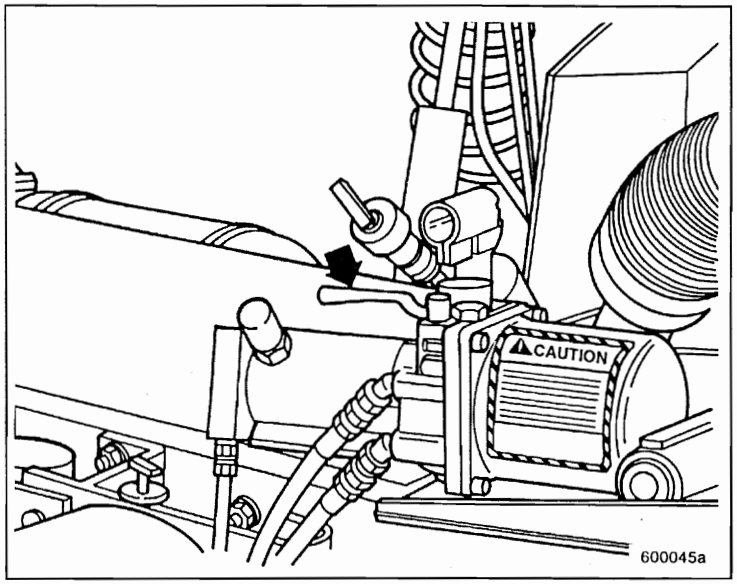
The cab tilt system uses one hydraulic cylinder. It incorporates internal safety valves which lock up automatically if the cab moves too rapidly in either direction.

The hydraulic fluid pressure imbalance forces the check valves to seat, holding the cab in a hydraulically locked position. If this situation occurs, operate the pump in the opposite direction to open the check valves. The system will then be returned to normal operation.

Tilting Cab

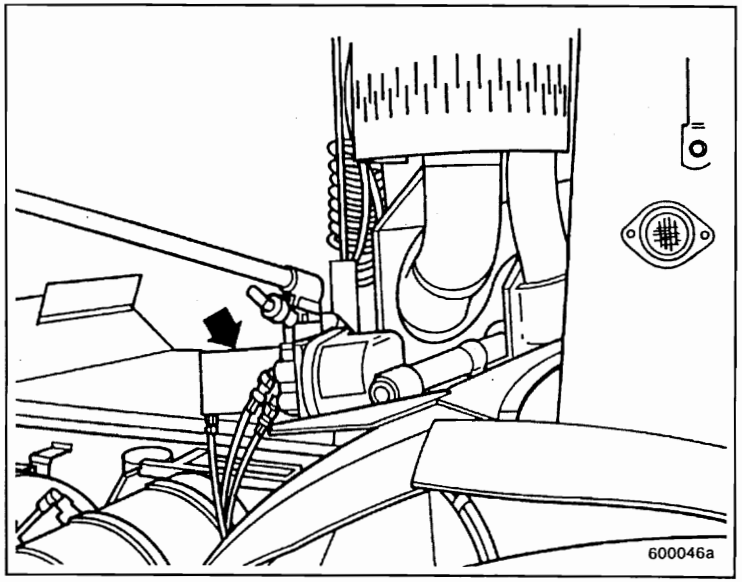
Use the following instructions to tilt the cab:

1. Be sure the engine is shut off, and secure all loose items in the cab.
2. Take the cab tilt pump handle from its stored position.

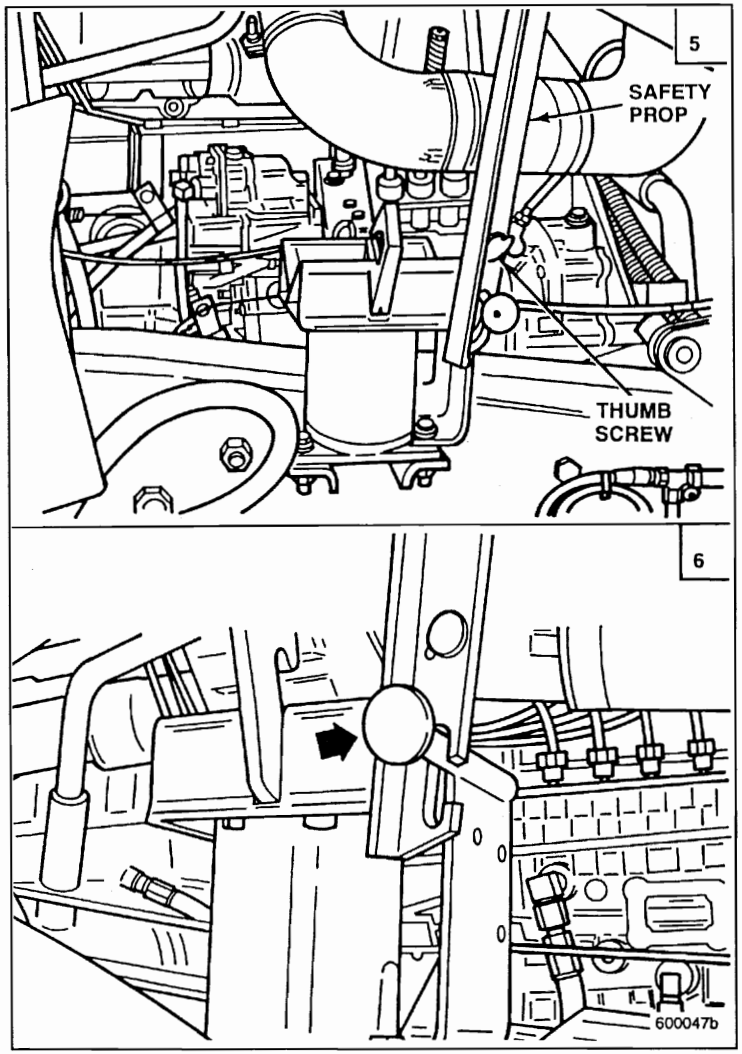


3. Insert the pump handle into the pump and move the pump control lever to the RAISE position.

OPERATION



4. To raise to the service position, pump cab up to SERVICE HEIGHT.



OPERATION

5. In the service position, the cab must be secured with the safety prop. Loosen the thumbscrew and swing the safety prop down onto the safety prop stud so the slot in the safety prop settles securely around the stud.

⚠ WARNING

Be certain that there are no people, tools or unsecured vehicle parts in the path of the descending cab before shifting pump control lever.

6. You may have to manipulate the control lever to get the cab to descend so the safety prop settles on the stud (see arrow).
7. To raise the cab to the full tilt position, pump the cab up past the balance point. The cab will descend by itself. The rate of descent may be controlled by manipulating the pump control lever from the RAISE to LOWER position.

Lowering Cab

NOTE

The cab safety prop must be in stored position and the transmission in NEUTRAL.

1. Move the pump control lever to the LOWER position.
2. Pump until the cab is past the balance point and allow the cab to descend and latch.
3. Leave the pump control lever in the LOWER position to operate the vehicle.

System Bleed Procedure

NOTE

The cab must be in the lowered position.

NOTE

All steps must be performed in the following order ONLY.

1. Connect all hydraulic lines.
2. Tighten all connections (except two) at the tilt cylinder and one at each latch cylinder.
3. Fill pump reservoir to top with specified oil. Close and tighten fill plug.

⚠ CAUTION

Do not refill the reservoir with the cab in the RAISE position.

4. Shift pump control lever to LOWER position. Pump until LOWER lines are bled. Tighten corresponding connections.

OPERATION

5. Shift pump control lever to RAISE position. Repeat the procedure in step 4 for the RAISE lines. Bleed latch cylinders first and tighten connections. Repeat for push port of the tilt cylinder.
6. After the entire system is bled, shift pump control lever to LOWER position. Check and refill reservoir, if necessary.

SERVICE HINT

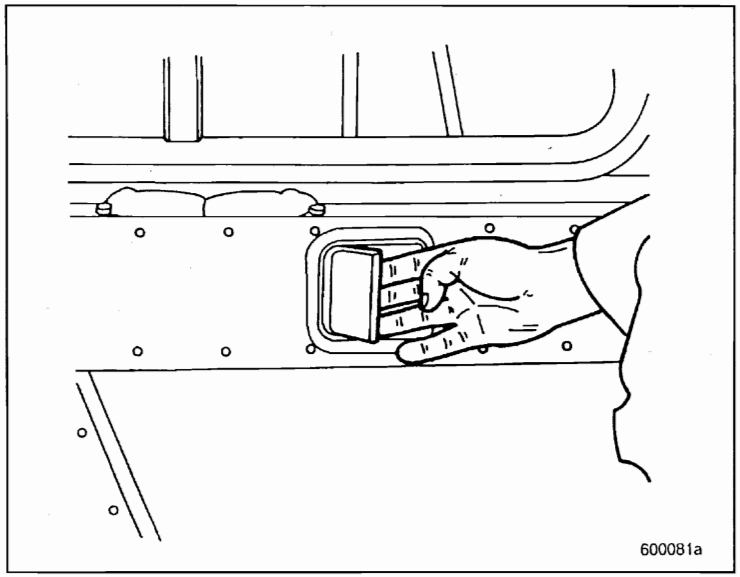
The recommended type of fluid for the cab tilt system is CF-A (MIL-H-5606B), capacity 3 pints (1.4 liters).

⚠ WARNING

The pump control lever must be in the LOWER position before operating the vehicle.

Doors

Opening



The inside door handles are of flush-mounted, paddle-type design. To open, put your fingers behind the handle and pull out while exerting some force on the door to open it.

Locking

To lock (with door open), press the door handle inward and shut the door.

OPERATION

Power Take-Off

If the vehicle you are operating is equipped with a Power Take-Off (PTO) unit, be sure you read and understand the following section.

⚠ DANGER

Power Take-Off (PTO) units and their related equipment can be very dangerous. Any PTO installation, repair or replacement should include a warning indicator light which indicates PTO engagement. The light must be located close to the PTO control and clearly visible to the operator.

⚠ DANGER

PTO units are driven by the engine or drivetrain components (flywheel, crankshaft, transmission). Do not attempt any work or service on the PTO and related units unless the engine is shut down.

⚠ DANGER

Always keep body parts and loose-fitting clothing out of the range of drivetrain components or personal injury may result.

⚠ DANGER

Be sure you are aware of the PTO's engagement or non-engagement status and the position of the truck's body (dump body controlled by PTO, etc.). Be sure PTO is disengaged when not in use.

OPERATION

MACK transmission rear-mounted PTO units fall into one of two categories (depending on how they operate).

Intermittent Service — The PTO unit is operated, under load, for less than seven minutes and then allowed to cool before it is operated again.

Continuous Service — The PTO unit is operated, under load, for seven minutes or more. Also, units operated for less than seven minutes and not allowed to cool down before operating again, should be considered in continuous service.

Rear-mounted PTO units operating under the continuous service guideline must not be run at more than 70% of the PTO output-rated torque/horsepower.

V-MAC — PTO operations controlled through V-MAC differ from vehicles not equipped with V-MAC. See TS725 (V-MAC) or TS780 (V-MAC II) for information regarding the programming of PTO.

OPERATION

PTO Operating Procedures

The following procedures apply to transmissions with a neutral switch and a transmission rear-case-mounted PTO only.

When engaging PTO:

1. Select LO-split using the splitter switch and select LO range using the range selector. The transmission MUST be in LO range and LO-split at all times during PTO operation.
2. Depress the clutch pedal to disengage the clutch.
3. Set parking brakes.
4. Move the main box gearshift lever to the NEUTRAL position.
5. Move the dash-mounted compound neutral control valve to the ON position, which moves the synchro clutch to a neutral position.
6. Engage the PTO.
7. Move the main box gearshift lever to the desired ratio.
8. Release the clutch pedal to engage the clutch.
9. Operate the PTO-driven load.

When disengaging the PTO:

1. Depress the clutch pedal to disengage the clutch.
2. Move the main box gearshift lever to NEUTRAL.
3. Disengage the PTO.
4. Move the dash-mounted compound neutral control valve to the OFF position, which moves the synchro clutch back to LO range.
5. Move the gearshift lever to the desired main gear box ratio.
6. Release the parking brakes.
7. Release the clutch pedal to engage the clutch.

Engine

⚠ CAUTION

Use a Mack-approved winterfront designed for the specific chassis only. The use of winterfronts or shutters for normal operating conditions above freezing requires caution to avoid high intake/exhaust temperatures. The restriction in air flow can cause higher exhaust temperature, power loss, excessive fan usage and a reduction in fuel economy.

⚠ CAUTION

A Mack-approved exhaust pyrometer must be installed and closely monitored while the engine is in operation when a winterfront is used. DO NOT exceed the maximum temperature listed on the decal. To reduce exhaust temperature, downshift or reduce engine power and open the winterfront.

⚠ CAUTION

Do not permit load to drive engine above governed speed. Operate in a gear low enough to allow engine to accelerate to (or maintain) governed RPM when applying throttle.

OPERATION

⚠ WARNING

Misuse or modification of a turbocharger can result in serious injury and property damage. In addition, extreme care must be taken to avoid foreign material induction, excessive exhaust temperatures and lack of lubrication.

Model Designation

The MACK engine unit symbol designation system is designed to provide total unit description identification through a combination of prefix letters, numbers, digits and suffix letters, as applicable.

Prefix Letters and Numbers:

- E = MACK turbocharged diesel engine
- M = Maxidyne engine (high torque rise)
- 7 = 728 cubic inch displacement
- 9 = 998 cubic inch displacement
- Digits: peak gross horsepower (BHP)

NOTE

E7 engines use the Jacobs compression release brake, or the Jacobs Stealth Retarding System™. With either system, the best braking performance is achieved in the 1800 to 2100 RPM range. For optimum retarding power, keep engine RPM as close to 2100 RPM as possible. For additional information, refer to the Jacobs driver's manual supplied with your chassis.

Brakes

Air Brake System

This truck has been built to meet or exceed all applicable federal standards and regulations.

Brake Operation — The air brake system consists of three main elements:

- The compressor, governor and reservoirs supply and store the air pressure.
- The brake application valve controls the brake application pressures.
- The brake chambers perform the work on the brake mechanism.

MACK vehicle design has incorporated into this chassis a dual braking system. It has two complete air circuits: a primary circuit for rear brakes and a secondary circuit for front brakes. Each circuit receives air from separate reservoirs. Although there are two air circuits, they operate as one brake system through the dual-circuit treadle valve. This provides the driver with easy, graduated control when applying and releasing the brakes.

The air pressure in the two air brake circuits is monitored by air pressure gauges on the instrument panel. (See the INSTRUMENT PANEL section for more information.) When air pressure drops below 65 ± 5 psi (448 ± 34 kPa) in either the primary or secondary air system at any time other than vehicle startup, pull to the side of the road and determine problem. If air pressure continues to drop below 40 ± 5 psi in BOTH systems, spring brakes will automatically apply. The Low Air Pressure warning indicator or buzzer will be activated if low air pressure occurs in either circuit.

⚠ CAUTION

Avoid sudden stops. Constant, sudden stops may negatively affect the performance of braking and driving parts.

OPERATION

When slowing for a stop, leave clutch engaged as long as possible to use the braking effect of the engine. When forward speed has dropped to a little above idling speed, push clutch pedal in and brake to a complete stop.

Parking Brake

Spring-type parking brakes are standard on rear axles and bogies. The basic unit of a spring brake system is an air cylinder with heavy springs integrated with the service brake chamber. The spring brake chamber operates so that when there is no pressure in the spring brake section of the air chamber, the spring expands, causing a brake application. When air pressure is applied to the spring section of the air chamber, the heavy spring is compressed, releasing the brakes.

The spring brakes can be applied and released from the cab by using the hand-operated control valve. In the event of an air loss in both the primary and secondary air systems, pressure is automatically exhausted from the spring brake chambers, applying the brakes. The spring brakes will remain applied until enough pressure is available in the system to compress the heavy application springs.

⚠ CAUTION

NEVER use the trailer parking brake system alone. Use the tractor-trailer parking brake system only.

Anti-Lock Brakes (If Equipped)

Installation of Electrical Equipment on Vehicles Equipped with Anti-Lock Brake System (ABS)

Connecting electrically powered or electrically controlled equipment to the vehicle may cause interference with the proper operation of other vehicle components. This interference may depend on the operating frequency and the degree to which transient signals are coupled into the vehicle system.

Every user and installer of electrical equipment has the obligation to ensure the proper operation of all electrical systems on the vehicle with respect to conducted or radiated signals by his installation.

Specific attention is directed to the anti-lock brake control system. A vehicle checkout procedure should include operating any added circuitry under the following test conditions:

- Engine running and brake air system pressure in operating range
- Vehicle stationary
- Depress and hold brake pedal in full application pressure mode
- Operate added equipment in all starting, running and shutdown conditions. Listen for any air exhausting from anti-wheel-lock controllers. This indicates an interference condition which must be corrected before the vehicle is released for highway use.

Operating an ABS-Equipped Vehicle

- Apply the brakes as normal. If the anti-lock brake system begins to function, maintain brake pressure. DO NOT release the brakes.
- Avoid rapidly pumping the brakes. The anti-lock brake system automatically applies and releases the brakes up to five times per second.
- When towing a trailer(s), especially if only the tractor is equipped with anti-lock brakes, watch the trailer(s) through the mirrors. Adjust brake application pressure as necessary to keep the combination in a straight line. Make sure the trailer(s) follows the tractor properly.

OPERATION

Good Driving Habits

Gross Vehicle Weight (GVW) Rating

Do not overload your chassis. The gross vehicle weight ratings for a given model truck vary with operating conditions, tire size, wheel base, type of wheels, axles, suspension, frame length and overhang. For economy and safety, it is important to observe the GVW rating for your particular truck, which can be found on the Safety Certification Label.

Observe Instruments

Glance at instruments frequently. When problems develop, take prompt steps to correct them.

Stopping the Engine

After a hard run, allow engine to idle three minutes before shutdown in order to stabilize the temperature of all engine parts. Quick shutdowns can cause engine damage and prevent the turbocharger from being properly lubricated.

Parking

Use only the parking brake for parking. Do NOT use the hand control for rear service brakes or trailer brakes (if equipped) for parking. Check brake adjustment frequently to be sure the brakes will lock and hold vehicle when parked. Do NOT use the parking brake for braking vehicle when in motion, except in an emergency. When parking on a grade, use wheel chocks under the rear wheels or turn front wheels to the curb. Do NOT leave diesel engine vehicles in gear; if vehicle should move, the engine may start by heat of compression.

General Observation

Make it a habit at stops to walk around your truck looking for fuel, oil and coolant leaks. Also check condition of tires, wheel nuts, springs and lights. Stop trouble before it stops you!

STARTING YOUR VEHICLE

General Information

Before you put the key in the ignition switch, set the parking (spring) brake, disengage the clutch (if equipped) and put the transmission in NEUTRAL. Push the Engine Stop Control all the way in (if equipped).

⚠ CAUTION

Do not engage the starting motor too soon after an incomplete start of the engine, or the starter may be damaged. Wait at least five seconds before attempting to restart the engine.

⚠ CAUTION

Do not rev the engine at start-up. Turbocharger damage may result. Lubricants need time to establish a film between moving parts.

⚠ CAUTION

If the engine does not start immediately, limit cranking periods to 30 seconds to avoid overheating and damaging the starter.

OPERATION

Cold Weather Starting Tips

NOTE

Before attempting to start the engine during cold weather, actuate the Engine Stop Control (if so equipped) several times to ensure that the injection pump control rack is free. Condensation in the fuel could cause the control rack to freeze up after extended shutdown in cold weather.

- Save your batteries. Do not overtax batteries and starting motor by cranking for more than 30 seconds without interruption. Allow about two minutes between attempts at starting the truck. This permits starter to cool and batteries to re-energize.
- Use the correct grade of oil in your crankcase for the prevailing winter temperature.
- Water/moisture can accumulate in the fuel system. Water accumulation can freeze in fuel tank, fuel lines and filter. This can be avoided by regularly draining the tanks and filters.

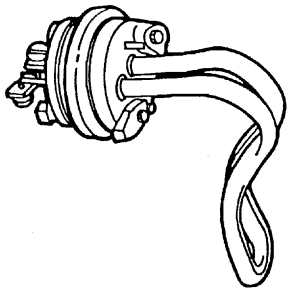
⚠ WARNING

Under NO circumstances should gasoline, alcohol, used oil or additives with metallic particles be added to the fuel.

- Diesel fuel has some bad habits in cold weather. It can gel and clog filters and small passages. When gelling occurs, mix a small percentage of No. 1D fuel (kerosene) with No. 2D (diesel) fuel. Adding kerosene is NOT recommended for general use since there will be a sacrifice in both performance and fuel economy. Refer to the MAINTENANCE AND LUBRICATION manual, TS494, for additional cold weather operating information.

Engine Block Heater

An engine block heater works by heating the coolant surrounding the combustion chambers. Engine heaters are recommended to help combat the extreme demands of cold weather operating conditions. The engine heater can be plugged in overnight when the temperature drops. Location of the engine heater power receptacle varies according to vehicle design.



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Engine Heater Benefits

- Eliminates cold weather starting problems.
- Increases engine life significantly by keeping the engine warm and avoiding costly, excessive idling.
- Prevents external water leaks caused by excessive cold.
- Allows the cab to heat more quickly.
- Reduces the temperature at which ether is required.
- Engine heaters may be activated as soon as the engine is stopped.

OPERATION

Air Starter or Push Button (If Equipped)

NOTE

Build up air pressure to a maximum (120 lbs/827 kPa) before shutting down and parking for the night.

⚠ CAUTION

Idling engine unnecessarily for long periods of time wastes fuel and fouls injection nozzles. Unburned fuel causes carbon formation and oil dilution. NEVER race an engine during warm-up.

Put the key in the ignition switch. Turn the key clockwise to the first "click" (about two o'clock position) to activate the instruments. Push starter button in and release as soon as engine starts. Keep clutch (if equipped) disengaged until engine runs smoothly. When oil pressure and air pressure approach normal operating ranges, you may put the vehicle into operation.

E7 Non V-MAC Engines

If your chassis is equipped with a mechanically governed E7 (non V-MAC) engine, use the following procedure:

Normal Temperatures

1. Do NOT depress the accelerator.
2. Crank the engine.
3. After the engine has started, set the hand throttle to maintain an engine speed of 1200 RPM.
4. Allow the engine to idle at 1200 RPM and reach normal operating temperature BEFORE moving the vehicle.

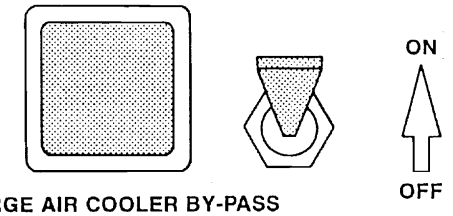
If the engine is difficult to start, use the following procedure:

1. With the key switch in the OFF position, fully depress and hold the accelerator pedal to the floor.
2. If equipped with an Engine Stop Control, pull to the OFF position, then return to the run position.
3. Crank the engine.
4. Release the accelerator pedal as soon as the engine starts.

Cold Temperatures

1. Fully depress and hold the accelerator pedal to the floor.
2. Push the Charge Air Cooler Bypass switch (if equipped) to the ON position. A dash light will illuminate when the bypass is activated.

OPERATION



CHARGE AIR COOLER BY-PASS

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3. Crank the engine.
4. Release the accelerator pedal as soon as the engine starts.
5. Set the hand throttle to maintain an engine speed of 1200 RPM.
6. Allow the engine to idle at 1200 RPM and reach normal operating temperature BEFORE moving the vehicle.
7. Move the Charge Air Cooler Bypass switch (if equipped) to the OFF position when the coolant temperature has reached 125°F (52°C).

⚠ CAUTION

Operating the chassis with the Charge Air Cooler Bypass switch (if equipped) in the ON position may cause severe engine damage.

⚠ CAUTION

Do NOT use the Charge Air Cooler Bypass switch (if equipped) during warm temperatures or if the engine is already warm.

E7 V-MAC Engines

If your chassis is equipped with an electronically governed E7 (V-MAC) engine, use the following procedure:

Normal Temperatures

1. Do NOT depress the accelerator. The pedal must be left in the idle position.
2. Crank the engine.
3. After the engine has started, set the hand throttle to maintain an engine speed of 1200 RPM.
4. Allow the engine to idle at 1200 RPM and reach normal operating temperature BEFORE moving the vehicle.

Cold Temperatures

1. Fully depress and hold the accelerator pedal to the floor.
2. Crank the engine.
3. Release the accelerator pedal as soon as the engine starts.
4. Set the Variable Speed Control (VSC) (if equipped) to maintain an engine speed of 1200 RPM.
5. Allow the engine to idle at 1200 RPM and reach normal operating temperature BEFORE moving the vehicle.

OPERATION

Engine Warm-Up

Engine damage can occur if the engine is not warmed up to a minimum operating temperature of 170°F (77°C) before putting the chassis into full operation.

Heavy-duty diesel engines are designed to operate at optimum efficiency when they are running loaded at (or very near) normal operating temperature where efficient combustion takes place. When the engine is operated unloaded, lightly loaded (stop and go operations, PTO operations, or periods of extended engine idling) or in cold weather conditions, normal operating temperature may not be achieved or maintained. As a result, carbon and/or varnish build-up will occur and lubricating oil will become contaminated with combustion byproducts.

Cold weather operations place added demands on a diesel engine. When operating in cold climates, particularly in stop-and-go operations, PTO operations or periods of extended engine idling, minimum operating temperature must be maintained to prevent engine damage resulting from valve varnishing and carbon build-up. Many accessories, from winterfronts to belly tarps, are available to best equip your truck for cold weather operations. Refer to the MAINTENANCE AND LUBRICATION manual, TS494, supplied with your truck for additional information concerning cold weather accessories.

Engine Idling

Idling the engine unnecessarily for long periods of time wastes fuel, fouls injector nozzles and can lead to valve carbon and varnish deposits. Unburned fuel causes carbon formation and oil dilution. Shut engine down when prolonged loading or unloading of cargo is required.

When starting a cold engine, or if the vehicle has been parked and the engine coolant has fallen well below normal operating temperature, a fast idle speed of approximately 1200 RPM should be maintained to help the engine warm up more quickly.

Engine Shutdown

After a hard run, allow the engine to idle approximately three minutes before shutdown. This provides the temperature stabilization of all engine parts and allows the turbocharger RPM to slow gradually. Quick shutdowns can result in mechanical problems for the engine and/or turbocharger.

⚠ CAUTION

Operating the engine below normal operating temperature for extended periods of time will allow varnish/carbon deposits to build on the valve stems and guides. Varnish deposits will cause the valves to stick in the guides after the engine has been shut down, and could result in push rod damage when the engine is restarted. If the engine has been operated below normal operating temperature for an extended period of time, and the odor of raw diesel fuel can be detected or unburned fuel can be seen at the exhaust stack, it is recommended that the engine be operated under load until normal operating temperature is achieved before shutting down.

On chassis equipped with an air starter, make sure that the air pressure gauge reads a maximum of 120 psi before shutting down and parking for the night. This will ensure sufficient air pressure for restarting the engine.

OPERATION

Engine Shutdown System (If Equipped)

The engine may be protected by a shutdown system that prevents engine failure when a condition such as loss of oil pressure, loss of coolant or engine overheating occurs. If the system detects a condition that will initiate engine shutdown, a warning indicator light will illuminate to alert the driver before the engine actually shuts down. Should shutdown occur, the system can be overridden so the vehicle can be moved to a location where it will not pose a hazard.

Check Engine Warning Indicator — During normal operating conditions, the Check Engine warning indicator should illuminate as soon as the key switch is turned on. After the engine is started, it will remain illuminated until engine oil pressure reaches normal idling range. During shutdown, if the system detects a condition that could lead to engine failure, the Check Engine warning indicator illuminates 30 to 45 seconds prior to engine shutdown.

Lengard Shutdown System

Shutdown Override Button (If Equipped) — During normal operation, to ensure adequate fuel delivery when starting the engine (whether starting a hot or a cold engine), the following starting procedures are recommended (Lengard system only):

1. Depress and hold the Shutdown Override button.
2. Crank the engine.
3. Continue depressing the Shutdown Override button after the engine is started and the Check Engine warning indicator is still illuminated.
4. Release the Shutdown Override button when the Check Engine warning indicator deactivates.

Refer to the STARTING YOUR VEHICLE section for complete engine starting procedures.

During Shutdown — If the shutdown system activates, use the following procedures to move the vehicle to a location where it can be parked safely:

1. Push and hold the Shutdown Override button (if equipped).
2. Start the engine.
3. Continue depressing the Shutdown Override button while moving the vehicle to the nearest area where the vehicle can be parked safely.

Kysor Shutdown Systems

There are no special starting instructions for the Kysor shutdown system. To override the engine shutdown system so the vehicle can be moved to safety, simply restart the engine in the normal manner. The engine will run for 30 seconds and then shut down again.

⚠ CAUTION

Continuously overriding the shutdown system for an extended period will cause severe engine damage.

OPERATION

MOVING YOUR VEHICLE

General Information

Braking

Avoid sudden stops. Constantly making such stops may have a negative effect on the performance of braking and driving parts. When slowing, leave clutch (if equipped) engaged as long as possible to use the braking effect of the engine.

⚠ CAUTION

When using the braking effect of the engine, final gear selection is critical. If gear selection is too high the vehicle will buck, which could cause loss of control.

E7 engines use the Jacobs compression release engine brake, or the Jacobs Stealth Retarding System™. With either system, the best braking performance is achieved in the 1800 to 2100 RPM range. For optimum retarding power, keep engine RPM as close to 2100 RPM as possible. For additional information, refer to the Jacobs driver's manual supplied with your chassis.

Shifting

Operate in a gear low enough to allow engine to accelerate to, or maintain, governed RPM when applying full throttle. Allowing the engine to lug causes excessive strain on engine which could damage pistons, rings, cylinder walls, or bearings. However, you should not overspeed the engine either.

⚠ CAUTION

Do not permit a load to drive the engine above governed speed. Use lower gears when descending steep grades, and watch the tachometer. Over-speeding will cause severe drivetrain damage and eventually destroy the engine.

⚠ DANGER

Select the proper gear ratio BEFORE descending a grade to avoid a runaway vehicle and to stay within safe and legal speed limits. Do NOT coast down hills. Gear ratios should be selected to allow engine operation between peak torque and rated speed.

⚠ CAUTION

Running the engine at an RPM that is too low for the load or grade of the road can cause damage to the drivetrain.

Shifting at the proper time will save both fuel and unnecessary repair bills, but remember that once your engine falls below the peak torque, both the torque and horsepower drop off very rapidly. Before this happens, downshift to the next lower gear.

On vehicles with transmissions having extreme reduction gearing coupled with high rear-axle loads, a torque-limiting device will be used. This device limits the amount of fuel that can be delivered to the engine by the injection pump and prevents overloading of the drivetrain components while in extreme reduction gears.

Use the same gear going downhill as you would going uphill. This will save your brakes and prevent damage to the engine from over-speeding.

Engine Temperature

Before entering high-speed traffic conditions, allow the engine to reach normal operating temperature. Normal operating range may be between 170°F and 225°F (77°C and 107°C) depending on weather and road conditions.

OPERATION

Clutch (If Equipped)

To avoid shock damage, release the clutch pedal smoothly without shock-loading the driveline, especially on grades while carrying heavy loads. Do not ride the clutch pedal. Premature wear of clutch facing and release bearing may result.

⚠ CAUTION

Always use the lowest drive gear combination to start vehicle moving to avoid premature clutch failure.

General Instructions

1. To move the vehicle, begin by starting the engine and waiting until it reaches its operating range.
2. Disengage the clutch (if equipped) by pushing the pedal to the floor.
3. Shift transmission into first or LO gear (see Transmission Shifting Instructions for how to shift your particular transmission and in what gear to start).
4. Release the parking brake.

⚠ CAUTION

If the Spring Brake Warning indicator is on, do NOT attempt to move the vehicle because driveline damage may result.

5. Engage clutch (if equipped) smoothly by releasing the clutch pedal. At the same time, apply the accelerator enough for the engine to move the load.

⚠ CAUTION

Never allow your foot to ride the clutch pedal when clutch is engaged. This will cause premature failure and short clutch facing life.

6. As vehicle gains speed, continue shifting until transmission is in the highest gear possible with engine in operating range.

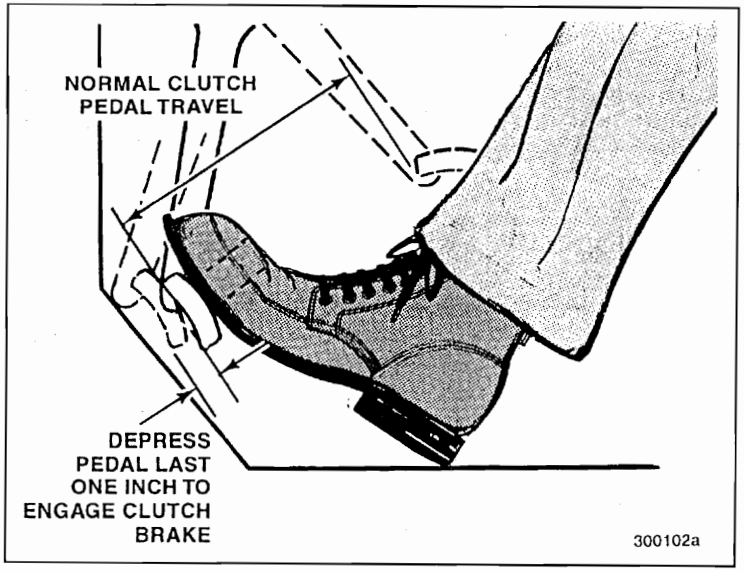
NOTE

Engine must be warmed up to operating temperature before attempting to move in either REVERSE or LO-LO range when the vehicle is equipped with a torque-limiting device.

OPERATION

Clutch Brake Operation (If Equipped)

The clutch brake is designed to stop the rotation of the transmission input shaft while the truck is standing still, to make shifting into first or reverse gears easier.



With the vehicle standing still, push in the clutch pedal. Apply the clutch brake by pushing the clutch pedal all the way to the floor (the clutch brake is applied when the clutch pedal is fully depressed, the last one inch of travel past normal pedal travel).

NOTE

When the clutch is engaged, a slight but definite resistance to clutch pedal downward travel will be felt in the last one inch.

Shift the transmission into first or reverse gear, engage the clutch and accelerate. The clutch brake is only to be used when the vehicle is stopped and being shifted into first or reverse gears. It is not designed to be used as an upshifting aid.

⚠ CAUTION

Clutch brake damage may result if used while the vehicle is in motion. The clutch brake must NOT be used when making a downshift or an upshift.

Double-Clutching

As with all nonsynchronized transmissions, double-clutching is necessary on downshifts as well as upshifts. It is advisable to use the torque-limiting clutch brake to engage first and REVERSE gears and to double-clutch for gear ratio changes.

Double-clutching is a way to bring the speed of transmission gears into synchronization so that the shift can be made without clash. The engine is used to speed up the countershaft for a downshift and to slow it down for an upshift.

1. Depress clutch pedal and shift to NEUTRAL.
2. Let up clutch pedal and accelerate engine (when making downshift) or allow engine to slow down (upshift) until engine speed approximately corresponds to road speed of gear to be selected.
3. Depress clutch pedal and complete shift to desired gear. Release the clutch pedal.

OPERATION

Transmission Shifting Instructions

⚠ CAUTION

Maximum safe oil temperature is 235°F (113°C) for manual transmissions. Continued operation with oil above this temperature will cause rapid deterioration of the oil's lubricating properties and is NOT recommended.

⚠ CAUTION

The vehicle must be completely stopped before attempting to shift from REVERSE to any forward speed, or vice versa, to avoid transmission damage.

T2070-T2070C-T2070F TRANSMISSION RATIOS

Gear (Main Box)	Ratios	
	LO	HI
1	14.16	5.24
2	8.25	3.05
3	(4.67)	1.73
4	(2.70)	1.00
5	(1.62)	0.60
5 (T2070C)	(1.81)	0.67
Reverse	14.53	5.38

( ) The ratios in parentheses are not practical to use.

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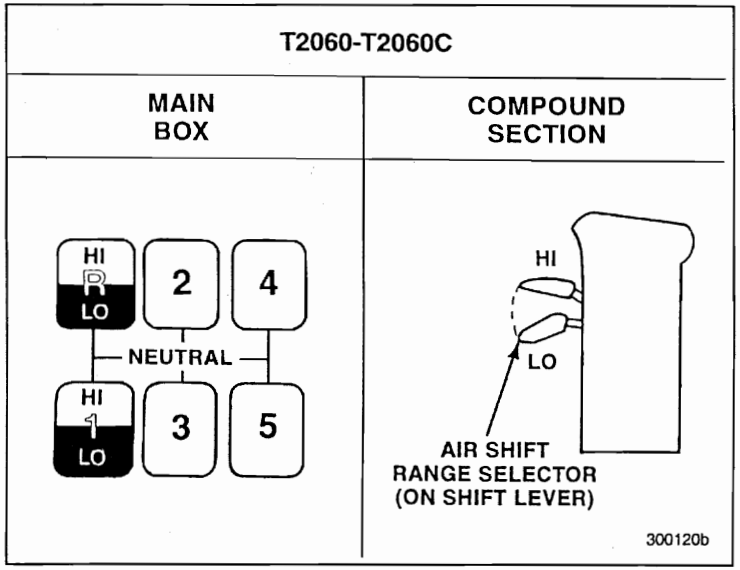

T2060-T2060C TRANSMISSION RATIOS

Gear (Main Box)	Ratios	
	LO	HI
1	9.02	5.24
2	(5.25)	3.05
3	(2.98)	1.73
4	(1.72)	1.00
5 (T2060)	(1.03)	0.60
5 (T2060C)	(1.16)	0.67
Reverse	9.25	5.38

( ) The ratios in parentheses are not practical to use.

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OPERATION

MACK T2070-T2070C-T2070F

The T2070-T2070C-T2070F are nonsynchronized transmissions. These transmissions feature a LO and HI auxiliary compound section controlled by an air-shift range selector located on the shift lever. The LO range provides two low ratios. In HI range there are five forward gears that can be shifted in the standard manner, but remember to double-clutch whether moving up or down through the gears. For normal highway usage, start in HI range, first gear and shift through second, third, fourth, and fifth. The two gears in LO range are designed for off-highway use and in slow-moving applications (curb pouring, material spreading, heavy load/steep grade operation). REVERSE can be used in LO or HI range.

Upshift — Begin in first gear, LO range (commonly called LO-LO as shown on the shift pattern diagram). Double-clutch and upshift to second gear, LO range (called LO) in the normal manner. When ready to upshift again, depress the clutch pedal and release the accelerator pedal. Move the shift lever to NEUTRAL, then flip the air-shift range selector to HI range, double-clutch and move the shift lever back to first gear. This is first gear HI range, which provides the next higher ratio. Release the clutch pedal and apply the accelerator to reach the top of the operating range. Shift through second, third, fourth, and fifth (HI range), being sure to double-clutch from one gear to the next.

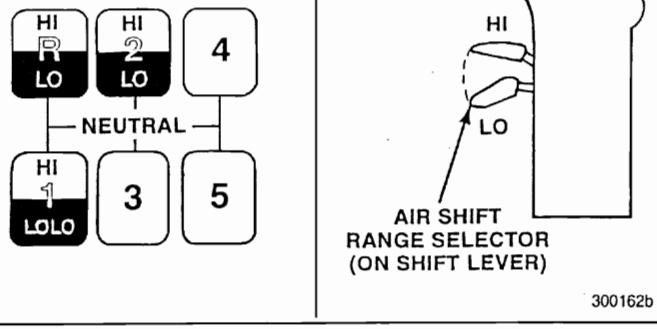
Downshift — Downshift in reverse order from fifth through first gear (HI range), double-clutching through each gear. The next downshift will be to second gear, LO range (called LO). Proceed to depress the clutch pedal and release the accelerator pedal. Move the shift lever to NEUTRAL, then flip the air-shift range selector to LO range, double-clutch and move the shift lever to second gear. This is second gear, LO range, which provides the next lower ratio. When ready for the lowest ratio available (called LO-LO), double-clutch and downshift to first gear, LO range.

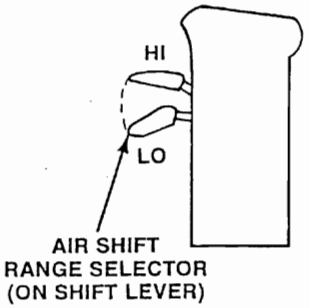
⚠ CAUTION

Do not overspeed the engine when downshifting the transmission. Damage to the drivetrain components can result. Do NOT preselect the air-shift range selector. Shift the auxiliary compound section only with the clutch pedal depressed and/or the shift lever in NEUTRAL. To avoid transmission damage, do NOT change range while moving in reverse gear.

T2070-T2070C-T2070F

MAIN BOX	COMPOUND SECTION





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Axles

Rear Axle

Mack Trucks, Inc. provides axle housings in three capacity classifications. They are medium duty, heavy duty and extra-heavy duty. To deliver the appropriate amount of torque to the driving wheels, Mack Trucks, Inc. offers single-reduction and dual-reduction carriers in a large variety of ratios for single axle applications. When required, a large variety of four-wheel-drive, two-axle bogies are also available with top-mounted, dual-reduction carriers for straight line through drive. The bogie carriers are also available in a large number of ratios.

All four-wheel-drive bogie tandem carriers are available with the MACK inter-axle power divider third differential, with or without a driver-controlled lockout.

MACK rear axles are designed so the entire load is carried by the axle housing through the wheel bearings mounted on the housing spindle. The rear axle shafts can be either free-splined, both ends, or integral flange type. Both types of axle shafts may be removed without removing or disturbing the rear wheels.

To avoid excessive tire wear, good maintenance must be practiced in the matching of tires on bogies without a compensating inter-axle power divider.

⚠ CAUTION

Maximum safe oil temperature is 235° F (113° C). Continued operation with oil above this temperature will cause rapid deterioration of the oil's lubricating properties and is NOT recommended.

Two-Speed Rear Axle

The dual-reduction rear axle carrier employs selective fast and slow gear reductions. Electric shift (button on the transmission shifter lever) provides either fast or slow ratio by selecting these gearsets. The transmission is shifted in the usual manner and the two-speed axle is shifted in the usual manner. The two-speed axle is shifted as follows:

Split Shifting — To shift to higher transmission gear and LO axle speed at the same time:

1. Shift transmission to higher gear in the usual way.
2. Push the axle shifter button down just before re-engaging the clutch.
3. Re-engage clutch and depress the accelerator to maintain road speed.

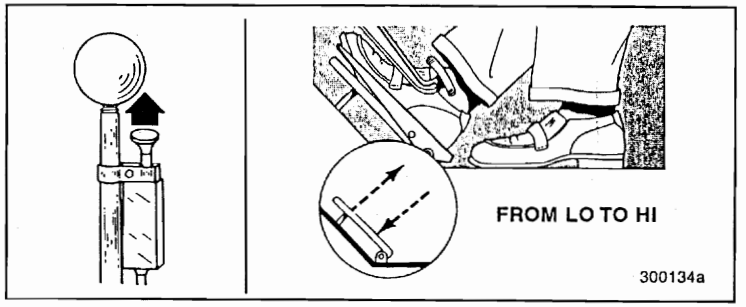
To shift to lower transmission gear and HI axle speed at the same time:

1. Hold accelerator down and pull axle shifter up.
2. Shift transmission to lower gear in the usual way, then depress accelerator to maintain road speed.

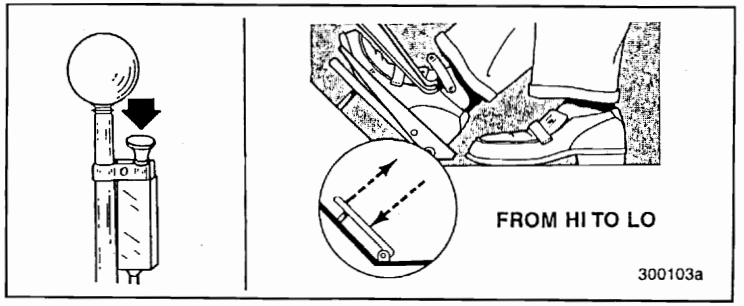
⚠ CAUTION

Always keep accelerator down when shifter button is moved, except when split shifting to LO axle speed. Vehicle must be brought to a full stop before shifting from forward to REVERSE, and vice versa.

OPERATION



To shift from LO to HI speed — Hold accelerator down and pull axle shifter button up. Ride with accelerator down until you want to complete shift. Release accelerator, pause until shift is completed, then depress accelerator to maintain road speed.



To shift from HI to LO speed — Push axle shifter button down and hold accelerator down until you want to shift. Disengage and re-engage clutch as quickly as possible while holding accelerator down, or release and depress accelerator as quickly as possible without declutching.

Inter-Axle Power Divider (If Equipped)

A driver-controlled, air-shifted lockout is available so the MACK power divider can be rendered inoperative for short periods of poor traction, and then unlocked when normal traction returns. When the MACK sliding clutch lockout is engaged with mating teeth of the outer cam, both axles are locked together in positive through-drive for maximum traction with no differential action taking place between axles.

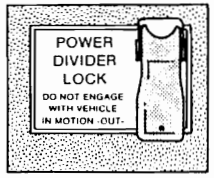
Normally, the driver-controlled, inter-axle power divider lockout control switch is in the OUT or unlocked position. On rare occasions, it is necessary to provide positive through-drive to both bogie axles for poor traction situations.

⚠ CAUTION

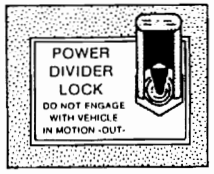
Stop the vehicle before actuating the air-shift range selector.

NOTE

The lockout should NOT be used on dry, hard surfaces.



LOCKOUT DISENGAGED



LOCKOUT ENGAGED

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OPERATION

Declutch the engine (if equipped with an automatic transmission, shift to NEUTRAL) and move the lockout switch to the engaged position. Re-engage clutch and drive through the slippery area.

NOTE

An electric buzzer in the cab sounds continuously as long as the lockout is engaged. This is to remind the driver to release the lock as soon as normal traction is regained.

When driving conditions permit returning to normal, unlock power-divider drive, move the lockout switch back to the OUT (disengaged) position, and let up momentarily on the accelerator pedal to powershift out of locked position. Then drive as usual.

⚠ CAUTION

To avoid clash at the lockout sliding clutch and outer cam, under NO circumstances should the air-shift mechanism be activated while the drive wheels are actually slipping or spinning.

MAINTENANCE INTRODUCTION

Preventive maintenance is vital to the life of your new MR. This section of the Operator's Handbook covers items of importance concerning the proper care of your new truck. A well-run maintenance and lubrication program is the best way of ensuring a long and productive life for your truck, as well as increased profitability and reduced maintenance costs for your business.

The operator plays an important role in the proper care of this equipment. By performing daily checks and observing the equipment while it is in operation, minor defects can be caught and corrected before they become major problems. Make sure any problems are corrected before putting the equipment into operation.

The service manager at your Mack Sales, Parts and Service Center knows your truck the best. Your satisfaction is his main concern. If you have any questions concerning the proper care, maintenance and lubrication of your MR, or if you need help in developing a preventive maintenance program, he will be glad to help.

NOTE

This handbook contains some maintenance information. Refer to TS494 for complete maintenance and lubrication procedures.

MAINTENANCE AND LUBRICATION

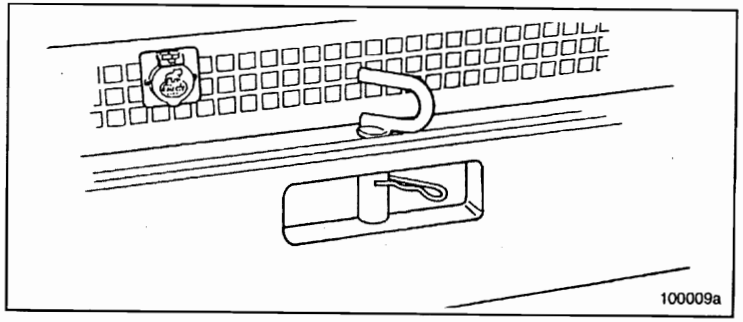
TOWING

There is one center-mounted tow pin located in the front bumper. The device meets the requirements set forth by The Maintenance Council (TMC) of the American Trucking Association. The tow pin may be used for towing a disabled vehicle from the immediate location.

If it is necessary to remove the tow pin, remove the retainer clip first. Once the retainer clip is pulled, the tow pin can be lifted out of the bumper hole.

⚠ CAUTION

Do NOT lift and tow vehicle by tow pins, hooks, eyes, etc. If mired in heavy mud, snow, etc., use a suitable sling-type towing arrangement to move the truck.



NOTE

Use of tow pins, hooks, eyes, etc., is NOT intended for long-term wrecker pull of disabled vehicles.

⚠ CAUTION

Failure to disconnect the driveline before towing or pushing the vehicle can cause serious transmission damage.

Before towing or pushing the vehicle, the driveline should be disconnected or the drive wheels should be lifted off the ground.

MAINTENANCE AND LUBRICATION

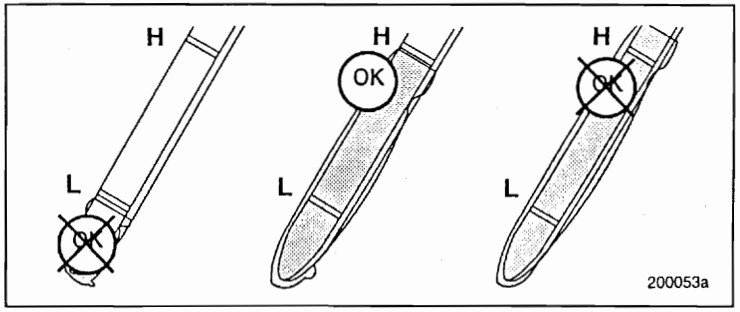
ENGINE

Oil Level Check

As the operator of this vehicle, it is important for you to perform the daily inspections necessary to keep your truck in good shape. Maintaining the proper oil level in your engine crankcase cannot be overemphasized.

Before checking the oil, remember these important points:

- Measurement of the oil level must be taken on level ground.
- If the engine has been running, allow about 15 minutes after shutdown for oil to drain down to the oil pan.
- The level must be close to the FULL line (at least between the ADD and FULL lines) on the dipstick, but must NOT exceed the FULL line (refer to illustration below).



COOLING SYSTEM

The cooling system is a pressurized system. The coolant is circulated by a centrifugal pump. It is a typical system in most respects, but there are a few things to keep in mind when checking or working on the cooling system.

⚠ WARNING

Avoid injury when checking coolant in a hot engine. Wait for the engine to cool prior to checking the level, whenever possible.

Winterfronts

A MACK-approved winterfront, although not recommended for normal operation, may be used during cold weather to aid the engine in reaching and maintaining engine coolant temperatures within the normal operating range.

⚠ CAUTION

Use only a MACK-approved winterfront designed for the specific chassis. Restricted air flow through the charge air cooler can cause higher exhaust temperatures, power loss, excessive fan usage, reduced fuel economy and possible engine damage. The use of any other type of device, such as a radiator cover, cardboard or similar material, is not approved by Mack Trucks, Inc.

NOTE

The minimum operating temperature is 170°F (77°C).

MAINTENANCE AND LUBRICATION

When a winterfront is installed, a MACK-approved exhaust pyrometer must also be installed and closely monitored while the engine is in operation.

⚠ CAUTION

DO NOT exceed the maximum exhaust temperature listed on the pyrometer decal. To reduce exhaust temperature, open the winterfront, downshift or reduce engine power.

Maximum Ambient Air Temperature			
	Above 60°F (15.5° C)	60°F (15.5°C)	40°F (4.40°C)
MACK-Approved Winterfront	Not Recommended	Available*	Recommended
MACK-Approved Belly Tarp	Not Recommended	Not Recommended	Available*

* Make sure that engine oil, coolant, transmission and pyrometer temperatures remain in normal operating range.

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⚠ CAUTION

Winter treatments are NOT RECOMMENDED for vehicles which only operate intermittently in cold climates.

⚠ CAUTION

Never operate a viscous fan with a closed or partially closed winterfront.

ON/OFF FAN CLUTCH

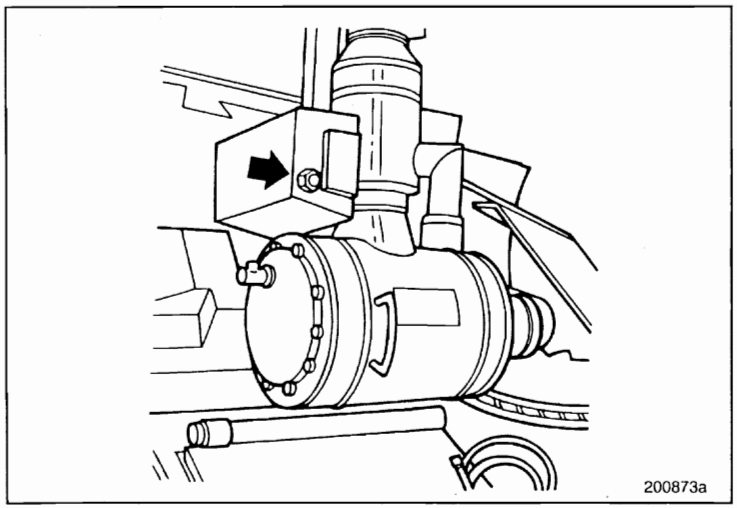
An ON/OFF fan clutch can help prevent excessive cooling during extremely cold weather operations. Whereas viscous fans often rotate continuously during cold weather, an ON/OFF fan clutch keeps the fan in the OFF position, thus reducing unnecessary air movement and helping to maintain adequate engine operating temperatures.

COOLANT LEVEL CHECK

⚠ WARNING

Turn the radiator cap counterclockwise to the first stop but do NOT depress. After the pressure has completely dissipated, press the cap downward and continue turning to remove.

The MR model chassis has an expansion tank located on the left-hand side of the chassis, mounted on the air cleaner assembly support bracket. Coolant should be visible in the sight glass located on the side of the tank.



MAINTENANCE AND LUBRICATION

Draining

Whenever repairs are to be made which would require disconnection of coolant hoses, etc., the cooling system should be completely drained. Carefully remove the filler cap and open all coolant drain cocks.

Protecting Coolant System

⚠ CAUTION

The concentration of ethylene glycol or propylene glycol in the cooling system must be checked with a refractometer prior to traveling or operating in areas where subfreezing temperatures may be encountered. When adding antifreeze to the system, run the engine for 20 minutes before checking with a hydrometer.

NOTE

Your chassis is currently supplied from the factory with engine coolant protection to −10°F (−23°C). Optional coolant protection to −40°F (−40°C) is also available.

Ethylene glycol or propylene glycol-based antifreezes are both approved for all MACK engines. All ethylene glycol and propylene glycol coolants must be low-silicate antifreezes which meet ASTM4985 test (GM6038M SPEC) criteria. These antifreezes are sometimes referred to as heavy-duty diesel coolants. Passenger car coolants do NOT meet this specification.

Be sure to maintain the required level of antifreeze protection for anticipated winter temperatures in your area of operation. A 40% to 60% concentration of antifreeze is required for E7 and E9 engines, regardless of application, geographic location or ambient air temperature.

⚠ CAUTION

Do NOT exceed a 60% concentration of antifreeze to water. A higher percentage of antifreeze will not increase protection. Concentrations over 60% adversely affect freeze protection and heat transfer rates.

NOTE

Propylene glycol should be checked with a refractometer.

NOTE

ALWAYS mix the water/antifreeze solution before pouring it into the cooling system.

NOTE

Piping arrangement may cause capacity variation depending on the type of cooling system and optional external cooling devices which may be attached. Therefore, it is difficult to tell exactly how much coolant it will take to fill any one particular system. As a general rule, fill to one inch below the bottom of the radiator filler neck.

MAINTENANCE AND LUBRICATION

⚠ CAUTION

Do NOT use coolant solutions which contain anti-leak additives in trucks equipped with coolant filters or conditioners.

⚠ CAUTION

Do NOT use soluble oil-type coolants in any MACK cooling system.

Refilling

Close all drain cocks and fill with the proper coolant mixture. Run engine with the radiator cap off until operating temperature is reached and the thermostat opens. Recheck level and add coolant, if required. Run the engine long enough to be sure the system is free of air and has the correct amount of coolant.

Cooling System Maintenance

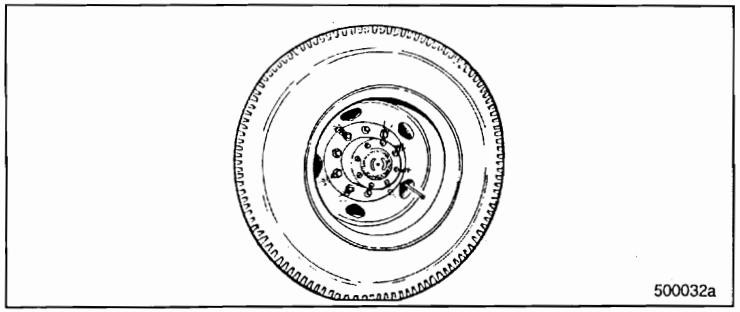
The cooling system must be maintained by performing regularly scheduled maintenance as outlined in the MAINTENANCE AND LUBRICATION manual, TS494. Cold weather operations, however, place added demands on the cooling system. Prevent potential cold weather problems by performing a quick check of the cooling system as outlined below:

- Make a general check for cooling system leaks.
- Inspect hoses and clamps for leaks and condition. Tighten hose clamps to specifications (as required).
- Check coolant level. Add fresh coolant (in specified concentration) as necessary.
- Check and record degree of antifreeze concentration. Add antifreeze as necessary to obtain required protection level.

WHEELS

Wheel Inspection

Look at wheels and cap nuts. Inspect them for evidence of cap nut looseness. Rust streaks from the cap nut ball seat are an indication of looseness.



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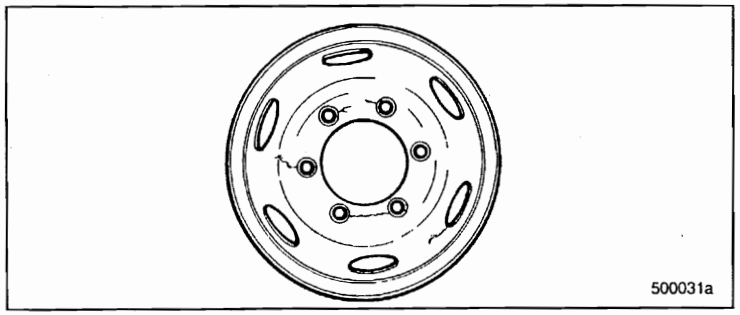
Look for cracks around the hand hole, stud hole and wheel. Look for broken studs, wheel damage or improperly seated lock rings.



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MAINTENANCE AND LUBRICATION

Tires

⚠ DANGER

Tires used on multipiece rims must be assembled and inflated only by experienced, qualified personnel. Tires must be inflated in a safety cage whenever possible. If, however, a safety cage is not available, use a portable lock-ring guard. The tire must be deflated prior to removal of the tire-and-rim assembly from the vehicle. Remove the valve core to ensure complete deflation.

⚠ DANGER

NEVER position your body in front of the rim during inflation.

Inflation Pressure

In order to ensure maximum mileage and overall performance from your tires, it is essential that they operate at the correct inflation pressure for the load carried. Inflation pressure should be checked daily while the tires are cold. Always use an accurate tire pressure gauge. NEVER bleed air from a hot tire, as it will then be underinflated. Refer to the MAINTENANCE AND LUBRICATION manual, TS494 for a complete listing of tire inflation pressures, and for additional information concerning tire care.

⚠ WARNING

UNDER NO CIRCUMSTANCES should you drive on underinflated or overloaded tires. A tire in this condition builds up excessive heat which can result in sudden tire destruction, property damage and personal injury.

⚠ CAUTION

Never bleed air from your tires in an attempt to gain traction for a vehicle stuck in snow, ice or mud. This practice provides no additional traction and typically results in underinflated tires. Never bleed air from a hot tire since that tire will then be underinflated.

To adjust for pressure fluctuations induced by temperature changes associated with winter weather, it is recommended that tire inflation pressure be checked daily when the tires are cold (i.e., before the vehicle is driven). Always use an accurate tire pressure gauge.

Inspection

Inspect your tires daily. Look for bulges, cracks, cuts, penetrations and/or oil contamination. If any such damage is found, the tire must be thoroughly inspected by a qualified tire inspector and repaired or discarded immediately, at his discretion. Also, check for uneven wear. If found, a thorough inspection of front end parts and alignment should be made by a qualified mechanic.

Tire Manufacturer's Data Book

Specific and more detailed information can be obtained by referring to the technical data books provided by each tire manufacturer.

Subjects of interest are:

- High-speed or low-speed operation
- Repair, retreading and regrooving
- Use of tire chains
- Mixing radial and bias tires on the same vehicle
- Use of dynamometers
- Tire mounting/dismounting

MAINTENANCE AND LUBRICATION

Oil Contamination of Tires

Lubricating oils, fuel oil, gasoline and other petroleum derivatives, if allowed to contact tires, will soften the rubber and destroy the tire. Preventive maintenance is necessary to ensure that oil leakage does not occur. The following areas should be inspected on a regular basis:

- Axle end seals
- Engine seals
- Transmission seals
- Drive axle seals
- Oil filters
- Oil and hydraulic lines (if equipped)

BATTERY

Jump-Starting Engine

If you encounter a situation in which it is necessary to jump-start an engine, use the following procedures.

⚠ WARNING

Batteries which are to be linked together must be of the same voltage (12 to 12, 24 to 24). Batteries produce explosive gasses. Keep sparks, flames, cigarettes, etc., away from batteries at all times. Protect your eyes by wearing safety goggles. Be sure vehicles are NOT touching each other.

1. Connect positive (+) cable to positive (+) post of discharged battery.
2. Connect the other end of the same cable to the positive (+) post of the booster battery.
3. Connect the second cable, negative (−) side, to the other post of the booster battery.
4. Make the final connection on the engine block of the stalled vehicle AWAY FROM THE BATTERY, and stand back.
5. Start the vehicle with the booster batteries and then start the stalled vehicle. Shut down the vehicle with the booster batteries and remove the cables in the reverse order of connection.

⚠ WARNING

Do NOT connect the final negative (−) connection to the frame of the stalled vehicle. This would cause all current to flow through the master ground circuit breaker resulting in overload.

MAINTENANCE AND LUBRICATION

ELECTRICAL

Circuit Protection

The circuit protection panel is located to the left of the passenger seat (on the engine tunnel). Remove the fasteners and the circuit board will be exposed.

Fuses are standard equipment for all circuits except the headlamps and windshield wipers. Circuit breakers are available as optional equipment.

⚠ CAUTION

For proper installation of electrical accessories, all wiring should meet SAE requirements and be routed through the circuit protection panel with proper amperage fuses or Type II circuit breakers. (Headlights and wipers will be on Type I, cycling-type circuit breakers.)

Some vehicles may be equipped with daytime running lights. For the daytime running lights to be operational, a DRL module must be installed in the relay socket marked either "DRL MOD" or "Running Lamps" on the electrical equipment panel. Do NOT install a standard relay into the daytime running light relay socket (marked either "DRL MOD" or "Running Lamps") or a short circuit in the headlight high beam circuit will result.

The headlight circuits are protected by SAE Type I (automatic reset-cycling) circuit breakers that automatically interrupt then restore the flow of current through the circuit in the event of an overload. This cycling will continue until the cause of the overload is repaired.

SAE Type II (automatic reset, non-cycling) circuit breakers (if equipped) provide a complete circuit disconnect until the overload is corrected. The power to the affected circuit breaker must be shut off before the circuit breaker will reset itself.

The circuit protection panel also provides access to battery, ignition and ground terminals for non-factory installed electronic equipment. (On V-MAC chassis, there are two serial link terminals for easy local connection of a trip recording device.)

MAINTENANCE AND LUBRICATION

Bulb Chart

Light (Some lights may not be available on certain models)	Quantity (Varies with model)	CP/Watt	Trade No.
ABC Gauge Panel Cluster Lights	26	1.0CP	#161
Gauge Panel D	2	1.0CP	#161
Dome and Door Courtesy Light	2/3	12.0CP	#561
Map Light	1	3.0CP	#1816
Heater and Air Conditioner	1	1.0CP	#184
Clearance & Cab ID Marker (Standard)	5/7	3.0CP	#168
Clearance & Cab ID Marker (Premium)	5	4.0CP	#904
Side Turn Indicator	2	32.0CP	#570
Hook-Up Light	1	35W/600CP	#4406
Fog Light	2	55W	#H3
Headlight, Incandescent (Round)	2	60W/50W	#6015
Headlight, Halogen (Round)	2	65W/35W	#H6024
Headlight, Halogen (Rectangular)	2	65W/45W	#9004
Rear Tail Light Backup	2	32.0CP	#1156
Rear Stop, Tail and Turn Light	2	32.0/3.0CP	#1157
Front Turn Light	2	32.0/3.0CP	#3057

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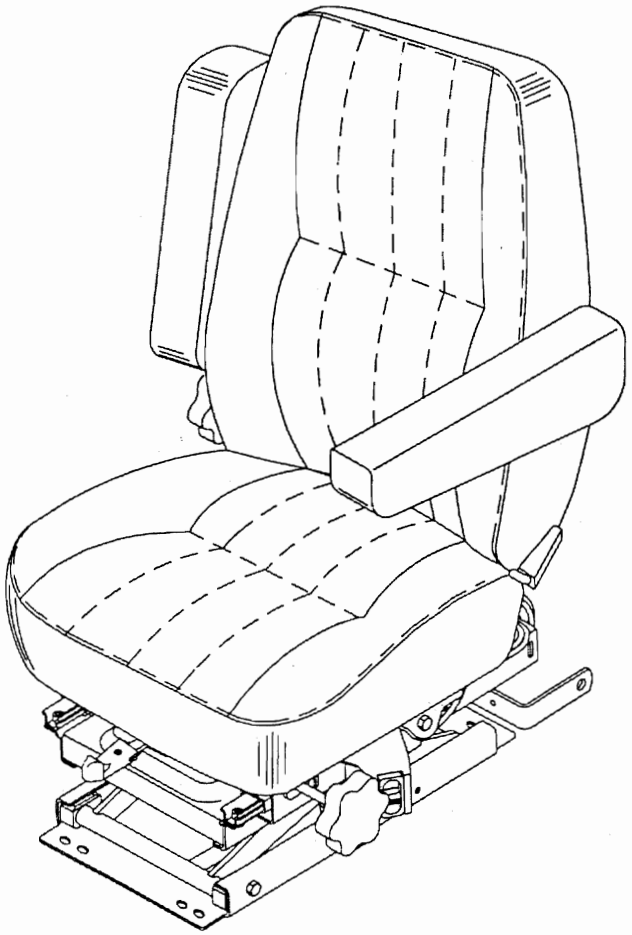
To prevent corrosion of the lamp socket terminals, particularly with the clearance and marker lamps, apply a coating of electrical sealing grease, such as Lubriplate DS-EX, to the socket and terminal assemblies.

⚠ CAUTION

Do not use electrical grease on any V-MAC connectors.

Bostrom®
SEATING



TALLADEGA™ SERIES

905L/905/910

AIR SUSPENSION SEATS

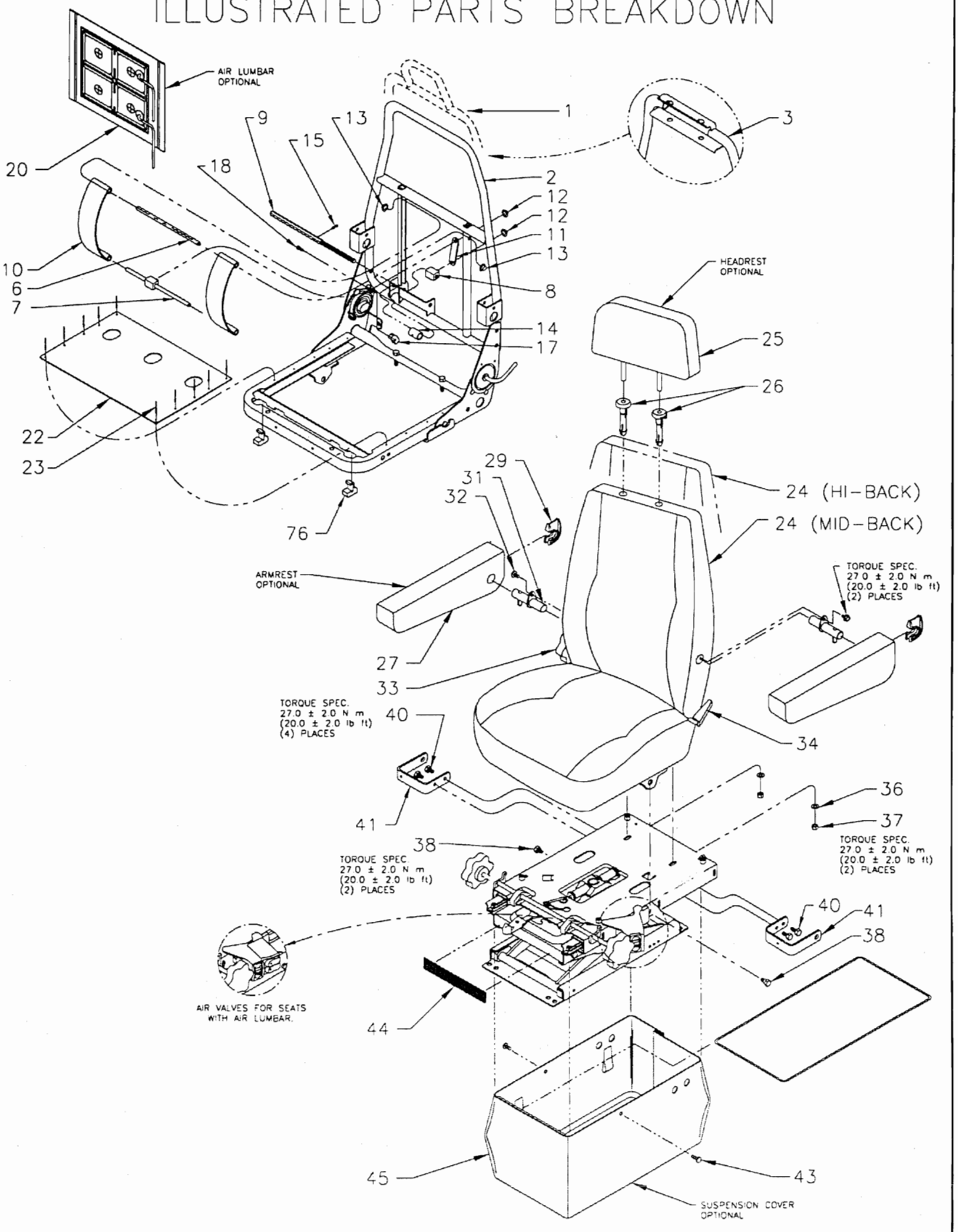
REED
CONCRETE PLACING EQUIPMENT

BOSTROM AIR SUSPENSION SEAT
TALLADEGA SERIES

VENDR

FIGURE 02
PAGE 02

ILLUSTRATED PARTS BREAKDOWN



REVISION:

PARTS REPLACEMENT LIST
LOW PROFILE SUSPENSION SEAT

ORDERING INSTRUCTIONS: Order by Part Number, NOT Reference Number.

HOW TO USE: Find the corresponding part that you wish to replace on the exploded view illustration and note its reference number. Refer to list below and record part number, quantity required and description. Order cover pad kits or armrests by color and material.

ORDER FROM: Your truck dealer or Bostrom Authorized Distributor for your area.

REF NO	PART NO	DESCRIPTION	QTY
1	6200906-001	Frame Assy. - High Back	
2	6200908-001	Frame Assy. - Mid Back	
3	6201118-001	Frame w/Headrest	
4	6201316-001	Frame w/Air Lumbar	
5	6222137-001	Lumbar Kit	
6	*	Lumbar Support Shaft	1
7	*	Lumbar Slide Shaft	1
8	*	Lumbar Adj. Block	1
9	*	Lumbar Adj. Shaft	1
10	*	Lumbar Spring	2
11	*	Lumbar Linkage	1
12	*	Push Nut 5/16"	2
13	*	Push Nut 3/8"	2
14	*	Spacer	1
15	*	Roll Pin	1
16	6107030-001	Back Restriction Kit	
17	*	Stop Block	1
18	*	Screw 10-32	1
19	6222141-001	Lumbar Kit (Air)	
20	*	Lumbar Bladder	1
21	6222157-001	Pan - Support Kit	
22	*	Pan	1
23	*	Rivets	10
24	**	Upper or Cover Pad Kit	
25	**	Headrest	
26	6201133-001	Grommet	2
27	**	Armrest Assy.	
28	6222159-001	Kit Armrest Insert	
29	*	Insert	1
30	6222160-001	Kit Armrest Bracket	
31	*	Screw 5/16 x 1/2 Hex Tap	1
32	*	Armrest Shaft	1
33	6200413-002	Lumbar Knob	1
34	6103653-003	Recliner Handle	1
35	6222007-001	Kit Fastener Mounting	
36	*	Washer Flat	2
37	*	Nut M8 x 1.25	2
38	*	Shoulder Bolt M8	2
39	6222005-001	ICP Bracket Kit	
40	*	Bolts	4
41	*	ICP Bracket	2
42	**	Suspension Cover Kit	
43	*	Fastener	2
44	*	Velcro	1
45	*	Suspension Cover	1
46	6222155-001	Air Valve Kit	
47	*	Valve Mounting Pod	1
48	*	Air Valve	1
49	*	Wire Tie 3"	3
50	*	Wire Tie 6"	1
51	*	Air Line	
52	6222133-001	Isolator Spring Kit	
53	*	Rubber Bumper	2
54	*	Isolator Spring	2
55	*	Shoulder Bolt M10 x 1.50	1
56	*	Pivot Block Assy.	1
57	*	Latch Spring	2
58	*	Split Poly Loom	2
59	*	Spacer	1
60	*	Latch Bar	1
61	6222134-001	Control Handle Kit	
62	*	Control Handle Assy.	1
63	*	Detent Pin Assy.	1
64	*	Spring Lockout	1
65	*	Hex Head - Shoulder	1
66	*	Washer	1
67	*	Isolator Knob	1
68	*	Pop Rivet	1

REVISION:

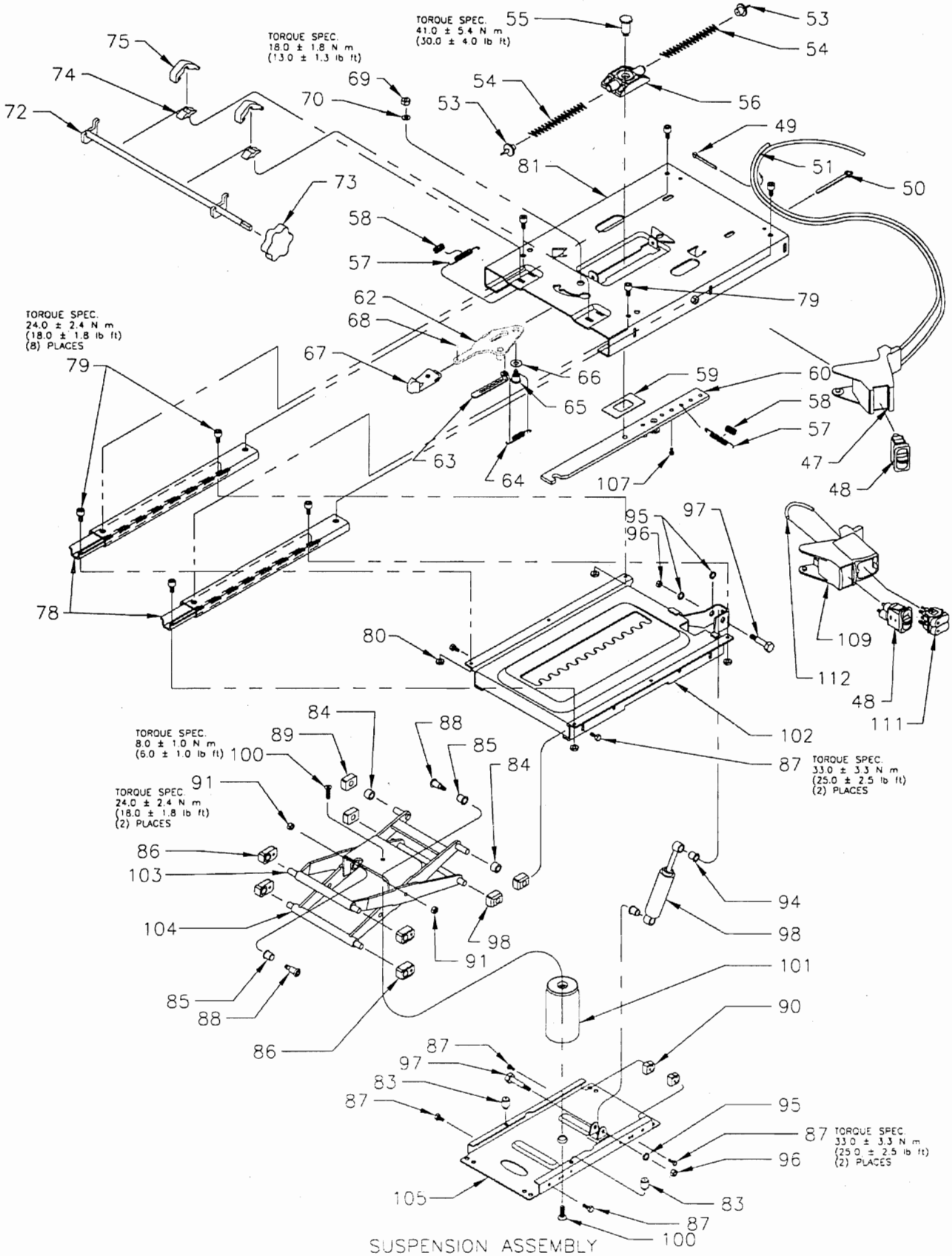
REED
CONCRETE PLACING EQUIPMENT

BOSTROM AIR SUSPENSION SEAT
TALLADEGA SERIES

VENDR

FIGURE 02
PAGE 04

ILLUSTRATED PARTS BREAKDOWN



REVISION:

PARTS REPLACEMENT LIST
LOW PROFILE SUSPENSION SEAT
CONTINUED

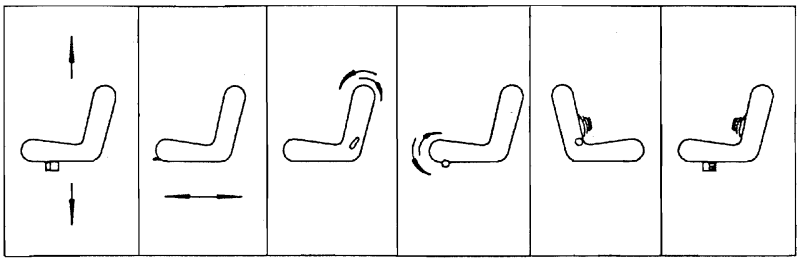
REF NO	PART NO	DESCRIPTION	QTY
69	*	Hex Nut M8 x 1.25 LK	1
70	*	Washer	1
71	**6222135-001**	**Seat Tilt Replacement**	
72	*	Tilt Rod Weldment	1
73	*	Tilt Knob	1
74	*	Bracket Tilt Rod	2
75	*	Bracket Tilt Rod	2
76	*	Slide Block Seat Tilt	2
77	**6222165-001**	**Slide Rail Kit**	
78	*	Slide Rail	2
79	*	Screws	8
80	*	Nuts	4
81	**6200641-004**	**Isolator Assy.**	
82	**6222076-001**	**Susp. Hardware Kit**	
83	*	Rubber Bumper	2
84	*	Spacer Roller	2
85	*	Bearing Multilube	2
86	*	Bearing Block	4
87	*	Screw Cap M8 x 20mm	6
88	*	Bolt Shoulder M8 x 1.25	2
89	*	Block Slide	4
90	*	Stop Block Assy.	2
91	*	Nut Hex M8 x 1.25 LK	2
92	**6222078-001**	**Low Profile Damper Kit**	
93	**6222079-001**	**Heavy Duty Damper Kit**	
94	*	Bearing Multilube	2
95	*	Washer Flat	2
96	*	Hex Nut	2
97	*	Bolt	2
98	*	Standard Damper	1
99	**6222084-001**	**Air Spring Kit**	
100	*	Screw	2
101	*	Air Spring Assy.	1
102	**6201571-001**	**Upper Plate Weldment**	1
103	**6065662-002**	**Outer Lever Assy.**	1
104	**6106528-002**	**Inner Lever Assy.**	1
105	**6111111-001**	**Base Assy.**	1
106	**6222138-001**	**Fore/Aft Restriction**	
107	*	Restrictor Screw	1
108	**6222163-001**	**Air Valve Kit Assy.**	
109	*	Pod	1
110	*	Air Lumbar Valve	1
111	*	Air Valve	1
112	*	Jumper Loop	1

* EXCEPT AS NOTED, KITS CONTAIN ALL ITEMS DENOTED BY ASTERISK LISTED BELOW EACH KIT PART NUMBER.

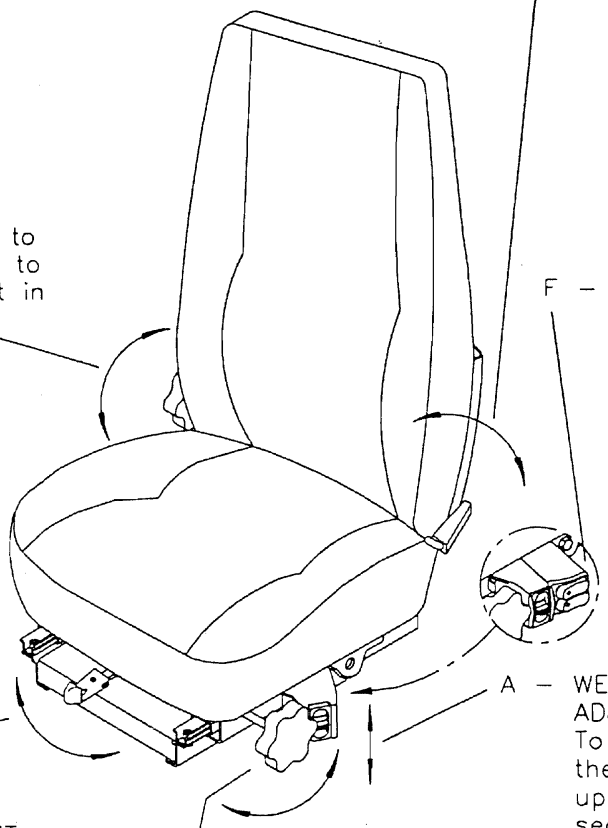
** SEE YOUR DEALER OR BOSTROM AUTHORIZED DISTRIBUTOR FOR UPPER, ARMREST, SUSPENSION COVER OR COVER PAD KIT PART NUMBERS APPROPRIATE FOR YOUR SEAT.

COMFORT ADJUSTMENTS

After installation the following comfort adjustments can be made to ensure the best performance.



A B C D E F



C – BACK ANGLE ADJUSTMENT
Lean forward slightly to remove pressure from seat back, hold handle rearward to adjust to any position within range.

E – LUMBAR ADJUSTMENT
Rotate knob forward to increase or rearward to decrease the support in the lumbar area.

F – OPTIONAL AIR LUMBAR ADJUSTMENT (UPPER AND LOWER)
To increase lumbar support press control valve forward.
To decrease lumbar support press control valve rearward.

A – WEIGHT AND HEIGHT ADJUSTMENT
To raise seat, push the air valve lever upwards. To lower seat, push the air valve lever downwards. When adjusted properly and under normal driving conditions. The seat should not top nor bottom against the end limits of the vertical travel. Adjusted height position should aide drivers visibility and vehicle control.

B – FORE AND AFT SEAT POSITION ADJUSTMENT
FORE AND AFT ISOLATION
Hold lever to left to adjust seat position forward or backward. Isolation is provided when lever is in center (straight forward) position. To lock out move lever to right.

D – SEAT CUSHION TILT ADJUSTMENT
Rotate seat tilt knob to decrease or increase seat tilt.

REMOVAL / REASSEMBLY

Air Spring Assembly (101) Removal/Reassembly

Remove complete seat assembly from vehicle.

1. Fill air spring assembly (101) so that seat is at maximum height (see comfort adjustments).
2. Block suspension up with a spacer placed between the base riser (105) and the upper frame (102).
3. Release air pressure from air spring so that seat is supported by spacer (see comfort adjustments).
4. Disconnect air line (51) from air spring assembly (101) by loosening air fitting and pulling air line out of fitting.
5. Remove top and bottom screw from air spring (101) and remove air spring assembly from suspension assembly.
6. Position air spring so that fitting at bottom of air spring (101) is toward the front of the seat. Install screw (100) into bottom of air spring (101).
7. Torque screw (100) at bottom of air spring assembly (101) to 10.0 +/- 1.0 ft.-lbs.
8. Install screw (100) at top of air spring assembly (101) and torque to 6.0 +/- 1.0 ft.-lbs.
9. Reconnect air line (51) to fitting in air spring assembly (101) by pushing air line into fitting and tightening fitting.
10. Fill air spring assembly (101) (see comfort adjustment) and remove spacer block.

Damper Replacement (98)

Seat need not be removed from truck.

1. Be sure suspension is at maximum height. Add air if needed (see comfort adjustment).
2. Move channel assembly (81) to full frontward position to gain working room.
3. Remove shoulder bolts (97) and hex nuts (96).
4. Remove damper assembly.
5. Install new damper with flanges of bearings to the outside of the suspension. Add thrust washers (95) and install shoulder bolts (97) and hex nuts (96).

Slide Rail (77) Replacement

1. Remove seat/back assembly (24). NOTE: See Seat/Back Assembly Removal/Reassembly procedure.
2. Once seat/back is removed, slide channel assembly (81) to the rear. Remove front screws (79) and nuts (80). Carefully, move channel assembly (81) to the front. Remove screws (79) and nuts (80).
3. Remove top screws (79).
4. Remove and install one slide rail (78) at a time.
5. Install new screws (79) and nuts (80).
6. Reassemble seat/back assembly (24).

REMOVAL / REASSEMBLY

Suspension Rebuild Bearing/Slide Block Replacement

1. Bleed all air from supply line. Disconnect air supply line to seat. Using air valve, exhaust all air from air spring. Remove complete seat assembly from vehicle.

2. Remove seat/back assembly (24) from suspension per procedures shown.

3. If seat assembly has a suspension cover (45), remove along with fasteners (43), after removing ICP bracket (41) and cap screws (40).

4. Block suspension up with a spacer placed between the base riser (105) and the upper frame (102).

5. Disconnect air line (51) from air spring assembly (101) by loosening air fitting and pulling air line (51) out of fitting.

6. Remove top and bottom screw from air spring (101) and remove air spring assembly from suspension assembly.

7. Remove damper assembly (98) by removing shoulder bolts (97) nuts (96) and washers (95) (see procedure for damper replacement).

8. Remove cap screws (87) from upper front bearing blocks (86) and lower rear stop block assemblies (90).

9. Remove upper plate weldment (102) by lifting and sliding it forward until bearing blocks (86) can be removed from cutouts in channels on upper frame (102). Then slide channel rearward until slide blocks (89) can be removed. Be careful not to pinch fingers in lever assembly.

10. Remove cap screws (87) from lower front bearing blocks (86) and slide lever assemblies (103 and 104) forward until bearing blocks (87) are removed from channel on base (105). Then slide lever assemblies rearward until slide blocks (89) are removed from channel. Be careful not to pinch fingers in lever assemblies.

11. Remove shoulder bolts (88) and nuts (91) from pivots of lever assemblies (103 and 104) and inspect. Replace if worn.

12. Replace bearings (85) at pivots on lever assembly (104) by pushing the old out and pressing in new. Flange of bearings (85) should be on outside of lever assembly (104).

13. Reassemble reverse order. Torque pivot shoulder bolts (88) to 20.0 +/- 2 ft.-lbs.

14. Put new bearing blocks (86) and slide blocks (89) on levers with beveled surfaces outward and slide levers with blocks into channel on base riser (105). Torque screws (87) to 30.0 +/- 3.0 ft.-lbs.

15. After putting bearing blocks (86), spacers (85) and slide blocks (89) on levers, slide upper frame assembly (102) over blocks. Line up screws (88) with bearing blocks (86) and torque screws (87) to 30.0 +/- 3.0 ft.-lbs.

16. Manually move suspension up and down to make sure there are no clearance problems. Be careful not to pinch fingers in linkage.

17. Block up suspension and reinstall air spring assembly (101). Torque upper screw (100) to 6.0 +/- 1.0 ft.-lbs. and lower screw (100) to 10.0 +/- 1.0 ft.-lbs. (see procedure shown for air spring reassembly).

18. Reinstall damper assembly (98) with washer (95) and nuts (96) (see procedure for damper replacement).

19. Reinstall suspension cover (45) and ICP brackets (41) if removed (see step #3).

20. Install assembly (24).

Seat/Back Assembly (24) Removal/Reassembly

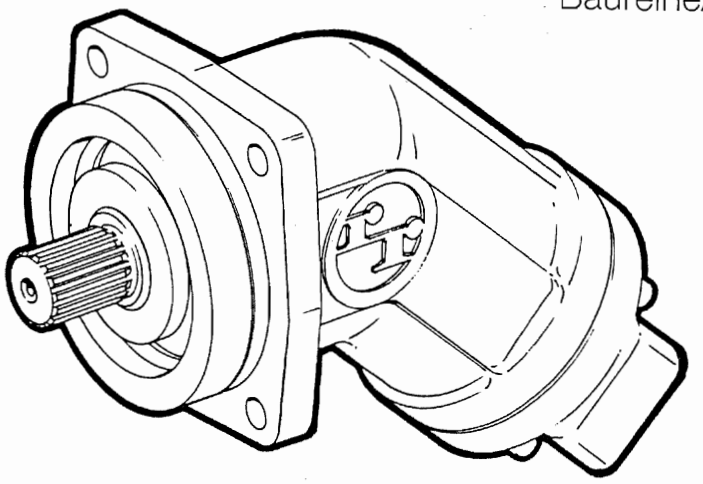
1. Adjust the seat upper to most rearward position and remove two nuts (37) and flat washers (36) from underside of channel assembly (81).

2. Remove two shoulder bolts (38) from channel assembly (81).

3. Reverse procedure to reassemble.

A2F

Baureihe/Series 6.1



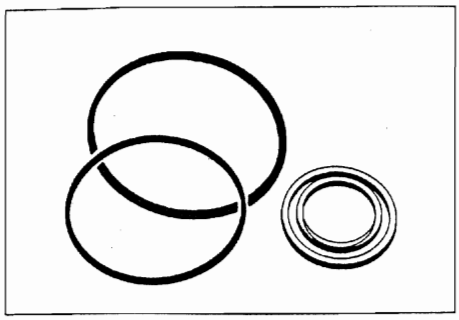
NOTE

Pretested and preassembled Original-Hydromatik-subassemblies make quick and successful repairs possible.
Should it be necessary to carry out repairs with individual components, our experience shows that only Original-Hydromatik-seals, retaining rings, and bearings should be used. Basically, these should be changed when ever a unit is stripped down, as useful life still remaining cannot be visvally determined.
In addition, it would be dissapointing to spoil a well done repair by including marginally cheaper components.
Giving us the unit type and fabrication number when ordering components will mean that you receive them quickly.
Repairs are simple, but we recommend you take advantage of our training in order to acquire the necessary special knowledge. This applies also to specialists whom we ale always pleased to meed again to explain the repair of newly developed products.

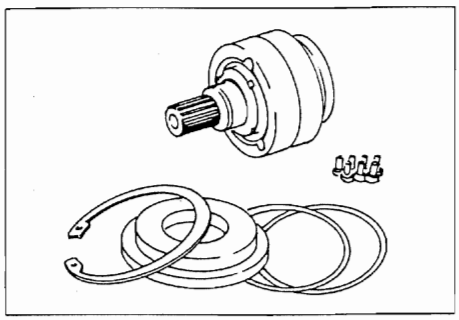
MANNESMANN REXROTH

Hydromatik GmbH

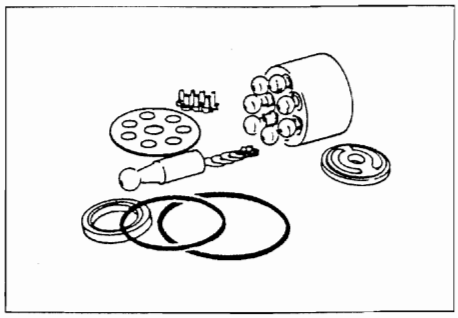
R



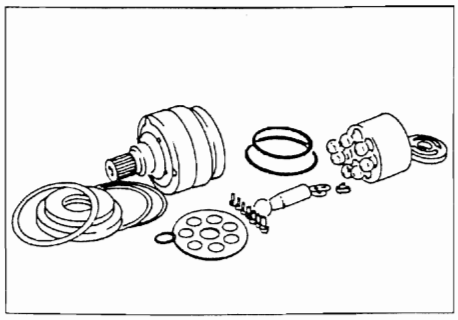
External seals



Rotary group, mechanical part; with sealkit, completely adjusted.



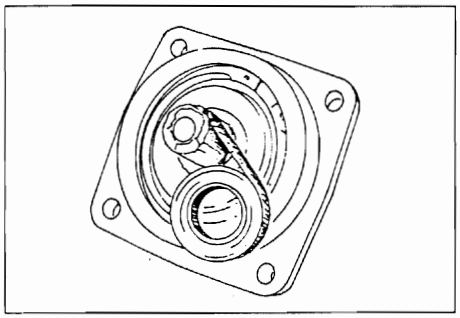
Rotary group, hydraulic part; with sealkit, completely adjusted.



Rotary group, complete; with sealkit, completely adjusted.

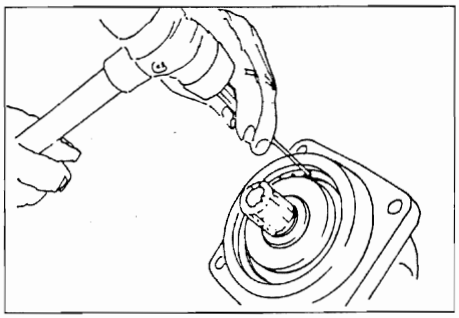
C O N T E N T S

Shaft seals



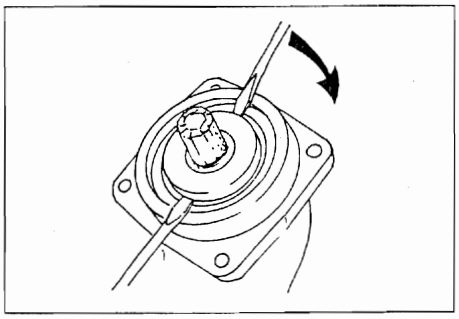
1

Remove protective cover. If keyed shaft,remove key.



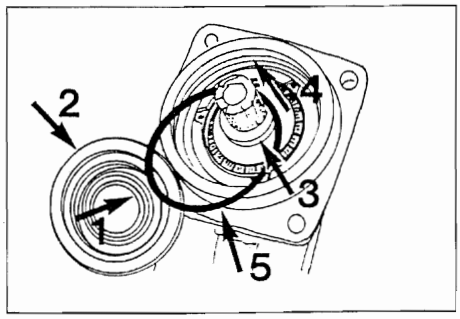
2

Free circlip and remove.



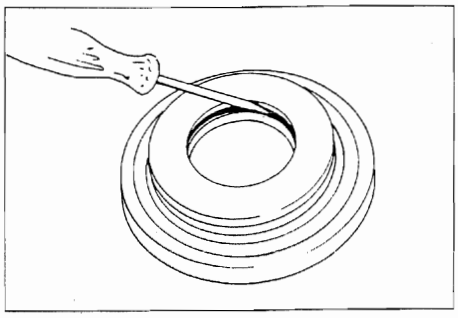
3

Prise off front cover.



4

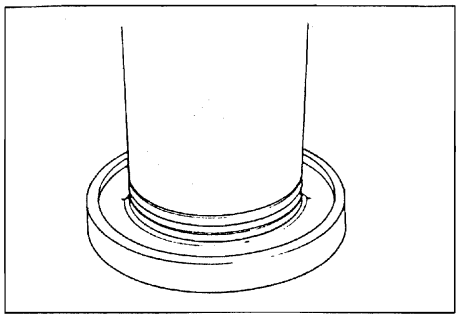
Visual check
Shaft seal (1), Cover (2), drive shaft (3), housing (4), O-ring (5).



5

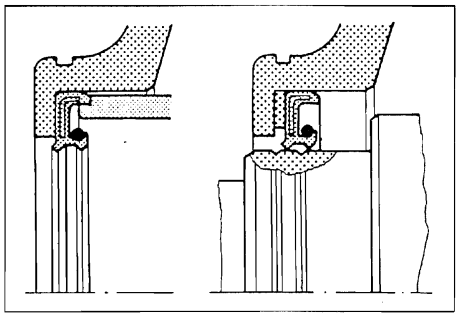
Remove old shaft seal.

Shaft seals



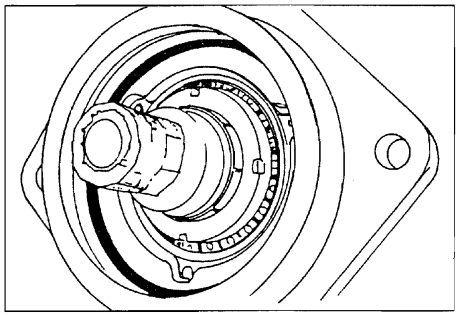
6

Press in the shaft seal ring to the correct position with a suitable sleeve.



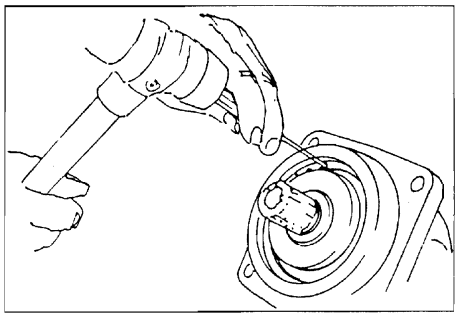
7

If the shaft is deeply grooved, insert shim behind seal.



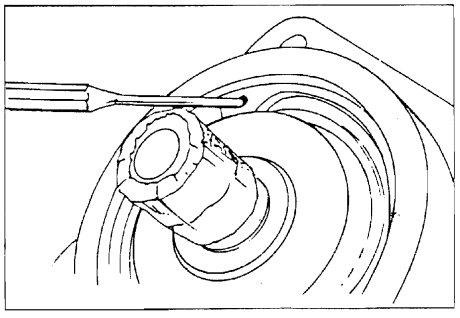
8

Fit new O-ring, ensure it is a snug fit. Grease O-ring and lips of shaft seal.



9

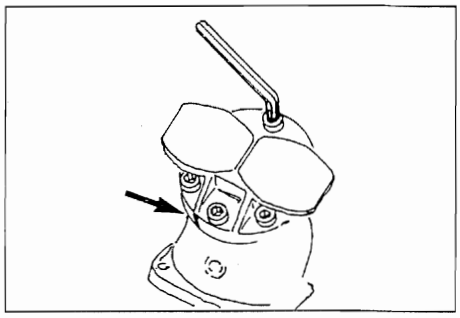
Fit circlip using a punch.



10

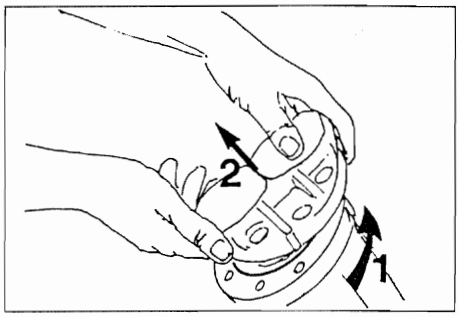
Check that circlip is well seated.

Cover plate/seals



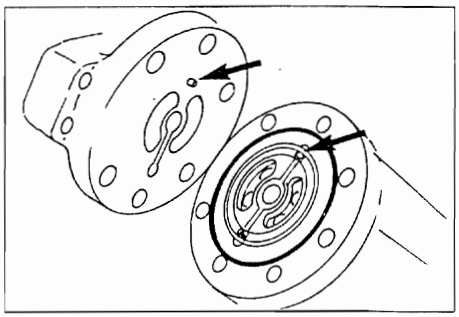
11

Mark position of cover plate (arrowed). Remove screws.



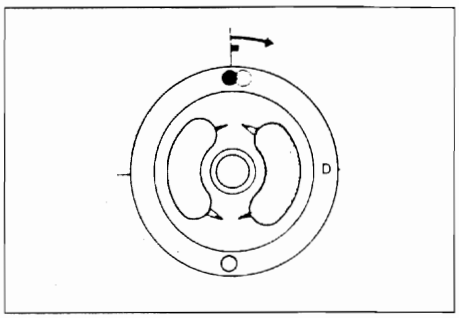
12

Swivel port plate on locating pin and lift off.



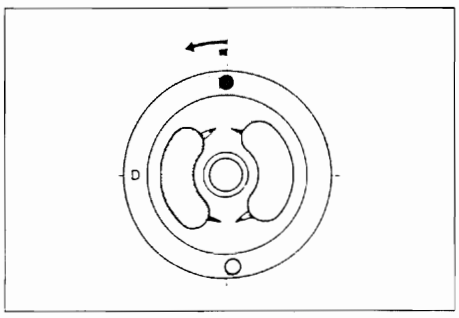
13

Note position of locating pin. (arrow).



14

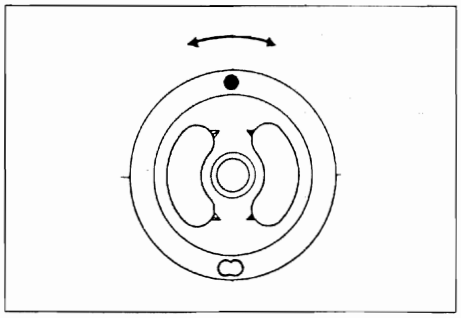
Pump, clockwise rotation. (Viewed on spherical surface.)



15

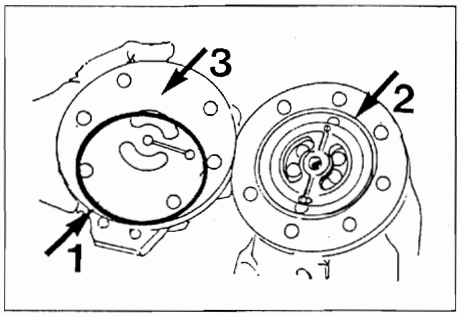
Pump, anti-clockwise rotation. (Viewed on spherical surface.

Cover plate/seals



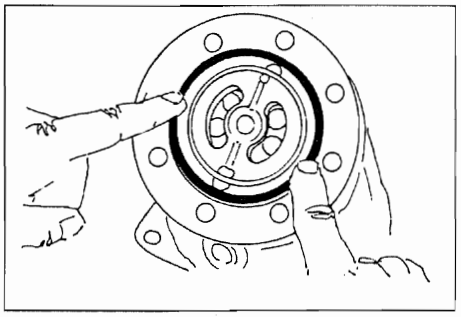
16

Motor, bi-directional. (Viewed on spherical surface.)



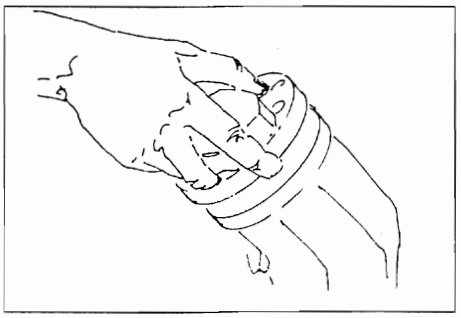
17

Visual check
O-ring (1), Groove (2), Plate (3).



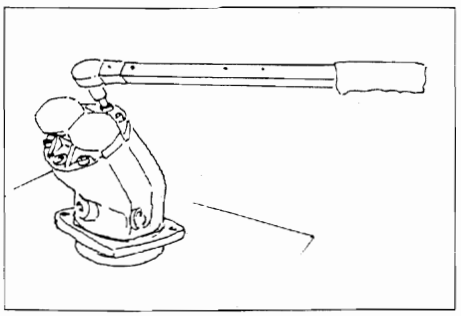
18

Lightly grease and fit O-ring.



19

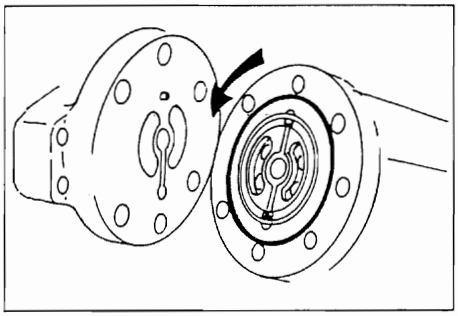
Assemble port plate to original mark (11),noting position of port plate (14-16). See notes fitting control plate.



20

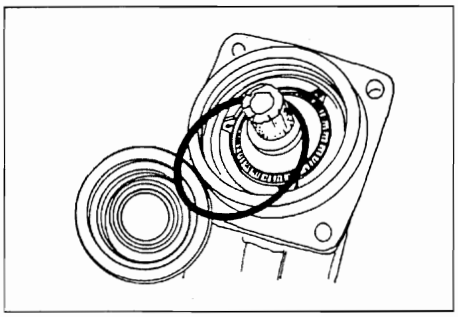
Tighten screws using torque wrench. See p. 14 for setting.

Removal of rotary group



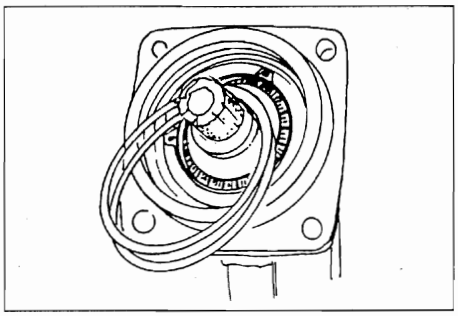
21

Remove cover plate (page 6). Rotate control plate to remove.



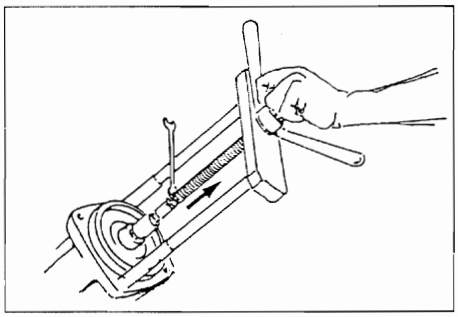
22

Remove front cover (page 4).



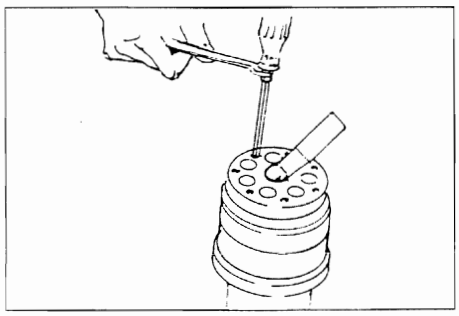
23

Remove shim(s).



24

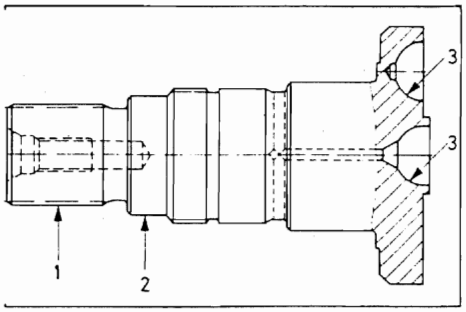
Remove rotary group with extractor. (See fig. 50).



25

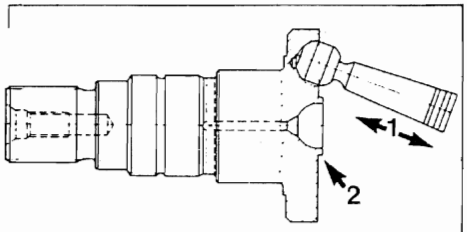
Remove retaining plate. The screws are held by loctite.

Examination notes



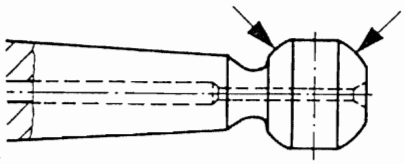
26

Drive shaft
1.) Free of corrosion or erosion, no damage to splines or keyway.
2.) No trace of wear, free of scratches (p. 7).
3.) Cups free of scratches and no pitting.



