

WX210
WX240
WX210 Industry
WX240 Industry

TIER 3

Service manual

Print No. 87677489A

CASE
CONSTRUCTION

SAFETY INSTRUCTION



This warning symbol points out important messages involving your safety.

Carefully read the safety rules contained herein and follow advised precautions to avoid potential hazards and to safeguard your safety and personal integrity.

In this manual you will find this symbol together with the following key-words:

WARNING

This symbol warns about the possibility of potential damages to the machine that can involve the operator's safety.

DANGER

With specific warnings about potential dangers for the operator's or other persons integrity directly or indirectly involved.

The non compliance with the warning preceded by the above mentioned key-words (**WARNING** and **DANGER**) can cause serious accidents or even the death of the persons involved.

Moreover in the present Manual have been given some instructions with texts in italics, preceded by the words **NOTE** and **CAUTION**:

NOTE: it emphasizes and underlines to the operator the correct technique or correct procedure to follow.

CAUTION

It warns the operator of a possible hazard of machine damage in case he does not follow a determined procedure.

INDEX

SECTION 01 - SAFETY PRECAUTIONS

- 1. GENERAL SAFETY INSTRUCTIONS 2
- 2. USE INSTRUCTION 11

SECTION 02 - CONTROLS AND INSTRUMENTS

- 1. SWITCHES AND PUSH-BUTTONS 1
- 2. CONTROLS AND PEDALS 13
- 3. MULTI-FUNCTION DISPLAY 16

SECTION 03 - TECHNICAL SPECIFICATIONS

- 1. MAIN COMPONENTS 1
- 2. DIMENSIONS - OPERATING WEIGHTS 4
- 3. DIGGING PERFORMANCE 10
- 4. LIFTING CAPACITIES 20
- 5. HYDRAULIC SYSTEM 33
- 6. ROTATION 34
- 7. TRAVEL 35
 - 7.1 TYRES 36
- 8. BRAKES 36
- 9. STEERING 36
- 10. ELECTRICAL SYSTEM 37
- 11. BUCKETS 37
- 12. TIGHTENING TORQUES 38
- 13. CENTRALIZED LUBRICATION PUMP (OPTIONAL) 38
- 14. FUEL SYSTEM 38
- 15. ENGINE 39
- 16. SUPPLY SUMMARIZING CHART 40

SECTION 04 - UPPER STRUCTURE

- 1. MAIN COMPONENTS 1
- 2. SLEWING BEARING 3
- 3. ROTATION GEARMOTOR 7
 - 3.1 DISASSEMBLY AND ASSEMBLY 12
- 4. MULTI-COOLER 13
 - 4.1 TECHNICAL SPECIFICATIONS 14
- 5. HYDRAULIC PUMPS 17
- 6. MUFFLER 18

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7. HYDRAULIC OIL TANK.....	19
8. AIR FILTER.....	25
9. COUNTERWEIGHT.....	25
10. FUEL SYSTEM.....	26
11. CAB AND OPERATOR'S SEAT.....	32
11.1 CAB AT VARIABLE HEIGHT (WX 210 Industry - WX 240 Industry).....	43
12. CENTRALIZED LUBRICATION PUMP.....	44

SECTION 05 - UNDERCARRIAGE

1. UNDERCARRIAGE COMPONENTS.....	1
2. REAR RIGID AXLE.....	2
2.1 TECHNICAL SPECIFICATIONS.....	3
2.2 DISASSEMBLY AND ASSEMBLY.....	6
2.3 DISASSEMBLY AND ASSEMBLY.....	8
2.4 TROUBLESHOOTING.....	87
2.5 SPECIAL TOOLS.....	89
3. TRAVEL MOTOR.....	90
3.1 TECHNICAL SPECIFICATIONS.....	90
3.2 DISASSEMBLY AND ASSEMBLY.....	91
3.3 DISASSEMBLY AND ASSEMBLY.....	92
4. CARDAN SHAFT.....	103
4.1 DISASSEMBLY AND ASSEMBLY.....	104
5. FRONT STEERING AXLE.....	106
5.1 TECHNICAL SPECIFICATIONS.....	107
5.2 DISASSEMBLY AND ASSEMBLY.....	110
5.3 DISASSEMBLY AND ASSEMBLY.....	112
5.4 TROUBLESHOOTING.....	184
5.5 SPECIAL TOOLS.....	186
6. WHEELS AND TYRES.....	187
7. BLADE.....	192
7.1 BLADE CYLINDER.....	194
8. AXLE FLOATING LOCKING CYLINDERS.....	202
8.1 TECHNICAL SPECIFICATIONS.....	203
8.2 DISASSEMBLY AND ASSEMBLY.....	204
8.3 AIR BLEEDING.....	205
8.4 DISASSEMBLY AND ASSEMBLY.....	206
8.5 TROUBLESHOOTING.....	208
9. STABILIZERS.....	209
9.1 STABILIZER CYLINDERS.....	212
9.2 TROUBLESHOOTING.....	222
10. LEFT LADDER.....	224
11. RIGHT LADDER AND TOOL STORAGE BOX.....	225
12. ROTARY CONTROL VALVE AND ELECTRIC ROTOR.....	226
12.1 TECHNICAL SPECIFICATIONS.....	226
12.2 DISASSEMBLY AND ASSEMBLY.....	227
12.3 DISASSEMBLY AND ASSEMBLY.....	228
12.4 ELECTRIC ROTOR.....	230

SECTION 06 - FRONT ATTACHMENT

1. TYPES OF FRONT ATTACHMENT	2
2. HYDRAULIC CYLINDERS.....	4
2.1 BOOM CYLINDER.....	6
2.2 DIPPER CYLINDER (WX 210 - WX 240).....	16
2.3 DIPPER CYLINDER (WX 210 Industry - WX 240 Industry).....	26
2.4 SPECIAL TOOLS.....	55
3. BUCKETS WX 210 - WX 240	56
4. WX 210 - WX 240 QUICK COUPLER	60
5. CLAMSHELL BUCKET	64

SECTION 07 - STEERING SYSTEM

1. OPERATION.....	1
2. POWER STEERING	3
2.1 DISASSEMBLY AND ASSEMBLY.....	5
3. PRIORITY VALVE	23
4. TROUBLESHOOTING.....	24

SECTION 08 - BRAKE SYSTEM

1. OPERATION.....	1
2. SERVICE BRAKE	4
3. PARKING BRAKE.....	7
4. PEDAL BRAKE VALVE	8
5. ACCUMULATORS.....	9
6. TROUBLESHOOTING.....	11

SECTION 09 - HYDRAULIC SYSTEM

1. HYDRAULIC SYSTEM	1
2. HYDRAULIC SYSTEM DIAGRAMS	5
2.1 HYDRAULIC SYSTEM DIAGRAMS - UPPER STRUCTURE	5
2.2 HYDRAULIC SYSTEM DIAGRAMS - UNDERCARRIAGE	21
2.3 HYDRAULIC SYSTEM DIAGRAMS BLADE AND/OR STABILIZERS	25
3. HYDRAULIC PUMPS	28
4. UPPER STRUCTURE CONTROL VALVE	48
5. UNDERCARRIAGE CONTROL VALVE	60
6. PILOT CONTROL ASSY	62
7. ROTATION SYSTEM.....	71
8. TRAVEL.....	75
9. STABILIZATION HYDRAULIC SYSTEM.....	87
10. BOOM HYDRAULIC SYSTEM	93
11. HYDRAULIC SYSTEM	100

12. HYDRAULIC SYSTEM OF DIPPER	106
13. HYDRAULIC SYSTEM OF PLACING BOOM	110
14. HYDRAULIC SYSTEM WITH COMBINATION OF DIFFERENT FUNCTIONS (BOOM, PLACING BOOM, DIPPER AND BUCKET)	117
15. HYDRAULIC SYSTEM OF HAMMER (WITH PLACING BOOM)	119
16. HYDRAULIC SYSTEM OF HAMMER AND SHEARS (WITH PLACING BOOM)	122
17. HYDRAULIC SYSTEM OF SHEARS (WITH PLACING BOOM)	127
18. HYDRAULIC SYSTEM OF HAMMER (WITH MONOBOOM)	130
19. HYDRAULIC SYSTEM OF HAMMER AND SHEARS (WITH MONOBOOM)	133
20. HYDRAULIC SYSTEM OF SHEARS (WITH MONOBOOM)	138
21. TROUBLESHOOTING	141

SECTION 10 - ELECTRICAL SYSTEM

1. ELECTRICAL DIAGRAMS	1
1.1 WX 210 - WX 240	1
1.2 WX 210 Industry - WX 240 Industry	41
2. FUSES	80
3. BATTERIES	83
4. BULBS	87
5. TROUBLESHOOTING	91

SECTION 11 - ELECTRONICS

1. MAIN COMPONENTS	1
1.1 ELECTRICAL POWER SUPPLY DIAGRAM	3
2. COMPONENTS OF LINE 1	6
3. COMPONENTS OF LINE 2	10
3.1 TRAVEL PEDAL	16
3.2 ATTACHMENT PEDAL (PLACING BOOM AND HAMMER)	17
3.3 ELECTRO-HYDRAULIC SYSTEM	18
3.4 POWER CONTROL SYSTEM	19
4. ENGINE SPEED ACTUATOR	26
5. COOLANT TEMPERATURE DETECTION	27
6. CHARGE AIR TEMPERATURE DETECTION	28
7. HYDRAULIC OIL TEMPERATURE DETECTION	29
8. PROPORTIONAL VALVE - FAN MOTOR	30
9. PROPORTIONAL VALVES - CONTROL BLOCK	31

SECTION 12 - CALIBRATION

1. NECESSARY OPERATIONS BEFORE CALIBRATION	1
2. DISPLAY: CALIBRATION MENU	3

3. CALIBRATIONS WITH THE ENGINE RUNNING.....	4
3.1 VDO CALIBRATION	6
3.2 POWER CALIBRATION	8
3.3 MAIN VALVE CALIBRATION (CONTROL VALVE).....	10
3.4 TRAVEL CALIBRATION.....	13
3.5 PUMP DELIVERY CALIBRATION.....	15
3.6 ROTATION PUMP CALIBRATION.....	18
3.7 AUXILIARY PRESSURE CALIBRATION	20
4. CALIBRATIONS WITH THE ENGINE STOPPED	22
4.1 CALIBRATIONS, ALL SOLENOID VALVES, MAIN PUMP, ROTATION PUMP, AUXILIARY PRESSURE.....	24
4.2 MAIN VALVE CALIBRATION (CONTROL VALVE).....	26

SECTION 01 - SAFETY PRECAUTIONS

1. GENERAL SAFETY INSTRUCTIONS.....	2
2. USE INSTRUCTION	11

Carefully read the safety rules contained herein and follow advised precautions to avoid potential hazards and to safeguard your safety and personal integrity.

In this manual you will find the following indications:

⚠ WARNING

This symbol warns about the possibility of potential damages to the machine that can involve the operator's safety.

⚠ DANGER

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NOTE: it emphasizes and underlines to the operator the correct technique or correct procedure to follow.

⚠ WARNING

It warns the operator of a possible hazard of machine damage in case he does not follow a determined procedure.

Your safety and that of people around you depends on you. It is essential that you understand this manual for the correct operation, inspection, lubrication and maintenance of this machine.



1. GENERAL SAFETY INSTRUCTIONS

Carefully read this Manual before proceeding with maintenance, repairs, refuelling or other machine operations.

Repairs have to be carried out only by authorized and instructed staff; specific precautions have to be taken when grinding, welding or when using mallets or heavy hammers.

Not authorized persons are not allowed to repair or carry out maintenance on this machine. Do not carry out any work on the equipment without prior authorization.

Ask your employer about the safety instructions in force and safety equipment.

Nobody is allowed to seat on the operator's place during machine maintenance unless he is a qualified operator helping with the maintenance work.

If it is necessary to move the equipment to carry out repairs or maintenance, do not lift or lower the equipment from any other position than the operator's seat.

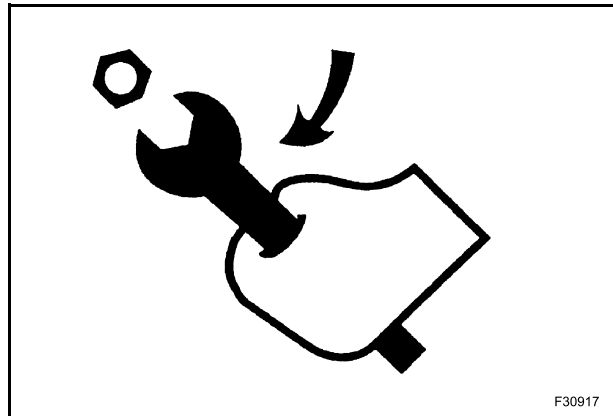
Never carry out any operation on the machine when the engine is running, except when specifically indicated.

Stop the engine and ensure that all pressure is relieved from hydraulic circuits before removing caps, covers, valves, etc.

All repair and maintenance operations should be carried out with the greatest care and attention.

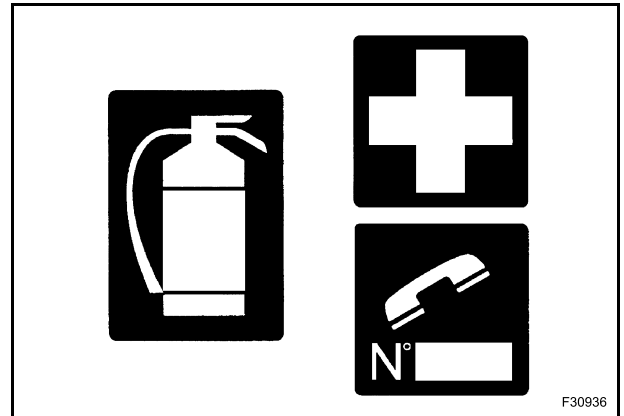
Service stairs and platforms used in a workshop or in the field should be built in compliance with the safety rules in force.

Any functional disorders, especially those affecting the safety of the machine, should therefore be rectified immediately.



1.1 EMERGENCY

Be prepared for emergencies. Always keep at disposal on the machine a first aid kit and a fire extinguisher. Make sure that the fire extinguisher is serviced in accordance with the manufacturer's instructions.



1.2 EQUIPMENT

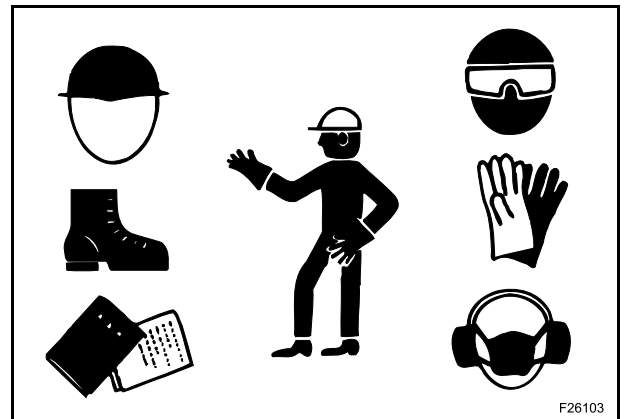
Wear close fitting clothing and safety equipment appropriate for the job:

- safety helmet;
- safety shoes;
- heavy gloves;
- reflective clothing;
- wet weather clothing.

If environment condition require it following personal safety equipment should be at hand:

- respirators (or dustproof masks);
- ear plugs or acoustic ears protections;
- goggles with lateral shield or masks for eyes protection.

Do not wear rings, wristwatches, jewels, unbuttoned or flapping clothing such as ties, torn clothes, scarves, open jackets or shirts with open zips which could get caught into moving parts.



1.3 ENGINE - RADIATOR

Never leave the engine run in closed spaces without ventilation and not able to evacuate toxic exhaust gases. Keep the exhaust manifold and tube free from combustion materials.

Do not refuel with the engine running, especially if hot, as this increases fire hazard in case of fuel spillage.

Never attempt to check or adjust the fan belts when the engine is running.

Never lubricate the machine with the engine running.

Pay attention to rotary pieces and do not allow anyone to approach to avoid becoming entangled.

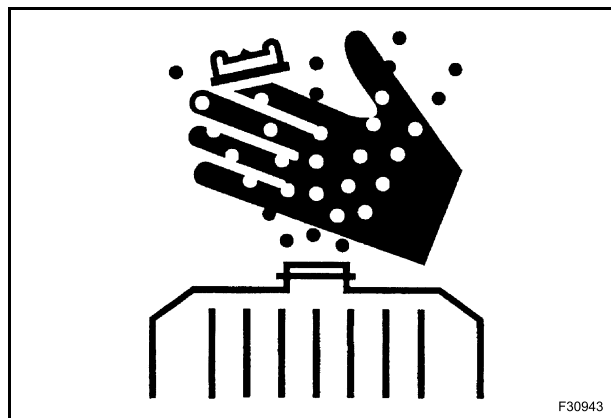
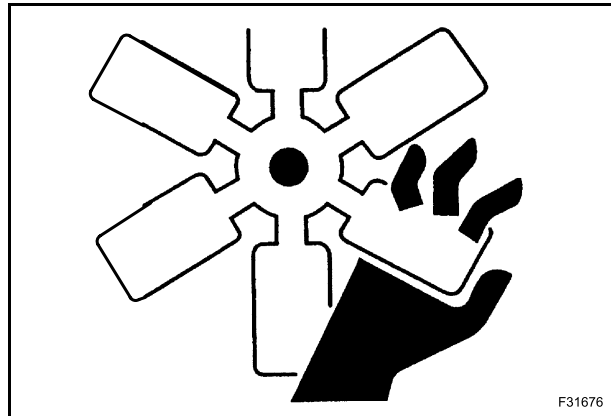
If hands, clothes or tools get caught in the fan blades or in the transmission belt, this can cause amputations, violent tears and generate condition of serious danger; for this reason avoid touching or to come close to all rotary or moving parts.

A violent jet of the coolant from the radiator can cause damages and scalds.

If you are to check the coolant level, you have to shut off the engine previously and to let cool down the radiator and its pipes. Slowly unscrew the cap to release the inside pressure.

If necessary, remove the cap with hot engine, wear safety clothes and equipment, then loosen the cap slowly to relieve the pressure gradually.

When checking the fuel, oil and coolant levels, use exclusively explosion proof classified lamps. If this kind of lamps are not used fires or explosions may occur.



1.4 HYDRAULIC SYSTEMS

Splashes of fluids under pressure can penetrate the skin causing serious injuries.

Avoid this hazard by relieving pressure before disconnecting hydraulic or other lines.

Relieve the residual pressure by moving the hydraulic control levers several times.

Tighten all connections before applying pressure.

To protect the eyes wear a facial shield or safety goggles.

Protect your hands and body from possible splashes of fluids under pressure.

Swallowing hydraulic oil is a severe health hazard.

When hydraulic oil has been swallowed, avoid vomiting, but consult a doctor or go to a hospital.

If an accident occurs, see a doctor familiar with this type of injury immediately.

Any fluid penetrating the skin must be removed within few hours to avoid serious infections.

Flammable splashes may originate because of the heat near pipes with fluids under pressure, with the result of serious scalds for the persons hit. Do not weld or use torches near pipes containing fluids or other flammable materials.

Pipes under pressure can accidentally be pierced when the heat expands beyond the area immediately heated.

Arrange for fire resistant temporary shields to protect hoses or other components during welding.

Have any visible leakage repaired immediately.

Escaping oil pollutes the environment. Soak up any oil that has escaped with a proper binding agent.

Sweep up binding agent and dispose of it separately from other waste.

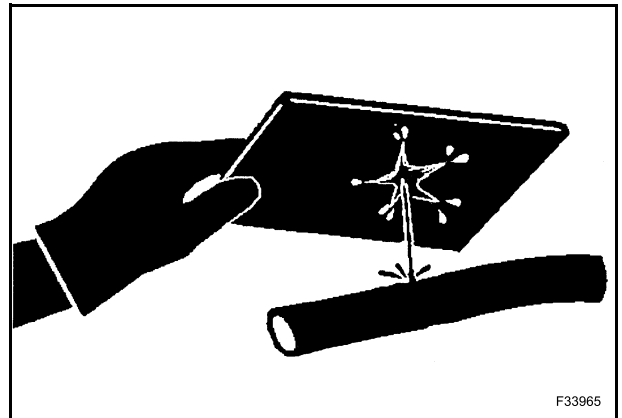
Never search for leakages with the fingers, but use a piece of cardboard and always wear goggles.

