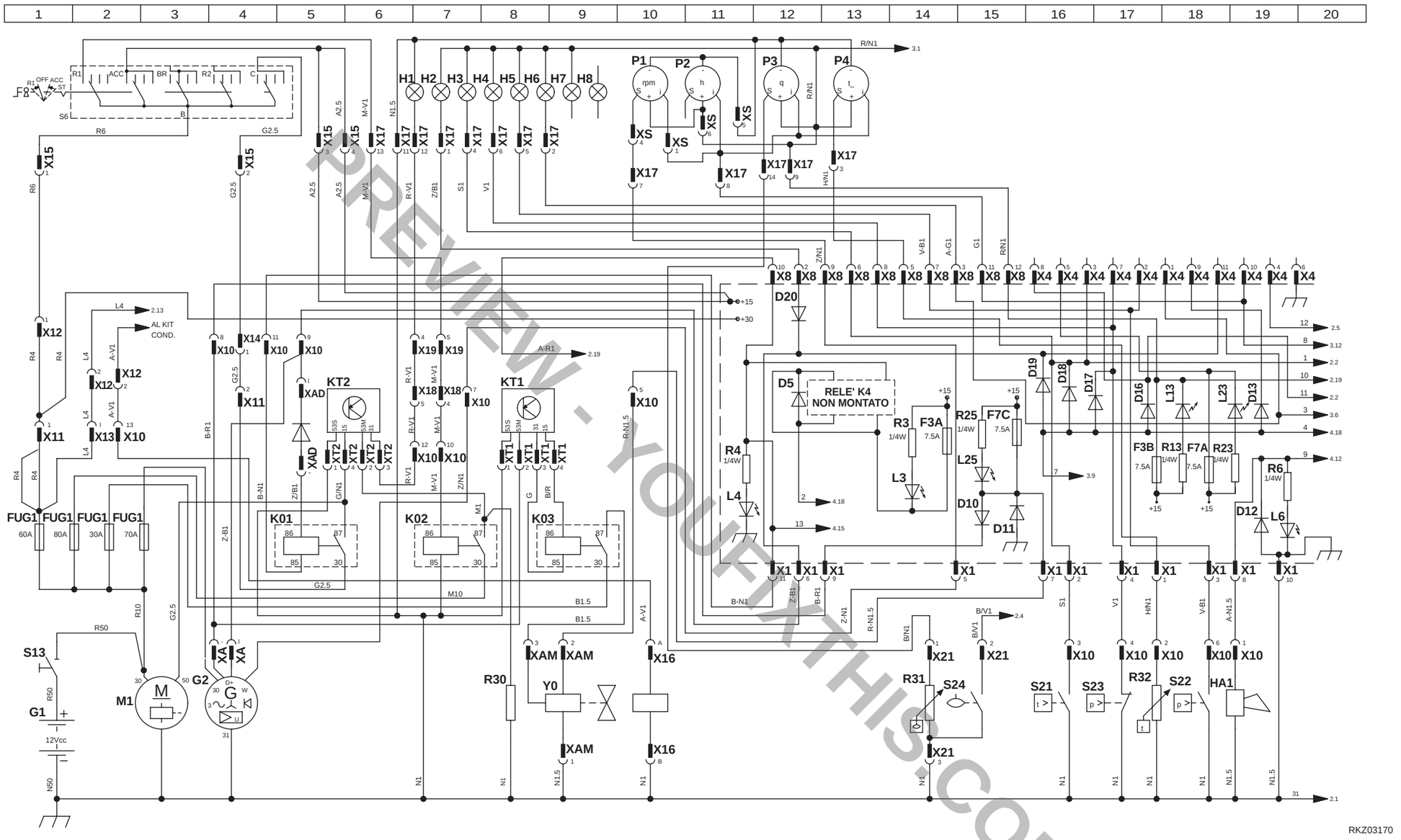
ELECTRICAL DIAGRAM (1/5)



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COMPONENTS

G1 - Battery
G2 - Alternator
H1 - Preheating warning light
H2 - Generator warning light
H3 - Engine water high temperature warning light
H4 - Air filter warning lamp
H5 - Hydraulic oil filter warning lamp
H6 - Optional warning lamp
H7 - Optional warning lamp
H8 - Optional warning lamp
HA1 - Horn
K01 - Starting relay
K02 - Preheating relay
K03 - Fuel shut off relay
KT1 - Fuel shut off timer
KT2 - Preheating timer
M1 - Starter motor
P1 - RPM instrument
P2 - Hour counter
P3 - Fuel level indicator
P4 - Water temperature instrument
R30 - Preheater
R31 - Fuel level sender
R32 - Water temperature sender
S13 - Battery stop switch
S21 - Engine water high temperature switch
S22 - Air filter blocked switch
S23 - Engine oil low pressure switch
S24 - Fuel gauge
Y0 - Fuel shut off solenoid valve

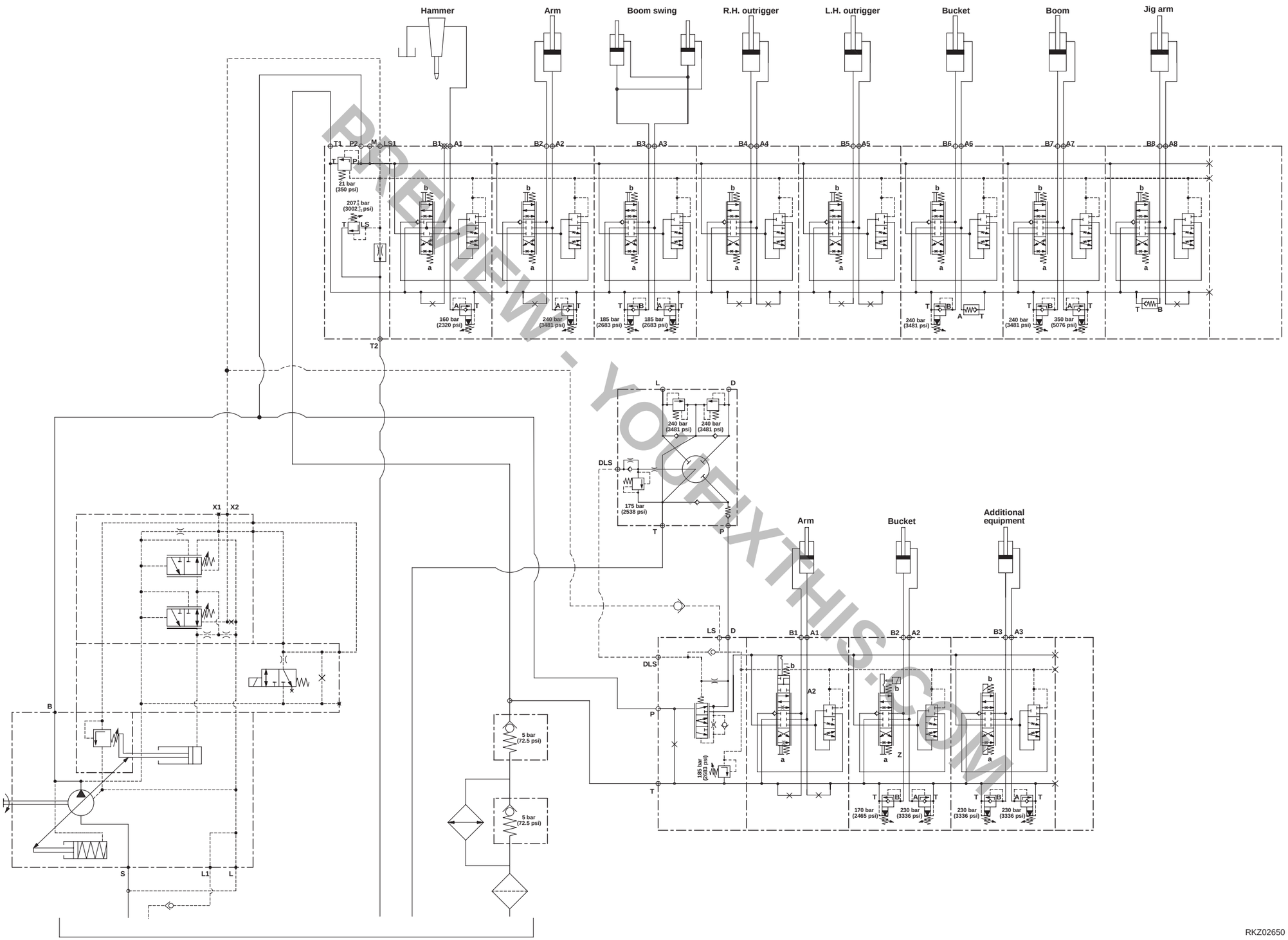
CONNECTORS

X1 - 11-ways connector front line (engine)
X4 - 11-ways connector monitor
X8 - 17-ways connector lateral dashboard
X10 - 13-ways connector front line - engine line
X11 - 3-ways connector power
X12 - 3-ways connector front line - cross line
X13 - 2-ways connector front line - engine line
X14 - 4-ways connector front line - cross line
X15 - 4-ways connector start key
X16 - 2-ways connector conditioner clutch
X17 - 21-ways connector lateral dashboard
X18 - 5-ways connector power box
X19 - 9-ways connector front dashboard
X21 - 3-ways connector fuel level indicator
XA - 2-ways connector alternator
XAD - 2-ways connector diode
XAM - 3-ways connector shut off valve
XS - 6-ways connector instrument
XT1 - 4-ways connector timer stop engine
XT2 - 4-ways connector timer preheater

FUSES

F3A - Starting fuse 7.5A
F3B - Switch + warning light fuse 7.5A
F7A - Monitor fuse 7.5A
F7C - Fuel shut off fuse 7.5A
FUG1 - General fuse 60A

HYDRAULIC CIRCUIT (WB140-2)



RKZ02650

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Nm

STANDARD TIGHTENING TORQUE

The following charts give the stardard tightening torques of bolts and nuts. Exceptions are given in sections of «**Disassembly and Assembly**».