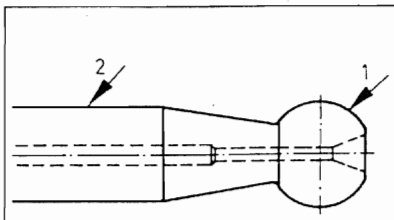
27

1.) Axial play of piston.
2.) Spigot.



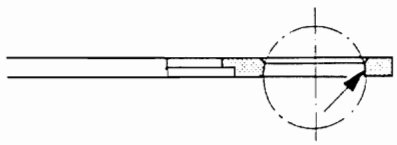
28

Piston
Free of scratches, no pitting (do not dismantle - tilt).



29

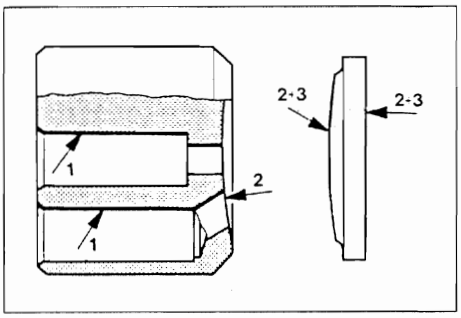
Centre pin
1.) Free of scratches, no pitting (do not dismantle - tilt).
2.) Free of scratches.



30

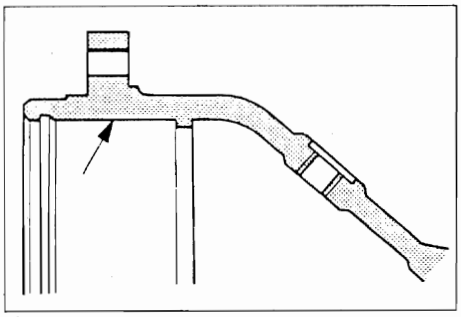
Retaining plate
Free of scratches, no wear.

Examination notes



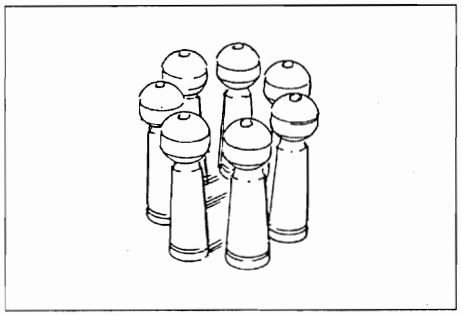
31

Cylinder block/Control plate
1.) Bores unscratched, and not worn.
2.) Faces, smooth and even, no cracks or scratches.
3.) Min. hardness 700 HV 10.



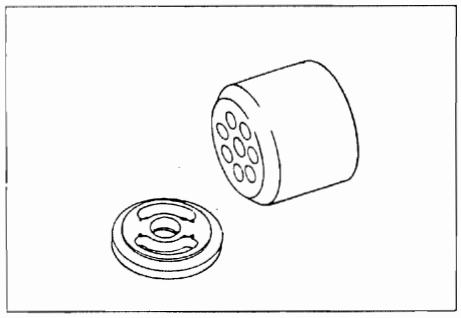
32

Housing
No damage or wear where bearings fit.



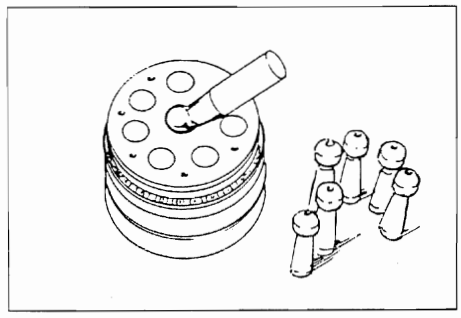
33

Only exchange piston as a complete set. When changing other components, re-calibration is required.



34

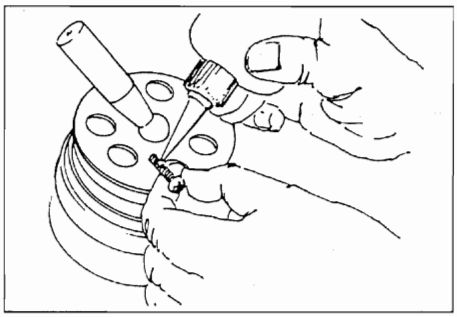
Exchange cylinder block and control plate as a pair.



35

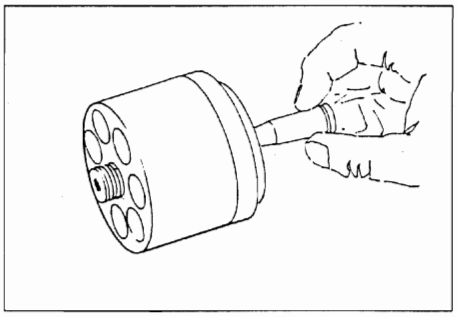
Insert centre pin with retaining ring.
Correctly fit retaining plate.

Installing rotary group



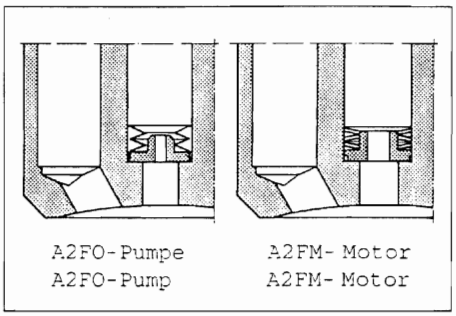
36

Apply loctite sparingly to screws only.



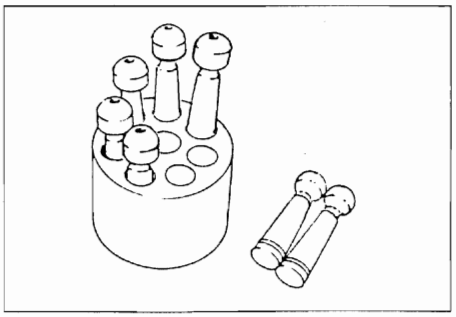
37

Heavily grease and fit spring pad and Belleville washers (using screwdriver).



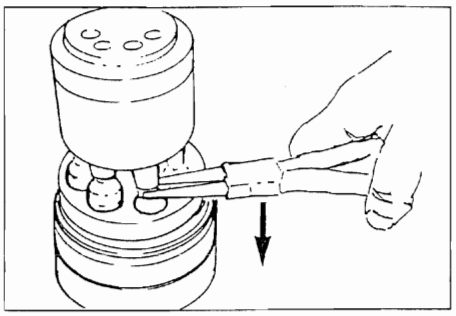
38

Make sure all parts are fitted in correctly!
Note:
A2FO - Pump- 4 Belleville washers/ Spring pad
A2FM - Motor- 6 Belleville washers/ Spring pad



39

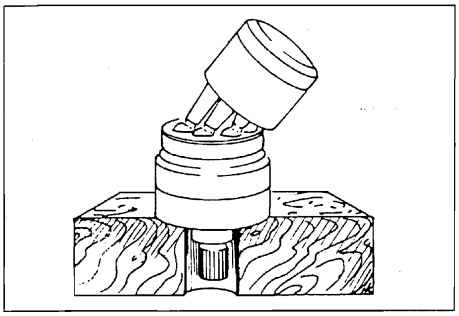
Fit pistons in bores.



40

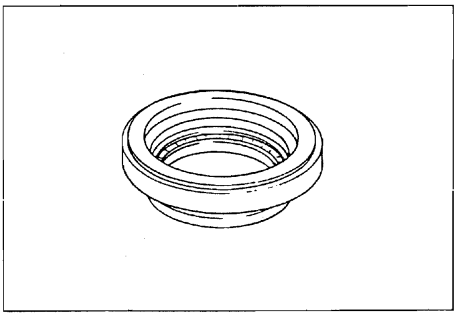
Press pistons firmly into cups with cylinder block held in central position.

Installing rotary group



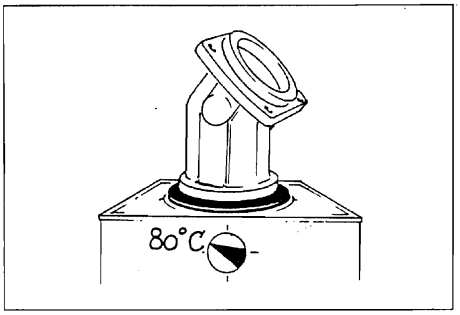
41

Swivel cylinder block to max. It fouling occurs fig. 40.



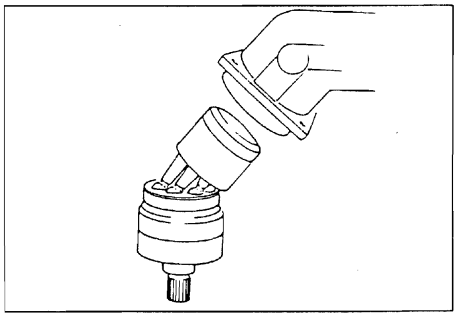
42

Is new shaft seal fitted? (comparisons fig 7).



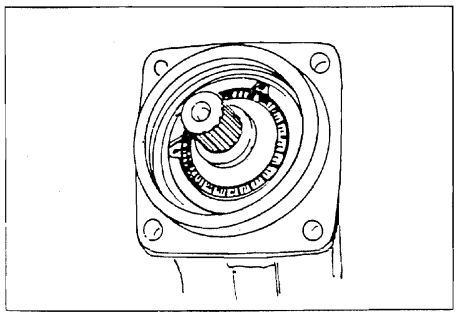
43

Heat the housing to 80°C.



44

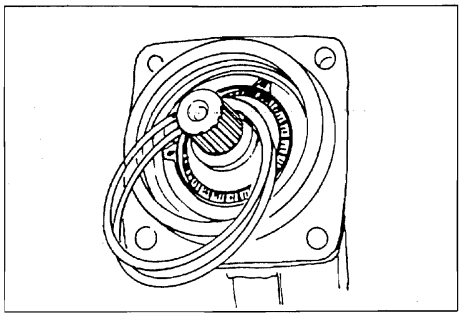
Fit pre-heated housing up to stop.



45

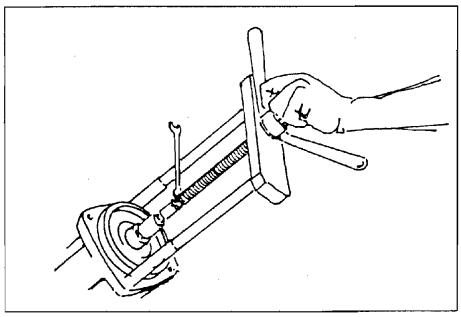
Re-position.

Installing rotary group



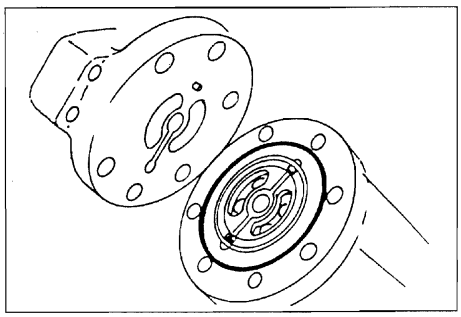
46

Insert shims and assemble to figs. 7 - 10.



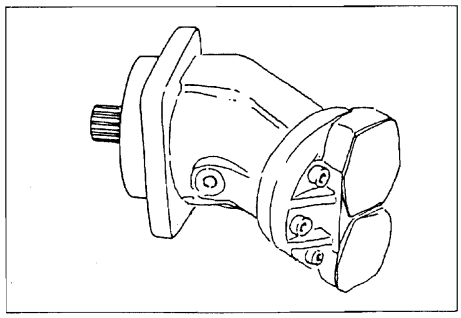
47

Pull the rotary group against the cover plate.
Check that the cover plate cannot move!



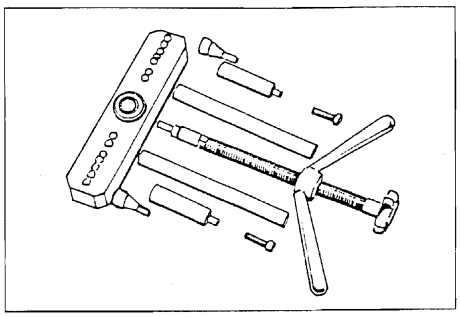
48

Completely assemble to figs. 18 - 20.



49

Seal connections to protect against dust.
Corrosion proctection (internal/external).
Assembly complete.



50

Extractor for rotary group (fig. 24).

Tightening torques

Anziehdrehmomente für Schaftschrauben (Metrisches ISO-Regelgewinde)

Die nebenstehenden Werte für Anziehdrehmomente gelten nur für Schaftschrauben mit metrischem ISO-Regelgewinde und Kopfauflagemaßen nach DIN 912, DIN 931 und DIN 933. Außerdem gelten diese Werte nur für leicht oder nicht geölte, unbehandelte Oberflächen, sowie nur bei Verwendung von Drehmoment- und Kraftbegrenzungsschlüsseln.

Gewinde größe	Festigkeitsklassen 8.8	10.9	12.9
	Anziehdrehmoment (Nm)		
M 3	1.1	1.6	1.9
M 4	2.9	4.1	4.9
M 5	6	8.5	10
M 6	10	14	17
M 8	25	36	41
M 10	49	69	83
M 12	86	120	145
M 14	135	190	230
M 16	210	295	355
M 18	290	405	485
M 20	410	580	690
M 22	550	780	930
M 24	710	1000	1200
M 27	1050	1500	1800
M 30	1450	2000	2400

Tightening torques for shaft bolts (Metric ISO Standard Thread)

The values for tightening torques shown in the table are valid only for shaft bolts with metric ISO- standard threads and head support surface dimensions in accordance with DIN 912, DIN 931 and DIN 933. These values are also valid only for light or unoiled, untreated surface as well as for use only with torque-indicating wrenches and force limiting tools.

Thread Size	Strength Classes 8.8	10.9	12.9
	Tightening Torque (lb.ft)		
M 3	0.8	1.2	1.4
M 4	2.1	3.0	3.6
M 5	4.4	6.3	7.4
M 6	7.4	10.3	12.5
M 8	18.4	25.8	30.2
M 10	36.1	50.9	61.2
M 12	63.4	88.4	106.9
M 14	99.5	140.0	169.5
M 16	154.8	217.4	261.6
M 18	213.7	298.5	357.4
M 20	302.2	427.5	508.5
M 22	405.4	574.9	685.4
M 24	523.5	737.0	884.4
M 27	773.9	1105.5	1326.6
M 30	1068.7	1474.0	1768.8

Anziehdrehmomente für Verschlußschrauben VSTI (Metrisches Feingewinde)

Gewindegröße	Bezeichnung		Anziehdrehmoment (Nm)
M 8 x 1	VSTI 8 x 1	-ED/SA	≈ 5
M 10 x 1	VSTI 10 x 1	-ED	≈ 10
M 12 x 1,5	VSTI 12 x 1,5	-ED	≈ 20
M 14 x 1,5	VSTI 14 x 1,5	-ED	≈ 30
M 16 x 1,5	VSTI 16 x 1,5	-ED/SA	≈ 30
M 18 x 1,5	VSTI 18 x 1,5	-ED/SA	≈ 40
M 20 x 1,5	VSTI 20 x 1,5	-ED/SA	≈ 50
M 22 x 1,5	VSTI 22 x 1,5	-ED	≈ 60
M 26 x 1,5	VSTI 16 x 1,5	-ED/SA	≈ 70
M 27 x 2	VSTI 27 x 2	-ED	≈ 90
M 30 x 1,5	VSTI 30 x 1,5	-ED/SA	≈ 100
M 33 x 2	VSTI 33 x 2	-ED/SA	≈ 120
M 42 x 2	VSTI 42 x 2	-ED/SA	≈ 200
M 48 x 2	VSTI 48 x 2	-ED	≈ 300

Tightening torques for locking screws VSTI (Metric ISO fine thread)

Thread Size	Designation		Tightening Torque (lb.ft)
M 8 x 1	VSTI 8 x 1	-ED/SA	≈ 4
M 10 x 1	VSTI 10 x 1	-ED	≈ 7
M 12 x 1,5	VSTI 12 x 1,5	-ED	≈ 15
M 14 x 1,5	VSTI 14 x 1,5	-ED	≈ 22
M 16 x 1,5	VSTI 16 x 1,5	-ED/SA	≈ 22
M 18 x 1,5	VSTI 18 x 1,5	-ED/SA	≈ 29
M 20 x 1,5	VSTI 20 x 1,5	-ED/SA	≈ 37
M 22 x 1,5	VSTI 22 x 1,5	-ED	≈ 44
M 26 x 1,5	VSTI 16 x 1,5	-ED/SA	≈ 51
M 27 x 2	VSTI 27 x 2	-ED	≈ 66
M 30 x 1,5	VSTI 30 x 1,5	-ED/SA	≈ 74
M 33 x 2	VSTI 33 x 2	-ED/SA	≈ 88
M 42 x 2	VSTI 42 x 2	-ED/SA	≈ 147
M 48 x 2	VSTI 48 x 2	-ED	≈ 220

Anziehdrehmomente für Seal-Lock Bundmuttern (Metrisches ISO-Regelgewinde)

Die nebenstehenden Werte für Anziehdrehmomente gelten nur für Seal-Lock Bundmuttern der Festigkeitsklasse 8.8 mit metrischem ISO-Regelgewinde.

Gewinde größe	Festigkeitsklassen 8.8	10.9	12.9
	Anziehdrehmoment (Nm)		
M 6	10		
M 8	22		
M 10	40		
M 12	69		
M 14	110		
M 16	170		

Tightening torques for seal-lock nuts (Metric ISO-Standard Thread)

The values for tightening torques shown in the table are valid only for seal-lock-nuts of the strength class 8.8 and with metric ISO- standard thread.

Thread size	Strength Classes 8.8	10.9	12.9
	Tightening Torque (lb.ft)		
M 6	7.4		
M 8	16.2		
M 10	29.5		
M 12	50.9		
M 14	81.1		
M 16	125.3		

Anziehdrehmomente für Linsenschrauben mit Kreuzschlitz DIN 7985 (Metrisches ISO-Regelgewinde)

Die nebenstehenden Werte für Anziehdrehmomente gelten nur für Linsenschrauben mit Kreuzschlitz DIN 7985 der Festigkeitsklasse 8.8 mit metrischem ISO-Regelgewinde.

Gewinde größe	Festigkeitsklassen 8.8	10.9	12.9
	Anziehdrehmoment (Nm)		
M 3	1.1		
M 4	2.9		
M 5	6		
M 6	10		
M 8	25		
M 10	49		

Tightening torques for cross-slotted lens head screws DIN 7985 (Metric ISO-Standard Thread)

The values for tightening torques shown in the table are valid only for cross-slotted lens head screws DIN 7985 of the strength class 8.8 and with metric ISO-standard thread.

Thread size	Strength Classes 8.8	10.9	12.9
	Tightening Torque (lb.ft))		
M 3	0.8		
M 4	2.1		
M 5	4.4		
M 6	7.4		
M 8	18.4		
M 10	36.1		

General advice
- Make yourself familiar with the equipment of the machine.
- Only operate the machine if your are completely familiar with the operating and control elements as well as the functioning of the machine.
- Use your safety equipment like helmet, safety shoes and hearing protection.
- Make yourself familiar with your working field.
- Only operate the machine for its intended purpose.

Please observe the guidelines of the Professional Association and the machine manufacturer.

Before starting
- Observe the operating instructions before starting.
- Check the machine for remarkable faults.
- Do not operate the machine with defective instruments, warning lights or control elements.
- All safety devices must be in a secure position.
- Do not carry with you movable objects or secure them to the machine.
- Keep oily and inflammable material away from the machine.
- Before entering the driver's cabin, check if persons or obstacles are beside or beneath the machine.
- Be careful when entering the driver's cabin, use stairs and handles.
- Adjust your seat before starting.

Start
- When starting all operating levers must be in "neutral position".
- Only start the machine from the driver's seat.
- Check the indicating instruments after start to assure that all functions are in order.
- Do not leave the machine unobserved when the motor is running.
- When starting with battery connection cables connect plus with plus and minus with minus. Always connect mass cable (minus) at last and cut off at first.

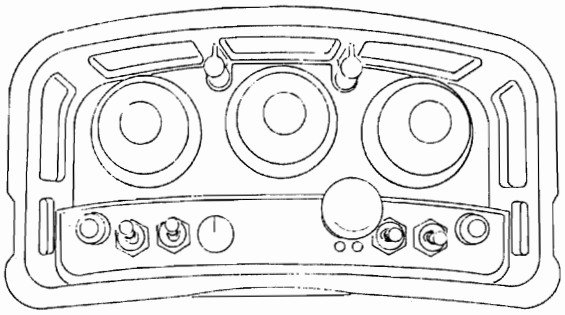
Attention
- Exhaust gas is dangerous. Assure sufficient fresh air when starting in closed rooms!

Hydraulic equipment
1. Hydraulic equipment is standing under high pressure.
   ⚠ High pressure fluids (fuel, hydraulic oil) which escape under high pressure can penetrate the skin and cause heavy injuries.
   Therefore immediately consult a doctor as otherwise heavy infections can be caused.
2. When searching leakages use appropriate auxiliary devices because of the danger of accidents.
3. Before working at the hydraulic equipment, lower pressure to zero and lower working arms of the machine.
4. When working at the hydraulic equipment, absolutely stop motor and secure tractor against rolling away (parking brake, shim)!
5. When connecting hydraulic cylinders and motor pay attention to correct connection of hydraulic flexible hoses.
6. In case of exchanging the ports, the functions are vice versa (f. ex. lift-up/lower) - danger of accidents!
7. Check hydraulic flexible hoses regularly and replace them in case of dammage or wear! The new hose pipes must comply with the technical requirements of the machine manufacturer!

⚠ Orderly disposal or recycling of oil, fuel and filters!

NBB NANO-S-A2-HC
RADIO REMOTE CONTROL

NBB
NACHRICHTEN
TECHNIK



S/N :

1. STANDARD SPECIFICATION

- Portable transmitter with two replaceable 7,2 volt NiCd batteries, halter and waist straps
- Receiver with NBB adapter plate for fastening purposes (Only PNN-BUS-3)
- Receiver with 4 fastening angles (PNN-BUS-5)
- Multi-pole connecting cable for the receiver, to your specifications
- Automatic battery charger with charging adapter (rapid charging in three hours)

The actual delivery specification is as detailed on the confirmation of order or the delivery note accompanying the goods!

2. SAFETY PRECAUTIONS

Even if you are accustomed to working with radio control systems, read these operating instructions without fail before using this equipment. Only this document contains the latest information relating to your NBB radio control system.

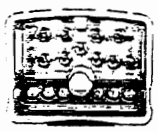
Please refer to the accompanying registration documents for the explanatory notes on obtained an operating permit. Observe all applicable work-safety and accident prevention regulations without fail. Only fully trained, authorized personnel may use the NBB radio control equipment. Components, etc. built into the NBB equipment for safety purposes must be regularly inspected. (See point 6 of this instruction)

If the NBB radio control unit develops a fault, it must be shut down immediately. The transmitter should be switched off with the EMERGENCY-OFF switch. The connecting cable must be disconnected from the crane connecting socket (terminal) on the receiver. The repair of the equipment must not be carried out other than by NBB or an NBB authorized technician.

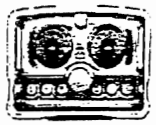
Failure to observe these recommendations will put both you yourself and others at risk. Under these circumstances, NBB rescinds the guarantee and any other form of liability. This radio control unit is designed exclusively for the control of construction machines and industrial plants. Only under these conditions are the safety systems (EMERGENCY-OFF, zero setting) fully effective. No other form of use is permitted. Any non-observance of this condition will relieve NBB of all liability.

Nano, Nano-S-A2-HC

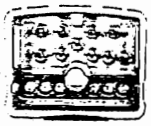
Nano-Vario



Nano, Nano-S-A2-HC

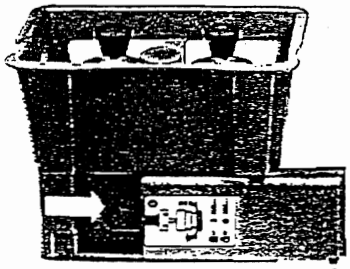


Nano-Vario

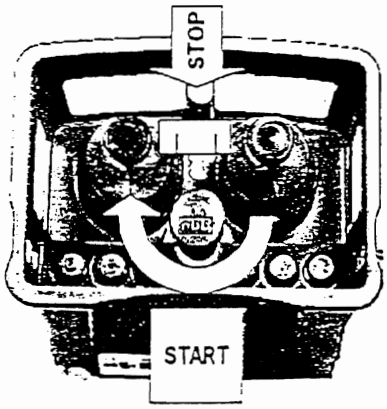


3. TRANSMITTER

To make the unit ready for use, insert the battery into the battery compartment. To remove the battery, depress the pin and push out the battery. The power supply to the transmitter is activated with the EMERGENCY-OFF switch (when depressed, the EMERGENCY-OFF switch can also be secured by removing the key cap). The green LED on the transmitter control panel must flash regularly. Commands can now be input by means of the controls. The operating period with a charged battery is approximately 8 hours with the transmitter in continuous use. When the red 'Battery' indicator lamp lights up, the battery is nearing exhaustion.
The transmitter can be operated for approximately 15 minutes more in this condition. During this time, bring the crane to a safe position and install a new battery.
Removal of the battery inerrupts the radio link. As a result, the master switch for the crane must be switched on again.
Charge the discharged battery with the charger supplied.

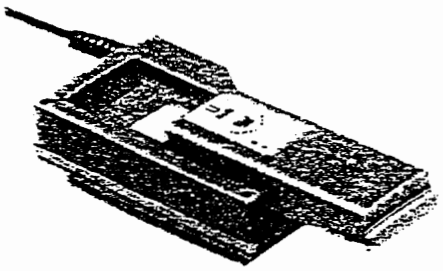


Depress the pin and push out the battery



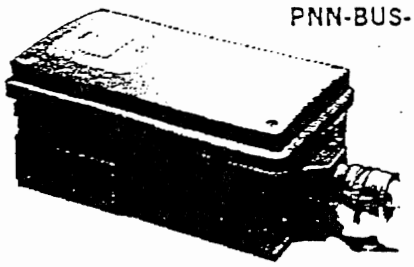
4. BATTERY CHARGER

The red indicator lamp indicates that the battery charger is ready for use. Place the battery in the charging well; it will now be charged. When the red LED goes out, the charging process is concluded. No harm will come to the battery if it is left in the charger beyond the required charging time.
Do not use the charger other than in dry rooms having a min-max temperature range of 0-40°C. A charged battery is a concentrated energy source. Never store a charged battery in a toolbox or similar where it could be short-circuited by metal components (even a key in your trouser pocket can cause a short circuit).



5. RECEIVER (PNN-BUS-3 and PNN-BUS-5)

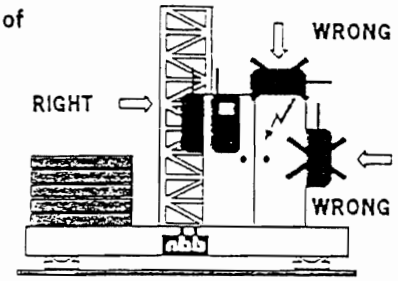
PNN-BUS-3

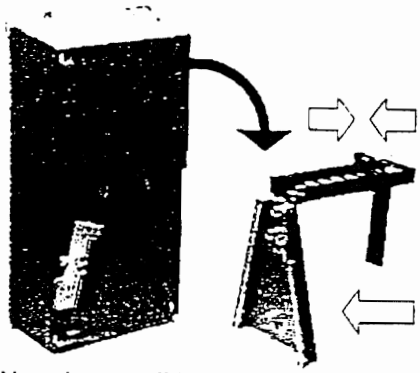


The receiver is connected to the crane with the multi-pole connecting cable supplied. Please observe the instructions issued by the crane manufacturer. The power supply to the receiver is generally effected by way of the connecting cable.

- **In general, an earth lead is required in the case of cranes which have not previously been operated under radio control. Failing this, the receiver electronic circuit will not receive any power supply.**
  Take care to ensure that the operating voltage of the receiver complies with the electrical specifications of the crane.
  The applicable operating voltage is specified in the supplement.

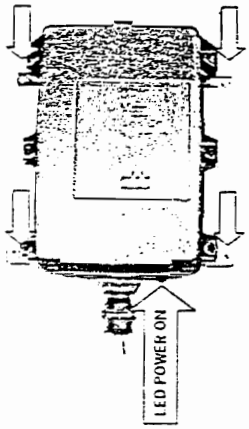
- **Never expose the receiver to a high pressure cleaning jet. This also applies to the transmitter.**
- **The receiver should always be fixed vertical at the outside panel of the switching cabinet. The antenna should reach over the top of the panel.**



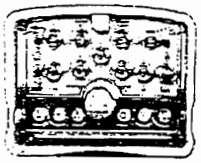


Mounting-possibilities of the PNN-BUS-3 or of the PNN-BUS-5.

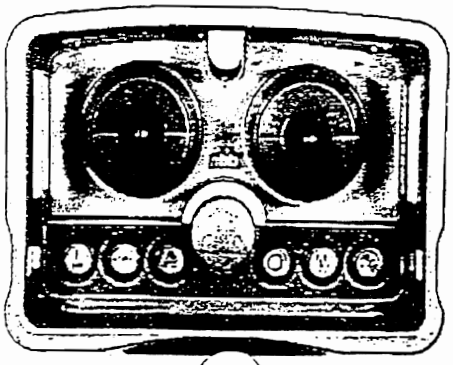
PNN-BUS-5

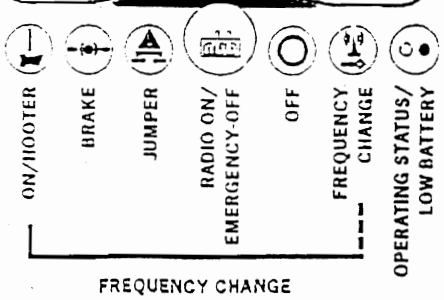


Nano-Vario



Nano / Nano-S-A2-HC





6. OPERATING THE SYSTEM

Safety equipment in the NBB radio control system:

In the transmitter:

- EMERGENCY-OFF switch with automatic disconnection from the power supply
- Automatic zeroing

In the receiver:

- Duplicated 2-channel evaluation of the EMERGENCY-OFF signal
- Automatic zeroing when switched on again after radio signal interruption
- Inhibition of radio control commands at the relay level if EMERGENCY-OFF circuit defective.

To ensure troublefree operation, observe the following operating instructions precisely. Subject to the transmitter being in operating condition, the crane's master switch can only be switched on provided no command transmitter is actuated. The necessary command for this purpose is initiated by the 'ON/HOOTER' button. This activates a warning signal on the crane. After the crane has been switched on, this button serves for the subsequent activation of the hooter as required by safety at work regulations.

If the NBB radio control unit remains unused for a prolonged period, we strongly recommend that the battery be charged from time to time (approximately every four weeks). This will prevent it from becoming discharged and will prolong its working life. If an extended period of disuse is intended, we recommend that the battery be removed from the transmitter.

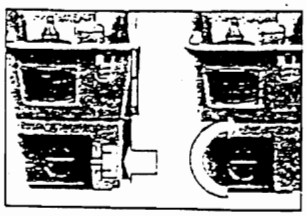
Changing the frequency:

To change the frequency, hold down the 'ON/HOOTER' button while simultaneously operating the 'FREQUENCY CHANGE' button until the hooter sounds. (Please observe the accompanying registration conditions, see page 5, point 9).

TEACH-IN: Individual Setting of Analog Channels (Basic Setting) at Nano Transmitter*.
The output signals of the analog channels can be individually programmed from the transmitter.

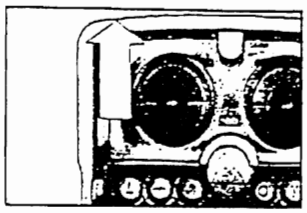
Activate programming mode

Mounting the key cap on the rotary switch opposite the battery compartment and then turning this switch activates the programming mode.



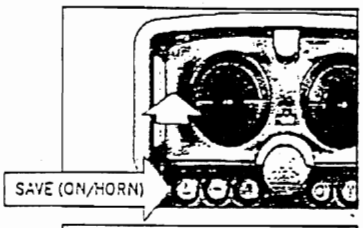
Select analog function

To determine which analog function is to be programmed, it is sufficient to briefly turn the appropriate master switch fully in the direction of this function.



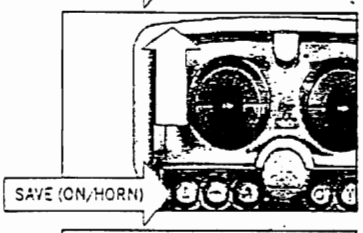
Save "contact point"

The master switch is now turned until the required "contact point" (less than 50% of the master switch turning range) is reached. To save this value, the "SAVE" ("ON/HORN") key must be pressed at this position.



Save maximum speed

The upper initial value is saved by turning the master switch (further than 50% of the master switch turning range) until the maximum speed of the function is reached, and then pressing again the "SAVE" ("ON/HORN") key.

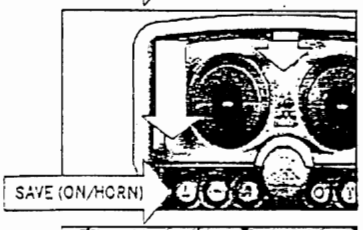


Program opposite direction ?

No

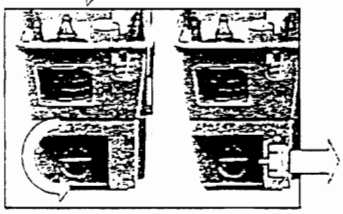
Yes

The opposite direction of this function can then be programmed the same way immediately afterwards.



End programming mode

If the rotary switch is reset, the programming mode is left and working with this function can commence.
Removing the key cap secures the transmitter against inadvertant teaching.



Programming of next function ?

No

Yes

When programming several analog channels consecutively, the programming function must be left after saving a function, in order to release the next channel for programming, after turning the programming switch back on by briefly turning the master switch to the full.

The control is ready to operate.

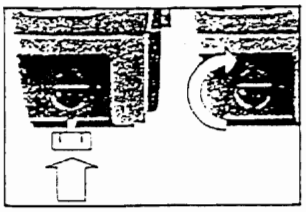
Please note:
No frequency change is possible in the programming mode!

***Please refer to the scope of supply of your facility.**

TEACH-IN: Individual Setting of Analog Channels (Basic Setting) at Nano Transmitter with Potentiometer Control*.
The output signals of the analog channels can be individually programmed from the transmitter.

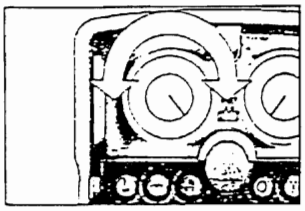
Activate programming mode

Mounting the key cap on the rotary switch opposite the battery compartment and then turning this switch activates the programming mode.



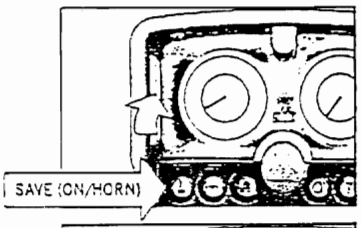
Select analog function

To determine which analog function is to be programmed, it is sufficient to briefly turn the appropriate potentiometer fully in the direction of this function and then back again.



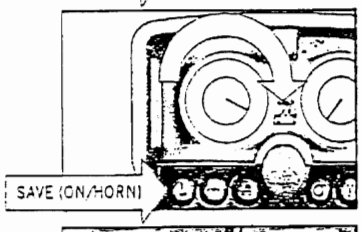
Save "contact point"

The potentiometer is now turned until the required "contact point" (less than 50% of the potentiometer turning range) is reached. To save this value, the "SAVE" ("ON/HORN") key must be pressed at this position.



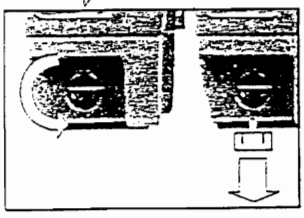
Save maximum speed

The upper initial value is saved by turning the potentiometer (more than 50% of the potentiometer turning range) until the maximum speed of the function is reached, and then pressing again the "SAVE" ("ON/HORN") key.



End programming mode

If the rotary switch is reset, the programming mode is left and working with this function can commence.
Removing the key cap secures the transmitter against inadvertant teaching.



Programming next function ?

No

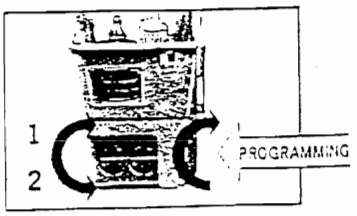
Yes

When programming several analog channels consecutively, the programming function must be left after saving a function, in order to release the next channel for programming, after turning the programming switch back on by briefly turning the master switch to the full.

The control is ready to operate.

Please note:
No frequency change is possible in the programming mode!

Saving two different basis settings (optional)*
If required, the unit can be supplied with two saving options for the basic setting.
These can be selected using an additional key switch or rotary switch once saved.
For both settings, the individual analog functions must be programmed separately.



***Please refer to the scope of supply of your facility.**

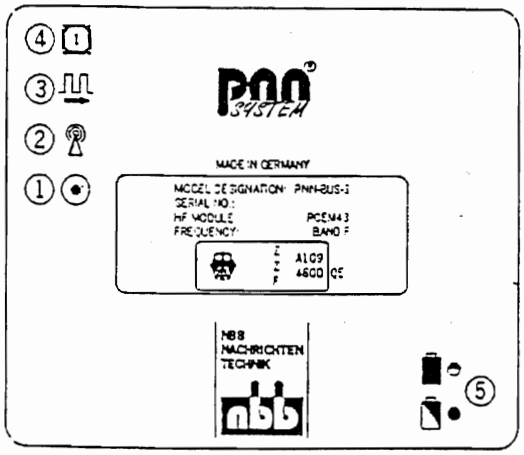
7. FUNCTION CHECKS

Regular function checks of the NB8 radio control unit are essential to ensure that operating safety is maintained. In the case of a single-shift daily operation, we recommend that the checks be carried out once a week. They can be performed with the aid of the indicator lamps on the receiver. For this purpose, the transmitter must be in operating condition.

- First, connect only the receiver - the transmitter remains switched off.
- Switch on the transmitter by releasing the EMERGENCY-OFF button.
- Now test the command functions (always starting at the lowest stage) and check that the crane responds correctly. In particular, make sure that the danger area is clear of all personnel. **Failure to do so may result in an ACCIDENT.**
- **EMERGENCY-OFF check.** Press the EMERGENCY-OFF button on the transmitter until it locks. The crane's master contactor must drop out after a maximum of 1/2 second.

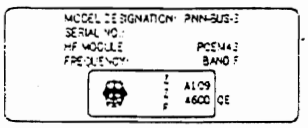
Checking the LEDs of the receiver

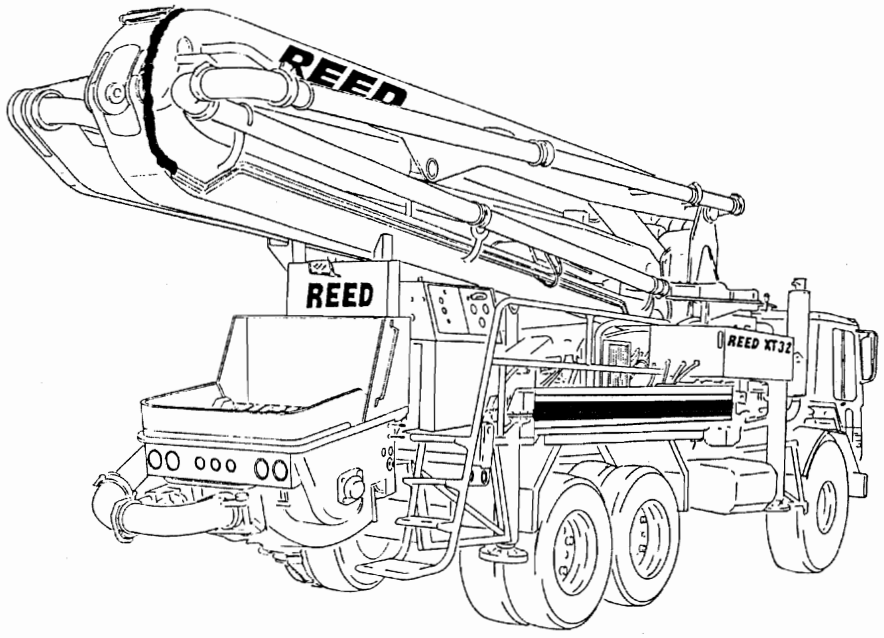
- **LED1:** POWER ON. If the LED does not light up, check the power supply. If the power supply lead is in satisfactory condition, notify your service centre.
- **LED2:** HF AVAILABLE. Remains lit continuously when the transmitter is switched on.
  (not significant in the case of scanner operation).
- **LED3:** Flashes at regular intervals during fault-free operation. Irregular flashing means that the HF channel is probably disrupted. In this case, select an alternative channel.
- **LED4:** If this LED flashes, the HF channel is disrupted.
- **LED5** (Battery operation): state of charge of the battery.



8. RATING PLATES

Rating plates contain the serial number, model designation, type of HF module and frequency. In the event of a query, please give the serial number without fail.





9. REGISTRATION

Explanatory notes on obtaining an operating permit for your NBB radio control system will be found in the accompanying registration documents.

10. MAINTENANCE

The NBB radio control unit is largely maintenance-free. Nevertheless, please observe the following points:

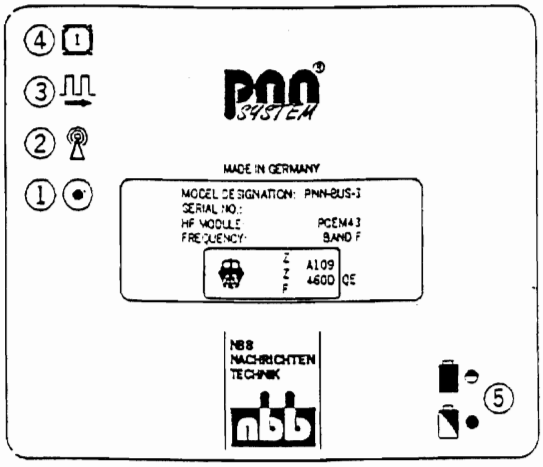
- The EMERGENCY-OFF button must operate freely.
- Keep the unit clean of any contamination from building materials.
- If any electrical welding is carried out on the crane, disconnect the control cable from the receiver, otherwise the receiver electronics may be damaged.

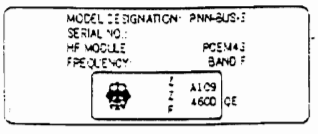
11. GUARANTEE

All NBB radio control units (transmitter, receiver, battery charger) are guaranteed to operate satisfactorily for a period of six months from the date of sale. The terms of the guarantee include parts and labour. Transport costs are the buyer's responsibility. The following are excluded from the guarantee: wearing parts, relays and batteries. The guarantee does not cover damage, accidental damage, negligence, improper use, non-adherence to operating conditions, the non-observance of operating, testing and servicing instructions, or repairs or modifications to the unit not authorized by NBB.
NBB will not be liable for consequential damage. It reserves the right to effect repairs or replacements at its own discretion.

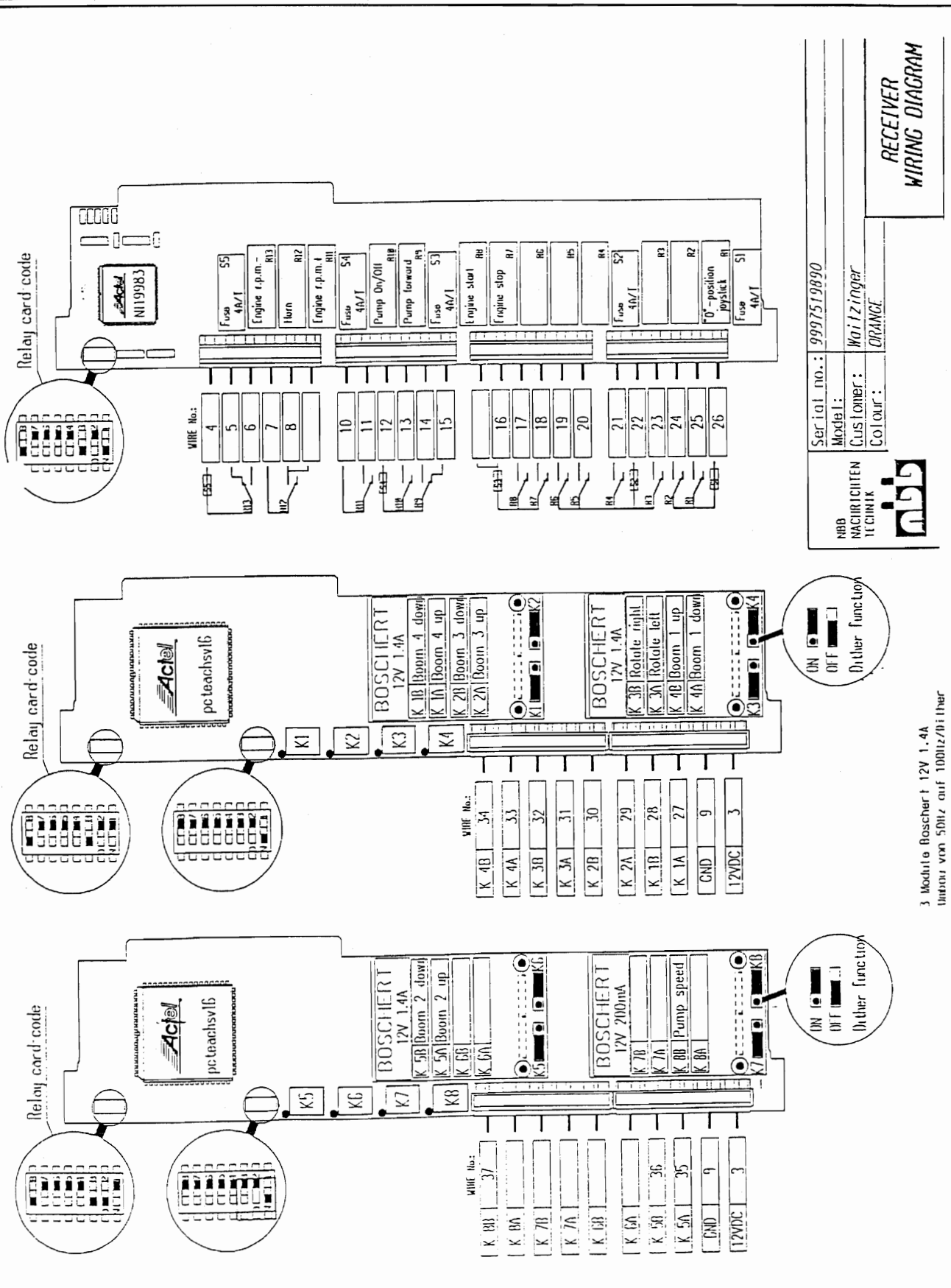
12. ACTION IN THE EVENT OF A FAULT

Do not continue to work with a defective NBB radio control unit. Even a minor defect in the first instance may eventually lead to a major fault!
Do not try to repair the NBB radio control unit yourself. In the event of a fault, please notify your dealer or contact us!



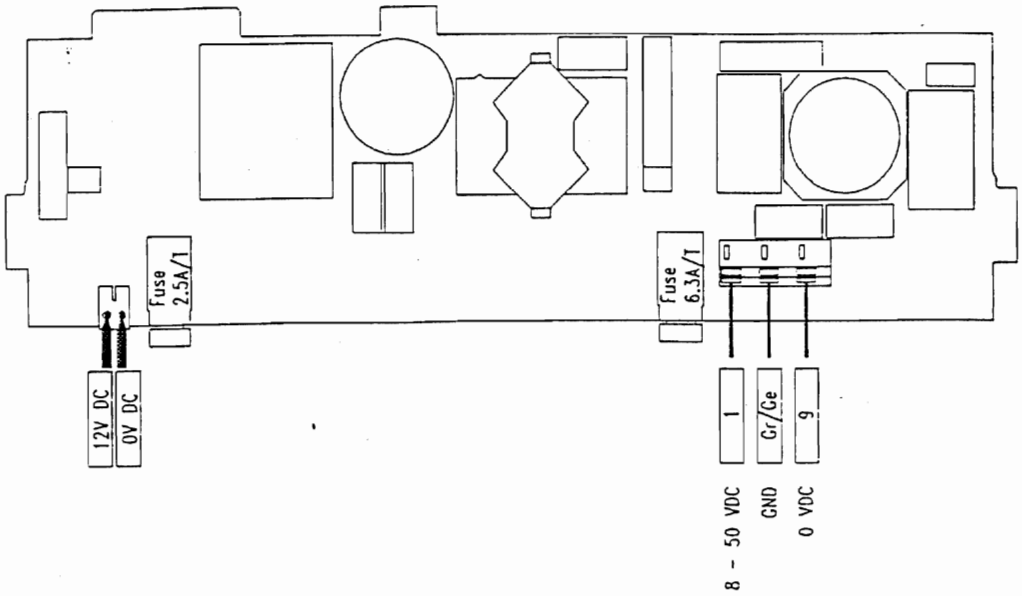


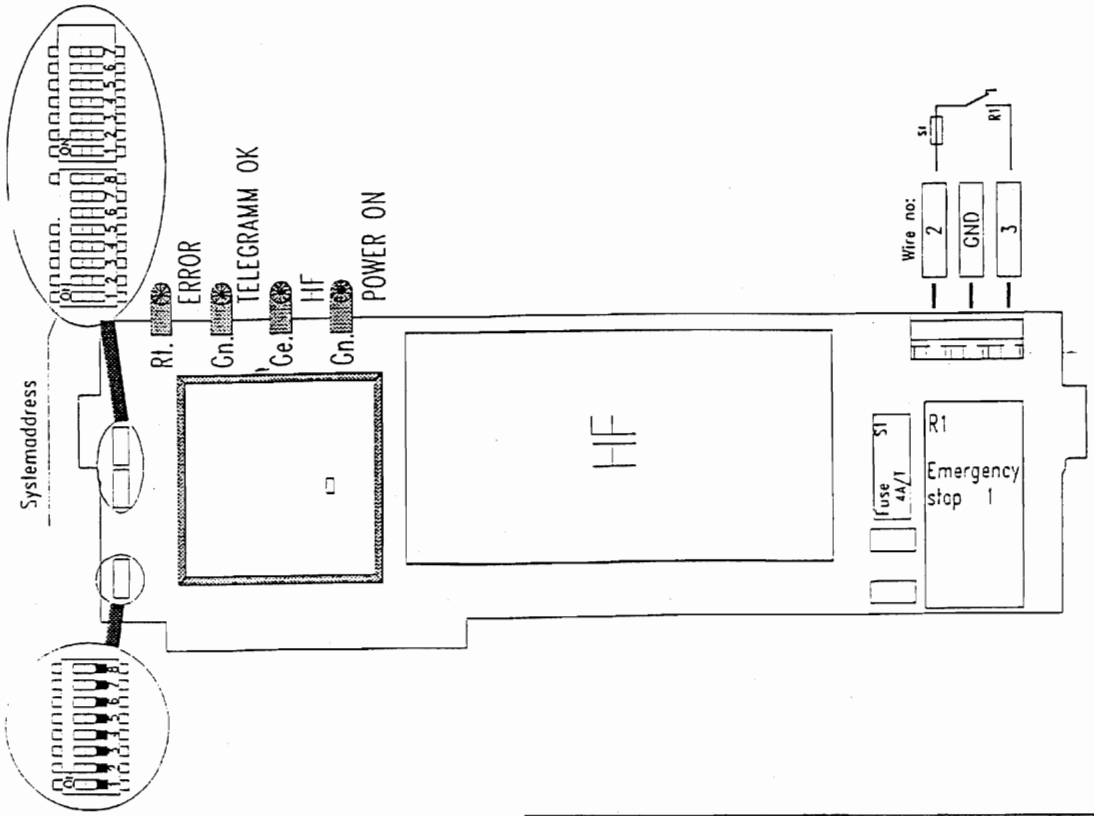
NBB NANO-S-A2-HC
RADIO REMOTE CONTROL



REVISION:

NBB NANO-S-A2-HC
RADIO REMOTE CONTROL





NBB NACHRICHTEN TECHNIK	Serial no.:	9997519890
	Model:	Concrete-Pump
	Customer:	Waitzinger
	Colour:	
	Date:	/05/1997
	Name:	
	Scale:	

RECEIVER WIRING DIAGRAM

REVISION:

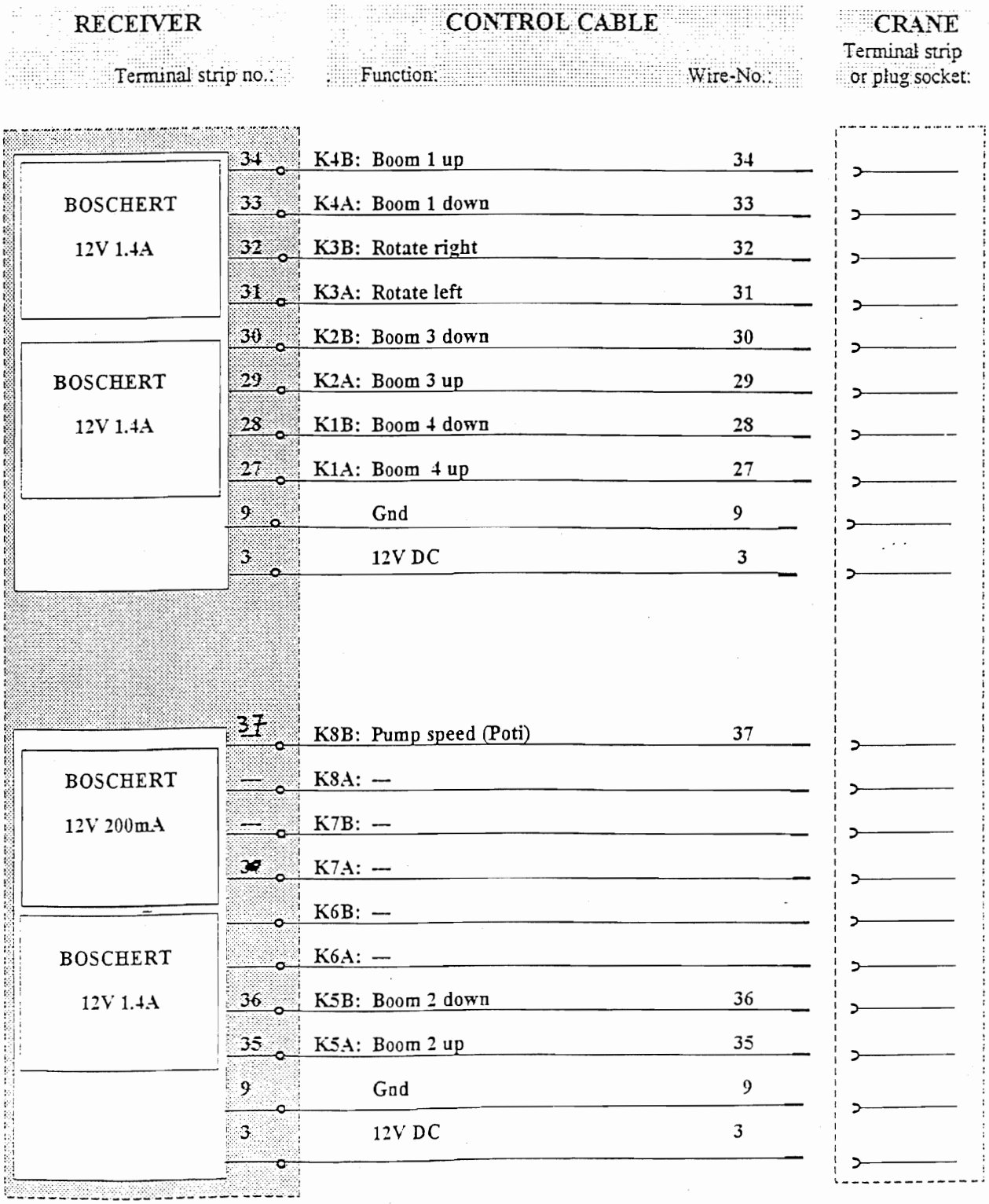
CONTROL CABLE CONNECTING PLAN

Serial no.: 9997519890
Relay board code: 1. 3. 8

RECEIVER		CONTROL CABLE		CRANE
Terminal strip no .:		Function:	Wire-No.:	Terminal strip or plug socket:
8-50VDC / 12VDC	1	Power supply 12VDC	1	
	9	Power supply 0VDC GND	9	
	2	Common	2	
	3	Emergency stop	3	
	4	Common	4	
R 13	5	Engine r.p.m. „-„	5	
R 13	6	Engine r.p.m. „-„	6	
	7	Common	7	
R 12	8	Horn	8	
	10	Common	10	
R 11	11	Engine r.p.m. +	11	
	12	Common	12	
R 10	13	Pump on/off	13	
R 9	14	Pump for.	14	
R 9	15	Pump rev.	15	
	16	Common	16	
R 8	17	Engine start	17	
R 7	18	Engine stop	18	
R 6	19		19	
R 5	20		20	
R 4	21		21	
	22	Common	22	
R 3	23		23	
R 2	24		24	
R 1	25	„0"-position joystick	25	
	26	Common	26	

NBB NANO-S-A2-HC
RADIO REMOTE CONTROL

Serial no.: 9997519890
Crane model:
Relay board code: 3, 8

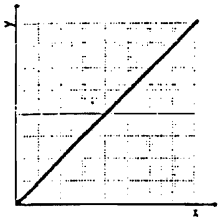


REVISION:

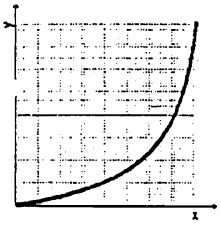
TECHNICAL SUPPLEMENT

NANO: Board E-AN04A2V1/1 TEACH-IN*

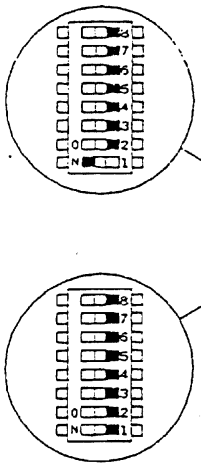
DIL switch (SW2) for setting various transmission characteristics:

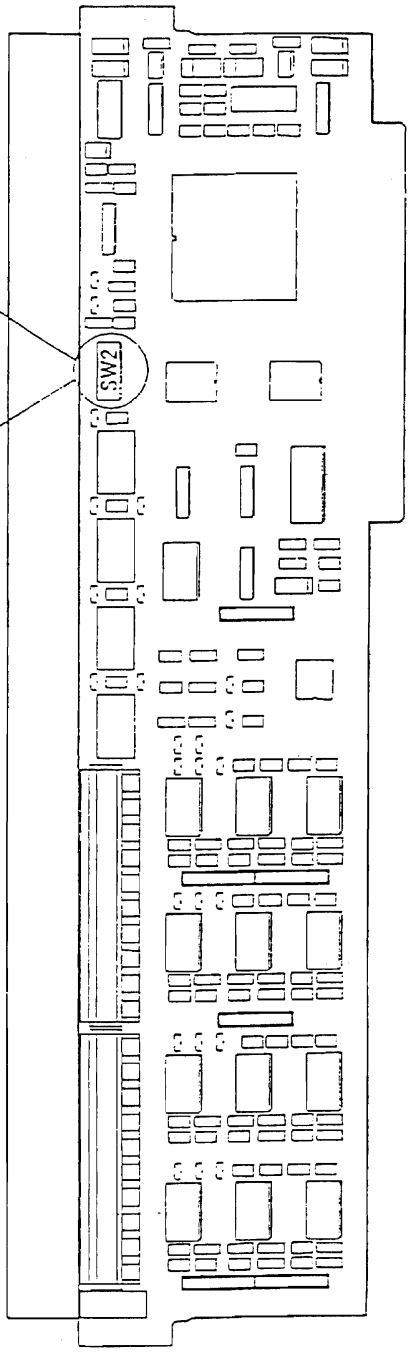


Setting for linear characteristic

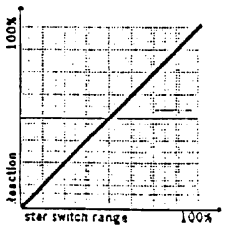


Setting for non-linear characteristic

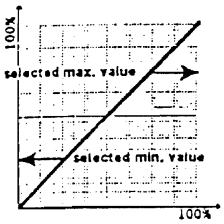




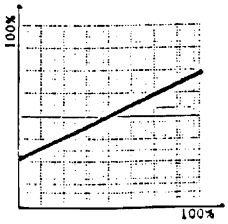
Characteristics linear or non-linear

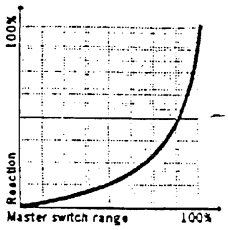


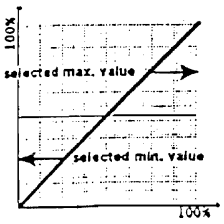
Characteristics in Teach-In mode

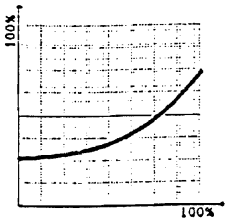


Characteristics after Teach-In mode









*Please refer to the scope of supply of your facility.

Teaching of the function "PUMP SPEED":

In case of teaching the function "PUMP SPEED" the rotary switch has to be set from minimum to maximum and back in order to release this function for programming.
This function is to be programmed at last.

Teaching of the additional functions:

Before the programming-mode is activated the rotary switch for the function "PUMP SPEED" has to be set to less than 50% (best minimum or left-hand position).

Apart from that the programming is according to the advice in the operating instructions.

TECHNICAL DATA

Operating ambient temperature	-20 to +65 °C
Insulation class - Protection	IP 65

TRANSMITTER

Nano, Nano-Vario, Nano-S-A2-HC

Transmission frequency range	400 - 477 MHz, 25 mW FM

The use of synthesizer technology permits frequencies to be selected in accordance with the appropriate waveband for the country of use.

Low frequency modulation	FSK signal to CCITT V.23
Data repetition rate	about 60 ms
Baud rate	1200 baud (bits per sec.)
Range	300 up to 1000 m
Power input	about 60 mA
RF ouput	25 mW

	Weight (without battery)	Size (L x W x H)
Pocket	0,4 kg	8,7 x 3,5 x 18,2 cm
Nano	0,8 kg	17,5 x 12,6 x 12,2 cm
MOL	1,5 kg	28,3 x 14,4 x 16,7 cm

TECHNICAL DATA

RECEIVER

PNN-BUS-3 PNN-BUS-5

Reception frequency range	400 - 477 MHz

Data security:
Generates a CRC code with a Hamming distance = 4. Generates a neutral position Addressing of each transmitter with its own, unique combination (32768 possible combinations). Parity - Bit parameters with addressing.

Data reception security:

2 diversitary evaluators (1 hardware evaluator, 1 software - controlled evaluator). CRC. EMERGENCY OFF and neutral position bits. Restart inhibitor if EMERGENCY OFF relay defective.

Contact loading for EMERGENCY OFF and commands.

max. switching voltage	250 V
max. switching current	6 A
max. switching power	1000 VA

	Weight	Size (L x W x H)
PNN-BUS-3	3,0 kg	30,6 x 18,1 x 13 cm
PNN-BUS-5	4,7 kg	36,4 x 28,3 x 15,2 cm

BATTERY

Pocket / Nano	7,2V / 0,6 Ah
MOL	9,6V / 0,6 Ah

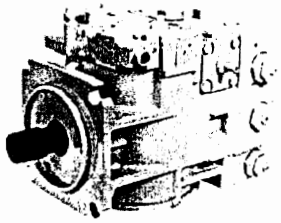
CHARGING UNIT

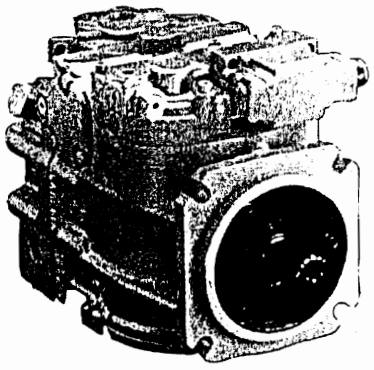
Operating voltage	80V - 270V AC
	8V - 50V DC

SAUER SUNDSTRAND

Series 90

Contents





SAUER SUNDSTRAND

1. Introduction

1.1 Use of This Manual

This manual includes information for the normal operation, maintenance, and servicing of the Series 90 family of hydrostatic pumps and motors. The manual includes the description of the units and their individual components, troubleshooting information, adjustment instructions, and minor repair procedures. Unit warranty obligations should not be affected if maintenance, adjustment, and minor repairs are performed according to the procedures described in this manual.

Many service and adjustment activities can be performed without removing the unit from the vehicle or machine. However, adequate access to the unit must be available, and the unit must be thoroughly cleaned before beginning maintenance, adjustment, or repair activities. Since dirt and contamination are the greatest enemies of any type of hydraulic equipment, cleanliness requirements must be strictly adhered to. This is especially important when changing the system filter and during adjustment and repair activities.

A worldwide network of Sauer-Sundstrand Authorized Service Centers is available should repairs be needed. Contact any Sauer-Sundstrand Authorized Service Center for details. A list of all Service Centers can be found in bulletin BLN-2-40527, or in brochure SAW (Ident. No. 698266).

1.2 Safety Precautions

Observe the following safety precautions when using and servicing hydrostatic products.

Loss of Hydrostatic Braking Ability

WARNING
When Series 90 units are used in vehicular hydrostatic drive systems, the loss of hydrostatic drive line power in any mode of operation (e.g. acceleration, deceleration or "neutral" mode) may cause a loss of hydrostatic braking capacity. A braking system which is independent of the hydrostatic transmission must, therefore, be provided which is adequate to stop and hold the system should the condition develop.

Disable Work Function

WARNING
Certain service procedures may require the vehicle/machine to be disabled (wheels raised off the ground, work function disconnected, etc.) while performing them in order to prevent injury to the technician and bystanders.

Fluid Under High Pressure

WARNING
Use caution when dealing with hydraulic fluid under pressure. Escaping hydraulic fluid under pressure can have sufficient force to penetrate your skin causing serious injury. This fluid may also be hot enough to burn. Serious infection or reactions can develop if proper medical treatment is not administered immediately.

Flammable Cleaning Solvents

WARNING
Some cleaning solvents are flammable. To avoid possible fire, do not use cleaning solvents in an area where a source of ignition may be present.

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2. Functional Description

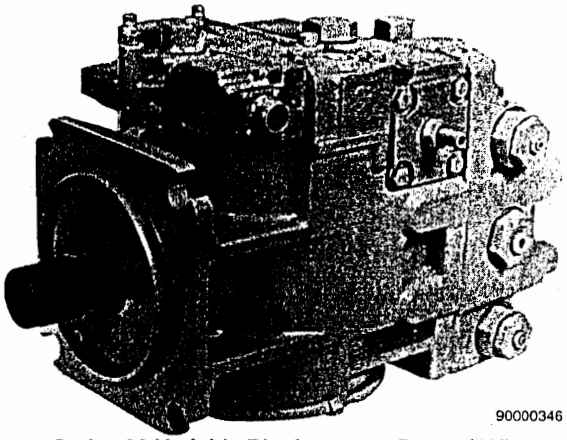
This section describes the operation of pumps, motors, and their various serviceable features. It is a useful reference for readers unfamiliar with the functioning of a specific system.

2.1 General Description and Cross Sectional Views

2.1.1 Variable Displacement Pumps

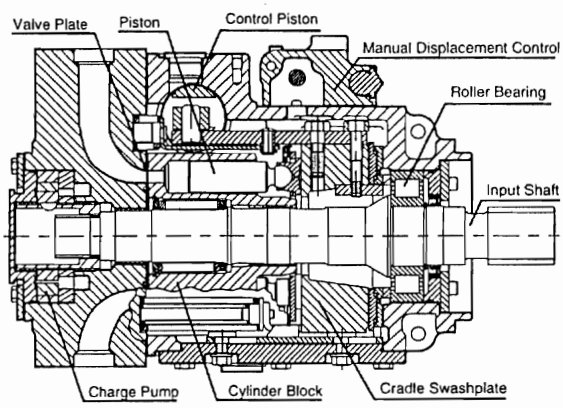
The Variable Displacement Pump (PV) is designed to convert an input torque into hydraulic power. The input shaft turns the pump cylinder which contains a ring of pistons. The pistons run against a tilted plate, called the swashplate. This causes the pistons to compress the hydraulic fluid which imparts the input energy into the hydraulic fluid. The high pressure fluid is then ported out to provide power to a remote function.

The swashplate angle can be varied by the control piston. Altering the swashplate angle varies the displacement of fluid in a given revolution of the input shaft. A larger angle causes greater displacement which yields greater output torque for a given input. A smaller angle reduces the displacement per revolution and yields greater speed for a given input.



90000346

Series 90 Variable Displacement Pump (PV)

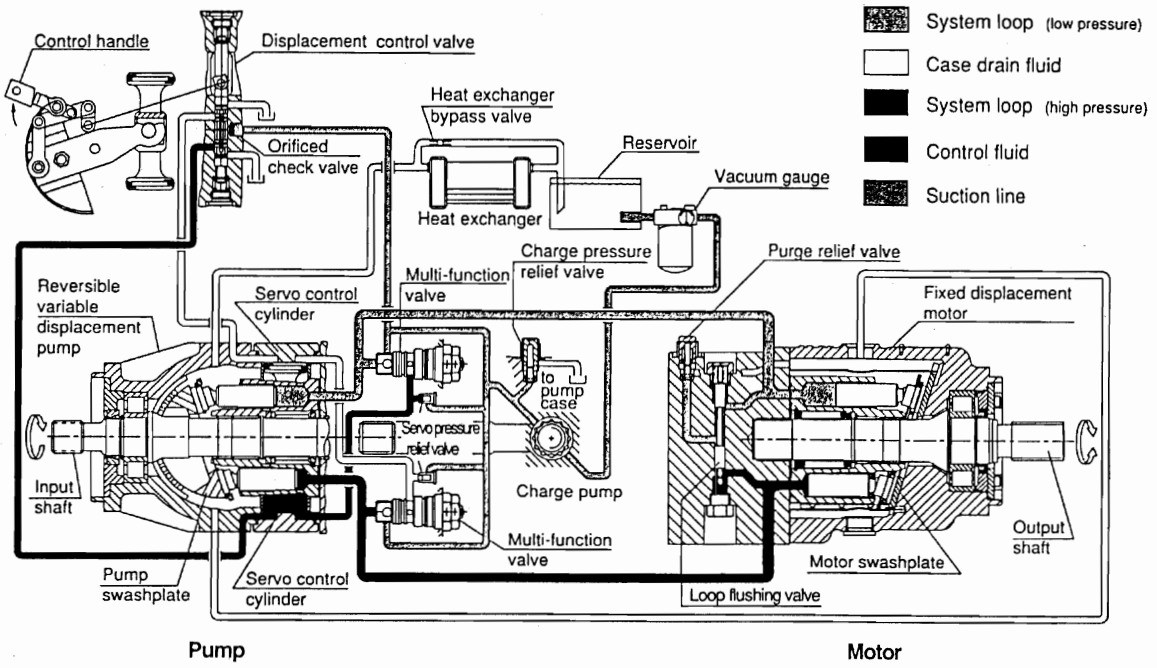


90000189

Series 90 PV Cross Section

SAUER SUNDSTRAND

2.2 The System Circuit



90000800

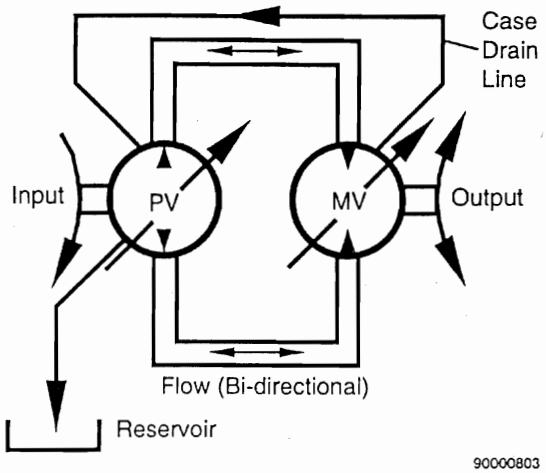
Circuit Diagram for Series 90 PV and Series 90 MF

The Basic Closed Circuit

The main ports of the pump are connected by hydraulic lines to the main ports of the motor. Fluid flows, in either direction, from the pump to the motor then back to the pump in this closed circuit. Either of the hydraulic lines can be under high pressure. The position of the pump swashplate determines which line is high pressure as well as the direction of fluid flow.

Case Drain and Heat Exchanger

The pump and motor require case drain lines to remove hot fluid from the system. The motor should be drained from its topmost drain port to ensure the case remains full of fluid. The motor case drain can then be connected to the lower drain port on the pump housing and out the top most port. A heat exchanger, with a bypass valve, is required to cool the case drain fluid before it returns to the reservoir.



90000803

Basic Closed Circuit

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Series 90 Functional Description 2

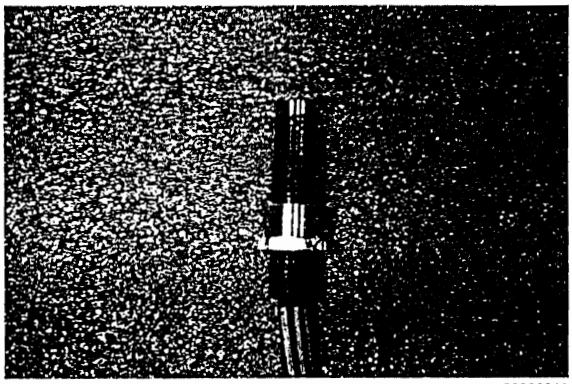
2.3 Common Features of Pumps and Motors

2.3.1 End Caps and Shafts

Series 90 pumps and motors can be supplied with a variety of end caps and shafts to allow for almost any configuration. For pumps, end caps are available with system ports on either side ("side ports") or both ports on one side ("twin ports"). Motors have end caps with ports on the face of the end cap ("axial ports") or both ports on one side ("twin ports"). See the Series 90 Technical Information manuals (BLN-10029 and BLN-10030) or the Series 90 Price Book (BLN-2-40588) for information on available options. **Removing the end cap will void the warranty on a Series 90 pump or motor.**

2.3.2 Speed Sensors

An optional speed sensor can be installed on Series 90 pumps and motors to provide unit speed information. The sensor reads a magnetic ring wrapped about the unit's cylinder. See Sec. 4 to locate the speed sensor port. See Sec. 8.4 and 9.6 to adjust and install the sensor.



90000810

Speed Sensor

SAUER SUNDSTRAND

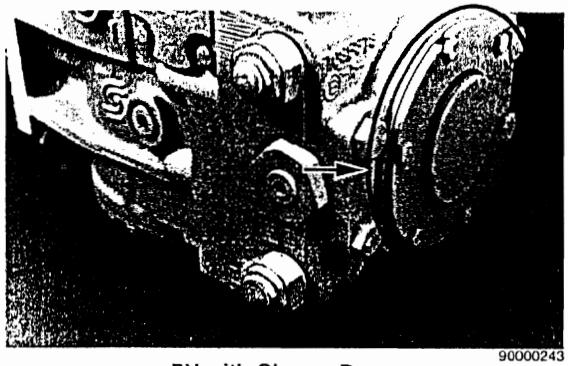
2.4 Pump Features

2.4.1 Charge Pump

The charge pump is necessary to supply cool fluid to the system, to maintain positive pressure in the main system loop, to provide pressure to operate the control system, and to make up for internal leakage. Charge pressure must be at its specified pressure under all conditions of driving and braking to prevent damage to the transmission.

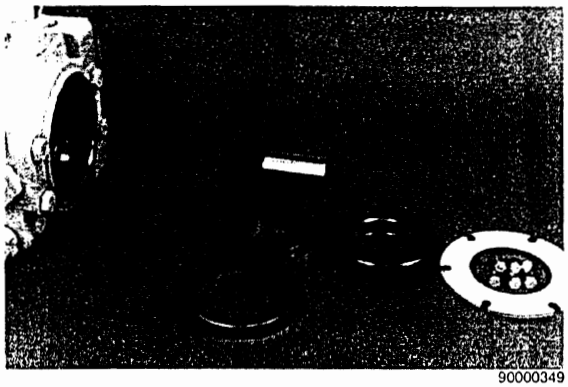
The charge pump is a fixed-displacement, gerotor type pump installed in the variable displacement pump and driven off the main pump shaft. Charge pressure is limited by a relief valve (Sec. 2.4.2).

The standard charge pump will be satisfactory for most applications. However, if the charge pump sizes available for the given main pump size are not adequate, a gear pump may be mounted to the auxiliary mounting pad (Sec. 2.4.8) and supply the required additional charge flow. For repairs to the charge pump see Sec. 9.2.4.



90000243

PV with Charge Pump



90000349

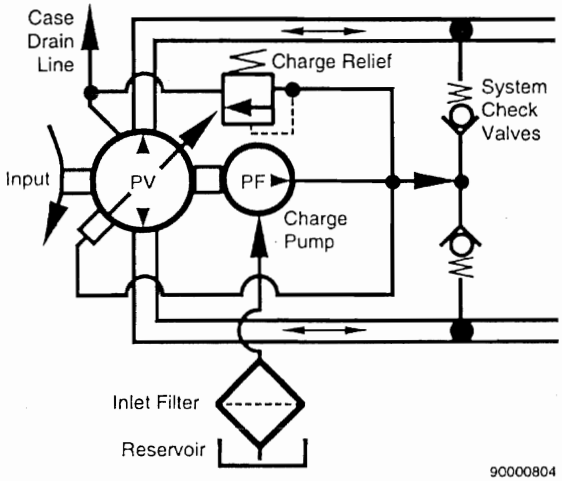
Charge Pump Components

2.4.2 Charge Relief Valve

The charge relief valve on the pump serves to maintain charge pressure at a designated level. A direct-acting poppet valve relieves charge pressure whenever it surpasses a certain level. This level is nominally set referencing case pressure at 1775 rpm. This nominal setting assumes the pump is in neutral (zero flow); in forward or reverse charge pressure will be lower. The charge relief valve setting is specified on the model code of the pump (Sec. 8.1.1). For repairs to the pump charge relief valve see Sec. 9.2.3.

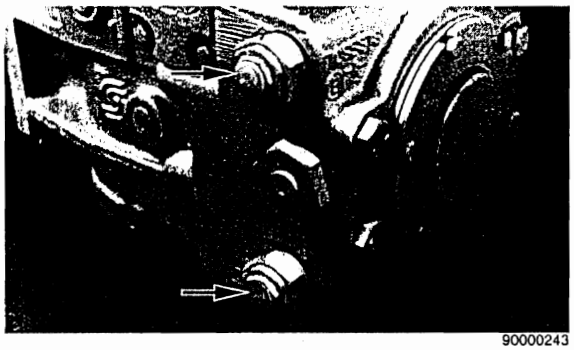
2.4.3 System Check Valves

The system check valves allow pressurized flow from the charge pump to enter the low pressure side of the loop whenever system pressure dips below a certain level. This is needed as the pump will generally lose system pressure due to leakage and other factors. Since the pump can operate in either direction, two system check valves are used to direct the charge supply into the low pressure lines. The system check valves are poppet valves located in the multi-function valve assembly (next section).



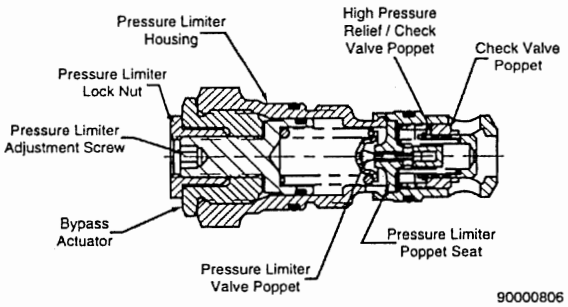
Pump Charge System

SAUER SUNDSTRAND



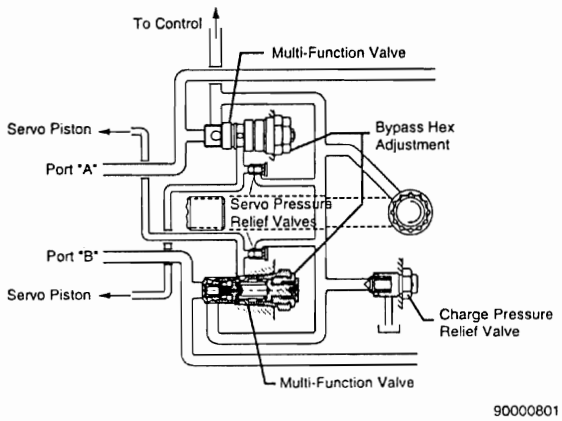
90000243

PV showing location of Multi-Function Valves



90000806

Cross Section of Multi-Function Valve



90000801

Circuit Diagram Showing Pressure Control Mechanisms

2.4.4 Multi-Function Valves

All Series 90 pumps include two multi-function valves. The multi-function valve incorporates the system check valve, the pressure limiter valve, the high pressure relief valve, and the bypass valve in a replaceable cartridge. These functions are described separately. There are two multi-function valve cartridges in each Series 90 pump to handle functions in either direction. See Secs. 8.1.2 and 9.2.1 for adjustments and repairs.

NOTE: Some multi-function valves do not include a pressure limiter valve.

2.4.5 Pressure Limiter and High Pressure Relief Valves

Series 90 pumps are designed with a sequenced pressure limiting system and high pressure relief valves. When the preset pressure is reached, the pressure limiter system acts to rapidly destroke the pump so as to limit the system pressure. For unusually rapid load application, the high pressure relief valve acts to immediately limit system pressure by cross-porting system flow to the low pressure side of the loop. The pressure limiter valve acts as the pilot for the high pressure relief valve spool. The high pressure relief valve is sequenced to operate at approximately 35 bar (500 psi) above the level that initiates the pressure limiter valve.

Both the pressure limiter sensing valves and relief valves are built into the multi-function valves (see above).

NOTE: For some applications, such as dual path vehicles, the pressure limiter function may be defeated so that only the high pressure relief valve function remains.

2.4.6 Bypass Valves

The bypass valves ("tow") can be operated when it is desired to move the vehicle or mechanical function when the pump is not running. The valve is opened by manually resetting the valve position (Sec. 8.1.3).

The bypass valves are built into the multi-function valves (see above).

SAUER SUNDSTRAND

Series 90 Functional Description 2

2.4.7 Displacement Limiters

Series 90 pumps sizes 042 - 250 are designed for optional mechanical displacement (stroke) limiters. The maximum displacement of the pump can be limited in either direction.

The setting can be set as low as 0° in either direction.

For instructions on adjustment see Sec. 8.1.5.

90000244

PV with Displacement Limiters

2.4.8 Auxiliary Mounting Pads

Auxiliary mounting pads are available on all Series 90 pumps. SAE A through E and H mounts are available (availability varies by pump size). This pad is used for mounting auxiliary hydraulic pumps and for mounting additional Series 90 pumps to make tandem pumps. The pads allow for full through-torque capability.

90000242

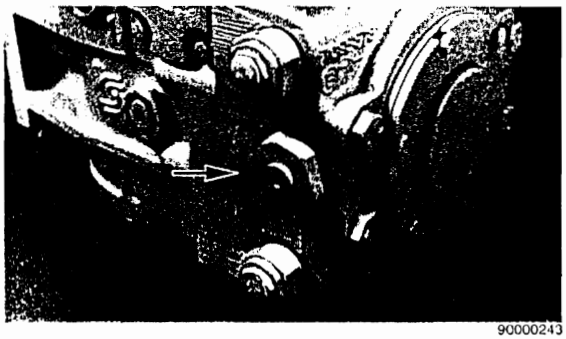
PV with Auxiliary Mounting Pad

2.4.9 Filtration Options

All Series 90 pumps are available with provisions for either suction or charge pressure filtration (integral or remote mounted) to filter the fluid entering the charge circuit. (See Sec. 6 for more information.)

Suction Filtration

The suction filter is placed in the circuit between the reservoir and the inlet to the charge pump. When suction filtration is used, a reducer fitting is placed in the charge pressure gauge port (M3). Filtration devices of this type are provided by the user.



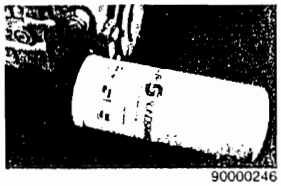
90000243

PV with Suction Filtration
(No filtration device attached)

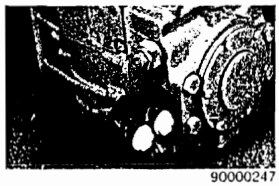
Charge Pressure Filtration

The pressure filter may be integrally mounted directly on the pump or a filter may be remotely mounted for ease of servicing.

A 200 mesh screen, located in the reservoir or the charge inlet line, is recommended when using this filtration option. A non-bypass filter is preferred on all types of filtration.



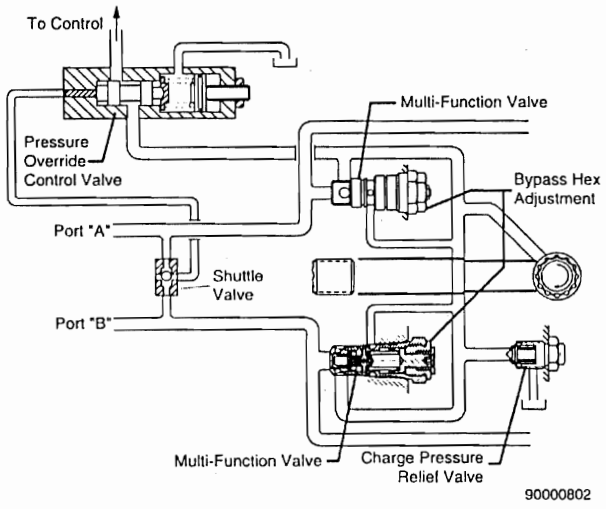
90000246



90000247

PV with Integral Charge Pressure Filtration (left)
PV with Remote Charge Pressure Filtration (right, filter attached remotely)

SAUER SUNDSTRAND



Pressure Override - 180 Frame Size Only

2.4.10 Pressure Override (POR) - 180 Frame Size Only

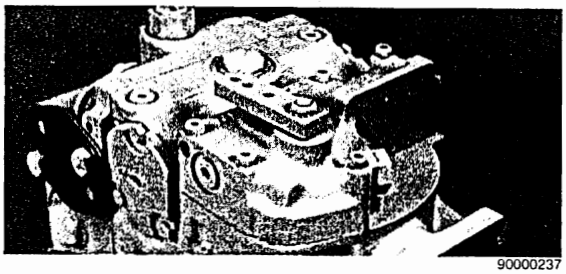
The pressure override valve (POR) modulates the control pressure to the displacement control to maintain a pump displacement which will produce a system pressure level less than or equal to the POR setting. For unusually rapid load application, the high pressure relief valve function of the multifunction valves is available to also limit the pressure level.

The pressure override consists of a three-way normally open valve which operates in series with the pump displacement control. Control supply pressure is normally ported through the pressure override valve to the displacement control valve for controlling the pump's displacement. If the system demands a pressure above the override setting, the POR valve will override the control by reducing the control pressure supplied to the displacement control. As the control pressure reduces, the internal forces tending to rotate the swashplate overcome the force of the servo pistons and allow the pump's displacement to decrease.

2.5 Pump Control Options

2.5.1 Manual Displacement Control (MDC)

The manual displacement control converts a mechanical input signal to a hydraulic signal using a spring-centered four-way servo valve. This valve ports hydraulic pressure to either side of a dual-acting servo piston. The servo piston rotates the cradle swashplate through an angular rotation of ±17°, thus varying the pump's displacement from full displacement in one direction to full displacement in the opposite direction. The MDC is designed so the angular position of the pump swashplate is proportional to the rotation of the control input shaft. For adjustments see 8.2.1; for repairs see 9.3.2, 9.3.8.

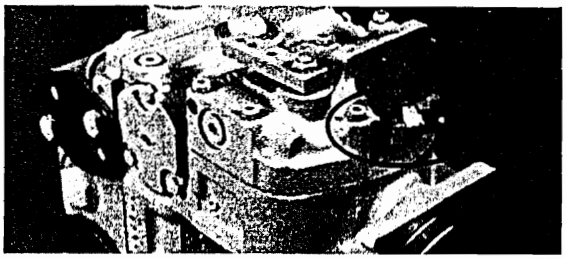


90000237

PV with Manual Displacement Control

Non-Linear MDC

The non-linear manual displacement control (photo in Sec. 8.2.2) operates in the same manner as the regular MDC except that it is designed so the change in the angular position of the pump swashplate *progressively* increases as the control input shaft is rotated toward its maximum displacement position. For adjustments see Sec. 8.2.2; for repairs see 9.3.2.



90000239

PV with Manual Displacement Control and Neutral Start Switch

Solenoid Override Valve

A solenoid override valve option (not shown here) is available for MDC. This safety feature will return the swashplate to zero displacement position when activated. The valve may be set in either a normally open or normally closed mode. For repairs see 9.3.3, 9.3.4.

Neutral Start Switch (NSS)

The neutral start switch is an optional feature available with MDC. When connected properly with the vehicle's electrical system, the neutral start switch ensures that the prime mover can be started only when the control is in a neutral position. For adjustments see Sec. 8.2.3.

2.5.2 Hydraulic Displacement Control (HDC)

The hydraulic displacement control uses a hydraulic input signal to operate a spring-centered four-way servo valve. This valve ports hydraulic pressure to either side of a dual-acting servo piston. The servo piston rotates the cradle swashplate through an angular rotation of ±17°, thus varying the pump's displacement from full displacement in one direction to full displacement in the opposite direction. The HDC is designed so the angular position of the pump swashplate is proportional to input pressure. For adjustments see 8.2.4; for repairs see 9.3.5, 9.3.8.

90000240

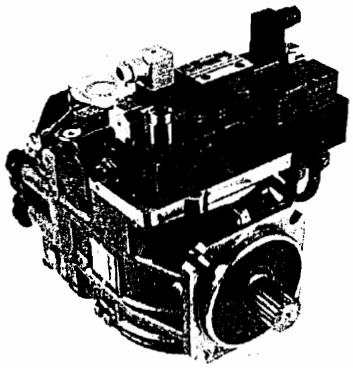
PV with Hydraulic Displacement Control

SAUER SUNDSTRAND

Series 90 Functional Description 2

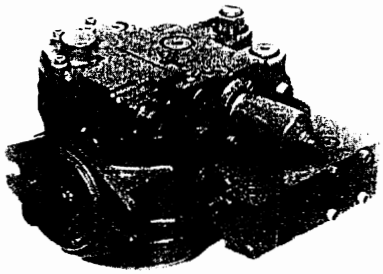
90000241

PV with Electric Displacement Control



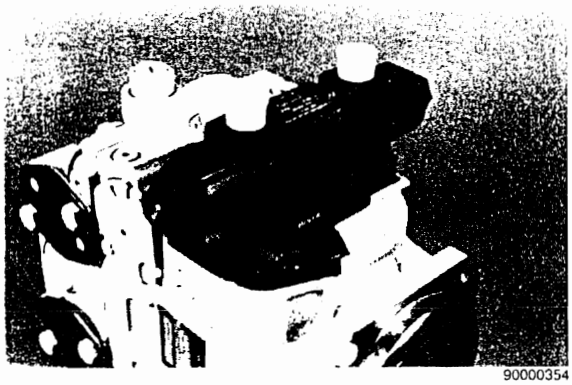
90000353

PV with Automotive Control (AC)



F000645

PV with Automotive Control Type II (AC II)



90000354

PV with 3-Position (FNR) Electric Control

2.5.3 Electric Displacement Control (EDC)

The electric displacement control is similar to the hydraulic displacement control with the input signal pressure controlled by a pressure control pilot (PCP) valve. The PCP valve converts a DC electrical input signal to a hydraulic signal which operates a spring-centered four-way servo valve. This valve ports hydraulic pressure to either side of a dual-acting servo piston. The servo piston rotates the cradle swashplate through an angular rotation of ±17°, thus varying the pump's displacement from full displacement in one direction to full displacement in the opposite direction. The control is designed so the angular position of the swashplate is proportional to the EDC input. For neutral adjustment see Sec. 8.2.4; for repairs see Sec. 9.3.5, 9.3.6, and 9.3.8.

2.5.4 Automotive Control (AC and AC II)

Automotive Control (AC) allows a vehicle to be driven in a manner similar to an automobile with an automatic transmission.

The AC control includes a three-position electric control to provide direction control.

The AC II control can be combined with a manual, hydraulic, or electric displacement control to provide both direction control and control over maximum vehicle speed. It may also be combined with a 3-position electric control to provide direction control.

2.5.5 3-Position (FNR) Electric Control

This control utilizes a 12 or 24 VDC electrically operated spool valve to port pressure to either side of the pump displacement control piston. Energizing one of the solenoids will cause the pump to go to its maximum displacement in the corresponding direction.

All functions of the three-position (FNR) electric control are preset at the factory. For repairs, see Sec. 9.3.7.

SAUER SUNDSTRAND

Series 90 Functional Description 2

2.6 Motor Features

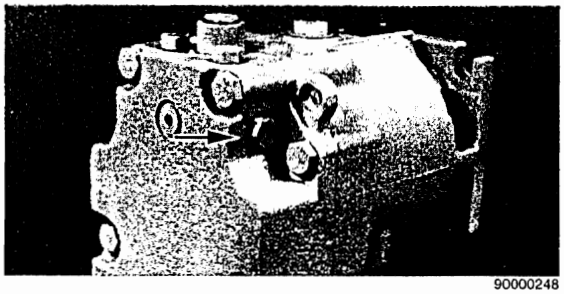
2.6.1 Motor Loop Flushing Valve and Charge Relief Valve

All Series 90 motors are designed to accommodate a loop flushing valve. The loop flushing valve is used in installations which require additional fluid to be removed from the main hydraulic circuit because of transmission cooling requirements, or unusual circuits requiring additional loop flushing to remove excessive contamination in the high pressure circuit.

A shuttle valve and charge relief valve are installed in the motor end cap to provide the loop flushing function. The shuttle valve provides a circuit between the low pressure side of the closed loop and the charge relief valve in the motor end cap.

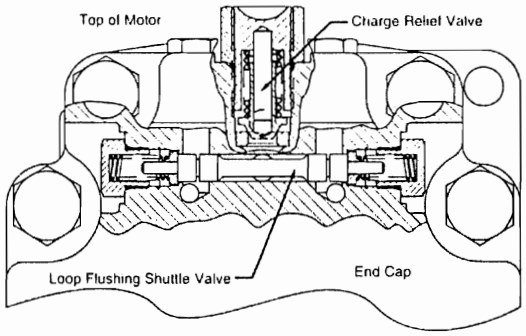
The motor charge relief valve regulates the charge pressure level only when there is a pressure differential in the main loop. The shuttle valve is spring centered to the closed position so that no high pressure fluid is lost from the circuit when reversing pressures.

For charge relief valve adjustment see Sec. 8.3.1, for repairs see Sec. 9.4.1.



90000248

MF showing location of Loop Flushing Valve



90000238

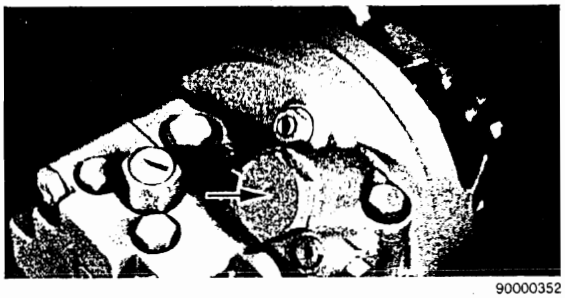
Motor Charge Relief Valve and Loop Flushing Shuttle Valve

2.6.2 Variable Motor Displacement Limiters

All Series 90 variable motors include mechanical displacement (stroke) limiters. Both the maximum and minimum displacement of the motor can be limited.

The range of the settings is as follows:

	055 MV Frame	075 MV Frame
Minimum Displacement	19 - 40 cm^3 1.2 - 2.4 in^3	26 - 54 cm^3 1.6 - 3.3 in^3
Maximum Displacement	65 - 100%	65 - 100%



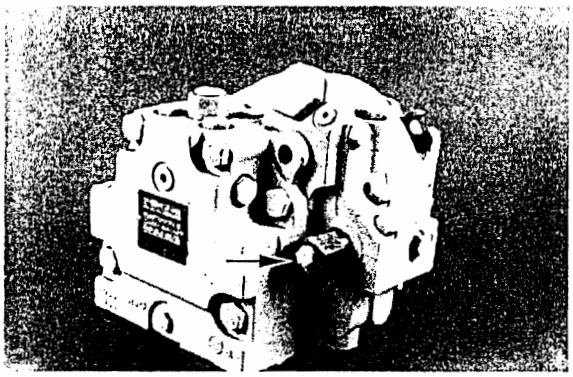
90000352

MV Maximum Displacement Limiter
(Minimum Displacement Limiters on Opposite Side)

SAUER SUNDSTRAND

Series 90 Functional Description 2

2.7 Variable Motor Controls



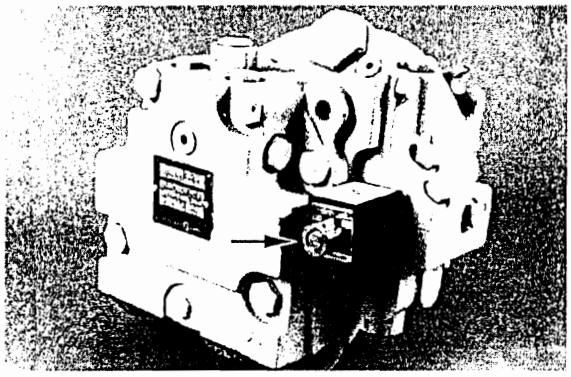
90000350

MV with Hydraulic 2-Position Control

2.7.1 Hydraulic 2-Position Control

This control utilizes a hydraulically operated three-way hydraulic valve to port system pressure to either of the motor displacement control pistons. The motor is normally held at its maximum displacement. Supplying pilot hydraulic pressure to the valve will cause the motor to go to its minimum displacement.

All functions of the hydraulic two-position control are preset at the factory. For repairs see Sec. 9.5.2 and 9.5.4.



90000351

MV with Electric 2-Position Control

2.7.2 Electric 2-Position Control

This control utilizes an electric solenoid operated three-way hydraulic valve to port system pressure to either of the motor displacement control pistons. The motor is normally held at its maximum displacement. Energizing the solenoid will cause the motor to go to its minimum displacement.

All functions of the electric two-position control are preset at the factory. For repairs see Sec. 9.5.1 and 9.5.4.

3. Technical Specifications

3.1 General Specifications

Design
Variable Pumps and Motors: Axial piston pump of variable displacement, cradle swashplate design.

Fixed Motors: Axial piston motor with fixed displacement, fixed swashplate design.

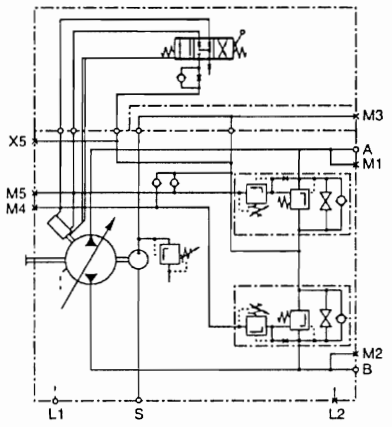
Type of Mounting (per SAE J744)
SAE flange, Size "B" mounting pad, 2 bolts
SAE flange, Size "C" mounting pad, 4 bolts
Cartridge flange, 2 bolts (for motor only)

Port Connections (See Sec. 4.2 for exact specs.)
Main pressure ports: SAE flange, Code 62
Remaining ports: SAE straight thread O-ring boss

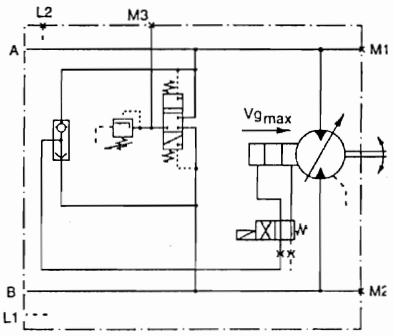
Direction of Rotation
Clockwise or counterclockwise (motors are bidirectional)

Installation Position
Installation position is discretionary. The housing must always be filled with hydraulic fluid, so note position of drain ports.

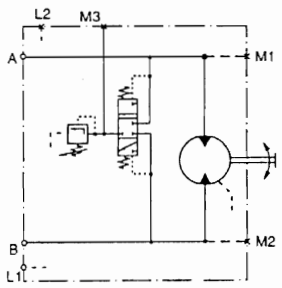
3.2 Circuit Diagrams



PV with charge pump and manual displacement control



MV with electrohydraulic two-position control



MF

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Series 90 Technical Specifications 3

3.3 Hydraulic Parameters

System Pressure Range

Maximum Pressure	480 bar	[6960 psi]
Rated Pressure	420 bar	[6000 psi]

Charge Pump Inlet Vacuum (on pumps only)

Maximum Vacuum, Continuous	0.7 bar abs	[10 in Hg]
Maximum Vacuum, Cold Start	0.2 bar abs	[25 in Hg]

Case Pressure

Maximum, Continuous	3 bar	[44 psi]
Maximum, Intermittent or Cold Start	5 bar	[73 psi]

Hydraulic Fluid

Refer to SAS publication BLN 9887 or Publication SDF (Id. No. 697581). Also refer to publication ATI-E 9101 for information relating to biodegradable fluids

Temperature Range[1]

Minimum, Intermittent or Cold Start	-40°C	[-40°F]
Maximum, Continuous	104°C	[220°F]
Maximum, Intermittent	115°C	[240°F]

Fluid Viscosity Limits

Minimum, Intermittent	5 mm^2/s	[42 SUS]
Minimum, Continuous	6.4 mm^2/s	[47 SUS]
Minimum, Optimum	13 mm^2/s	[70 SUS]
Maximum, Continuous	110 mm^2/s	[510 SUS]
Maximum, Intermittent or Cold Start	1600 mm^2/s	[7400 SUS]

Filtration

Required cleanliness level: ISO 4406 Class 18/13 or better. Refer to SAS publications BLN 9887 or Publication SDF (Id. No. 697581) and ATI-E 9201.

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3.4 Technical Data

Table 1 - Variable Displacement Pumps

	Dimension	030 PV	042 PV	055 PV	075 PV	100 PV	130 PV	180 PV	250 PV
Displacement (maximum)	cm^3 in^3	30.0 1.83	42.0 2.56	55.0 3.35	75.0 4.57	100.0 6.10	130.0 7.93	180.0 10.98	250.0 15.25
Minimum speed	min^{-1} (rpm)	500	500	500	500	500	500	500	500
Rated speed*	min^{-1} (rpm)	4200	4200	3900	3600	3300	3100	2600	2300
Maximum speed*	min^{-1} (rpm)	4600	4600	4250	3950	3650	3400	2850	2500
Max. attainable speed* at max. disp.	min^{-1} (rpm)	5000	5000	4700	4300	4000	3700	3150	2750
Theoretical torque at max. disp.	Nm / bar lbf•in/1000 psi	0.48 290	0.67 380	0.88 530	1.19 730	1.59 970	2.07 1260	2.87 1750	3.97 2433
Weight (Base Unit)	kg lb	28 62	34 75	40 88	49 108	68 150	88 195	136 300	154 340

Table 2 - Fixed and Variable Displacement Motors

		Dimension	030 MF	042 MF	055 MF	075 MF	100 MF	130 MF	055 MV	075 MV
Displacement (maximum)		cm^3 in^3	30.0 1.83	42.0 2.56	55.0 3.35	75.0 4.57	100.0 6.10	130.0 7.93	55.0 3.35	75.0 4.57
Displacement (minimum)		cm^3 in^3	—	—	—	—	—	—	19.0 1.16	26.0 1.59
Rated speed*	at max. disp.	min^{-1} (rpm)	4200	4200	3900	3600	3300	3100	3900	3600
	at min. disp.	min^{-1} (rpm)	—	—	—	—	—	—	4600	4250
Maximum speed*	at max. disp.	min^{-1} (rpm)	4600	4600	4250	3950	3650	3400	4250	3950
	at min. disp.	min^{-1} (rpm)	—	—	—	—	—	—	5100	4700
Max. attainable speed* at max. disp.		min^{-1} (rpm)	5000	5000	4700	4300	4000	3700	4700	4300
Theoretical torque at max. disp.		Nm / bar lbf•in/1000 psi	0.48 290	0.67 380	0.88 530	1.19 730	1.59 970	2.07 1260	0.88 530	1.19 730
Maximum flow at max. disp.		l / min gal / min	138 36.5	193 51	234 62	296 78	365 96	442 117	234 62	296 78
Max. corner power		kW hp	111 149	155 208	187 251	237 318	292 392	354 475	224 300	282 378
Weight (SAE Flange)		kg lb	11 24	15 34	20 45	26 57	34 74	45 99	39 86	44 98
Weight (Cartridge Motor)		kg lb	—	17 37	26 57	33 72	—	—	40 88	46 101

* = Refer to Series 90 Technical Information manual for definitions

4. Pressure Measurement

4.1 Required Tools

The service procedures described in this manual for Series 90 pumps and motors can be performed using common mechanic's tools. Special tools, if required are shown.

Pressure gauges should be calibrated frequently to ensure accuracy. Snubbers are recommended to protect pressure gauges.

4.2 Port Locations and Pressure Gauge Installation

The following sections list the ports for each type of hydraulic unit. The recommended pressure gauge and fitting are also specified.

Outline drawings showing port locations follow the tables.

4.2.1 Variable Pump

Port	Function	Recommended Gauge Size and Fitting
M1	System Pressure Port "A"	1000 bar or 10 000 psi Gauge 9/16—18 O-Ring Fitting
M2	System Pressure Port "B"	1000 bar or 10 000 psi Gauge 9/16—18 O-Ring Fitting
M3 (M6)	Charge Pressure	50 bar or 1000 psi Gauge 9/16—18 O-Ring Fitting
M4 M5	Servo Pressure	50 bar or 500 psi Gauge 9/16—18 O-Ring Fitting

Port	Function	Recommended Gauge Size and Fitting	
L1 L2	Case Pressure	10 bar or 100 psi Gauge	
		SAE O-Ring Fitting:	
		030, 042	7/8—14
		055, 075, 100	1-1/16—12
		130	1-5/16—12
		180, 250	1-5/8—12
X1 X2	HDC / EDC Pressure	50 bar or 1000 psi Gauge 7/16 — 20 O-Ring Fitting or 9/16 — 18 O-Ring Fitting	
X3	Ext. Control Pressure	50 bar or 1000 psi Gauge 9/16 — 18 O-Ring Fitting	
S	Charge Pump Inlet	Vacuum Gauge, Tee into Inlet Line	
		SAE O-Ring Fitting:	
		030, 042	1-1/16 — 12
		055, 075	1-5/16 — 12
		100, 130, 180	1-5/8 — 12
		250	1-1/2 SAE Split Flange

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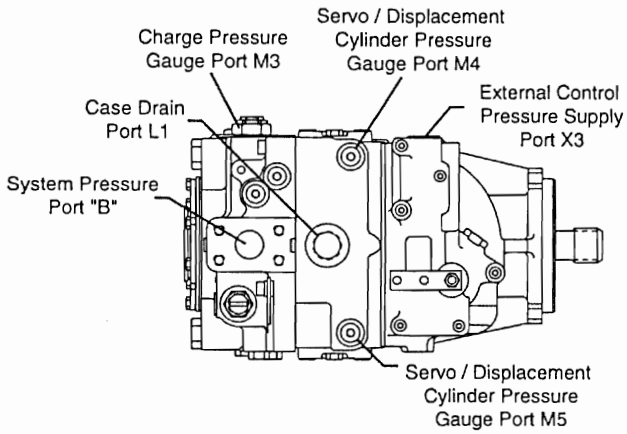
Series 90 Pressure Measurement 4



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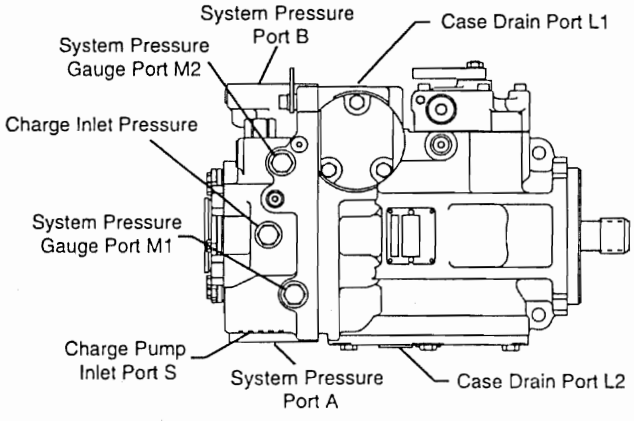
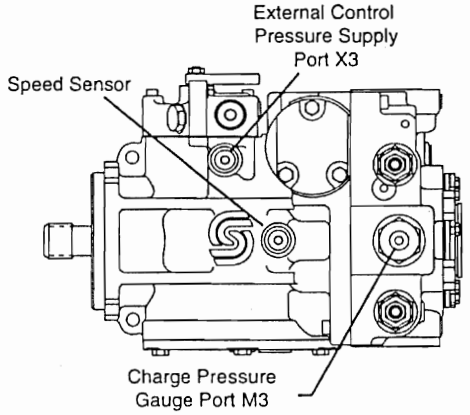
Top View



Left Side View



Right Side View

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PV with Side Port End Cap and Manual Displacement Control

5. Initial Start-Up Procedure

The following start-up procedure should always be followed when starting-up a new Series 90 installation or when restarting an installation in which either the pump or motor had been removed.

WARNING
The following procedure may require the vehicle/machine to be disabled (wheels raised off the ground, work function disconnected, etc.) while performing the procedure in order to prevent injury to the technician and bystanders. Take necessary safety precautions before moving the vehicle/machine.

Prior to installing the pump and/or motor, inspect the units for damage incurred during shipping and handling. Make certain all system components (reservoir, hoses, valves, fittings, heat exchanger, etc.) are clean prior to filling with fluid.

Fill the reservoir with recommended hydraulic fluid. This fluid should be passed through a 10 micron (nominal, no bypass) filter prior to entering the reservoir. The use of contaminated fluid will cause damage to the components, which may result in unexpected vehicle/machine movement. See the publications BLN-9887 and SDF 697581 for further related information.

The inlet line leading from the reservoir to the pump must be filled prior to start-up. Check inlet line for properly tightened fittings and make sure it is free of restrictions and air leaks.

Be certain to fill the pump and/or motor housing with clean hydraulic fluid prior to start up. Fill the housing by pouring filtered oil into the upper case drain port.

Install a 50 bar (or 1000 psi) pressure gauge in the charge pressure gauge port (see Sec. 4.2 for location) to monitor the charge pressure during start-up.

It is recommended that the external control input signal (linkage for MDC, hydraulic lines for HDC, or electrical connections for EDC) be disconnected at the pump control until after initial start-up. This will ensure that the pump remains in its neutral position.

WARNING
Do not start prime mover unless pump is in neutral position (0° swashplate angle). Take precautions to prevent machine movement in case pump is actuated during initial start up.

"Jog" or slowly rotate prime mover until charge pressure starts to rise. Start the prime mover and run at the lowest possible RPM until charge pressure has been established. Excess air may be bled from the high pressure lines through the high pressure system gauge port.

Once charge pressure has been established, increase speed to normal operating RPM. Charge pressure should be as indicated in the pump model code (see Sec. 8.1.1). If charge pressure is inadequate, shut down and determine cause for improper pressure. Refer to Troubleshooting Sec. 7.

WARNING
Inadequate charge pressure will affect the operator's ability to control the machine.

Shut down the prime mover and connect the external control input signal. Also reconnect the machine function if disconnected earlier. Start the prime mover, checking to be certain the pump remains in neutral. With the prime mover at normal operating speed, slowly check for forward and reverse machine operation.

Charge pressure may slightly decrease during forward or reverse operation. Continue to cycle slowly between forward and reverse for at least five minutes.

Shut down prime mover, remove gauges, and plug ports. Check reservoir level and add filtered fluid if needed.

The transmission is now ready for operation.

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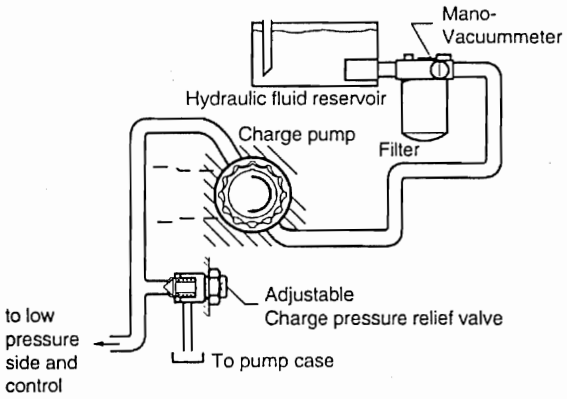
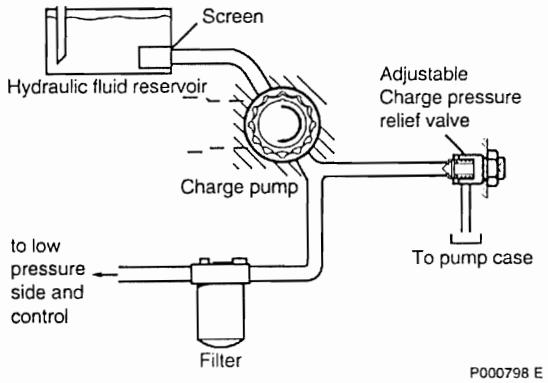
6. Fluid and Filter Maintenance



Suction Filtration Schematic



Charge Pressure Filtration Schematic
(Partial Flow)

To ensure optimum service life of Series 90 products, regular maintenance of the fluid and filter must be performed. Contaminated fluid is the main cause of unit failure. Care should be taken to maintain fluid cleanliness while performing any service procedure.

Check the reservoir daily for proper fluid level, the presence of water (noted by a cloudy to milky appearance, or free water in bottom of reservoir), and rancid fluid odor (indicating excessive heat). If either of these conditions occur, change the fluid and filter immediately.

It is recommended that the fluid and filter be changed per the vehicle/machine manufacturer's recommendations or at the following intervals:

System with a sealed-type reservoir	2000 hours
System with a breathing-type reservoir	500 hours

It may be necessary to change the fluid more frequently than the above intervals if the fluid becomes contaminated with foreign matter (dirt, water, grease, etc.) or if the fluid has been subjected to temperature levels greater than the recommended maximum. Never reuse fluid.

The filter should be changed whenever the fluid is changed or whenever the filter indicator shows that it is necessary to change the filter.

Filters can be in either pressure filtration or suction filtration configurations. For suction filtration, filters should have a Beta-ratio of $\beta_{10}>2$. For charge pressure filtration, filters should have a Beta-ratio of $\beta_{10}>10$. See Sauer-Sundstrand publication BLN-9887 or 697581 and ATI-E 9201 for more information on filtration.

7. Troubleshooting

This section provides general steps to follow if certain undesirable system conditions are observed. Follow the steps in a section until the problem is solved. Some of the items will be system specific. For areas covered in this manual, a section is referenced. **Always observe the safety precautions listed in Sec. 1.2 and related to your specific equipment.**

7.1 "Neutral" Difficult or Impossible to Find

Item	Description	Action
1. Check input to pump control.	Input to control module is operating improperly.	Check control input and repair or replace as necessary.
2. Check pump displacement control.	Control linkages are not secure, control orifices are blocked, etc.	Adjust, repair, or replace control module as necessary (8.2 and 9.3).
3. Repair or replace pump.		Consult a Sauer-Sundstrand Authorized Service Center.

7.2 System Operating Hot

Item	Description	Action
1. Check oil level in reservoir.	Insufficient hydraulic fluid will not meet cooling demands of system.	Fill reservoir to proper level.
2. Inspect heat exchanger.	Heat exchanger not sufficiently cooling the system.	Check air flow and input air temperature for heat exchanger. Clean, repair or replace heat exchanger.
3. Check charge pressure.	Low charge pressure will overwork system.	Measure charge pressure (4.2). Inspect and adjust or replace charge relief valve (8.1.1 and 9.2.3). Or repair leaky charge pump (9.2.4).
4. Check charge pump inlet vacuum.	High inlet vacuum will overwork system. A dirty filter will increase the inlet vacuum. Inadequate line size will restrict flow.	Check charge inlet vacuum (4.2). If high, inspect inlet filter and replace as necessary. Check for adequate line size, length or other restrictions.
5. Check system relief pressure settings.	If the system relief settings are too low, the relief valves will be overworked.	Verify settings of pressure limiters and high pressure relief valves and adjust or replace multi-function valves as necessary (8.1.2, 9.2.1)
6. Check for internal leakage in motor.	Leakage will reduce low side system pressure and overwork the system.	Monitor motor case flow without loop flushing in the circuit (use defeat spool 9.4.1.3). If flow is excessive, replace motor.
7. Check system pressure.	High system pressure will overheat system.	Measure system pressure (4.2). If pressure is high reduce loads.
8. Replace transmission.		Replace pump and motor.

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Series 90 Troubleshooting 7

7.3 Transmission Operates Normally in One Direction Only

Item	Description	Action
1. Check input to pump control.	Input to control module is operating improperly.	Check control input and repair or replace as necessary.
2. Check pump displacement control.	Control linkages are not secure, control orifices are blocked, etc.	Repair or replace control module as necessary (8.2 and 9.3).
3. Interchange system pressure limiters, high pressure relief valves, and system check valves.	Interchanging the multi-function valves will show if the problem is related to the valve functions contained in the multi-function valves.	Interchange multi-function valves. If the problem changes direction, repair or replace the valve on the side that does not operate (8.1.2 and 9.2.1).
4. Check charge pressure.	If charge pressure decays in one direction the loop flushing valve may be "sticking" in one direction.	Measure charge pressure in forward and reverse (4.2). If pressure decays in one direction, inspect and repair the motor loop flushing valve (9.4.1.1).

7.4 System Will Not Operate in Either Direction

Item	Description	Action
1. Check oil level in reservoir.	Insufficient hydraulic fluid to supply system loop.	Fill reservoir to proper level.
2. Check input to pump control.	Input to control module is operating improperly.	Check control input and repair or replace as necessary.
3. Check pump displacement control.	Control linkages are not secure, control orifices are blocked, etc.	Repair or replace control module as necessary (8.2 and 9.3).
4. Ensure bypass valve(s) are closed.	If bypass valve(s) is open, the system loop will be depressurized.	Close bypass valves (8.1.3). Replace multi-function valve if defective (9.2.1).
5. Check charge pressure with pump in neutral.	Low charge pressure insufficient to recharge system loop.	Measure charge pressure with the pump in neutral (4.2). If pressure is low, go to step 6; otherwise continue with step 5.
6. Check charge pressure with pump in stroke.	Low charge pressure with the pump in stroke indicates a motor charge relief valve or system pressure relief valve may be improperly set.	Measure charge pressure with pump in stroke (4.2). If pressure is low, adjust or replace motor charge relief valve (8.3.1 and 9.4.1.2), otherwise go to step 9.
7. Inspect pump charge relief valve.	A pump charge relief valve that is leaky or set too low will depressurize the system.	Adjust or replace pump charge relief valve as necessary (8.1.1, 9.2.3)
8. Check charge pump inlet filter.	A clogged filter will undersupply system loop.	Inspect filter and replace if necessary.

9. Check charge pump.	A malfunctioning charge pump will provide insufficient charge flow.	Repair or replace the charge pump (9.2.4). If OK go to last step.
10. Check pump displacement control.	Control linkages are not secure, control orifices are blocked, etc.	Repair or replace control module as necessary (8.2 and 9.3).
11. Check system pressure.	Low system pressure will not provide power necessary to move load.	Measure system pressure (4.2). Continue with next step.
12. Check system multi-function valves.	Defective multi-function valves will cause system pressure to be low.	Repair or replace multi-function valve(s) (9.2.1).
13. Replace transmission.		Replace pump and motor.

7.5 Low Motor Output Torque

Item	Description	Action
1. Check system pressure at motor.	Low system pressure at the motor will reduce torque.	Measure system pressure at motor (4.2). If pressure limiter setting is low, increase setting.
2. Variable motor stuck at minimum displacement.	Minimum motor displacement yields low output torque.	Check control supply pressure (4.2.3) or repair displacement control (9.5). Check motor control orifices (9.5.4).
3. Check for internal leakage.	Internal leakage will reduce system pressure.	Check for leakage in O-rings, gaskets, and other fittings (9.1.1 and others). Repair unit as required, or replace leaky unit.
4. Replace transmission.		Replace pump and motor.

7.6 Improper Motor Output Speed

Item	Description	Action
1. Check oil level in reservoir.	Insufficient hydraulic fluid will reduce motor speed.	Fill oil to proper level.
2. Check charge pressure.	Incorrect charge pressure can result in a low speed motor.	Measure charge pressure (8.1.1), adjust charge system as necessary (9.2.3 and 9.2.4).
3. Check pump output flow.	Incorrect outflow will affect output speed. Incorrect output flow indicates the swashplate is out of position.	Measure pump output flow by teeing into outflow hose. Check for proper pump speed and see that the pump is in full stroke.
4. Check variable motor displacement control.	If variable motor displacement control is not functioning correctly, variable motor swashplate may be in wrong position.	See if variable motor displacement control is responding. If not, repair or replace control (9.5).

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Series 90 Troubleshooting 7

7.7 Excessive Noise and/or Vibration

Item	Description	Action
1. Check oil in reservoir.	Insufficient hydraulic fluid will lead to cavitation.	Fill reservoir to proper level.
2. Air in system.	Air bubbles will lead to cavitation.	Look for foam in reservoir. Check for leaks on inlet side of system loop. Afterwards, let reservoir settle until bubbles are gone. Run system at low speed to move system fluid to reservoir. Repeat.
3. Check pump inlet vacuum.	High inlet vacuum will create noise. A dirty filter will increase the inlet vacuum.	Inspect and replace filter as necessary. Check for proper suction line size.
4. Inspect shaft couplings.	A loose shaft coupling will cause excessive noise.	Replace loose shaft coupling in charge pump (Sec. 9.2.4) or replace pump or motor.
5. Inspect shaft alignment.	Unaligned shafts will create excessive frictional noise.	Align shafts.

7.8 System Response is Sluggish

Item	Description	Action
1. Check oil level in reservoir.	Insufficient hydraulic fluid will reduce output pressure.	Fill reservoir to proper level.
2. Check multi-function valves' pressure settings.	Incorrect pressure settings will affect system reaction time.	Adjust or replace multi-function valves (8.1.2 and 9.2.1).
3. Check pump inlet vacuum.	High pump inlet vacuum will reduce system pressure.	Measure charge inlet vacuum (4.2). If high replace inlet filter.
4. Check prime mover speed.	Low engine speed will reduce system performance.	Adjust engine speed.
5. Check charge and control pressures.	Incorrect charge or control pressures will affect system performance.	Measure charge and control pressures and correct if necessary (4.2 and others).
6. Check system internal leakage.	Internal leakage will reduce system pressure.	Check for leakage in O-rings, gaskets, and other fittings (9.1.1 and others).
7. Replace transmission.		Replace pump and motor.

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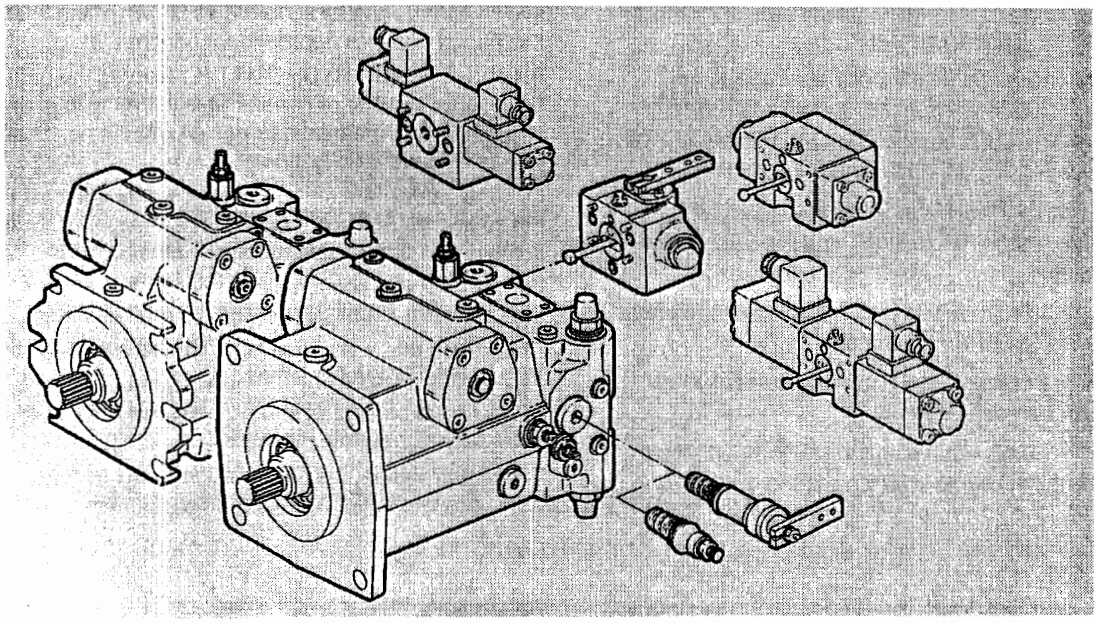


NOTICE

Specifications, descriptions and illustrative material shown herein were as accurate as known at the time this publication was approved for printing.

BRUENINGHAUS HYDROMATIK reserves the right to discontinue models or options at any time or to change speci-fications, materials, or design without notice and with-out incurring obligation.

Optional equipment and accessories may add cost to the basic unit, and some options are available only in combination with certain models or other options.

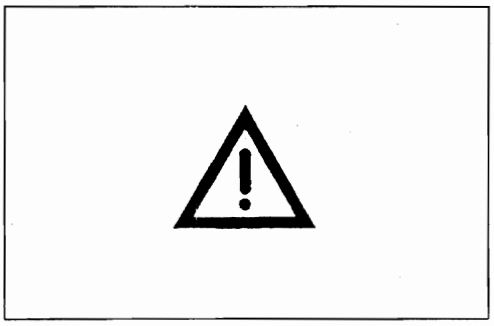
For the available combinations refer to the relevant data sheet for the basic unit and the desired option.

Adjustment and tests have to be carried out on the test bench under operating temperatures.

Protection of personnel and property has to be guar-anteed by appropriate measures.

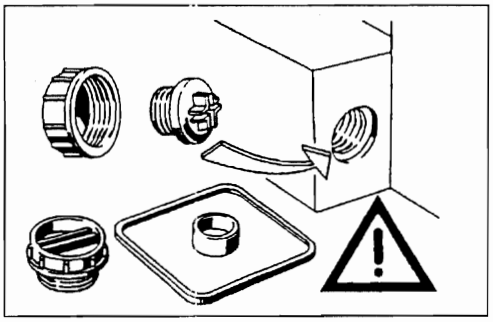
Expert knowledge, the precondition of any service work, can be obtained in our training courses.

CONTENTS



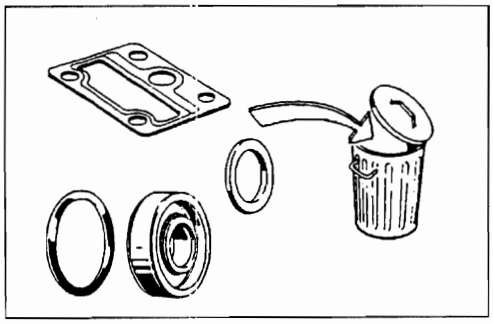
Achtung!
Nachfolgend Hinweise bei allen Reparaturarbeiten an Hydraulikaggregaten beachten!

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



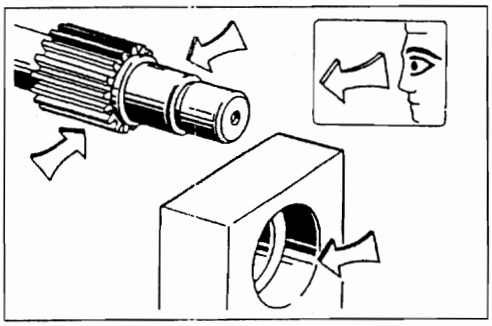
Alle Öffnungen der Hydraulikaggregate verschließen.

Close all ports of the hydraulic aggregates.



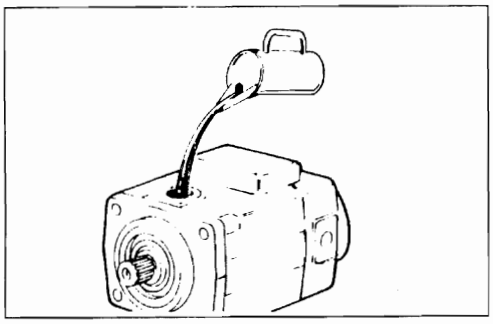
Alle Dichtungen erneuern.
Nur original HYDROMATIK-Ersatzteile verwenden.

Replace all seals.
Use only original HYDROMATIK spare parts.



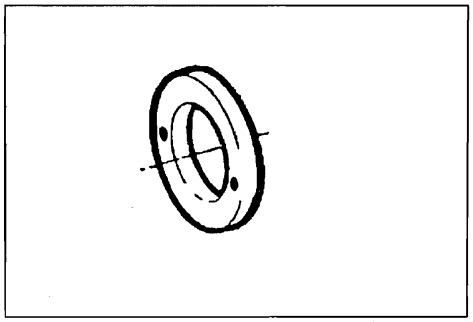
Alle Dicht- und Gleitflächen auf Verschleiß prüfen.
Achtung: Nacharbeiten an Dichtflächen z.B. durch Schleifpapier kann die Oberfläche beschädigen.

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



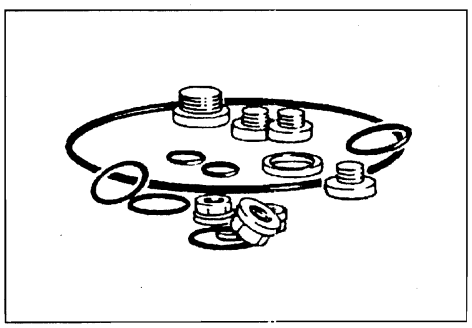
Hydraulikaggregate vor Inbetriebnahme mit Betriebsmedium befüllen.

Fill up hydraulic aggregates with medium before start- up.



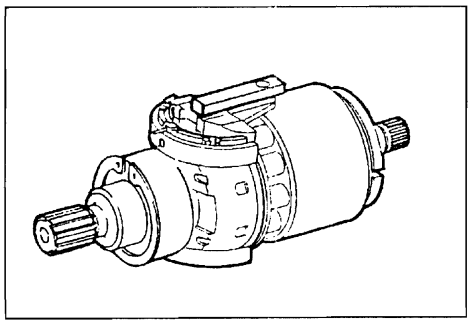
1 Dichtsatz für Triebwelle.

Seal kit for drive shaft.



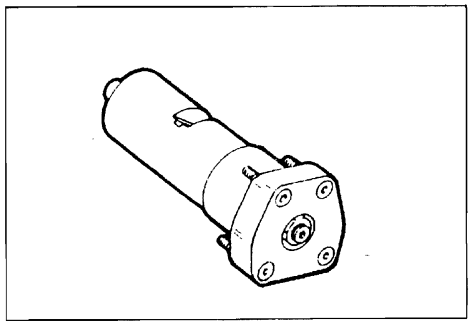
2 Äußerer Dichtsatz.

External seal kit.



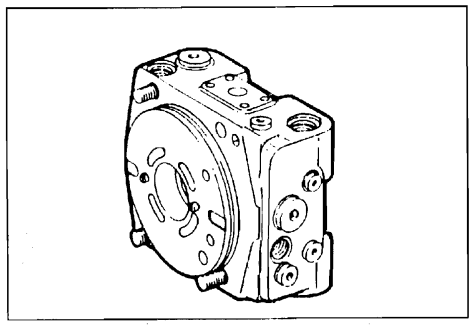
3 Triebwerk komplett.

Complete rotary group.



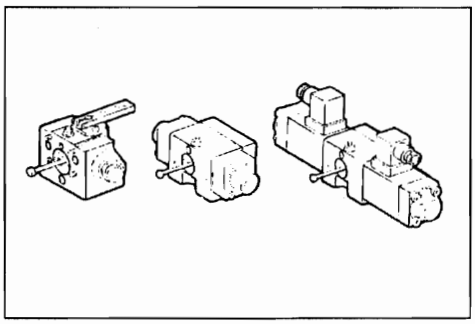
4 Stellkolben

Positioning piston



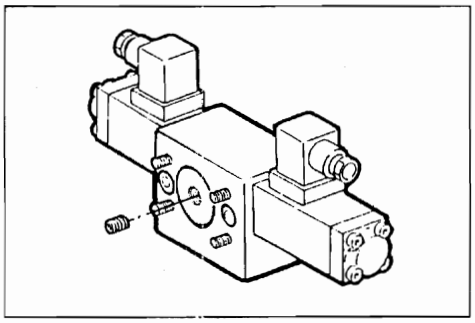
5 Anschlußplatte

Valve plate



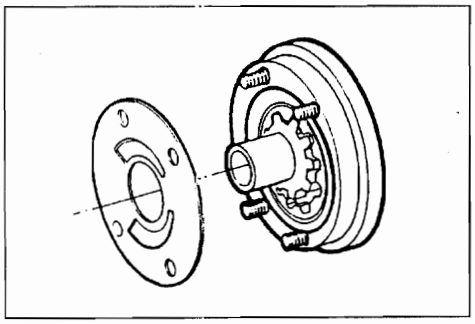
6 Ansteuergeräte **HW, HD, EP**
Hinweis:
NG 71 wie NG 40 - 56 mit Flachdichtung.

Control device **HW, HD, EP**
Note:
Size 71 control device as size 40 - 56 with flat seal.



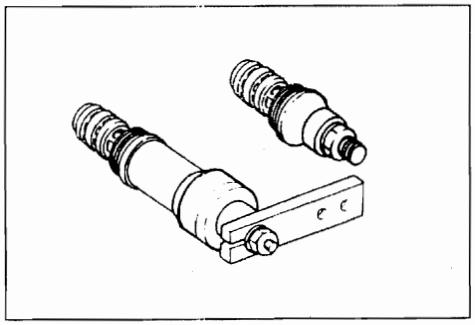
7 Ansteuergerät **DA**
Hinweis:
NG 71 wie NG 40 - 56 mit Flachdichtung.

Control device **DA**
Note:
Size 71 control device as size 40 - 56 with flat seal.



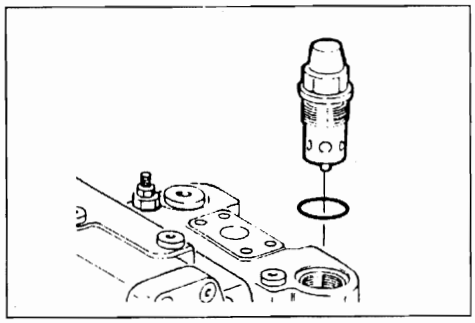
8 Hilfspumpe

Boost pump



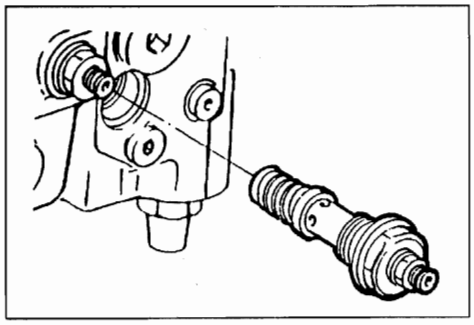
9 Regelventil

Control valve



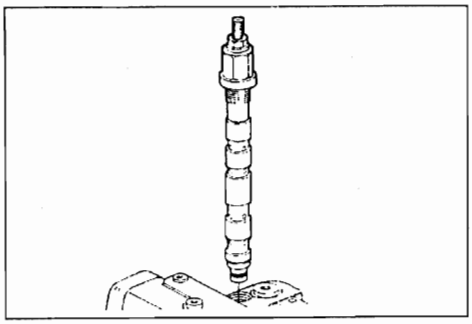
10 HD - Ventil

High pressure valve



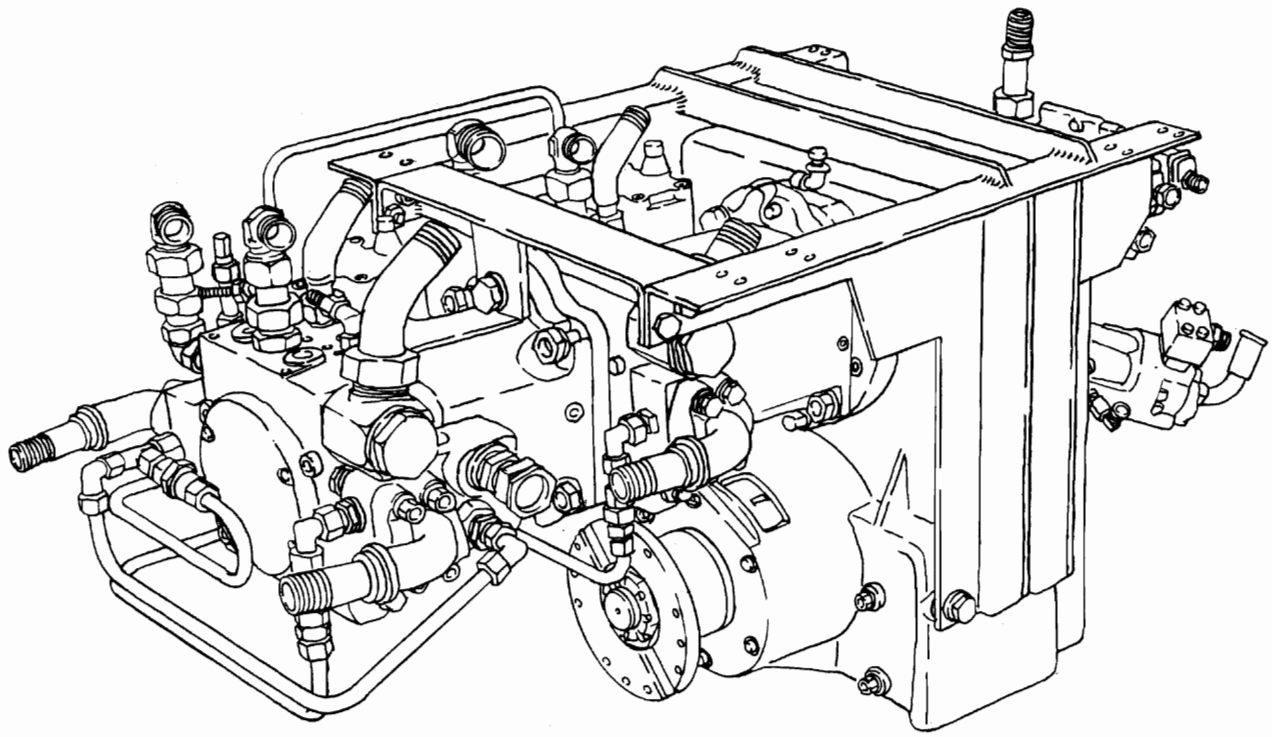
11 ND - Ventil

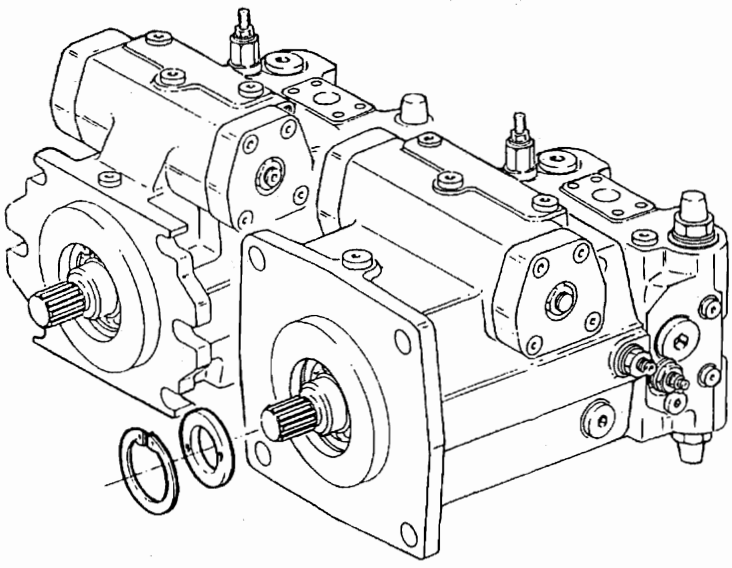
Low pressure valve



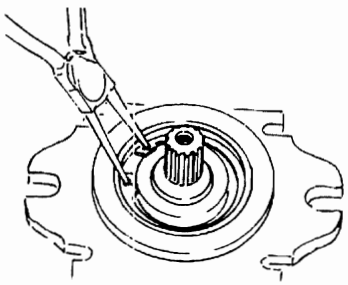
12 Druckabschneidung

Pressure cut-off



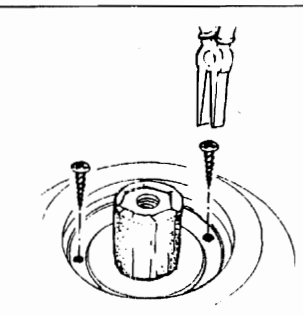


13



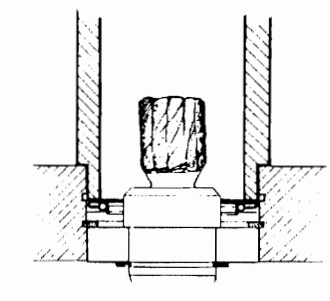
14 Triebwelle abkleben.
Sicherungsring ausbauen.

Protecting the drive shaft.
Remove retaining ring.



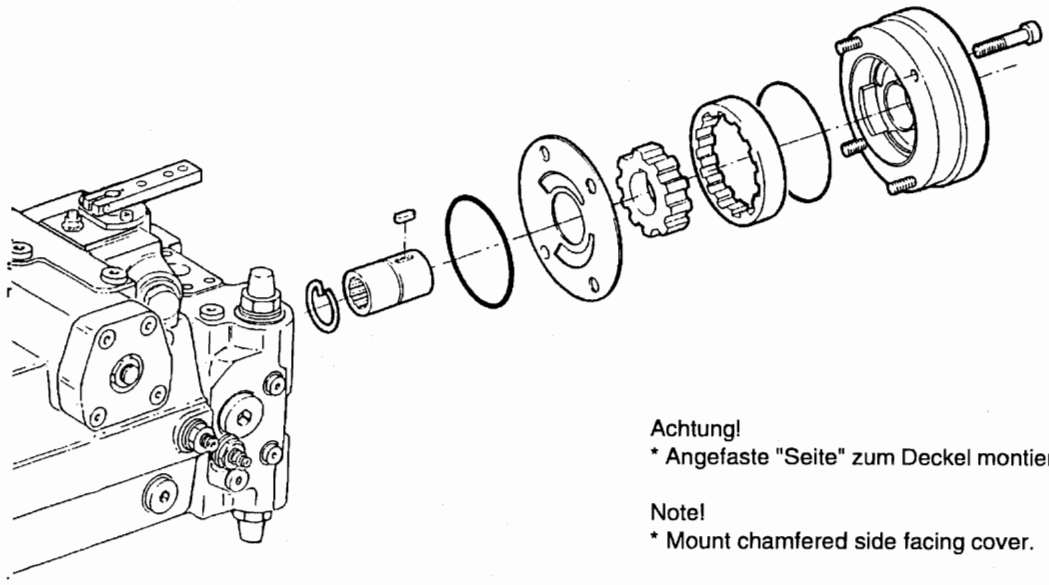
15 Blechschraube in die mit Gummi gefüllten Löcher eindrehen.
Mit Zange WDR herausziehen.

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



16 Wellendichtring mit Buchse auf Anschlag einpressen.
Sicherungsring einbauen.

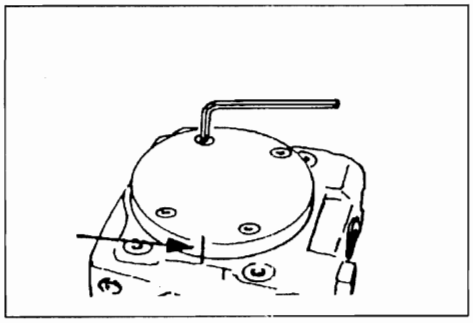
Press-in shaft seal with bush to stop.
Assemble retaining ring.



Achtung!
* Angefaste "Seite" zum Deckel montieren.

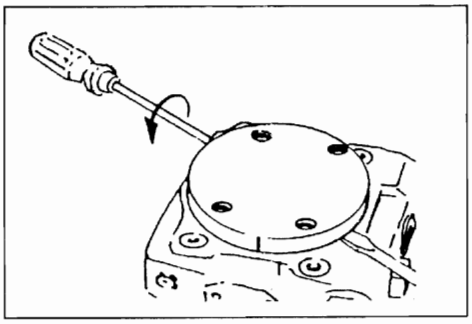
Note!
* Mount chamfered side facing cover.

17



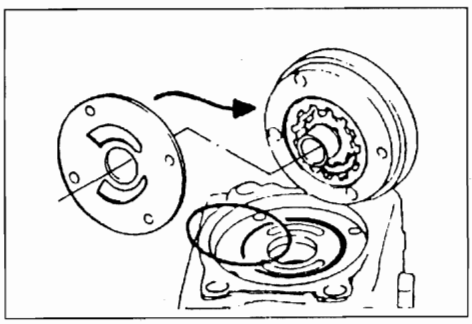
18 Lage kennzeichnen,
Befestigungsschrauben ausbauen.

Mark position,
remove fixing screws.



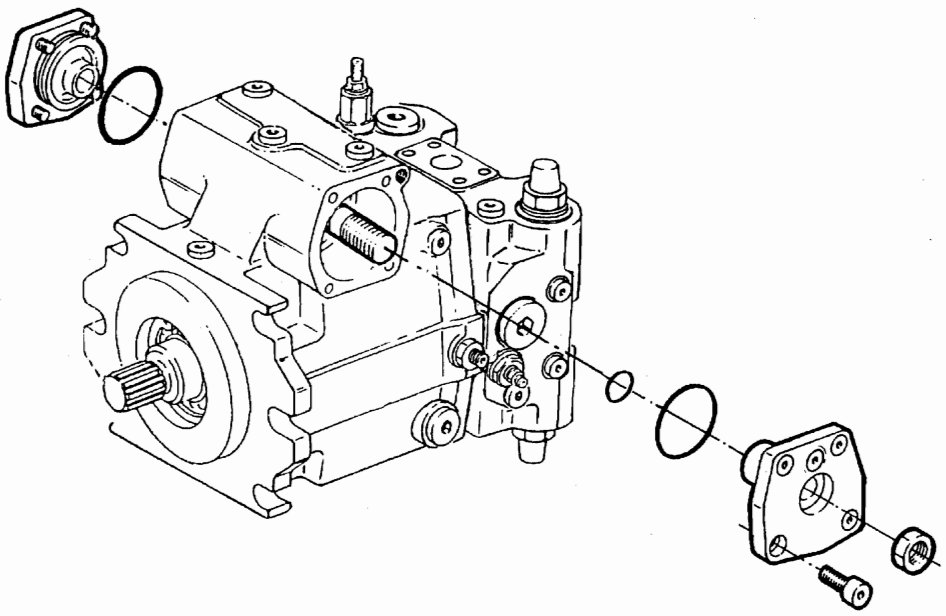
19 Deckel abdrücken.

Pry-off cover.



20 Kontrolle:
O-Ring, Nut,
Lauffläche, Anschlußplatte.

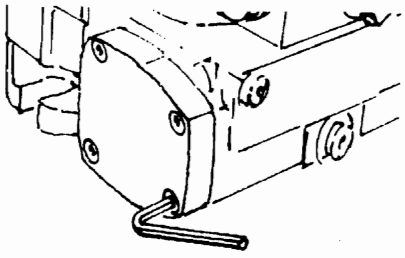
Check:
O-ring, groove,
gliding surface, connection plate.



Achtung!
Korrekt mechanische 0-Lageneinstellung überprüfen

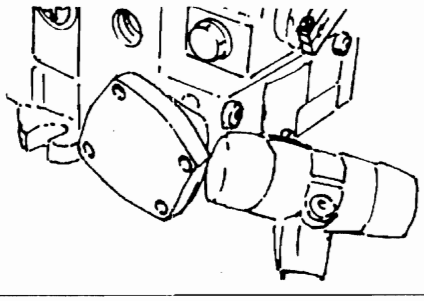
Attention!
Check correct mechanical 0-position.

21



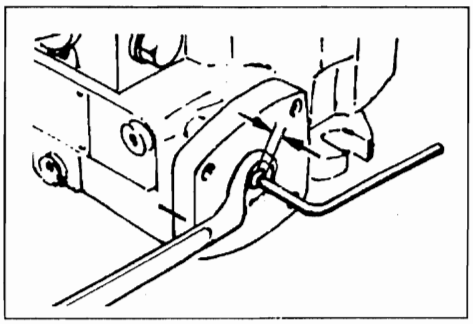
22 Lage kennzeichnen.

Mark position.



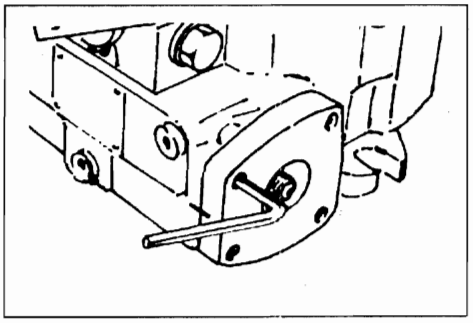
23 Deckel verdrehen und mit leichten Hammerschlägen lösen.

Rotate cover and release by tapping gently with hammer.



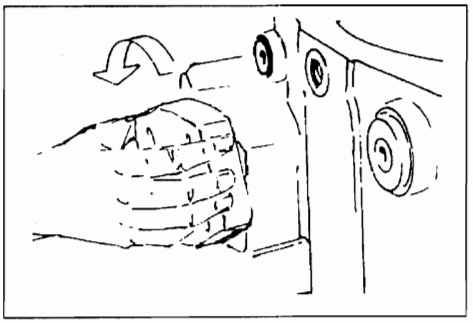
24 Deckel kennzeichnen. Maß festhalten, Kontermutter lösen, Stellschraube gegenhalten.

Mark cover. Must be fixed, loosen counter nut, hold adjustment screw.



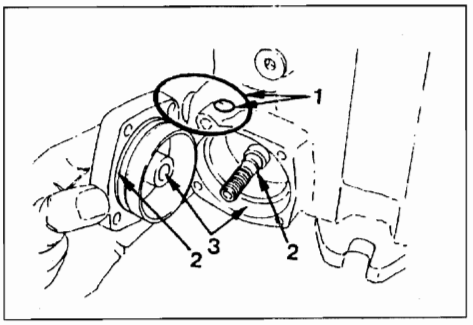
25 Deckel demontieren.

Remove cover.



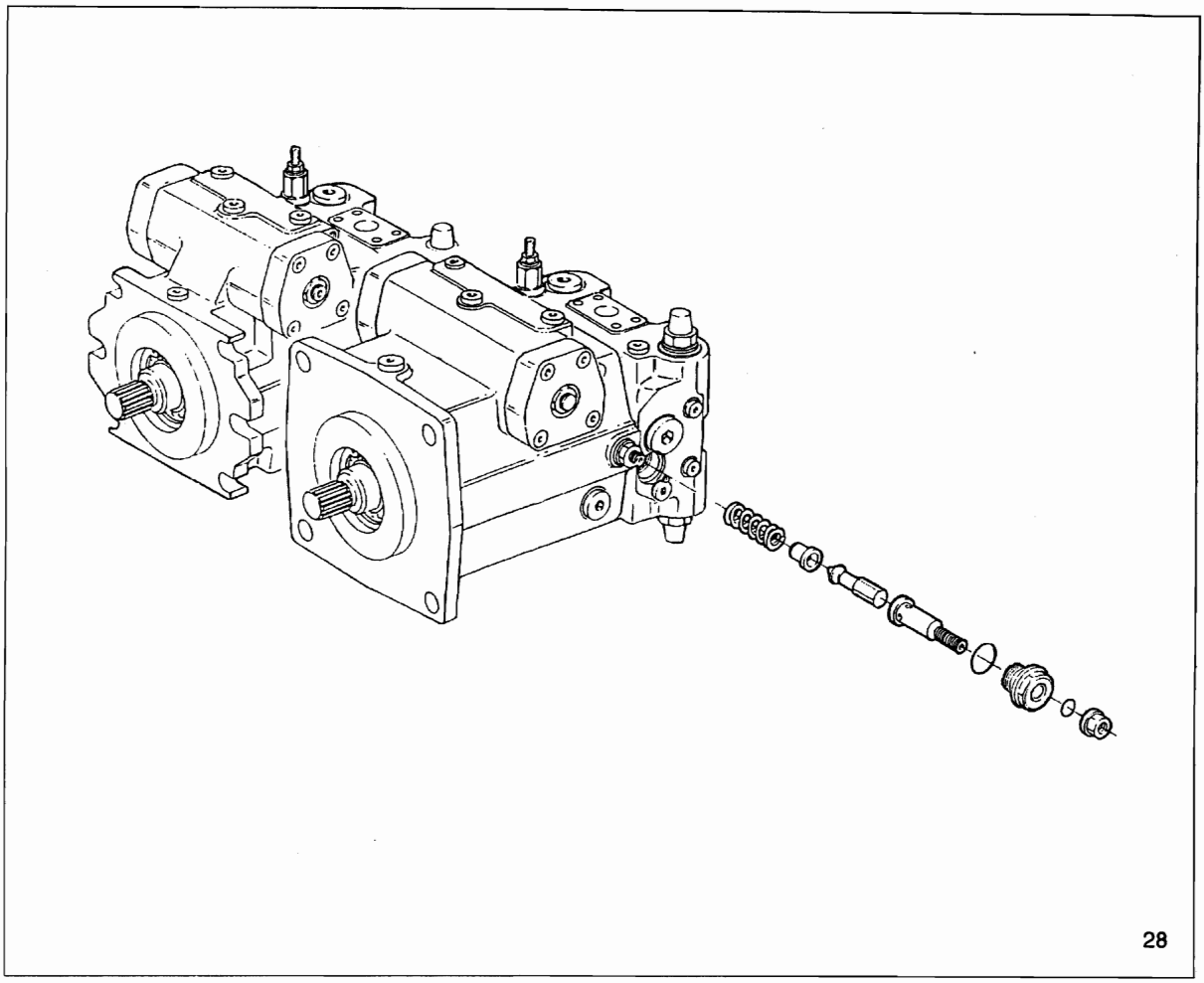
26 Deckel von Stellschraube "abschrauben".

Lift off by turning the setting screw.

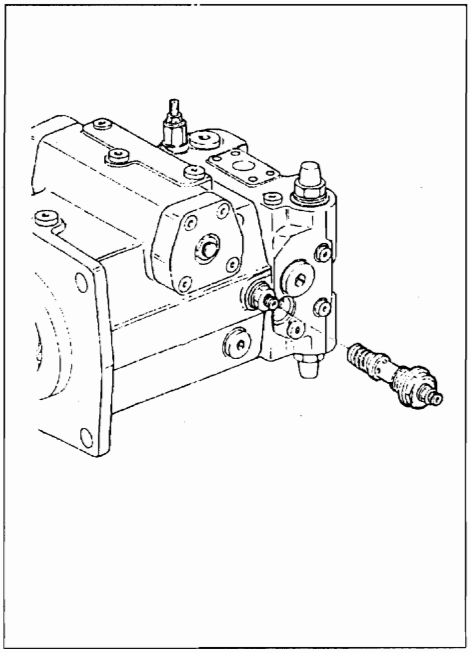


27 Kontrolle!
O-Ring (1), Nut (2), Gehäuse (3).

Check!
O-ring (1), groove (2), housing (3).



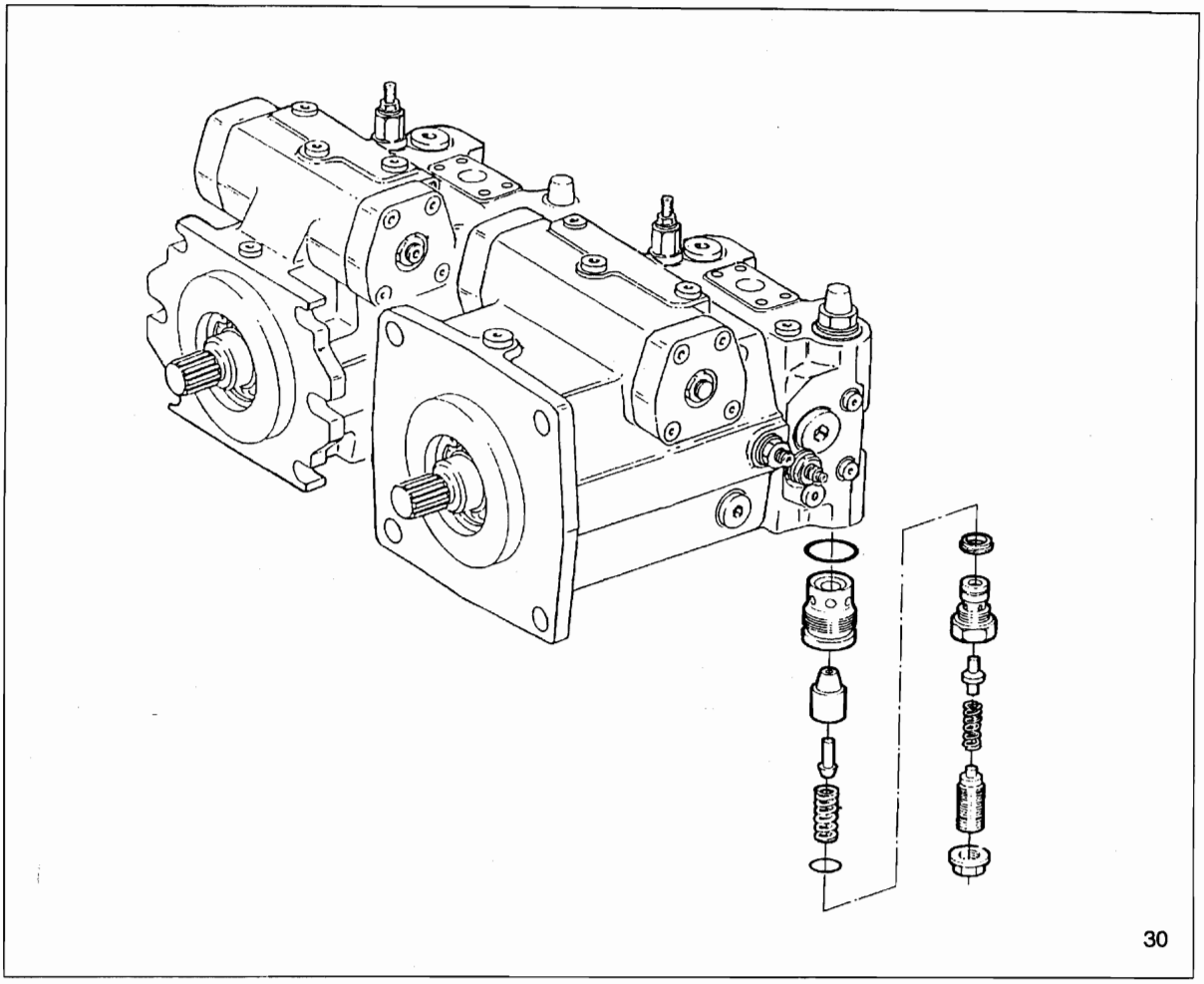
28



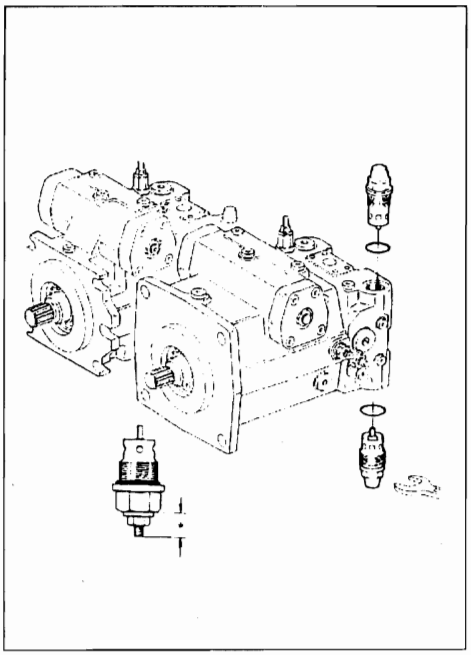
29

Ventil komplett ausbauen.
Hinweis:
Einstellschraube nicht verändern.
Achtung!
Nach Einbau Ventileinstellung überprüfen!

Remove valve completely:
Note:
Do not change adjustment screw.
Attention!
Check valve setting after installation.

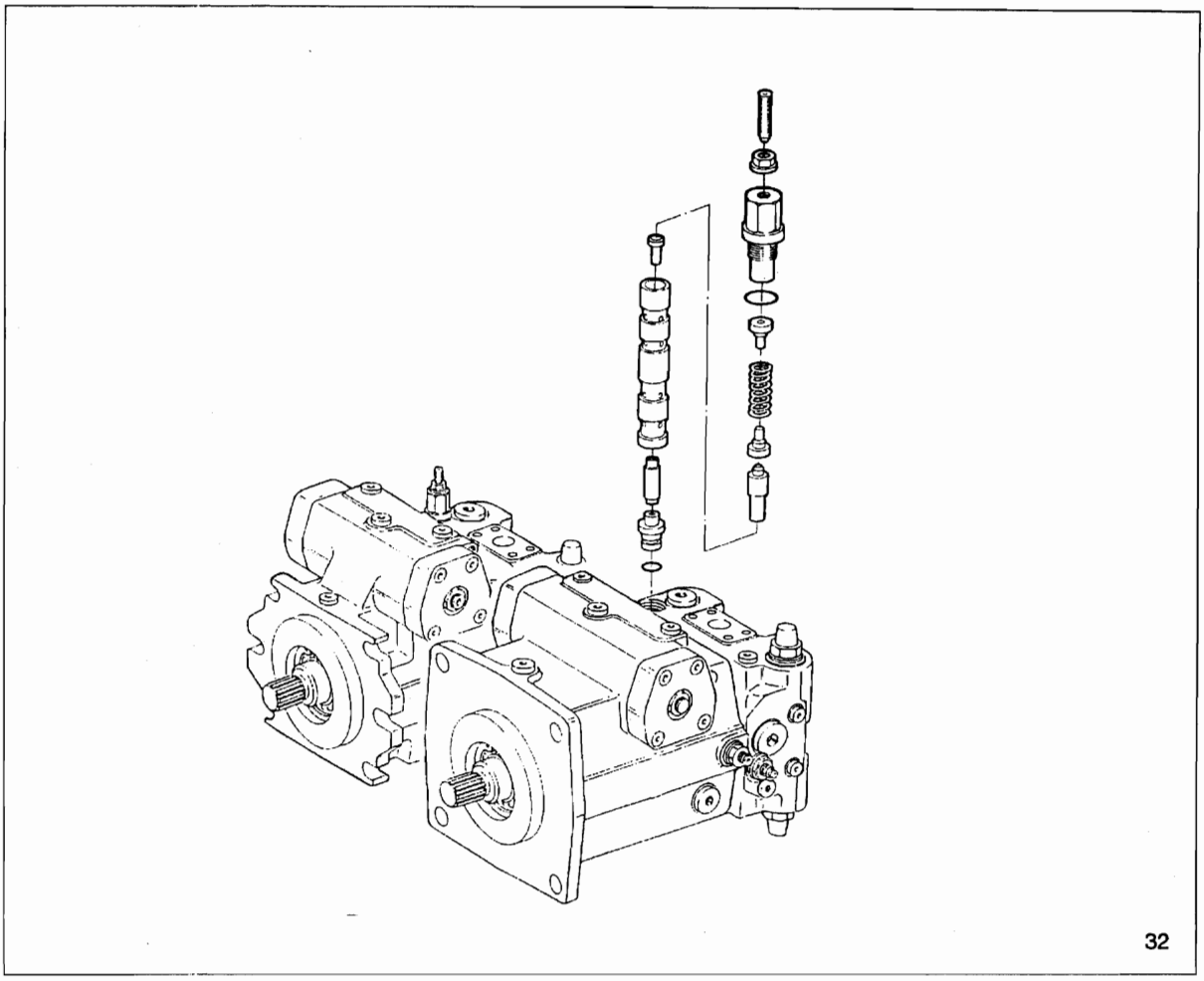


30

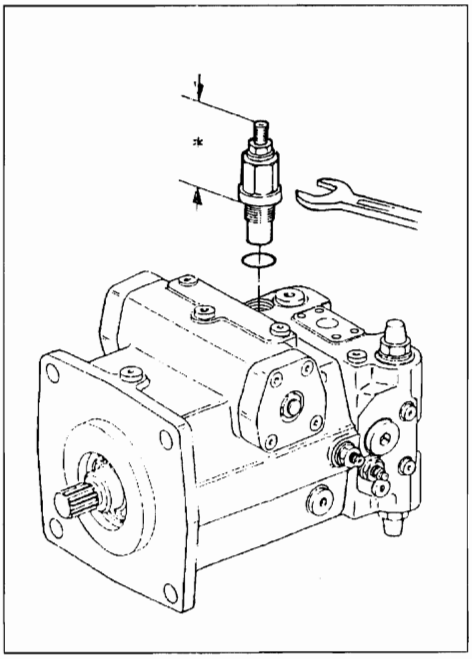


31 Ventil komplett ausbauen.
Kontrolle: O-Ring, Gehäuse.
Wechsel der Dichtmutter - Einstellmaß (*) festhalten.
Achtung!
Nach Einbau "Ventileinstellung" überprüfen.

Remove valve completely.
Control: O-ring, housing.
Replacement of the tightening nut, record measure (*).
Attention!
After assembly check "valve setting".



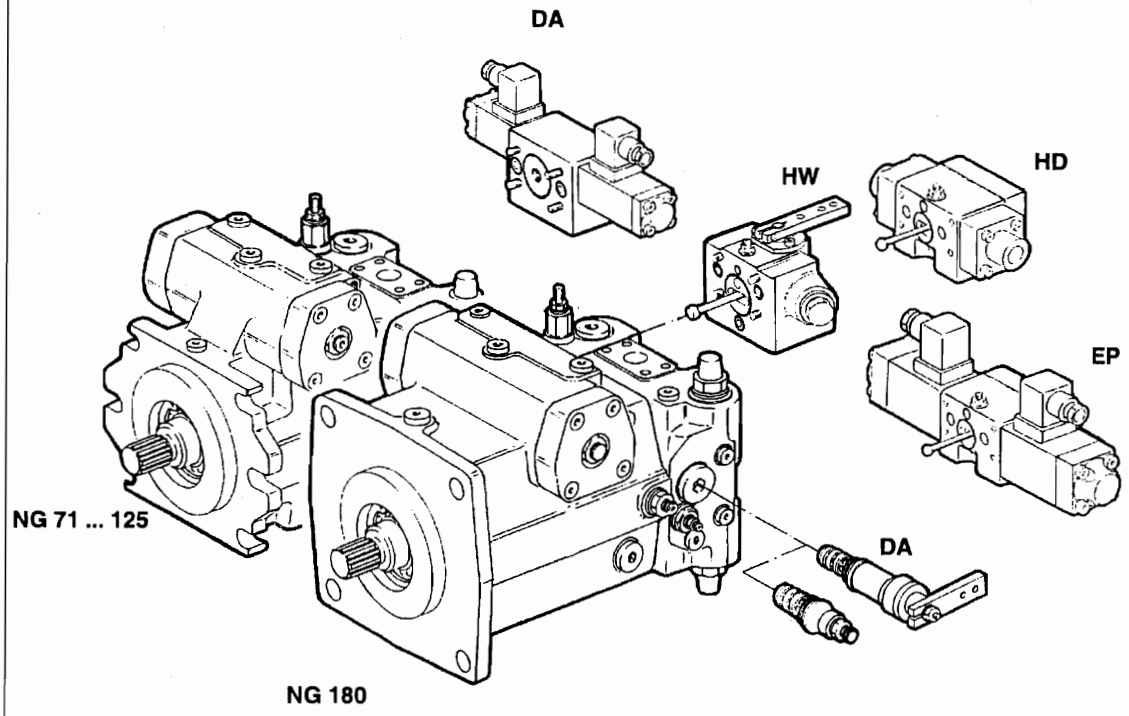
32



33

Einstellteil komplett ausschrauben.
Kontrolle: O-Ring, Gehäuse.
Wechsel der Dichtmutter - Einstellmaß (*) festhalten.
Achtung!
Nach Einbau "Ventileinstellung" überprüfen.

Unscrew setting cartridge completely.
Control: O-ring, housing.
Replacement of the tightening nut, record measure (*).
Attention!
After assembly check "valve setting".

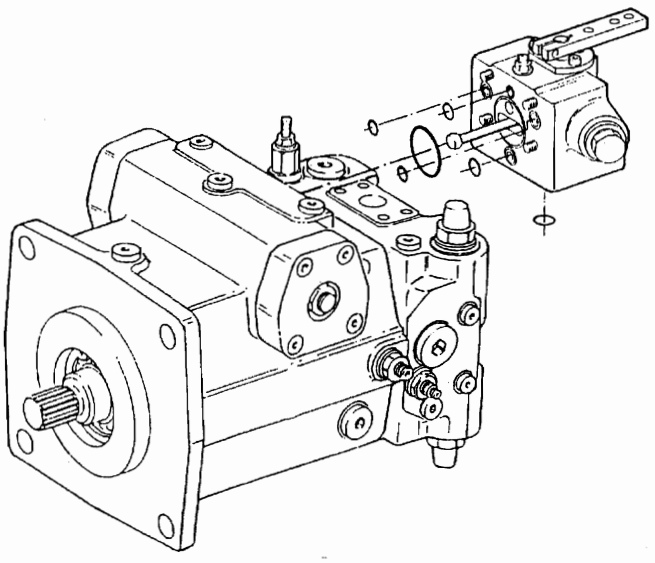


Ansteuergerät abbauen.

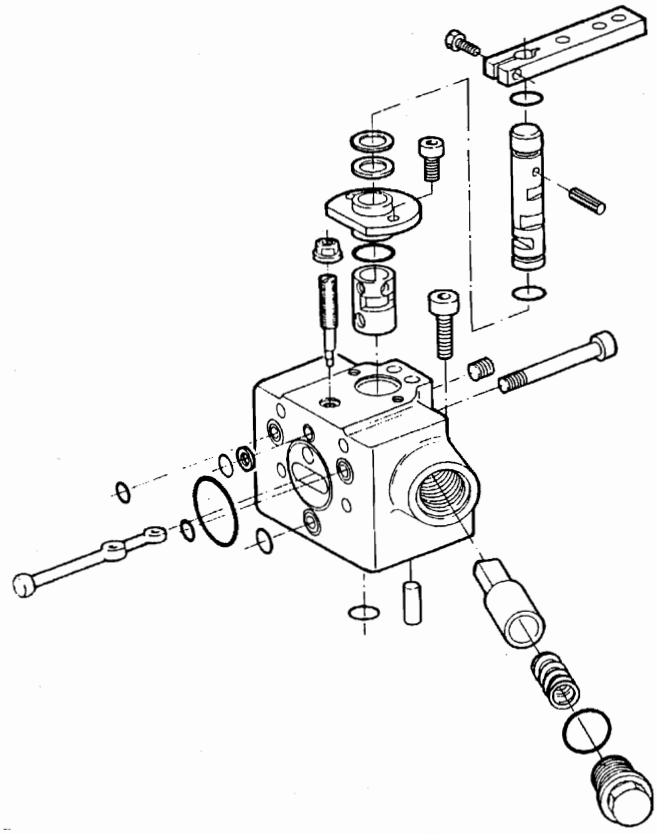
Remove control device.

Hinweis:
NG 71: Abdichtung der Ansteuergeräte wie NG 40 - 56 mit Flachdichtung.
Achtung!
Korrekte hydraulische Nullageneinstellung überprüfen.

Note:
Size 71: Sealing of control device as size 40 - 56 with flat seal.
Attention!
Check correct hydraulic 0-position.



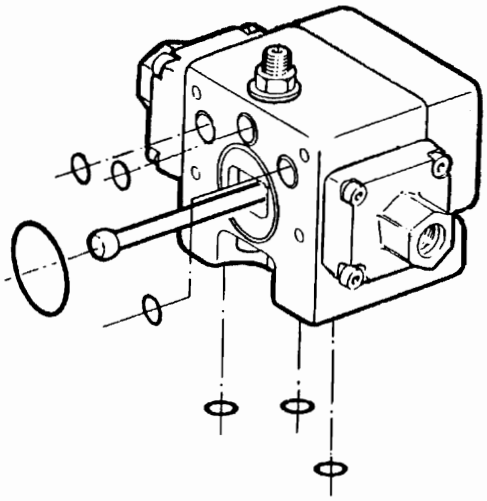
35



Kontrolle:
O-Ringe und Dichtung.

Check:
O-rings, gasket.

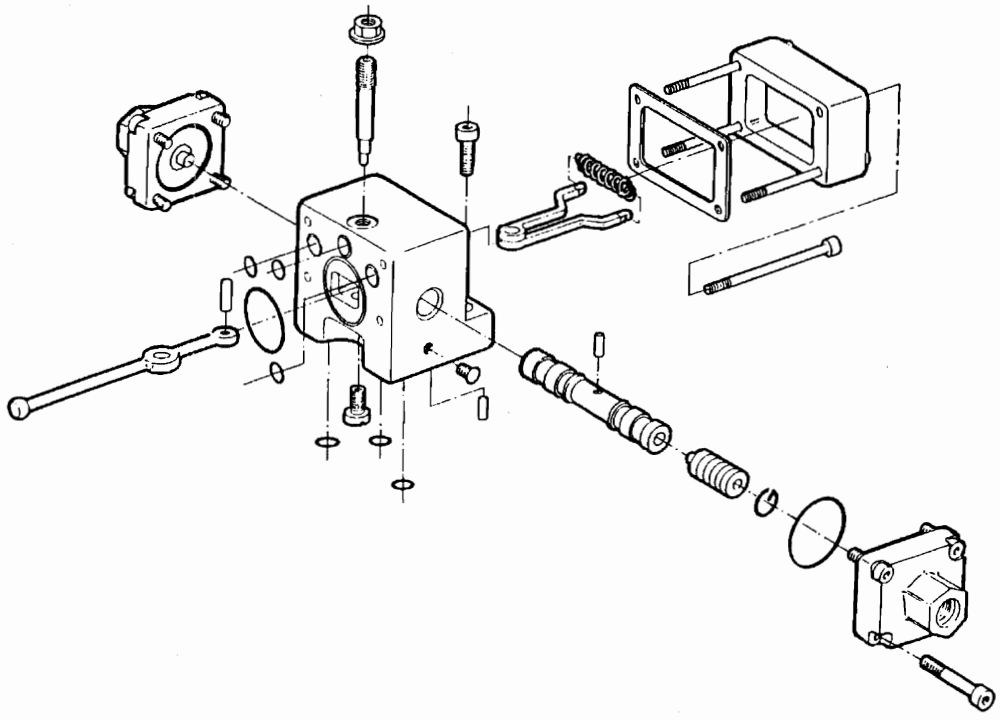
36



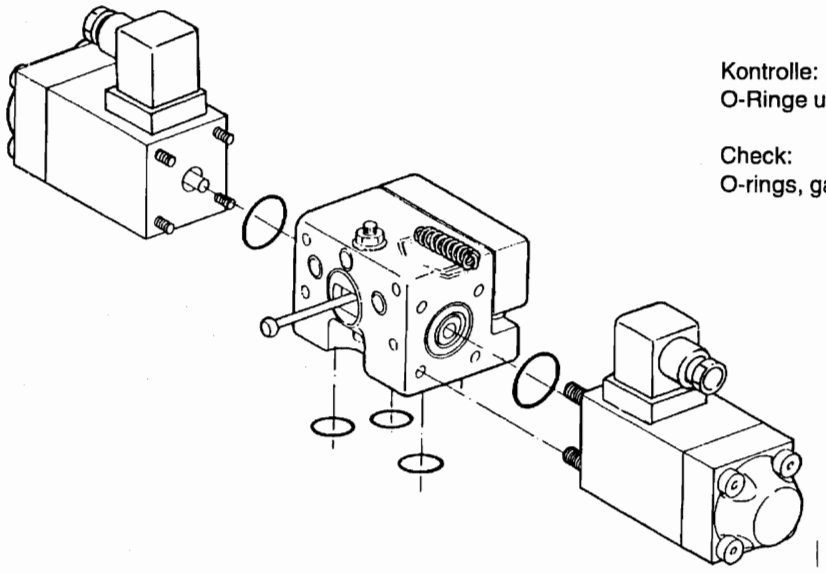
Kontrolle:
O-Ringe

Check:
O-rings

37



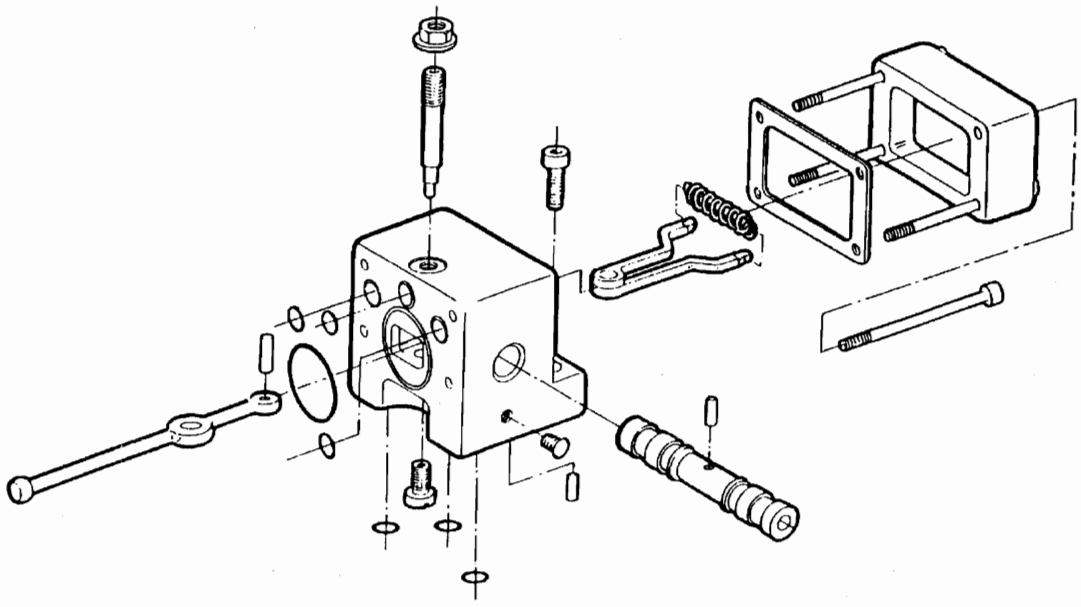
38



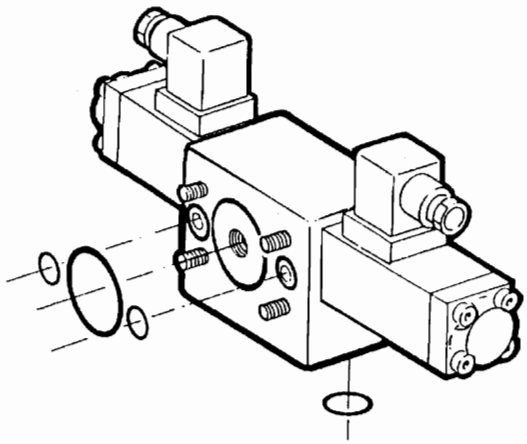
Kontrolle:
O-Ringe und Dichtung.

Check:
O-rings, gasket.

39



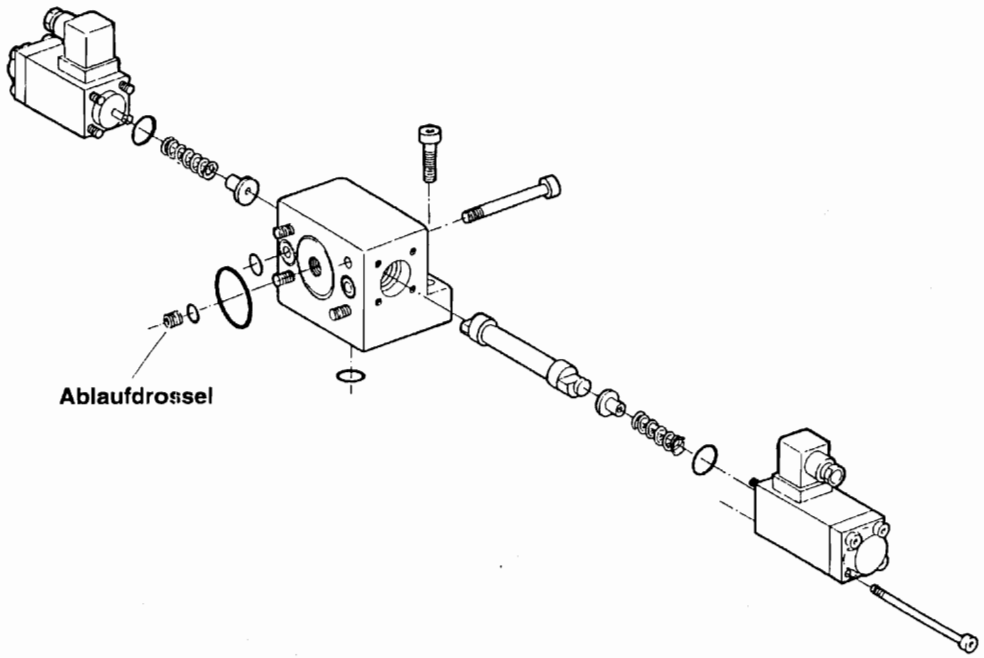
40



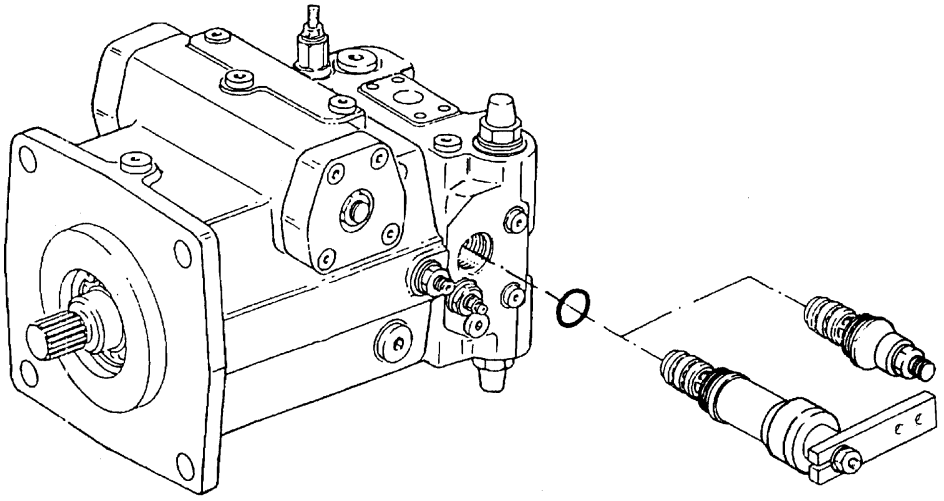
Kontrolle:
O-Ringe

Check:
O-rings

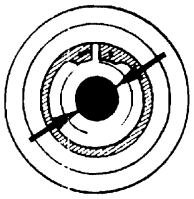
41



42

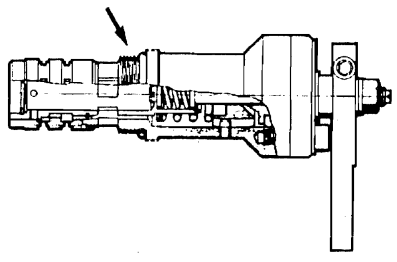


43



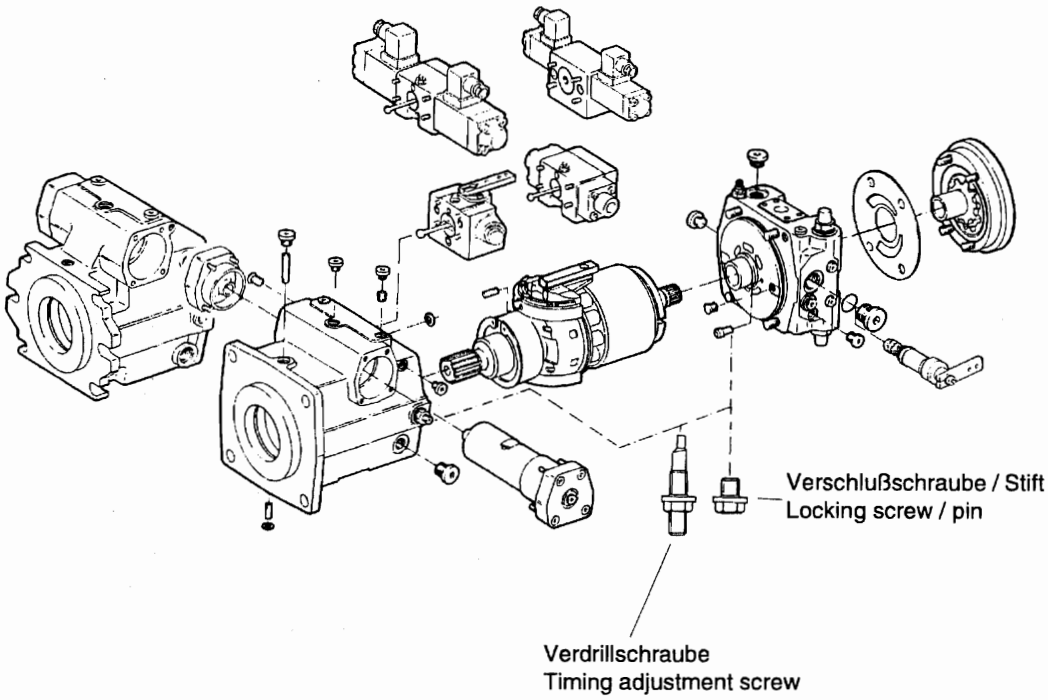
44 Blende überprüfen.
Keine Beschädigung.

Inspect orifice.
No damage.

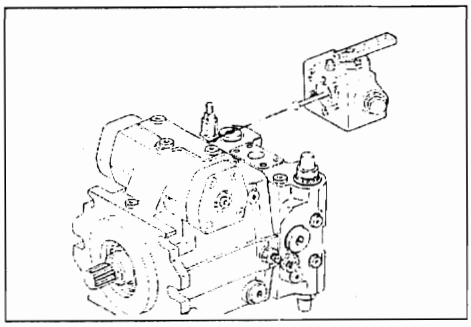


45 Gewinde abkleben.
O-Ring einsetzen.

Cover threads.
Insert O-ring.

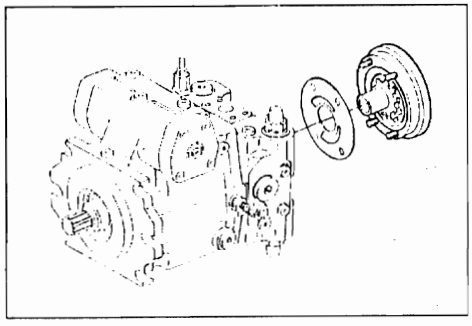


46



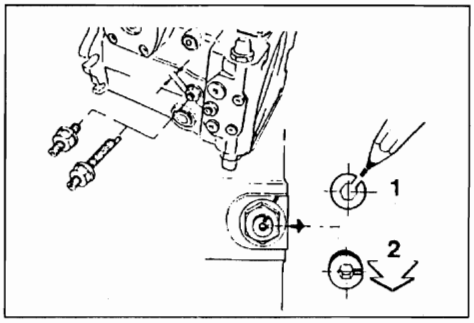
47 Ansteuergerät abbauen.

Remove control device.



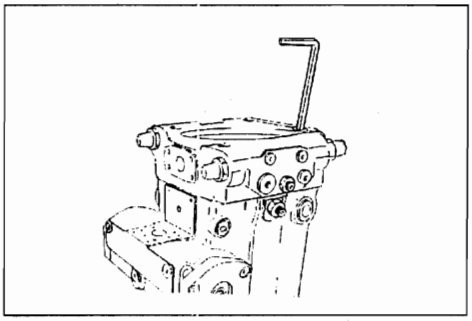
48 Hilfspumpe ausbauen.
Hinweis:
Einbaulage kennzeichnen.

Remove auxiliary pump.
Note:
Mark assembly position previously.



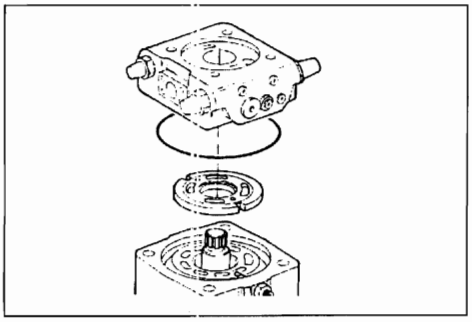
49 Lage der Verdrillschraube markieren (1).
Einstellmaß festhalten.
Verdrillschraube auf Demontageposition stellen (2).

Mark the position of the indexing screw (1).
Record setting measure.
Set the indexing screw to disassembly position (2).



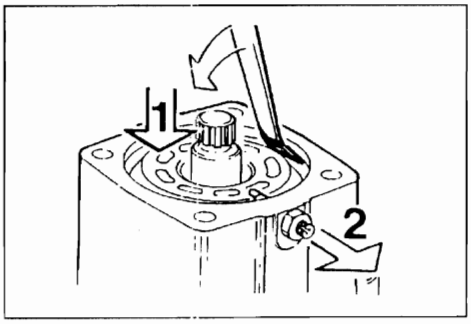
50 Lage der Hilfspumpe und Anschlußplatte markieren.
Anschlußplattenbefestigung lösen.

Mark position of the connection plate.
Loosen connection plate fixation.



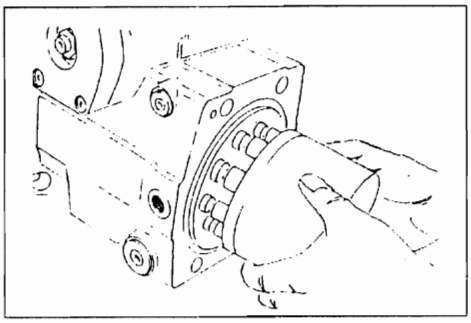
51 Anschlußplatte und Steuerplatte abheben.

Lift off port plate and control plate.



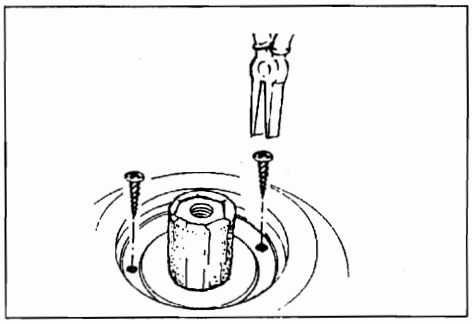
52 1. Zylinder nach unten drücken.
2. Verdrillschraube herausdrehen.

1. Press the cylinder to the bottom.
2. Remove fixing indexing screw.



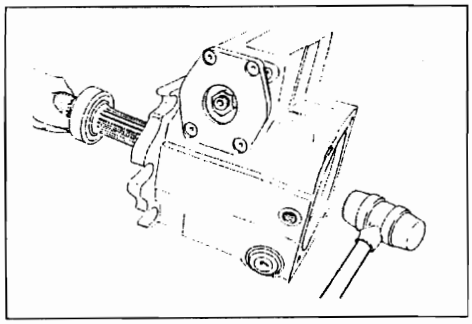
53 Zylinder komplett mit Kolben und
Rückzugeinrichtung ausbauen.

Push off hydraulic section of rotary group.



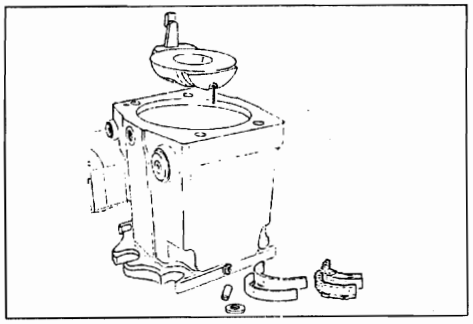
54 Seegerring / WDR ausbauen.

Remove retaining ring and radial seal ring.



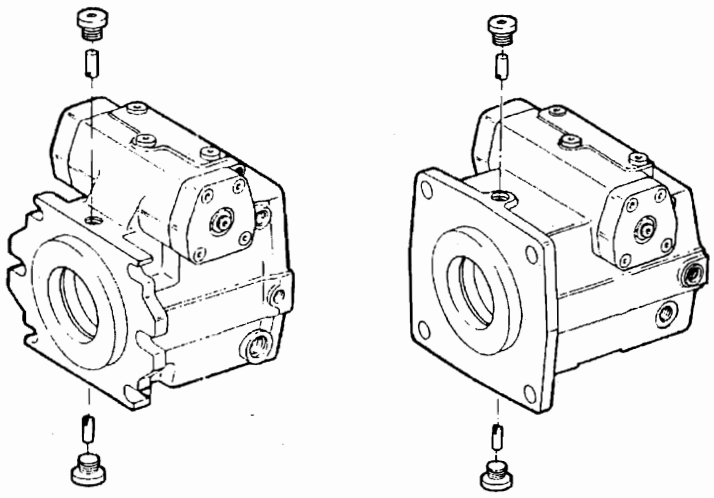
55 Triebwelle mit leichten Hammerschlägen austreiben.

Remove drive shaft with slide hammer strokes.



56 Schwenkwiege / Lager komplett ausbauen.

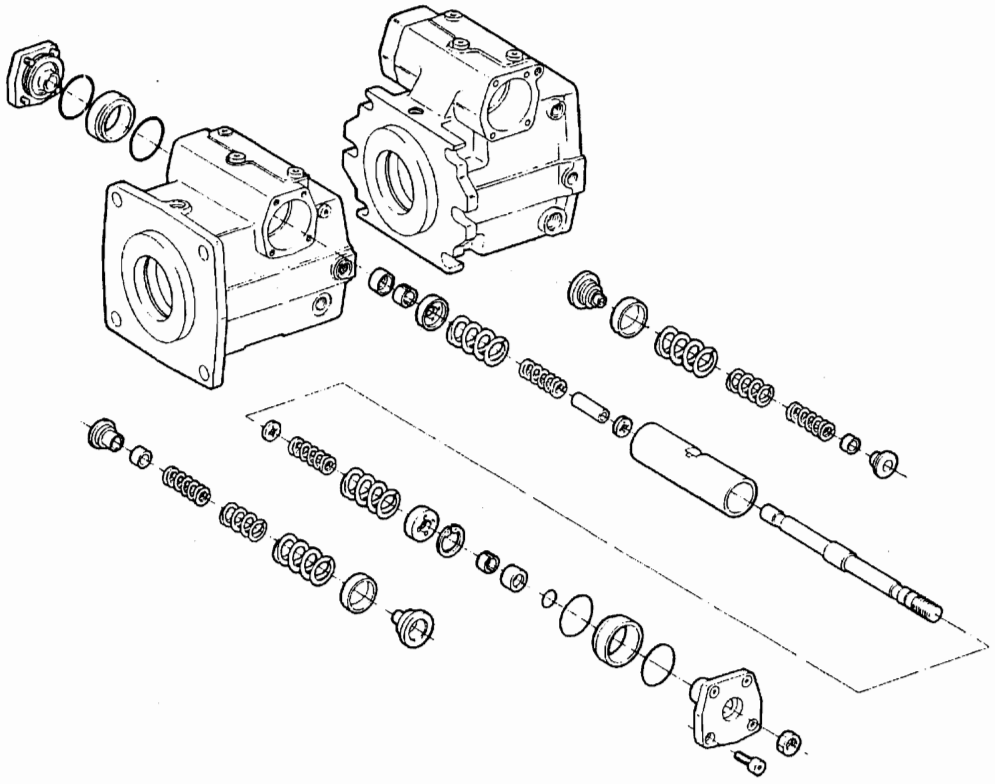
Remove swash plate / bearing cups.



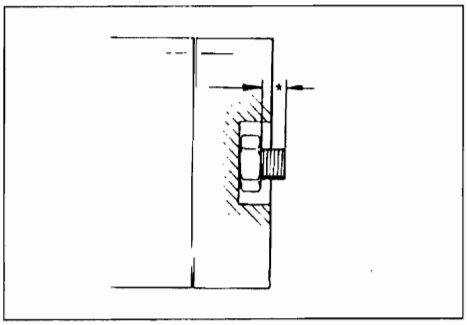
Gelenkstift ausbauen.

Remove joint pin.

57

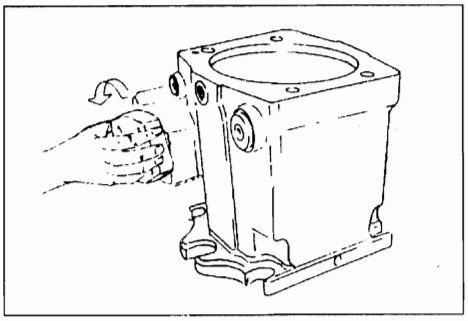


58



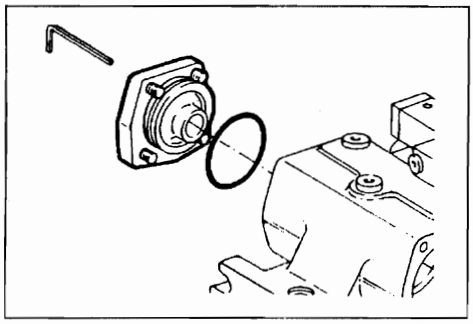
59 Lage vom Deckel markieren, Maß "Nullage" festhalten, Mutter lösen.

Mark position of the cover, note measure of "zero position". Loosen nut.



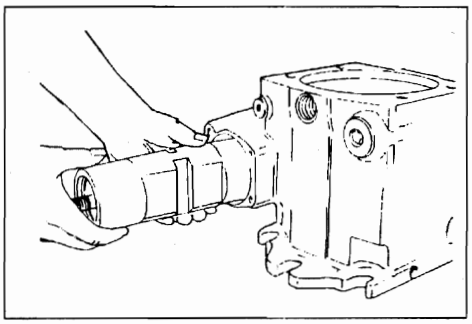
60 Deckel abdrehen.

Remove cover.



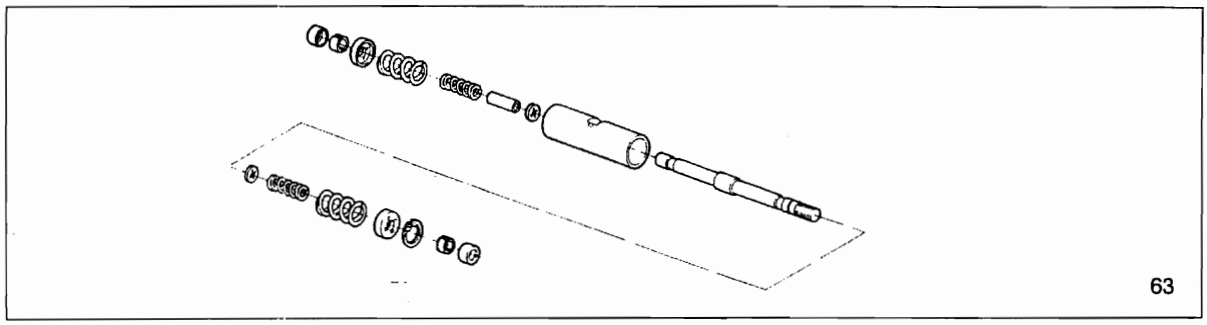
61 Lage des Deckels markieren.
Befestigungsschrauben lösen, abbauen.

Mark position of the cover.
Loosen locking screw, remove cover.

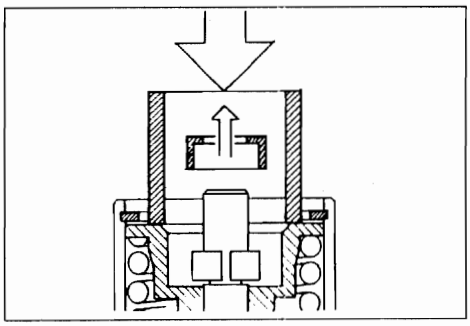


62 Stellzylinder ausbauen.

Remove positioning ring.

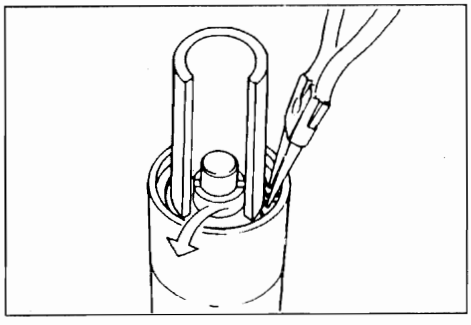


63



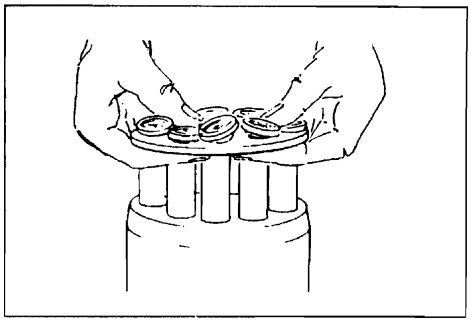
64 Vorrichtung aufsetzen und Feder vorspannen.
Aufnahmering ausbauen.

Fit tool device and preload spring.
Remove take-off ring.



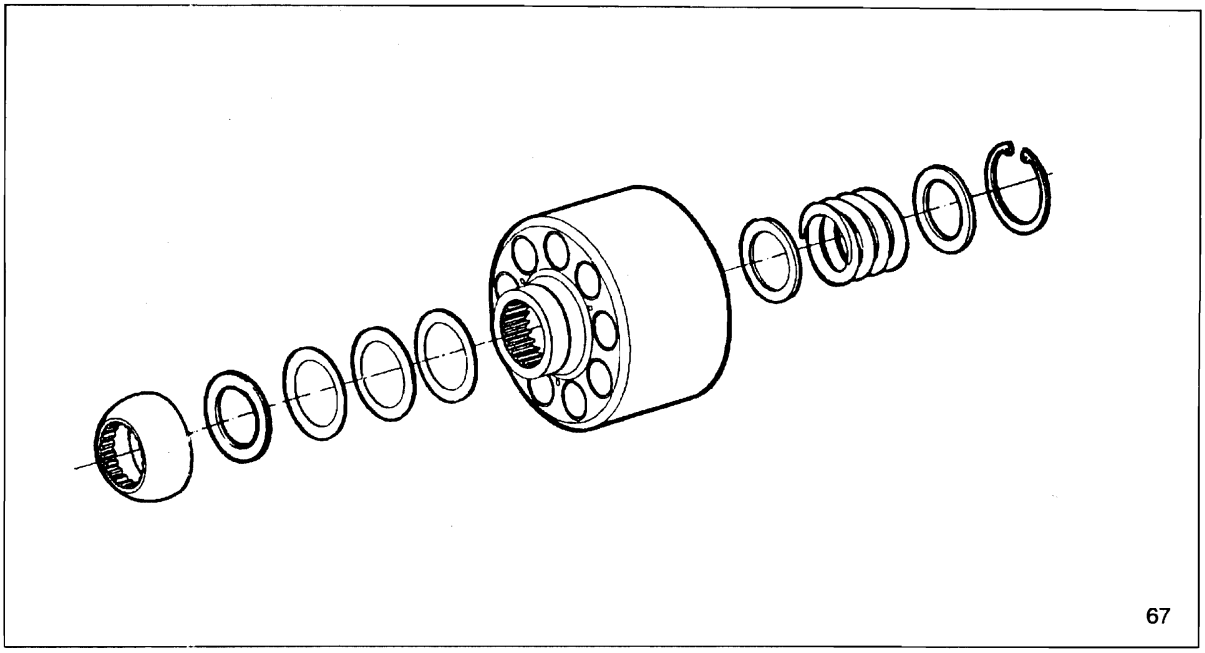
65 Ringe ausbauen.
Sicherungsring ausbauen.
Achtung: Teile stehen unter Federvorspannung.

Remove rings.
Remove safety ring.
Attention: Parts are under spring load.

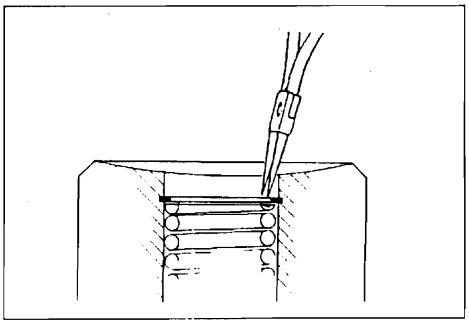


66 Kolben mit Rückzugeinrichtung ausbauen.
Tragkugel mit Tellerfedersäule abheben.

Remove piston with retaining plate.
Remove retaining ball with spring cup assembly.

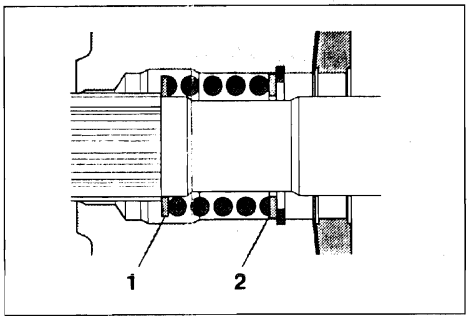


67



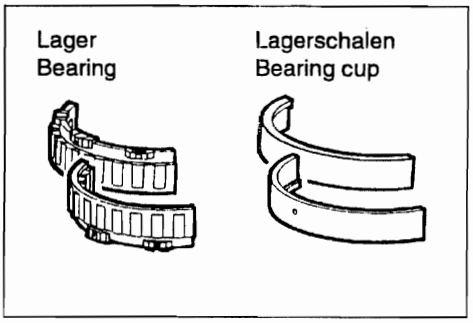
68 Sicherungsring ausbauen.

Remove safety ring.



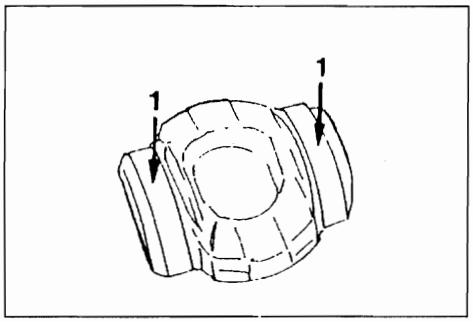
69 Scheibe 1, 2

Disc 1, 2



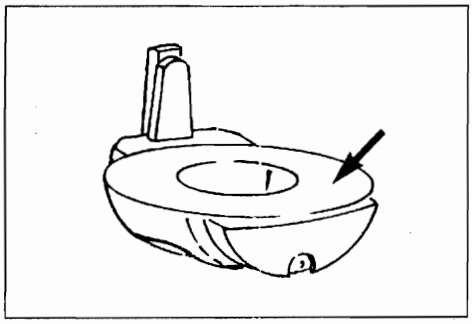
70 Kontrolle!
Käfig-Paar (1),
Lagerschalenpaar (2).

Check!
Cage set (1),
Bearing cup set (2).



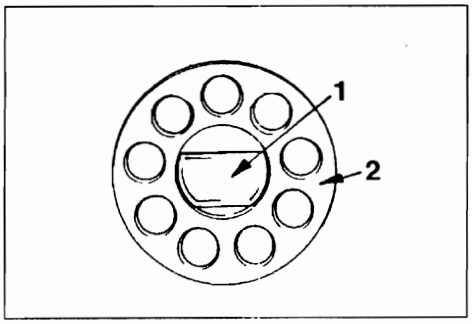
71 Kontrolle!
Lagerbahnen (1)

Check!
Bearing surfaces (1)



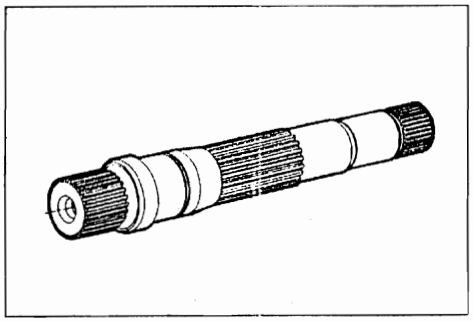
72 Kontrolle!
Gleitfläche riefenfrei.

Check!
Sliding surface free from scoring.



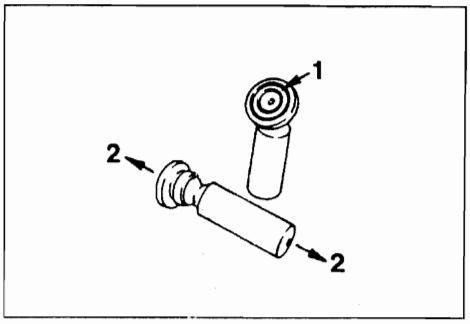
73 Kontrolle!
Rückzugeinrichtung riefenfrei.

Check!
Check that return device is free of scoring.



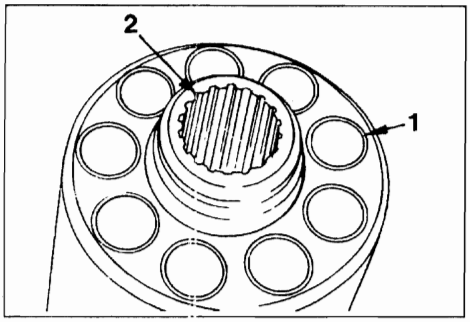
74 Kontrolle!
1. Verzahnung "ausgeschlagen", Passungsrost.
2. Laufflächen.
3. Lauffläche - Wellendichtring.

Check!
1. Splines for damage or fretting.
2. Running surfaces.
3. Groove cut by shaft seal.



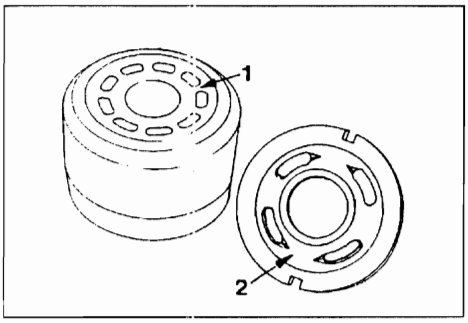
75 Kontrolle!
Lauffläche (1) keine Kratzer, keine Metalleinlagerungen, kein Axialspiel (2), (Kolben nur satzweise tauschen).

Check!
Check that there are no scratches or metal deposits on sliding surface (1), and there is no axial play (2), (otherwise: pistons must be replaced in sets).



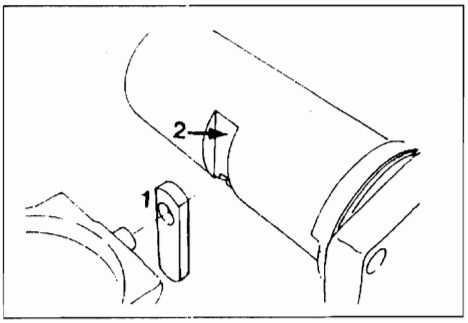
76 Kontrolle!
Zylinderbohrungen (1), Verzahnungen (2).

Check!
Cylinder bores (1), splines (2).



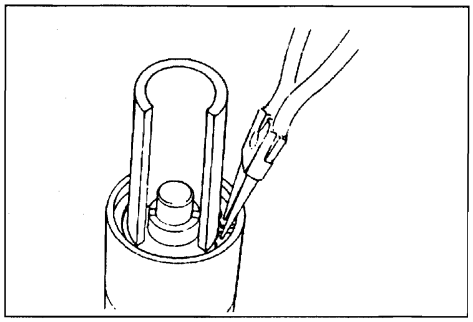
77 Kontrolle!
Zylindergleitfläche (1) riefenfrei.
Steuerplatte (2) nicht riefig.

Check!
Cylinder surface (1) free of scoring.
Control plate (2) without scoring.



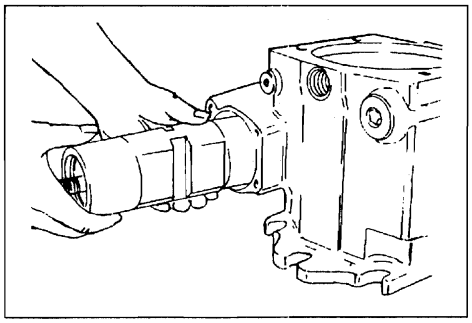
78 Kontrolle!
Stellkolben - Schwenkwiegenverbindung
Gleitstein (1), Nut im Stellkolben (2), Stellkolben.

Check!
Positioning piston - cradle linkage
Gliding stone (1), groove at the positioning piston (2).
Positioning piston.



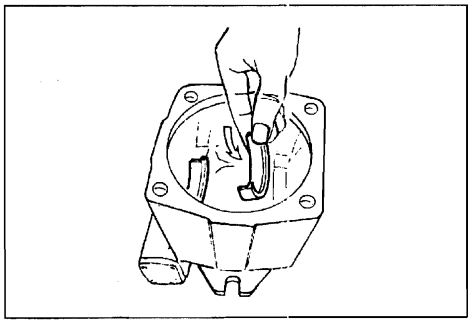
79 Stellkolben montieren.
Hinweis:
Auf korrekten Sitz der geteilten Ringe "achten".

Assemble positioning piston.
Instruction:
Observe correct fit of the divided rings.



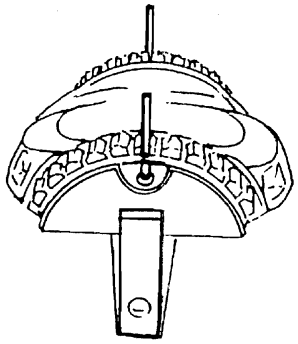
80 Stellkolben ins Gehäuse einsetzen.
Hinweis:
Stellkolben vor Einbau einölen.

Insert positioning piston into the housing.
Instruction:
Oil positioning piston before assembly.



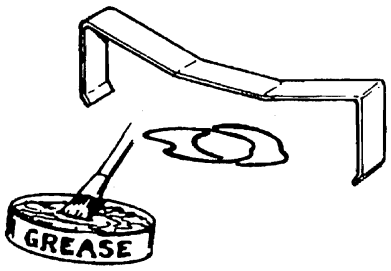
81 Lagerschalenpaar einsetzen.

Insert bearing cup set.

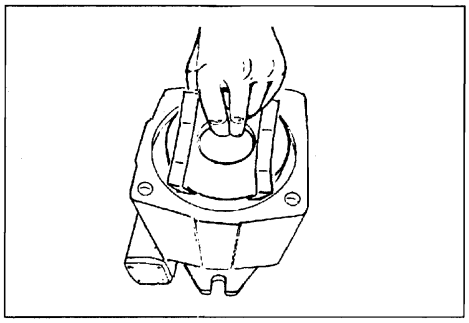


Lager, Draht, Gleitstein und Gelenkstift
montieren.
Montagehilfe: z.B. - Klammer / Gummiringe / Fett

Assemble bearing, wire, gliding stone
and articulating pin.
Assistance: Devices e.g. - Clamp / rubber rings / grease



82

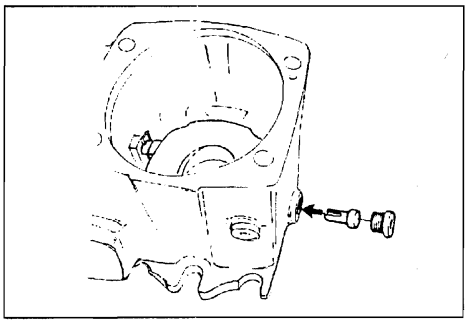


83 Schwenkwiege komplett ins Gehäuse einsetzen.
Auf korrekten Sitz der Schwenklager im Gehäuse "achten".

⚠ Montagehilfe ausbauen.

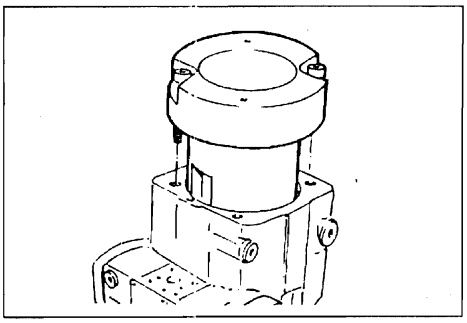
Insert completely swivel cradle into the housing.
Pay attention for correct seat of the swivel cradle in the housing.

⚠ Remove auxiliary device.



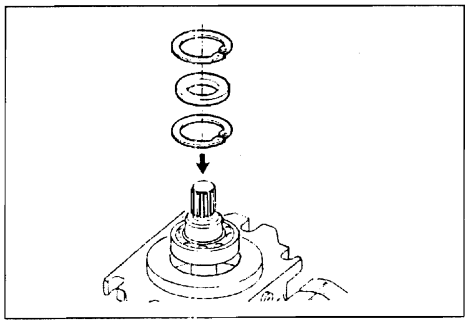
84 Gelenkstifte montieren.

Assemble articulating pins.



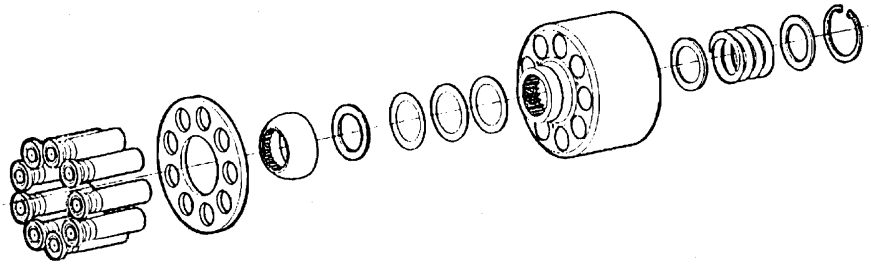
85 Vorrichtung zum Fixieren der Schwenkwiege montieren.

Assemble device for fixation of the swivel cradle.

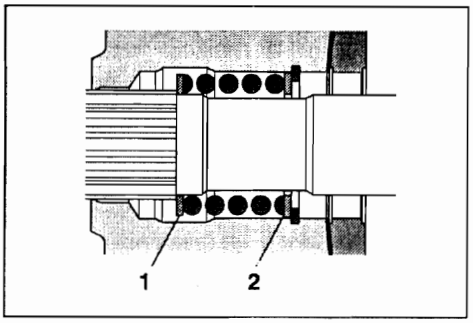


86 Neue Montageposition!
Triebwelle mit Lager und Wellendichtring einbauen.

Assemble drive shaft with bearings and radial seal rings.

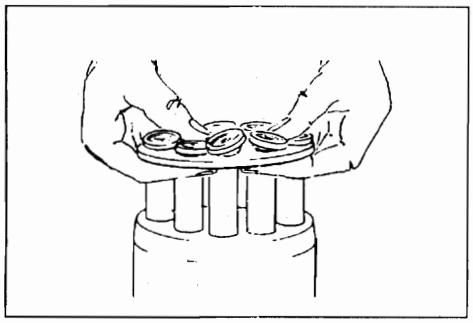


87



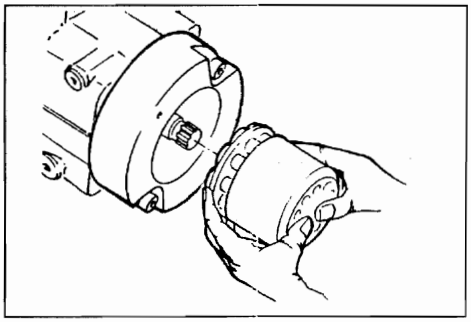
88 Scheibe 1, 2

Disc 1, 2



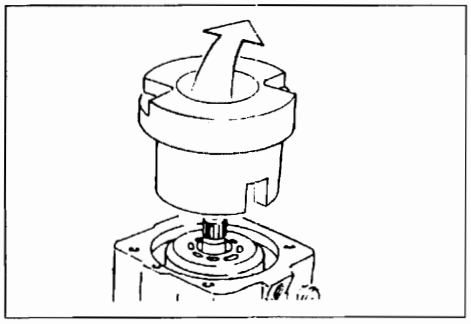
89 Kolben mit Rückzugeinrichtung montieren.
Hinweis:
Kolben, Gleitschuhe einölen.

Assemble piston with retaining plate.
Note:
Oil piston and piston pad.



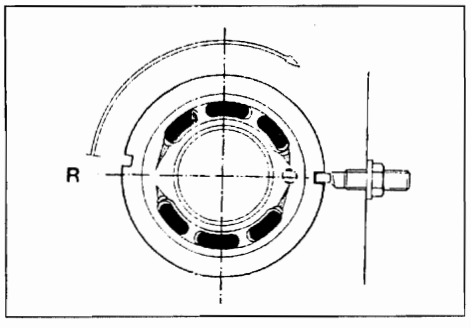
90 Zylinder komplett einbauen.

Assemble cylinder completely.



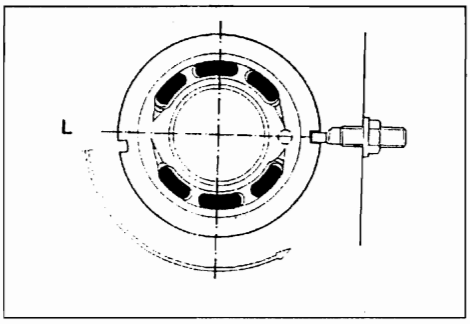
91 Vorrichtung ausbauen.

Remove assembly device.



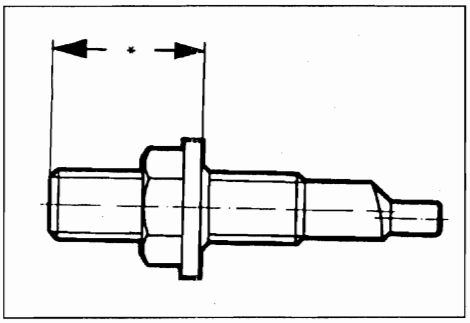
92 Steuerplatte Rechtslauf - in Drehrichtung verdreht.
Achtung!
Geräuschkerben sind drehrichtungsbezogen eingeschliffen.

Control plate clockwise rotation - indexed in the direction of rotation.
Note!
Noise grooves are machined - in based on direction of rotation.



93 Steuerplatte Linkslauf - in Drehrichtung verdreht.
Achtung!
Geräuschkerben sind drehrichtungsbezogen eingeschliffen.

Control plate counter clockwise rotation - indexed in the direction of rotation.
Note!
Noise grooves are machined - in based on direction of rotation.

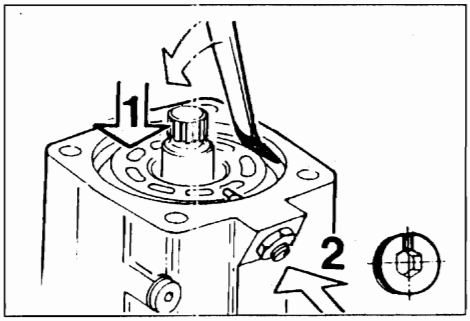


94 Grundeinstellung - Verdrillschraube

A4VG...71 * = 28 ± 0,75 mm	A4VG...90 * = 29 ± 0,75 mm
A4VG...125 * = 20 ± 0,75 mm	A4VG...180 * = 22 ± 0,75 mm.

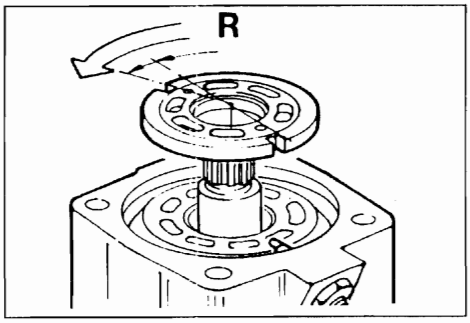
Basic setting - indexing screw

A4VG...71 * = 28 ± 0,75 mm	A4VG...90 * = 29 ± 0,75 mm
A4VG...125 * = 20 ± 0,75 mm	A4VG...180 * = 22 ± 0,75 mm.



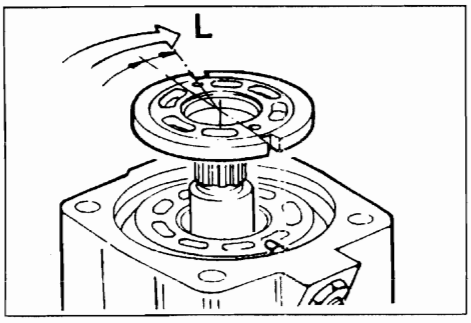
95 Steuerplatte einsetzen - Rechtslauf.

Insert the control plate - clockwise rotation.



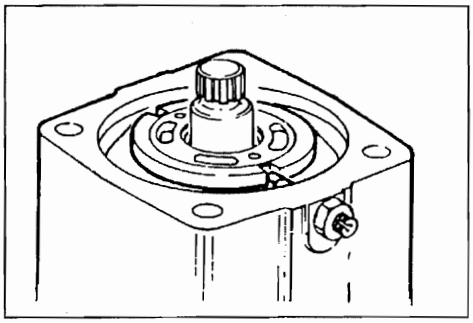
96 Zylinder nach unten drücken (1).
Verdrillschraube einbauen (2).
Kerbe in Montageposition.

Press the cylinder to the bottom (1).
Screw in the indexing screw (2).
Groove in mounting position.



97 Steuerplatte einsetzen - Linkslauf.

Insert the control plate - Counter- clockwise rotation.



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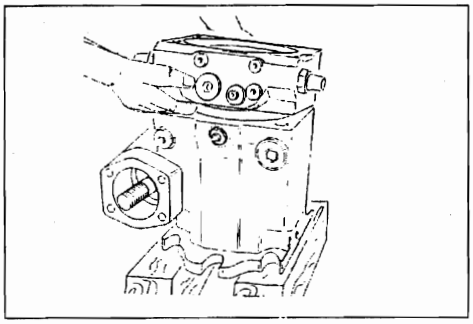
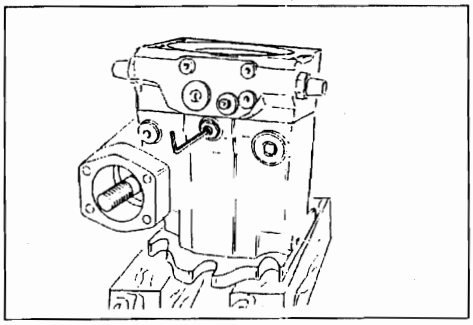


99

Anschlußplatte aufbauen.
Achtung! Federvorspannung!
Mit zwei Befestigungsschrauben überkreuz Anschlußplatte in Gehäuseführung einsetzen - Fertigmontage!

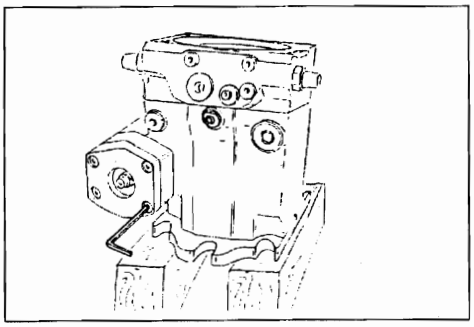
Assemble connection plate.
Attention! Spring preloaded!
Insert control plate into housing, guidance with two locking screws crossing over -Finish assembly!



100

Verdrillschraube - Nach Markierung ausrichten.

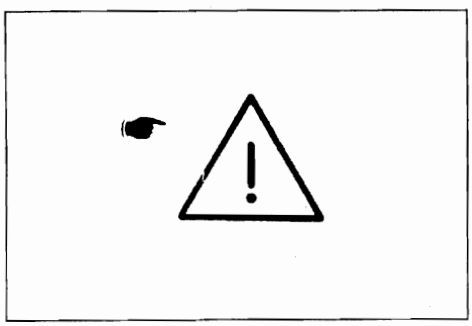
Locking screw - Observe adjusting measure.



101

1. Deckel montieren.
2. Nullage nach Maß einstellen.

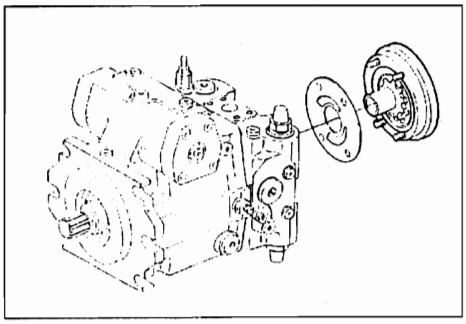
1. Assemble cover
2. Adjust zero position according to measure.



102

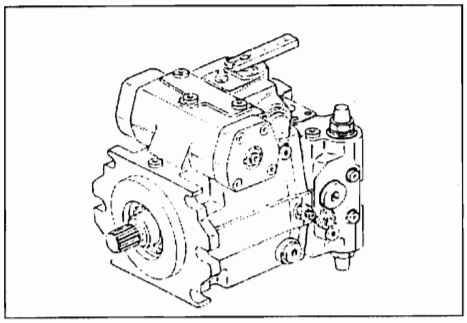
Achtung!
Korrekte mechanische Nullageneinstellung muß nach Einbau im Gerät bzw. Prüfstand erfolgen.

Attention!
Adjustments of the correct zero position to be carried out after installation into the machine or on the bench test.



103 Hilfspumpe montieren.
Hinweis: Drehrichtung beachten.

Assemble auxiliary pump.
Note: Take care of direction of rotation.



104 Ansteuergerät montieren.

Assemble control device.

Tightening torques for shaft bolts (Metric ISO Standard Thread)

The values for tightening torques shown in the table are valid only for shaft bolts with metric ISO- standard threads and head support surface dimensions in accordance with DIN 912, DIN 931 and DIN 933. These values are also valid only for light or unoiled, untreated surface as well as for use only with torque-indicating wrenches and force limiting tools.

Thread size	Strength Classes 8.8	10.9	12.9
	Tightening Torque (lb.ft)		
M 3	0,8	1,2	1,4
M 4	2,1	3,0	3,6
M 5	4,4	6,3	7,4
M 6	7,4	10,3	12,5
M 8	18,4	25,8	30,2
M10	36,1	50,9	61,2
M12	63,4	88,4	106,9
M14	99,5	140,0	169,5
M16	154,8	217,4	261,6
M18	213,7	298,5	357,4
M 20	302,2	427,5	508,5
M 22	405,4	574,9	685,4
M 24	523,5	737,0	884,4
M 27	773,9	1105,5	1326,6
M 30	1068,7	1474,0	1768,8

Tightening torques for cross-slotted lens head screws DIN 7985 (Metric ISO- Standard Thread)

The values for tightening torques shown in the table are valid only for cross-slotted lens head screws DIN 7985 of the strength class 8.8 and with metric ISO-standard thread.

Thread size	Strength classes 8.8	10.9	12.9
	Tightening torques (lb.ft)		
M 3	0,8		
M 4	2,1		
M 5	4,4		
M 6	7,4		
M 8	18,4		
M10	36,1		

Tightening torques for locking screws VSTI (Metric ISO fine thread)

Thread size	Designation		Tightening torques (lb.ft)
M 8 x 1	VSTI 8 x 1	-ED/SA	= 4
M 10 x 1	VSTI 10 x1	-ED	= 7
M 12 x 1,5	VSTI 12 x 1,5	-ED	= 15
M 14 x 1,5	VSTI 14 x 1,5	-ED	= 22
M 16 x 1,5	VSTI 16 x 1,5	-ED/SA	= 22
M 18 x 1,5	VSTI 18 x 1,5	-ED/SA	= 29
M 20 x 1,5	VSTI 20 x 1,5	-ED/SA	= 37
M 22 x 1,5	VSTI 22 x 1,5	-ED	= 44
M 26 x 1,5	VSTI 16 x 1,5	-ED/SA	= 51
M 27 x 2	VSTI 27 x 2	-ED	= 66
M 30 x 1 ,5	VSTI 30 x 1,5	-ED/SA	= 74
M 33 x 2	VSTI 33 x 2	-ED/SA	= 88
M 42 x 2	VSTI 42 x 2	-ED/SA	= 147
M 48 x 2	VSTI 48 x 2	-ED	= 220

Tightening torques for seal-lock nuts (Metric ISO-Standard Thread)

The values for tightening torques shown in the table are valid only for seal-lock nuts of the strength class 8.8 and with metric ISO-standard thread.

Thread size	Strength classes 8.8	10.9	12.9
	Tightening torque (lb.ft)		
M 6	7,4		
M 8	16,2		
M 10	29,5		
M 12	50,9		
M 14	81,1		
M 16	125,3		

General advice

- Make yourself familiar with the equipment of the machine.
- Only operate the machine if your are completely familiar with the operating and control elements as well as the functioning of the machine.
- Use your safety equipment like helmet, safety shoes and hearing protection.
- Make yourself familiar with your working field.
- Only operate the machine for its intended purpose.

Please observe the guidelines of the Professional Association and the machine manufacturer.

Before starting

- Observe the operating instructions before starting.
- Check the machine for obvious faults.
- Do not operate the machine with defective instruments, warning lights or control elements.
- All safety devices must be in a secure position.
- Do not carry with you movable objects or secure them to the machine.
- Keep oily and inflammable material away from the machine.
- Before entering thc driver's cabin, check if persons or obstacles are beside or beneath the machine.
- Be careful when entering the driver's cabin, use stairs and handles.
- Adjust your seat before starting.

Start

- When starting all operating levers must be in "neutral position".
- Only start the machine from the driver's seat
- Check the indicating instruments after start to assure that all functions are in order.
- Do not leave the machine unobserved when the motor is running.
- When starting with battery connection cables connect plus with plus and minus with minus. Always connect negative (-) cable last and disconnect negative cable first.

Attention

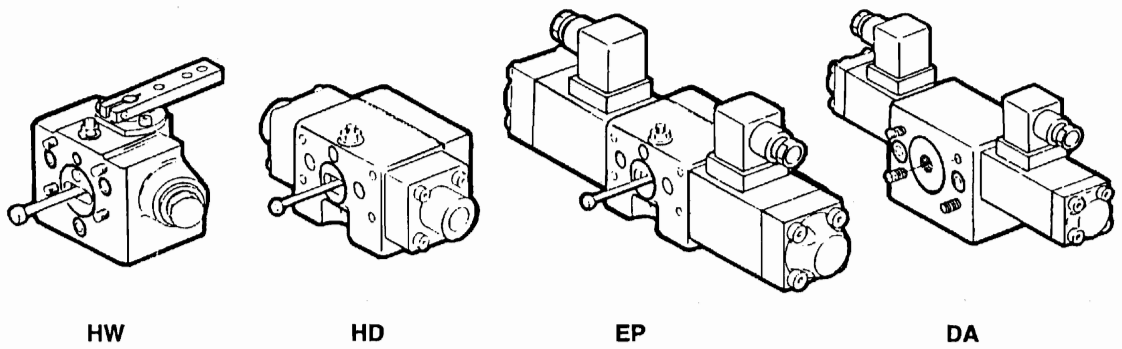
- Exhaust gas is dangerous. Assure sufficient fresh air when starting in closed rooms!

Hydraulic equipment

1. Hydraulic equipment is standing under high pressure.

   ⚠ High pressure fluids (fuel, hydraulic oil) which escape under high pressure can penetrate the skin and cause heavy injuries.
   Therefore immediately consult a doctor as otherwise heavy infections can be caused.
2. When searching leakages use appropriate auxiliary devices because of the danger of accidents.
3. Before working at the hydraulic equipment, lower pressure to zero and lower working arms of the rnachine.
4. When working at the hydraulic equipment, absolutely stop motor and secure machine against rolling away (parking brake, shim)!
5. When connecting hydraulic cylinders and motor pay attention to correct connection of hydraulic flexible hoses.
6. In case of exchanging the ports, the tunctions are vice versa (f. ex. lift-up/lower) - danger of accidents!
7. Check hydraulic flexible hoses regularly and replace them in case of dammage or wear! The new hose pipes must comply with the technical requirements of the machine manufacturer!

⚠ Orderly disposal or recycling of oil, fuel and filters!



HW HD EP DA

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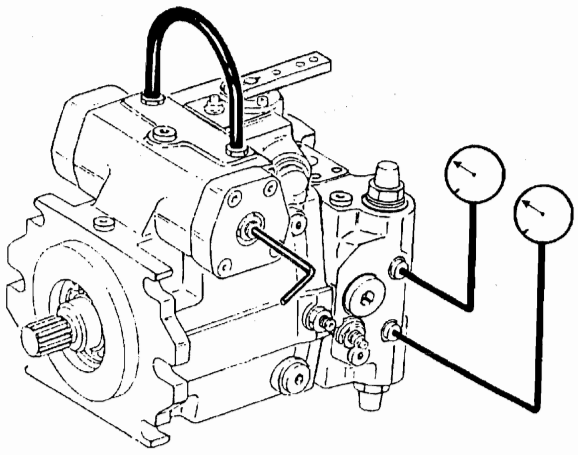

Achtung!
Sicherheitsbestimmungen beachten!
Mit Schlauch NW6 beide Stellkammern verbinden. Vermeidung von Restsignal aus hydraulischer Nullage.
Manometer an M_A und M_B anschließen.
Nullage so einstellen, daß bei blockiertem Antrieb beide Manometer auf gleichem Druckwert stehen.
Hinweis:
Totband der Nullage - vermitteln.

Attention!
Observe safety regulations!
Connect both control chambers with hose NW6. Avoidance of rest signal from hydraulic zero position.
Connect manometer to M_A and M_B. Adjust zero position so that at blocked drive both manometer indicate the same pressure valve.
Note:
Adjust death line of zero position.

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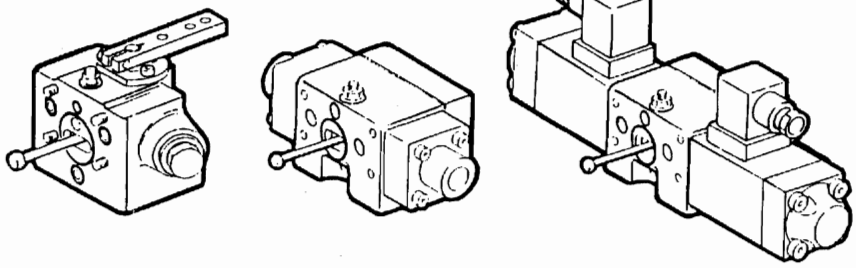

HW HD EP

Achtung!
Sicherheitsbestimmungen beachten!

Attention!
Observe safety regulations!

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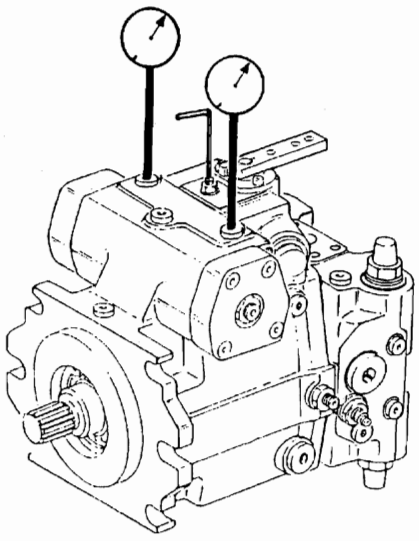

Manometer an X_1 und X_2 anschließen.
Nullage so einstellen, daß bei blockiertem Antrieb beide Manometer auf gleichem Druckwert stehen.
Hinweis:
Excenterjustierung
- nicht über ±90° verdrehen.

Connect manometer to X_1 and X_2.
Adjust zero position so that at blocked drive both manometer indicate the same pressure value.
Note:
Eccentric adjusting
- Do not turn over ±90°.

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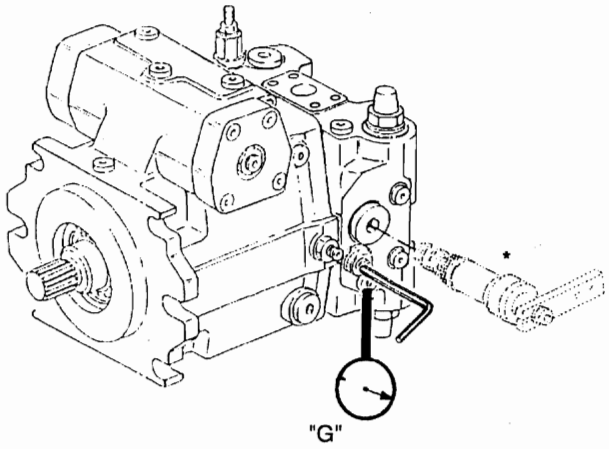


Achtung!
Sicherheitsbestimmungen beachten!

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!

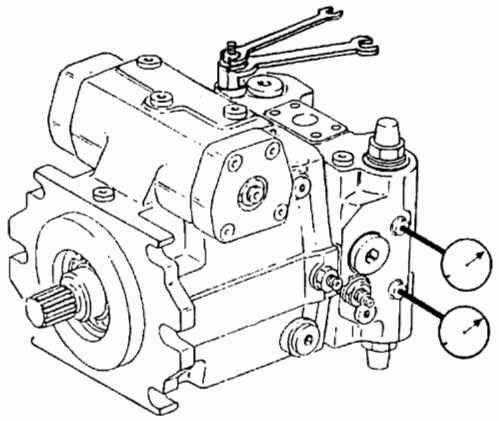
Note:
Readjusting only at operating temperature.

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.

Druckabschneidung
Pressure cut-off



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Achtung!
Sicherheitsbestimmungen beachten!

HD-Ventil ohne Bypass

1 . HD- Ventile sind immer 10% höher eingestellt als die Druckabschneidung.
Bei Veränderung eines Einsteilwertes immer beide kontrollieren.
2. Nachjustierung nur bei Betriebstemperatur

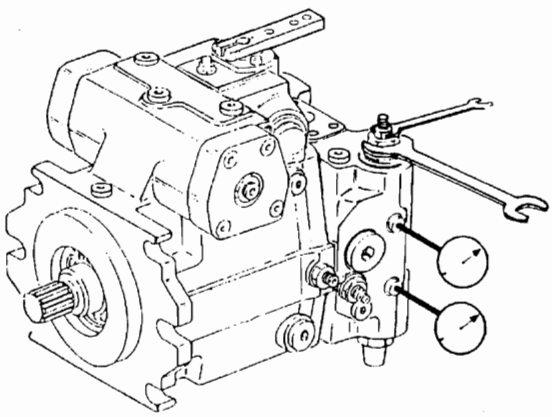
Manometer an M_A und M_B anschließen.
Druckabschneidung: Maß X Einstellschrauben notieren! Einstellschraube auf Block drehen.

HD- Ventile: Mit geringer Pumpenmenge über Ventile fahren. Einstellwert kontrollieren.
(Nur kurzzeitig "Temperatur".)

Drucklos "Einstellwert" verändern - Kontrolle

Druckabschneidung:
Einstellschraube auf Maß (*) zurückdrehen.
Druckwert kontrollieren bzw. nachjustieren.
Achtung! Differenz von 10% HD- Ventile und Druckabschneidung beachten!
Hinweis: Einstelldaten nach Werksauftrag.

HD- Ventile
HP- valves



111

Attention!
Observe safety regulations.

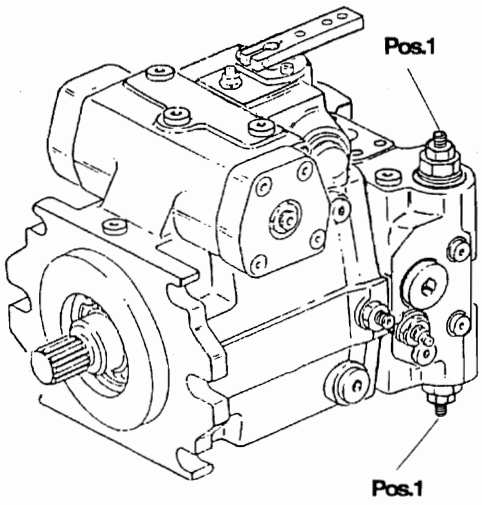
HP valve without bypass-function

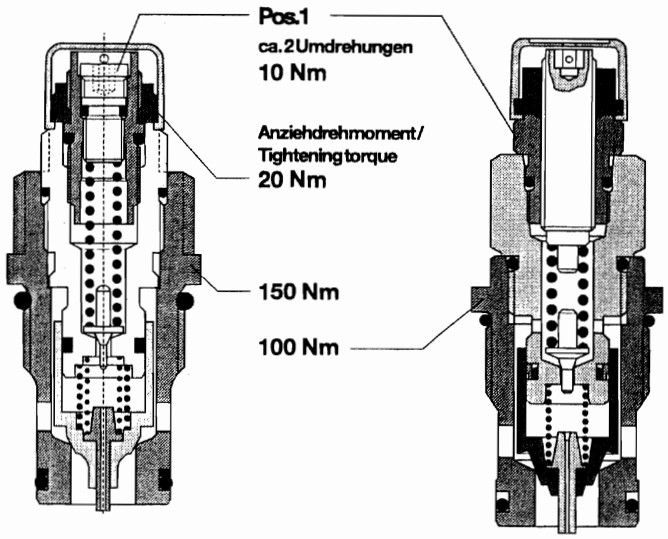
1 . HP valves are always adjusted 10% higher than the pressure cut-off.
If one setting value is changed, always check both values.
2. Readjusting only at operating temperature.

Connect manometer M_A and M_B.
Pressure cut-off: Note measure X setting screw! Turn setting screw on block.
HP valves: Operate valves with small pump flow volume.
Check setting value. ("temperature" only for a short time).
Change "setting value" - check.

Pressure cut-off:
Turn back setting screw to measure (*).
Check pressure value and readjust.
Attention! Observe 10% pressure difference HP valves and pressure cut-off!

A4VG 71 - 90





Fahrzeuge mit rein-hydrostatischem Fahrantrieb bzw. mit hydrostatischem Fahrantrieb und Schaltgetriebe ohne Leerlaufstellung (Freilauf).

Hydrostatischer Antrieb / Bypaß-Schaltung

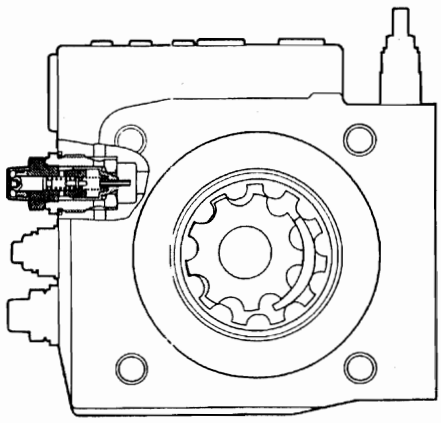
In diesem Fall wird der Fahrantrieb auf freien Umlauf geschaltet. Zu diesem Zweck haben die in der Verstellpumpe integrierten Hochdruckbegrenzungsventile eine sogenannte Bypaß-Funktion. D.h. durch Drehen der entsprechenden Schraube (Pos.1) wird der Ventil-Einsatz so entspannt, daß ein freier Öl-Umlauf möglich ist.

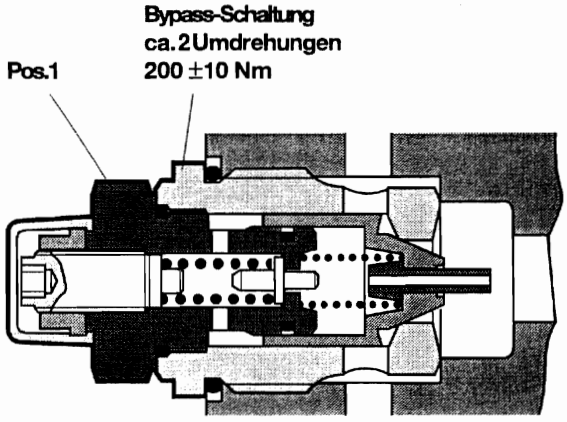
Vehicle with hydrostatic transmission and gear shift without idling setting position (free wheeling).

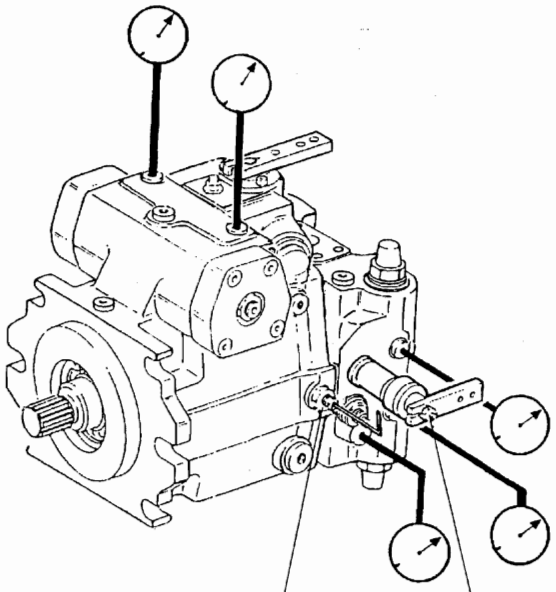
Hydrostatic transmission / Bypass-switching

In this case the travel transmission is switched on to free wheeling. For this purpose the variable displacement pump has incorporated high pressure relief valves with bypass function.
The screw (item 1) is unscrewed to such an extent, that the valve cartridge is released and free oil circulation is possible.

A4VG 125 - 250







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Achtung!
Sicherheitsbestimmungen beachten!

Überprüfung der Einstelldaten
Betriebstemperatur soll während des Überprüfungsvorgangs weitgehend konstant gehalten werden.
Antriebsmotor starten, Leerlaufdrehzahl

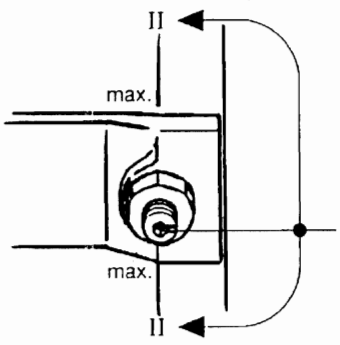
Blockzustand
Fahrtrichtungsschalter **"0"**
Motordrehzahl langsam steigern bis zur max. Motordrehzahl, dabei Meßgeräte beobachten.
Speisedruck:
Leerlaufdrehzahl
Psp = ca. 15-20 bar
max. Motordrehzahl
Psp = ... bar*

Blockzustand
Fahrtrichtungsschalter - vorwärts
(Straßengang und Festgebremst)

Einstelldaten Pumpe A4V/DA überprüfen
Regelbeginn
HD 40 - 50 bar
Motordrehzahl . min.^{1} * Psp . . . . . bar*
HD . . . . . bar
Nachjustierung - Regelbeginnschraube

Regelende
HD . . . . . bar*
Motordrehzahl . . . . . min.^{1} * Psp . . . . . bar*
Nachjustierung - Verdrillschraube

Hinweis:
Excenterjustierung - Drehrichtung beachten



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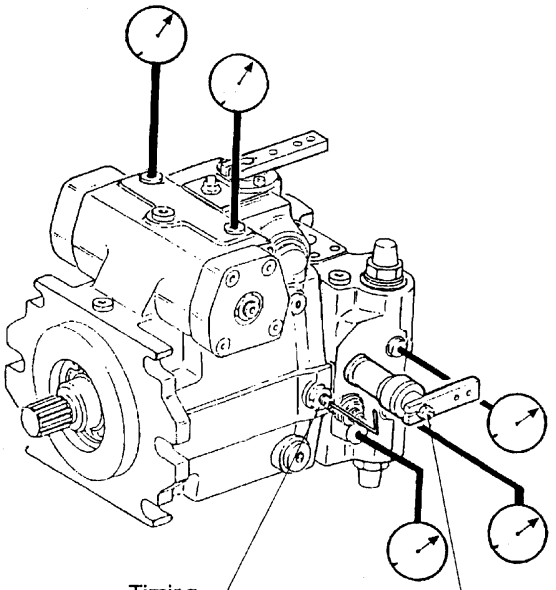
Hinweis: * Einstelldaten nach Werksauftrag!



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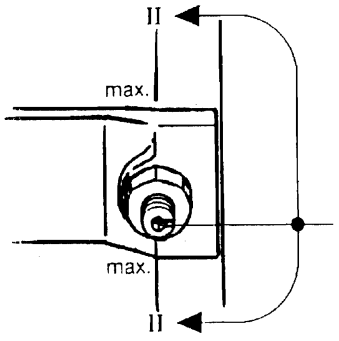

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Attention!
Observe safety regulations!

Check setting data.
Operating temperature should be kept largely constant during the check procedure.
Start prime mover, idle speed.

Block position
Drive direction switch - **"0"**.
Slowly increase motor speed up to the max. motor speed and thereby observe measuring instruments.

Boost pressure:
Idle speed of prime mover
Psp = approx. 15 - 20 bar
max. motor speed
Psp = ... bar*

Block position
Drive direction switch - **forward**
(Road gear and fully applied brake)

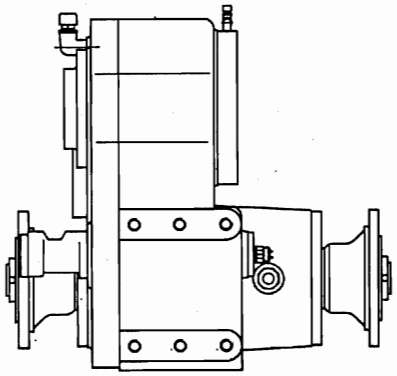
Check setting data pump A4VIDA
Begin of control:
HD 40 - 50 bar
Motor speed . . . . . rpm* Psp . . . . . bar*
HD . . . . . bar*
Readjusting - control start screw

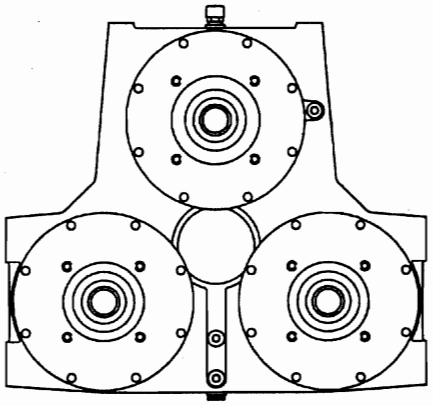
End of control
HD . . . . . bar
Motor speed . . . . . rpm* Psp . . . . . bar*
Readjusting timing adjustment screw

Note:
Eccentric adjusting - observe direction of rotation

* Setting data according to order!

STIEBEL GETRIEBE





Contents

1. Technical Data

STIEBEL D51545 WALDBROEL

Typ 4400.02.09904.97-
Nr. 459005
kW n_1 min^{-1}
T_2 Nm i= 1:1,6289
Bj. 1997 kg
GETRIEBEOEL 8.50L
CLP220 DIN51517

2. Foreword

These operating instructions contain important advice on the safe, correct and economic operation of the gear and plant.

Following this advice helps to prevent hazards and damage, reduce repair costs and breakdown times and to increase the reliability and service life of the gear.

Important: Always read information marked with this ⚠ symbol. Such information warns of danger. Non-observance can lead to personal injury and damage to property.

3. Prescribed Use

The above-mentioned product is intended for installation in a machine. It may not be commissioned until it has been ascertained that the machine in which the above-mentioned product is to be installed complies with the conditions of the EC guideline on machinery.

The product may only be used for the technically designed purpose agreed. The product may not be operated with outputs, torques or external loads which exceed the structural design (see technical data and catalogue).

Installation and commissioning may only be carried out by properly qualified personnel.

Any applicable national, local and plant-specific conditions and requirements concerning the prevention of accidents must be observed.

Qualified personnel are those persons who, on the basis of their training, experience and instruction, along with their knowledge of relevant standards, conditions, regulations for the prevention of accidents and operating conditions, have been authorized by the person responsible for the safety of the plant to carry out the necessary activities and in so doing are able to detect and prevent possible hazards.

4. Transport and Storage

Transport

⚠ For risk-free handling, the hoisting lugs and pegs or threaded bore-holes provided must be used. Hoisting lugs and similar aids attached to the gears are designed only for the weight of the gear and may not be used for raising extension components such as motors, drum shafts or similar. Only use suitable and technically faultless lifting equipment and load suspension devices (e.g. ropes, eye bolts etc.) with sufficient load-bearing capacity. See indication of weight in the technical data or on the type plate. The indications of weight must be regarded as approximate as weights can vary slightly, e.g. by different oil levels.
Do not remain or work under suspended loads.

Storage

Storage from delivery to commissioning should be in dry, dust-free and vibration-free. Enquiries should be addressed to the manufacturer in the case of differing storage conditions.

Protection against Corrosion

The standard preservation of the shafts, hollow shafts etc. is effective for one year maximum under the above-mentioned conditions. It is not suitable for outside storage.

5. Set-up and putting into operation

Assembly and commissioning may only be carried out by suitably qualified personnel.

⚠ Before commissioning and the test run it must be ensured that the moving and rotating components (e.g. shafts, couplings etc.) do not represent a hazard. This means that the necessary contact protection must be provided or measures taken to ensure a safe distance from the machine is maintained. During the test run without attached machinery, the keys in the shaft ends are to be secured against being spun out.

⚠ Before work on the gear unit or attached equipment is performed, the power supply must be disconnected. Action must be taken to prevent the power being inadvertently switched on again. Where necessary, mechanical devices (special equipment, supports etc.) must ensure that the machine cannot move or rotate.

⚠ It must be ensured before commissioning that the specified amount of lubricant has been poured into the machine. For the oil quantity and oil grade, see nameplate or operating manual. Check the oil level by undoing the overflow screw or by using the oil dipstick or oil sight glass if these devices are fitted.

⚠ Never operate without a breather filter otherwise the excess pressure resulting from the gear unit heating up will cause an oil leak.

⚠ After prolonged operation the lubricant and gear unit surface may reach temperatures which could cause skin burns.

⚠ Oil mist is produced in the gear units. It is therefore dangerous to work with a naked flame near the gear unit openings. There is a risk of fire or explosion.

⚠ High-speed machines into which these gear units are installed may generate loud noises which can damage your hearing if they persist. In this case the operating staff should be provided with ear protection. In order to reduce the noise, all technical possibilities should be used to observe the statutory regulations.

⚠ It must be ensured that the gear units are not continuously subjected to severe vibrations, e.g. from low-speed diesel engines.

Technical information

Housings: Torsionally rigid housings made of aluminium or grey cast iron

Gearing: casehardened, tooth flanks ground

Lubrication: Splash lubrication, pressurised circulation lubrication

Assembly of the gear units

Before assembly, check the surfaces, edges of the shaft end, keys and external shaft splines for damage, and remedy any damage discovered.

In the case of key and splined shaft connections apply lubricating paste (e.g. Optimol White T) to the shaft end. The paste facilitates assembly of the units and prevents corrosion which would make subsequent dismantling much more difficult. It must be ensured that the shaft seals are not dirty, damaged or coated with paint. When the units are being painted, cover the seals and running surfaces of the shafts or protect with grease. This is the only way to prevent damage and thus oil losses.

Oil baffle plates which may be installed on the pump mounting flanges must not be damaged or dismantled.

Assembly of input and output elements

Couplings, belt pulleys or similar elements should be mounted with the appropriate jigs (threaded spindle which is screwed into the centring bore of the shaft). Severe hammering must be avoided as antifriction bearings, retaining rings and other internals would be damaged!

Hydraulic pumps must be connected with the mounting flanges so that they are oil-tight and must not exert any axial pressure on the gear unit shafts! The coupling elements and the splines must be adequately lubricated before assembly; we recommend Optimol White T or Staburags NBU 30 PTM. Exception: Splined hollow shafts which have their own oil filling from the gear unit lubrication system; the relevant mounting flange is then provided with screw plugs for the oil level and oil drain as well as a breather. In these cases the oil level as well as the oil quantity required to fill the gear unit flange is entered in the assembly drawing.

Lubricants

The gear units are as a rule supplied without oil; they are then provided with a label "Caution! Not filled with oil!". Normally gear oil CLP220 to DIN 51517 (mineral oil) or PGLP 220 to DIN 51502 (synthetic oil) is used. These grades are suitable for normal operating conditions at an ambient temperature of -5° to +35°C or -25° to +80°C with synthetic oil. Consult the manufacturer in the event of special operating and application conditions.

Commissioning

Before commissioning, the gear units and, if necessary, the mounting flanges must be properly filled with oil; for the oil grade and oil level, refer to the technical data or the nameplate and assembly drawing. During commissioning the plant must not be operated immediately at full capacity. Only after 3-4 hours is the load to be slowly increased so that the plant can then be run under full load. Oil and gear unit temperatures up to 80°C, or up to 100°C with synthetic oil, are not unusual and do not have any negative impact on the functioning of the gear units. The oil level is to be checked after about 15 min. running time as oil collects in the mounting flanges or is dammed there to lubricate the splined hollow shafts. If necessary, replenish oil up to the specified oil level mark. We recommend you to repeat this procedure until the oil level no longer changes. This is especially important if oil pumps, oil coolers and the like also have to be filled with oil.

Installation positions

Stiebel power take-off, pump power take-off and variable-speed gear units can be operated in several installation positions depending on the type. The manufacturer must always be consulted in the event of installation positions which deviate from the position ordered or shown in the assembly drawing.

Power take-off variable-speed gear units

⚠ The gear units must not be switched under load; this operation may only be performed at standstill. Any contravention of this will result in damage to the geared coupling and no claims under the guarantee will be accepted.

- Pneumatic gear-shifting: The pneumatics must be designed so that the side subjected to pressure is continuously under a pressure of 6 bar. A mist oiler must be installed in the pneumatic system to ensure proper lubrication of the operating piston and to protect it against any corrosion.

- Mechanical gear-shifting: A spring element (gear-shifting aid) must be installed in the shift linkage so that, if the geared coupling in the gear unit is in an unfavourable position (tooth on tooth), the shift linkage can be locked. When the motor starts up, the coupling then engages. The tensile and compressive forces of the shift linkage in the engaged condition must not exceed 500 N.

6. Conversions and modifications

Do not make any changes, provide attachments or perform conversion work on the gear unit or components which could reduce safety without the manufacturer's permission! In particular any protective facilities provided (e.g. covers, overload protection) must not be removed or changed.

7. Notes on maintenance

Change oil regularly in accordance with the operating manual. Refer to lubrication chart, pump power take-off gear units. If the mounting flanges have their own oil filling, it is designed as long-life lubrication and no oil change is necessary. For the oil quantity and oil grade, see nameplate or operating manual; the oil quantities are to be regarded as approximations. The oil level indicated in the assembly drawing is always decisive. Check the oil level by undoing the overflow screw or by using the oil dipstick provided these devices are part of the fittings. At each oil change check all the seals and screw fittings for any leaks and, if necessary, retighten the screws. If possible, a visual leak check should be made every day. A rise in the oil level in the gear unit or mounting flanges with their own oil filling is a sign of defective seals in the hydraulic units.

Premature gear unit failure may occur as a result of running dry caused by oil loss, the ingress of water into the gear unit housing or the presence of foreign matter in the lubricant.

⚠ When changing, replenishing or draining the oil or when taking oil samples, it must be guaranteed that no oil can escape onto the ground, penetrate the ground or surface water or enter the sewage system.

⚠ Prolonged contact with lubricants can cause injury to your skin. Use a protective skin ointment.

⚠ After prolonged operation the lubricant and surface of the gear unit may reach temperatures which can cause skin burns. When working on hot components, wear protective clothing, e.g. protective gloves.

The lubricant is best drained while still warm from operation so that a complete change of the old lubricant is ensured. If the oil is highly contaminated, the gear unit should be rinsed with the same lubricant.

⚠ Under no circumstances may different types of lubricant, such as mineral oil, synthetic oil or grease, be mixed with each other.

⚠ The applicable national, local and plant-specific regulations and requirements concerning accident prevention and environmental protection are to be observed.

⚠ To prevent faults, it is necessary to carry out the regular maintenance and inspection work prescribed. Any changes compared with normal operation (higher power input, temperatures or vibrations, unusual noises or smells, response of monitoring devices etc.) are an indication that the unit is not functioning properly. To avoid faults which could result in injury to people or damage to property, the maintenance staff responsible must be notified immediately. In case of doubt switch off the relevant item of equipment and ensure it cannot be switched on again.

⚠ To prevent damage from overheating, dirt and dust deposits should be regularly removed from the gear unit surface.

8. Spare parts and repairs

Spare parts must satisfy the technical requirements specified by the manufacturer. This is always guaranteed with original spare parts. When ordering spare parts, the type number and serial number (to be found on the nameplate or in the technical data) in addition to the spare part number must be indicated. Spare parts drawings and spare parts lists can be requested from the manufacturer.

Repairs and overhauls are carried out by the manufacturer at short notice. When carrying out your own repairs, make sure that the expendables and auxiliary materials and parts which have been replaced are disposed of safely and without polluting the environment.

⚠ The applicable national, local and plant-specific regulations and requirements concerning accident prevention and environmental protection are to be observed. The manufacturer does not assume any liability for damage caused by improper repair work or the use of non-original spare parts.

⚠ Prolonged contact with lubricants can cause skin damage. Use a protective skin ointment. After prolonged operation the lubricant and the surface of the gear unit may reach temperatures which can cause skin burns. Before starting repairs, let the gear unit cool down.

Schmierstoffe — Lubricants — Lubrifiants

DEA	Shell	Mobil / KLÜBER LUBRICATION	Esso	Deutsche	Castrol	Calypsol	BP	ARAL	Umgebungstemp. in °C Ambient temperature in °C Température ambiante en °C	Kinem. Viskosität in cSt bei 40° C Kinem. viscosity in cSt at 40° C Viscosité kiném. en cSt à 40° C	Schmierstoffart siehe Typenschild Lubricant type see name plate Type de graisse voir plaque de type	Schmierstoffe für Lubricants for Graisses pour
											mineralisch mineral minérale	STIEBEL-Getriebe STIEBEL-Gears STIEBEL-Réducteurs
											Öl Oil CLP DIN 51517 Huile	
Falcon CLP 460	Shell Omala Öl 460	Mobilgear 634	Klüberoil GEM 1-460	Spartan EP 460	NL-Gear Compound 460	Alpha SP 460	UK-ECUBSOL Öl 8140	Energol GR-XP 460	Degol BG 460	+ 5··· + 45	460	
Falcon CLP 320	Shell Omala Öl 320	Mobilgear 632	Klüberoil GEM 1-320	Spartan EP 320	NL-Gear Compound 320	Alpha SP 320	UK-ECUBSOL Öl 8060	Energol GR-XP 320	Degol BG 320	0··· + 40	320	
Falcon CLP 220	Shell Omala Öl 220	Mobilgear 630	Klüberoil GEM 1-220	Spartan EP 220	NL-Gear Compound 220	Alpha SP 220	UK-ECUBSOL Öl 8050	Energol GR-XP 220	Degol BG 220	− 5··· + 35	220 (standard)	
Falcon CLP 150	Shell Omala Öl 100	Mobilgear 627	Klüberoil GEM 1-100	Spartan EP 100	NL-Gear Compound 100	Alpha SP 100	UK-ECUBSOL Öl 8030	Energol GR-XP 100	Degol BG 100	− 15··· + 25	100	
Astron Z HLP 15	Shell Tellus Öl T 15	Mobil DTE 11	ISOFLEX MT 30 ROT	Univis N 15	Mechanism LPS 15	Alphasyn T 15	—	Bartran HV 15	—	− 50··· 10	15	
											Fließfett Fluid grease Graisse fluide	
Glissando 283 EP 00	Shell Spezial Getriebefett H	Gargoyle Fett 1200 W	MICROLUBE GB 00	Fibrax EP 370	Dura-Lith. EP Grease 00	CLS-Grease	Calypsol D 6024	Energrease HT 00–EP	Aralub FDP 00	− 20··· + 50	—	
Orona DR 00	Shell Tivela Compound A			Fibrax 370			Calypsol D 8024	Energrease FG 00–EP				
											synthetisch synthetic synthétique	
											Öl Oil PGLP DIN 51502 Huile	
Polydea CLP 460	Shell Tivela Oil SD	Mobil Glygoyle 80	Klübersynth GH 6-460	—	—	Alphasyn T 460	UK-ECUSYNTH Öl PG 460	Energol SG-XP 460	Degol GS 460	− 15··· + 100	460	
Polydea CLP 220	Shell Tivela Oil WB	Mobil Glygoyle 30	Klübersynth GH 6-220	Umlauföl S 220 Umlauföl EZL 502	—	Alphasyn T 220	UK-ECUSYNTH Öl PG 220	Energol SG-XP 220	Degol GS 220	− 25··· + 80	220	
—	Shell Tivela Oil WA	Mobil Glygoyle 11	Klübersynth GH 6-100	—	—	—	—	—	—	− 35··· + 60	100	
											Fließfett Fluid grease Graisse fluide	
—	Shell Tivela Compound A	—	Klübersynth GE 46-1200	Fließfett S 420	—	CLS-Grease	—	Energrease GSF	—	− 35··· + 60	—	
											Fett Grease Graisse	Wälzlager Roller bearings Paliers à roulement
Glissando R EP 2	Shell Alvania Fett G 2	Mobilgrease MP	CENTOPLEX 2 EP	Beacon 2	Dura-Lith. EP Grease 2	Spheerol AP 2	Calypsol H 441	Mehrzweckfett L 2	Mehrzweckfett Aralub HL 2	− 30··· + 60	— (standard)	
Glissando 20	Shell Alvania Fett R 2	Mobilux 2	CENTOPLEX 2	Unirex N 2			Mehrzweckfett Calypsol 20	Energrease LS 2				
—	Aeroshell Grease 7	Mobiltemp SHC 100	ISOFLEX TOPAS NCA 52	—		LZV-EP	Calypsol H 729	—	—	− 50··· + 110	—	

Schmierstoffwechselintervalle für

STIEBEL-Standardgetriebe

Erster Ölwechsel nach ca. 500 Betriebsstunden; danach alle 4.000 h. jedoch maximal nach 18 Monaten.

STIEBEL-Standard gears

First oil change after approx. 500 operating hours; further every 4,000 h. or at least after 18 months.

Intervals of lubricant changing for

Termes de changement de lubrifiant pour

STIEBEL-Réducteur standard

Changement premier d'huile après environ 500 heures de service; toutes les 4.000 h. de plus ou au plus tard après 18 mois.

STIEBEL-Pumpenverteilergetriebe, STIEBEL-Getriebe mit besonderer Schmieranweisung

Erster Ölwechsel nach ca. 200 Betriebsstunden; danach alle 2.000 h. jedoch maximal nach 12 Monaten.

STIEBEL-Pump distributor gears, STIEBEL-Gears with special lubrication instruction

First oil change after approx. 200 operating hours; further every 2,000 h. or at least after 12 months.

STIEBEL-Réducteur à sorties multiples pour pompes STIEBEL-Réducteur avec des préseptes spéciaux de graissage

Changement premier d'huile après environ 200 heures de service; toutes les 2.000 h. de plus ou au plus tard après 18 mois.

Wälzlager

Neubefüllung alle 10.000 Betriebsstunden. Füllmenge: 1/3 Lagerinnenraum.

Roller bearing

New filling every 10,000 operating hours. Quantity: 1/3 inner space of roller bearing.

Palier à roulement

Remplissage nouveau après 10.000 heures de service. Quantité: 1/3 de l'intérieur du palier à roulement.

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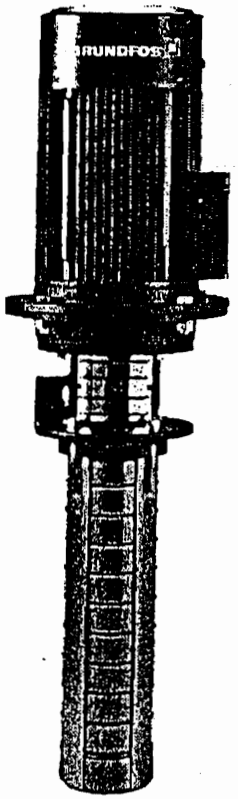
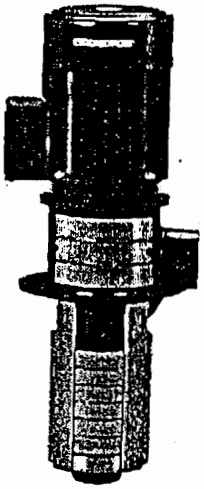




(GB) Installation and Operating Instructions
(D) Montage- und Betriebsanleitung
(F) Notice d'installation et d'entretien
(DK) Monterings- og driftsinstruktion

CRK

CONTENTS

1. Applications

The GRUNDFOS CRK pumps are multistage centrifugal pumps designed for the pumping of cooling and cutting liquids for machine tools, condensate transfer, liquid transfer in industrial washing machines and similar applications.

GB

CRK pumps are designed for the pumping of liquids with a density and viscosity corresponding to those of water. The pumped liquid must not contain abrasive particles or fibres.

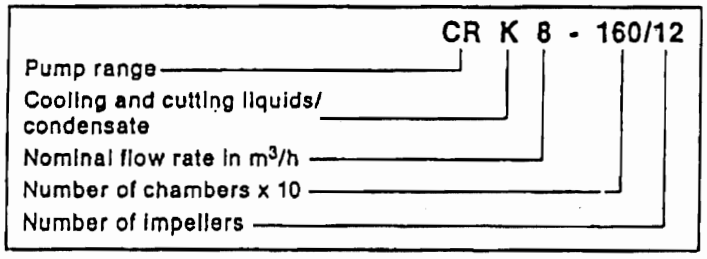
When pumping liquids with a density or viscosity higher than that of water, motors with correspondingly higher outputs must be used, if required.

2. Type Designation

The standard range of CRK pumps encompasses complete impeller in chamber combinations. On request, other lengths, against duty combinations, can be supplied by fitting empty intermediate chambers instead of standard chambers with impellers.

The pump key on the pump nameplate indicates the number of chambers and impellers fitted to the pump.

Example:



3. Operating Conditions

Liquid Temperature:	−15°C to +90°C.
Ambient Temperature:	−30°C to +40°C.
Enclosure Class:	IP 55.
Relative Air Humidity:	Maximum 90%.
Operating Pressure:	Maximum 25 bar.

4. Installation

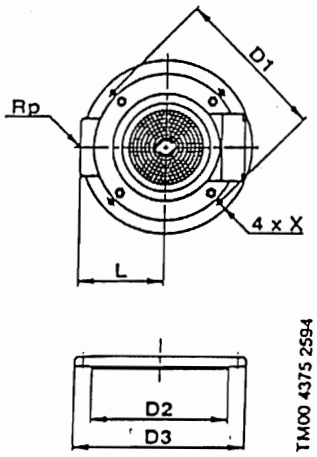
4.1 Pump Location

GB

The pump is designed for tank mounting in a vertical position. The pump is positioned in a hole cut into the cover of the tank (upper side) and is secured to the tank by four set screws through the holes in the mounting flange. It is recommended to fit a sealing gasket between the pump flange and tank.

Fig. 1
Pump Mounting Flange Dimensions

	CRK 2 and 4	CRK 8 and 16
D1	160	225
D2	140	200
D3	180	250
L	100	125
Rp	1¼	2
X	ø7	ø9



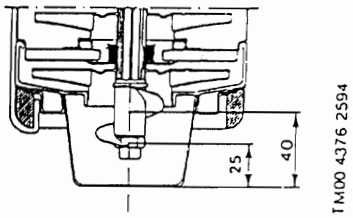
4.2 Suction Conditions

The CRK pumps are designed to provide full performance down to a liquid level of 40 mm (CRK 2/4) or 50 mm (CRK 8/16) above the bottom of the pump strainer.

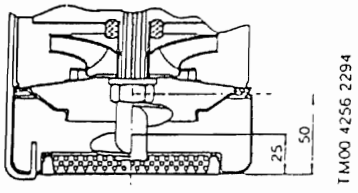
At a liquid level between 25 and 40/50 mm above the bottom of the strainer, the built-in priming screw will protect the pump against dry-running, see fig. 2.

Fig. 2

CRK 2 and CRK 4



CRK 8 and CRK 16



5. Electrical Connections

The electrical connections should be carried out in accordance with local regulations.

The operating voltage and frequency are marked on the pump nameplate. Please make sure that the motor is suitable for the electricity supply on which it will be used.

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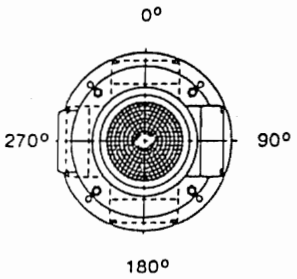
Single-phase GRUNDFOS motors incorporate a thermal switch and require no additional motor protection.

Three-phase motors must be connected to a motor starter.

To ensure easy access to the electrical connections, the terminal box can be turned to the positions shown in fig. 3.

Fig. 3



Remove the coupling guards which are kept in position by spring tension.

To change the position of the terminal box, remove the four screws securing the motor to the motor stool. Turn the motor to the required position, replace and tighten the four screws.

Replace the coupling guards.

Do not start the pump until it has been submerged in the pumped liquid.

The electrical connection should be carried out as shown in the diagram inside the terminal box cover.

In the case of **frequency converter** operation, the motor should not be loaded by more than 90% of the power stated on the motor nameplate, unless otherwise stated by the frequency converter manufacturer.

6. Start-Up

The pump can be started against an open or a closed discharge side.

- If the discharge side is open and the pump body is partly filled with liquid when the pump is started, the air will escape through the discharge pipe.
- If the discharge side is closed and the pump body is partly filled with liquid when the pump is started, the air will be pressed down through the pump body and out into the tank, and the pump will very quickly reach its maximum operating pressure.

Before starting the pump, make sure:

1. that the direction of rotation of the pump is correct.
   When seen from the top, the pump should rotate counter-clockwise.
   (Start the pump for a short period and check the direction of rotation at the motor cooling fan).
2. that all pipe connections are tight.
3. that the pump body is partly filled with liquid (partly submerged).
4. that the strainer is not blocked by impurities.

7. Operation and Maintenance

7.1 Lubrication and Maintenance

Pumps installed in accordance with these instructions require very little maintenance.

The mechanical shaft seal is self-adjusting and has wear-resistant seal rings which are lubricated and cooled by the pumped liquid.

The pump bearings are also lubricated by the pumped liquid. Motor bearings are grease packed and sealed for life. No further lubrication is necessary.

7.2 Filters

Chip trays, filters, etc. should be cleaned at regular intervals to ensure a correct flow of liquid.

7.3 Periodic Checks

At regular intervals, depending on the conditions and time of operation, the following checks should be made:

- Check the quantity of liquid and operating pressure.
- Check that there are no leaks.
- Check that the motor is not overheating.
- Check the tripping of the motor starter.
- Check that all controls are operating satisfactorily.

If the above checks do not reveal any abnormal operating details, no further checks are necessary. Should any faults be found, check the symptoms with section 8. "Fault Finding Chart".

8. Fault Finding Chart

Before removing the terminal box cover and before any removal/dismantling of the pump, make sure that the electricity supply has been switched off.

Fault	Cause
1. Motor does not run when started.	a) Supply failure. b) Fuses blown. c) Motor starter overload has tripped out. d) Main contacts in starter are not making contact or the coil is faulty. e) Control circuit fuses are defective.
2. Motor starter overload trips out immediately when supply is switched on.	a) One fuse is blown. b) Contacts in motor starter overload are faulty. c) Cable connection is loose or faulty. d) Motor winding is defective. e) Pump mechanically blocked.
3. Motor starter overload trips out occasionally.	a) Overload setting too low. b) Periodic supply failure. c) Low voltage at peak times.
4. Motor starter has not tripped out but the pump does not run.	a) Check 1 a), b), d) and e).
5. Pump capacity not constant.	a) Pump strainer partly blocked by impurities. b) Liquid level in tank too low. See 4.2 "Suction Conditions".
6. Pump runs but gives no liquid.	a) Pump strainer blocked by impurities. b) Liquid level in tank too low. See 4.2 "Suction Conditions". c) Pump rotates in the wrong direction.

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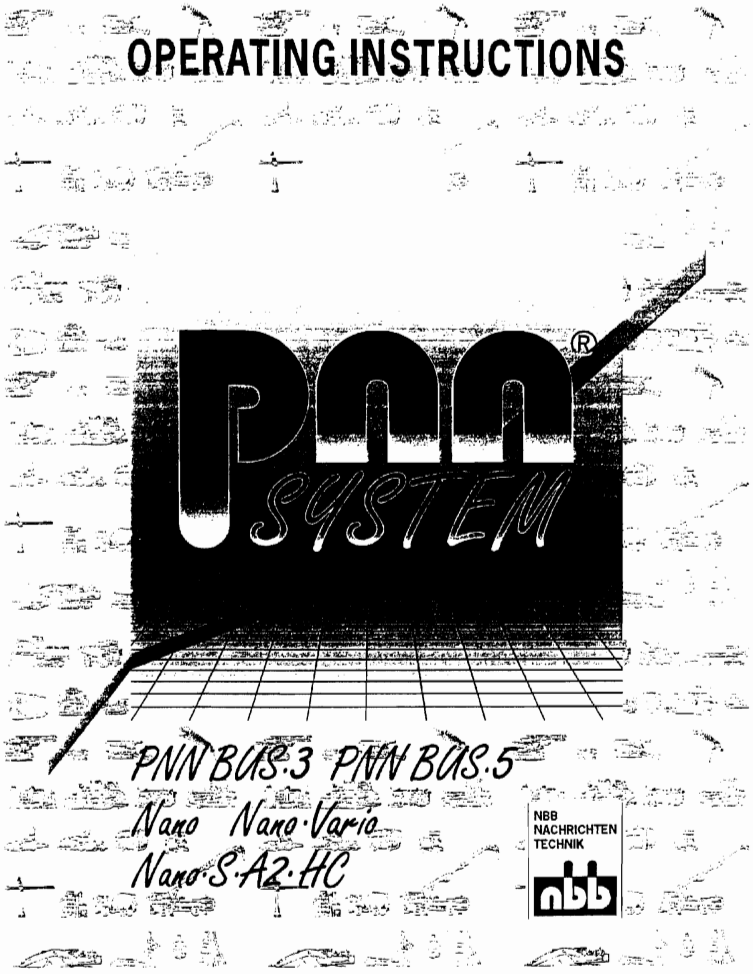


1. STANDARD SPECIFICATION

- Portable transmitter with two replaceable 7,2 volt NiCd batteries, halter and waist straps
- Receiver with NBB adapter plate for fastening purposes (Only PNN-BUS-3)
- Receiver with 4 fastening angles (PNN-BUS-5)
- Multi-pole connecting cable for the receiver, to your specifications
- Automatic battery charger with charging adapter (rapid charging in three hours)

The actual delivery specification is as detailed on the confirmation of order or the delivery note accompanying the goods!

2. SAFETY PRECAUTIONS

Even if you are accustomed to working with radio control systems, read these operating instructions without fail before using this equipment. Only this document contains the latest information relating to your NBB radio control system.

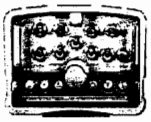
Please refer to the accompanying registration documents for the explanatory notes on obtained an operating permit. Observe all applicable work-safety and accident prevention regulations without fail. Only fully trained, authorized personnel may use the NBB radio control equipment. Components, etc. built into the NBB equipment for safety purposes must be regularly inspected. (See point 6 of this instruction)

If the NBB radio control unit develops a fault, it must be shut down immediately. The transmitter should be switched off with the EMERGENCY-OFF switch. The connecting cable must be disconnected from the crane connecting socket (terminal) on the receiver. The repair of the equipment must not be carried out other than by NBB or an NBB authorized technician.

Failure to observe these recommendations will put both you yourself and others at risk. Under these circumstances, NBB rescinds the guarantee and any other form of liability. This radio control unit is designed exclusively for the control of construction machines and industrial plants. Only under these conditions are the safety systems (EMERGENCY-OFF, zero setting) fully effective. No other form of use is permitted. Any non-observance of this condition will relieve NBB of all liability.

Nano, Nano-S-A2-HC

Nano-Vario



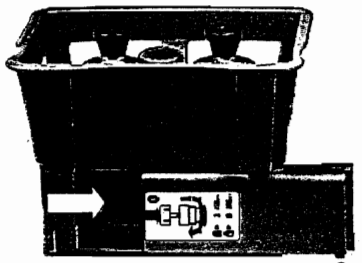
3. TRANSMITTER

To make the unit ready for use, insert the battery into the battery compartment. To remove the battery, depress the pin and push out the battery. The power supply to the transmitter is activated with the EMERGENCY-OFF switch (when depressed, the EMERGENCY-OFF switch can also be secured by removing the key cap). The green LED on the transmitter control panel must flash regularly. Commands can now be input by means of the controls. The operating period with a charged battery is approximately 8 hours with the transmitter in continuous use. When the red "Battery" indicator lamp lights up, the battery is nearing exhaustion.

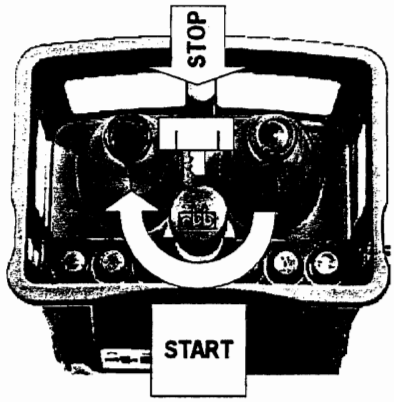
The transmitter can be operated for approximately 15 minutes more in this condition. During this time, bring the crane to a safe position and install a new battery.

Removal of the battery inerrupts the radio link. As a result, the master switch for the crane must be switched on again.

Charge the discharged battery with the charger supplied.



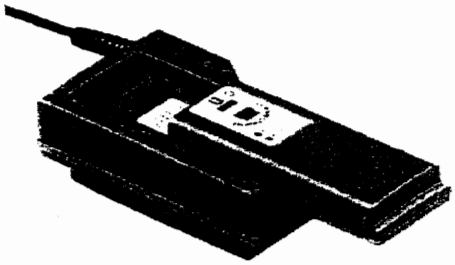
Depress the pin and push out the battery



4. BATTERY CHARGER

The red indicator lamp indicates that the battery charger is ready for use. Place the battery in the charging well; it will now be charged. When the red LED goes out, the charging process is concluded. No harm will come to the battery if it is left in the charger beyond the required charging time.

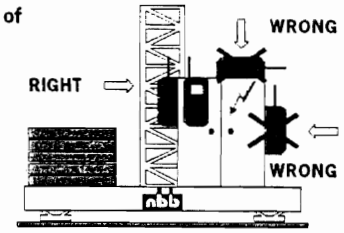
Do not use the charger other than in dry rooms having a min-max temperature range of 0-40°C. A charged battery is a concentrated energy source. Never store a charged battery in a toolbox or similar where it could be short-circuited by metal components (even a key in your trouser pocket can cause a short circuit).



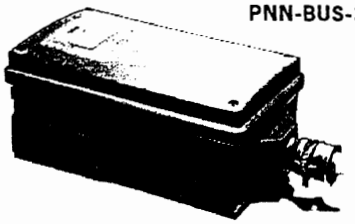
5. RECEIVER (PNN-BUS-3 and PNN-BUS-5)

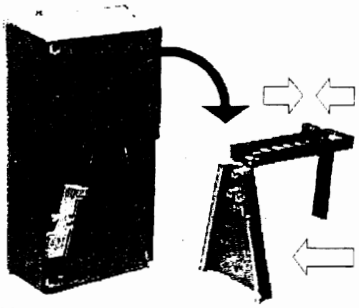
The receiver is connected to the crane with the multi-pole connecting cable supplied. Please observe the instructions issued by the crane manufacturer. The power supply to the receiver is generally effected by way of the connecting cable.

- **In general, an earth lead is required in the case of cranes which have not previously been operated under radio control. Failing this, the receiver electronic circuit will not receive any power supply.**
  Take care to ensure that the operating voltage of the receiver complies with the electrical specifications of the crane.
  The applicable operating voltage is specified in the supplement.
- **Never expose the receiver to a high pressure cleaning jet.**
  This also applies to the transmitter.
- **The receiver should always be fixed vertical at the outside panel of the switching cabinet.**
  The antenna should reach over the top of the panel.



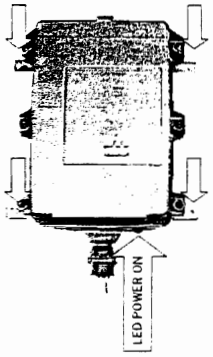
PNN-BUS-3



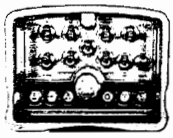


Mounting-possibilities of the PNN-BUS-3 or of the PNN-BUS-5.

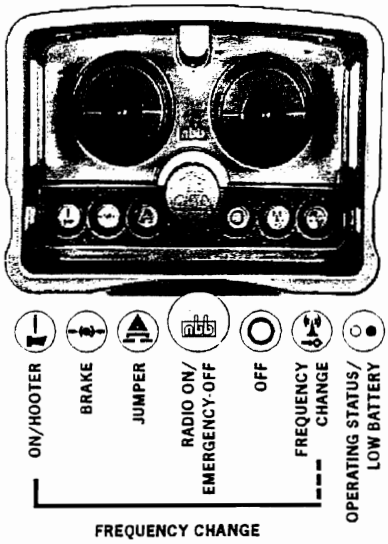
PNN-BUS-5



Nano-Vario



Nano / Nano-S-A2-HC



6. OPERATING THE SYSTEM

Safety equipment in the NBB radio control system:

In the transmitter:
- EMERGENCY-OFF switch with automatic disconnection from the power supply
- Automatic zeroing

In the receiver:
- Duplicated 2-channel evaluation of the EMERGENCY-OFF signal
- Automatic zeroing when switched on again after radio signal interruption
- Inhibition of radio control commands at the relay level if EMERGENCY-OFF circuit defective.

To ensure troublefree operation, observe the following operating instructions precisely. Subject to the transmitter being in operating condition, the crane's master switch can only be switched on provided no command transmitter is actuated. The necessary command for this purpose is initiated by the "ON/HOOTER" button. This activates a warning signal on the crane. After the crane has been switched on, this button serves for the subsequent activation of the hooter as required by safety at work regulations.

If the NBB radio control unit remains unused for a prolonged period, we strongly recommend that the battery be charged from time to time (approximately every four weeks). This will prevent it from becoming discharged and will prolong its working life. If an extended period of disuse is intended, we recommend that the battery be removed from the transmitter.

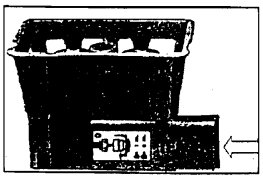
Changing the frequency:

To change the frequency, hold down the "ON/HOOTER" button while simultaneously operating the "FREQUENCY CHANGE" button until the hooter sounds. (Please observe the accompanying registration conditions, see page 5, point 9).

TEACH-IN: Individual Setting of Analog Channels (Basic Setting) at Nano Transmitter*.
The output signals of the analog channels can be individually programmed by the transmitter.

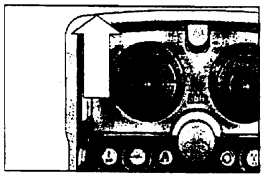
Activate programming mode

1 Set all analog channels to zero position. (potentiometer without automatic release) Insert the TEACH-battery into the battery compartment, release the EMERGENCY-OFF switch and press the "ON/HORN" key. Now the programming mode is activated.



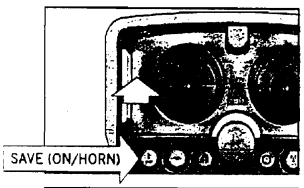
Select analog function

2 To determine which analog function is to be programmed, it is sufficient to turn briefly the appropriate master switch fully in the direction of this function.



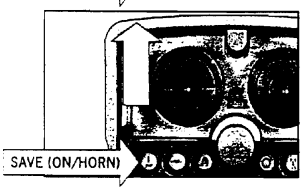
Save "contact point"

3 Now the "50%/100%" switch has to be turned into the "50%" position. The master switch is now turned until the required "contact point" is reached. To save this value, the "SAVE" ("ON/HORN") key must be pressed at this position.



Save maximum speed

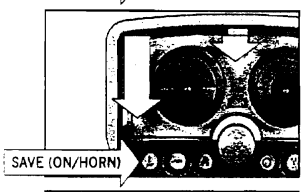
4 The "50%/100%" switch has to be turned into the "100%" position. The upper initial value is saved by turning the master switch until the maximum speed of the function is reached then pressing again the "SAVE" ("ON/ HORN") key.



Program opposite direction ?

No / Yes

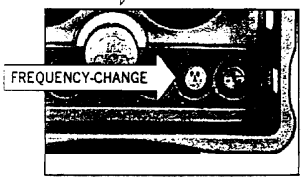
5 The opposite direction of this function can then be programmed the same way immediately afterwards. See point **3** and **4** .



Programming of next function ?

No / Yes

6 When programming several analog channels consecutively, the "FREQUENCY-CHANGE" key must be pressed once after saving a function. Continue point **2** .



Check the programmed values

7 By pressing and holding the "FREQUENCY-CHANGE" key it is possible to change to the working mode to check the programmed values. As soon as the key is released, the programming mode can be commenced, as described above. (Point **2** to **5** .)

Close the programming mode

8 Press the EMERGENCY-OFF switch, push out the TEACH battery of the battery compartment , insert the normal working battery, release the EMERGENCY-OFF switch again and prepare the control to operate by pressing the "ON/HORN" key.

The control is ready to operate.

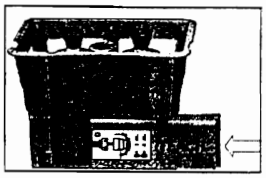
Please note:
In the programming mode all functions are locked, except "ON/HORN" and each selected function.

*** Please refer to the scope of supply of your facility.**

TEACH-IN: Individual Setting of Analog Channels (Basic Setting) at Nano Transmitter with Potentiometer Control*.
The output signals of the analog channels can be individually programmed by the transmitter.

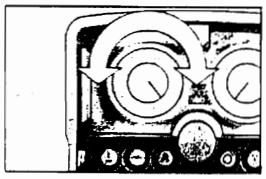
Activate programming mode

1 Set all analog channels to zero position. (potentiometer without automatic release) Insert the TEACH-battery into the battery compartment, release the EMERGENCY-OFF switch and press the "ON/HORN" key. Now the programming mode is activated.



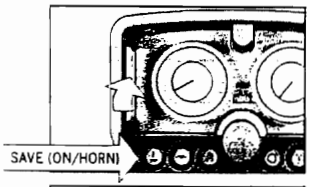
Select analog function

2 To determine which analog function is to be programmed, it is sufficient to turn briefly the appropriate potentiometer fully in the direction of this function.



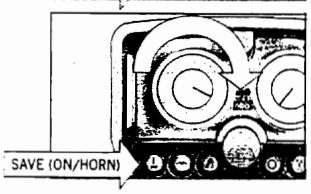
Save "contact point"

3 Now the "50%/100%" switch has to be turned into the "50%" position. The potentiometer is now turned until the required "contact point" is reached. To save this value, the "SAVE" ("ON/HORN") key must be pressed at this position.



Save maximum speed

4 The "50%/100%" switch has to be turned into the "100%" position. The upper initial value is saved by turning the potentiometer until the maximum speed of the function is reached then pressing again the "SAVE" ("ON/ HORN") key.



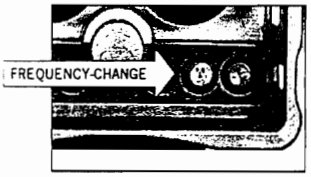
5 No opposite direction.

Programming of next function ?

No

Yes

6 When programming several analog channels consecutively, the "FREQUENCY-CHANGE" key must be pressed once after saving a function. Continue point **2** .



Check the programmed values

7 By pressing and holding the "FREQUENCY-CHANGE" key it is possible to change to the working mode to check the programmed values. As soon as the key is released, the programming mode can be commenced, as described above. (Point **2** to **5** .)

Close the programming mode

8 Press the EMERGENCY-OFF switch, push out the TEACH battery of the battery compartment , insert the normal working battery, release the EMERGENCY-OFF switch again and prepare the control to operate by pressing the "ON/HORN" key.

The control is ready to operate.

Please note:
In the programming mode all functions are locked, except "ON/HORN" and each selected function.

*** Please refer to the scope of supply of your facility.**

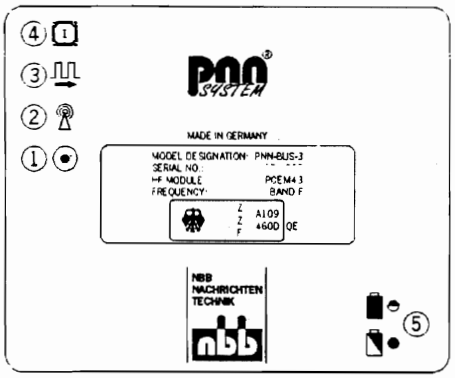
7. FUNCTION CHECKS

Regular function checks of the NBB radio control unit are essential to ensure that operating safety is maintained. In the case of a single-shift daily operation, we recommend that the checks be carried out once a week. They can be performed with the aid of the indicator lamps on the receiver. For this purpose, the transmitter must be in operating condition.

- First, connect only the receiver - the transmitter remains switched off.
- Switch on the transmitter by releasing the EMERGENCY-OFF button.
- Now test the command functions (always starting at the lowest stage) and check that the crane responds correctly. In particular, make sure that the danger area is clear of all personnel. **Failure to do so may result in an ACCIDENT.**
- **EMERGENCY-OFF check.** Press the EMERGENCY-OFF button on the transmitter until it locks. The crane's master contactor must drop out after a maximum of 1/2 second.

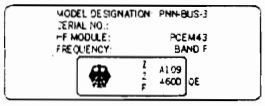
Checking the LEDs of the receiver

- **LED1:** POWER ON. If the LED does not light up, check the power supply. If the power supply lead is in satisfactory condition, notify your service centre.
- **LED2:** HF AVAILABLE. Remains lit continuously when the transmitter is switched on. (not significant in the case of scanner operation).
- **LED3:** Flashes at regular intervals during fault-free operation. Irregular flashing means that the HF channel is probably disrupted. In this case, select an alternative channel.
- **LED4:** If this LED flashes, the HF channel is disrupted.
- **LED5** (Battery operation): state of charge of the battery.



8. RATING PLATES

Rating plates contain the serial number, model designation, type of HF module and frequency. In the event of a query, please give the serial number without fail.



9. REGISTRATION

Explanatory notes on obtaining an operating permit for your NBB radio control system will be found in the accompanying registration documents.

10. MAINTENANCE

The NBB radio control unit is largely maintenance-free. Nevertheless, please observe the following points:

- The EMERGENCY-OFF button must operate freely.
- Keep the unit clean of any contamination from building materials.
- If any electrical welding is carried out on the crane, disconnect the control cable from the receiver, otherwise the receiver electronics may be damaged.

11. GUARANTEE

All NBB radio control units (transmitter, receiver, battery charger) are guaranteed to operate satisfactorily for a period of six months from the date of sale. The terms of the guarantee include parts and labour. Transport costs are the buyer's responsibility. The following are excluded from the guarantee: wearing parts, relays and batteries. The guarantee does not cover damage, accidental damage, negligence, improper use, non-adherence to operating conditions, the non-observance of operating, testing and servicing instructions, or repairs or modifications to the unit not authorized by NBB.
NBB will not be liable for consequential damage. It reserves the right to effect repairs or replacements at its own discretion.

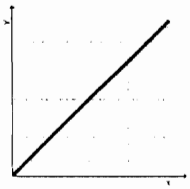
12. ACTION IN THE EVENT OF A FAULT

Do not continue to work with a defective NBB radio control unit. Even a minor defect in the first instance may eventually lead to a major fault!
Do not try to repair the NBB radio control unit yourself. In the event of a fault, please notify your dealer or contact us!

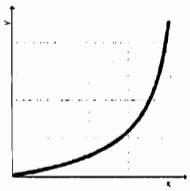
TECHNICAL SUPPLEMENT

NANO: Board E-AN04A2V1/1 TEACH-IN*

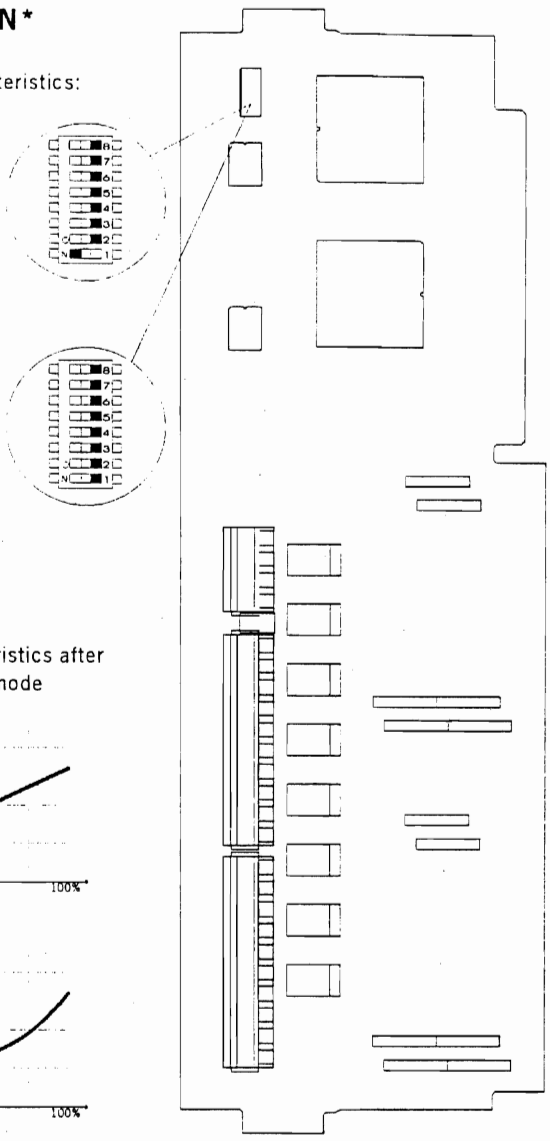
DIL switch (SW2) for setting various transmission characteristics:

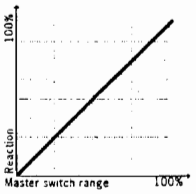
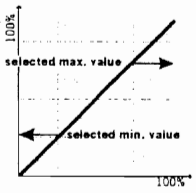
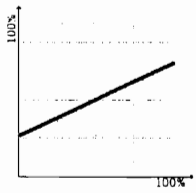
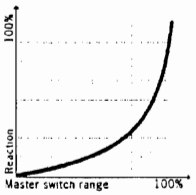
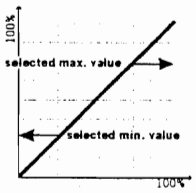
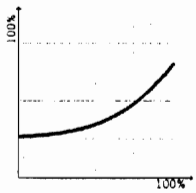


Setting for linear characteristic



Setting for non-linear characteristic



Characteristics linear or non-linear	Characteristics in Teach-In mode	Characteristics after Teach-In mode
		
		

DIL switch no. 8 : OFF: 50% switching variable
ON : 50% switching fixed

***Please refer to the scope of supply of your facility.**

TECHNICAL DATA

PNN SYSTEM

Operating ambient temperature	-20 to +65 °C
Insulation class - Protection	IP 65

TRANSMITTER

Pocket-S Nano Nano-L Nano-M

Transmission frequency range	400 - 477 MHz, 25 mW FM

The use of synthesizer technology permits frequencies to be selected in accordance with the appropriate waveband for the country of use.

Low frequency modulation	FSK signal to CCITT V.23
Data repetition rate	about 60 ms
Baud rate	1200 baud (bits per sec.)
Range	300 up to 1000 m
Power input	about 60 mA
RF ouput	10 mW

	Weight (without battery)	Size (L x W x H)
Pocket	0,2 kg	8,7 x 3,5 x 14 cm
Nano	0,7 kg	17,5 x 12,6 x 12,2 cm
Nano-L	1,0 kg	24,7 x 13,9 x 11,7 cm
Nano-M	1,5 kg	28,3 x 14,4 x 16,7 cm

RECEIVER

PNN-BUS-3, PNN-BUS-5

Reception frequency range	400 - 477 MHz

Data security:
Generates a CRC code with a Hamming distance = 4. Generates a neutral position Addressing of each transmitter with its own, unique combination (32768 possible combinations). Parity - Bit parameters with addressing.

Data reception security:
2 diversitary evaluators (1 hardware evaluator, 1 software - controlled evaluator). CRC. EMERGENCY OFF and neutral position bits. Restart inhibitor if EMERGENCY OFF relay defective.

Contact loading for EMERGENCY OFF and commands.

max. switching voltage	250 V
max. switching current	6 A
max. switching power	1000 VA

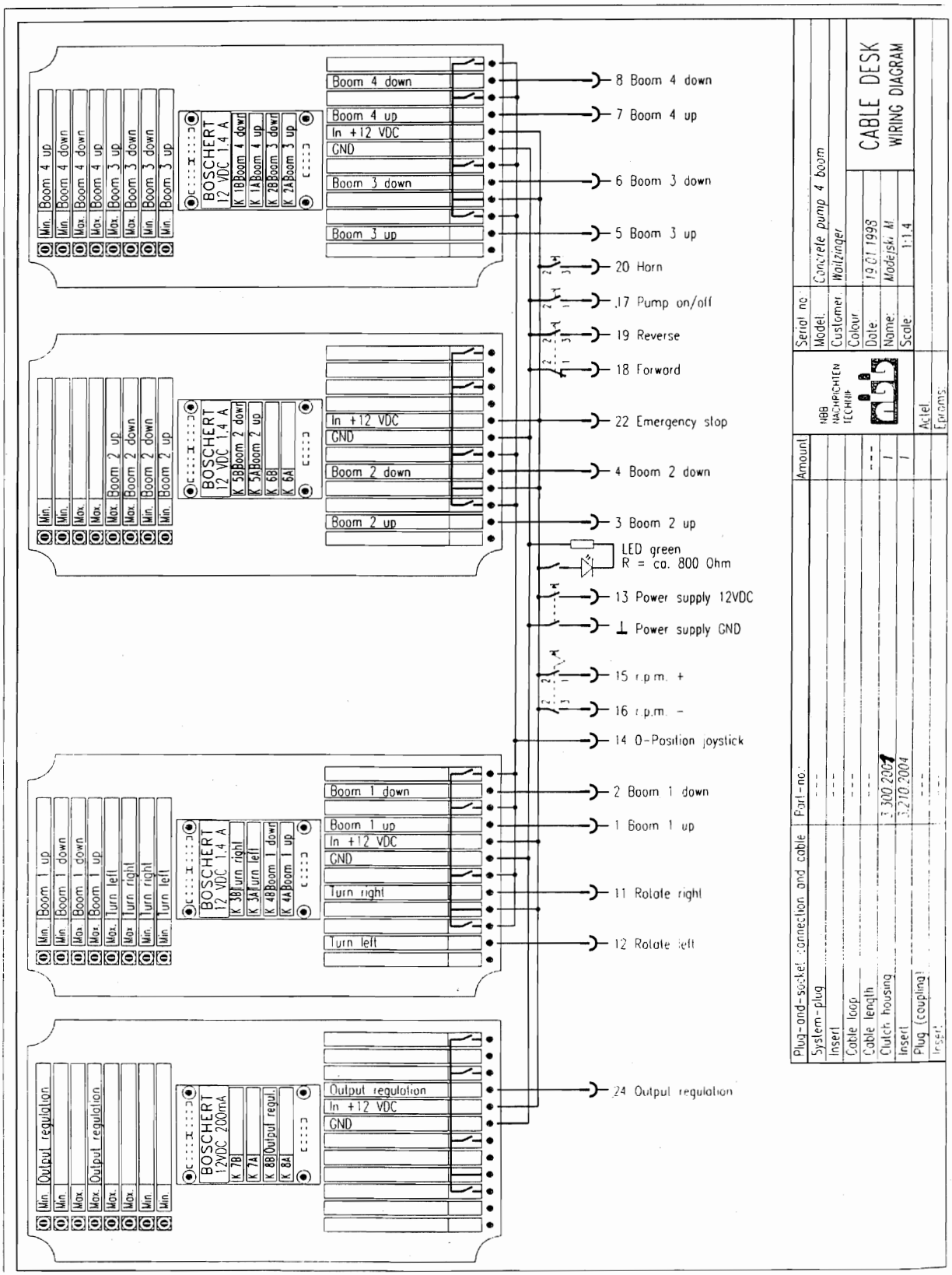
	Weight	Size (L x W x H)
PNN-BUS-3	3,0 kg	30,6 x 18,1 x 13 cm
PNN-BUS-5	4,7 kg	36,4 x 28,3 x 15,2 cm

BATTERY

7,2V / 0,6 Ah

CHARGING UNIT

Operating voltage external charging unit	12V/24V DC
	110V/230V AC
Operating voltage /PNN-BUS-3/PNN-BUS-5	90V - 270V AC
	40V - 270V AC
	40V - 130V AC
	8V - 50V DC
	24V DC


Boom 4 up
Boom 4 down
Boom 3 up
Boom 3 down
BOSCHERT
12 VDC 1.4 A
K 1B Boom 4 down
K 1A Boom 4 up
K 2B Boom 3 down
K 2A Boom 3 up
Boom 4 down
Boom 4 up
In +12 VDC
GND
Boom 3 down
Boom 3 up
8 Boom 4 down
7 Boom 4 up
6 Boom 3 down
5 Boom 3 up
20 Horn
17 Pump on/off
19 Reverse
18 Forword
Boom 2 up
Boom 2 down
K 5B Boom 2 down
K 5A Boom 2 up
K 6B
K 6A
In +12 VDC
GND
Boom 2 down
Boom 2 up
22 Emergency stop
4 Boom 2 down
3 Boom 2 up
LED green
R = ca. 800 Ohm
13 Power supply 12VDC
⊥ Power supply GND
15 r.p.m. +
16 r.p.m. -
14 0-Position joystick
Boom 1 up
Boom 1 down
Turn left
Turn right
K 3B Turn right
K 3A Turn left
K 4B Boom 1 down
K 4A Boom 1 up
Boom 1 down
Boom 1 up
In +12 VDC
GND
Turn right
Turn left
2 Boom 1 down
1 Boom 1 up
11 Rotate right
12 Rotate left
Output regulation
12VDC 200mA
K 7B
K 7A
K 8B Output regul.
K 8A
Output regulation
In +12 VDC
GND
24 Output regulation
Serial no.
Model: Concrete pump 4 boom
Customer: Wallzinger
Colour
Date: 19.01.1998
Name: Modejski M
Scale: 1:1.4
CABLE DESK
WIRING DIAGRAM
ABB
NACHRICHTEN
TECHNIK
Amount
Part-no.
Plug-and-socket connection and cable
System-plug
Insert
Cable loop
Cable length
Clutch housing
Insert
Plug (coupling)
Insert
3 300 2001
3 210 2004
Actel
Eprom

REVISION:

REVISION:

BUNDESAMT FÜR ZULASSUNGEN IN DER TELEKOMMUNIKATION

ZULASSUNGSURKUNDE

Zulassungsnummer: G120913F

Zus. Kennzeichen: LED-D

Objektbezeichnung: E-EM43 AO

Zulassungsinhaber: NBB
Nachrichtentechnik GmbH
Otto-Hahn-Str. 3
D-75248 Ölbronn-Dyrrn

Zulassungsart: Allgemeinzulassung

Objektart: Funkanlagen für gewerbliche und industrielle Fernsteuerungs- und Fernmeßzwecke

Das Zulassungsobjekt erfüllt die Zulassungsvorschrift BAPT 222 ZV 125, Ausgabe Dezember 1994 auf der Grundlage der angewandten technischen Vorschrift I-ETS 300 220, Ausgabe August 1993

Saarbrücken, den 05.10.1995

Im Auftrag

Hans-Werner Dies

1 Anlage

Bundesamt für Zulassungen in der Telekommunikation, Talstraße 34-42, D-66119 Saarbrücken, Tel.: (06 81) 9 66-0, Fax: (06 81) 5 84-18 00

SYSTEMBESCHREIBUNG

Objektbestandteil: Empfangsmodul: E-EM43 AO

Objektmerkmale:

Frequenzbereich:	433,05 MHz bis 434,79 MHz
Betriebsfrequenzbereich:	433,100 MHz bis 434,750 MHz
Sendeart:	F 1 D
Betriebsart:	Simplex
Spannungsversorgung des Empfängers:	12V, DC
Antenne des Empfängers:	Antennenbuchse
Anzahl der schaltbaren HF-Kanäle:	67

REED CONCRETE PLACING EQUIPMENT

PNN SYSTEM
CABLE REMOTE CONTROL

VENDR
FIGURE 08
PAGE 09

AS WE MAKE IMPROVEMENTS TO THE ***REED*** TRUCK MOUNTED CONCRETE BOOM PUMP MODEL ***XXT37R***, WE LIKE TO SUPPLY YOU, THE CUSTOMER, WITH UPDATED INFORMATION WHICH APPLIES TO YOUR PUMP.

THIS SECTION IS PROVIDED AS A PLACE TO STORE SERVICE BULLETINS AS YOU RECEIVE THEM FROM ***REED*** **LLC.**

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SERVICE BULLETIN 001
WARRANTY PROGRAM

BULLETIN NO: SB 001

DATE: FEBRUARY 5,1998

TO: ALL ***REED*** DEALERS

SUBJECT: ***REED* WARRANTY PROGRAM**

Each ***REED*** Concrete Placing Trailer Pump, Truck Mounted Boom Pump and Dry-mix Spraying Gun, undergoes before delivery a thorough Quality Assurance inspection, a performance check and final testing. However, even with these precautions the possibility exists that after delivery, for some reason, a component may fail.

This is the reason for warranty. If this should happen to one of your machines during the first 12 months or 1000 pumping hours after delivery, there is a good chance the failed component could be replaced under warranty.

REED has updated and formalized its **WARRANTY PROGRAM** and this bulletin is issued to make all dealers aware of the program.

Enclosed is a supply of our new **WARRANTY CLAIM** forms. From this point on, all warranty claims must be submitted on these forms. Also, please find a description of the program, coverage and how to make a claim and its submission. We suggest you give this some careful attention. Briefly some noteworthy items are:

- Do not return any failed part unless requested by ***REED***.
- Purchase the replacement part through normal channels from ***REED***. Submit your claim noting the invoice number of the replacement part. Upon approval of the claim, a credit will be issued.
- Every effort will be made to process claim within 2 weeks from receipt except for those occasions where the part is to be returned.

Should questions arise during your review, please do not hesitate to contact us.

We appreciate the opportunity to be of service.

Sincerely,

Mike Wickstrom
Service Manage

REVISION:

WARRANTY PROGRAM POLICY

REED Concrete Placing Equipment MODEL ***XXT37R*** is designed and engineered to perform as stated on published specifications. Only quality materials and workmanship are used in the manufacture of these products. As a back up for the product manufactured by ***REED***, a guarantee against defects in design and workmanship of components is provided for each machine.

The ***REED*** guarantee/warranty states, in general, that ***REED*** will replace free of charge any components found to be defective within the time frame of the warranty period. There are exceptions to some components which are not the responsibility of ***REED***. These are noted elsewhere.

A formal printed policy is available and depicts in more detail the warranty and description. However, for your ready reference the following is offered:

A. WARRANTY PERIOD

- ALL CONCRETE PLACING MACHINES

  The warranty period is for twelve (12) months from date of delivery to initial user or 1000 pumping hours whichever comes first.

- NEW PARTS WARRANTY

  For parts sold through the ***REED*** Parts Department the warranty is ninety (90) days from invoice ship date.

- REPLACEMENT WARRANTY PARTS

  Replacement parts provided under the terms of the machine warranty are for the warranty period applicable to the unit in which they were installed as if such parts were original components of the machine.

B. WARRANTY COVERAGE

- DEFECTIVE PARTS

  Unless otherwise authorized the replacement part **MUST** be **PURCHASED** from ***REED***. Once warranty claim is received and approved, ***REED*** will provide credit to the dealer/user for their cost of the replacement part as invoiced by ***REED***.

- LABOR

  No labor time and related compensation will be provided by ***REED*** to dealers/users or others to perform work under this warranty policy.

- TRAVEL TIME

  No travel time, mileage or other expenses will be compensated by ***REED*** to dealers/users or others to perform work under this warranty policy.

- FREIGHT, IMPORT DOCUMENTATION, CUSTOM DUTY

  Any expense incurred for freight, import duty and documentation will not be reimbursed by ***REED*** in association with this warranty policy.

C. EXCLUSIONS

- CHASSIS AND RELATED COMPONENTS (TRUCK MOUNTED UNITS)

  The warranty for the chassis is handled by the chassis manufacturer and their dealer network. Prior to putting the truck in service it is suggested you contact the nearest manufacturer dealership.

- ENGINE - TRAILER UNITS

  The engine warranty is handled by the engine manufacturer and their dealer network. The terms and conditions of their warranty will apply. Contact the local engine dealer for specifics on warranty of the engine.

- NORMAL WEAR

  This pertains to items that have failed as a result of normal wear and tear to the product including but not limited to material cylinder and hydraulic cylinder piston components, delivery systems, pins, chains, bushings, seals, concrete pump wear parts, brakes, filter elements, fluids and tires.

- DAMAGES

  Caused by transport of equipment or parts, improper set-up or installation, operator error, improper operation or storage, environmental conditions, accidents, improper mechanical techniques employed by anyone or any other cause other than a structural defect in materials or workmanship.

- MAINTENANCE

  Caused by failure to perform any scheduled maintenance or routine maintenance as specified in technical manual on any structural or mechanical component.

- MODIFICATIONS

  Any non-authorized changes or modifications of any kind to the product. Any modification must be authorized and approved in writing by ***REED*** Engineering Department.

- ABUSE

  Any accidental or intentional abuse of product including but not limited to neglect, loading beyond capacity or any operation of the equipment beyond the limits set forth by ***REED*** documentation and as depicted in the appropriate technical manual.

D. SUBMISSION OF CLAIM BY DEALER/USER

Should a component failure be encountered during the warranty period and should it fall within the guidelines of the ***REED*** **WARRANTY POLICY** the following procedure is to be followed to claim warranty:

1. REPLACEMENT PART

   - Obtain the replacement part by ordering it from the **REED PARTS DEPT.** through normal channels. You will be **INVOICED** for the part.

   - If the part has been previously ordered from ***REED*** and is in your replacement stock inventory you may choose to use that part.

2. COMPLETE THE CLAIM FORM

   REED has supplied you with a pre-numbered Warranty Claim Form which consists of four (4) parts. This and only this form is **ACCEPTABLE**. **DUPLICATE** copies of the form are **NOT ACCEPTABLE**. If you do not have the proper form, contact the ***REED*** Service Department. They will send you a supply.

REED
CONCRETE PLACING EQUIPMENT

WARRANTY CLAIM

13822 OAKS AVENUE
CHINO, CA. 91710 909-364-2100

NO.

Date: (1)

Distributor Account Number:
Distributor: (2)
Address:
City:
State: Zip Code:
Phone: ( )

End User Account Number:
End User: (3)
Address:
City:
State: Zip Code:
Phone: ( )

MACHINE PUMP DATA

Model (4) Serial No. (5) In Service Date (6)
Hours of Operation (7) Failure Date (8) Repair Date (9)

NOTE - Hold deficient part(s) until requested by **REED** or until claim is approved. All parts requested to be returned must have a return authroization number provided by **REED**, shipped freight prepaid.Parts must ship within 30 days from **REED** request.

RETURN AUTHORIZATION NO. (10) SHIP DATE (11)

PART NUMBER	DESCRIPTION (12)	QTY.	NET PRICE	TOTAL PRICE	*REED* REPLACEMENT PART INVOICE NO. (13)

Describe Failure and How it Occurred (14)

REED comments

Claim Approved for

$

REED Use - Claim Approved ☐ Denied ☐

Signed Date

Dealer Signature (15)

Date

REVISION:

The following instructions are offered for completing the **WARRANTY CLAIM FORM**. Refer to sample of form. Circled numbers on form correspond to items below. **FILL IN**:

1. Date your claim is written

2. Distributor name and address

3. End user name and address

4. Model number of unit affected

5. Serial number of unit affected

6. Date unit was first placed in service

7. Hours (from hour-meter) of operation at time of failure

8. Date when failure occurred

9. Date when unit was repaired

10. Return Authorization number as received from ***REED*** Service Department. This will only apply when failed component is requested to be returned by ***REED***.

11. Date when failed part is shipped back to ***REED***

12. List ***REED*** part number, description of part, quantity and price of part.

13. List ***REED*** invoice number sent you when replacement part was purchased

14. Briefly describe failure and how it occurred

15. Dealers signature and date

The claim form **MUST BE COMPLETELY FILLED OUT**. Claims lacking specific, accurate information will be returned **UNPROCESSED**. If additional room is needed to describe the failure or to list the parts used, attach a separate sheet and identify those sheets with the **SAME WARRANTY CLAIM NUMBER**.

3. SUBMITTING TO ***REED***

When all appropriate data has been entered on the claim and signed, proceed as follows:

- Remove copies of form marked **"DEALER"** (yellow) and **"RETURN AUTHORIZATION"** (green). The Dealer copy is for your records and the Return Authorization copy is to be retained in the event ***REED*** requests the return of the part.

- Mail the ***"REED"*** copy (white) and **"ACCOUNTING"** copy (pink) along with any back-up data such as a copy of the replacement part **INVOICE** to ***REED***. **DO NOT FAX COMPLETED FORM** and send only **FORM ORIGINALS**.

E. RETURN OF FAILED COMPONENT

Depending on the type of part and circumstance surrounding the component failure, the possibility exists that ***REED*** may request that the failed part be returned to them for investigation and evaluation purposes or to apply for warranty from the manufacturer of the part.

- Upon receipt of your warranty claim and before claim is approved, ***REED*** will inform you in writing if the part is to be returned. On this correspondence a **RETURN AUTHORIZATION** number will be given to you.

- This number is to be written in the appropriate area on the **RETURN AUTHORIZATION** copy (green) of the warranty form. Include this copy as part of your packing slip. Also write the number on a tag and attach to the part.

- Parts requested to be returned must be shipped back to ***REED*** within 30 days from issuing of the **RA** number. Failure to do so will cause warranty claim to be **DENIED**.

- Returned parts are to be properly packaged and shipped freight **PREPAID**.

- Any parts received by ***REED*** without the **PROPER RA** number will be shipped back at **DEALER/USER EXPENSE**.

- If claim is approved and no request to return parts from ***REED*** has been made, then parts can be discarded.

F. APPROVAL/DENIAL OF CLAIM

Every effort will be made to process the warranty claim within 2 weeks from receipt.

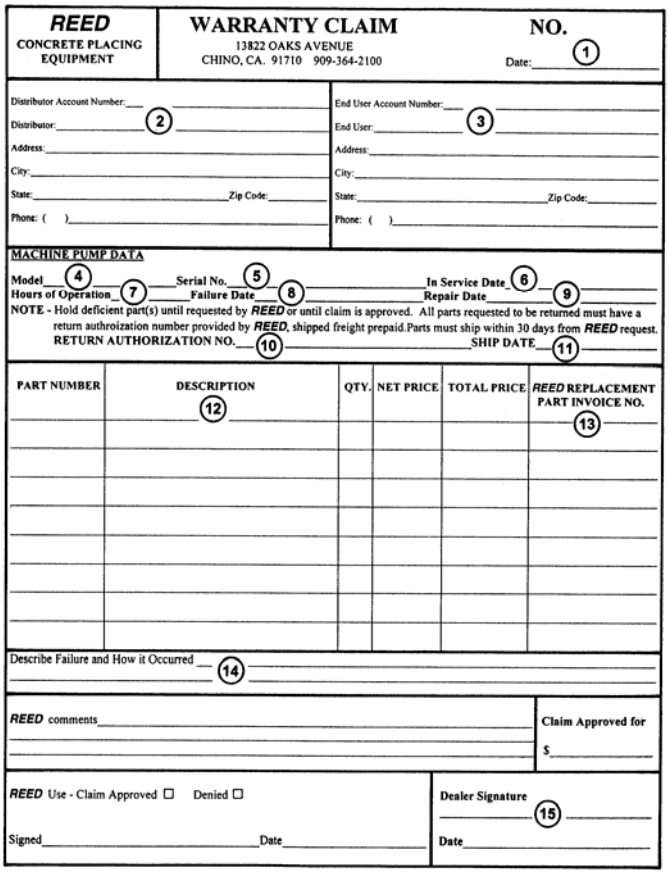
- APPROVAL

  Once your claim has been approved by ***REED***, the pink copy will be forwarded to our Accounting Dept. They in turn will issue a credit against the invoice for the replacement purchased part.

  In the meantime a fax or notification will be sent you indicating the claim and the amount approved.

- DENIAL

  If your warranty claim is denied for any reason, a fax or notification will be sent to you indicating reasons for denial. Should you have any dispute with the decision, you have the right to have the decision reconsidered. You must present your arguments in **WRITING** within 15 days of your receipt of the claim denial.



REED
CONCRETE PLACING EQUIPMENT

WARRANTY CLAIM NO. (1)
13822 OAKS AVENUE
CHINO, CA. 91710 909-364-2100
Date:

Distributor Account Number:
Distributor: (2)
Address:
City:
State: Zip Code:
Phone: ( )

End User Account Number:
End User: (3)
Address:
City:
State: Zip Code:
Phone: ( )

MACHINE PUMP DATA
Model (4) Serial No. (5) In Service Date (6)
Hours of Operation (7) Failure Date (8) Repair Date (9)
NOTE - Hold deficient part(s) until requested by **REED** or until claim is approved. All parts requested to be returned must have a return authroization number provided by **REED**, shipped freight prepaid.Parts must ship within 30 days from **REED** request.
RETURN AUTHORIZATION NO. (10) SHIP DATE (11)

PART NUMBER	DESCRIPTION (12)	QTY.	NET PRICE	TOTAL PRICE	*REED* REPLACEMENT PART INVOICE NO. (13)

Describe Failure and How it Occurred (14)

REED comments
Claim Approved for $

REED Use - Claim Approved ☐ Denied ☐
Signed Date
Dealer Signature (15)
Date