Never repair damaged piping; always replace it. Replace hydraulic hoses immediately on detecting any damage or moist areas.

Always store hydraulic oil in the original containers.



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HOSES AND TUBES

Always replace hoses and tubes if the cone end or the end connections on the hose are damaged.

When installing a new hose, loosely connect each end and make sure the hose takes up the correct position before tightening the connections. Clamps should be tightened sufficiently to hold the hose without crushing and to prevent chafing.

After hose replacement to a moving component, check that the hose does not foul by moving the component through the complete range of travel.

Be sure any hose which has been installed is not kinked or twisted.

Hose connections which are damaged, dented, crushed or leaking, restrict oil flow and the productivity of the components being served. Connectors which show signs of movement from the original position have failed and will ultimately separate completely.

A hose with a frayed outer sheath will allow the water penetration. Concealed corrosion of the wire reinforcement will subsequently occur along the hose length with resultant hose failure.

Ballooning of the hose indicates an internal leakage due to structural failure. This condition rapidly deteriorates and total hose failure soon occurs.

Kinked, crushed, stretched or deformed hoses generally suffer internal structural damage which can result in oil restriction, a reduction in the speed of operation and ultimate hose failure.

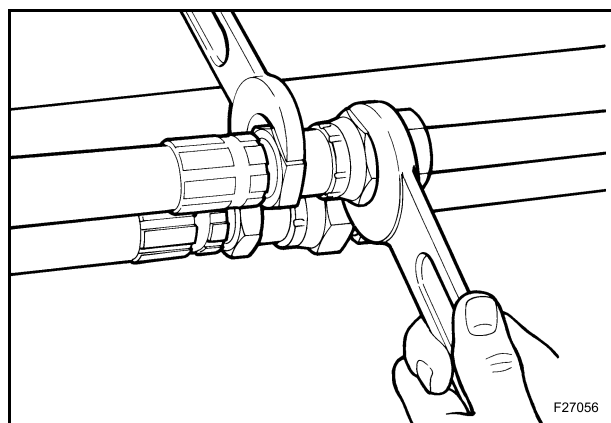
Free-moving, unsupported hoses must never be allowed to touch each other or related working surfaces. This causes chafing which reduces hose life.

O-RINGS

Replace O-rings, seal rings and gaskets whenever they are disassembled.

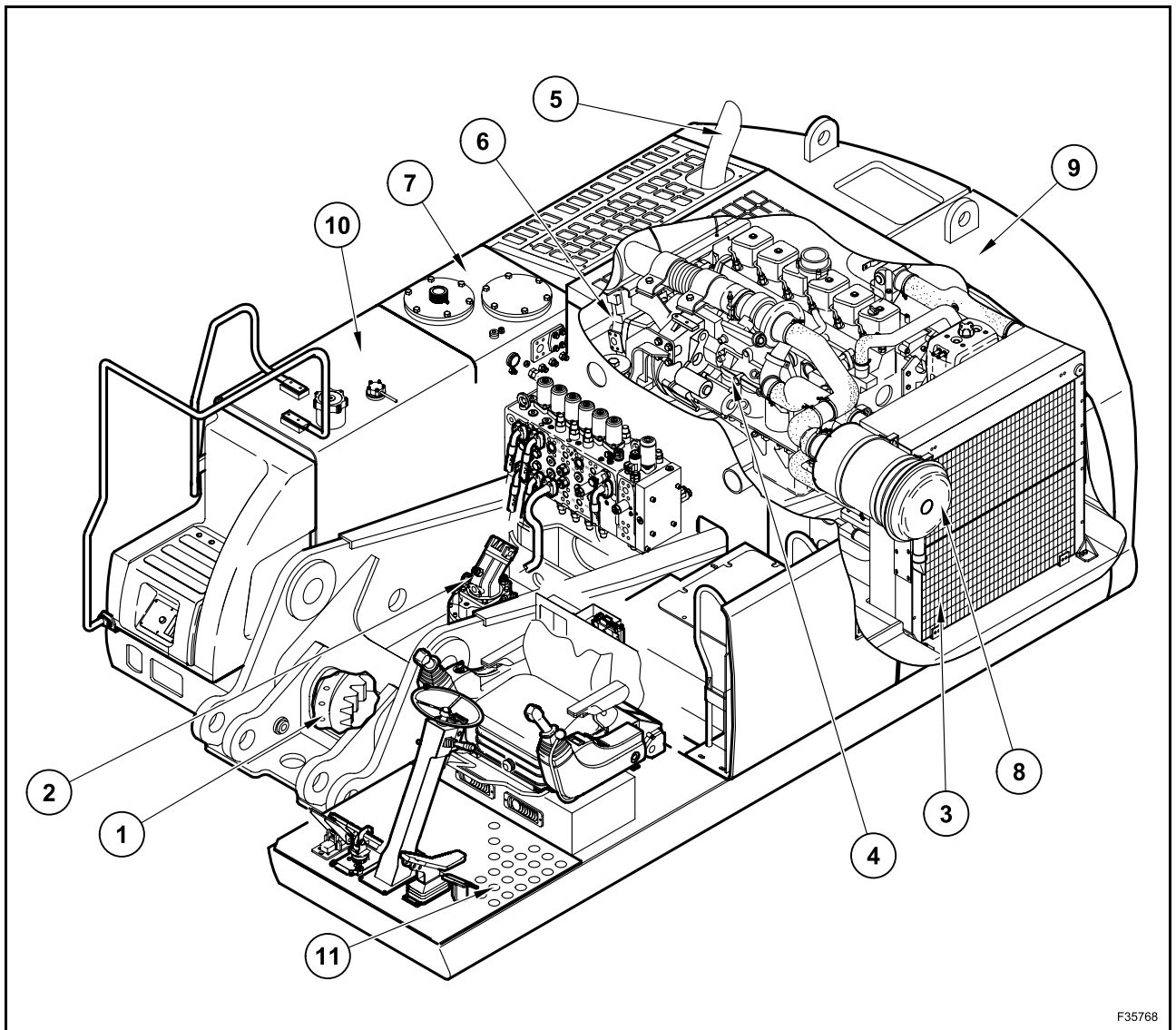
Never mix new and old seals or O-rings, regardless of condition. Always lubricate new seal rings and O-rings with hydraulic oil before installation to relevant seats.

This will prevent the O-rings from rolling over and twisting during mounting which will jeopardize sealing.



1. MAIN COMPONENTS

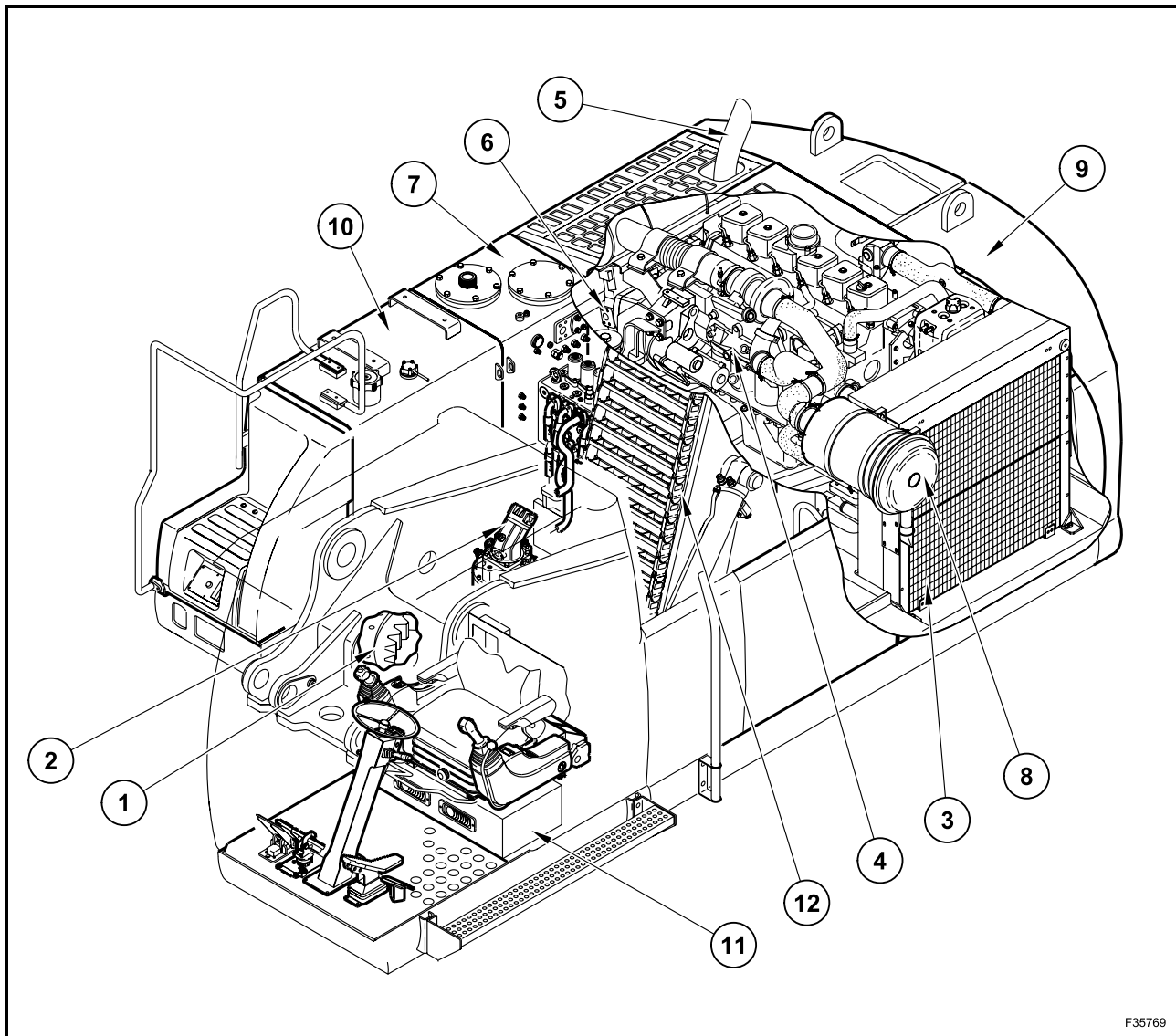
WX 210 - WX 240



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- | | |
|-----------------------|-----------------------------|
| 1. Slewing bearing | 7. Hydraulic oil tank |
| 2. Rotation gearmotor | 8. Air filter |
| 3. Multi-cooler | 9. Counterweight |
| 4. Diesel engine | 10. Fuel tank |
| 5. Muffler | 11. Cab and operator's seat |
| 6. Hydraulic pumps | |