1. STANDARD TIGHTENING TORQUE OF BOLTS AND NUT

Thread diameter of bolts (mm)	Pitch of bolts (mm)	Width across flat (mm)		8.8			10.9		
				kgm	Nm	lb. ft.	kgm	Nm	lb. ft.
6	1	10	5	0.96±0.1	9.5±1	7±0.74	1.3±0.15	13.5±1.5	10±1
8	1.25	13	6	2.3±0.2	23±2	17±1.5	3.2±0.3	32.2±3.5	24±2.6
10	1.5	17	8	4.6±0.5	45±4.9	6.5±0.6	6.5±0.6	63±6.5	47±4.8
12	1.75	19	10	7.8±0.8	77±8	11±1	11±1	108±11	80±8
14	2	22	12	12.5±1	122±13	17.5±2	17.5±2	172±18	127±13
16	2	24	14	19.5±2	191±21	141±15	27±3	268±29	198±22
18	2.5	27	14	27±3	262±28	194±21	37±4	366±36	270±26
20	2.5	30	17	38±4	372±40	275±30	53±6	524±57	387±42
22	2.5	32	17	52±6	511±57	377±42	73±8	719±80	531±59
24	3	36	19	66±7	644±70	475±52	92±10	905±98	668±72
27	3	41	19	96±10	945±100	698±74	135±15	1329±140	980±103
30	3.5	46	22	131±14	1287±140	950±103	184±20	1810±190	1336±140
33	3.5	50	24	177±20	1740±200	1282±147	250±27	2455±270	1809±199
36	4	55	27	230±25	2250±250	1658±184	320±35	3150±350	2321±258
39	4	60	–	295±33	2900±330	2137±243	410±45	4050±450	2985±332

This torque table does not apply to bolts or nuts which have to fasten nylon or other parts non-ferrous metal washer.

★ Nm (Newton meter): 1 Nm = 0.102 kgm (0.737 lb.ft.)

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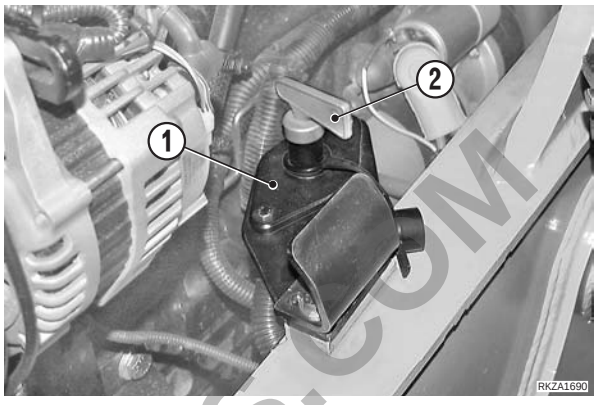
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REMOVAL OF THE STARTING MOTOR

⚠ Fully raise the front working equipment and engage the safety stop.

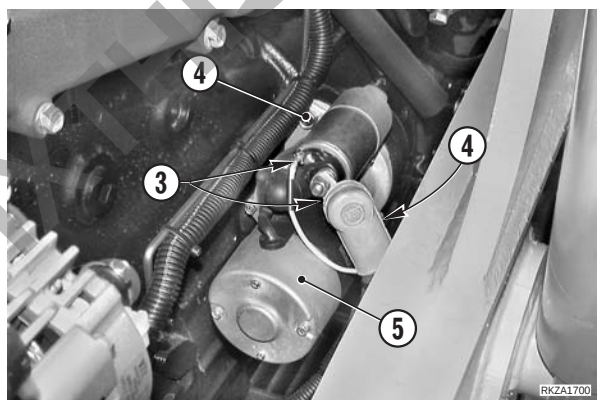
1 - Stop the engine and engage the parking brake.

⚠ Cut off the supply of electricity by turning the accumulator-disconnecting switch (1) in a counter-clockwise direction, and remove the handle (2).



2 - Disconnect the electric wiring (3).

3 - Loosen the two screws (4) and remove the starting motor (5). ※1



INSTALLATION OF THE STARTING MOTOR

- To install, reverse the removal procedure.

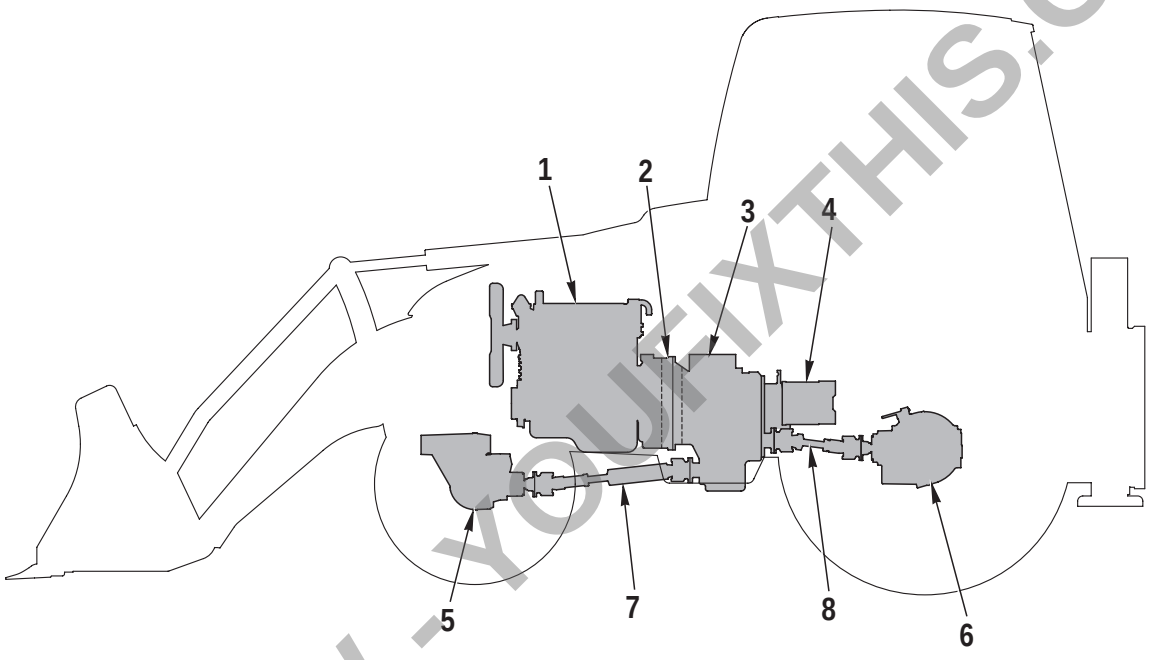
※1

Nm Starting motor mounting screws:
78.4 – 98 Nm (57.7 – 72.2 lb.ft.)

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POWER TRAIN



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DESCRIPTION

- The driving power for the engine (1) is transmitted through the flywheel to the converter (2).
  The converter (2) uses hydraulic oil to convert the torque transmitted by the engine (1) into driving power. The converter (2) transmits motion to the drive shaft of the transmission (3) and to the drive shaft of the hydraulic pump (4).
- The transmission (3) has two hydraulically-activated clutches that can be selected by an electrically-controlled gear selector. It also has manual gear selection (four forward gears and four reverse gears).
- The driving power is transmitted from the transmission flanges (3) to the front (5) and rear (6) axles through the Cardan drive shafts (7 and 8).
- The driving power transmitted to the front (5) and rear (6) axles is reduced by the differentials and then transmitted to the planetary gear through the differential shafts.

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The affected pages are indicated by the use of the following marks. It is requested that necessary actions be taken to these pages according to table below.

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○	Page to be newly	Add
●	Page to be replaced	Replace
( )	Page to be delete	Discard

Pages having no marks are those previously revised or made additions.

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IMPORTANT SAFETY NOTICE

Proper service and repair is extremely important for the safe operation of your machine.
The service and repair techniques recommended by Komatsu and described in this manual are both effective and safe methods of operation. Some of these operations require the use of tools specially designed by Komatsu for the purpose.

To prevent injury to workers, the symbols ⚠ and ⚠ are used to mark safety precautions in this manual. The cautions accompanying these symbols should always be carefully followed. If any danger arises or may possibly arise, first consider safety, and take necessary precautions.

SAFETY

GENERAL PRECAUTIONS

Mistakes in operation extremely dangerous.
Read all the Operation and Maintenance Manual carefully BEFORE operating the machine.

1. Before carrying out any greasing or repairs, read all the precautions written on the decals which are stuck on the machine.
2. When carrying out any operation, always wear safety shoes and helmet. Do not wear loose work clothes, or clothes with buttons missing.
   - Always wear safety glasses when hitting parts with a hammer.
   - Always wear safety glasses when grinding parts with a grinder, etc.
3. If welding repairs are needed, always have a trained, experienced welder carry out the work. When carrying out welding work, always wear welding gloves, apron, glasses, cap and other clothes suited for welding work.
4. When carrying out any operation with two or more workers, always agree on the operating procedure before starting. Always inform your fellow workers before starting any step of the operation. Before starting work, hang UNDER REPAIR signs on the controls in the operator's compartment.
5. Keep all tools in good condition and learn the correct way to use them.
6. Decide a place in the repair workshop to keep tools and removed parts. Always keep the tools and parts in their correct places. Always keep the work area clean and make sure that there is no dirt or oil on the floor.
   Smoke only in the areas provided for smoking. Never smoke while working.

PREPARATIONS FOR WORK

7. Before adding or making any repairs, park the machine on hard, level ground, and block the wheels to prevent the machine from moving.
8. Before starting work, lower ourigger, bucket or any other work equipment to the ground. If this is not possible, use blocks to prevent the work equipment from falling down. In addition, be sure to lock all the control levers and hang warning sign on them.
9. When disassembling or assembling, support the machine with blocks, jacks or stands before starting work.
10. Remove all mud and oil from the steps or other places used to get on and off the machine. Always use the handrails, ladders or steps when getting on or off the machine.
    Never jump on or off the machine.
    If it is impossible to use the handrails, ladders or steps, use a stand to provide safe footing.

PRECAUTIONS DURING WORK

11. When removing the oil filler cap, drain plug or hydraulic pressure measuring plugs, loosen them slowly to prevent the oil from spurting out.
    Before disconnecting or removing components of the hydraulic circuit and engine cooling circuit, first remove the pressure completely from the circuit.
12. The water and oil in the circuits are very hot when the engine in stopped, so be careful not to get burned.
    Wait for the oil water to cool before carrying out any work on the cooling water circuits.

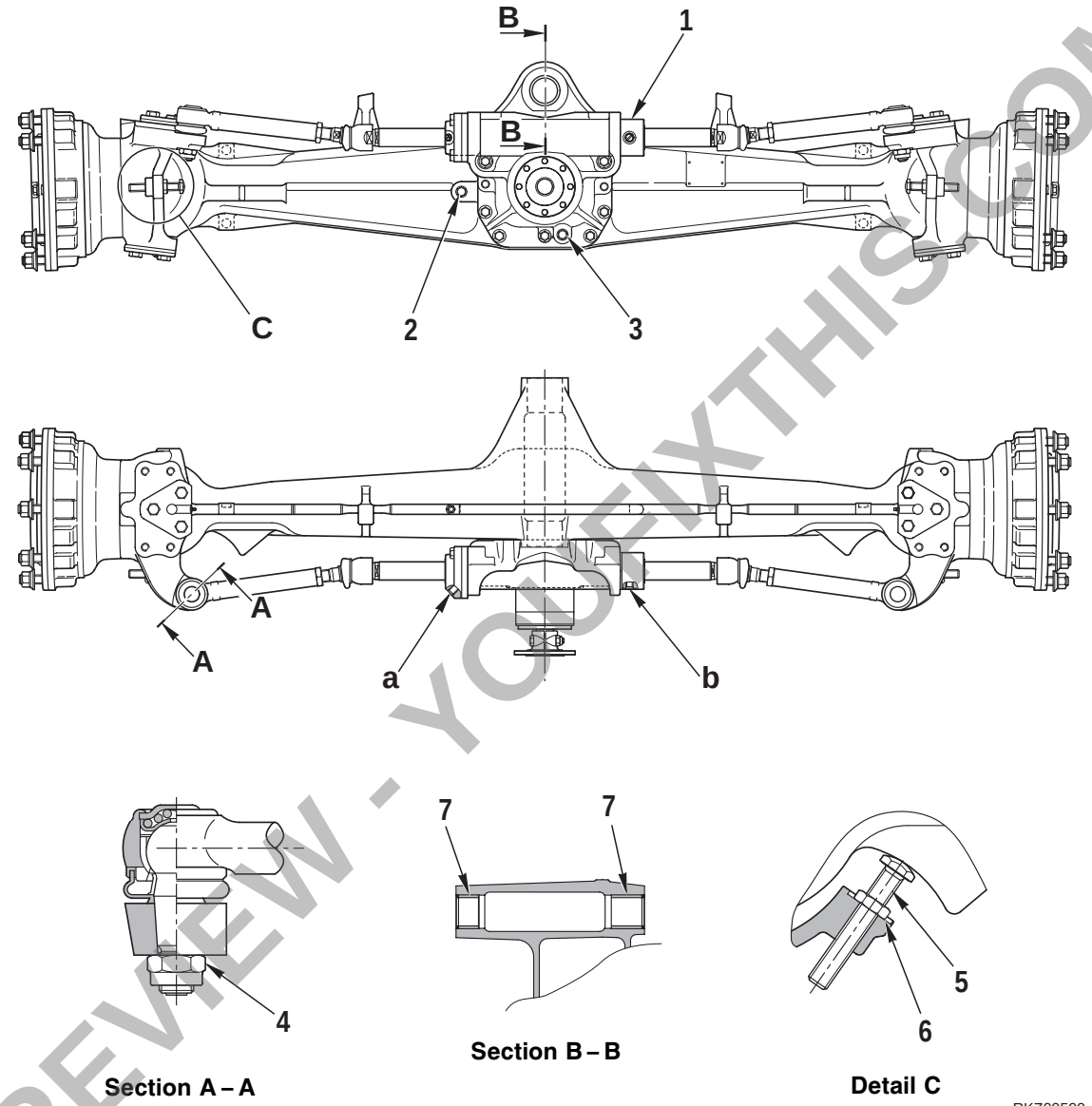
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Steering cylinder



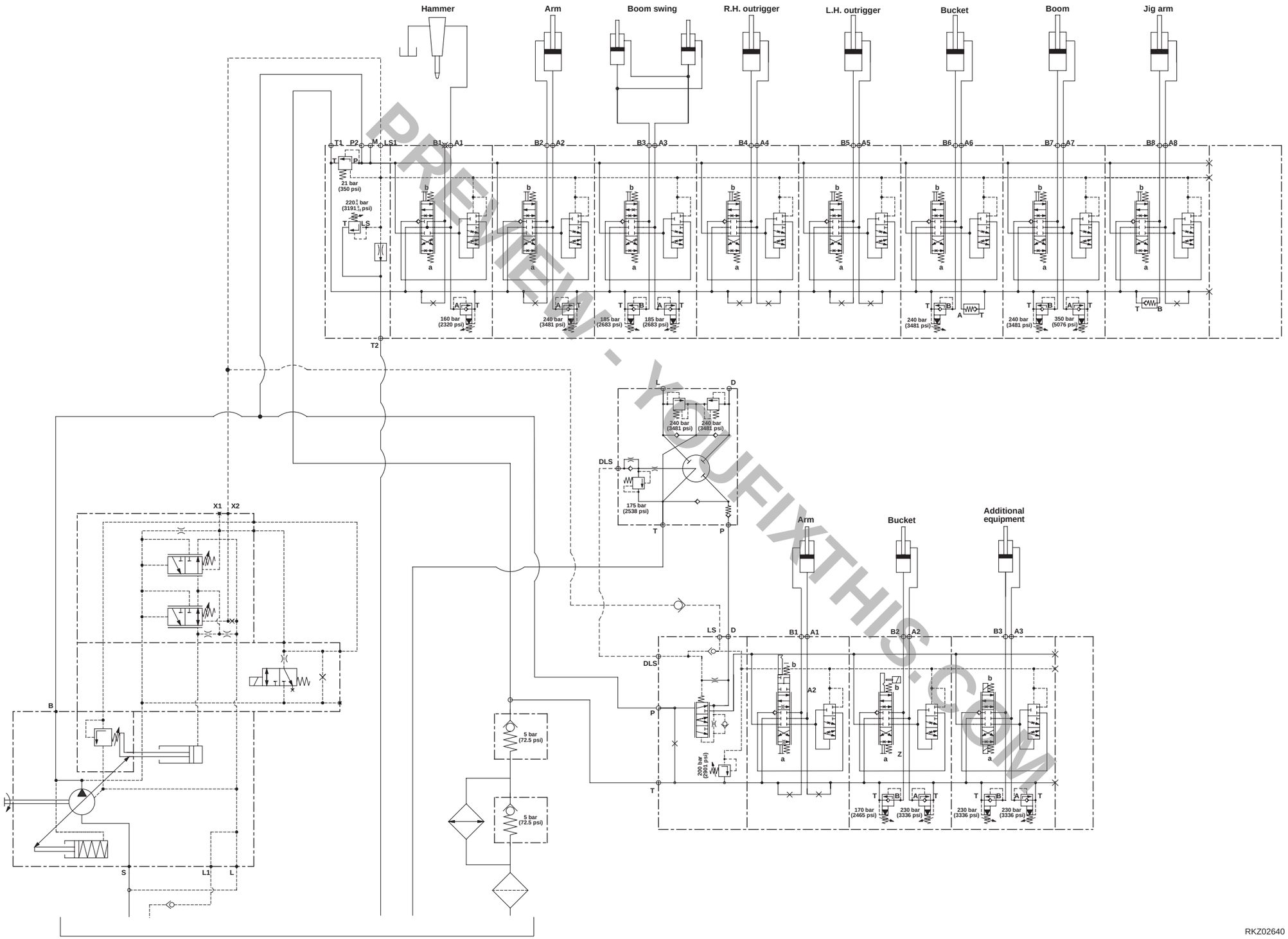
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1. Steady pin
2. Oil refilling plug
3. Oil drain plug
4. Nut
5. Adjustment screw
6. Nut

Port a - From the steering unit (Port L)
Port b - From the steering unit (Port R)

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HYDRAULIC CIRCUIT (WB150-2)

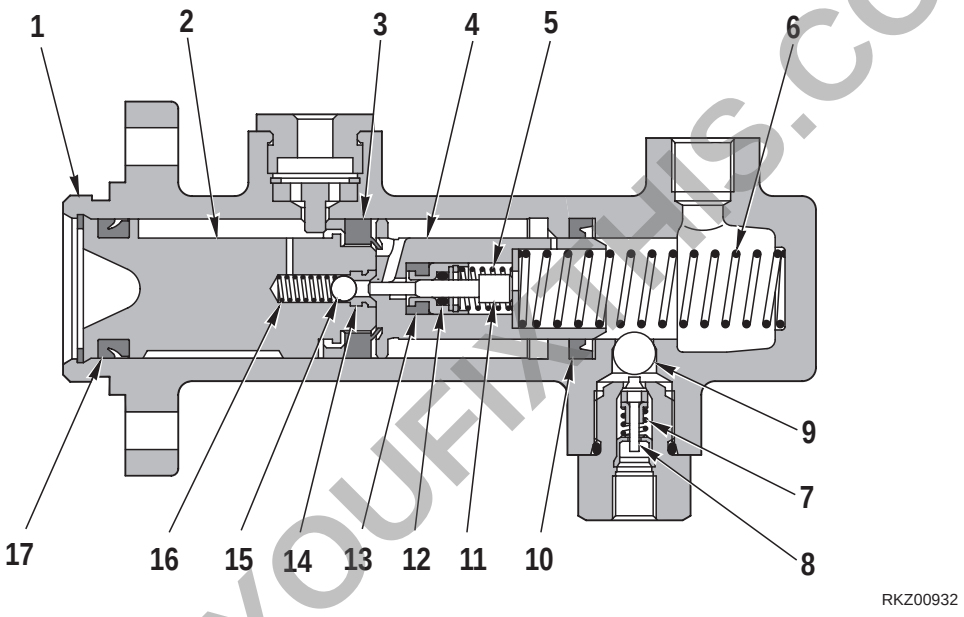


RKZ02640

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BRAKE PUMP



1. Pump body
2. Main piston
3. Seal
4. Differential piston
5. Spring
6. Pump spring
7. Spring
8. Check valve
9. Ball
10. Seal
11. Pin
12. Seal
13. Seal
14. Seal
15. Ball
16. Spring
17. Seal

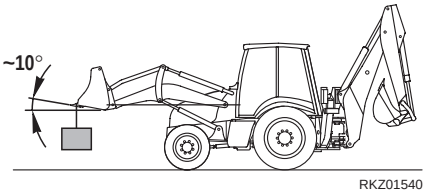
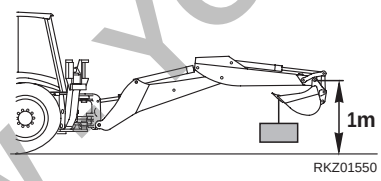
CHARACTERISTICS:

Stroke:	36 mm (1.42 in.)
Displacement:	15 – 28 cc
Max. pressure:	150 bar (2175 psi)

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• FOR MACHINE

Machine model					WB140-2 (ASPIRATED)	
Classification	Check item		Test conditions	Unit	Standard value	Permissible value
Hydraulic drift working equipment	Front bucket	Complete working equipment (Tip lowering of bucket teeth)	Measuring posture  RKZ01540	mm (in)	250 (10)	400 (16)
		Cylinders (cylinder in)	• In this position check in feedback of each cylinder and the leakage with applied load on the tip of bucket teeth. • Ground level. • Bucket: normal load (1500 kg) (3300 lb.) • Engine stopped • Oil temperature: 45 – 55°C (113 – 131°F) • Check measures as soon as engine stops. • Check changes every 5 min. and the total change in 15 min.		30 (1.2)	45 (1.7)
		Bucket cylinder (cylinder in)			15 (0.6)	25 (1.0)
	Backhoe	Complete working equipment (Tip lowering of bucket teeth)	Measuring posture  RKZ01550	mm (in.)	300 (12)	450 (18)
		Boom cylinders (cylinder out)	• In this position check the extension of each cylinder and the leakage with normal load on the bucket. • On level ground. • Bucket : normal load (450 kg) (990 lb.) • Engine stopped • Oil temperature: 45 – 55°C (113 – 131°F) • Check measures as soon as engine stops. • Check changes every 5 min. and the total change in 15 min.		35 (1.4)	50 (2.0)
		Arm cylinder (cylinder out)			15 (0.6)	25 (1.0)
		Bucket cylinder (cylinder in)			10 (0.4)	15 (0.6)

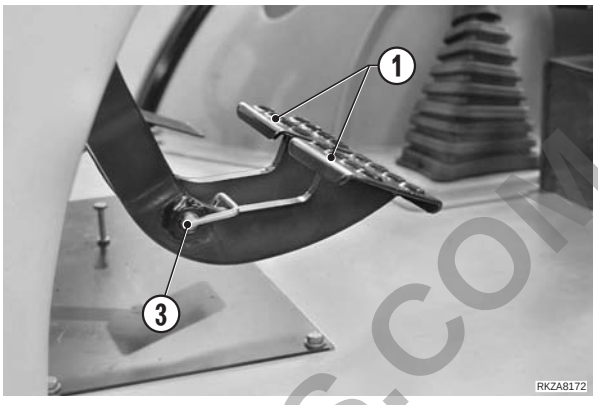
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ADJUSTING BRAKE PEDAL TRAVEL, BRAKE ALIGNMENT, MICROSWITCHES

★ Working condition:
- Engine stopped
- Machine with attachments on ground level and blocks under wheels.
- Release the residual pressure.
- Insert the safety pin of the front bucket control lever and the safety lever of the backhoe levers.
- Release parking brake.

1 - Check that pedal (1) is near to the stopper (2) and the pedals sides (1) are at "**A**" measure from cab. If necessary, adjust acting on the stopper (2).
★ "**A**" measure: 313±3 mm (12.33±0.12 in.).
★ Check that pin (3) can freely run and lock the two pedals (1) together.



Master cylinder rod adjustment

2 - Loosen nut (4) locking the adjusting rod (5) and loosen until it touches the brake pump piston seat.

3 - Tighten the adjusting rod (5) of one turn (360°) and lock it with nut (4).

4 - Repeat operations 3. and 4. for the other pedal.
★ After tightened nuts (4), check that the adjusting rod (5) touch the brake pump piston seat simultaneously.

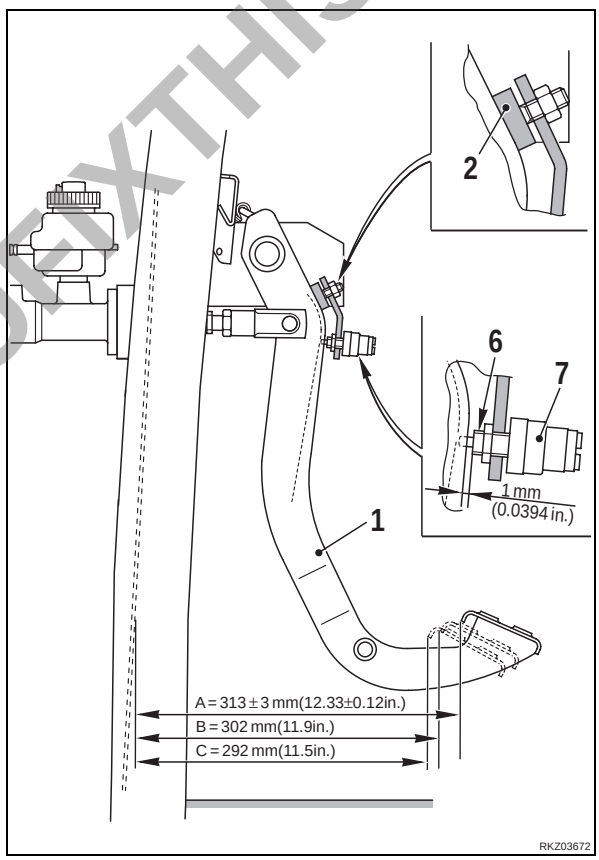
Microswitches adjustment

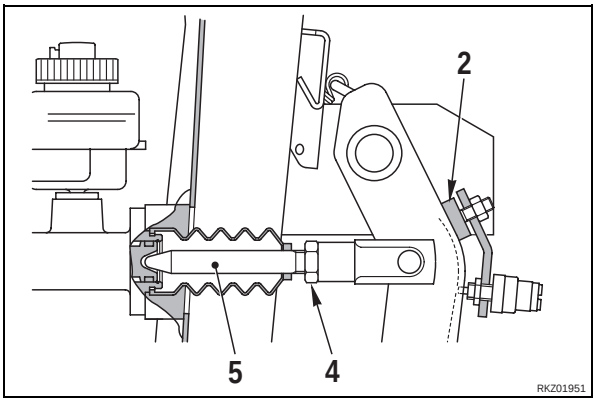
5 - Loosen microswitches (8) locking nuts (7).

6 - Adjust microswitches (8) paying attention to guarantee (at pedals in neutral position) a minimum clearance (about 1 mm (0.0394 in.)) between microswitches body and the pedal.

Checking adjustment

7 - Verify measure like shown in figure.
"**A**" measure: at pedal in neutral position
"**B**" measure: at master cylinder rod touching the pump
"**C**" measure: at pedal touching the microswitch



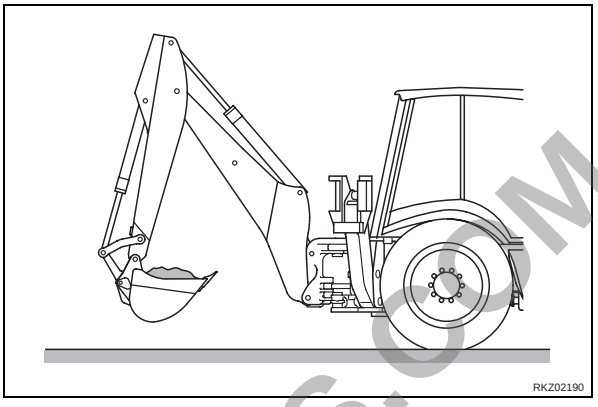


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5 - Start the engine and raise the boom.

6 - Stop the engine and check the bucket position for 5 minutes.
- If bucket has an opening movement, drift is due to cylinder gaskets.
- If bucket has no movement, drift is due to control valve.

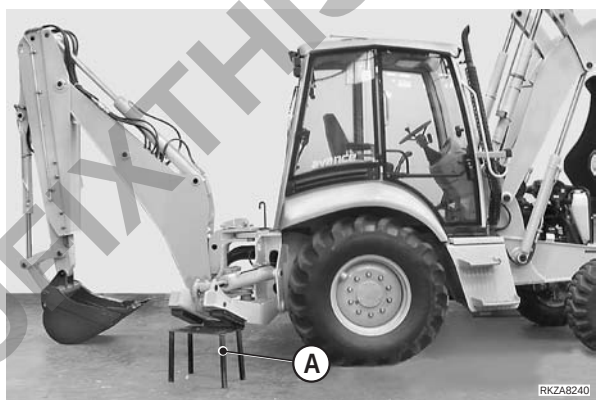


4. Outriggers testing

1 - Set machine with vertical arm and with bucket leaned at ground on the side.

2 - Place trestles "**A**" of a suitable height beneath the outriggers, and bring the cylinder eyes to a horizontal position.

3 - Without forcing them, lower the outriggers onto the trestles.

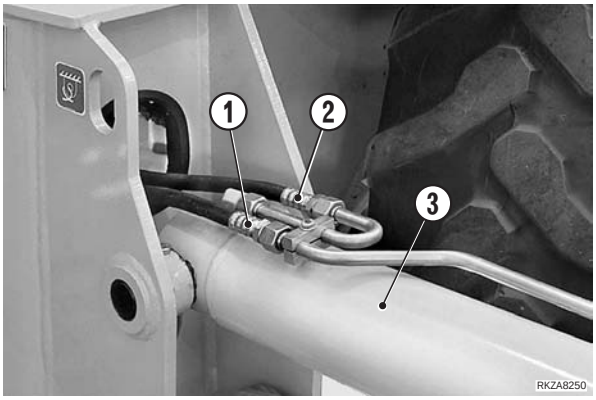


4 - Stop the engine and release residual hydraulic pressures.

5 - Disconnect the tubes (1) and (2) from the cylinders (3) and plug them to prevent entry of impurities.

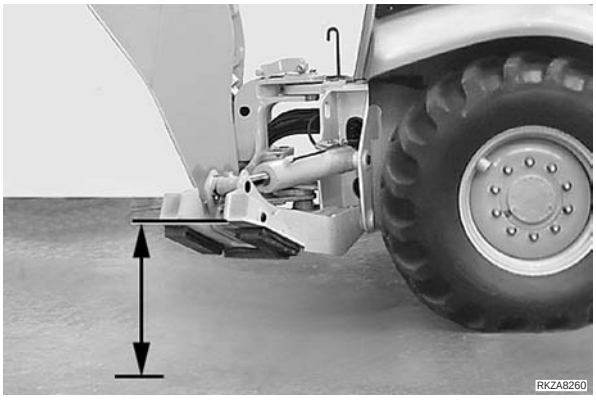
6 - Plug cylinders pipes (2) base side and apply on head sides temporary pipes to catch possible oil leakage.

7 - Start the engine, use force on the boom to raise the machine, and remove the trestles supporting the outriggers.



8 - Lower the machine and stop the engine.

9 - Check the outriggers position for 5 minutes.
- If one or both outriggers have a lowering movement, drift is due to single or both cylinders.
- If there is no lowering, drift is due to control valve.



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INSTALLATION OF THE CYLINDER HEAD

- To install, reverse the removal procedure.

※1

★ Fill up the cooling circuit.

Coolant liquid: 18 ℓ (4.75 US gal.)

★ Check carefully that there are no leaks.

※2

Support screws: 35.2 Nm (25.9 lb.ft.)

※3

Frontal screw (M8): 32 Nm (23.6 lb.ft.)
Lateral screws (M10): 64 Nm (47.2 lb.ft.)

※4

Frontal screws (M10): 64 Nm (47.2 lb.ft.)
Lateral screw (M8): 32 Nm (23.6 lb.ft.)

※5

Bracket screws: 45 – 55 Nm (33 – 40.5 lb.ft.)
Screws for intake line: Loctite 262
Screws for intake line: 45 – 55 Nm (33 – 40.5 lb.ft.)

※6

High-pressure pipe fittings:
24.5 – 34.3 Nm (18.7 – 25.2 lb.ft.)

※7

Collar lock nuts: 9.8 – 11.8 Nm (7.22 – 8.7 lb.ft.)

※8

★ Check the condition of the seals of the tappet cover and the O-rings of the fastening nuts. Thoroughly clean the contact surfaces on the cylinder heads.

Cover fastening nuts: 25±3 Nm (18±2.2 lb.ft.)

※9

★ Check that the tappets are firmly engaged in their rods and that the valve collars are correctly assembled.

Rods - tappets: Engine oil

★ Start tightening the rocker-arm shaft from the center towards the outside.

Screws and nuts for the rocker-arm shaft:
22.5 – 28.4 Nm (16.6 – 20.9 lb.ft.)

★ Adjust the valve clearances (For details, see «20. TESTING AND ADJUSTMENTS»).

※10

★ Install a new gasket.

Bolt and cylinder block threadings: Engine oil.

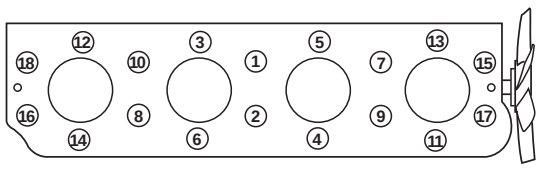
★ Tighten the screws, manually at first, and then in two stages, following the sequence indicated.

Cylinder head bolts.
First tightening: 88.3 – 98.1 Nm (65 – 72.3 lb.ft.)
Final tightening:
181.4 – 191.2 Nm (133.6 – 140.9 lb.ft.)

1 - Start the engine at low idling to circulate the coolant liquid through all circuits.

2 - Accelerate gradually up to 1700 rpm. After about one minute, stop the engine and check or top up the level in the container.

BOLT TIGHTENING ORDER

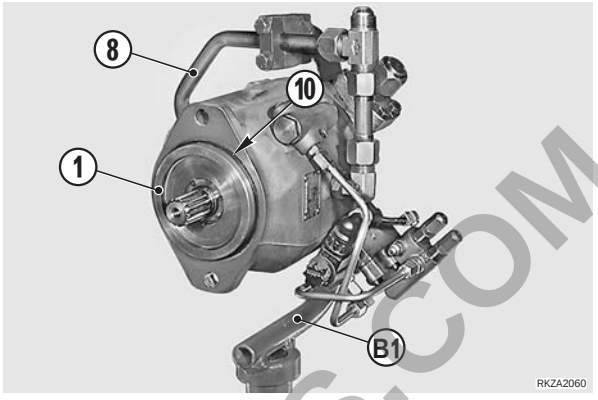


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6 - Take out the two screws (9) and remove the pump (1) complete with its O-ring (10). ※3

kg Pump: 38 kg (84 lb.)



INSTALLATION OF THE PISTON PUMP

- To install, reverse the removal procedure.

1 - Fill the tank with hydraulic oil up to maximum level.

Hydraulic oil: 92 ℓ (24.30 US gal.)

※1

★ Fill the pump body and the pump, bringing the tank up to pressure.
For the method, see «20. TESTING AND ADJUSTMENTS».

Nm Screws for suction flange: 100 Nm (73.7 lb.ft.)

Nm Screws for delivery flange: 60 Nm (44.2 lb.ft.)

※2

Screws on gearbox side: Loctite 262

Nm Screws on gearbox side: 70 Nm (51.6 lb.ft.)

Nm Nut on axle side: 70 Nm (51.6 lb.ft.)

