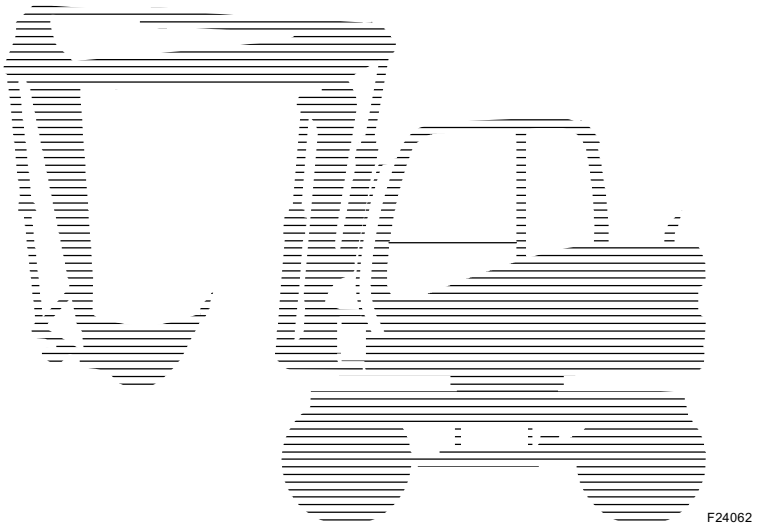
EXCAVATOR

MH2.6
MH3.6

SERVICE MANUAL



IMPORTANT:
Data contained in this manual was current at the time of publication. As the Manufacturer improves constantly his products, some information may result as not updated. If variances are observed, contact your Dealer and After-Sales Service.

NEW HOLLAND KOBELCO CONSTRUCTION MACHINERY S.p.A. - ENGINEERING
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03305

FEATURES OF THE MANUAL

MANUAL COMPOSITION

This service manual consists of 10 sections, of which we indicate hereunder denomination and content concisely. For the service manual best use, it is essential to understand how it is organised. Therefore, in order to speed up the searching of the wished subjects, it is advisable to carefully read this chapter.

SECTION 1 - MAIN OPERATING RULES
Begin to read first this Section to know the manual composition. This will help you for subject searching.

SECTION 2 - SAFETY PRECAUTIONS
This section gives indication on how to avoid dangerous situation during the machine use and maintenance. Besides,in this section are listed the safety decals applied on the machine and their relevant indications.

SECTION 3 - FEATURES AND DATA
This Section indicates the features and data of the machine.

SECTION 4 - SUPERSTRUCTURE
This section contains the information relevant to the operation principle of the systems, of the assemblies and of their components located on the machine upper frame. Besides, the assembly/disassembly procedures of the main devices are outlined.

SECTION 5 - UNDERCARRIAGE
This section contains the information relevant to the operation principle of the systems, of the assemblies and of their components located on the machine lower frame. Besides, the assembly/disassembly procedures of main devices are outlined (axles, transmission, travels motor, etc.).

SAFETY PRECAUTIONS

MAINTENANCE

GENERAL NOTES

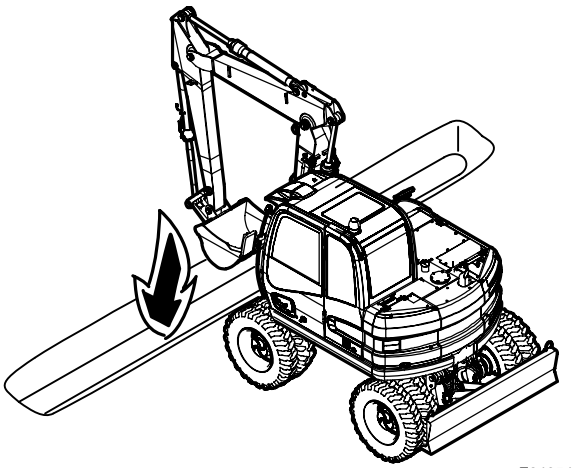
Carefully read the Operation and Maintenance Instruction Manual before starting, operating, maintaining, fuelling or servicing the machine in any manner.
Read all safety plates mounted on the machine and observe instructions they contain before starting, operating, repairing, fuelling or servicing the machine.
Do not allow unauthorised personnel to operate or service this machine.
Do not carry out any work on the attachment without prior authorisation.
Observe recommended maintenance and repair procedures.
Do not wear rings, wrist watches, jewellery, loose or hanging garments, such as ties, torn clothing, scarves, unbuttoned or unzipped jackets that can get caught in moving parts. Wear certified safety clothes such as: hard hat, no-slip footwear, heavy gloves, ear protection, safety glasses, reflector vests, respirators when required.
Ask your employer about safety regulations in force and protective equipment.
Do not use controls or hoses as hand holds. Hoses and controls are movable parts and do not provide solid support.
Besides, controls may be inadvertently moved and cause unexpected movement of the machine or its attachments. Do not jump on or off the machine. Always keep both hands and one foot, or both feet and one hand in contact with steps and/or grab rails.
Never service the machine with someone sitting in the driver's seat, unless this person is an authorised operator assisting in the maintenance being carried out.
Keep the operator's compartment, step plates, grab rails and handles clear of foreign objects, oil, grease, mud or snow to minimise the danger of slipping or stumbling. Remove mud or grease from your shoes before operating the machine.
Never attempt to operate the machine or its attachments from any position other than sitting in the operator's seat.
Keep the driver's seat free from foreign objects, especially if these are not secured.
Should it be necessary to move the attachment for maintenance purposes, do not raise or lower the attachment from any other position than sitting in the operator's seat. Before starting the machine or moving its attachment, sound the horn and require that nobody remains near the machine.
Raise the attachment slowly.
Always lock all moving components or parts of the machine that must be lifted for maintenance purposes using adequate external means as required by local and national regulations.
Do not allow anyone to pass or stay near or below a raised attachment. If you are not absolutely sure about your safety, do not stay or walk under a raised attachment.
Do not place head, body, limbs, hands, feet or fingers near articulated cutting edges deprived of the necessary guards, unless they are suitably and safely locked.
Never lubricate, repair or adjust the machine with the engine running, except when this is specifically required by the Operation and Maintenance Instruction Manual.
Do not wear loose clothing, jewellery near rotating parts.
When service or maintenance require access to areas that cannot be reached from the ground, use a ladder or step platform conforming to local or national regulations to reach the working area. If such means are not available, use machine grab rails and steps. Always perform all service or maintenance work with the greatest care and attention.
Shop and/or field service platforms or ladders should be manufactured and maintained in accordance with local or national safety regulations in force.
Disconnect batteries and label all controls to warn that service work is in progress, according to local and national safety regulation requirements.
Block the machine and all attachments to be raised according to local and national safety regulation requirements.
Do not check or fill fuel tanks or install batteries near burning or smoking materials and open flames due to the presence of flammable vapours.
The fuel filler pipe nozzle must be constantly kept in contact with the filler neck and this even before fuel starts flowing in. Keep this contact from the beginning to the end of the fuelling operation to avoid possible generation of sparks due to static electricity.
Use a truck or trailer to haul a failed machine. Should it be necessary to tow it, provide for suitable danger signals as required by the local norms and regulations and observe recommendations given in the Operation and Maintenance Instruction Manual. Load/unload the machine on firm level ground providing safe support to the wheels of the truck or trailer.
Use strong access ramps, with adequate height and angle. Keep the trailer flatbed free of mud, oil or slippery materials. Tie the machine securely to the trailer and block carriages and upperstructure.
When aligning the pin bores, never insert your finger or hands into the pin bore. Use a suitable tool.
Remove all sharp edges and burrs from re-worked parts.
Use only approved and grounded auxiliary power sources for heaters, battery chargers, pumps and similar equipment to reduce electrical shock hazard.
Lift and handle heavy components using hoisting devices of appropriate capacity. Ensure the parts are supported by appropriate straps and hooks.

SAFETY PRECAUTIONS

DIG WITH CAUTION

Accidental severing of underground cables or gas lines may cause an explosion and/or fire, possibly resulting in serious injury or death.

Before digging, check the location of cables, gas lines, and water lines.
Keep the minimum distance required by law from cables, gas lines, or water lines. If a fiber optic cable should be accidentally severed, do not look into the end, to avoid eyes injury.
To solve possible doubts, contact local authorities and/or the Power companies (Electric Power, Gas, Telephone, Water, Telecommunications, etc.). Ask for information about underground utility lines.



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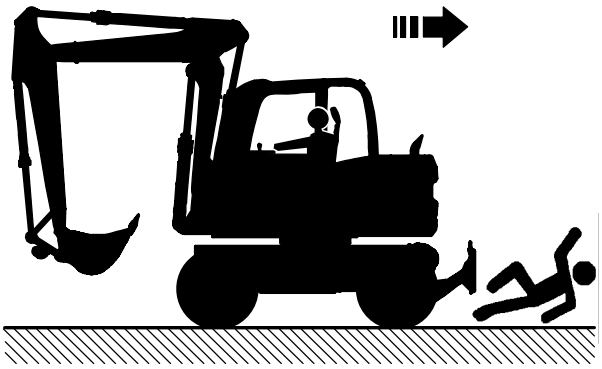
MOVE AND OPERATE MACHINE SAFELY

Bystanders are in danger of being run over. Confirm the location of bystanders before moving, slewing, or operating the machine.

Always keep the travel alarm in good working condition. (if equipped). It warns people when the machine starts to move.

Use a signal person when moving, slewing, or operating the machine in congested areas. Coordinate hand signals before starting the machine.



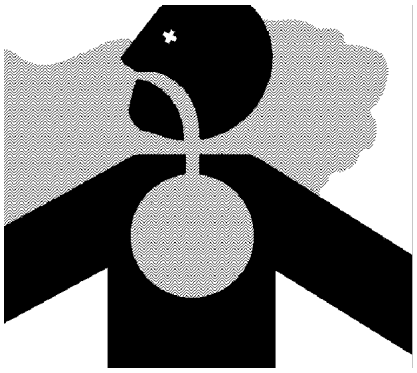
F24657

BEWARE OF EXHAUST FUMES

Engine exhaust fumes can cause sickness or death.

If you must operate in closed buildings, be sure there is adequate ventilation.

Use an extension to eliminate exhaust gases or open doors and windows to ensure a sufficient air exchange.



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SAFETY PRECAUTIONS

STORE ATTACHMENTS SAFELY

Stored attachments such as buckets, hydraulic breakers, and blades can fall and cause serious injury or death.

Securely store attachments and implements to prevent them from falling. Keep playing children and bystanders away from storage area.

SUPPORT MACHINE PROPERLY

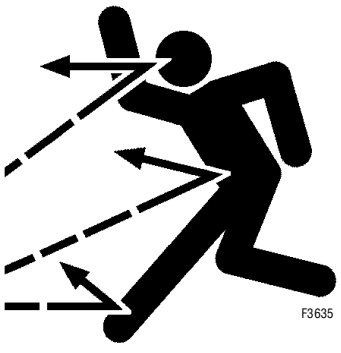
Never attempt to work on the machine without securing the machine first.

Always lower the attachment or tool to the ground before working on the machine.
If you must work on a lifted machine or attachment, securely support the machine or attachment.

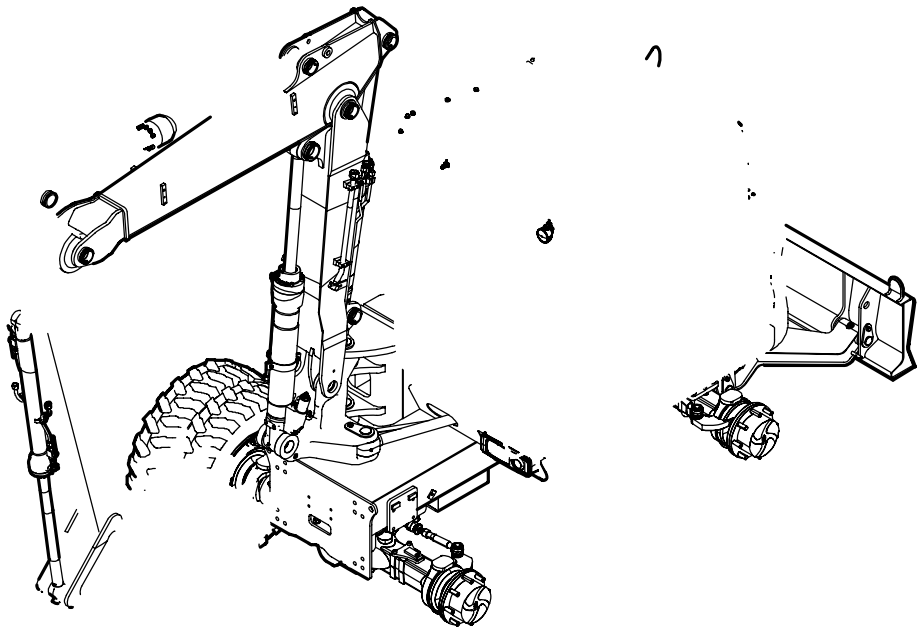
Do not support the machine on cinder blocks, bollow tires, or props that may crumble under continuous load.
Do not work under a machine that is supported solely by a jack.

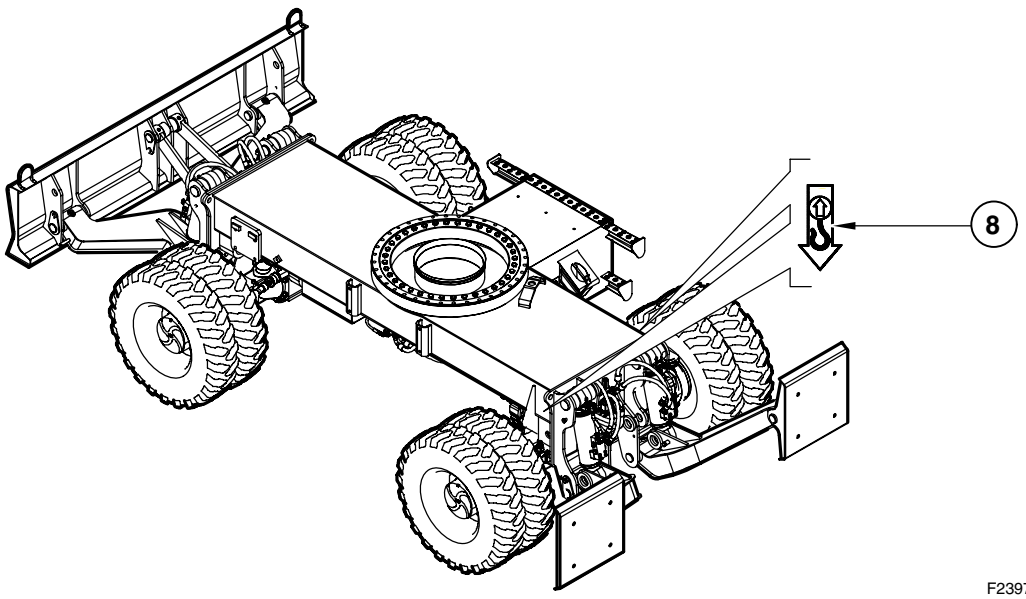
PREVENT PARTS FROM FLYING OFF

Tyres are charged with pressure.
Tyre and/or rim parts burst may result in serious injury or death.
Only skilled staff can replace tyres.
Always keep the correct tyre pressure.
Never exceed the recommended pressure when inflating tyres.
Slow down or stop and let tyres get cool.
When adjusting tyre pressure, keep at a certain distance and protect yourself. Use an extension equipped with a quick connection for the valve handling.
Always stay behind the tyre when adjusting pressure.



SAFETY LABELS





NOISE LEVELS (2000/14/EC)

SOUND POWER LEVEL

MH 2.6 - Lwa = 102 dB (A)

MH 3.6 - Lwa = 101 dB (A)

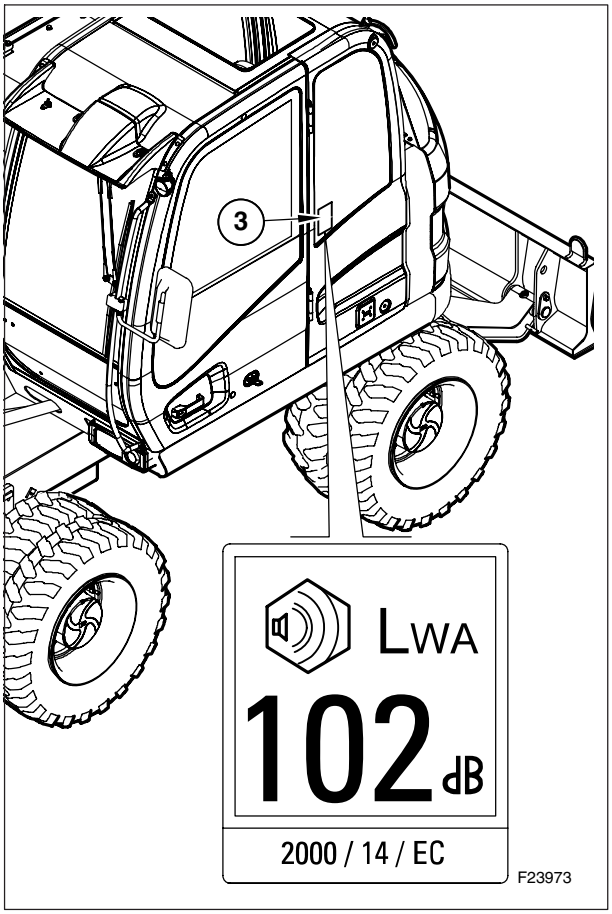
Plate (**3**) shows the guaranteed sound power level, determined in compliance with 2000/14/EC European Standard.

SOUND PRESSURE LEVEL AT THE OPERATOR'S SEAT

MH 2.6 - Lpa = 73 dB (A)

MH 3.6 - Lpa = 74 dB (A)

Sound pressure level continuous, equivalent and average (**A**) measured in compliance with ISO 6396:1992 on an identical machine with conditioning fan at the maximum operating speed.
The operating speeds (from the 1st to the 4th included) are the speeds suggested for manual selection during a long conditioning operation. They are a compromise for the performances of the system concerning air circulation and sound comfort.
Higher speeds (from the 5th to the 8th included) must be selected (manually) for short periods only and until reaching an acceptable temperature inside the cab.



BRAKING SYSTEM	
Service brakes	disc-type, in oil bath, operating on four wheels
Working brake	operating on service brakes and on front axle swing lock
Parking brake	multiple oil bath brake discs, mechanically activated by springs, hydraulic-control disconnection
Emergency brake	split braking circuit and automatic parking brake connection with engine off
Brake pedal valve	
Manufacturer	SAFIM
Model	V42 FSC PM5555110140SS
Braking circuits	2
Braking pressure	55 bar
Accumulator charge pressure	110 bar
Maximum accumulator pressure	140 bar
Accumulator	
Model	LAV 0.35
Capacity	0.35 l
Pre-charge pressure	50 bar
STEERING SYSTEM	
Steering mode	2 steering wheels, 4 steering wheels, crab steering
Steering angle	31°
Minimum steering diameter with twin tyre 10.00-20:	
with steered front axle	12500 mm
with both axles steered	8400 mm
Power steering	
Manufacturer	DANFOSS
Model	OSPC 125 ON 150N2185
Maximum pressure	17.5 MPa
Displacement	125 cm^3/rev
TYRES	
Twin wheels	10.00 - 20 EM NB-38 16PR
Individual wheels	600/40-22.5

MH 3.6
BUCKET USEFULNESS DEPENDING ON ARM

BUCKET			ARM (mm)	
Width	Capacity (dm^3) ISO 7451	Mass (kg)	2000	2350
500	232	194	■	■
600	297	208	■	■
700	364	230	■	■
800	433	244	■	■
900	503	271	▥	▥
1000	574	285	□	□

■ General digging work
(specific weight of material < 1.8 t/m^3)

▥ Slightly heavy digging work
(specific weight of material < 1.5 t/m^3)

□ Loading work
(specific weight of material < 1.2 t/m^3)

NOTE:
The data refer to a machine in transversal-digging position with rear blade in raised position.

MAIN FRAME AND COUNTERWEIGHT

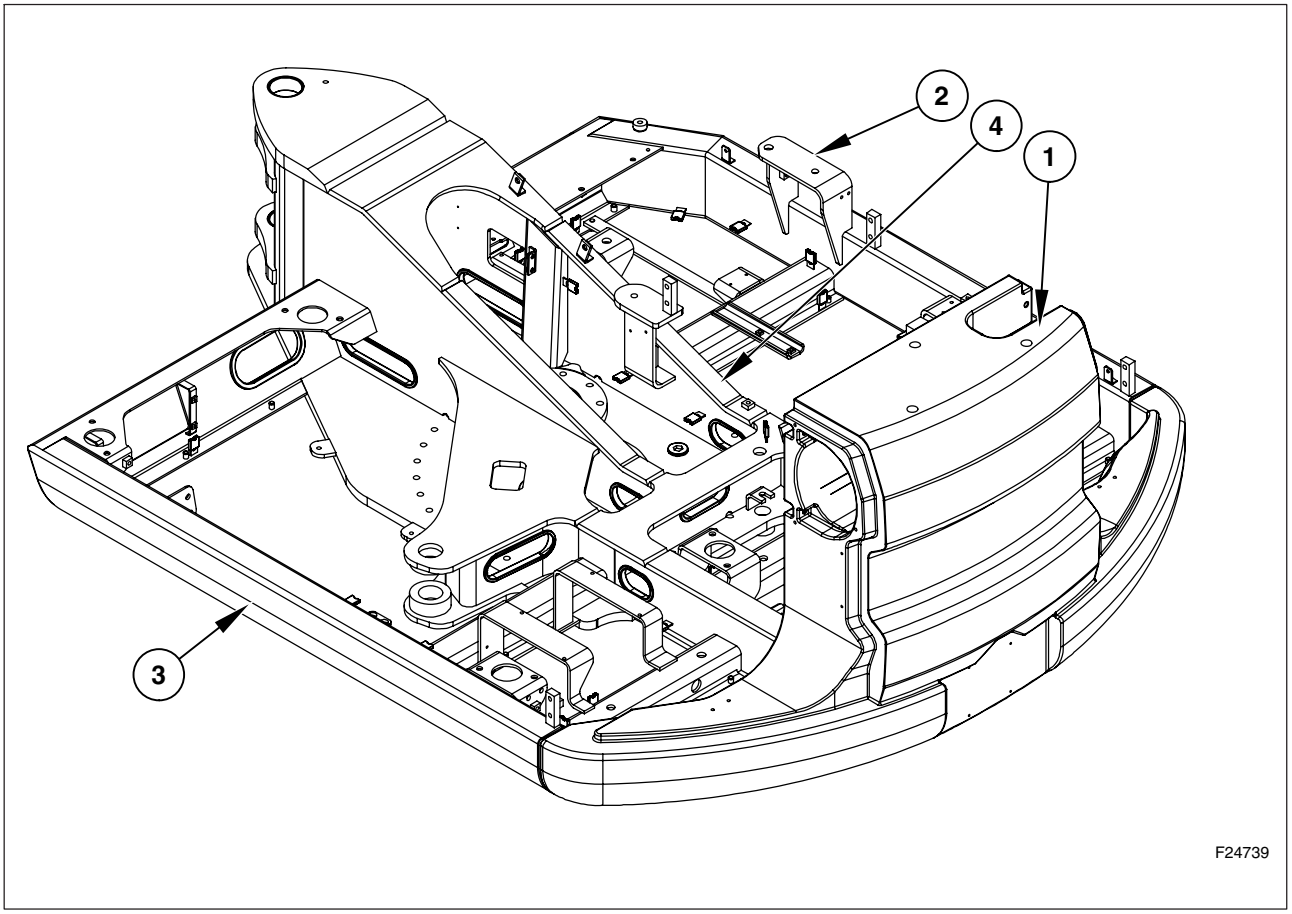
The main frame consists of a central frame and of side members (right, left), which are welded together.
Slew device and control valve are installed to the centre frame. Operator's cab and hydraulic oil tank are mounted on the left side member.
The fuel tank is mounted on the right side member.
The power unit and counterweight are mounted on the tail frame.

MH 2.6
FEATURES AND DATA

Main frame ..... kg 780
Counterweight ..... kg 1740

MH 3.6
FEATURES AND DATA

Main frame ..... kg 890
Counterweight ..... kg 2580



1. Counterweight
2. Right side member
3. Left side member
4. Central frame

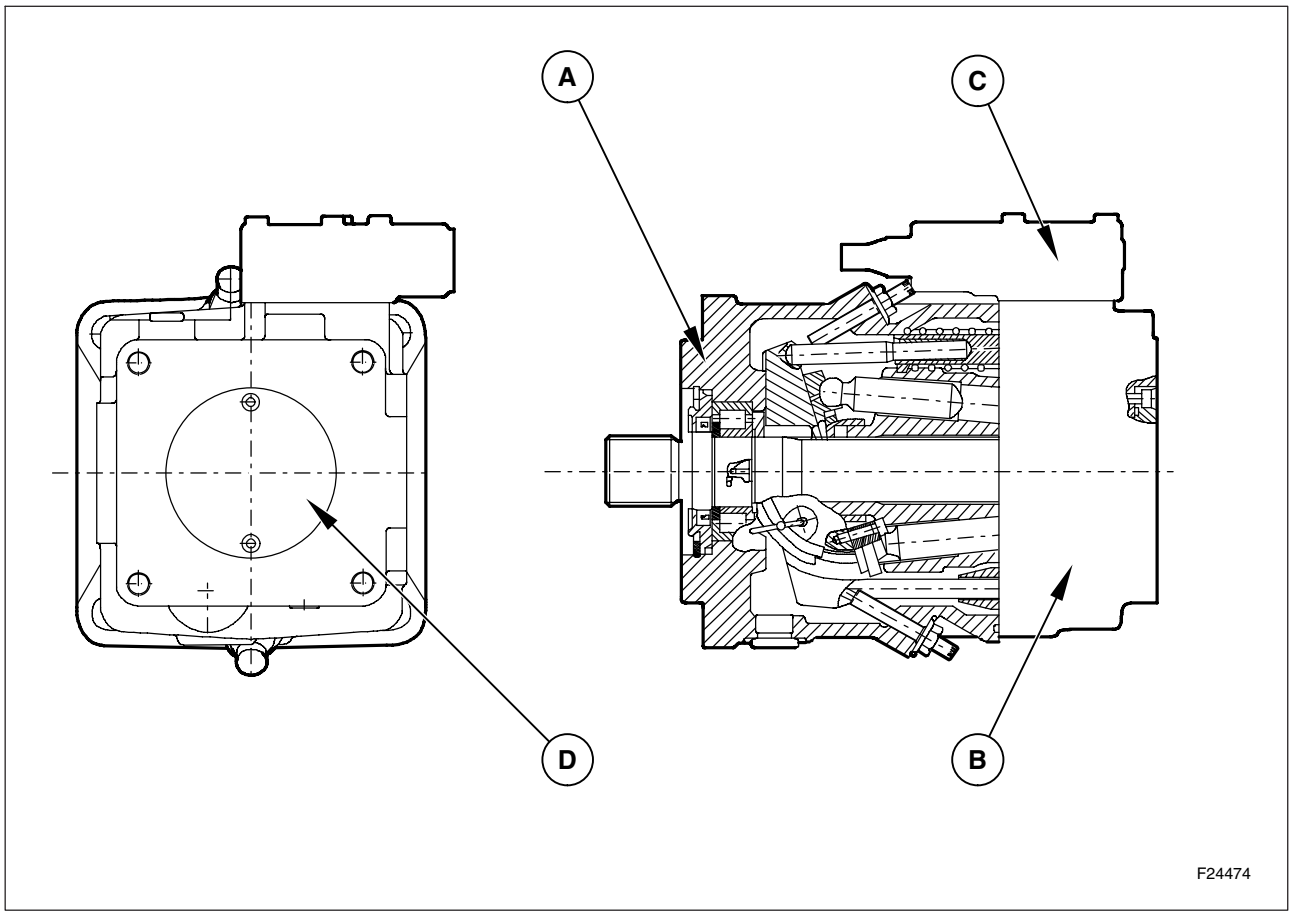
MH 2.6

MAIN PUMP

The main pump (A11VO75 LE2S) is of axial piston type with swash plate and variable delivery. The delivery is proportional to the revolution speed and to the displacement. The position of the swash plate allows a continuous variation of the delivery. The pump includes, essentially:

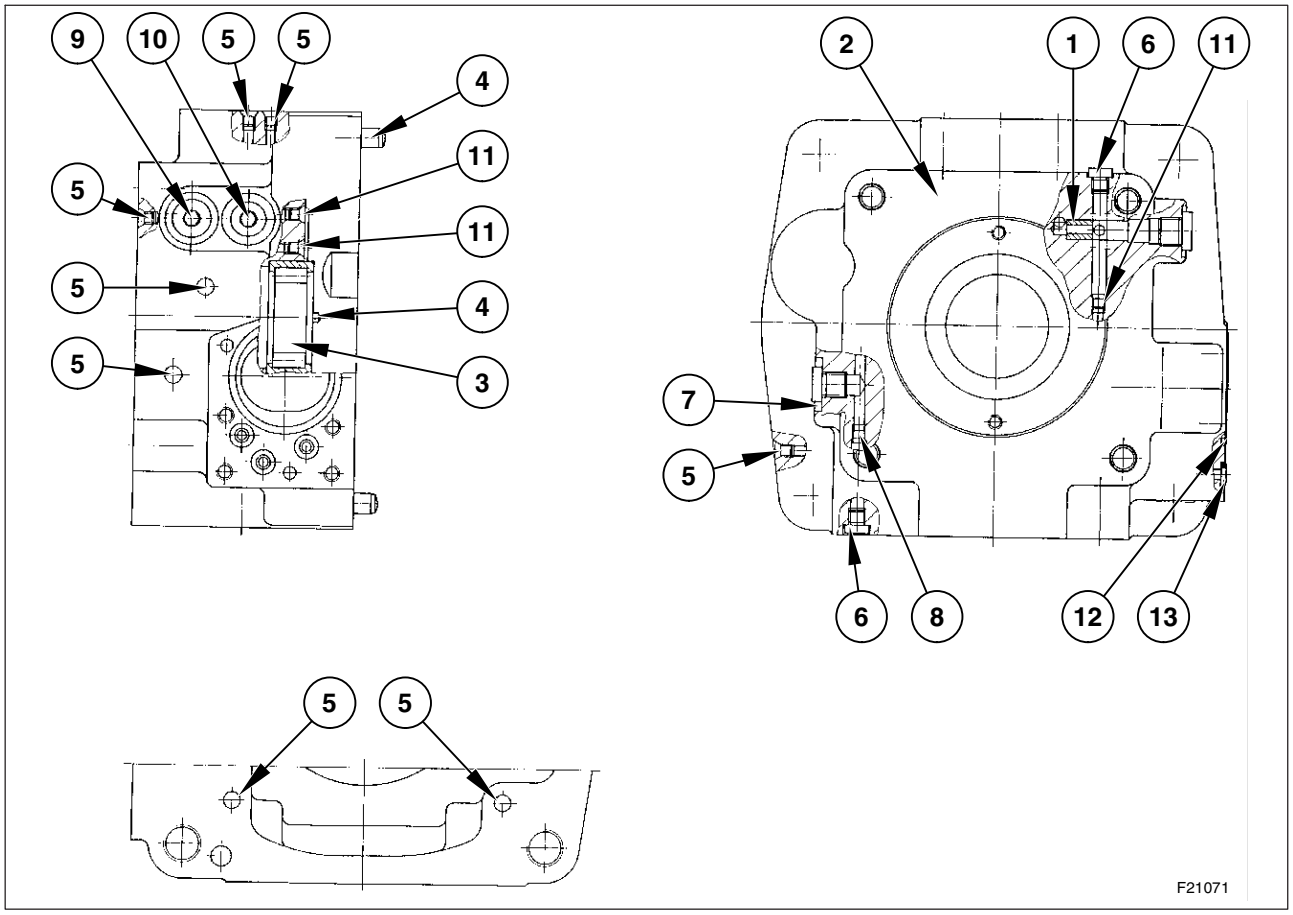
A. Rotor group
B. Inlet plate
C. Regulator
D. Pump support plate

When the driving shaft rotates, oil is sucked by the movement of the pistons sliding along the swash plate through the inlet ports of the valve plate.
When the pistons reach the bottom dead centre (cylinder chamber totally filled with oil) the relevant cylinders, where they slide, are communicating with the delivery ports of the valve plate. While the shaft rotates, the oil sucked by the retracting movement of the piston during the inlet phase, is pushed-out during the pushing movement of the piston itself, in the compression phase.
The alternating movement of the pistons, occurring in a sequence for all 9 pistons due to the rotation of the shaft, causes the pressurised hydraulic oil to exit into the feeding delivery piping.
The delivery of the pump is proportionate to the r.p.m. and the inclination angle of the swash plate where the pistons slide and it can be changed from a maximum to a minimum.
The rotation speed of the pump depends upon the r.p.m of the engine to which it is mechanically connected.



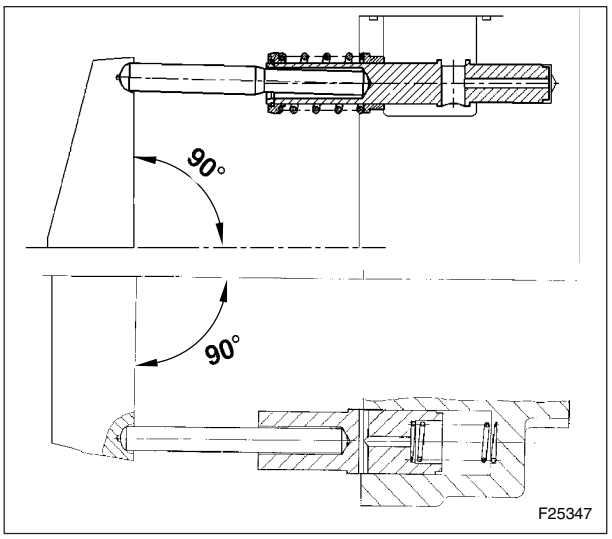
INLET PLATE

The inlet plate is mounted on the pump body and supports the regulator.



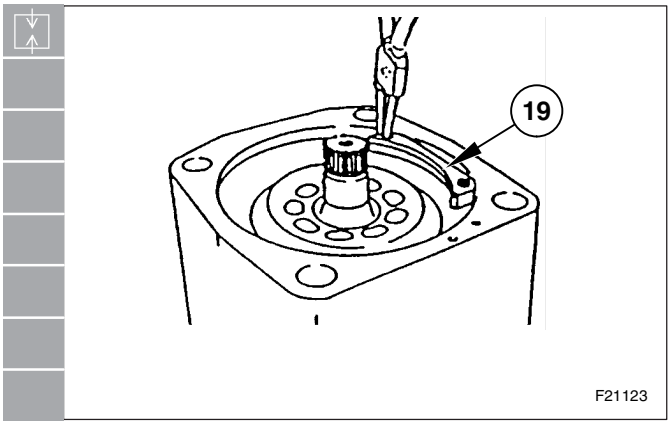
1. Bushing
2. Inlet plate
3. Bearing
4. Centring pin
5 Dowel
6. Plug
7. Plug
8. Orifice
9. Plug
10. Plug
11. Orifice
12. O-ring
13. Bonded seal

Inside, the seats for the swash plate control piston are made.

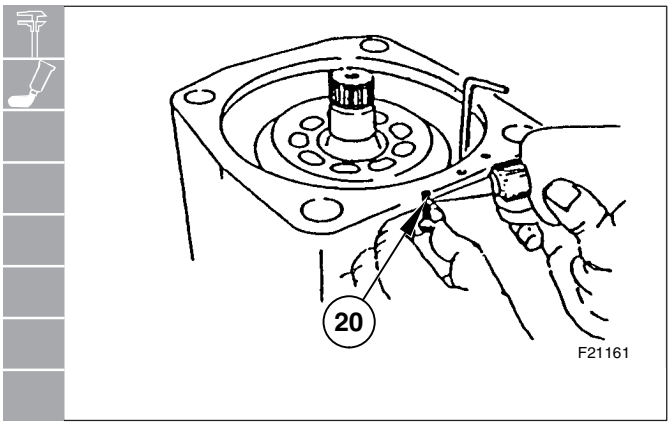


A. Rotor assy
B. Inlet plate
C. Regulator
D. Pump support plate
1. Circlip
2. Cover
3. Seal ring
4. O-ring
5. Shaft
6. Bearing
7. Pump body
8. Delivery set screw
9. Bearing race
10. Bearing
11. Swash plate
12. Retainer
13. Plug
14. Retaining pin
15. Retaining ball
16. Retaining plate
17. Snap ring
18. Piston
19. Locking segments
20. Screw
21. Cup springs
22. Cylinder
23. Control plate
24. Screw
25. Counter piston
26. Swash plate tilting control piston
27. Inlet plate
28. O-ring
29. O-ring
30. Piston
31. Regulator
32. Screw
33. O-ring
34. Pump support plate
35. Screw

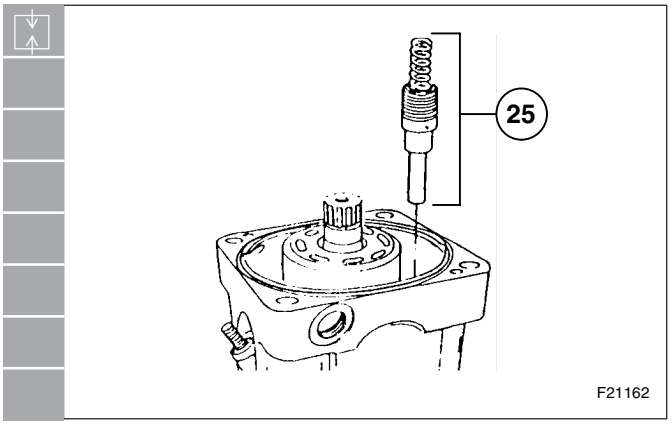
13. Remove the retaining segments (**19**).



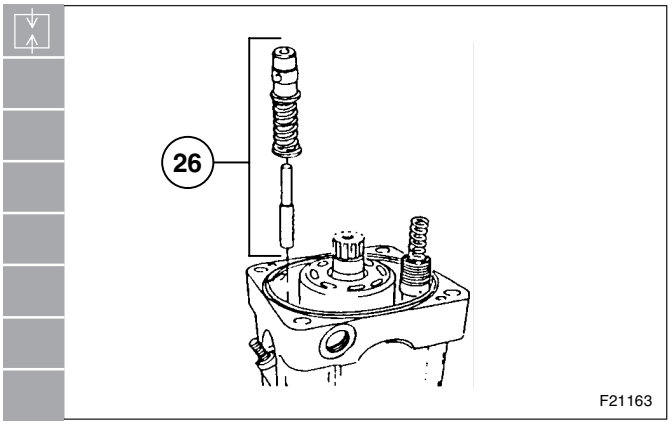
14. Apply Loctite on the fastening screws (**20**), then tighten screws to the correct tightening torque.



15. Install the control piston assy of swash plate (**25**) into its seat.



16. Install the counter piston assy (**26**) into its seat.

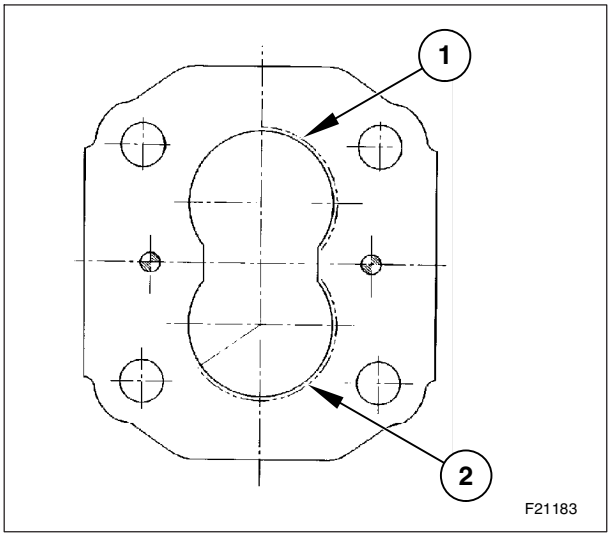


Inspections

Check that the components removed are free from fouling and do not show signs of discoloration, then clean them with diesel fuel.

NOTE:
Do not clean rubber components with diesel fuel.

Pump body
The pump is designed in order to work efficiently, that is: with the gears turning the teeth tips very near to the body. Thus, a used pump shows a contact trace near the suction port. The nominal length of the contact trace is about 1/3 of the inner circumference of the body. It the trace exceeds half of the circumference, this could indicate that a bush or a gear shaft are worn out.
The flange shows:
1. Acceptable trace
2. Non acceptable trace



Bushing
A bush can be considered in good conditions, when the inner contact face is not rough and the contact faces of the gears are shining without important scoring.

Replace the bushing when the following conditions are found:
- when the roughness of the inner sliding surface is such to be felt by a finger nail;
- when the contact results extended to the entire sliding surface;
- when the roughness of the side face is such to be felt by a finger nail;
- when it is evident that foreign matters have penetrated the bushing mating faces, the gears and the pump body.

Gear
Replace the gear when the following conditions are found:
- when the shaft roughness or the gear lateral one is such to be felt by a finger nail;
- when the sides of the gears are chipped;
- when the surface of the gears teeth is cracked or abnormally worn on one side only.

NOTE:
If the surface is rough or discoloured, also the bush and the pump body could result in bad conditions, thus it is necessary to check them.

FUEL TANK

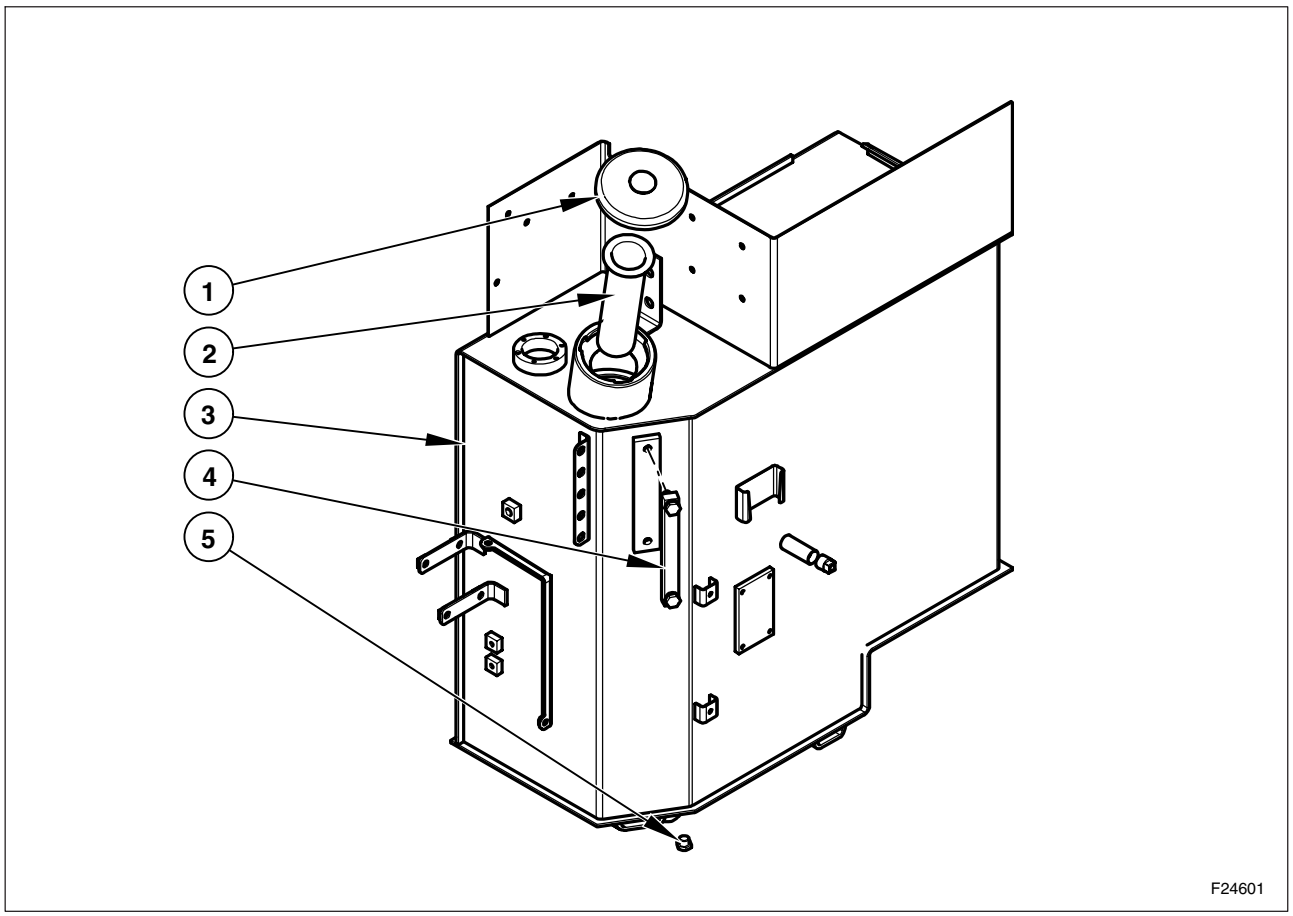
The fuel tank is equipped with a strainer in the filler neck and a level indicator, and is also equipped with a fuel level sensor connected to the relevant indicator, a reserve indicator, located on the monitor in the cab.

MH 2.6
Features and data

Tank capacity ..... 128 l
Weight (empty) ..... 66 kg

MH 3.6
Features and data

Tank capacity ..... 162 l
Weight (empty) ..... 73 kg



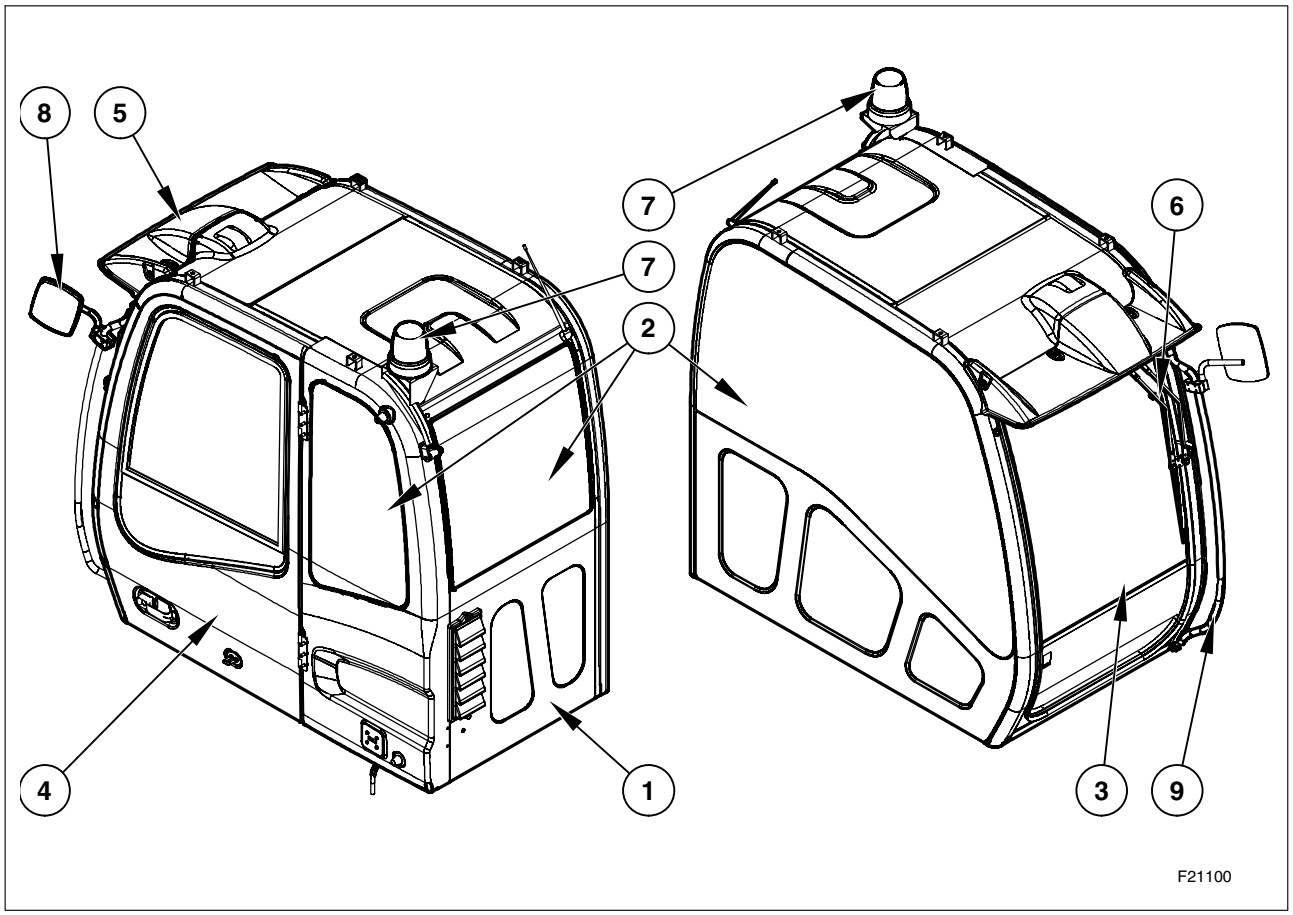
1. Plug
2. Filter
3. Fuel tank
4. Level indicator
5. Plug

CAB

The cab assembly includes: an outer frame, an operator's driving station with controls, dashboards and seat. The whole assembly is installed on antivibration elastic supports.

The cab is totally designed to suit the operator's comfort, in accordance with ISO standards, with an optimized sound proofing level. The dimensions of the glassed surfaces offer an excellent visibility in all directions.

The cab basically includes:



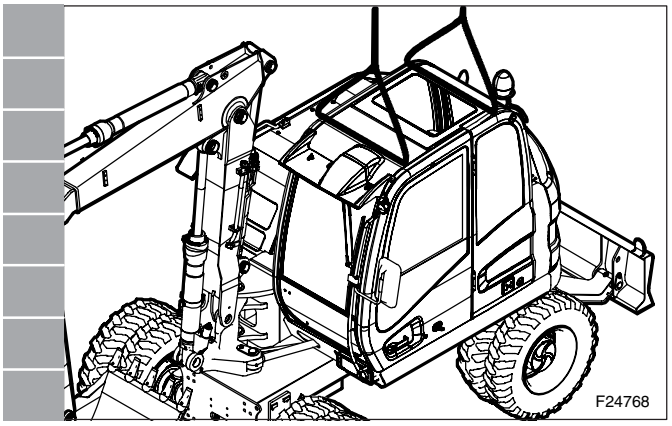
1. Frame
2. Fixed glasses and curtain
3. Front movable glass
4. Side door
5. Parasol wing
6. Windscreen wiper
7. Rotating light
8. Rearview mirror
9. Elastic holders
10. Handle

ASSEMBLY

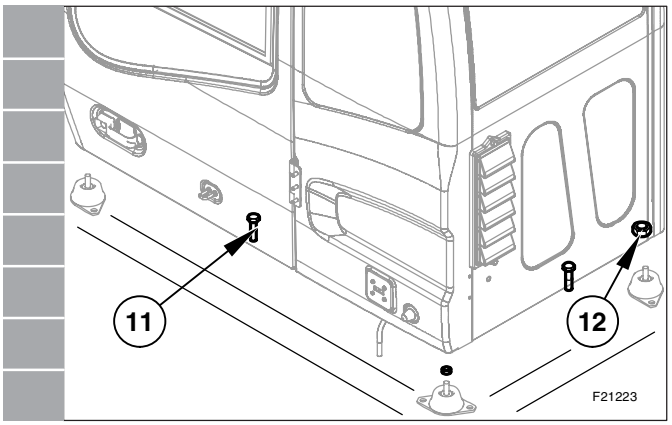
1. Attach the cab to the hoist by using lifting straps. Lift the cab and place it on the main frame.

WARNING

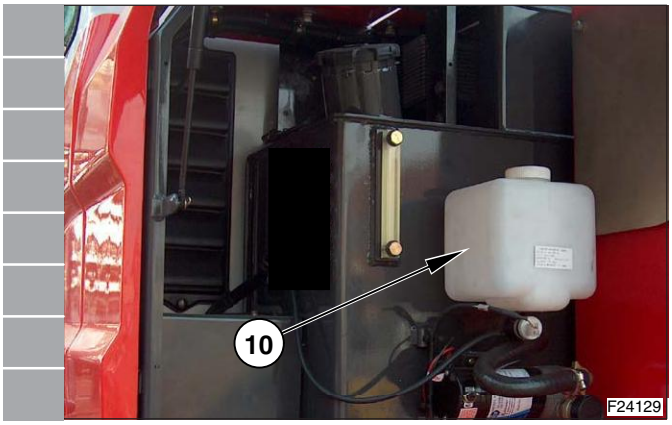
Approx. weight of cabin 400 kg.



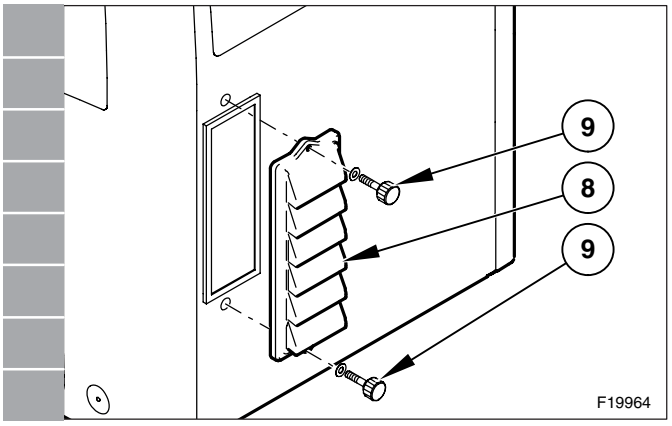
2. Tighten cab fastening screws (**11**) and the locking nuts of the Silentblock (**12**).



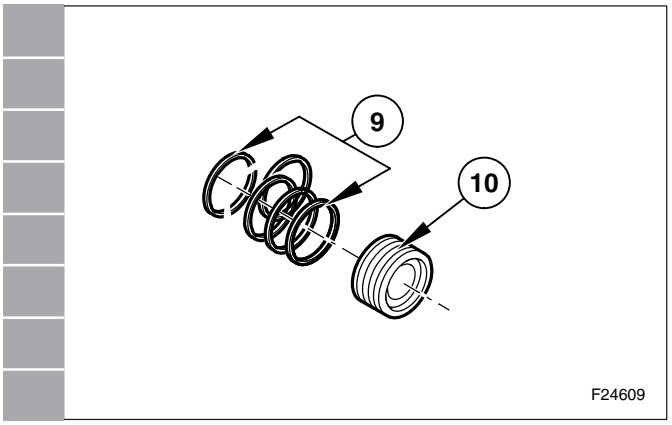
3. Connect pipe (**10**) of windscreen washer container.



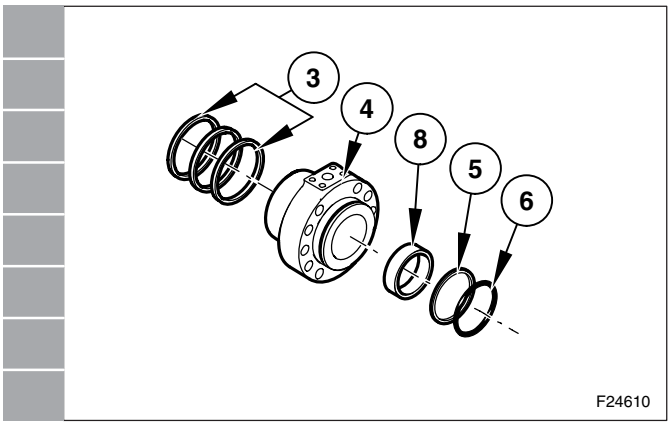
4. Install the air cleaner grid (**8**) and fasten it by tightening the two knobs (**9**).

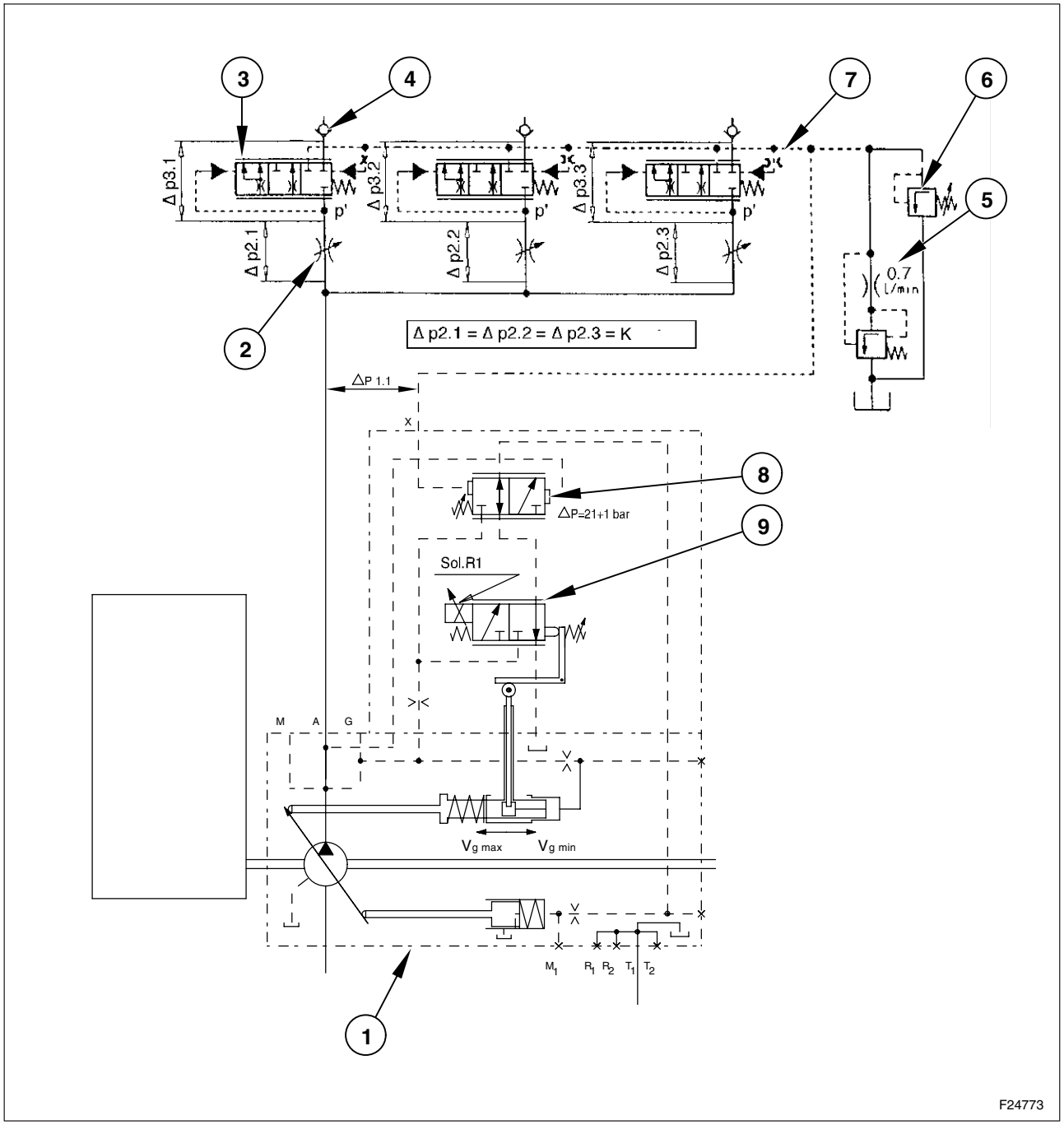


8. Remove the piston seals (**9**) from piston (**10**).



9. Remove the front head seals (**3**), back-up ring (**5**) and O-ring (**6**) + bush (**8**) from front head (**4**).





1. Main pump
2. Control valves push rod for direction and speed control of the user equivalent to a throttle orifice
3. Pressure compensator with integrated Load Sensing pressure comparison
4. Load check valves
5. Flow limiting valve
6. Pressure cut-off valves
7. Load Sensing line
8. Load Sensing regulator
9. Power setting valve

FLOW LIMITING VALVE

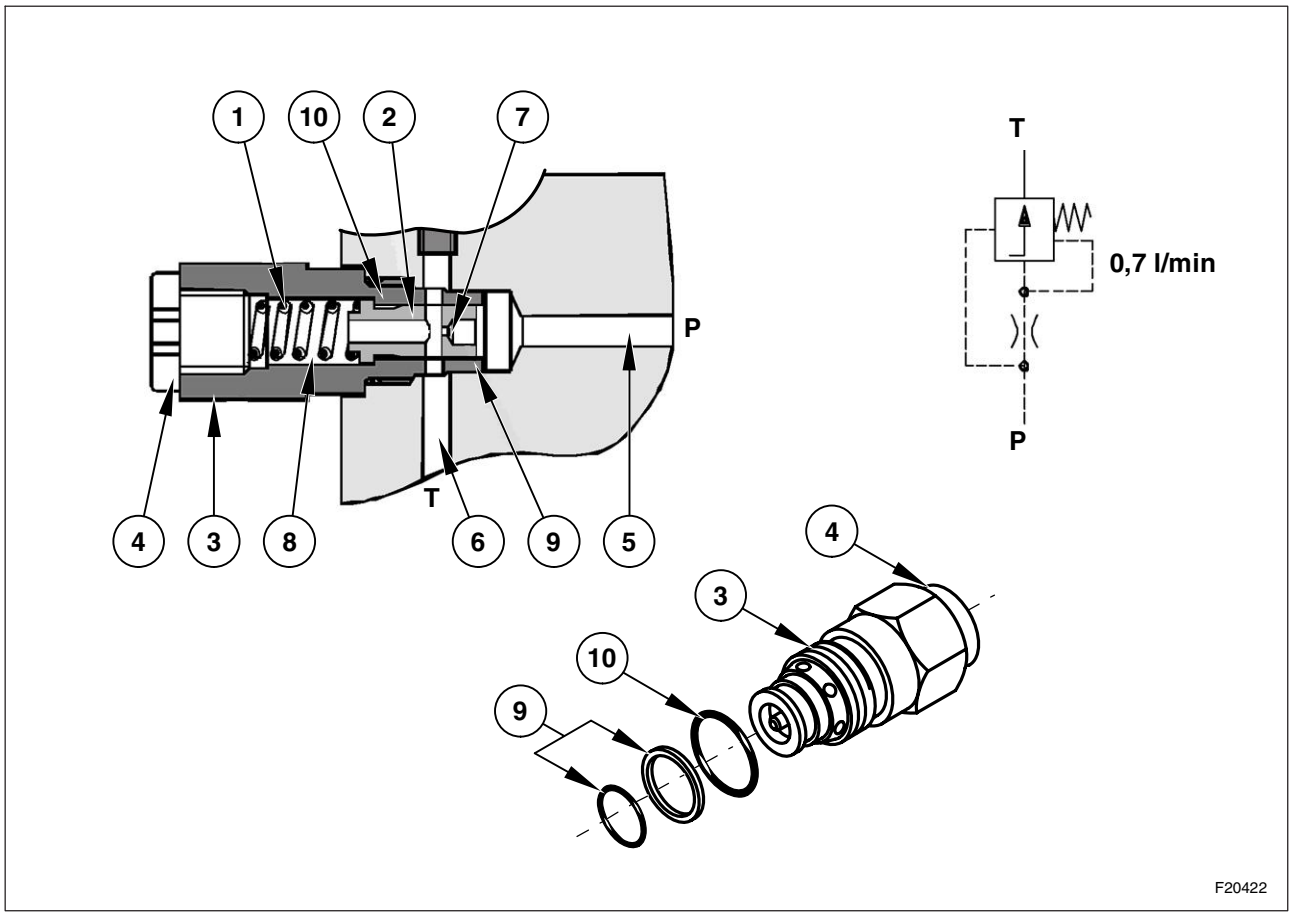
The flow limiting valve is installed in the Load Sensing line in parallel with the cut-off valve on the control valve central body.
The valve has two functions:

- when no user is operated (all control sections are in neutral position) the flow limiting valve drains the Load Sensing line to the tank;
- if a user runs against the maximum pressure (i.e.: to the cylinder stroke end) and another user is operated, the pressure drop generated before and after control spool axis is used to control the pump flow through the moving of swivel cylinder plate.

The flow of Load Sensing line that passes through the flow limiting valve while another user is operating, is used to check the position of the pump tilting plate from stroke end of minimum delivery.

Operation

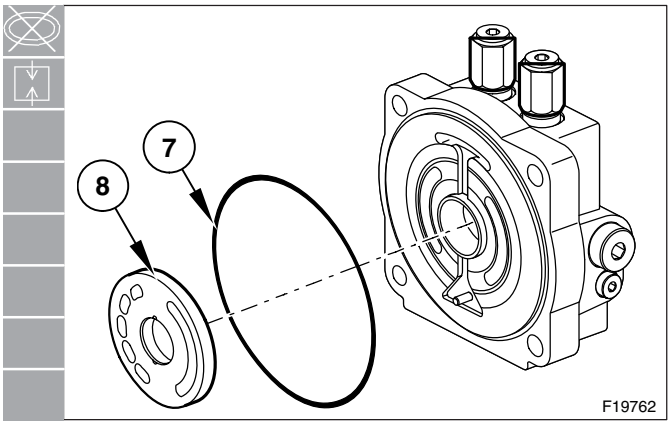
The flow limiting valve consists of a throttle orifice (**7**) and a pressure compensator with a control spool (**2**). The pressure compensator holds the pressure drop over the throttle orifice in the flow condition, to a constant value.
By that the flow is maintained constant to the preset value.
The gauged orifice controls the flow going out to the value of 0.7 liter/minute.
In the initial position the port (**P**) (**5**) is opened to tank, while in flow condition the pressure in the spring chamber (**8**) is lesser than the amount of pressure drop caused by the throttle orifice.
The nominal Δp is determined by spring (**1**). If the flow going to the port (**T**) (**6**) is higher than 0.7 l/min., the pressure drop increases, the control spool moves and reduces the outgoing flow so far as the difference of pressure in (**P**) and in the spring chamber corresponds to the nominal Δp value.



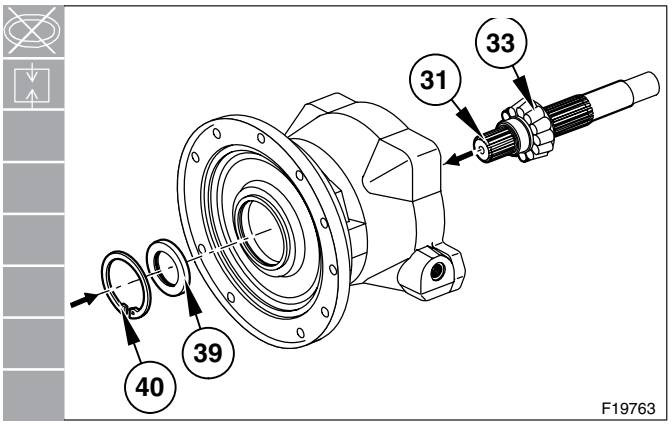
1. Spring
2. Control spool
3. Limiting valve housing
4. Plug
5. Inlet **P**
6. Port **T**
7. Gauged throttle
8. Spring chamber
9. Gasket
10. O-ring

NOTE:

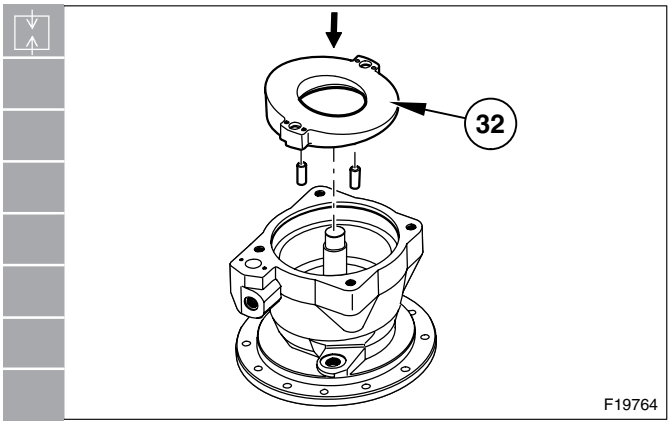
6. Fit O-ring (**7**), applying some grease in the seat. Install disc (**8**).



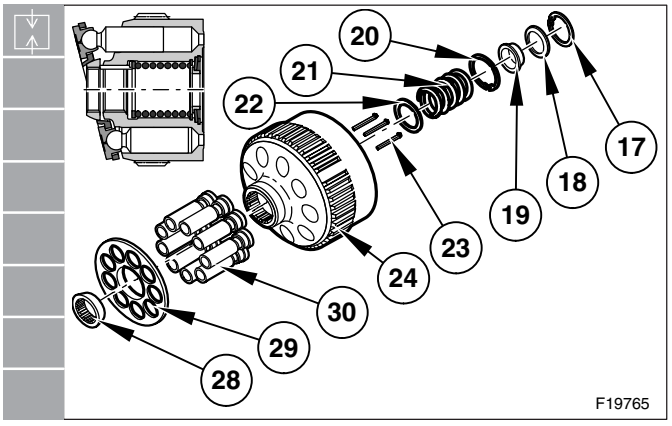
7. Remove shaft (**31**) complete with bearing (**33**). Assemble gasket (**39**) and snap ring (**40**).



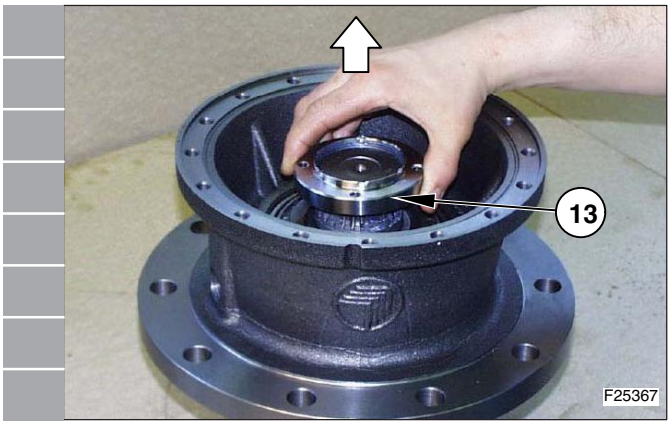
8. Install rotor (**32**) correctly using the relative pins.



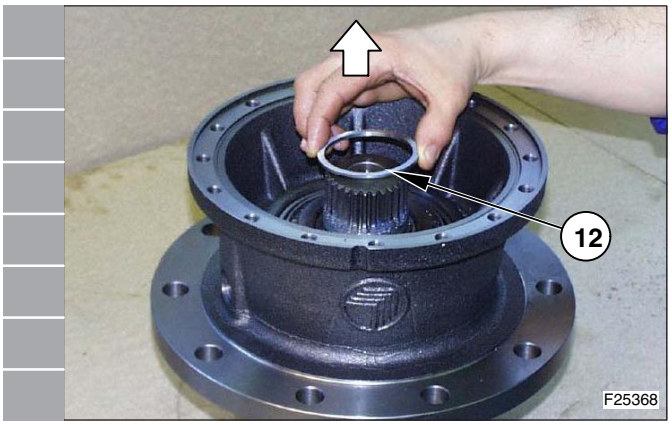
9. Preinstall the piston unit assembly.



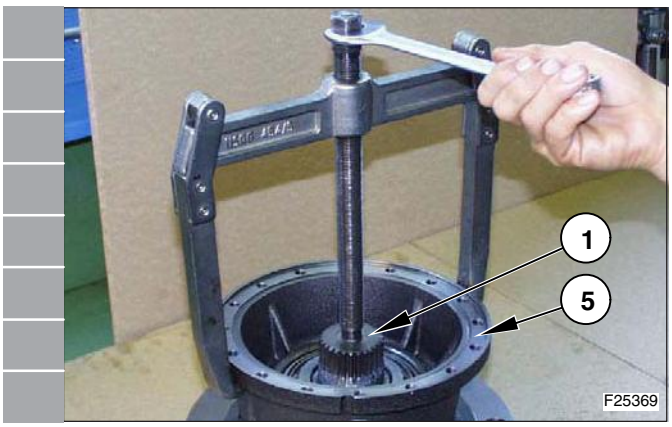
19. Pull out the ring nut (**13**).



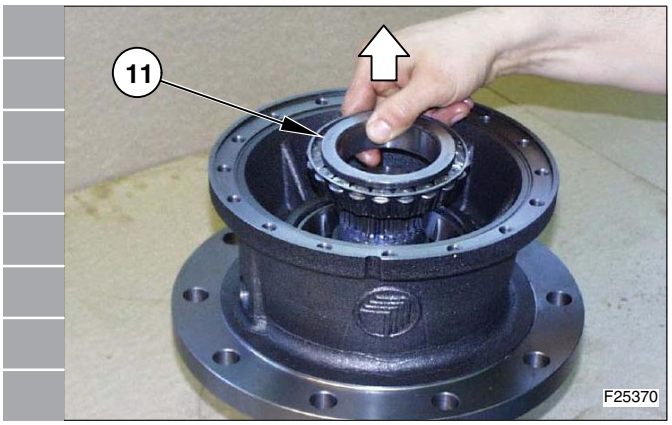
20. Remove spacer (**12**).



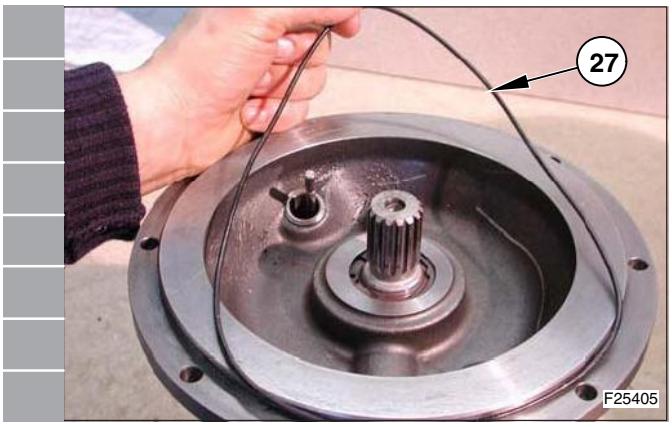
21. Assemble the extractor on the reduction unit body (**5**) and act on the screw to extract the pinion shaft (**1**).



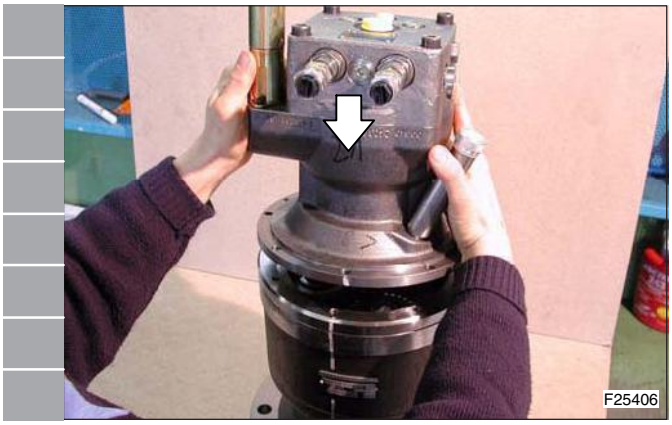
22. Extract the inner ring of bearing (**11**).



28. Insert O-ring (**27**) in its seat of hydraulic engine.



29. Assemble hydraulic engine on reduction unit referring to the mark applied previously.



30. Tighten the no. 8 screws TCEI M8 x 45 (**26**), with an Allen wrench at a torque of 25 Nm.

Oil filling:
The reduction unit is lubricated by oil splashing. We suggest using oil for transmission gears, with SAE 80W/90 viscosity and EP features corresponding to: MIL-L-2105 C & API GL 5.
- Untighten plug for oil level check/filling and fill with lubricating oil.
- Check by means of dipstick that oil level is within references MIN and MAX and retighten plug.
- When activating the reduction unit, wait some seconds and then verify again tthe oil level.
- Add some if necessary.

Indicative oil quantity of reduction unit = 3 litres ±10%.

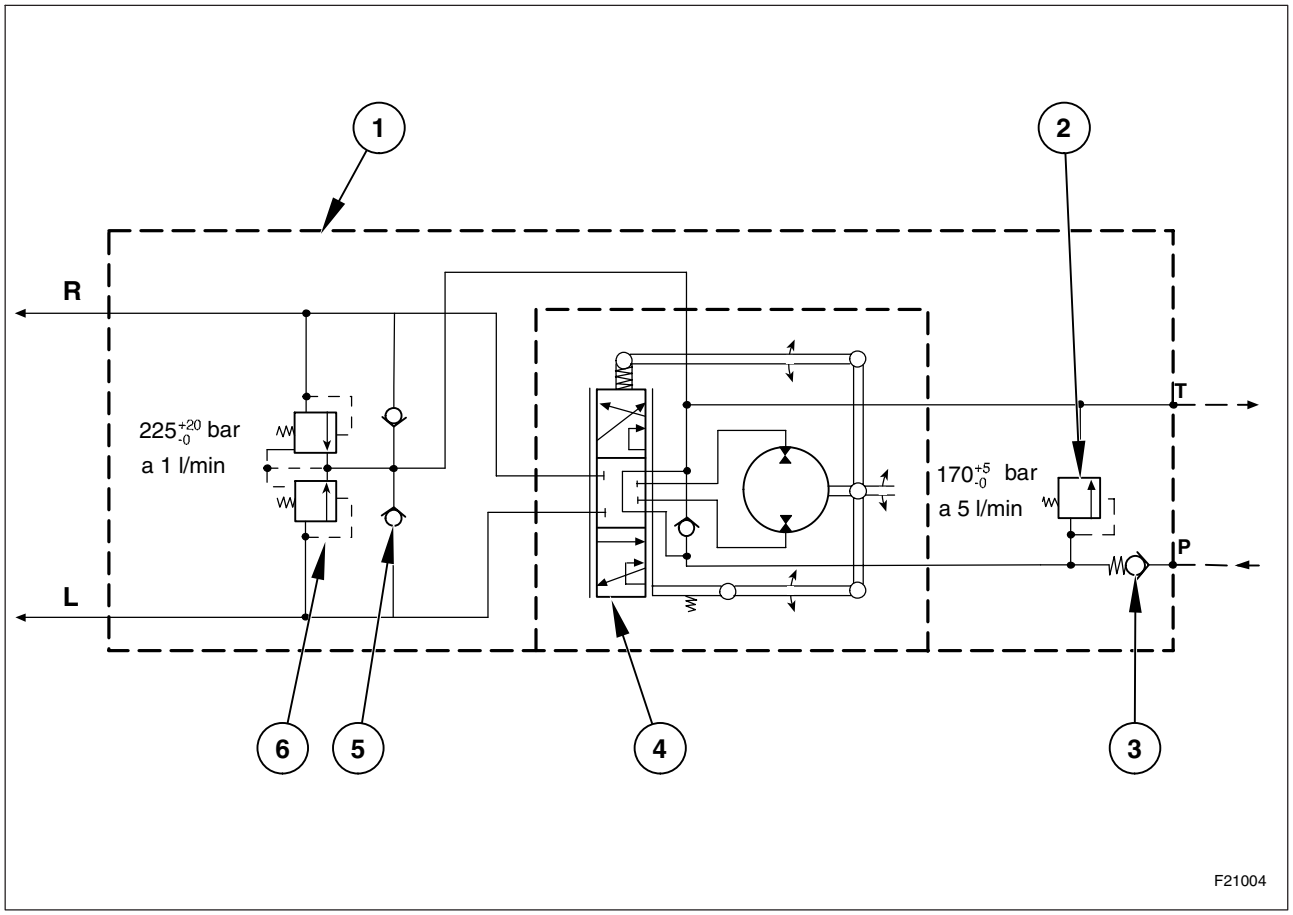
IMPORTANT:
Warning, Never mix mineral oils with synthetic oils and viceversa.

OPERATION

When the steering wheel is at standstill, (the control valve assy is at neutral position), there is free flow through neutral ports.
The oil passages to the control shaft are closed, so that the shocks are not transmitted to the steering wheel.
Turning the steering wheel, the rotation of the rotor occurs. The ducts to the cylinder passages, gradually open to a rotation of about 1.5°. These ducts will completely open at about 6°.
After about 4° of rotation, the neutral ports close.
The flow through the metering device takes place under following conditions:

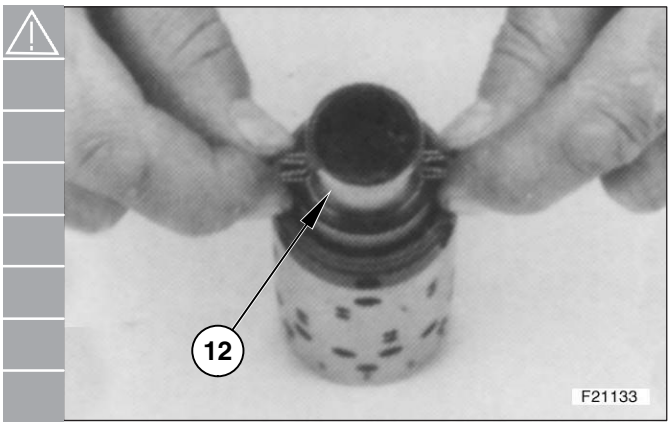
rotor rotation, oil volume supply directly proportional between steering wheel angular movement and displacement of control cylinder that produces the angular movement of the steering wheels. The inner delivery unit from shaft to outer sleeve of rotating distributor is positioned in such a way that ports close when the angular motion of the rotor coincides with the motion of the wheel house. The delivery unit therefore, replaces the conventional mechanical linkage.

Hydraulic diagram

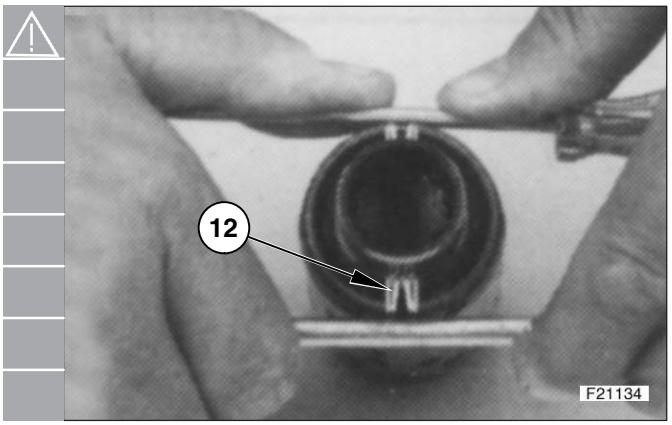


1. Steering unit general view
2. Pressure relief and overload relief valve set at 170 bar
3. Load check valve
4. Steering unit distributor
5. Anti-cavitation valve
6. Anti-shock valve set at 225 bar

4. Press neutral position setting springs (**12**) together into place in the sleeve.

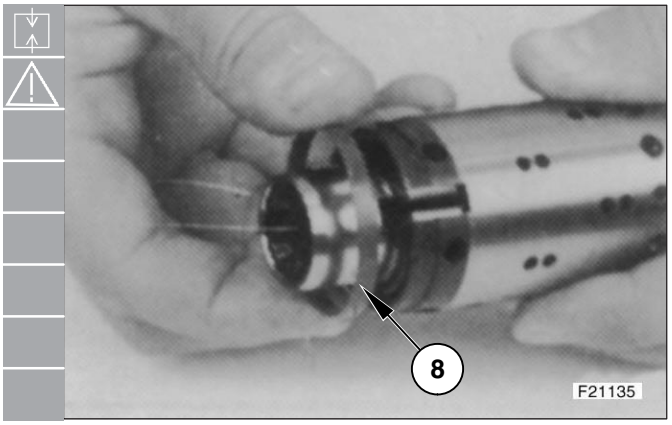


5. Line up springs (**12**) and centre them.

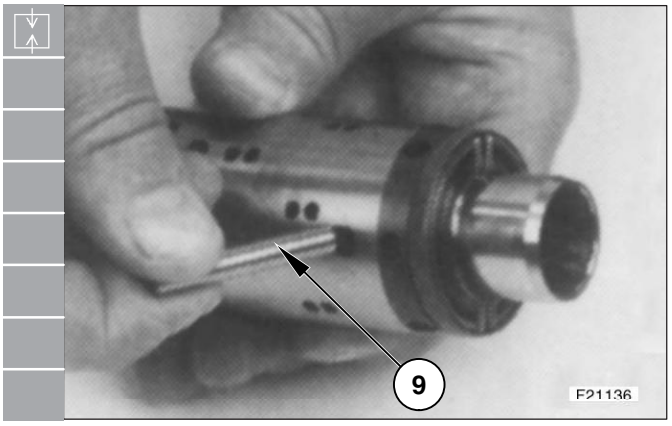


6. Insert ring (**8**) down in the conttrol valve.

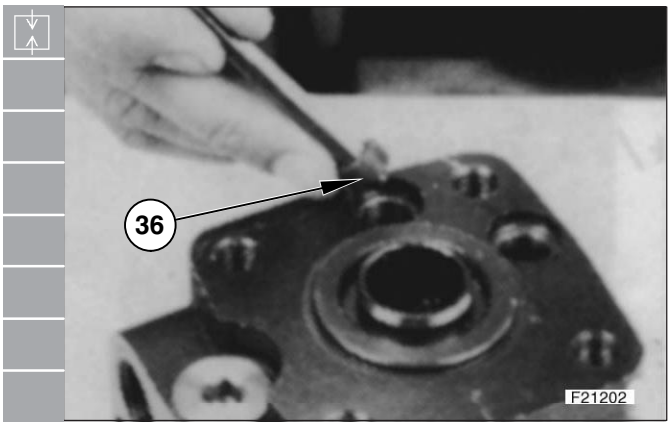
NOTE:
*Ring (**8**) should be able to rotate free of the springs.*



7. Insert pin (**9**).

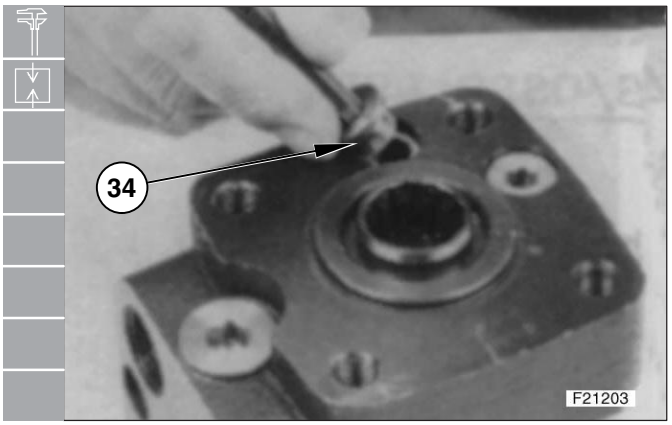


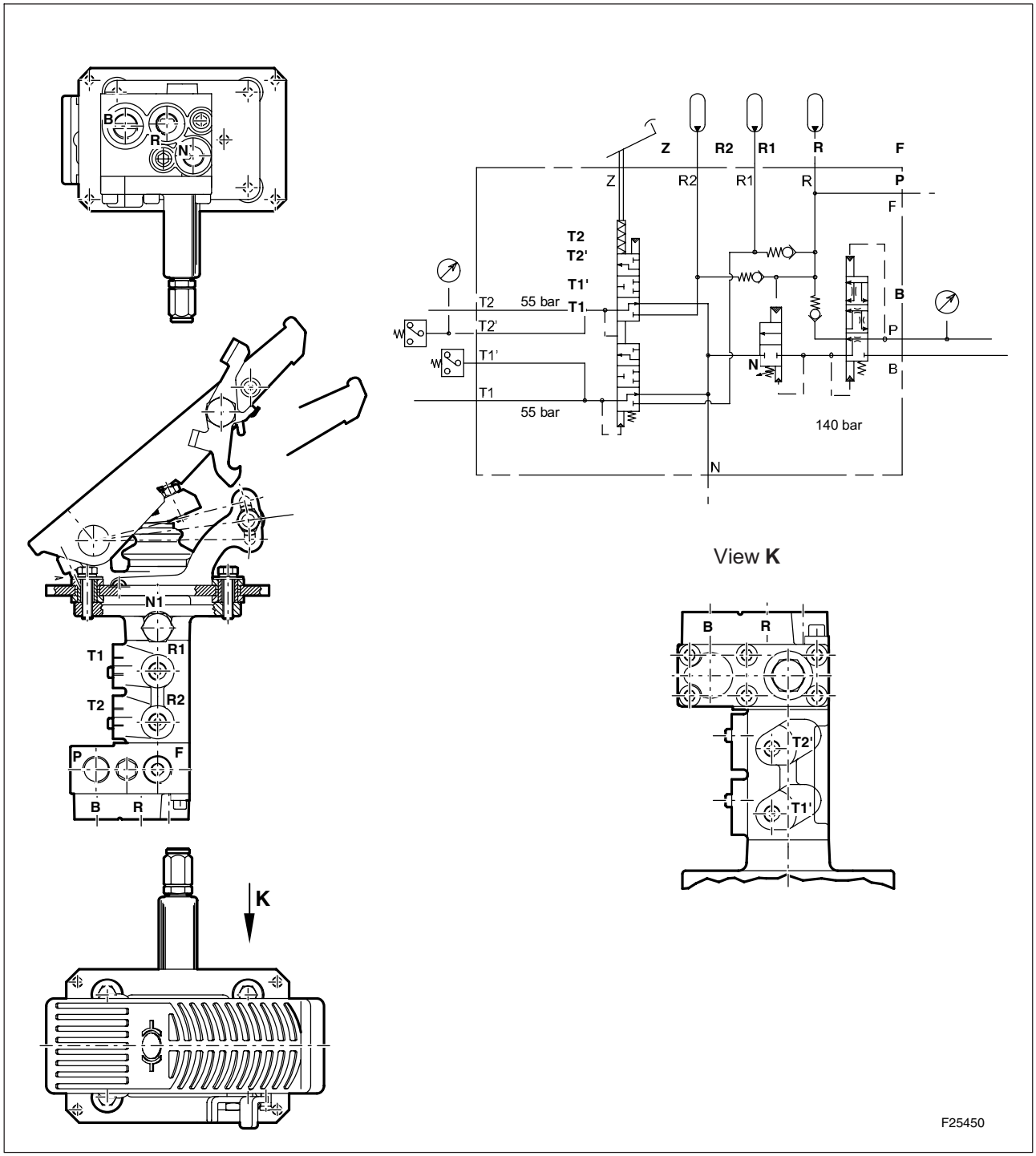
41. Screw in the two setting screws (**36**). Set pressure at 200 +20 bar.



42. Screw in plug (**34**) with seal ring (**35**)in the two anti-shock valves and tighten them.
Tightening torque 3 daNm.

The power steering valve is complete.





B. Other users or tank
F. Accumulator pressure switch
N. Tank
No.1 Tank (closed)
P. Oil filled
R. Accumulator
R1. Accumulator
R2. Accumulator
T1'. Brake pressure switch
T2'. Braking pressure switch
T1. Brake
T2. Brake

MAINTENANCE

Testing or reduction of pressure

To perform this operation it is necessary to provide a hose. Discharge the pressure in the pump circuit, remove or isolate the accumulator, remove the protection cap of the pre-charge valve on the shockless device, install the pre-charge device tightening ring nut (**1**) on the accumulator valve (**8**).
Screw, without tightening, hand-wheel (**4**) and read the charge pressure on pressure gauge (**3**); if it is too high, open slightly discharge valve (**2**).
Unscrew handle (**4**), remove the preload device, re-install the protection cap on the accumulator valve.

Increasing the loade pressure

To pre-load or to increase the pre-load pressure, remove the protection cap of the valve on the shockless device, install the pre-load device, turning ring nut (**1**), leaving handle (**4**) unscrewed and tighten completely discharge valve (**2**).
Remove cap (**5**) and connect hose (**6**) to a nitrogen cylinder (**9**). Tighten, without forcing, hand-wheel (**4**) and open slowly the nitrogen cylinder.
While reading pressure gauge (**3**) increase the pre-charge pressure until a value slightly over the desired value is obtained.
Loosen hand-wheel (**4**), close the bottle valve, empty hose (**6**) opening and closing valve (**2**) and wait for a few minutes.
Tighten hand-wheel (**4**) and check if pressure is correct, untighten hand-wheel (**4**) and take off device with hose (**6**) loosening ring nut (**1**), if pressure is not correct increase or decrease it as previously indicated.

NOTE:
For re-load use exclusively nitrogen.

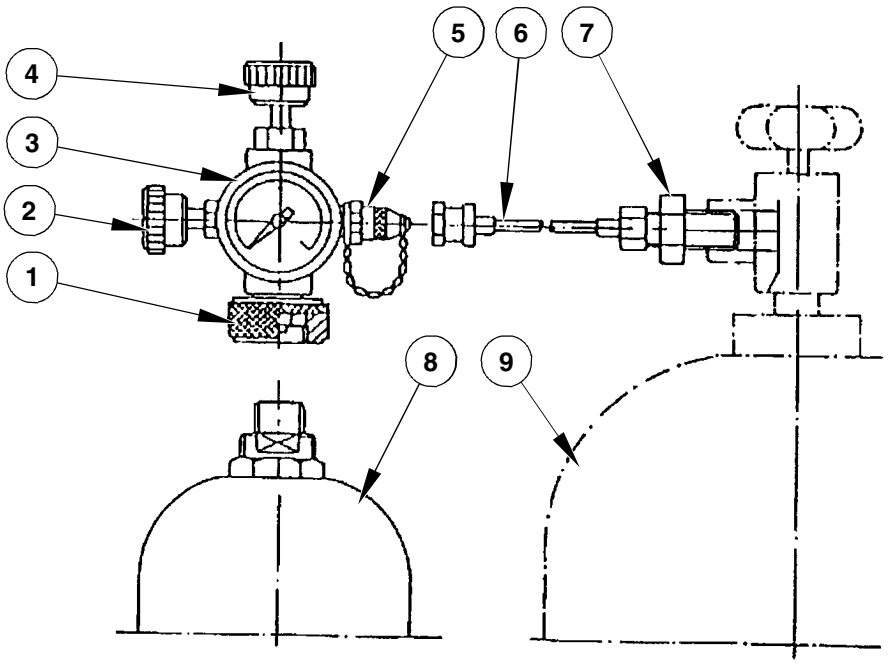
FEATURES AND DATA

Accumulator steering controls system

Nominal capacity ..... 0.35 l
Pre-load pressure ..... 13 bar
Weight ..... 2 kg

Brake system accumulators

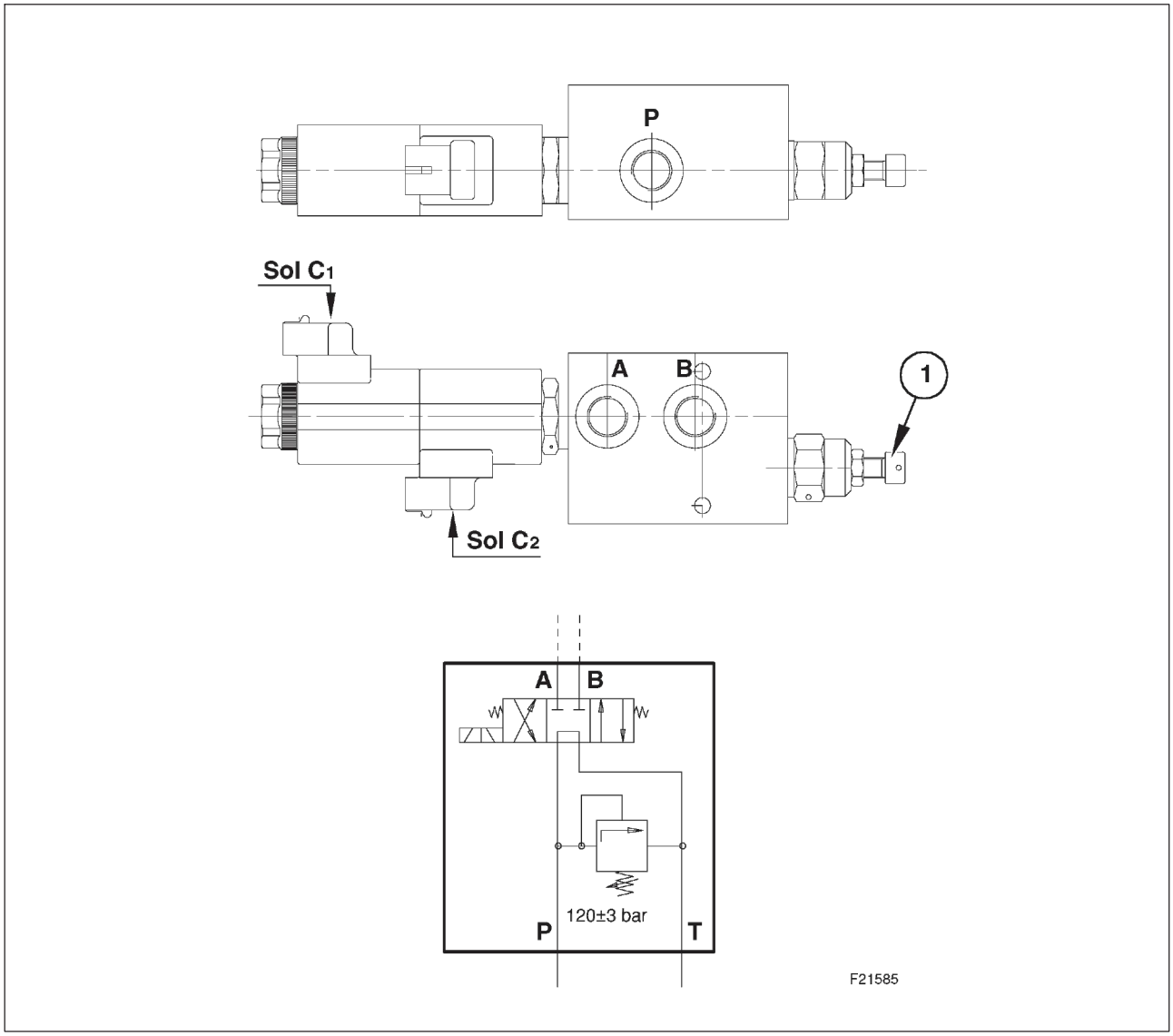
Nominal capacity ..... 0.35 l
Pre-load pressure ..... 50 bar
Weight ..... 2 kg



F20204

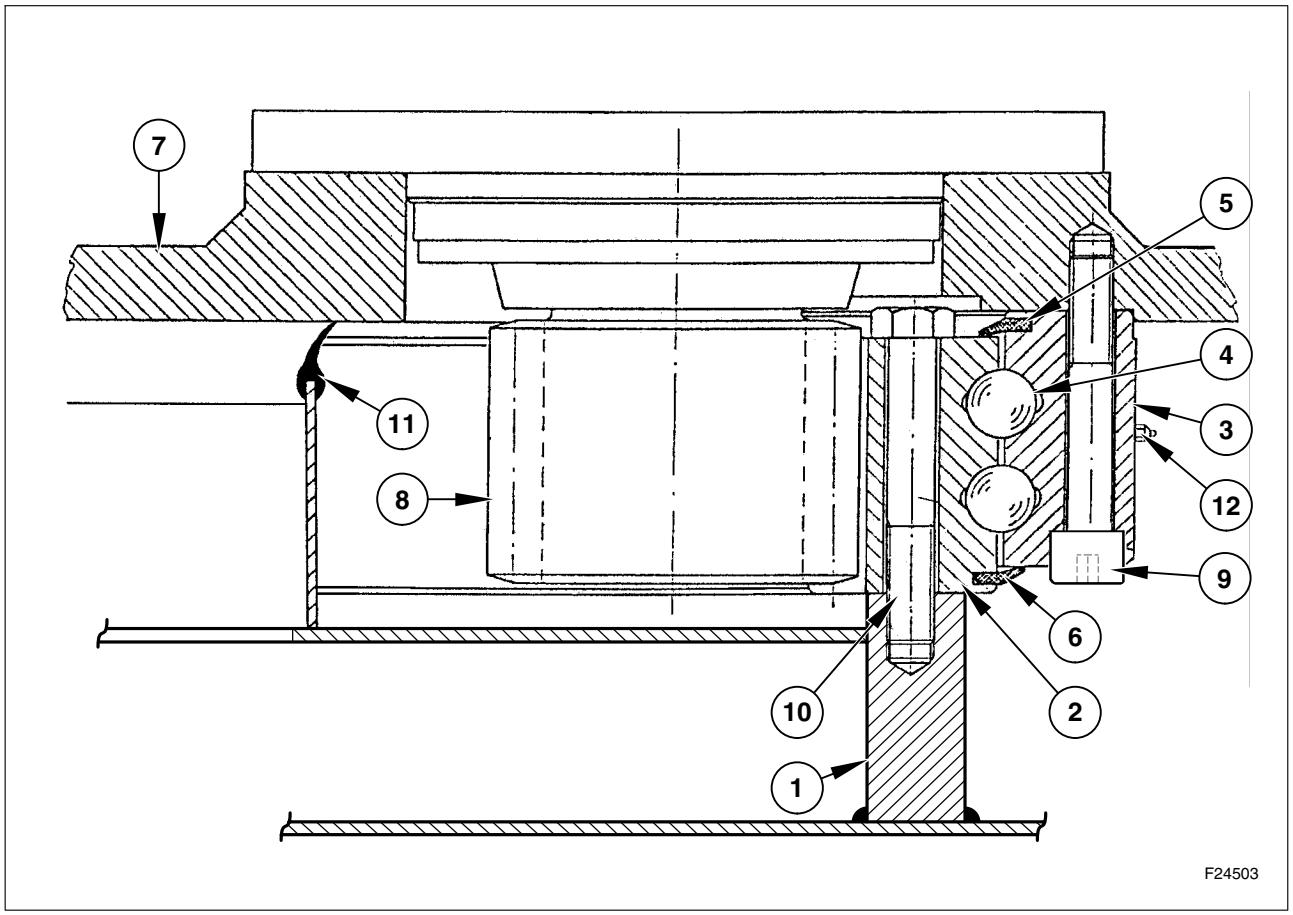
SOLENOID VALVE FOR CLAMSHELL BUCKET SLEW

If activated in a position, power control flow divider exceeding oil feeds clamshell bucket rotation in one direction.
If activated in the other position, it feeds clamshell bucket rotation in the opposite direction. In central position, it connects the circuit to the tank with rotation connections cut off. The block of this solenoid valve includes also the overload relief valve (**1**), calibrated at 120 bar.



SLEWING BEARING

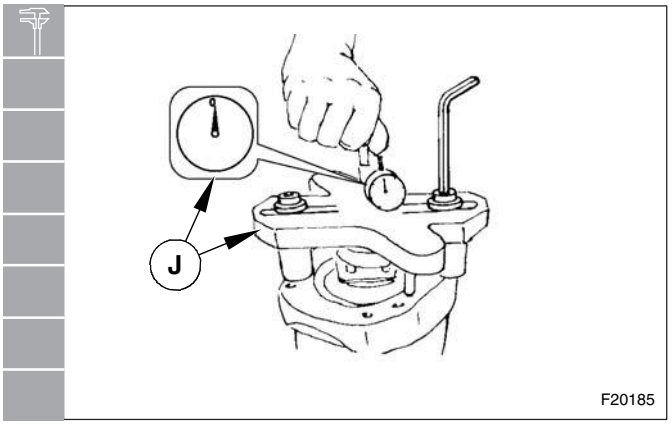
The slewing ring consists of an outer race (**3**) bolted to the superstructure (**7**), an inner race (**2**) bolted to the lower frame and a double row of balls (**4**).
The slew reduction pinion (**8**), controlled by slew motor through the slew reduction gears, rotates on its own axis and it also revolves round the centre of inner race of slewing ring, allowing the superstructure to slew independently from the lower frame.



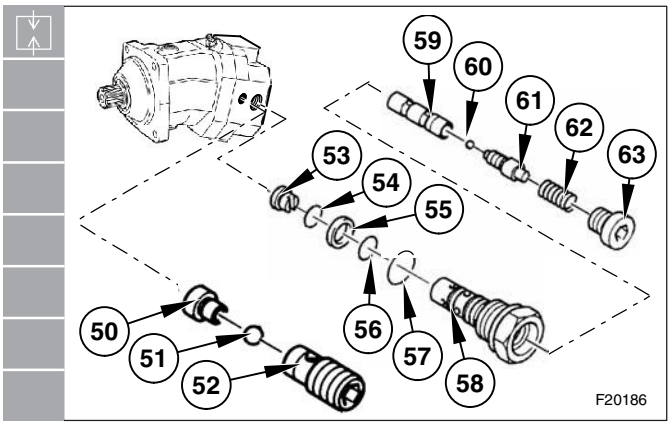
1. Lower frame
2. Slewing ring inner race
3. Slewing ring outer race
4. Bearing ball
5. Inner seal
6. Outer seal
7. Superstructure frame
8. Slew reduction pinion
9. Outer race screw
10. Inner race screw
11. Gasket
12. Grease nipple

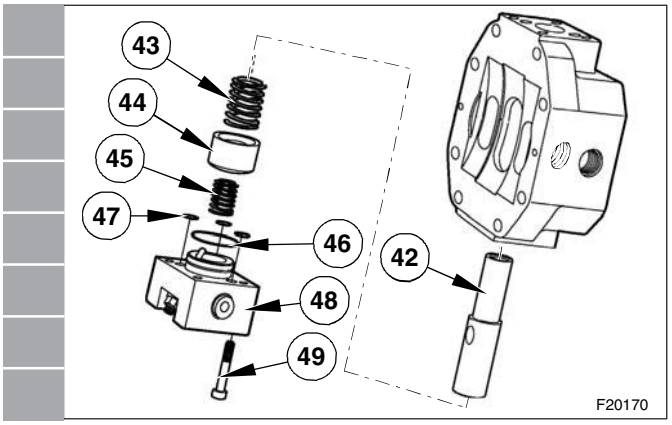
NOTES:

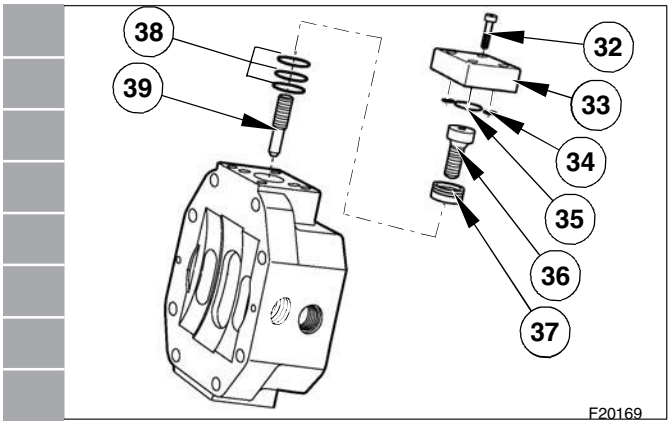
10. Check and/or measure dimensions **X** with measuring gauge (**J**).



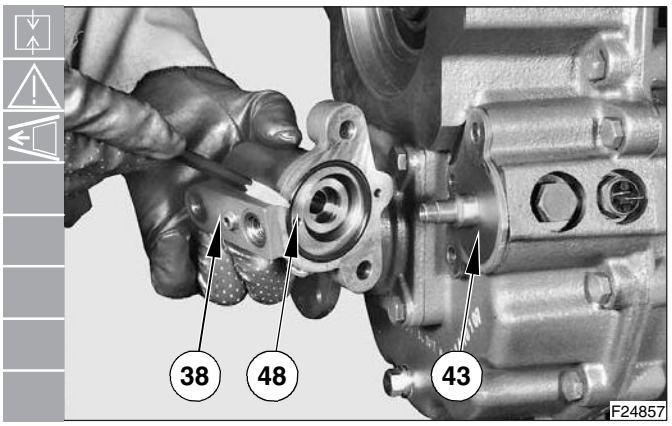
11. Reassemble (if previously disassembled) the regulator unit assembly.



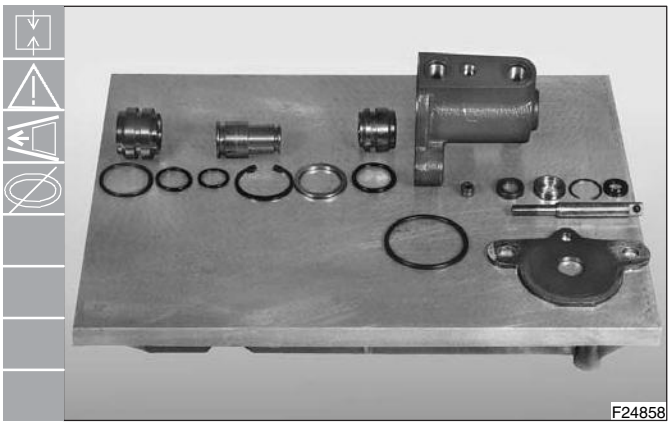




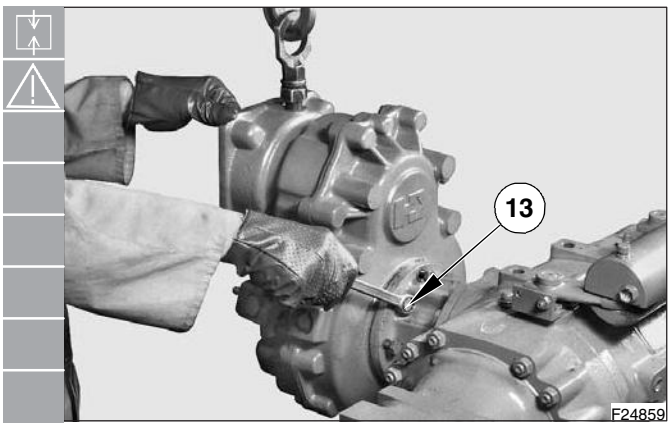
5. Pull out the gear control cylinder (**38**).
Pay attention to the position of the O-ring (**48**).
Remove the protection plate (**43**).



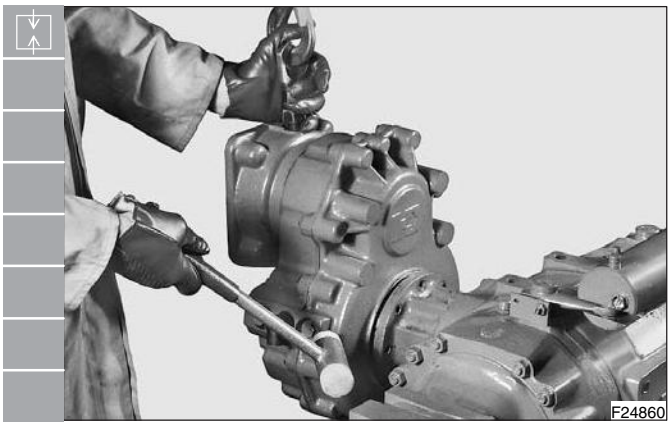
6. Disassembly sequence of gears control cylinder components.



7. Remove fastening screws (**13**) from reduction unit.

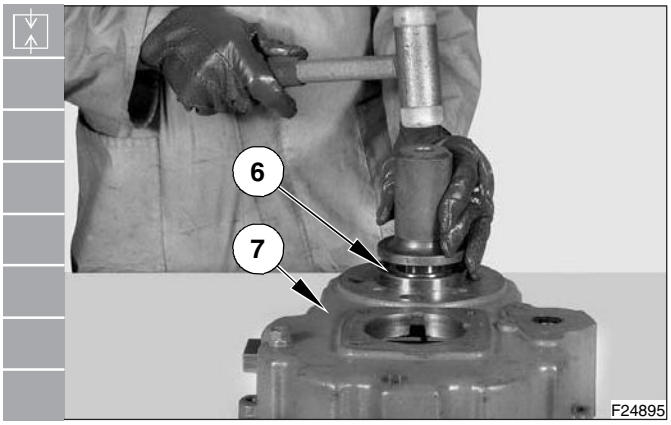


8. Detach the entire reduction unit from the axle and place it on a bench.

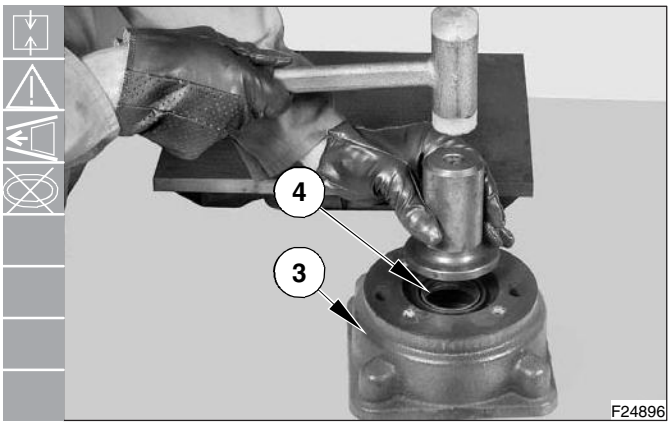


ASSEMBLY

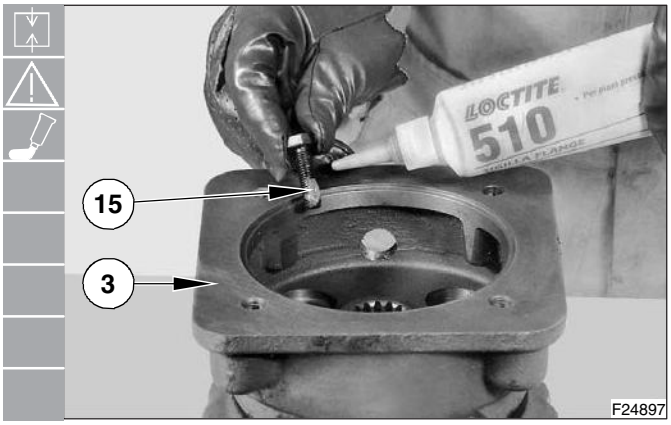
1. Reassemble bearing (**6**) in the cover of reduction unit (**7**) using ordinary tools.



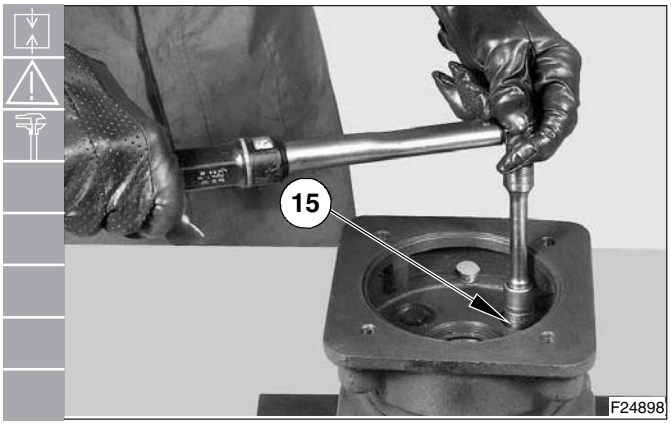
2. Reinsert the new seal ring (**4**) in the motion input cover (**3**).



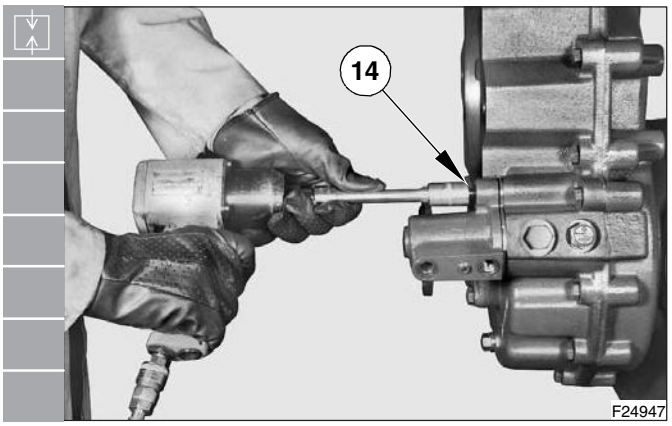
3. Reassemble the cover (**3**) applying LOCTITE 510 on planes and screws (**15**).



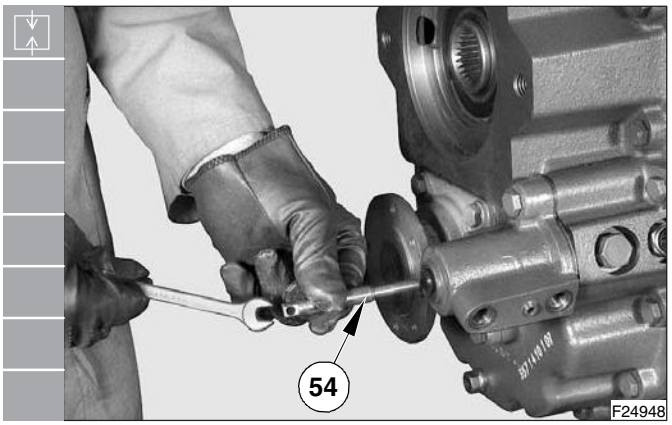
4. Tighten screws (**15**) using a tightening torque of 49 ÷ 51 Nm.



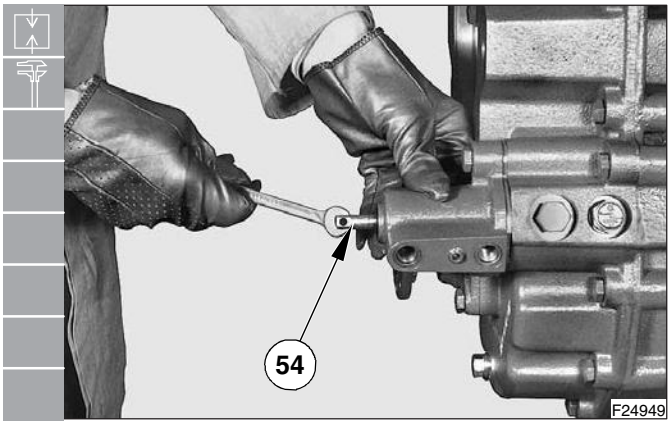
41. Reinsert screws (**14**) and tighten them.



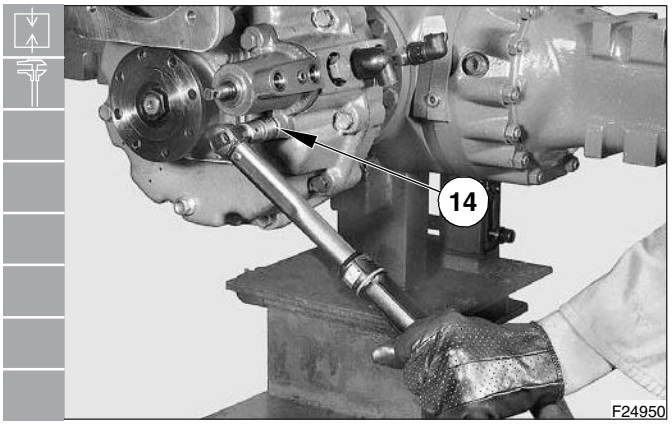
42. Reinstall the gear control rod (**54**) after application of LOCTITE 242.



43. Tighten the gear control rod (**54**) using a tightening torque of 25÷26 Nm.



44. Tighten the gear control cylinder screws (**14**) using a tightening torque of 49÷51 Nm.



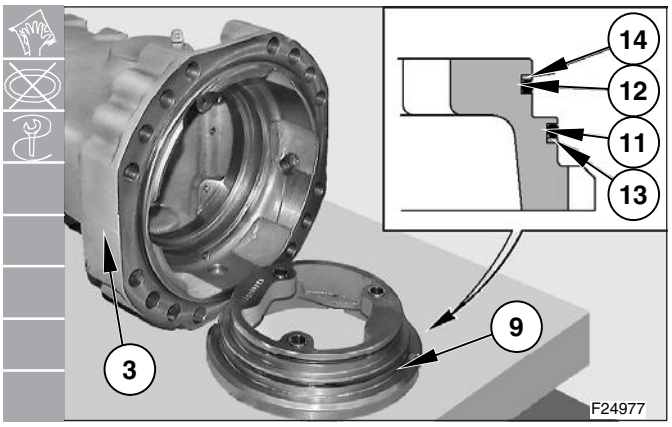
1. Nut
2. O-ring
3. Flange
4. Swinging support
5. Disc
6. Shim
7. Ring nut
8. Bearing
9. Shim
10. Spacer
11. Shim
12. Bearing
13. Pinion
14. Bevel gear set
15. Differential case
16. Safety ring
17. Pin
18. Washer
19. Planetary gear
20. O-ring
21. Planetary gear
22. Shim washer
23. Screw
24. Bearing
25. Bearing
26. Ring nut
27. Screw

Assembly

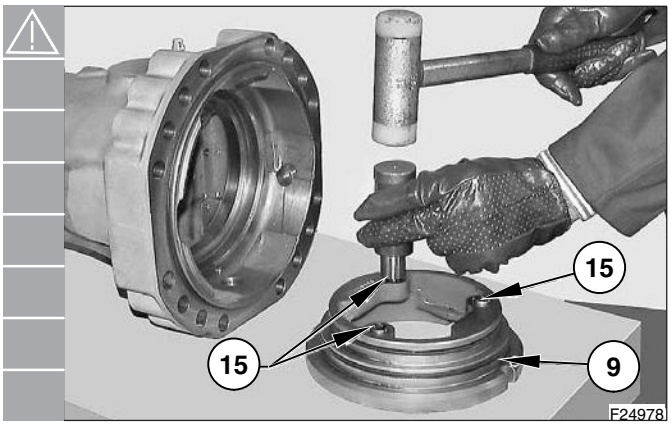
1. Accurately clean the piston (**9**) and the slinging seats and seal.
Replace the O-rings (**11**) and (**12**) and the back-up rings (**13**) and (**14**), follow the assembly side.

WARNING

*Accurately check the positioning of the back-up rings (**13**) and (**14**).*



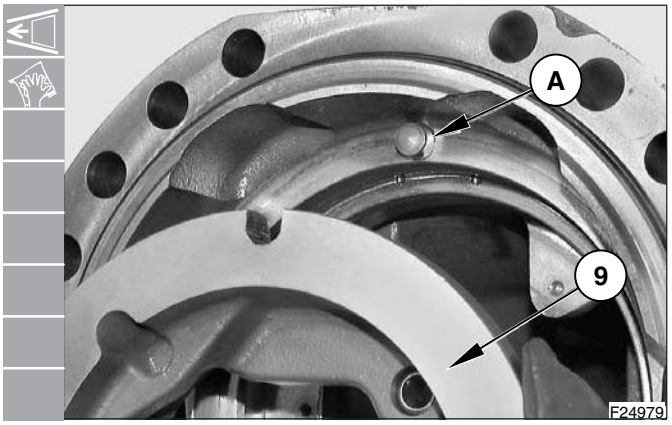
2. Insert the stroke automatic regulation springs (**15**); place them in line with the piston (**9**).



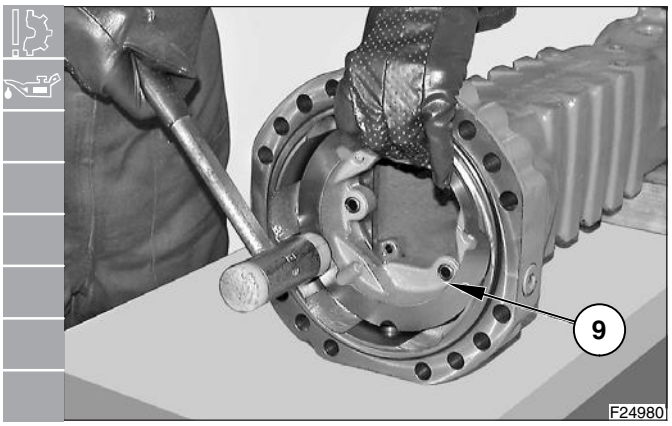
3. Lubricate the seals and fit the piston (**9**) into the arm.

WARNING

*Make sure that the piston seat fits into the stop pin (**A**) inside the arm.*



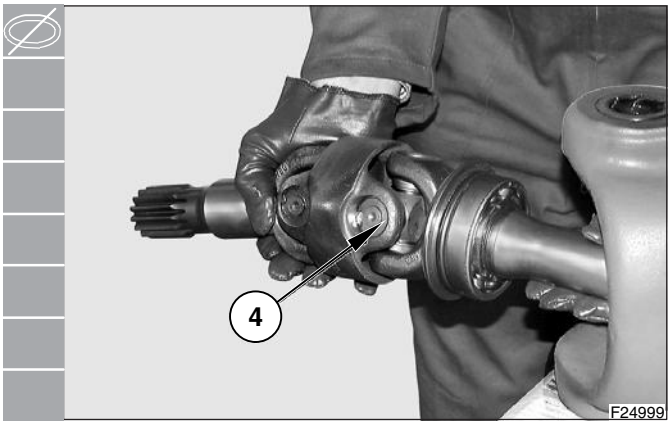
4. Assist the insertion of the piston (**9**) by lightly hammering around the edge with a plastic hammer.



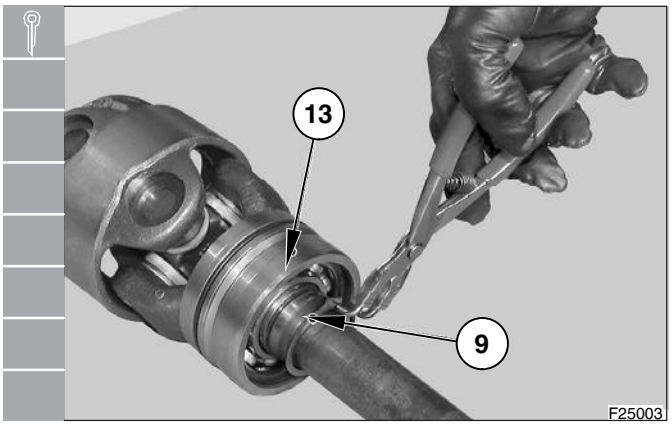
Coupling version

7. Remove the u-joint (**4**) assembly.

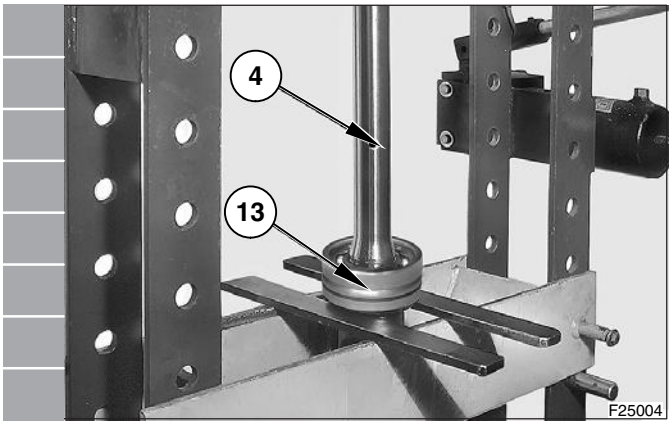
NOTE:
to remove the double cardan joint use, if necessary, use a plastic hammer or a lever.



8. Remove the snap ring (**9**) from the bushing unit (**13**).

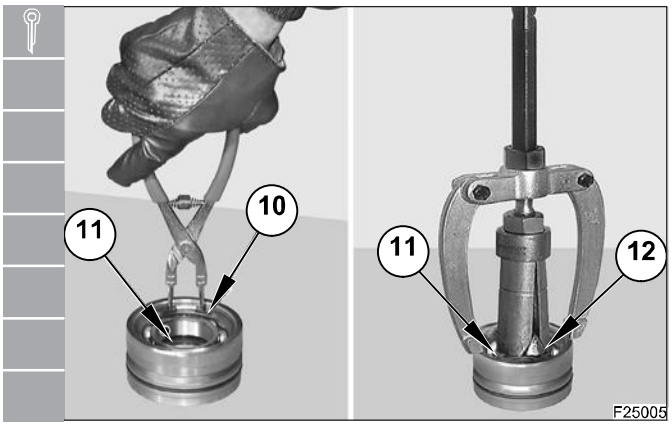


9. Position the entire u-joint (**4**) under a press and remove the complete bushing (**13**).



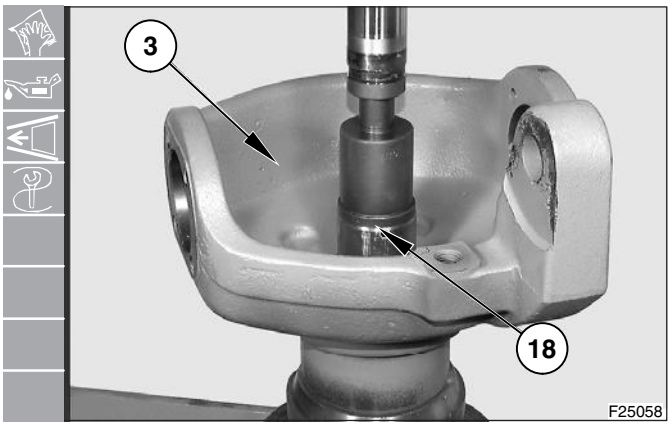
10. Remove the snap ring (**10**) from the bearing (**11**). Use a puller to remove the bearing (**11**), the seal ring (**12**) and the O-ring (**14**).

NOTE:
*notedown the assembly side of the ring (**12**).*

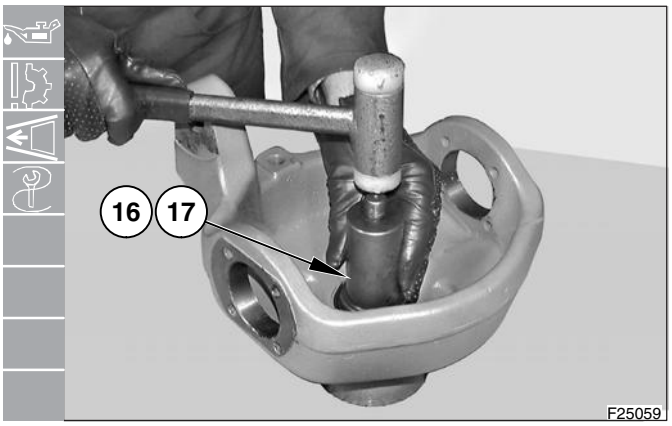


Assembly

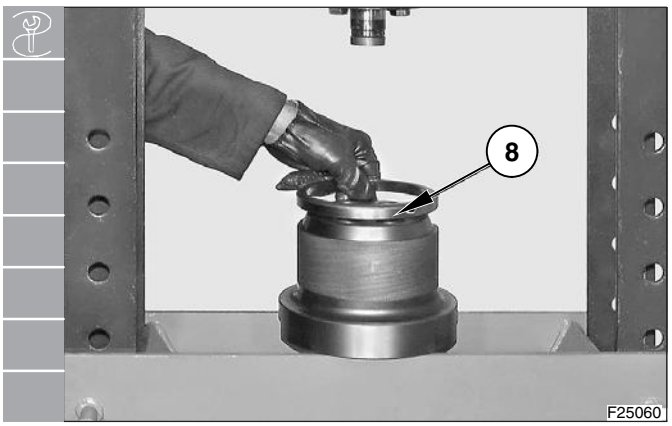
1. Lubricate the bushing (**18**) and the seat of the steering case (**3**).
Assemble the bushing (**18**) using tool 75301747.



2. Lubricate the outer surface of the sealing ring (**17**) and fit it onto the central body (**16**) using tool 75301748.

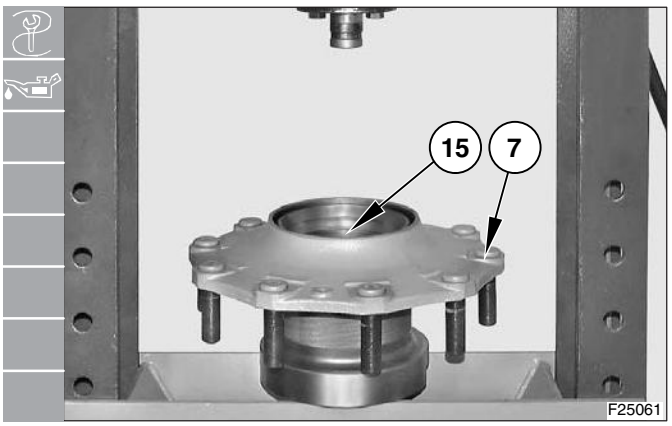


3. Position the lower part of tool 75301749 and the thrust block of the external bearing (**8**) under the press.



4. Lubricate the seats of the bearings and position the hub (**7**) on tool 75301749 ; position the bearing cups of the bearing inner race (**15**).

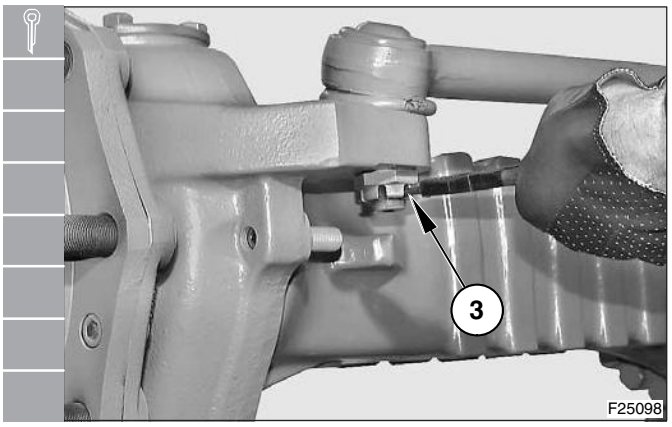
NOTE:
check that the bearing cup is correctly oriented.



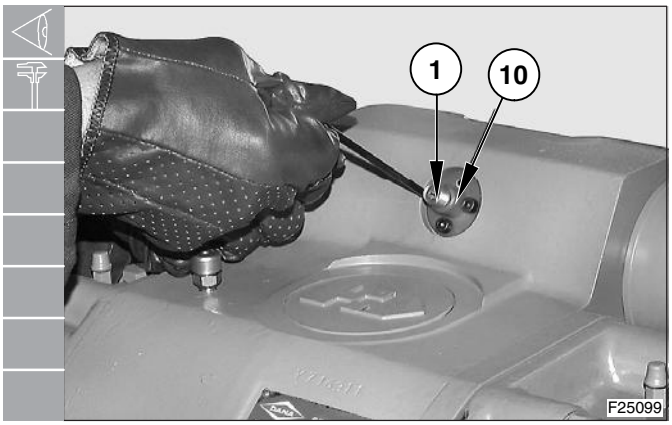
5. Insert the split pins (**3**) and bend the safety stems.

WARNING

Use new split pins.



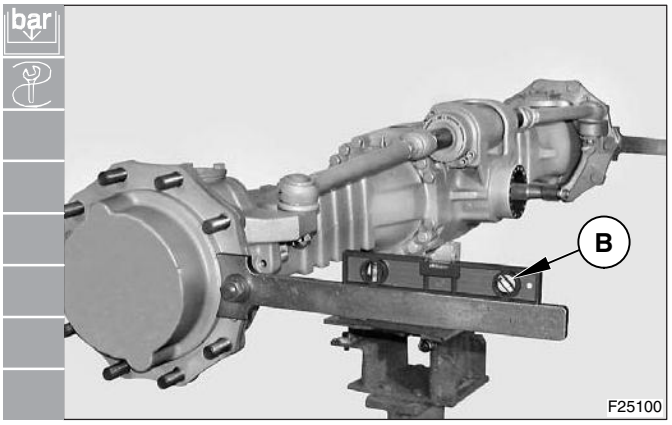
6. Install the proximity (**1**) for checking piston centring, if applicable, and tighten the screws (**10**). Tightening torque: 5 ÷ 6 Nm



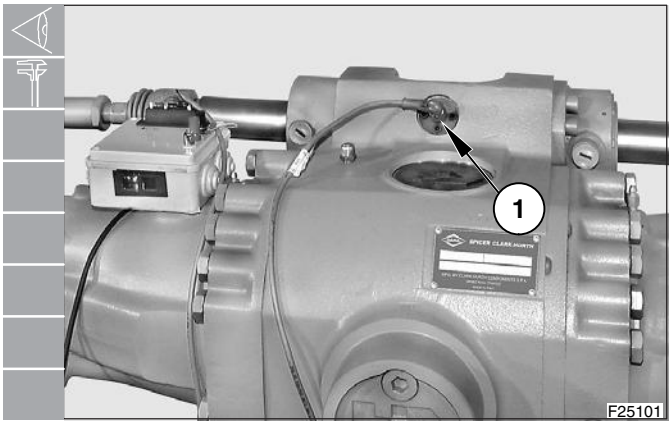
7. Apply tools 75301752 to the hubs and lock them. Using a level **B** , check that tools are perfectly flat and parallel to each other.

WARNING

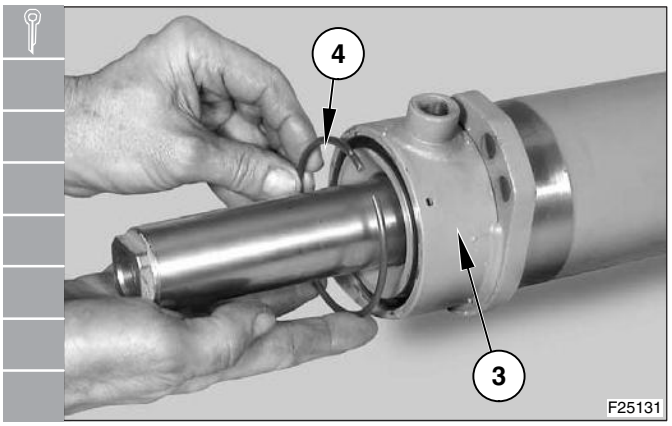
Eliminate the action of the negative brake, if fitted.



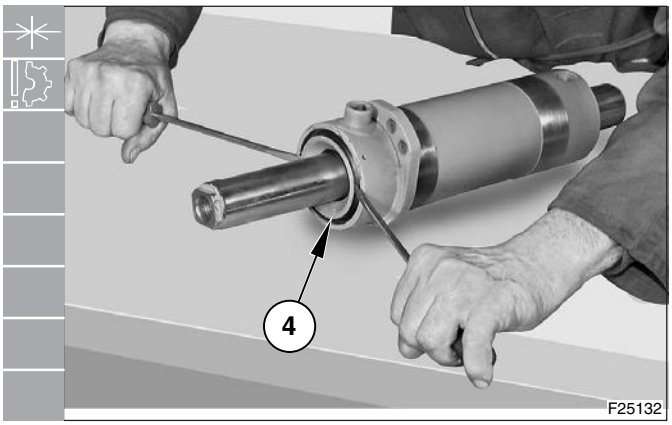
8. Connect the sensor (**1**) to the inspection device according to either diagram.



9. Insert the stop ring (**4**) ensuring that it fits into the seat of the cylinder (**3**).



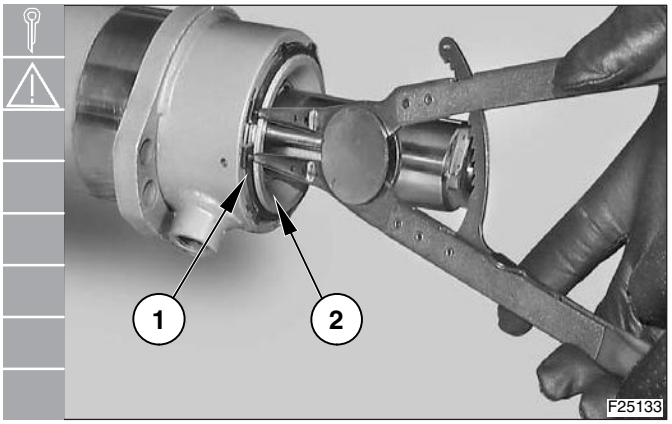
10. Apply pressure to the head using two screwdrivers or levers until the head is fastened onto the stop ring (**4**).



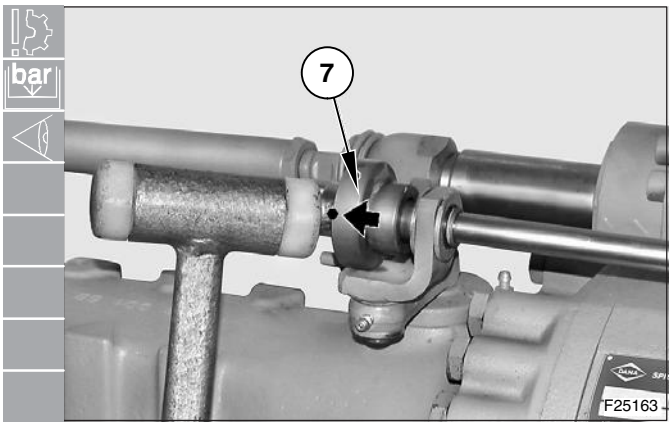
11. Fit the snap ring (**1**) on the head (**2**).

WARNING

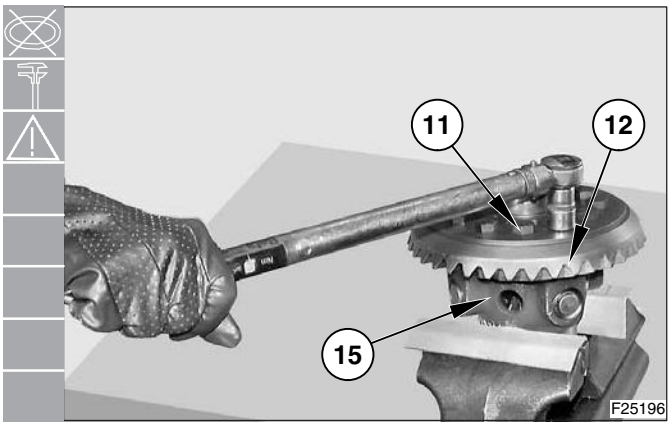
*Make sure that the snap ring (**1**) is securely fastened in its seat. If necessary, force it into its seat using a punch and an hammer.*



17. Release the retaining unit (**7**) with an hammer stroke on the outer ring.
Feed pressure again and check that at piston stroke end, the retaining unit **7**) is engaged in the rod.

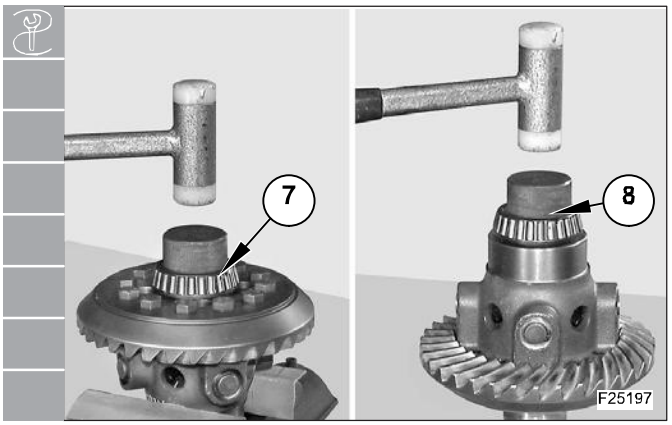


13. Position the crown (**12**) on the differential body (**15**) and lock it with screws (**11**) applied with LOCTITE 242.
Screws tightening torque: 128 ÷ 142 Nm

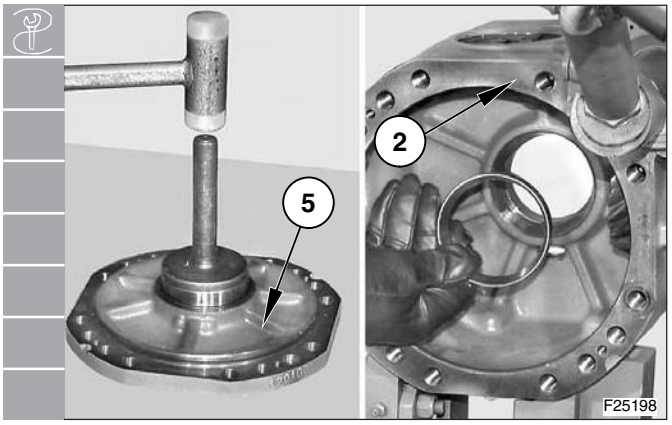


NOTE:
secure the screws using the cross-tightening method.

14. Install bearings (**7**) and (**8**) using tool 75301757.

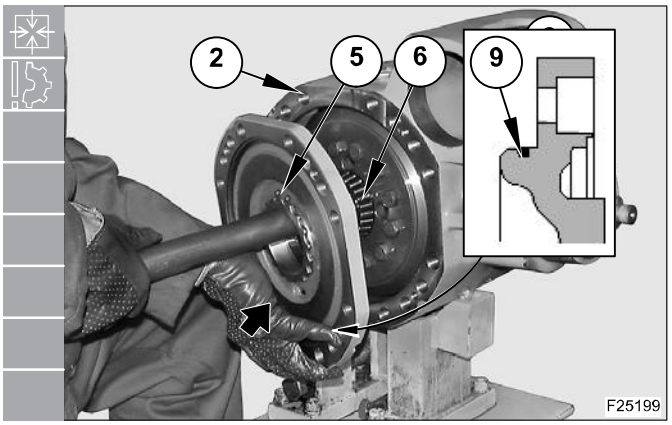


15. If the bearings are replaced, insert outer cups in the intermediate body (**5**) and in the central body (**2**).

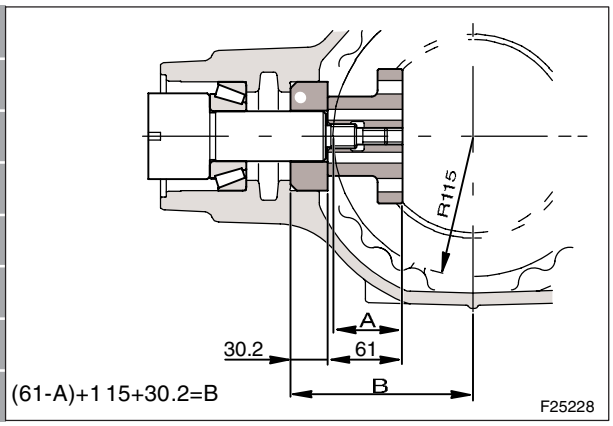


16. Position the differential assy in the central body (**2**) with the help of a bar and fit the intermediate cover (**5**).

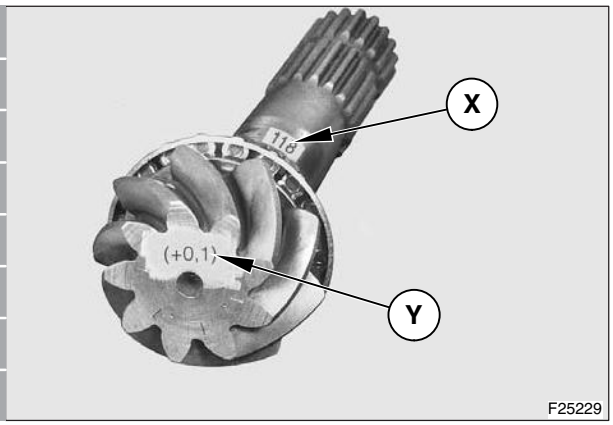
NOTE:
*thoroughly check the state of the O-ring (**9**) and make sure that the cover is fitted with oil discharge in lower position.*



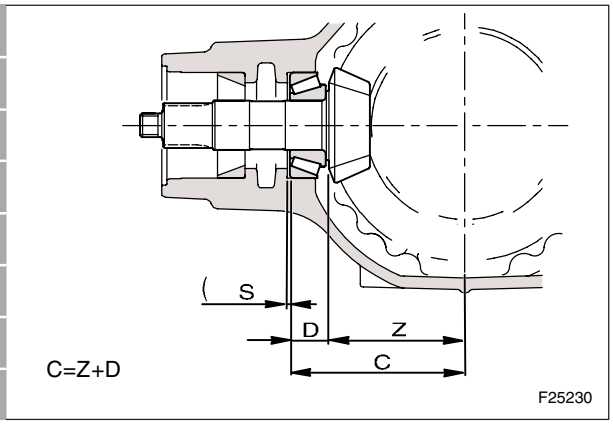
9. Calculate size **B** which will be the first useful value for calculating the size of the shims that are to be inserted under the cups of the inner bearing.



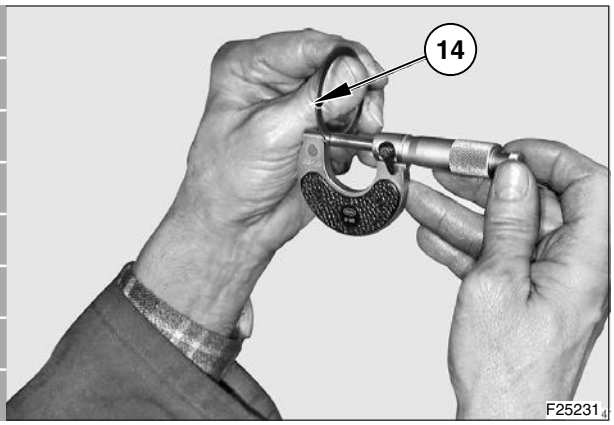
10. Check rated value (**X**) marked on the pinion and add or deduct from it the variation indicated: (**Y**) to obtain measure **Z** .
E.g.: Z= 118 + 0.1 = 118.1
Z= 118 -0.2 = 117.8



11. Calculate **C** which represents the second value for calculating the shim size **S** to be placed under the inner bearing cup.



12. Calculate the difference between sizes **B** and **C** so as to obtain the size **S** of the shim (**14**) that will go under the inner bearing cup.
S = **B** - **C**

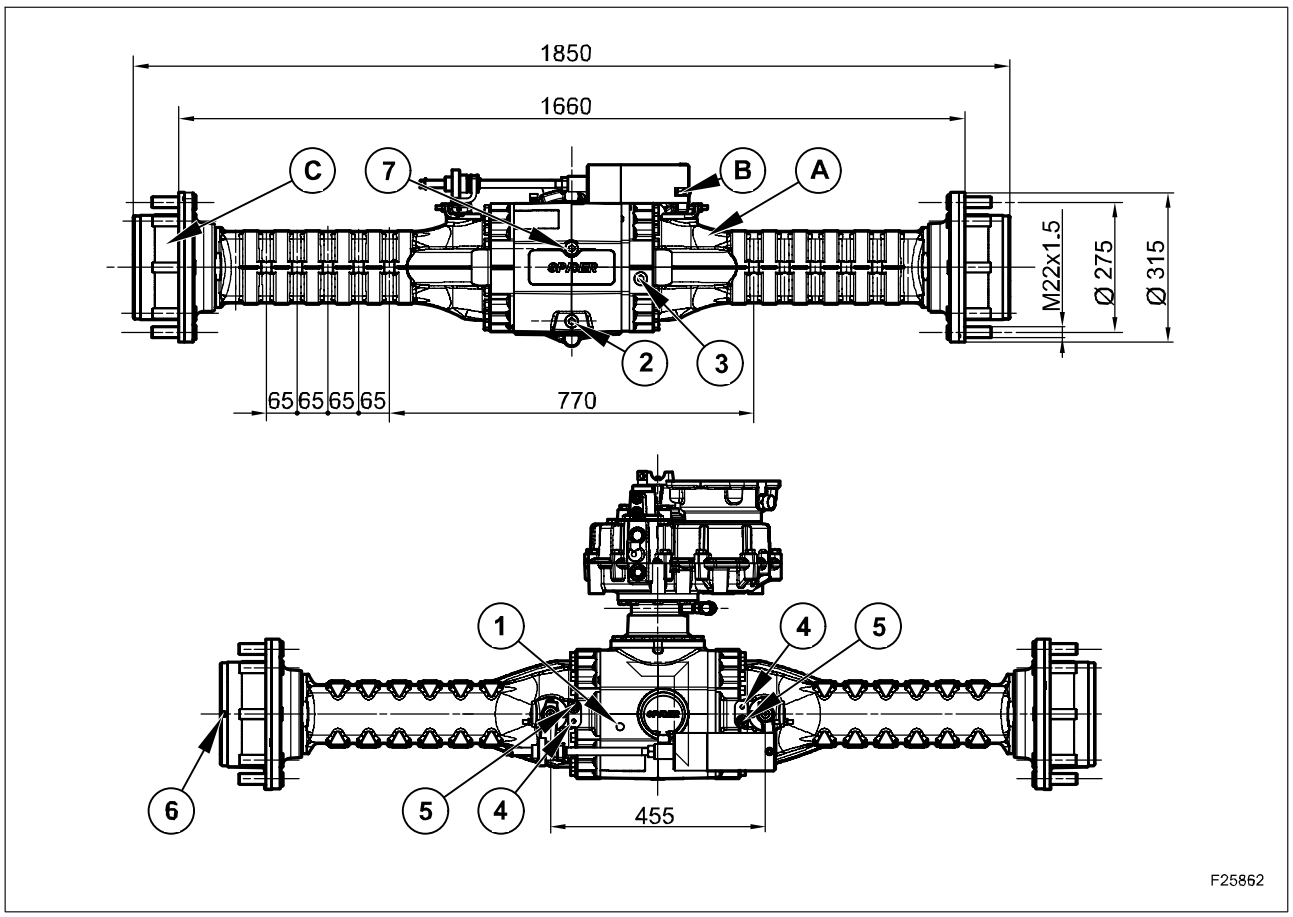


RIGID REAR AXLE

The axle is essentially composed of:
- axle body;
- side reduction gears;
- differential and pinion (in the axle body);
- braking unit (in the axle body);
- the negative hydraulic brake.

MH 2.6

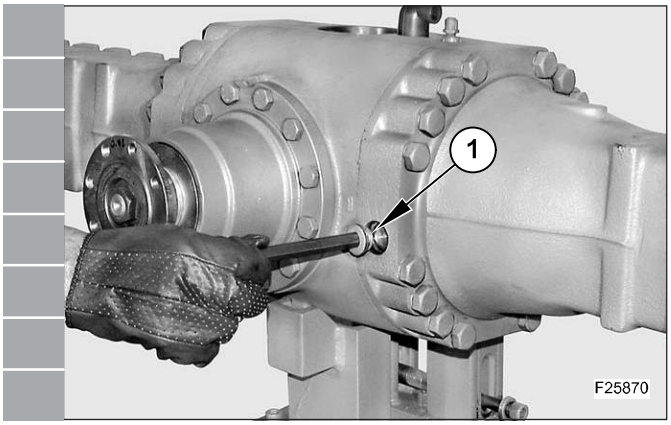
FEATURES:
Bevel gear ratio ..... 11 : 35
Epicycloidal reduction ratio ..... 1 : 6
Hydraulic brakes: ..... wet discs
(6 brake discs + 6 spacers each side)



A. Axle body
D. Outer negative brake
C. Lateral reduction unit
1. Breather plug
2. Drain plug
3. Oil level
4. Brakes bleeding screw
5. Hydraulic brakes control port
6. Final drive introduction, oil level and drain plug lateral reduction unit
7. Filling plug

DISASSEMBLING

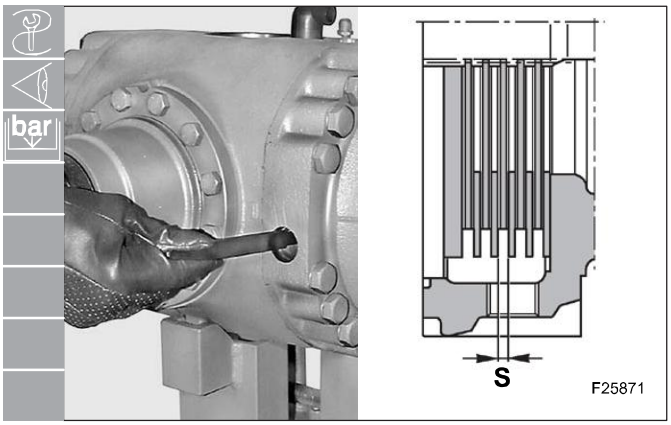
1. Remove the oil level plug (**1**).



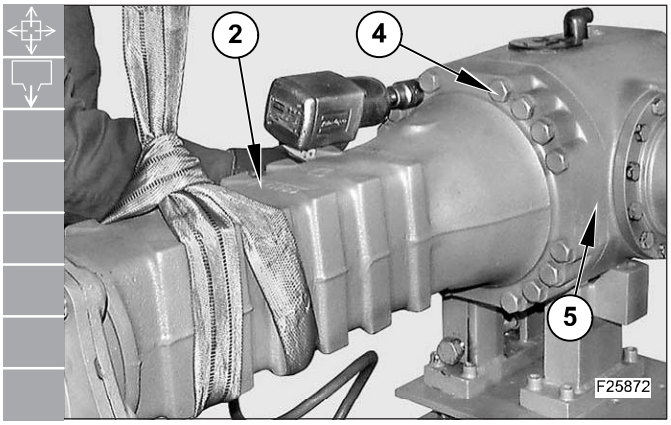
2. Apply the brakes and, keeping them under pressure, check the linings **S** between the disks using tool 75301741.
S minimum: 4.5 mm

WARNING

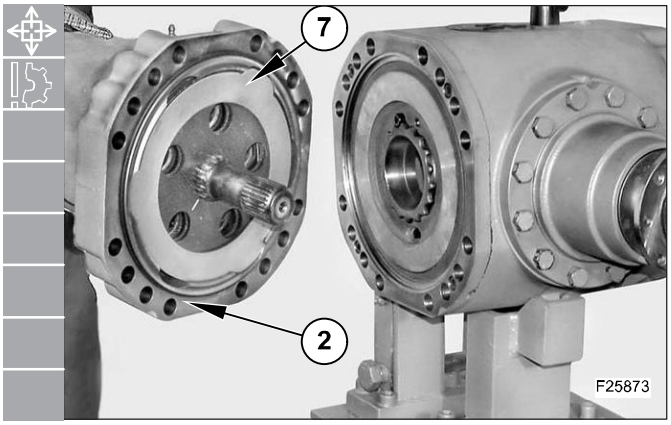
Replace the braking discs and the intermediate discs on both sides if necessary.



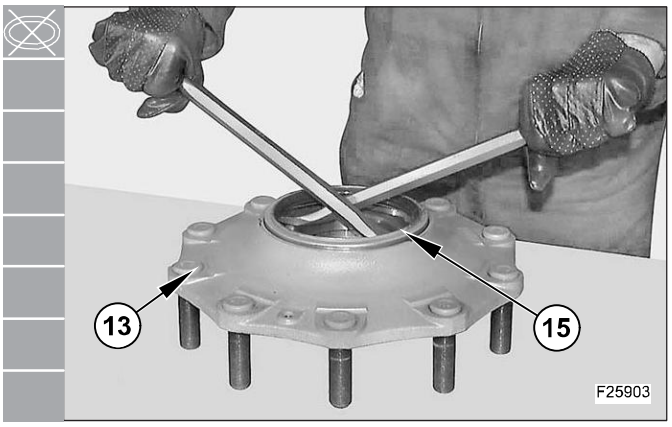
3. Unloose and remove the screws (**4**) fixing the arm (**2**) to the central body (**5**).



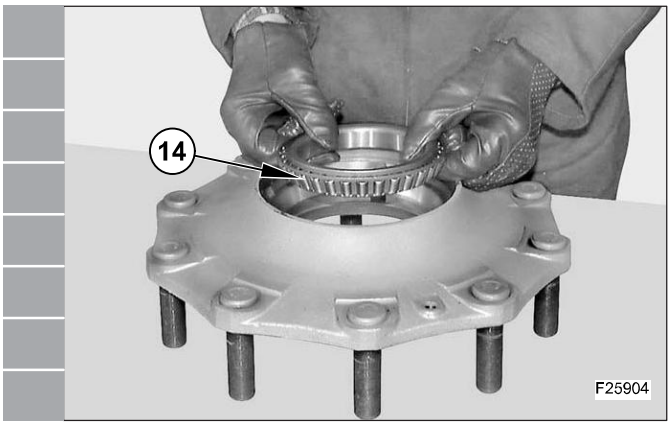
4. Remove the arm (**2**) together with the pack of braking discs (**7**).
Place the arm on a bench.



17. Remove the seal ring (**15**) from the wheel hub (**15**).



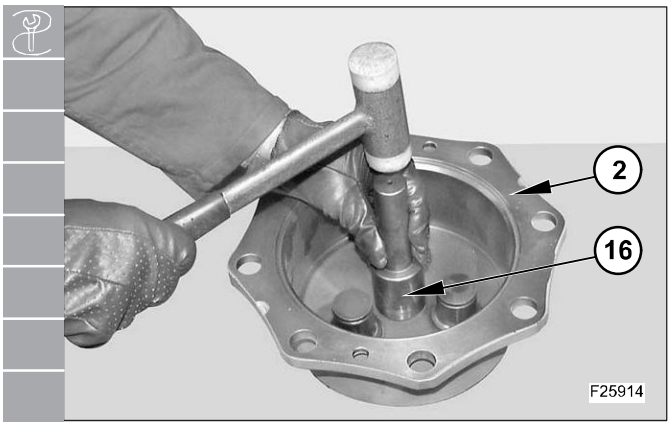
18. Remove the inner bearing (**14**).



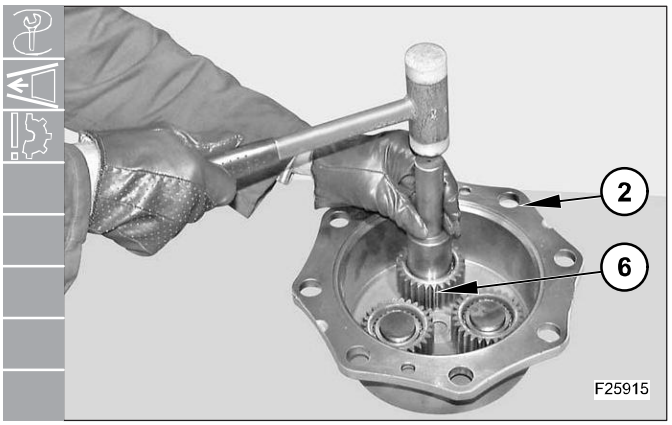
19. Remove the external cups of the bearings forcing a pin-driver into the appropriate slots on the hub (**13**).

NOTE:
Hammer in an alternate way so as to avoid crawling or deformation of the bearing cups.

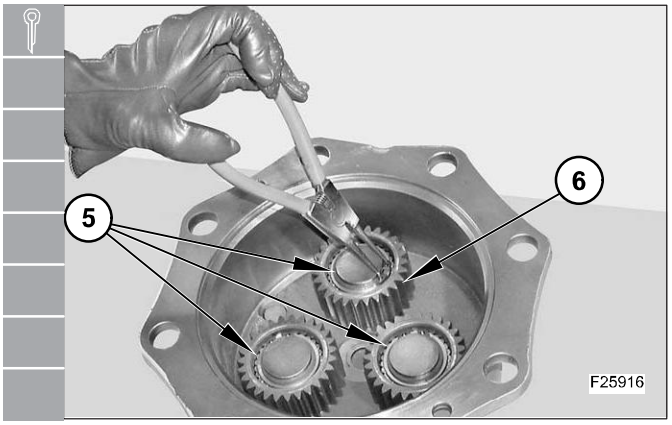
9. With the help of tool 7530...., insert the planetary gears cover (**2**) in the shim washer (**16**).



10. With the help of tool 75301751, insert the planetary gears (**6**) in to the cover (**2**).
Accurately check the orientation.

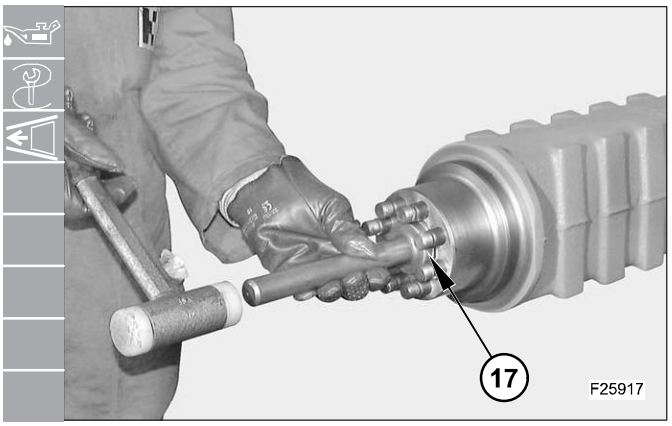


11. Lock the gears (**6**) into position by fitting the snap ring (**5**).



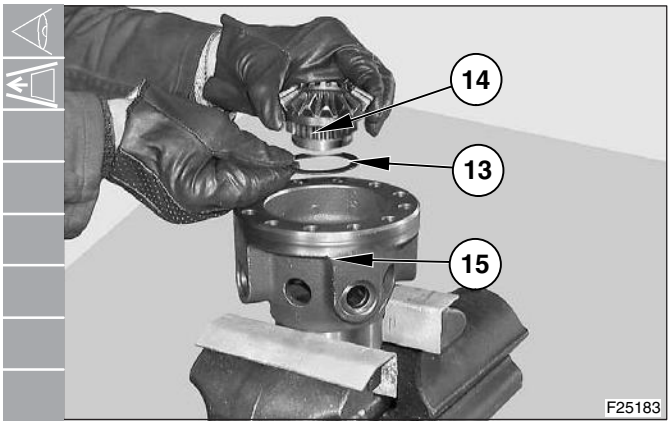
12. Lubrificare the outside of the seal ring (**17**) and, with tool 7530.... , fit it on the arm.

NOTE:
carefully check the assembly side.

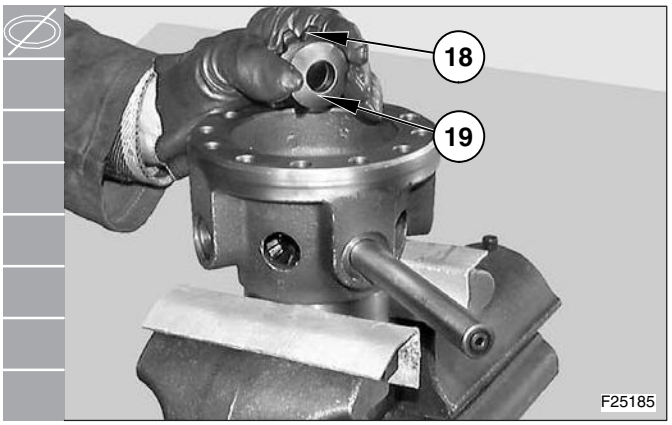


Assembly

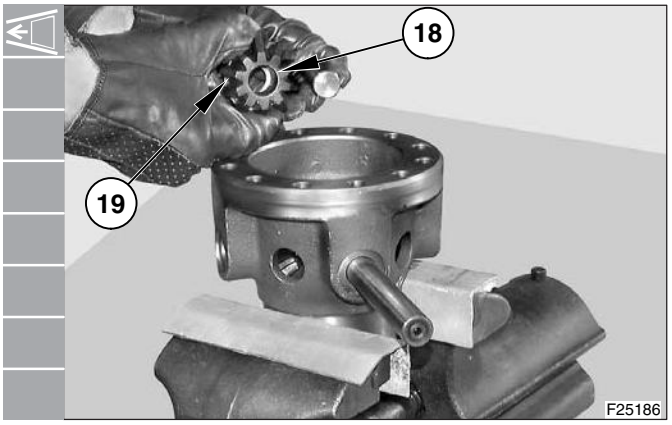
1. Insert the shim washer (**13**) and the planetary gear (**14**) in the differential carrier (**15**).



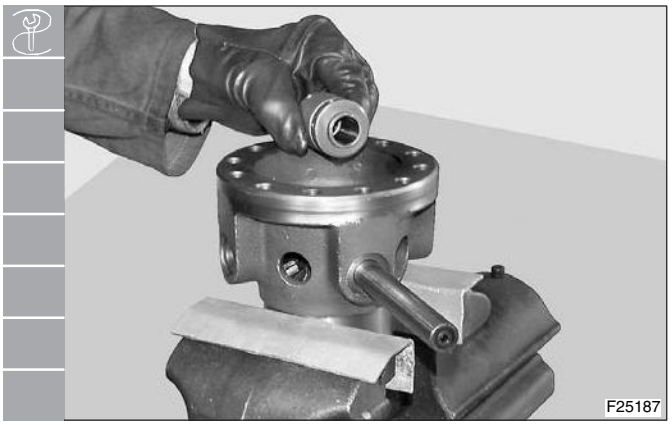
2. Position the shim washer (**19**) and the first planetary gear (**18**).
Hold them in position using bar 75301756.



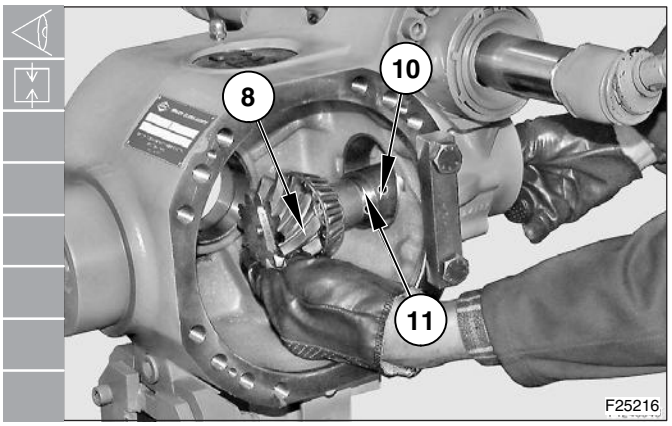
3. By means of pin 75301756, position the second planetary gear (**18**) and the relevant shim washer (**19**).



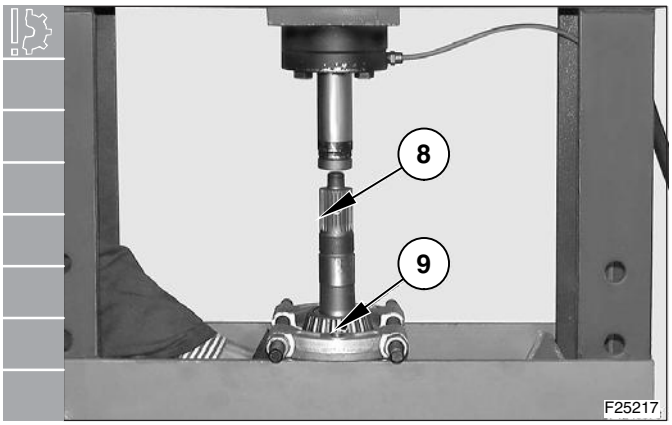
4. Insert tool 75301754 between the two planetary gears.
Align the entire assy by means of tool 75301756.



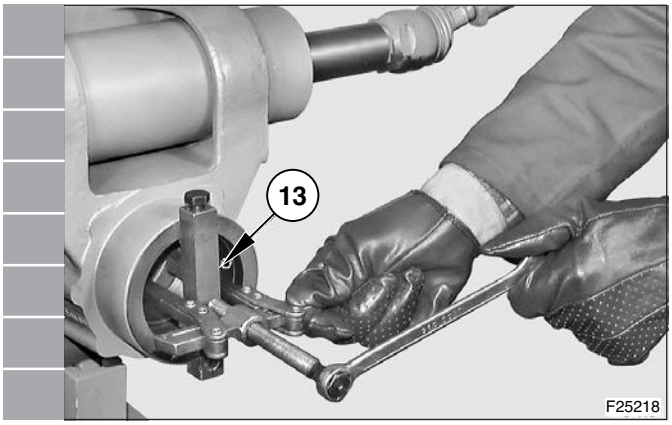
9. Remove the pinion (**8**), shims (**11**) and distance piece (**10**).



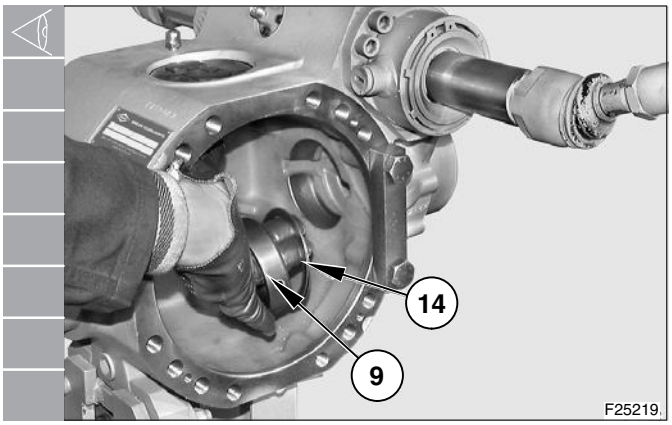
10. Using a puller and a press, remove the inner bearing (**9**) from the pinion (**8**).



11. Remove the cup of the outer bearing(**13**).



12. Insert a punch in the appropriate holes and remove the inner bearing cup (**9**) as well as the shim washers (**14**).



TROUBLES	CAUSES	CORRECTION
	Incorrect brake fluid	See remedy Insufficient braking
	No deadhead on master cylinder	Readjust brake pedal.
	Restriction in brake lines	Inspect and replace dented or folded lines.
	Restriction in return line of steering system	Inspect for and replace a dented or folded duct. Inspect and remove any filter and fitting on the line or any other obstacle from the return line.
	Incorrect lubricant	Change the seal rings of the brake circuit and brake pump.
Differential lock inoperative	If control is manual: loose or misadjusted linkage	Inspect, repair and adjust the control as indicated in vehicle's Service Manual .
	If control is hydraulic: problems in the hydraulic circuit of the vehicle	Refer to the Service Manual of the vehicle.
	If control is hydraulic: problems in actuating cylinder (noteable through loss of hydraulic oil or increase of the oil level in axle)	Check and repair cylinder.
	If the differential is self-locking, worn discs	Replace discs.
Oil coming out of breather	Hydraulik oil leak in the brake system	See correction Insufficient braking .
NoSpin indexing noise when driving straight WARNING! With NoSpin, fatigue damage can occur on the side with lager tire	Uneven pressure between left and right tire	Inflate tires to the pressure recommended by the Service Manual, or until the rolling radius is equal.
	Different style, size or brand of tires between left and right side	Change tires or try to obtain an equal rolling radius for both tyres. Vary the tire pressure within the tolerance specifications prescribed by the Manufacturer, until the rolling radius is equal.
Same noise during coast and under power	Hub wheels bearings damaged	Replace faulty items.

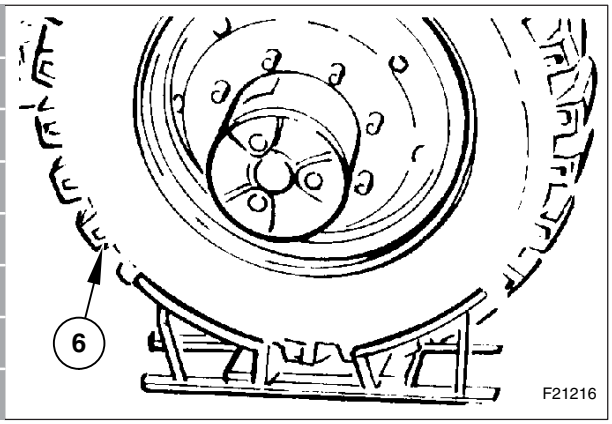
Assembly

IMPORTANT:
before installing the wheel check that tyre tread is oriented according to the travel direction of the machine.

NOTE:
for an easy assembly it is advisable to fit the wheel with tyres partially inflated.

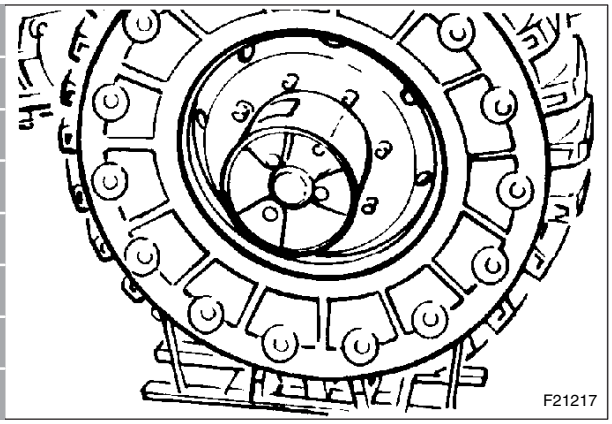
1. Install the inner wheel (**6**).
Match the rim surface with the axle hub centering base.
Lock the inner rim to avoid its movement.

NOTE:
the inner rim has the shorter disc offset.



2. Insert the rubber spacer ring.

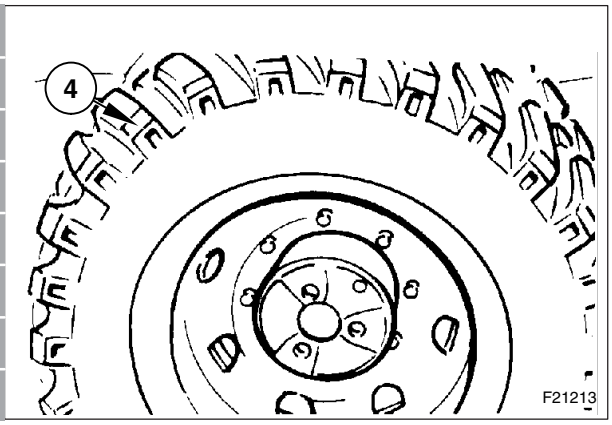
NOTE:
for a good operation and a longer tyre life of the tyre, centre the spacer on it.



3. Fit outer wheel (**4**) checking that the inflating valve of the inner tyre comes out of the outer rim holes.

NOTE:
two hub studs are longer; they are used to center the spacer.

NOTE:
the outer rim has the bigger disc offset.



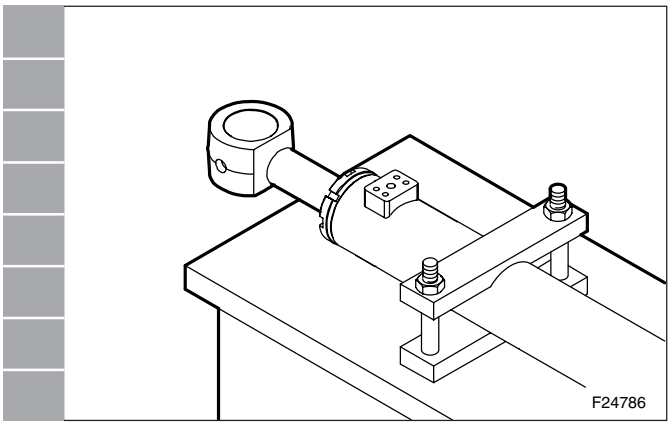
Disassembling

The disassembly procedure below starts on the premise that the hydraulic lines and the line securing bands have been removed.

WARNING

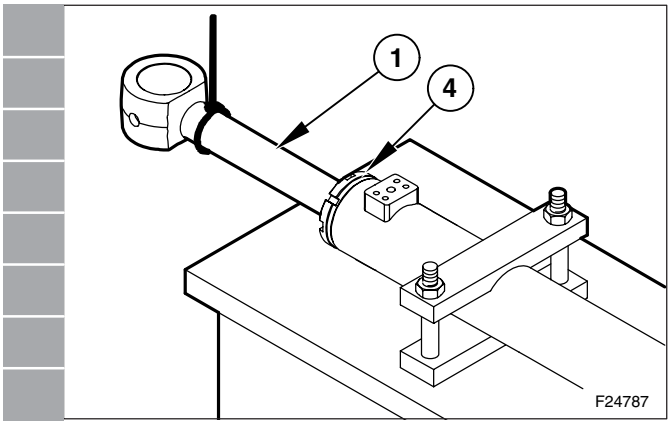
Weight of blade cylinder / stabilizer rod: 32 kg.

1. Lift and securely place the cylinder on a work-bench using a crane. Be sure that the cylinder is placed horizontally. Drain hydraulic oil from cylinder.

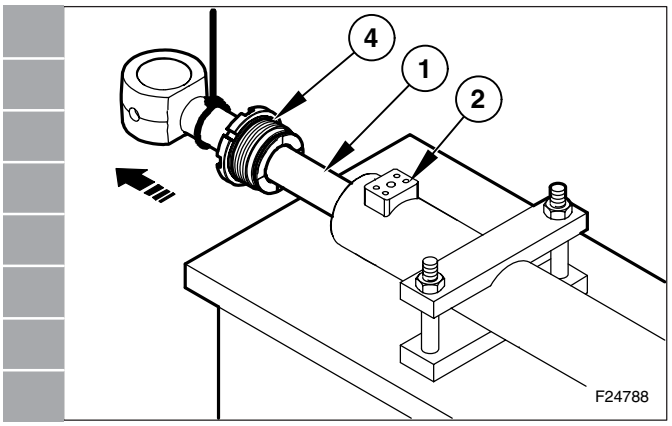


2. Fully extend cylinder rod (**1**). Secure the rod end using a crane. Remove front head (**4**).

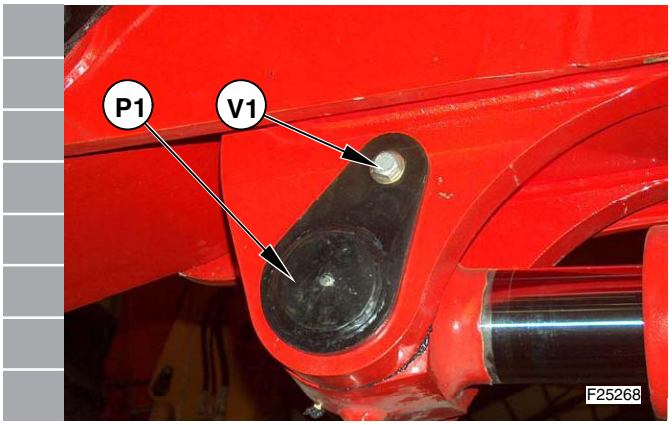
IMPORTANT:
*Be sure to pull out cylinder rod (**1**) straight so as not to damage the sliding surfaces.*



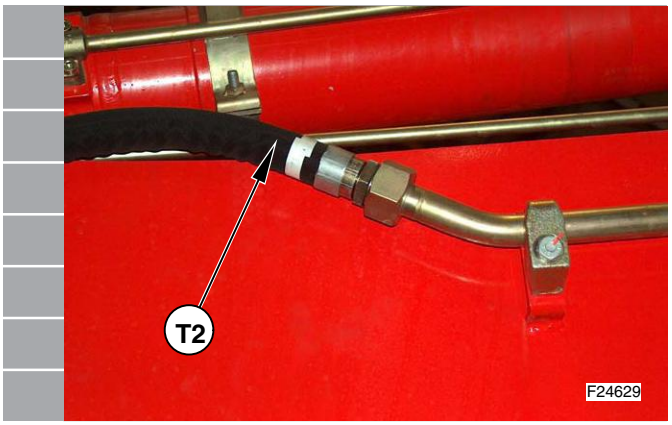
3. Pull out front cylinder head (**4**) from cylinder liner (**2**) by tapping with a plastic hammer. Remove cylinder rod (**1**) and front head (**4**).



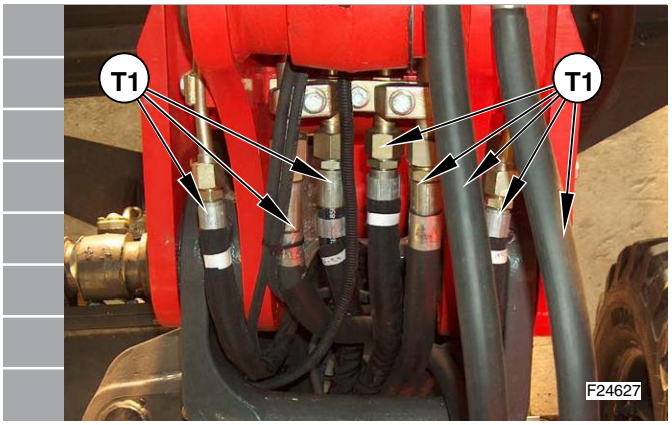
4. Insert the pin (**P1**) and lock it by tightening screw (**V1**).



5. Disconnect pipings (**T2**) connecting breaker / nibbler (on both ends).

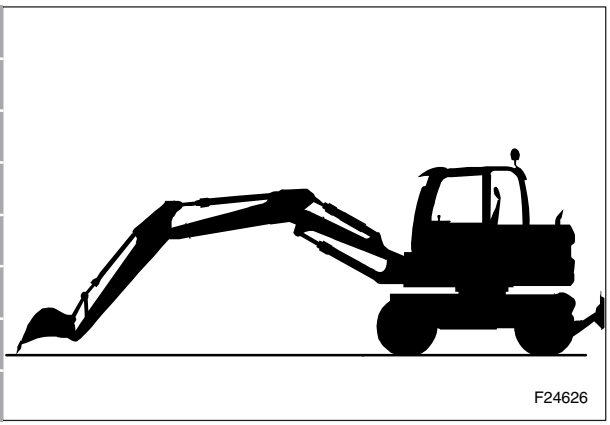


6. Disconnect all the hoses of the front attachment (**T1**).

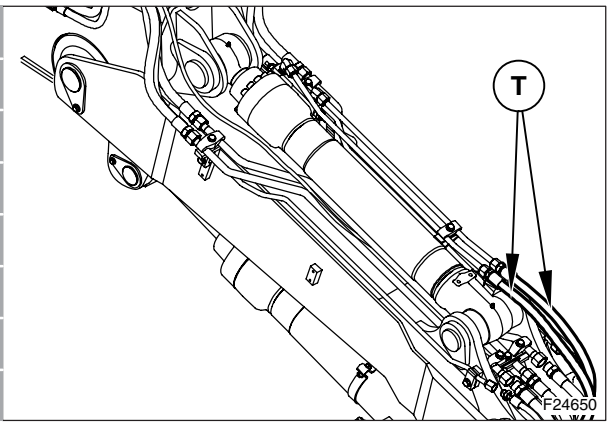


DISASSEMBLING

1. Place the machine on level ground. Lower the bucket to the ground and set the front attachment as shown.
   Stop the engine.



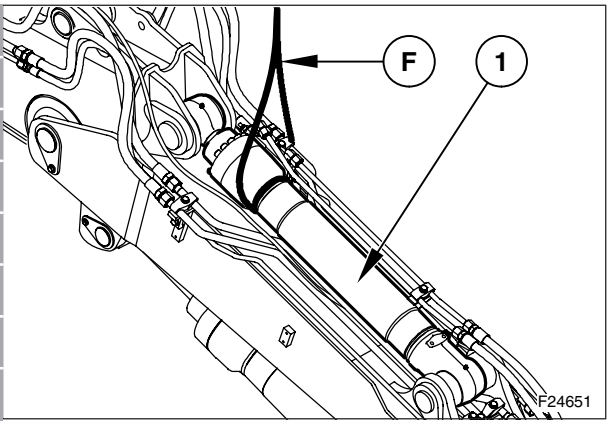
2. Disconnect hoses (**T**). Plug hoses to avoid that impurities reach the circuit.



3. By means of a rope (**F**) connected to an hoist, support the positioner cylinder (**1**).

WARNING

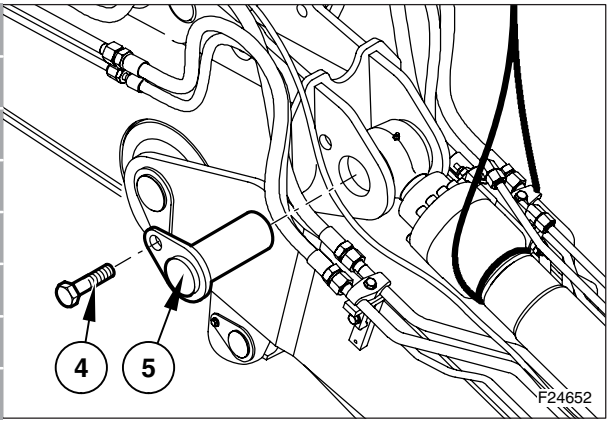
Weight of positioner cylinder: 106 kg MH 2.6.
Weight of positioner cylinder: 118 kg MH 3.6.



4. Untighten and remove screw (**4**).
   With an hammer remove pin (**5**).

WARNING

Prevent personal injuries. When removing the hinge pins with a hammer, some metal chips might fly away. Be properly protected with glasses, helmets, etc.



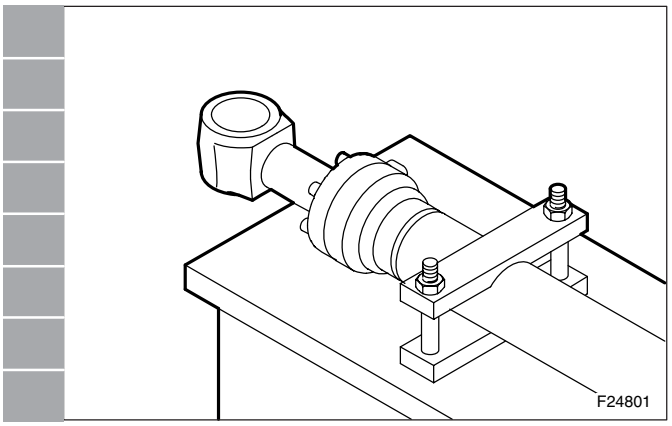
DISASSEMBLING

The disassembly procedure below starts on the premise that the hydraulic lines and the line securing bands have been removed.

WARNING

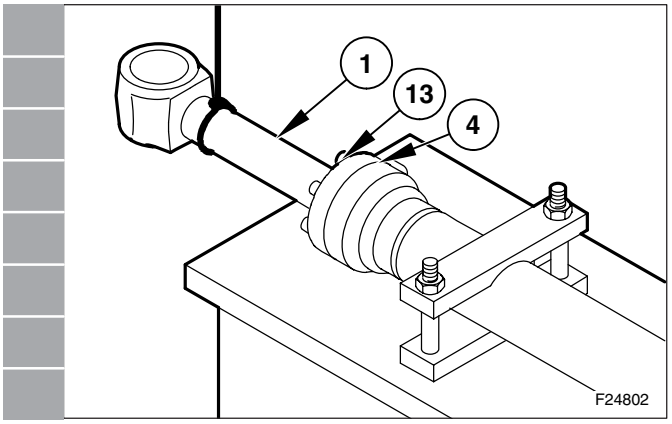
Bucket cylinder weight: 50 kg.

1. Lift and securely place the cylinder on a work-bench using a crane. Be sure that the cylinder is placed horizontally. Drain hydraulic oil from cylinder.

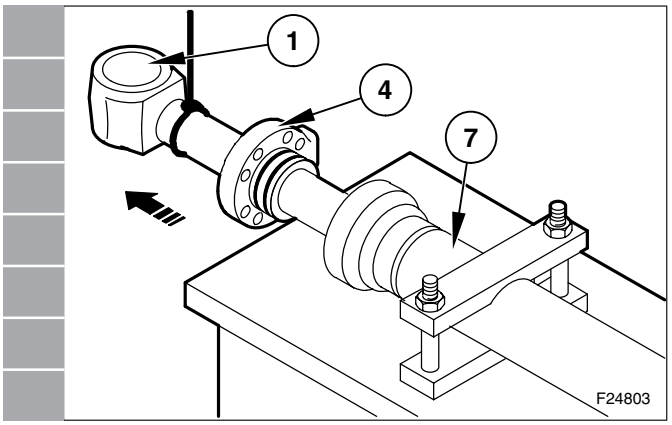


2. Fully extend cylinder rod (**1**). