CEBM017100

Shop Manual

CK30-1

COMPACT TRACK LOADER

SERIAL NUMBERS **CK30-1** **A30001** and UP

It is our policy to improve our products whenever it is possible and practical to do so. We reserve the right to make changes or add improvements at any time without incurring any obligation to install such changes on products sold previously.

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June 2006
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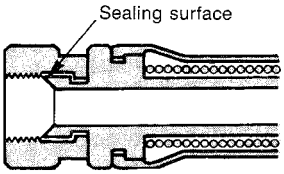
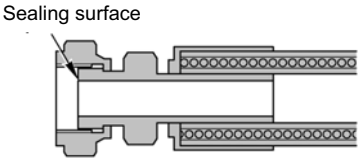
2. TIGHTENING TORQUE FOR NUTS OF FLARED



Use these torques for nut part of flared.

Thread diameter of nut part (mm)	Width across flats of nut part (mm)	TIGHTENING TORQUE	
		kgm	Nm
1/2” - 20	17	2.6±0.5	25.5±4.9
9/16” - 18	17	4±0.5	39.2±4.9
3/4” - 16	22	6.7±2	65.7±19.6
7/8” - 14	27	8±2	78.5±19.6
1.1/16 - 12	32	9.7±3	95.15±29.4
1.5/16 - 12	38	17±3	166.7±29.4
1.5/8 - 12	50	20±5	196.2±49
22	27	8±2	78.5±19.6
33	41	20±5	196.2±49



Use these torques for nut part of flared.

Thread diameter of nut part (mm)	Width across flats of nut part (mm)	TIGHTENING TORQUE	
		kgm	Nm
9/16” - 18	17	2.3–2.5	23–25
11/16” - 16	22	3.4–3.9	33–38
13/16” - 16	24	5.2–5.8	51–57
1” - 14	30	8.2–9.2	80–90
1.3/16 - 12	36	12.2–13.3	120–130
1.7/16 - 12	41	15.3–17.3	150–170
1.11/16 - 12	50	18.4–20.4	180–200
2” - 12	57	20.4–24.4	200–240

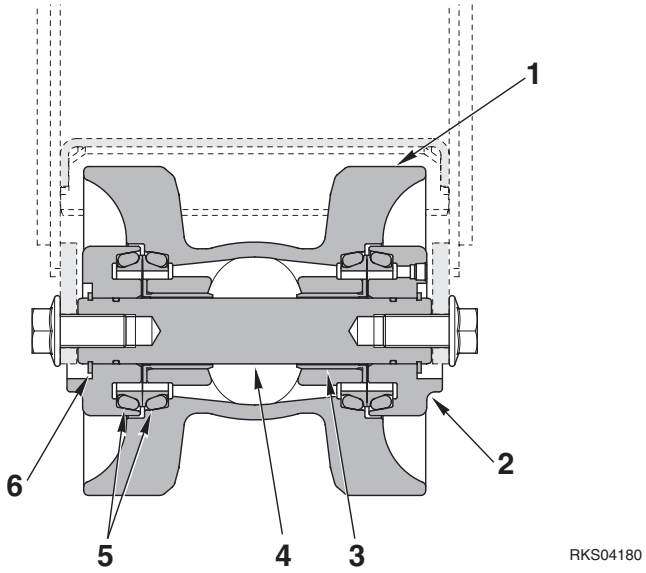
From Nm to kgm

1 Nm = 0.102 kgm

	0	1	2	3	4	5	6	7	8	9
0	0	0.102	0.204	0.306	0.408	0.510	0.612	0.714	0.816	0.918
10	1.020	1.222	1.224	1.326	1.428	1.530	1.632	1.734	1.836	1.938
20	2.040	2.142	2.244	2.346	2.448	2.550	2.652	2.754	2.856	2.958
30	3.060	3.162	3.264	3.366	3.468	3.570	3.672	3.774	3.876	3.978
40	4.080	4.182	4.284	4.386	4.488	4.590	4.692	4.794	4.896	4.998
50	5.100	5.202	5.304	5.406	5.508	5.610	5.712	5.814	5.916	6.018
60	6.120	6.222	6.324	6.426	6.528	6.630	6.732	6.834	6.936	7.038
70	7.140	7.242	7.344	7.446	7.548	7.650	7.752	7.854	7.956	8.058
80	8.160	8.262	8.364	8.466	8.568	8.670	8.772	8.874	8.976	9.078
90	9.180	9.282	9.384	9.486	9.588	9.690	9.792	9.894	9.996	10.098
100	10.200	10.302	10.404	10.506	10.608	10.710	10.812	10.914	11.016	11.118
110	11.220	11.322	11.424	11.526	11.628	11.730	11.832	11.934	12.036	12.138
120	12.240	12.342	12.444	12.546	12.648	12.750	12.852	12.954	13.056	13.158
130	13.260	13.362	13.464	13.566	13.668	13.770	13.872	13.974	14.076	14.178
140	14.280	14.382	14.484	14.586	14.688	14.790	14.892	14.994	15.096	15.198
150	15.300	15.402	15.504	15.606	15.708	15.810	15.912	16.014	16.116	16.218
160	16.320	16.422	16.524	16.626	16.728	16.830	16.932	17.034	17.136	17.238
170	17.340	17.442	17.544	17.646	17.748	17.850	17.952	18.054	18.156	18.258
180	18.360	18.462	18.564	18.666	18.768	18.870	18.972	19.074	19.176	19.278
190	19.380	19.482	19.584	19.686	19.788	19.890	19.992	20.094	20.196	20.298

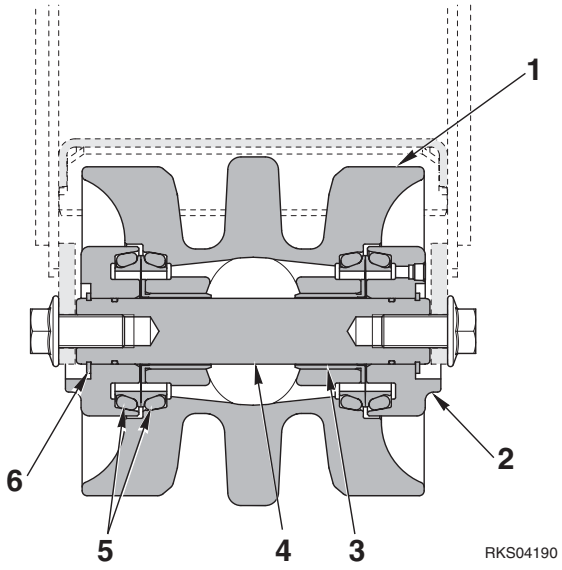
LOWER IDLER ROLLER

2-LIP TYPE



1. Roller
2. Shoulder
3. Bushing
4. Shaft
5. Gasket
6. Snap ring

3-LIP TYPE

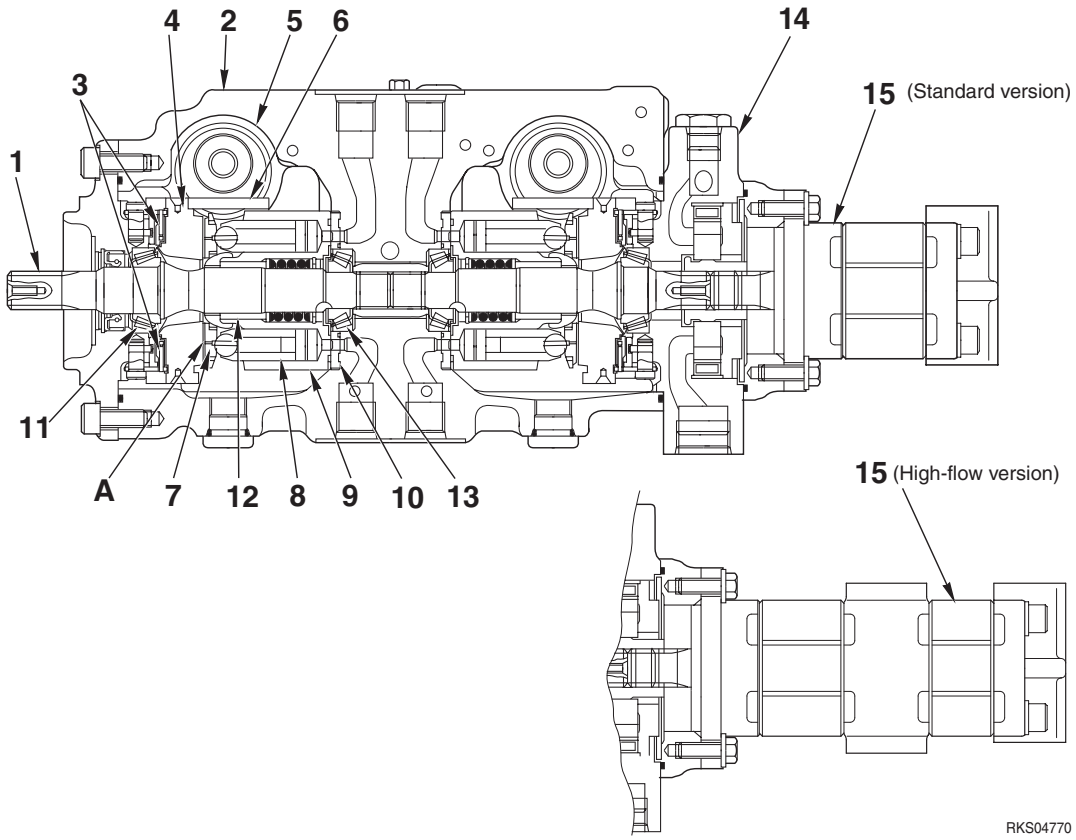


1. Roller
2. Shoulder
3. Bushing
4. Shaft
5. Gasket
6. Snap ring

HST PUMP LPV45 +45 (STANDARD FLOW AND HIGH FLOW)

FUNCTION

- The rotation and torque transmitted to the pump shaft is converted into hydraulic energy, and pressurised oil is discharged according to the load.
- It is possible to change the discharge amount by changing the swash plate angle (plus, zero and minus)

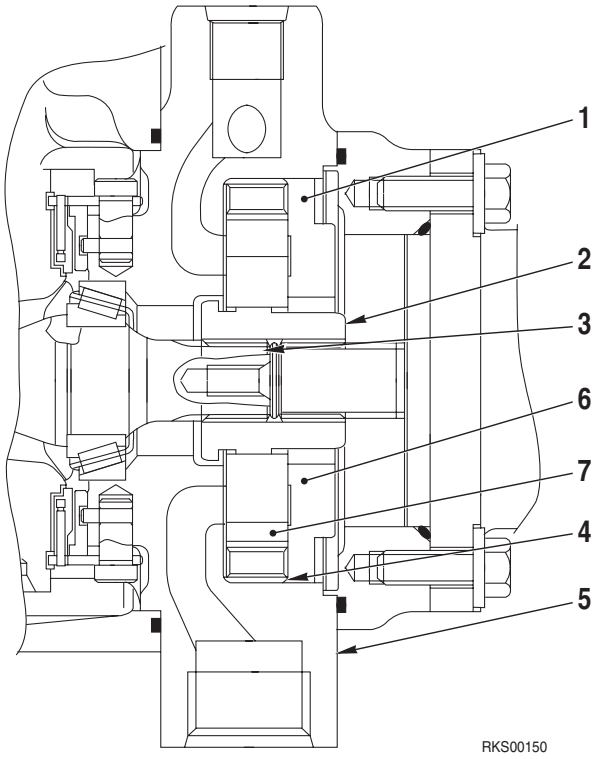


1. Shaft
2. Case
3. Cradle bearing
4. Rocker cam
5. Control piston
6. Slider
7. Shoe
8. Piston
9. Cylinder block
10. Valve plate
11. Main bearing
12. Spline
13. Sub bearing
14. Charge pump
15. Work equipment pump

STRUCTURE

- Cylinder block (9) is supported to shaft (1) by a spline (12), and shaft (1) is supported by the front and rear bearings (11), (13).
- The tip of piston (8) is a concave ball, and shoe (7) is caulked to it to form one unit. Piston (8) and shoe (7) form a spherical bearing.
- Rocker cam (4) has flat surface **A**, and shoe (7) is always pressed against this surface while sliding in a circular movement. There is a cradle bearing (3) between cradle and rocker cam (4) which is secured to the case.Rocker cam (4) sways on cradle bearing.
- Piston (8) carries out relative movement in the axial direction inside each cylinder chamber of cylinder block (9).
- The cylinder block seals the pressurised oil to valve plate (10) and carries out relative rotation.
  This surface is designed so that the oil pressure balance is maintained at a suitable level.
  The oil inside each cylinder chamber of cylinder block (9) is sucked in and discharged through valve plate (10).

CHARGE PUMP



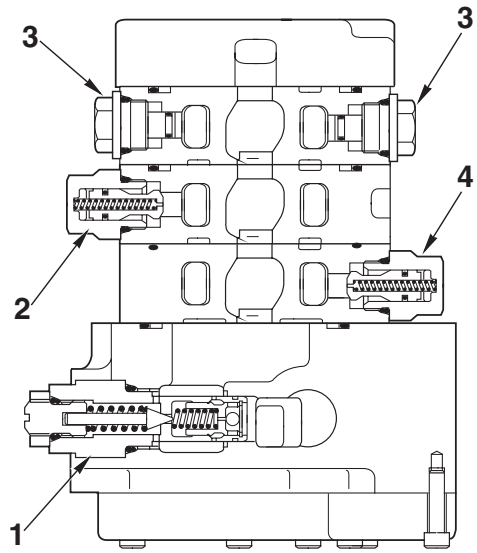
1. Slide plate
2. Coupling
3. Shaft
4. Outer ring
5. Case
6. Inner roter
7. Outer roter

FUNCTION

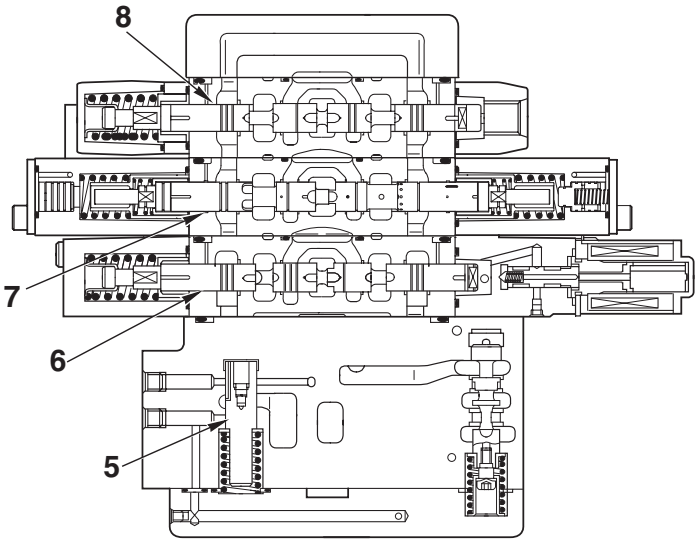
- HST charge pump is built-in the HST pump and driven with HST pump at the same time.
- The pressurised oil generated by the charge pump is sent to safety valve in the charge circuit and to AS valve.
- Charge pump sucks oil from hydraulic tank.

SPECIFICATIONS

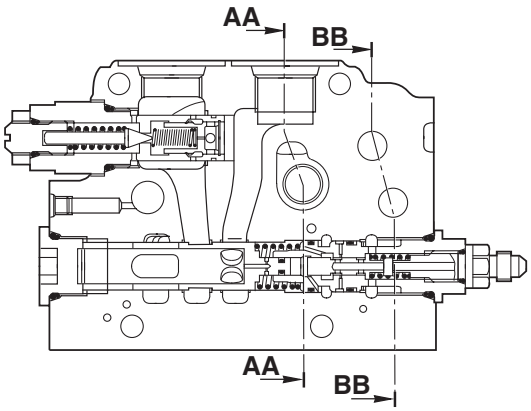
- Type: trochoid pump
- Theoretical delivery: 32 cm^3/rev



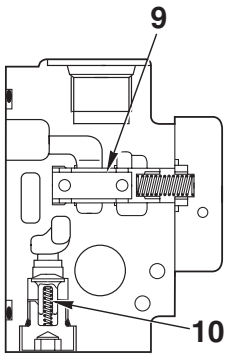
Section A - A



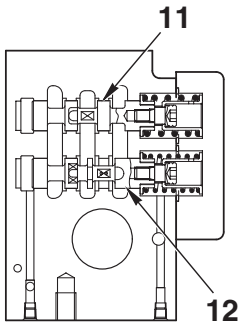
Section B- B



Section C - C



Section AA-AA



Section BB-BB

RKS04820

1. Main relief valve
2. Suction valve (bucket bottom side)
3. Plug
4. Plug
5. Series - parallel circuit switching valve
6. Spool (lift arm)
7. Spool (bucket)
8. Spool (attachment)
9. Flow divider
10. Check valve (circulating circuit)
11. Combination circulating valve
12. Leveling circulating valve

CLSS

1. OUTLINE

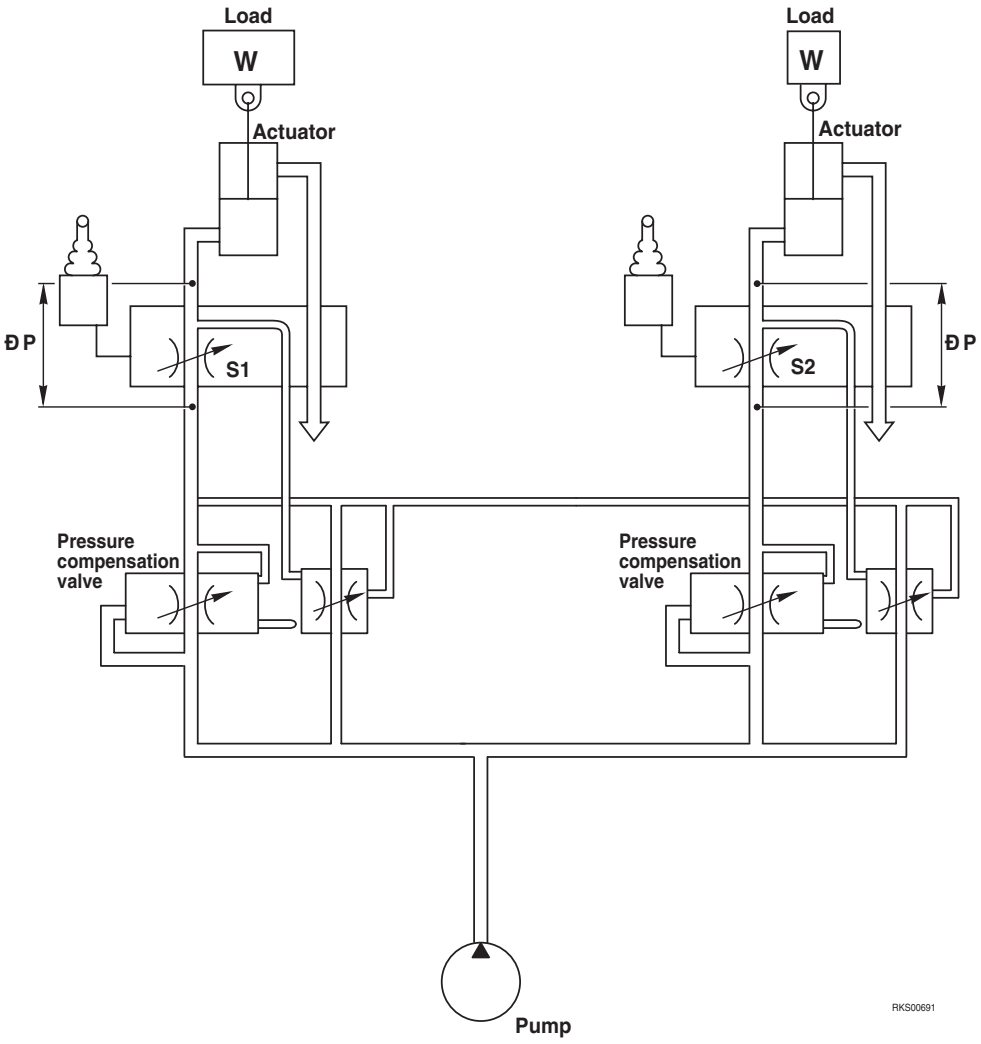
Features

CLSS stands for Closed centre Load Sensing System, and has the followings characteristics.

a. Controlability, not influenced by load;
b. Controllable digging force at fine control range;
c. Easy simultaneous operation by spool opening proportional flow dividing function.

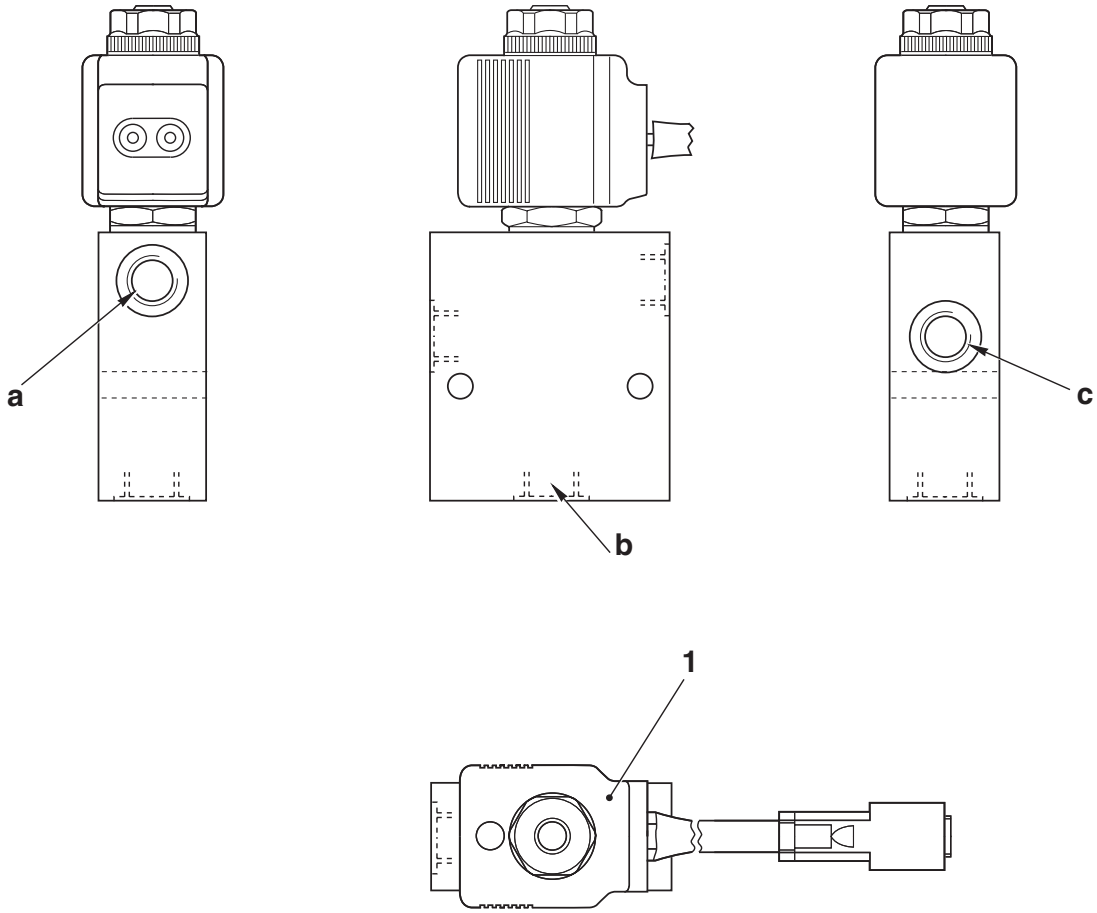
2. PRESSURE COMPENSATION CONTROL

- A valve (pressure compensation valve) is installed to the inlet port side of the control valve to balance the load. When there is compound operation of the actuators, this valve acts to make pressure difference Δ**P**constant for the upstream flow (inlet port) and downstream flow (outlet port) of the notch of each spool.
  In this way, the flow of oil from the pump is divided in proportion to area of opening **S1** and **S2** of each valve.



SOLENOID VALVE ST3

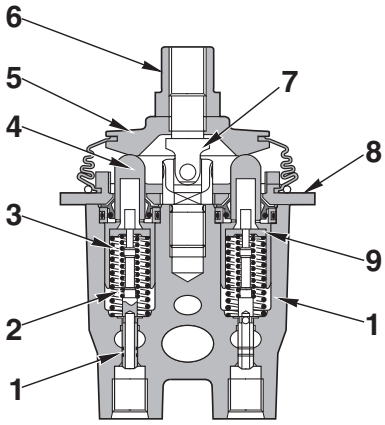
OVERRIDE CONTROL



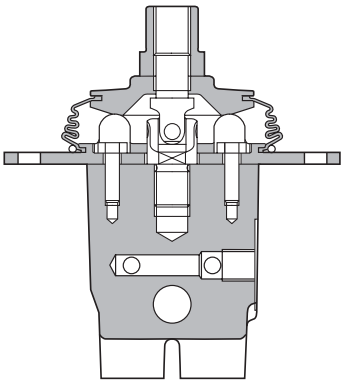
RKS04490

1. SV4 - Backhoe boom lockout

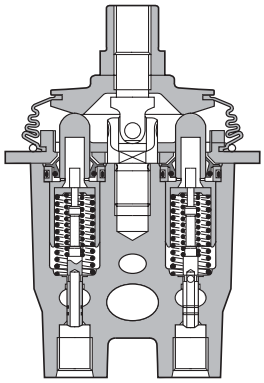
a. T port - To transmission
b. Port 1 - From transmission
c. T1 port - Boom lockout cylinder



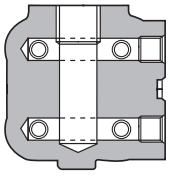
Section A - A



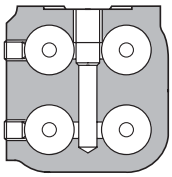
Section B - B



Section C - C



Section D - D



Section E - E

RKS00810

1. Spool
2. Metering spring
3. Centering spring
4. Piston
5. Disc
6. Nut
7. Joint
8. Cover
9. Stopper
10. Body

3. During fine control (when the lever is returned) (fine control → neutral)

When disc (5) starts to be returned, spool (1) is pushed up by the force of centering spring (3) and the pressure at port **P1**.

When this happens, fine control hole **f** is connected to drain chamber **D** and the pressure oil at port **P1** is released.

If the pressure at port **P1** drops too far, spool (1) is pushed down by metering spring (2), and fine control hole **f** is shut off from drain chamber **D**.

At almost the same time, it is connected to pump pressure chamber **PP**, and the pump pressure is supplied until the pressure at port **P1** recovers to a pressure that corresponds to the lever position.

When control valve spool returns, oil goes back into port **D**, through fine control hole **f'**, into port **B** of the spool opposite the active spool. Oil flows through port **P_2** and into port **B** to maintain the fill level (Fig. 3).

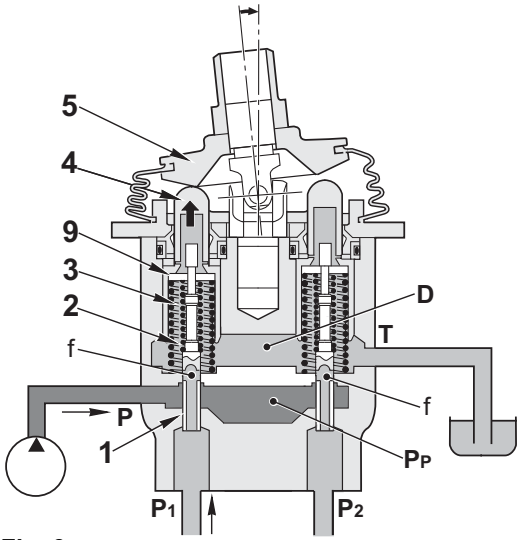
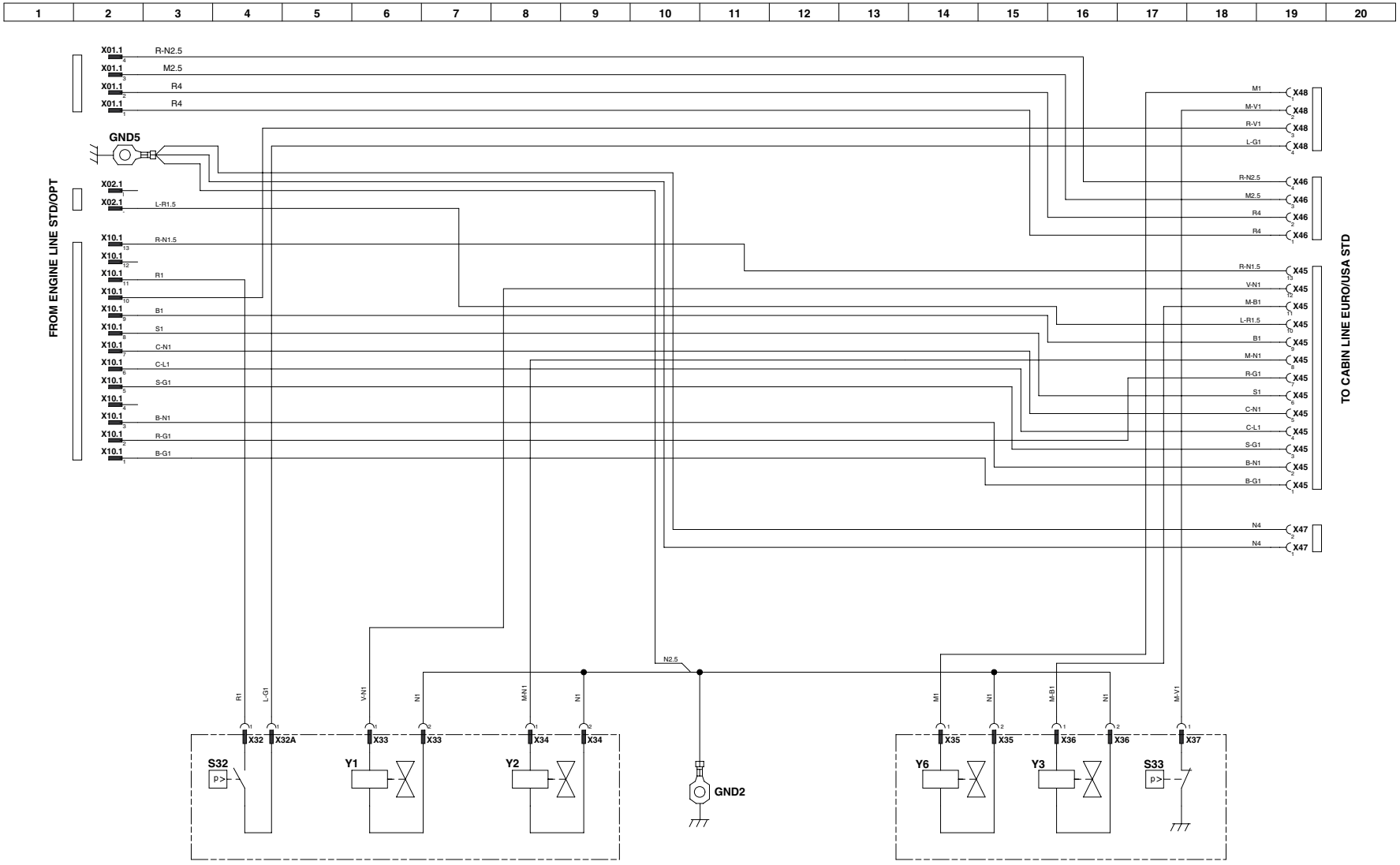
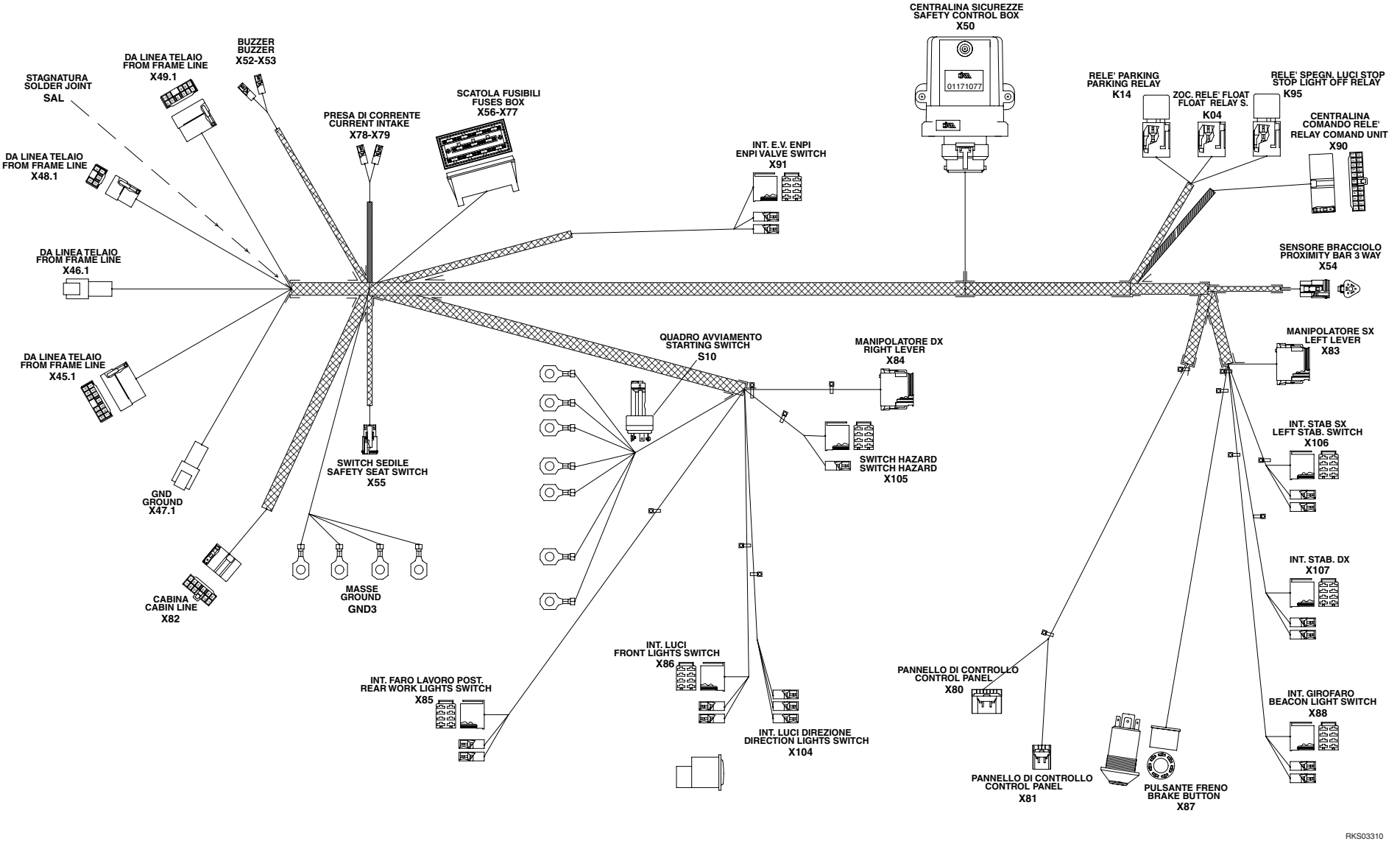


Fig. 3

ELECTRICAL DIAGRAM (FRAME LINE STANDARD) (2/3)



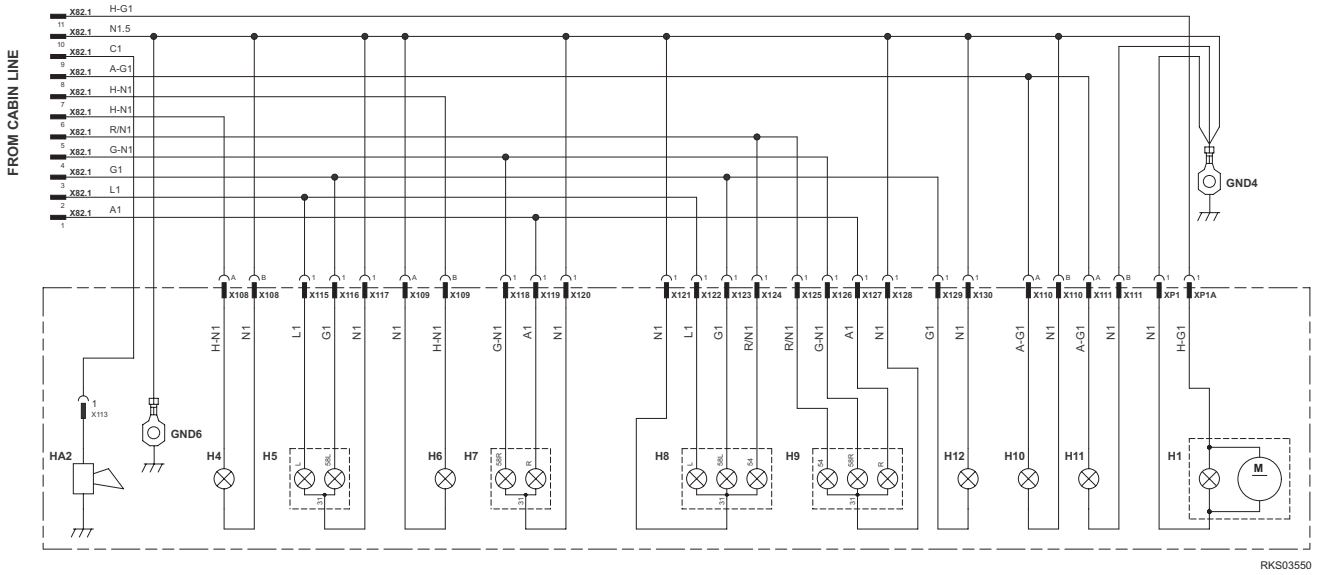
ELECTRICAL DIAGRAM (CABIN LINE OPTIONAL) (1/7)



ELECTRICAL DIAGRAM (TOP-CABIN LIGHT LINE HOMOLOGATION) (2/2)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

= Parts not included in the wiring



COMPONENTS

GND4 Ground ø6 terminal
GND6 Ground ø8 terminal
H1 Beacon light
H4 Left low beam
H5 Left side light
H6 Right low beam
H7 Right side light
H8 Left rear lamp
H9 Right rear lamp
H10 Left rear work light
H11 Right rear work light
H12 Plate light
HA2 Horn
X108 Front low beam 2 way connector
X109 Front low beam 2 way connector
X110 Rear work lights 2 way connector
X111 Rear work lights 2 way connector
X115 Front traffic lights 1 way connector
X116 Front traffic lights 1 way connector
X117 Front traffic lights 1 way connector
X118 Front traffic lights 1 way connector
X119 Front traffic lights 1 way connector
X120 Front traffic lights 1 way connector
X121 Rear traffic lights 1 way connector
X122 Rear traffic lights 1 way connector
X123 Rear traffic lights 1 way connector
X124 Rear traffic lights 1 way connector
X125 Rear traffic lights 1 way connector
X126 Rear traffic lights 1 way connector
X127 Rear traffic lights 1 way connector
X128 Rear traffic lights 1 way connector
X129 Plate light connector
X130 Plate light connector
XP1 Current intake 12v, beacon light
XP1A Current intake 12v, beacon light

PAGE INTENTIONALLY
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6 - After you have loosened the check nuts for the pump (6) and the screws (7), rotate the injection pump (5) outwards or towards the engine.
- To ADVANCE injection, rotate pump (4) outwards.
- To DELAY injection rotate the pump (4) towards the cylinder block.

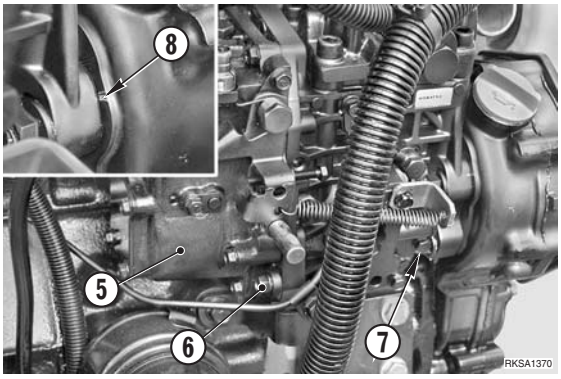
★ Check the extent of the movement on the scale (8).

7 - Lock the nuts (6) that fasten the pump to its block.

★ After adjustment of the fuel injection timing:

8 - Connect the fuel delivery tubes (5) to the pump and replace the clamp (3).

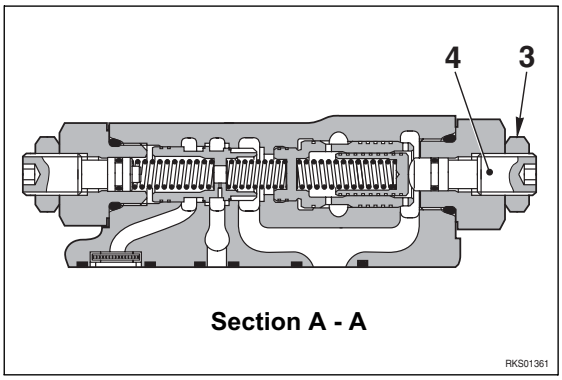
9 - Bleed any air from the fuel circuit.



- **Pressure adjustment at high pressure**

1 - Loosen the nut (3), and adjust the operating pressure of the AS valve (with the engine at 2690±30) using the following procedure:
  - To INCREASE pressure, turn the screw (4) in a CLOCKWISE direction.
  - To REDUCE pressure, turn the screw (4) in a COUNTER-CLOCKWISE direction.

  ★ Rotating the screw by one turn (4) will vary pressure by 1.47 bar.



3 - Tighten the nut (3) and check that the working pressure remains within permissible limits.

Nut: 34.3–58.8 Nm

30 REMOVAL AND INSTALLATION

STARTING MOTOR

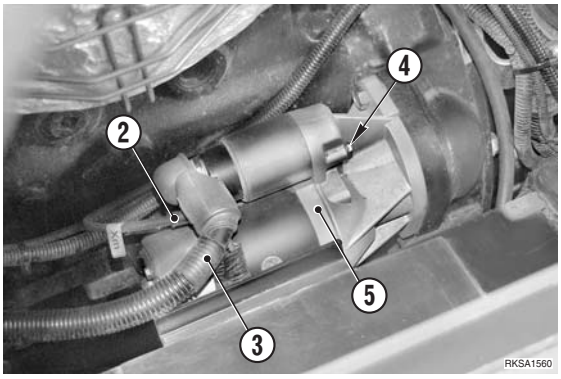
Removal

1 - Tilt the cab and secure it in its safety position.

2 - Remove the battery (1).
(For details, see "BATTERY")

3 - Disconnect the cables (2) and (3).

4 - Loosen the screws (4) and take out the starting motor (5).

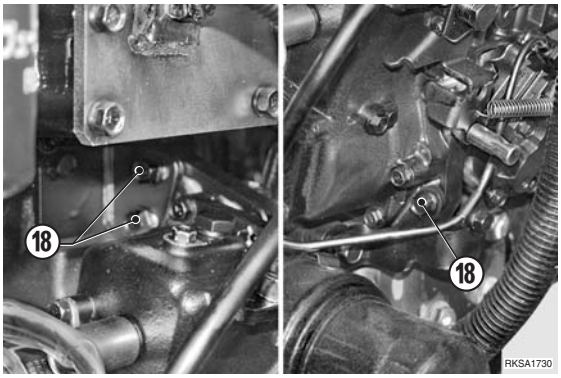


Installation

- To install, reverse removal procedure.

11- Loosen three screws (18) and remove the complete injection pump (4) with its O-ring (19).

[*6]



Installation

- To install, reverse the removal procedure.

[*1]

★ Check accelerator cable travel.
(See "20 TESTING AND ADJUSTMENTS" for details).

[*2]

High pressure pipe: 19.6-24.5 Nm

[*3]

Cover contact surface
liquid gasket

Fan screws: 22.6-28.4 Nm

[*4]

★ Align marks between gears before installing pump and nut.

Nut: 113-123 Nm

[*5]

Pump clamping nut:..... Nm

★ Check injection point timing.
(See "20 TESTING AND ADJUSTMENTS" for details).

[*6]

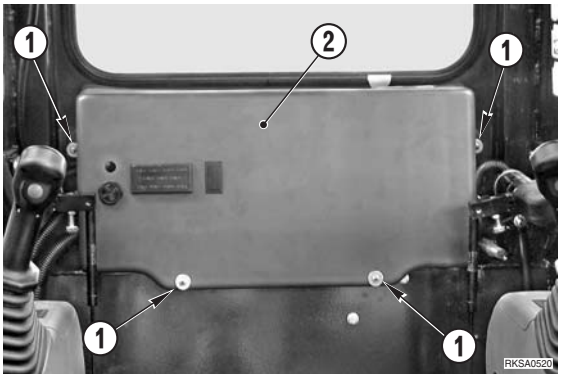
Pump screws: 22.6-28.4 Nm

CAB

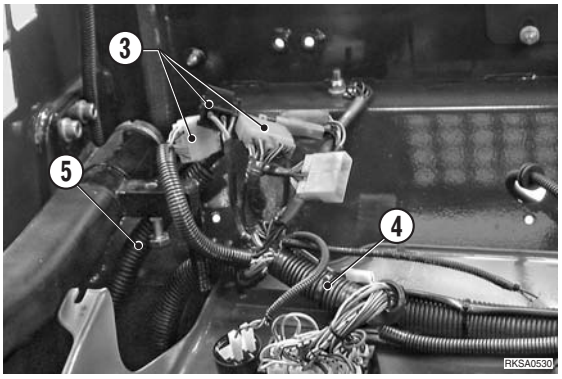
Removal

1 - Remove the complete attachments.
(For details, see "COMPLETE WORKING EQUIPMENT").

2 - Loosen the nuts (1) and tilt the rear panel (2) towards the front of the machine.



3 - Disconnect the connectors (3) from the cab cabling (4) and release the engine cabling (5) from its retaining clamps.

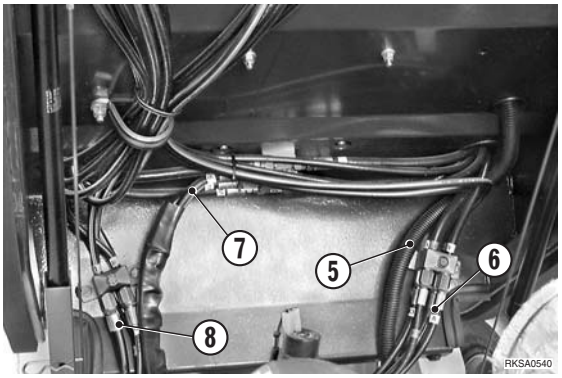


4 - Tilt the cab. (For details, see "CAB" - «Dump »).

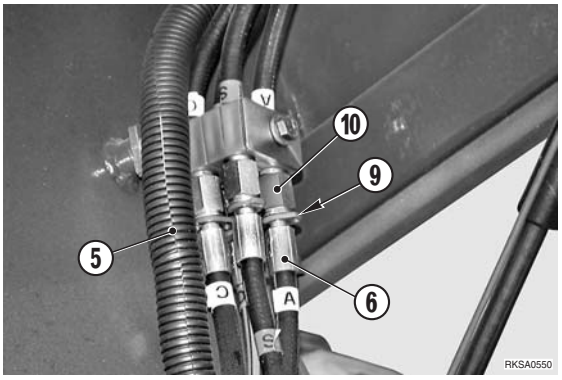
5 - Disconnect the four pipes (6) on the RH side, the two servo-control feed-pipes (7) and the four pipes (8) on the LH side.

★ To disconnect the pipes, remove the retainer (9) push the pipe (6) completely inside the union (10) and extract the pipe (6).
Then, mount the retainer (9) on the pipe (6).
[*1]

★ Mark the hoses to avoid mixing them during re-assembly.



6 - Pull out the cab cabling (5).



Installation

- To install, reverse removal procedure.

[*1]

Flange screws: 80 Nm

Flange screws: Loctite 262

Pump shaft: Lithium EP MS2 NLGI 2

[*2]

Pump screws: 195 Nm

Pump screws: Loctite 262

1 - Fill the tank up to maximum level.

Hydraulic oil requirement: approx. 32 ℓ

Bleed the air from the pump.
(For details, see "20 TESTING AND ADJUSTMENTS").

2 - Start the engine to circulate the oil and check that there are no leaks.

3 - Stop the engine, check the levels and, if necessary, top them up.

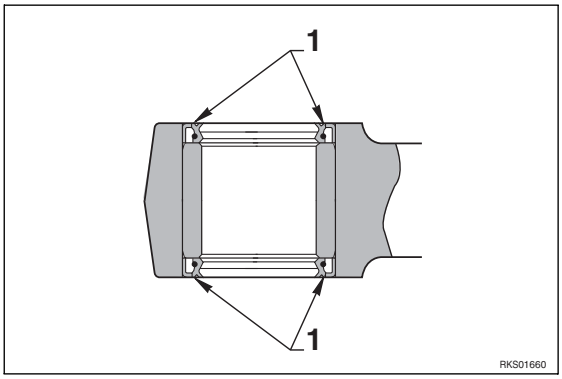
4 - Bleed the air from the hydraulic circuits and pressurise the tank.
(For details, see "20 TESTING AND ADJUSTMENTS").

WORK EQUIPMENT CYLINDERS

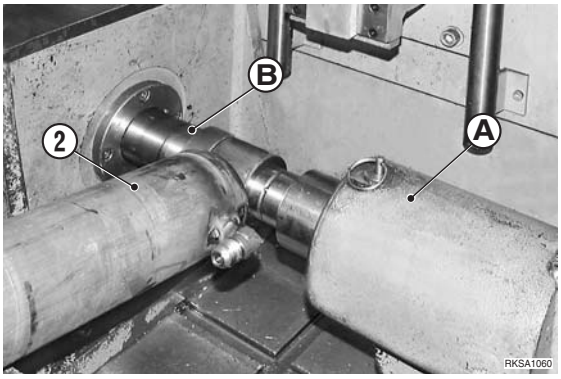
Disassembly

1 - Take off the guard rings (1) from both sides of the cylinder and from the piston rod.

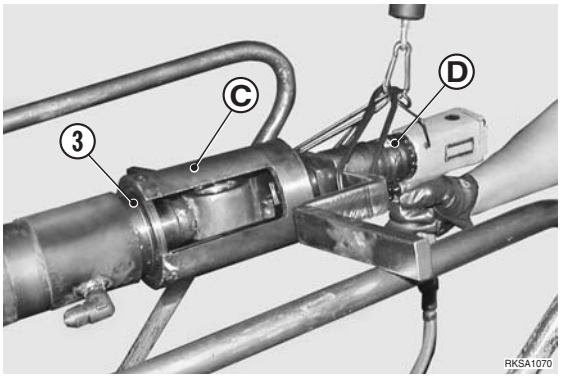
★ Make sure that the tube unions are not plugged.



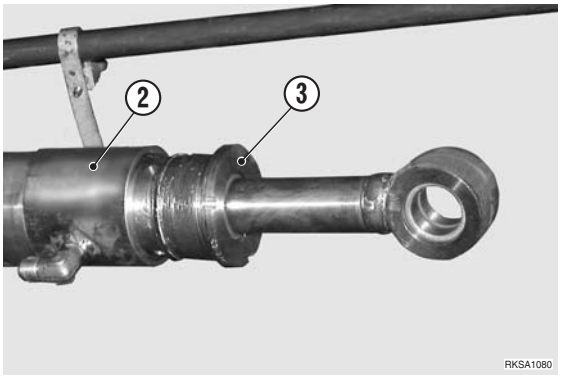
2 - Place the cylinder (2) on the apparatus **A**. Engage the cylinder in the tools **B**, having the same bushing diameter.



3 - Attach the special wrench **C** (adjusted to fit the cylinder) to the head (3) and apply the dynamometric tool **D**.



4 - Unscrew the head (3) and extract it completely from the cylinder (2).



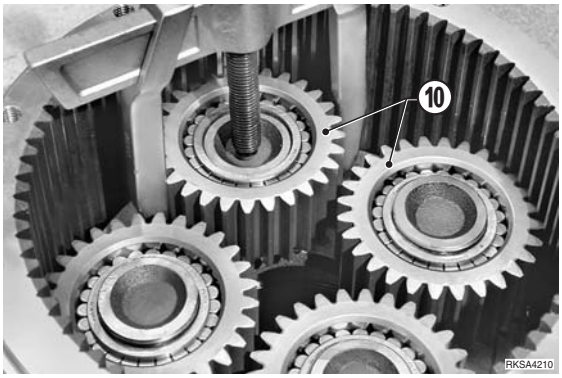
Installation

- To install, reverse removal procedure.

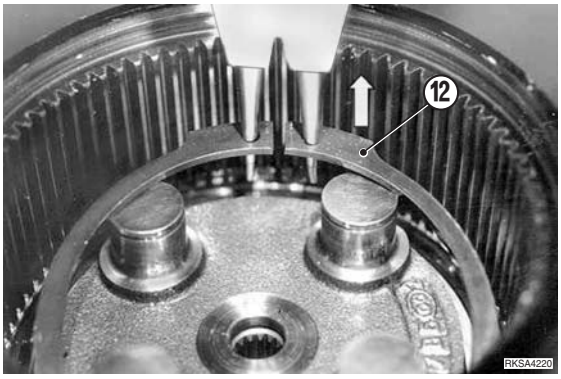
[*1]

★ Adjust track tension.
(For details, see "20 TESTING AND ADJUSTMENTS").

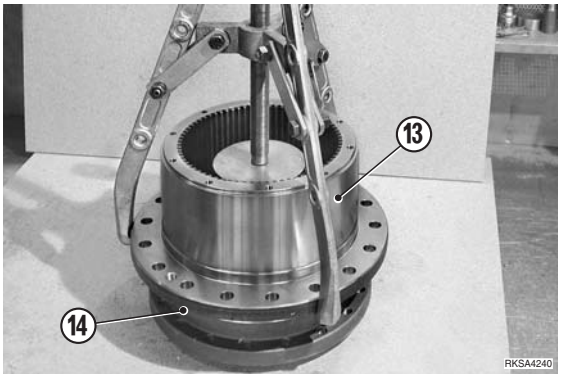
9 - Remove the side gears (10) (4 pcs.) together with bearings (11).



10 - Remove snap ring (12).



11 - Remove the complete housing (13) from the drive motor (14).



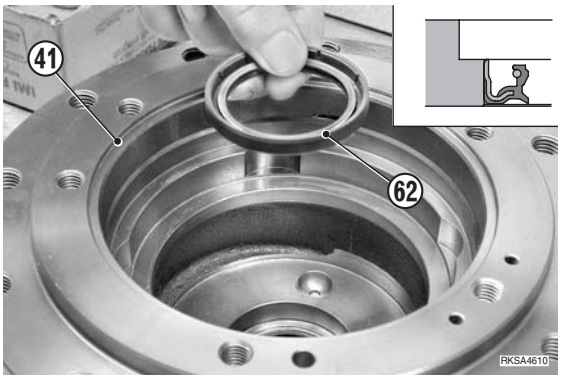
12– Remove the first ring of packing (15) from drive motor (14).

Assembly

1 - Install grommet (62) to flanged hub (41) so it is flush with the hub.

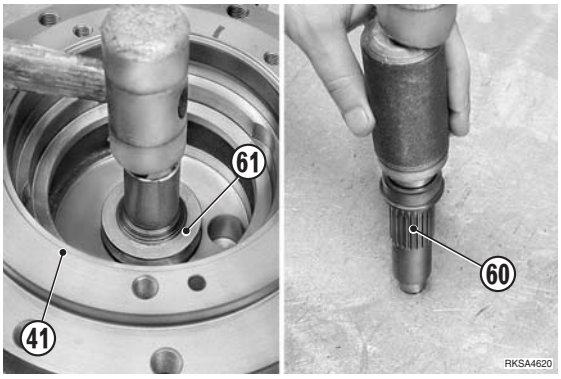
★ Pay attention to grommet orientation.

Grommet lip: grease

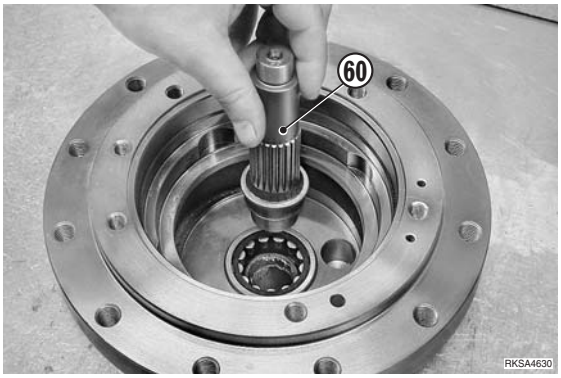


2 - Install the outer ring of bearing (61) to the flanged hub (41) and install the inner ring to the drive shaft (60).

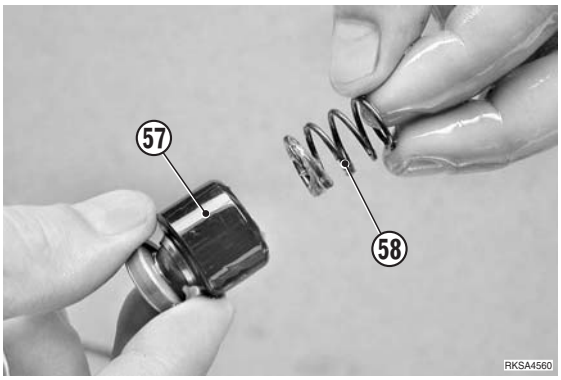
★ Pay attention to ring orientation.



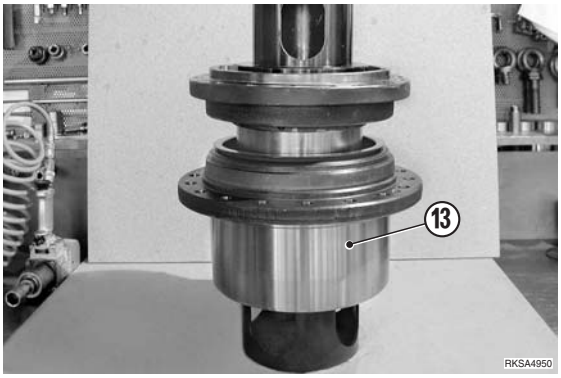
3 - Install the complete drive shaft (60).



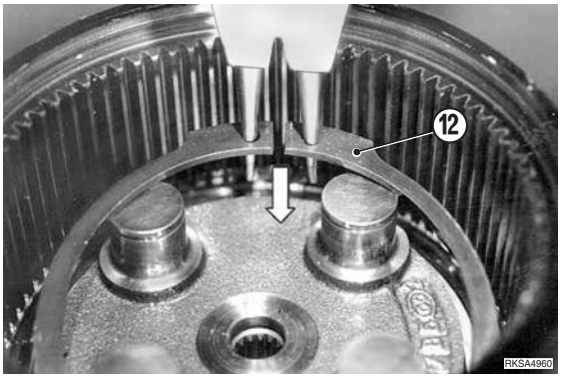
4 - Install springs (58) to pistons (57).



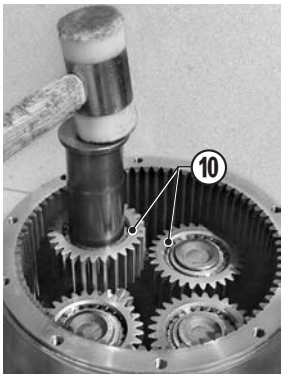
42 - Using a press and a suitable push rod, complete the assembly of the motor (13).

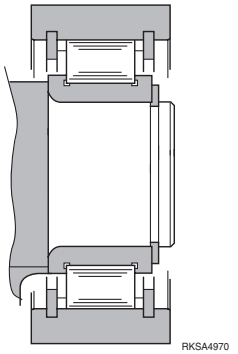


43 - Lock motor (13) in place using snap ring (12).

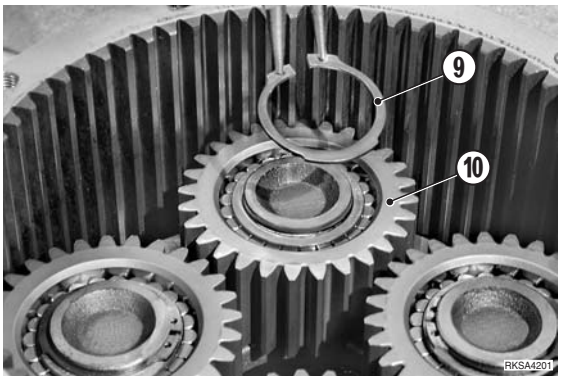


44 - Install the complete side gears (10) (4 pcs.).

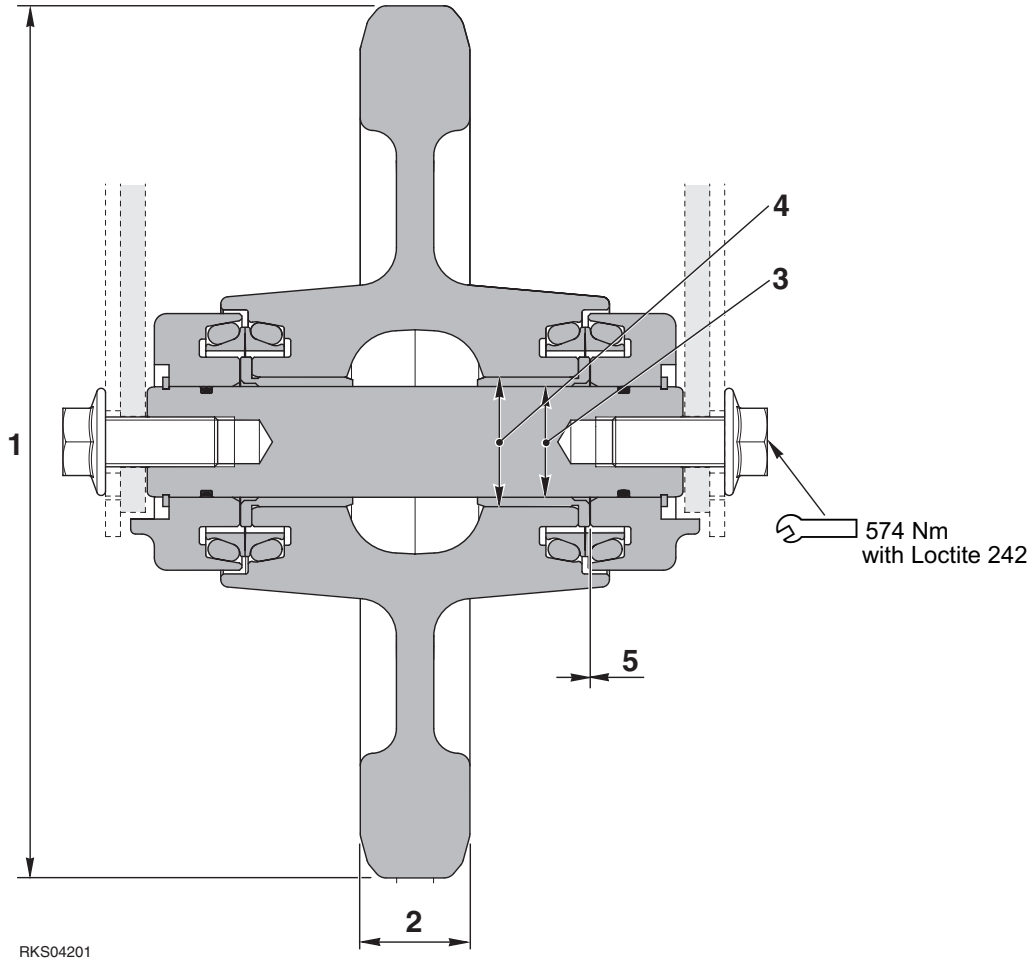




45 - Lock gears (10) in place using snap rings (9).

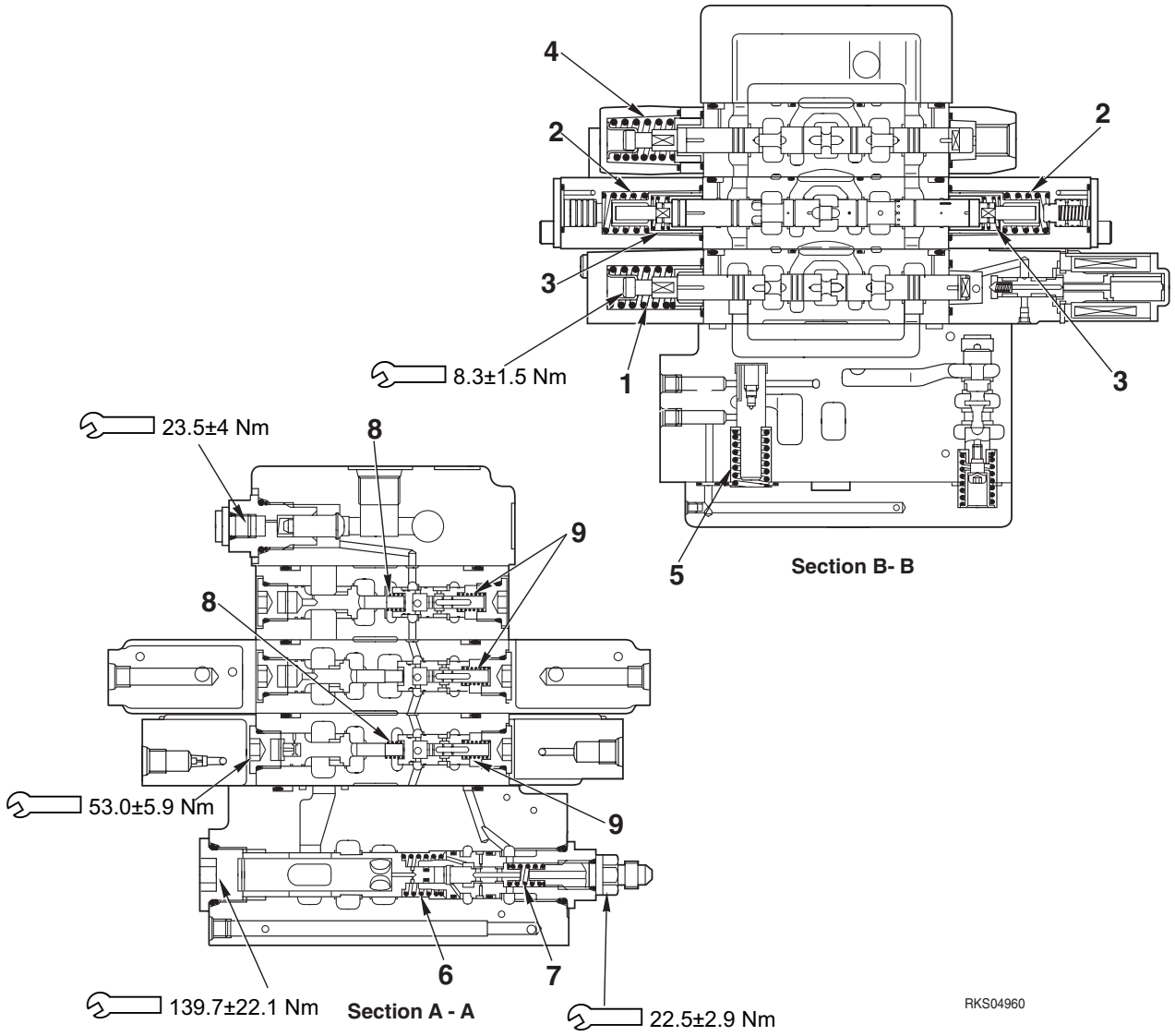


REAR IDLER WHEEL



Unit: mm

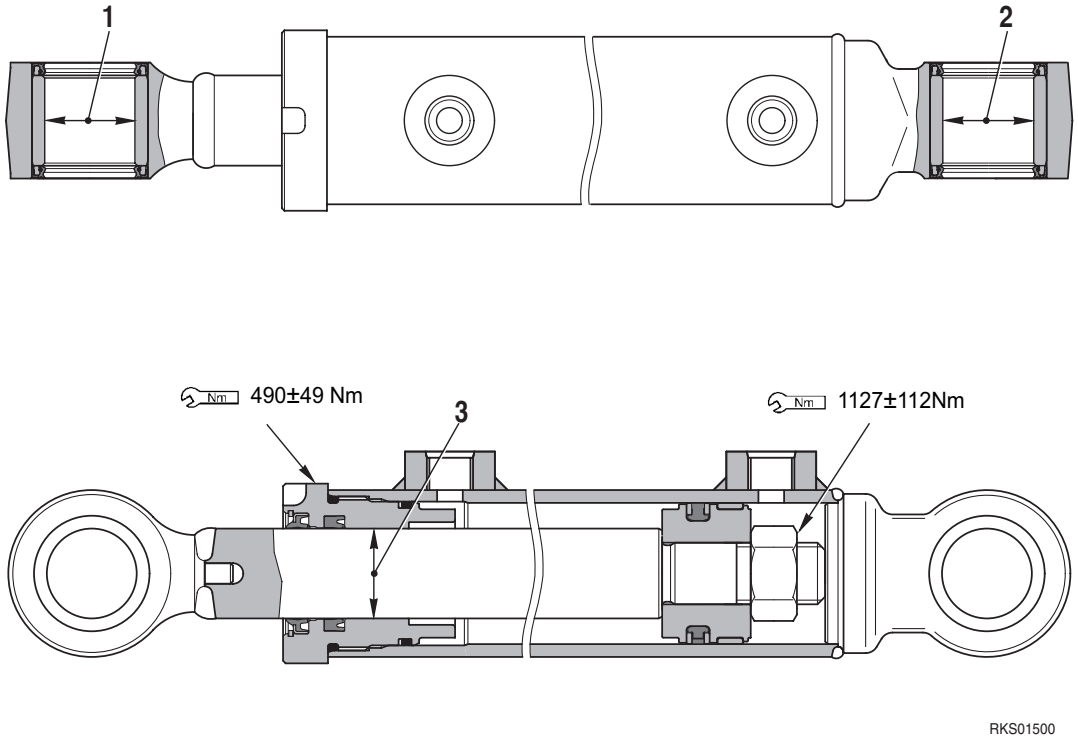
No.	Check item	Criteria					Remedy
		Standard size			Repair limit		Reconstruct by welding or replace
1	Outer diameter	350			–		
2	Track guide width	44			20		
3	Clearance between shaft and bushings	Standard size	Tolerance		Minimum clearance	Clearance limit	Replace
			Shaft	Hole			
4	Interference between bushing and roller						
5	Roller float	Standard size		Clearancelimit			Replace bushing



Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
		Free installed x Øe	Installed length	Installed load	Free length	Installed load	
1	Spool return spring (lift arm)	28.8x17.1	26.8	38.2 N	–	30.6 N	Replace springs. If there are damage or deformation
2	Spool return spring (bucket)	26.3x17.7	18.5	176.5 N	–	141.2 N	
3	Spool return spring (bucket)	21.6x14.8	10	38.7 N	–	31.0 N	
4	Spool return spring (ATT)	28x11.5	24.5	137.3 N	–	109.8 N	
5	Spring of series - parallel circuit switching valve	38.3x15.2	24	161.8 N	–	129.5 N	
6	Spring of unload valve	32.9x18.2	18	74.0 N	–	59.2 N	
7	Spring of unload valve	18.7x9.3	16	3.4 N	–	2.7 N	
8	Spring of pressurecompensation valve	15.4x6	13	2.5 N	–	2.0 N	
9	Spring of pressurecompensation valve	20x8.4	12	6.9 N	–	5.5 N	

CYLINDERS



Unit: mm

N°	Check item	Cylinder	Criteria					Remedy
			Standard size	Tolerance		Minimum clearance	Clearance limit	
				Shaft	Hole			
1	Tolerance between bushing and piston rod mounting pin	Lifting bucket	35	–0.01 –0.05	+ 0.072 + 0.134	0.082– 0.184	1.0	Replace bushing
		Tilt bucket	35	–0.01 –0.05	+ 0.072 + 0.134	0.082– 0.184	1.0	
2	Tolerance between bushing and cylinder mounting pin	Lifting bucket	35	–0.01 –0.05	+ 0.072 + 0.134	0.082– 0.184	1.0	
		Tilt bucket	35	–0.01 –0.05	+ 0.072 + 0.134	0.082– 0.184	1.0	
3	Tolerance between piston rod and cylinder head	Lifting bucket	40	–0.025 –0.087	+ 0.039 + 0	0.025– 0.126	0.426	Replace head
		Tilt bucket	35	–0.025 –0.087	+ 0.039 + 0	0.025– 0.126	0.426	