※3

Pump retaining screws: Loctite 262

Nm Pump retaining screws: 220 Nm (162 lb.ft.)

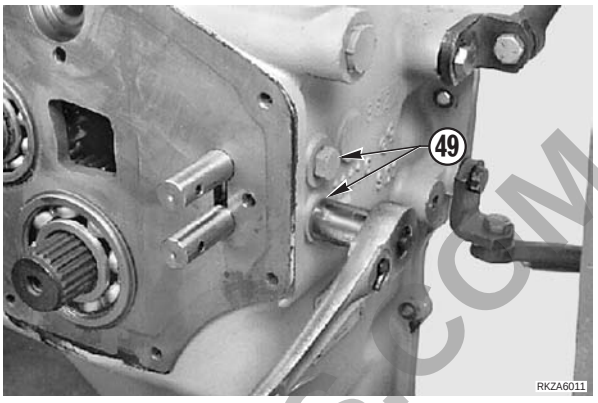
2 - Start the engine to circulate the oil in all hydraulic circuits.

3 - Stop the engine, check the oil level in the tank and, if necessary, top it up.

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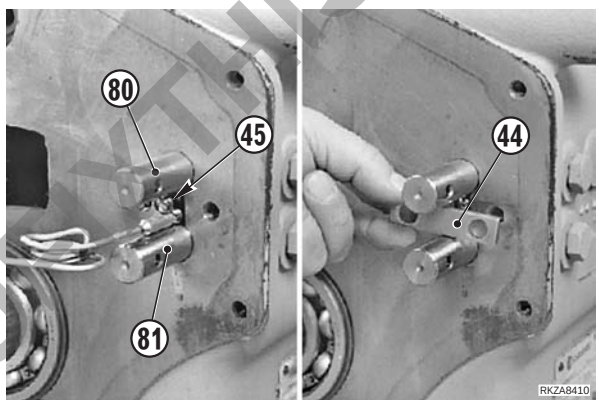
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10 - Mount the caps (49) complete with the copper washers and tighten them.
Caps: 80 Nm (60 lb.ft.)

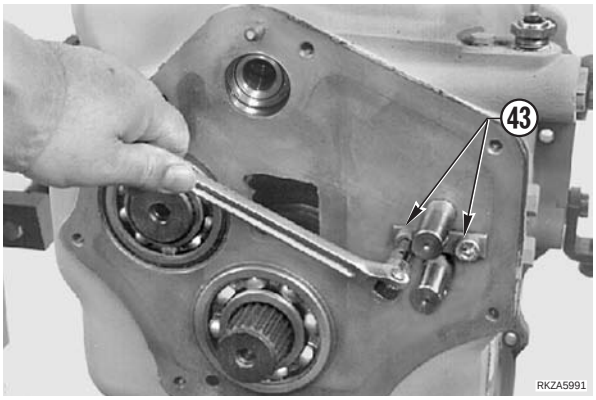


11 - Insert the two balls (45) into the hole between the shifter rods (80) and (81).

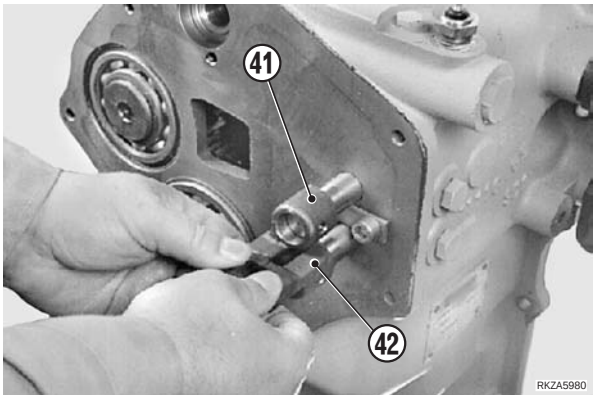
12 - Position the plate (44).



13 - Secure the plate (44) with the screws (43).
Screws: Loctite 542
Screws: 50 Nm (37 lb.ft.)



14 - Mount the differential lock rings (41) and (42) on the shifter rods (80) and (81).

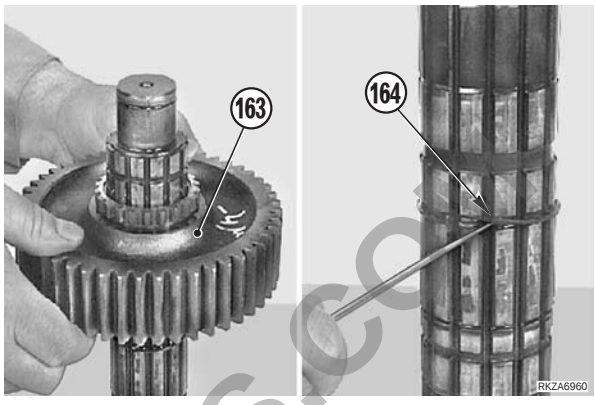


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34 - Remove the 1st speed gear (163).

35 - Remove the last snap ring (164).

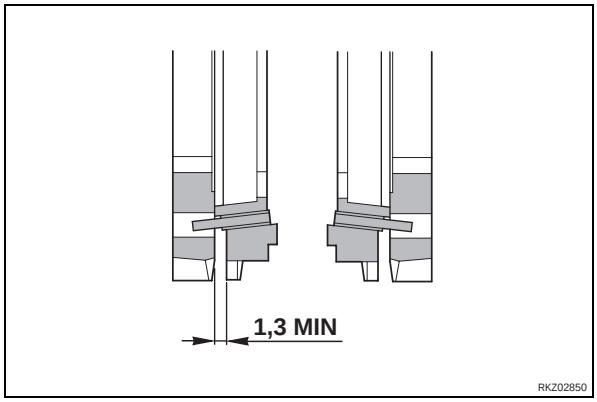


36 - Check that all component parts have been dismantled and, if there is any damage to the gears, the inner or outer tooth bases, or to the bearings (123), replace them with new ones.

37 - Check the clearance of the synchronizer assemblies at three different points, 120° apart.
For this test use the thickness calliper.

★ Minimum clearance permissible: 1.3 mm (0.051 in.)

If the clearance is less than this, put in new synchronizer assemblies.

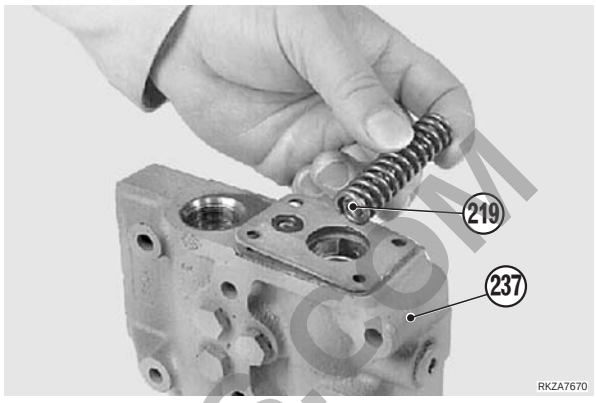


38 - Carefully check the secondary shaft, especially where bearing inner races will be installed. No wear or scoring (even if only localised) can be allowed.
Check the springs of the synchronization assembly. Cracks, heat distortion, or wear mean that the piece must be changed.

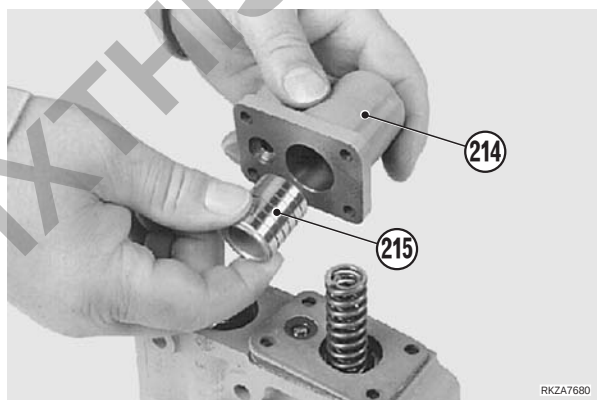
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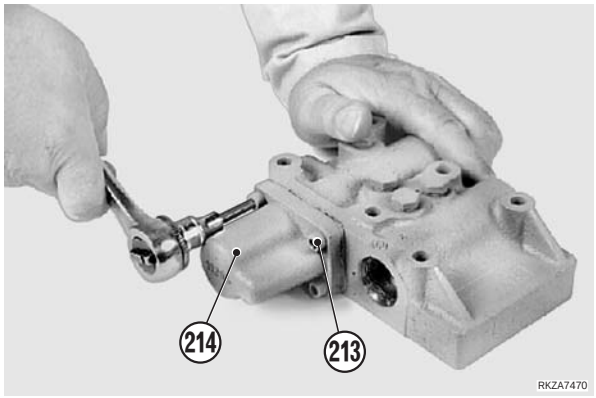
16 - Insert the pin and spring group into the distributor (237).
★ The pin (219) must face towards the inside of the distributor.



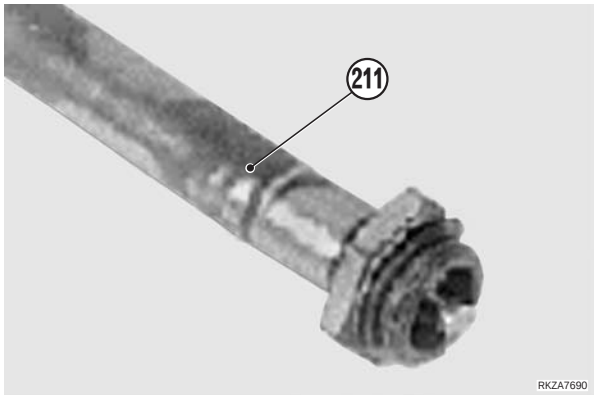
17 - Lubricate the outermodulation piston (215) and mount it in the cover (214).
★ The closed extremity of the piston (215) must face towards the cover (214).



18 - Mount the cover (214) and secure it with the screws (213).
Nm Screws: 11 Nm (8 lb.ft.)
★ Tighten using the alternating crosswise method.



19 - Mount a new O-ring on the solenoid plunger (211).
★ Lubricate the O-ring with transmission oil.



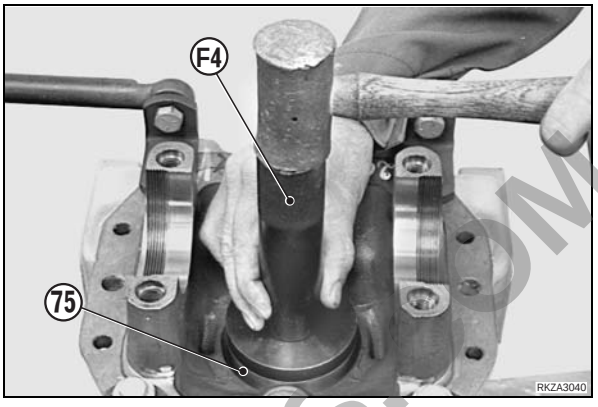
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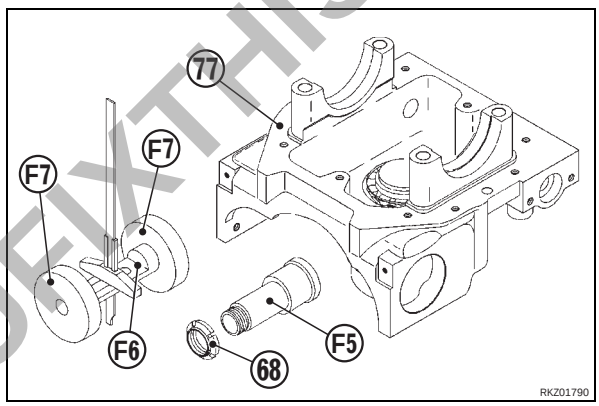
ASSEMBLY OF FRONT AXLE

1. Re-assembly of the bevel pinion

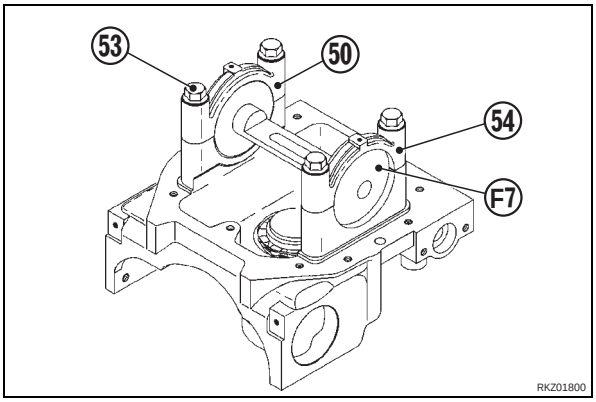
1 - Using the tool **F4**, insert the outer retainers of the pinion bearings (70) and (75).



2 - Mount into the differential support (77) the bearings (70) and (75), the gauge block **F5**, with the lock nut (68), the gauge tube **F6**, and the lock nuts **F7**.
In order to pre-load the bearings (70) and (75) tighten the lock nut (68) until the pinion becomes hard to turn.

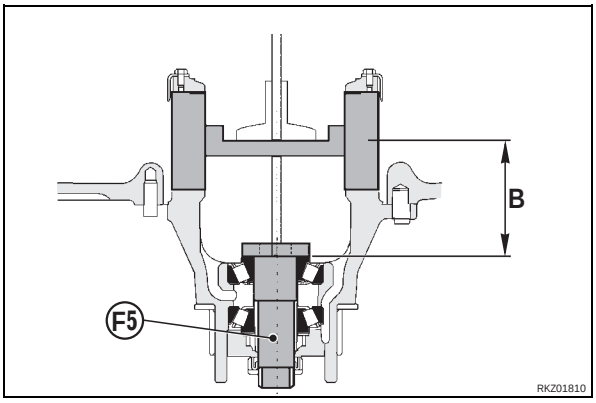


3 - Mount the bearing covers (50) and (54) and tighten the screws (53) uniformly until the lock nuts **F7** are held fast.



4 - Use a deep calliper to take the measurement «**B**» between the gauge tube **F6**, and the surface inside the gauge **F5**.

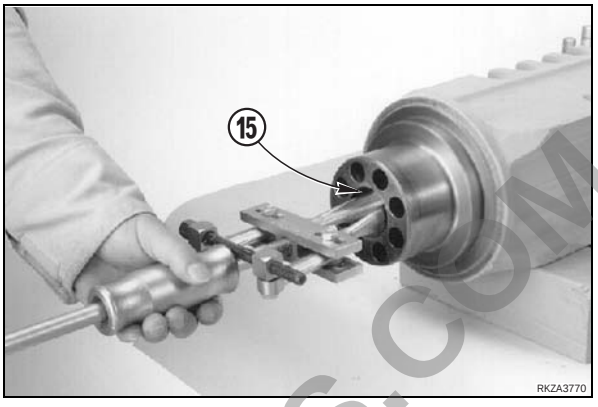
★ Write down the «**B**» measurement.



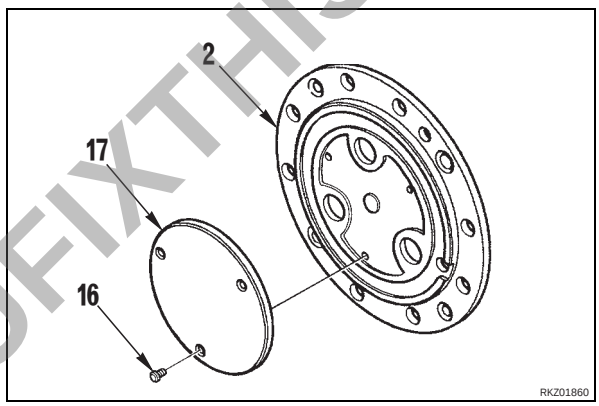
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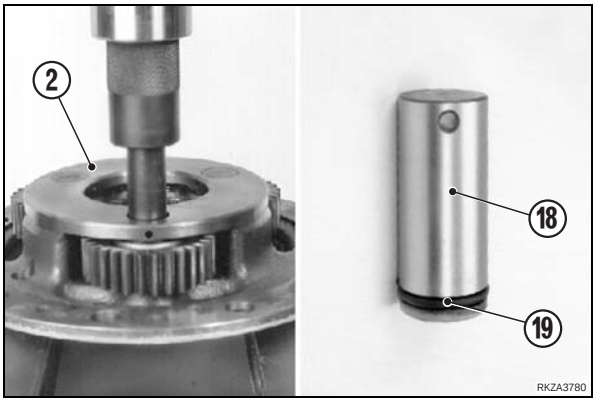
15 - Use a puller to remove the bronze bushing (15).



16 - Remove the screws (16) and then the cover (17) from the planetary carrier (2).

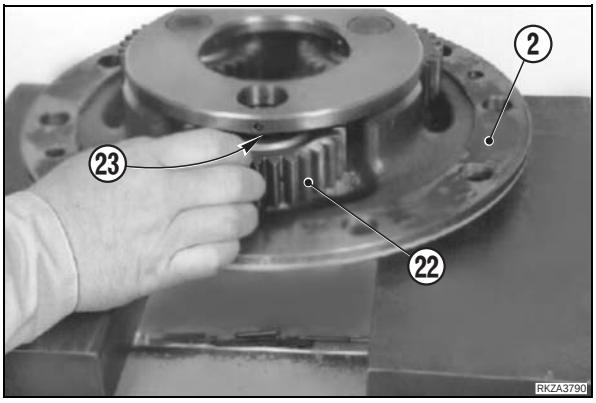


17 - Place the planetary carrier (2) beneath a press and, using an appropriate plunger, remove the shaft (18), complete with O-ring (19).



18 - Beneath the planetary carrier (2) place a container in which to catch the roller bearings (20) and the retainer (21). Take out the bevel gear (22) and the upper and lower shims (23).

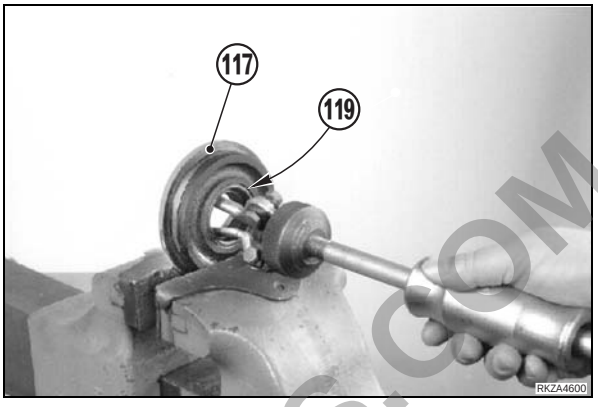
★ Repeat these last two operations for all the planetary gears.



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11 - Use a puller to take the seal ring (119) out of the cover (117).



12 - Take the O-ring (118) out of the cover (117).



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REMOVAL OF THE FRONT WORKING EQUIPMENT

Lower the working equipment completely until it rests on the ground stop the engine and remove the ignition wrench.

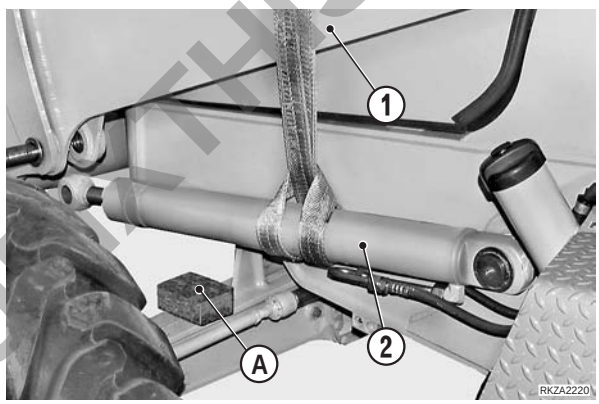
Release all residual pressure in all circuits. (For details, see «20. TESTING AND ADJUSTMENTS»).

1 - Remove the tilt cylinders. (See «REMOVAL OF FRONT BUCKET TILT CYLINDERS»).

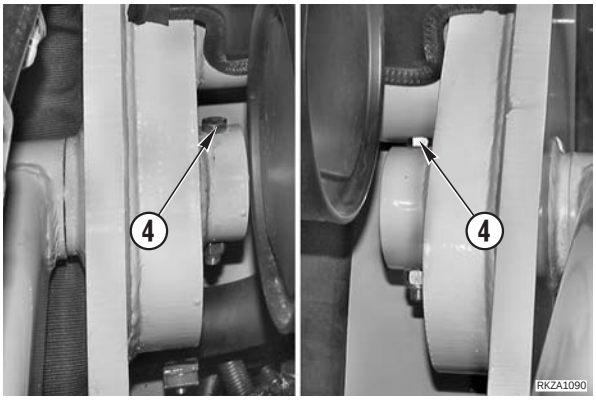


2 - Disconnect the cylinders (2) from the boom and rest them on wooden blocks «**A**» placed on the front axle.

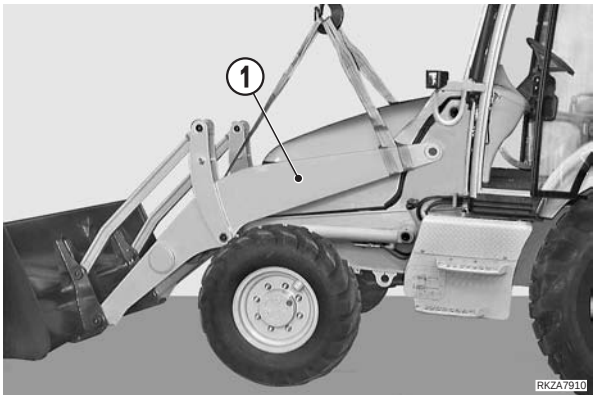
※1 ※2



3 - Open the front hood and take out the screws (4) that lock the axle oscillation pins of the boom (1).
Close the front hood.



4 - Put a sling round the boom (1) as shown in the figure, and attach it to the hoisting tackle. Apply a slight tension to the cables.



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4. Re-assembling cylinders

1 - Mount on the apparatus **A1** the tool **A3** and engage the cylinder axle oscillation pins (1).

2 - Lubricate the threading and the first part of the cylinder (1).

Cylinder: ASL800050

3 - Mount the two halves of the tool **A11** with the appropriate diameter at the mouth of the cylinder (1).

4 - Mount the piston rod group on the apparatus **A1** and raise the mobile part up to the end of its stroke.

5 - Place the cylinder (1) in a vertical position.

6 - Lower the mobile part of the apparatus in order to center the piston (5) in the tool **A11**.

7 - Wind the first guide ring (19) round the piston and insert part of the piston into the tool **A11**. Wind the second guide ring (19) and fully insert the piston.

Insert the piston slowly in order to calibrate the guide rings (19) without overheating them.

8 - Insert the cylinder head (2) and screw it in by hand for several turns.

9 - Use the special wrench **A6** to screw the cylinder head (4) home.

Nm Cylinder head: 930 – 980 Nm (685 – 722 lb.ft.)

10 - Screw in the dowel bolt (10).

11 - Screw the brake cylinder (3) into the cylinder (1).

Brake cylinder: Loctite 270

Nm Brake cylinder: $78.5^{0}_{+19.6}$ Nm ($57.8^{0}_{+10.6}$ lb.ft.)

12 - Remove the cylinder from the equipment.

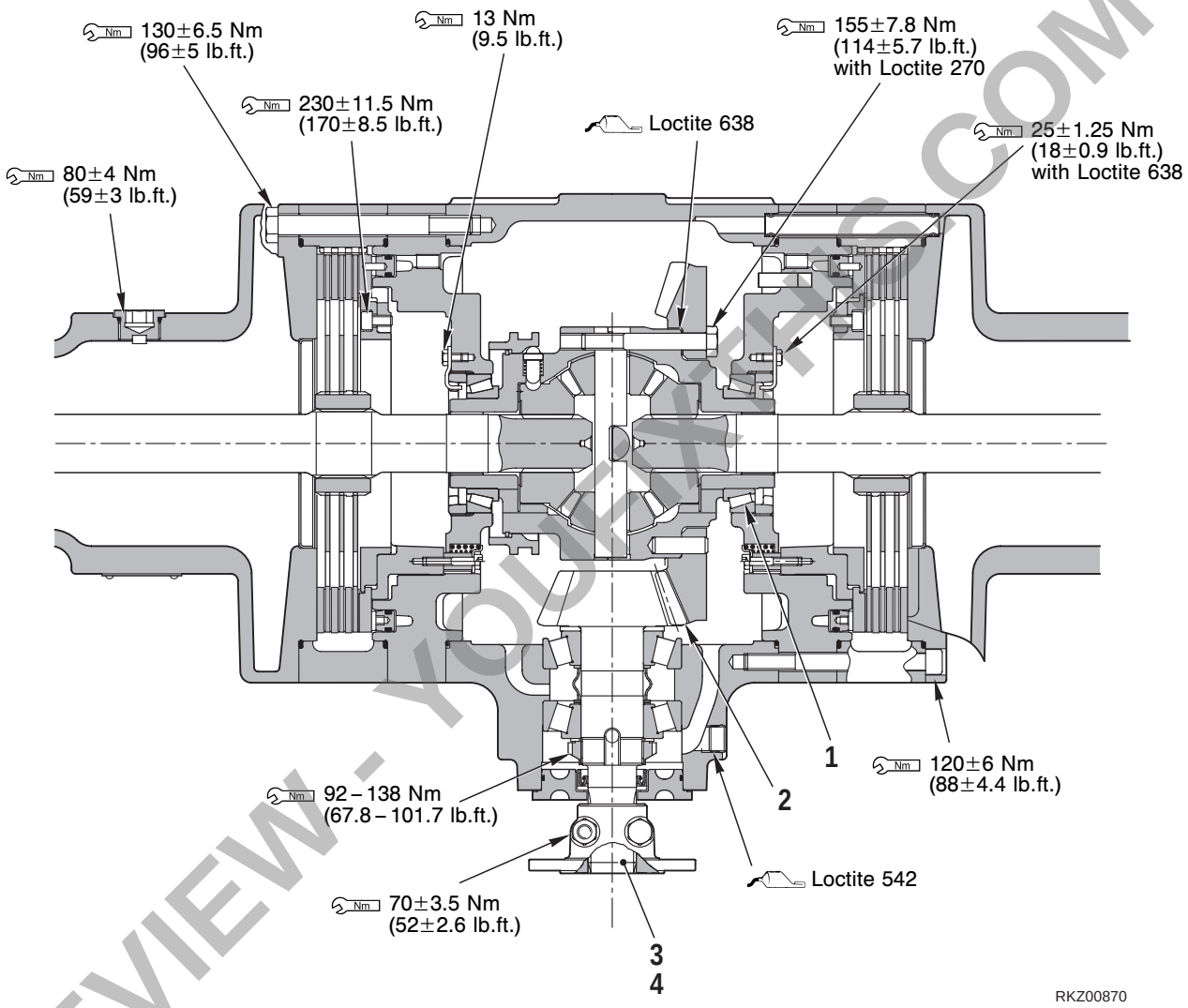
13 - Using and press and the appropriate tool **A3** mount the swing bushings (9).

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REAR AXLE

Differential



Unit: mm (in.)

Nº	Check item	Criteria		Remedy
1	Axle clearance	Standard clearance	Clearance limit	Adjust
		—	—	
2	Backlash of crown wheel and pinion	0.17 – 0.23 (0.007 – 0.009)	0.23 (0.009)	
3	Pinion preload (without seal ring)	92 – 138 Nm (67.8 – 101.7 lb.ft.)		
4	Pinion-crown wheel preload (without seal ring)	95.23 – 141.84 Nm (70.1 – 104.5 lb.ft.)		

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