WX 210 Industry - WX 240 Industry



- | | |
|-----------------------|-----------------------------|
| 1. Slewing bearing | 7. Hydraulic oil tank |
| 2. Rotation gearmotor | 8. Air filter |
| 3. Multi-cooler | 9. Counterweight |
| 4. Diesel engine | 10. Fuel tank |
| 5. Muffler | 11. Cab and operator's seat |
| 6. Hydraulic pumps | 12. Cab raising device |

2. SLEWING BEARING

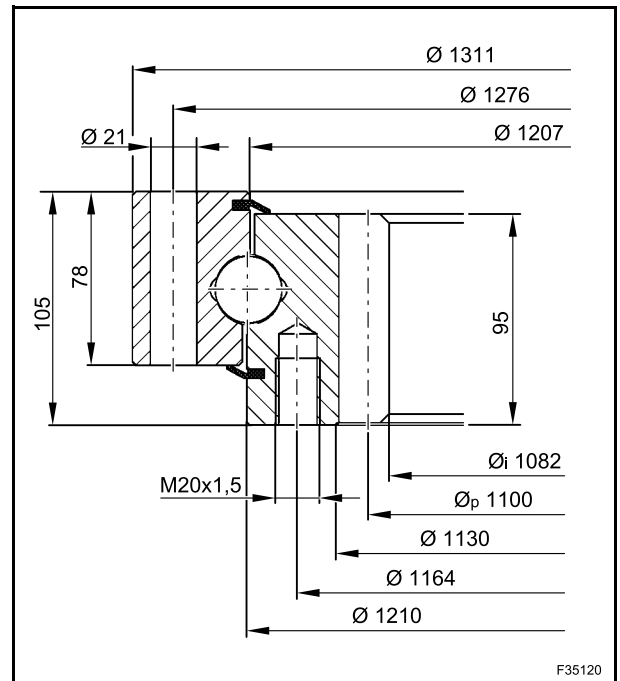
The slewing bearing consists of an external ring integral to the upper structure, an internal ring integral to the undercarriage and a single series of balls.

The pinion of the rotation gearbox, controlled by the rotation motor by means of the gears of the gearbox itself, rotates around its own axis and makes a revolution around the centre of the internal ring of the slewing bearing, thus enabling the upper structure to rotate independently from the undercarriage.

TECHNICAL SPECIFICATIONS

Teeth

Module	10
Number of teeth	110
Pressure angle	25°



DISASSEMBLY

Park the machine on a level and firm surface.

Lower the attachment to the ground.

Lower the blade and the stabilizers to the ground.

Engage the parking brake.

Lock the upper structure.

Stop the engine.

Place some wedges under the wheels so as to prevent the machine from moving.

Move both hydraulic control levers in all directions, to release possible residual pressure inside the hydraulic system.

For slewing bearing disassembly, it is necessary to remove the upper structure.

Disconnect all hydraulic hoses and electric harnesses from the rotary control valve and from the rotor.

Close all openings on pipes and rotary control valve with plugs in order to prevent dirt from entering.

By using chains or ropes (with a carrying capacity of 20000 kg (44000 lb)), sling the upper structure in its front and rear part.

Hook these ropes to two cranes (with a lifting capacity of ~ 20000 kg (44000 lb) each) and slowly tension them without lifting the upper structure.

Please remember that the internal ring (1) of the slewing bearing is fastened to the undercarriage and that the external ring (2) is fastened to the upper structure.

Loosen and remove the screws (3) from the slewing bearing's external ring (2). Keep the spacers (5) because they will be reused.

Now the upper structure is detached from the undercarriage.

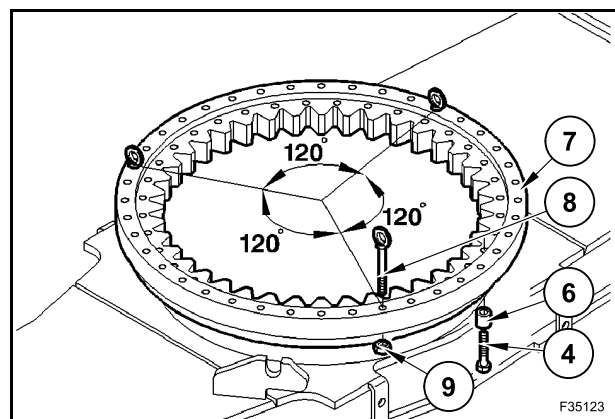
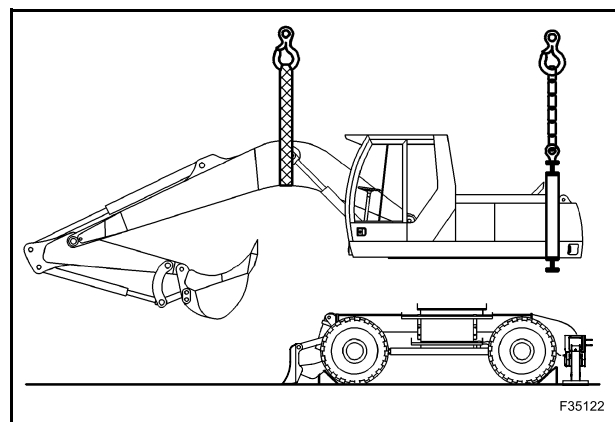
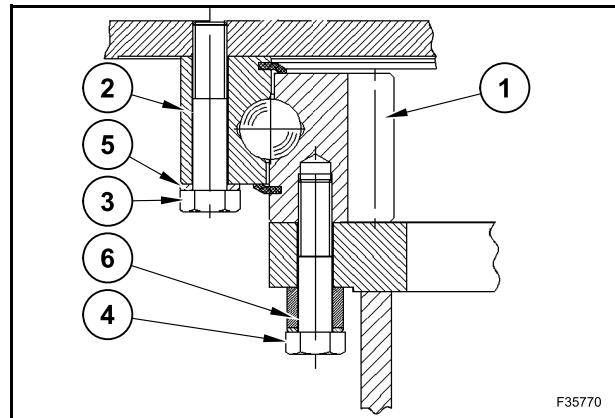
Carefully lift the upper structure, until the pinion of the rotation gearbox is freed. Turn the upper structure away from the undercarriage.

Using a hoist, hook the slewing bearing (7).

For this operation, insert 3 threaded eyebolts (8), staggered by 120°, into the holes, fastening them with the nuts (9).

Loosen and remove the screws (4) and keep the spacers (6) as they will be reused.

Lift the slewing bearing (7) and remove it from the undercarriage.



ASSEMBLY

When the slewing bearing is new, eliminate the anti-corrosive protection coat.

Carefully clean all supporting surfaces of the undercarriage and the upper structure. The metal of the supporting surfaces must be bright, clean and degreased. Eliminate projections and burrs.

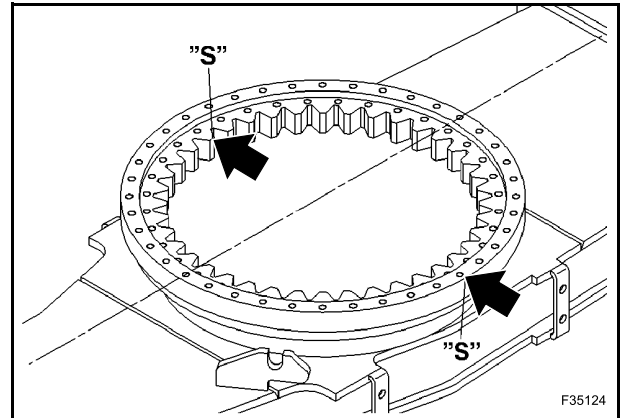
Clean the holes of the undercarriage. Carefully clean the threaded holes of the upper structure and check the threads. If damaged, pass them again with the screw tap.

Apply the adhesive to the supporting surface of the undercarriage. For this operation, use a painting roller, a hard brush or a plastic spatula.

Do not let the adhesive enter the holes. Adhesive on threads causes higher friction and, therefore, an alteration of the tightening torque.

Hook the new slewing bearing to the hoist.

Rotate the internal and the external ring so that the mark (S) on the external ring is at 90° to the travel direction, and the mark (S) on the internal ring is on the opposite side.



Rotate the slewing bearing on the undercarriage and leave it hanging above the supporting surface, without resting it. As a guide, screw in at least three new screws (4) with relevant spacers (6).

Carefully rest the slewing bearing and disconnect the hoist from the slewing bearing.

Screw in all remaining new screws with the relevant spacers and cross-tighten them using a torque wrench.

Tightening torque: 280 Nm (206.52 lbf-ft)

Mark the screws (4) already tightened.

Apply the adhesive, as described, also to the supporting surface of the upper structure.

Apply grease in a level coat to the teeth of the slewing bearing, so that the gaps between the teeth are completely filled.

Rotate the upper structure on the undercarriage and leave it hanging above the slewing bearing without resting it.

Carefully continue lowering the upper structure, inserting the pinion between the teeth.

As a guide, screw in at least three new screws (3) with relevant spacers (5).

Carefully release the upper structure.

Screw in all remaining new screws (3) with the relevant spacers (5) and cross-tighten them using a torque wrench.

Tightening torque: 280 Nm (206.52 lbf-ft)

Mark the screws (3) already tightened.

Connect all hydraulic hoses and electric harnesses again to the rotary control valve and to the rotor.

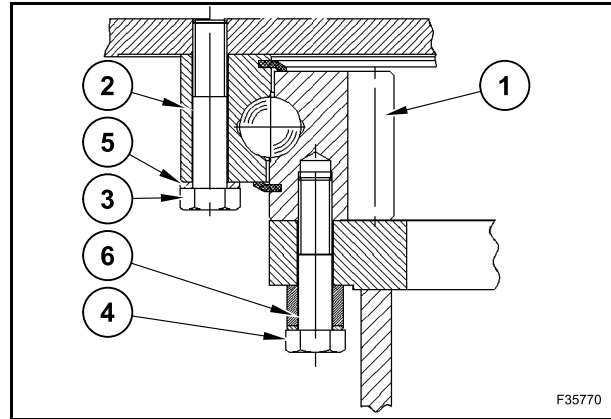
Remove the ropes from the upper structure.

Fill and bleed air from the hydraulic system. Operate the machine and check all hydraulic hoses for tightness.

The adhesive between the slewing bearing and the upper structure and between the slewing bearing and the undercarriage increases the load capacity of the screwed connection and contemporarily serves as a seal between the gaps.

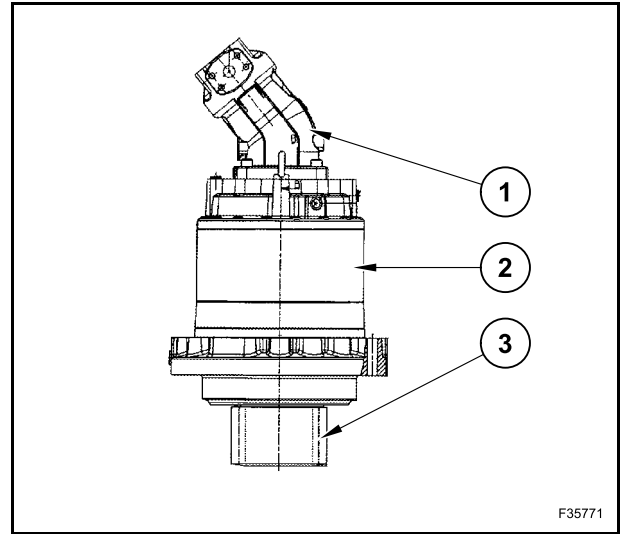
The adhesive hardens when exposed to air.

A definitive rigidity is obtained after ca. six hours. Fully load the machine only after this time has elapsed.



3. ROTATION GEARMOTOR

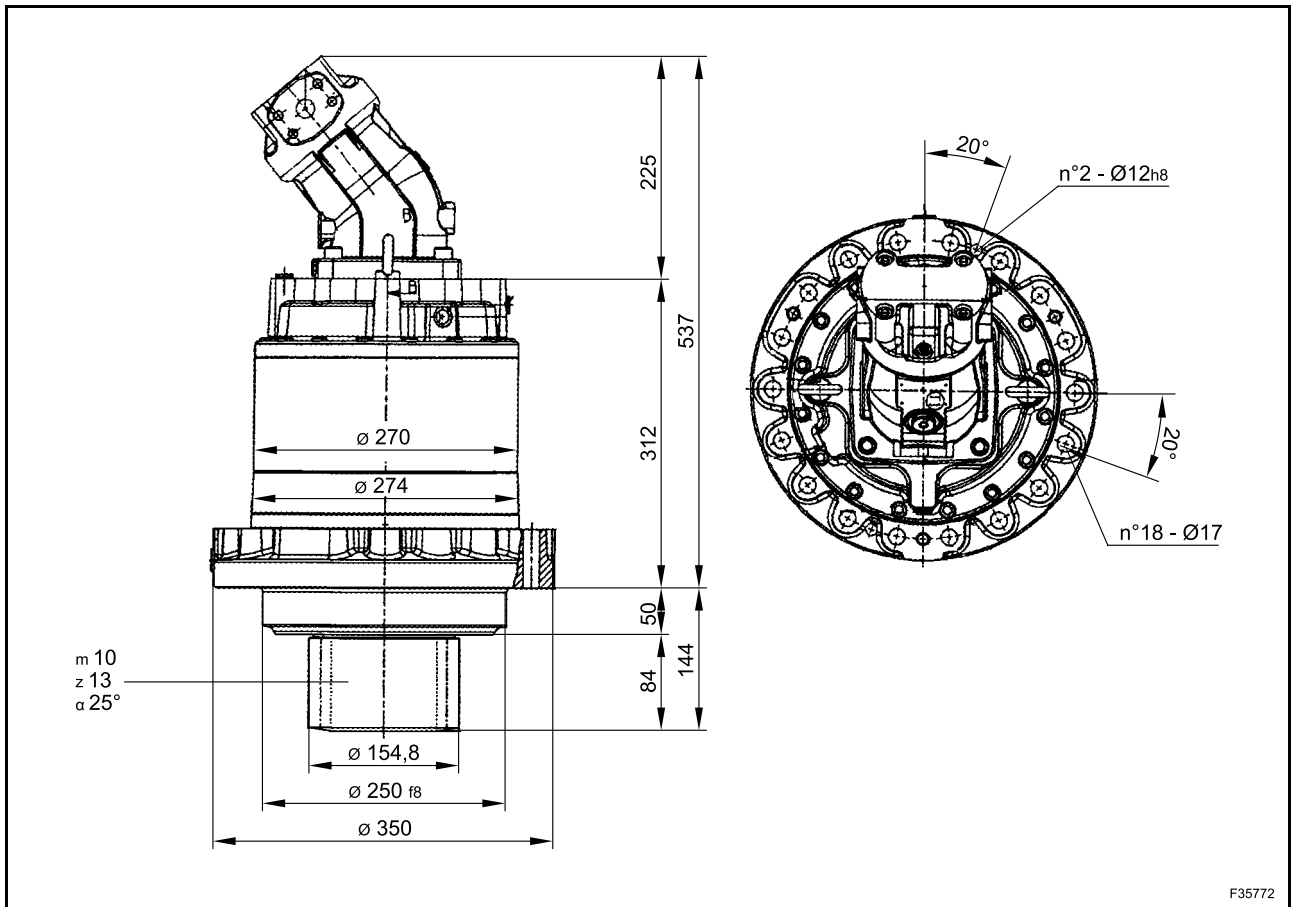
The rotation device consists of an hydraulic motor (1) and a gearbox (2). The hydraulic motor consists of an axial-piston motor. The gearbox is used to rotate the upper structure by means of the coupling of the relevant pinion (3) with the internal teeth of the slewing bearing. The rotation device is installed on the main frame of the upper structure.



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3.1 TECHNICAL SPECIFICATIONS

DIMENSIONS



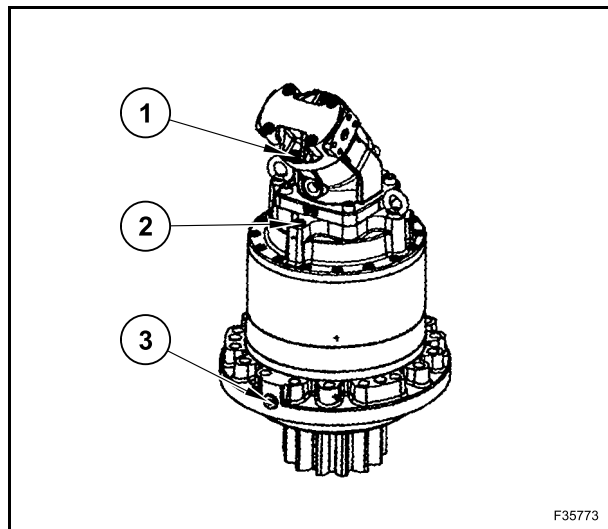
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DATA

		WX 210	WX 240
Model		MT706T056	MT706T057
Total ratio		24.5	
Dry weight	kg (lb)	140 (308)	
Oil capacity	litres (gal)	6 (1.60)	
Engine		A2FM56	A2FM63
Differential maximum pressure	bar (psi)	370 (5364)	
Output torque	kNm (lbs·ft)	8076 ()	9086 ()
Opening pressure	bar (psi)	12.5 (181)	
Maximum operating pressure	bar (psi)	50 (725)	
Brake		yes	
Maximum braking torque	Nm (lbf·ft)	475 (350.34)	

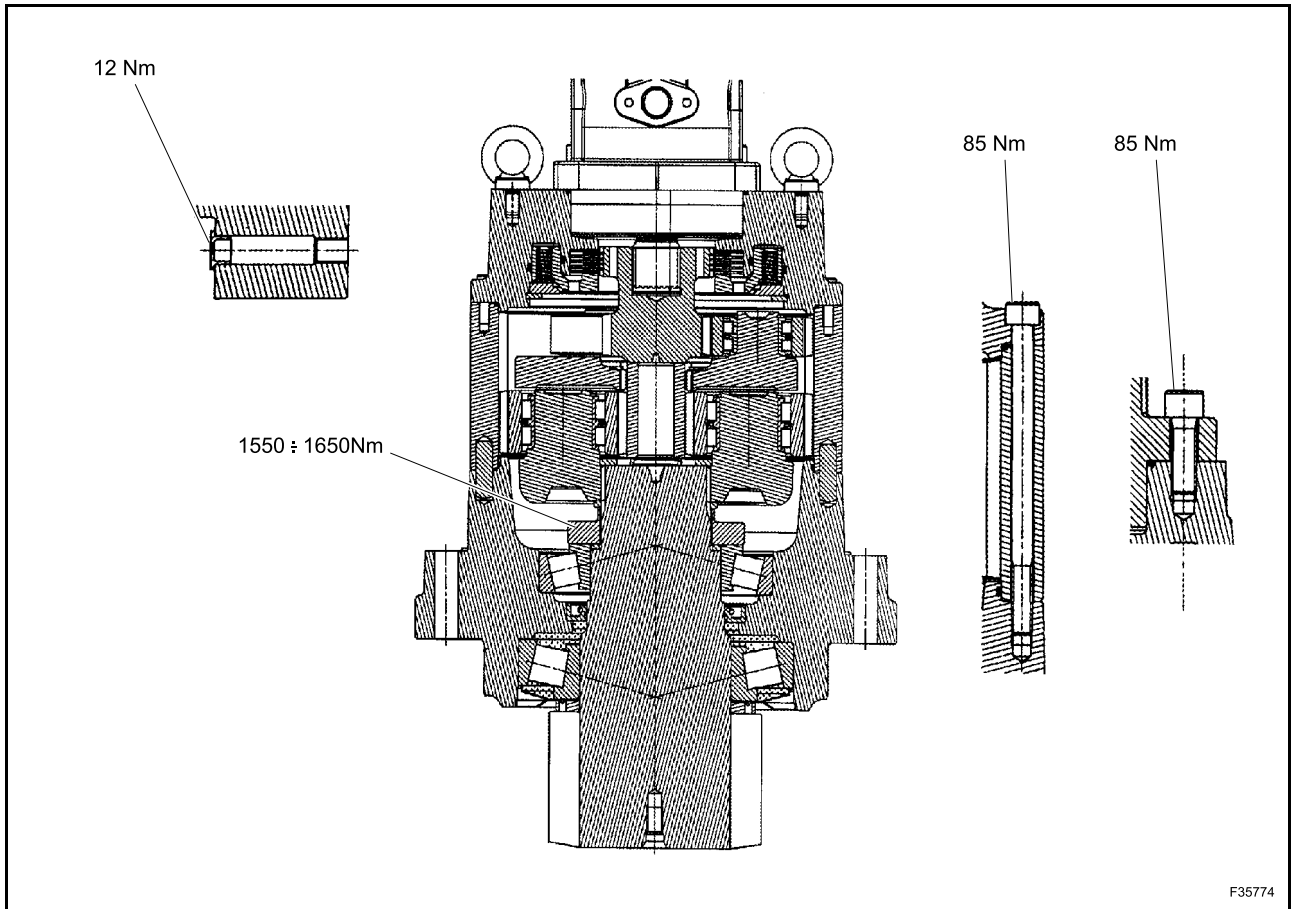
LUBRICATION

The gearmotor has two screw plugs (1) and (2) for oil filling and a plug (3) to be unscrewed for draining.



F35773

TIGHTENING TORQUES



3.2 DISASSEMBLY AND ASSEMBLY

DISASSEMBLY

Park the machine on a level and firm surface.

Lower the attachment to the ground.

Lower the blade and the stabilizers to the ground.

Engage the parking brake.

Lock the upper structure.

Stop the engine.

Move both hydraulic control levers in all directions, to release possible residual pressure inside the hydraulic system.

Disconnect the pilot control.

Place some wedges under the wheels so as to prevent the machine from moving.

Mark and disconnect the hydraulic lines (2) and remove the speed sensor (3) from the slewing gearbox (1).

Close all openings on hoses and rotation gearbox with plugs in order to prevent dirt from entering.

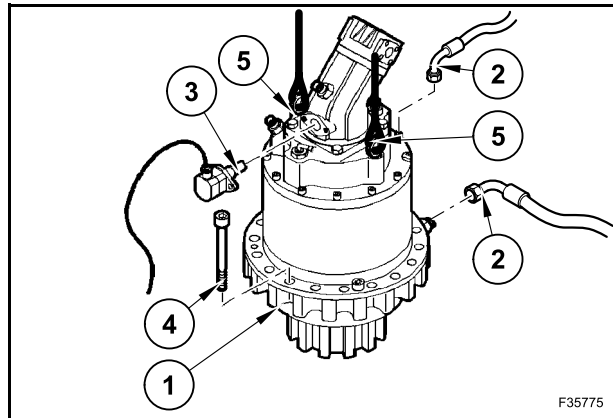
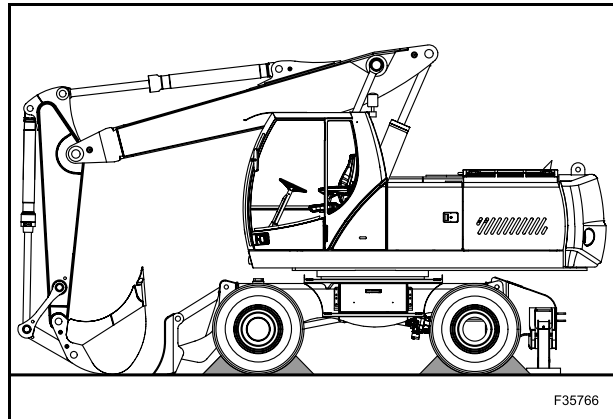
Using ropes, hook the slewing bearing (1) by means of eyebolts (5) and connect to a crane.

Mark the position of the rotation gearbox.

Unscrew and remove the screws (4).

Using the crane, lift and remove the slewing bearing (1).

The slewing bearing is glued to the supporting surface. To detach the glue, slightly hit the borders of the flange with a hammer.



ASSEMBLY

Using a solvent, accurately clean the supporting surfaces of the rotation gearbox and of the upper structure's frame from paint and grease. Then check for possible damage.

The metal of the supporting surfaces must be bright, clean and degreased.

Apply an adhesive strip with a thickness of approximately 1 mm (0.04 in) in the form of a ring around the hole of each fastening screw.

The adhesive must be applied at a certain distance from the holes, in order to prevent that, when coupling the two surfaces, the adhesive enters the threaded holes. The adhesive must only be applied when the gearbox is ready to be installed.

Using the ropes connected to the eyebolts (5), hook the gearbox to the crane, bring it to mounting position and rest it without moving it.

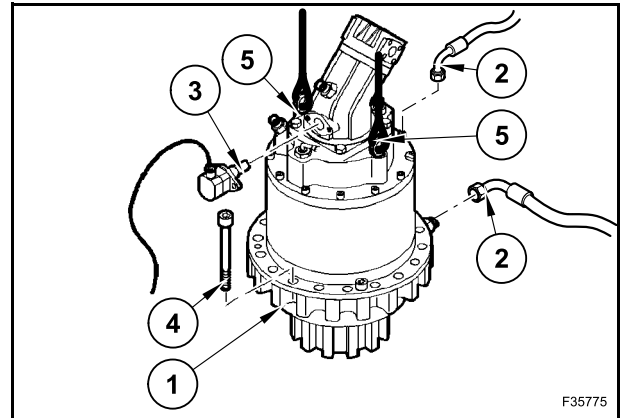
Screw in the screws (4) and cross-tighten them, marking the screws already tightened.

Tightening torque: 250 Nm (184.39 lbf-ft)

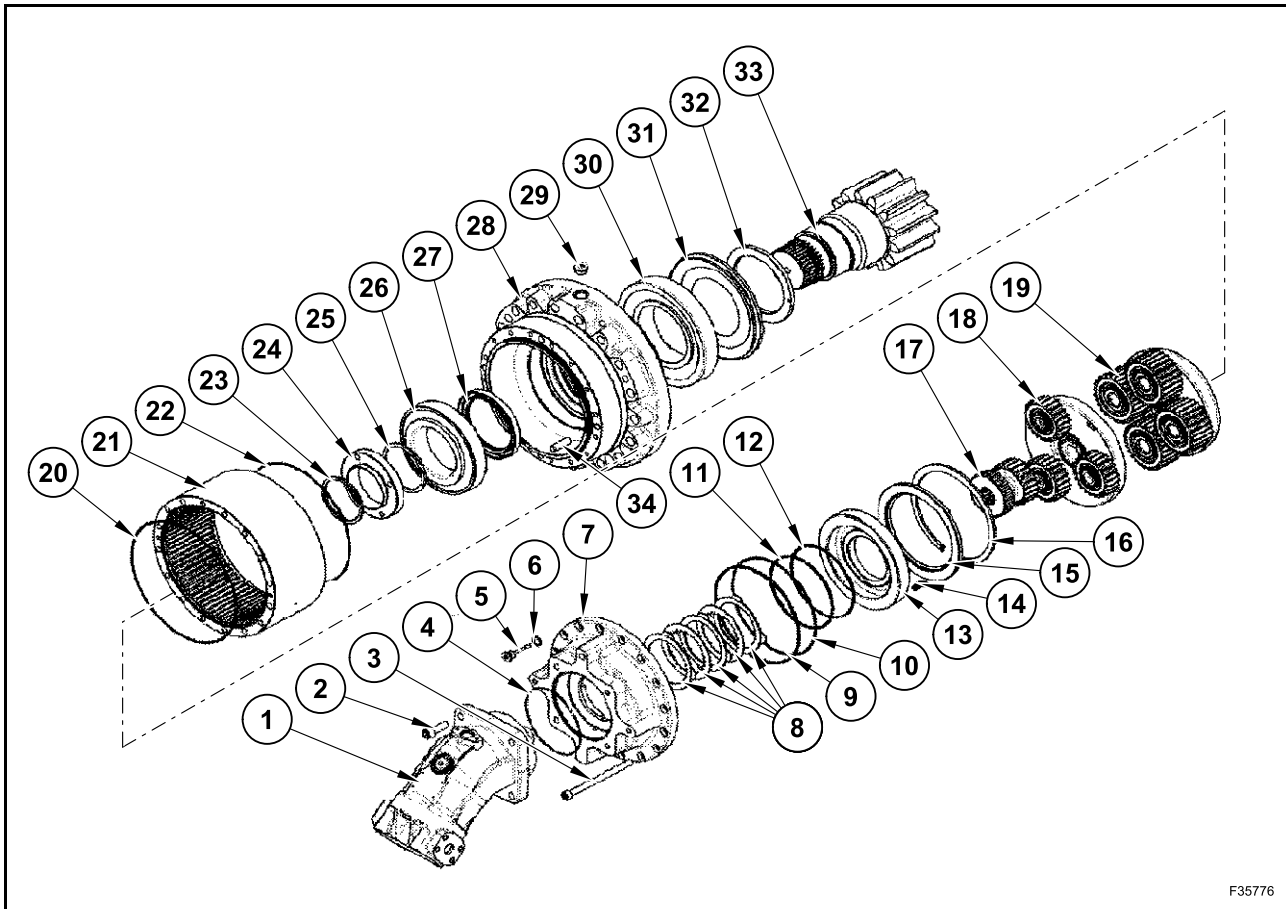
Assemble speed sensor (3).

Connect the hydraulic lines (2) and fill oil into the gearbox.

Bleed air from the hydraulic system.



3.3 DISASSEMBLY AND ASSEMBLY



F35776

- | | |
|-------------------|--------------------------|
| 1. Rotation motor | 18. Planetary gears assy |
| 2. Screw | 19. Planetary gears assy |
| 3. Screw | 20. O-ring |
| 4. O-ring | 21. Ring gear |
| 5. Screw | 22. O-ring |
| 6. Washer | 23. Spacer |
| 7. Flange | 24. Ring nut |
| 8. Brake discs | 25. Shim |
| 9. O-ring | 26. Bearing |
| 10. Back-up ring | 27. Seal ring |
| 11. O-ring | 28. Gearbox body |
| 12. Back-up ring | 29. Plug |
| 13. Piston | 30. Bearing |
| 14. Spring | 31. Ring |
| 15. Ring | 32. Shim |
| 16. Snap ring | 33. Pinion |
| 17. Gear | 34. Cross pin |

4. MULTI-COOLER

The multi-cooler consists of three radiator cores. The front radiator, in travel direction, is passed through by the return oil of the working hydraulics, the rear radiator by the coolant of the diesel engine, while the upper radiator is passed through by the air of the turbocharger. The fan is actuated by a geared motor with adjustable speed. Speed adjustment is managed by the load-limit regulator, according to temperature. With low temperatures, the fan rotates slowly; this keeps the noise level low and temporarily reduces power demand to the minimum.

The cooling air flow is sucked by the fan in the middle of the excavator, conveyed through the multi-cooler and then directed outside through the slots in the panelling.

The geared motor receives on connection P the pressurized oil coming from the brake and steering systems. There is pressurized oil also on the motor's closing plate, where an electronic proportional valve connected in parallel is located, with a bypass function.

The load-limit regulator analyses three signals it constantly receives from the temperature sensor of the coolant, from the temperature sensor of the turbocharger air and from the temperature sensor of the hydraulic oil. The highest of these three values is taken into consideration for proportional valve adjustment.

A low temperature forces the load-limit regulator to send a high current to the proportional valve. By means of the electric force, the control piston is opened further, and therefore a bypass is created, through which the oil, passing in front of the motor, drains into the channel of tank T. In this way, a low fan speed is set.

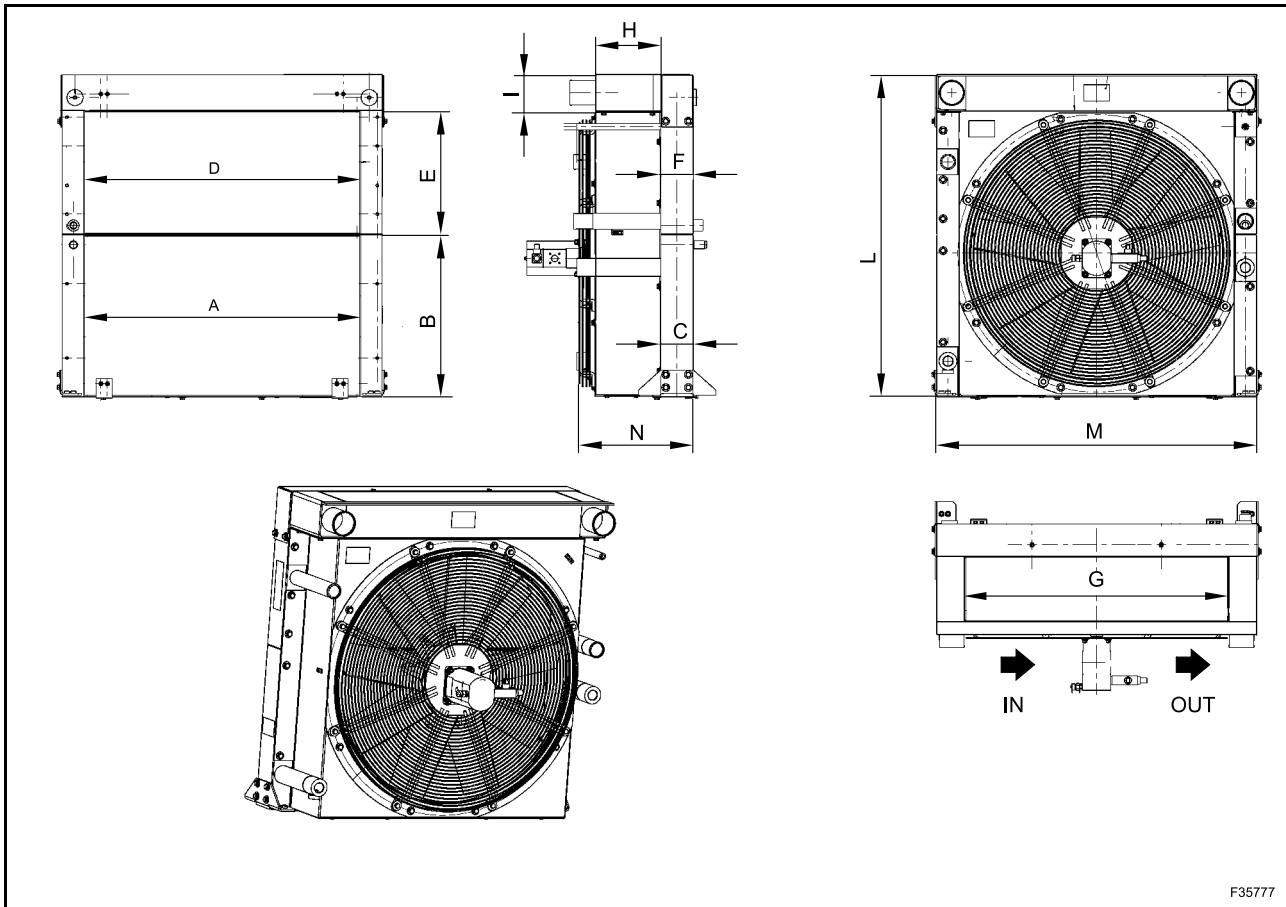
When temperature increases, the load-limit regulator reduces current on the proportional valve. The control piston is less opened, and therefore the motor receives a higher oil delivery. The fan speed increases.

A pressure relief valve, integrated in the proportional valve, protects the fan system against possible pressure peaks.

When the motor is stopped, a replenishing valve guarantees oil delivery to the motor during the fan deceleration phase, until it comes to a complete stop.

In case of anomalies, e.g. in case a cable breaks, the proportional valve receives no current. Therefore, the fan rotates at its maximum speed. In this case, the pressure in the fan system is limited by the pressure relief valve.

4.1 TECHNICAL SPECIFICATIONS



		WX 210	WX 240
Oil mass A x B x C	mm (in)	835 x 500 x 100 (32.87 x 19.68 x 3.94)	
H ₂ O D x E x F mass	mm (in)	835 x 382 x 100 (32.87 x 15.04 x 3.94)	
G x H x I Aftercooler mass	mm (in)	795 x 202 x 113 (31.3 x 7.95 x 4.45)	
L. Height	mm (in)	997 ± 5 (39.25 ± 0.19)	
M. Width	mm (in)	1000 ± 5 (39.37 ± 0.19)	
N. Thickness	mm (in)	354 ± 3 (13.93 ± 0.12)	
Aftercooler radiating surface	dm ² (in) ²	16 (248)	
H ₂ O radiating surface	dm ² (in) ²	31 (480)	
Oil radiating surface	dm ² (in) ²	41.8 (648)	
Aftercooler service pressure	bar (psi)	2.5 (36)	
H ₂ O service pressure	bar (psi)	1 (15)	
Oil service pressure	bar (psi)	16 (232)	
Weight	kg (lb)	130 (286)	

4.2 COOLANT LEVEL, TOP-UP AND CHANGE

LEVEL CHECK

The coolant level must be checked daily, so as to detect in time liquid leaks and prevent damage.

Shut off the engine and wait until the engine and the cooling system reach 50 °C (122 °F).

Open the engine compartment cover.

The coolant level must be between notches “min” and “max” of the surge tank (1). If necessary, top up the coolant.

To perform this operation, open with caution the cap (2) of the surge tank of about half of a turn, to allow the pressure to relieve from the cooling system.

Only after pressure relief can you completely unscrew the plug (2) and top up the coolant.

Retighten the plug.

Close the engine compartment cover.

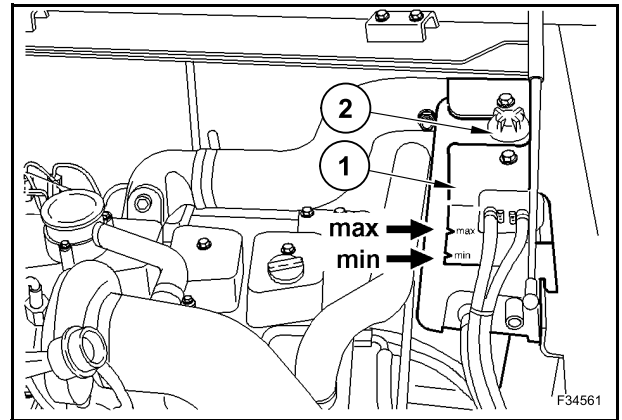
TOP-UP

The coolant must consists in a mixture of 50% of distilled water and 50% of antifreeze.

Before performing any top up or additive change, ask the After-sales Service about the specifications of the required additive allowed for your machine.

First of all mix the components in a clean container and then pour the mixture into the cooling system. If the mixture components are poured into the cooling system one after the other, it is not possible to obtain the correct mixture ratio. There is also the possibility that components do not mix together in the correct way.

NOTE: do not use not authorized additives. The corrosion produced by this improper use, can cause leaks in the cooling system and serious damages to the engine.



GEAR BOX

Park the machine on a level and firm surface.

Lower the working attachment to the ground.

Activate the parking brake.

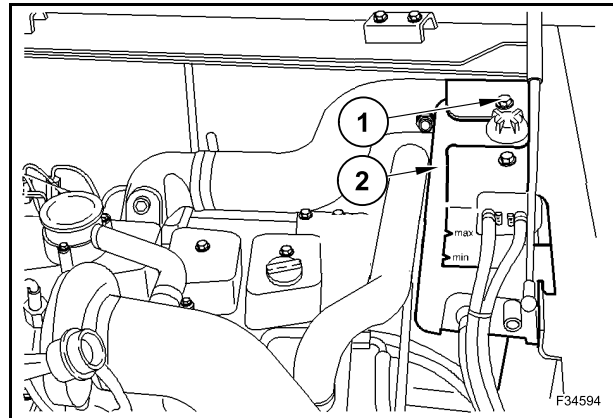
Place the machine in a safe condition.

Stop the engine.

Open the cover of the engine compartment and the door in front of the multi-cooler.

Prepare a collecting container for the coolant.

Unscrew plug (1) of expansion tank (2).



Using the oil drain hose, which must be clean, drain the coolant from the cooler.

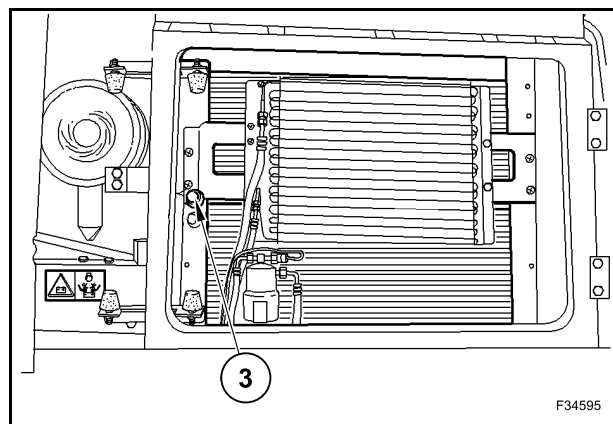
The drain sleeve (3) of the cooler coolant can be accessed from the front, on the left.

Collect the coolant in the previously prepared container.

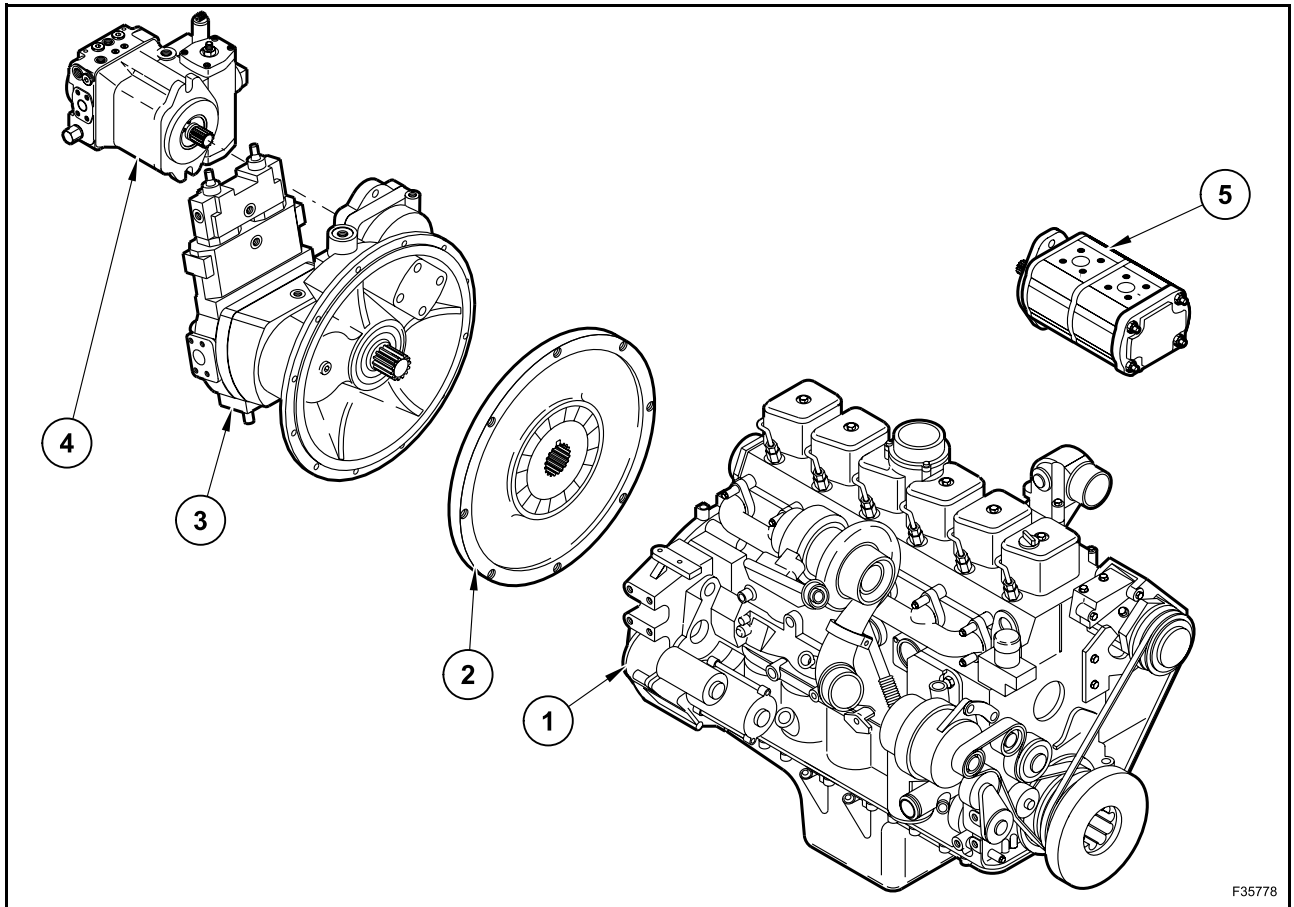
Fill the new liquid inside of the expansion tank, until the level sets between references "min" and "max".

Tighten the plug (1) again.

After a short test, check again the liquid level and, if necessary, top up.



5. HYDRAULIC PUMPS



1. Diesel engine
2. Flexible coupling
3. Variable-displacement twin pump

4. Rotation pump
5. Double gear pump

The variable-displacement twin pump (3) is actuated by the diesel engine (1) through a flexible coupling (2).

The rotation pump (4) is flanged to the side of the twin pump (3).

A twin gear pump (5) is installed on the diesel engine's (1) power take-off. The first pump is provided for the steering system, as well as for the fan motor. The second pump supplies the brake system and the clamshell rotation device.

The hydraulic tank provides cleaned and cooled oil to the pumps. The variable-displacement twin pump (3) sucks oil through the hydraulic hoses. The built-in pilot control pump sucks oil directly into the double pump's casing.

The auxiliary pump (supply pump), integrated into the rotation pump (4), sucks oil by means of a separate hose.

The double gear pump sucks oil from the tank through its own hose.



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7. HYDRAULIC OIL TANK

The hydraulic tank (6) is used for hydraulic oil supply. It contains the filter housing with the return filter's seat (16).

The cover (4), in the middle with the breather valve (1), closes the inspection opening.

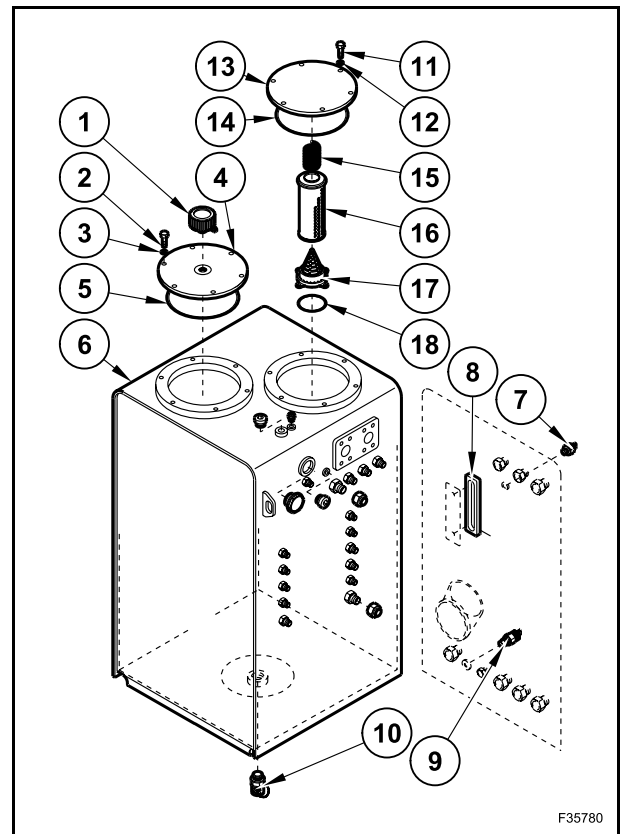
Several fittings for the return hoses to the filter housing, for the return hoses under the filter housing as well as the fitting for the suction hose are welded to the outer side of the tank. The oil drain plug (10) is located at the bottom.

The pressure switch (6) on the filter housing has the function to control the filter. If the filter element is clogged (16) and pressure reaches a non-allowable value, the contact closes. In this way, an optical and acoustic signal is generated.

The breather valve with filter (1) preserves the purity of oil from environmental influences. A built-in double-acting valve (17) makes sure that, when the oil level in the tank reduces, the atmospheric pressure continues entering until the allowable pressure is reached. It also makes sure that the pressure in the tank is limited when volume variations occur due to oil heating or cylinder retraction.

The temperature sensor (7), detects the hydraulic temperature. In order to control temperature, the load-limit regulator receives the temperature signal in the form of electric resistance.

1. Breather valve with filter
2. Screw
3. Washer
4. Cover
5. O-ring
6. Oil tank
7. Pressure switch
8. Level gauge
9. Temperature sensor
10. Oil drain plug
11. Screw
12. Washer
13. Cover
14. O-ring
15. Spring
16. Filter element
17. Valve
18. Seal ring



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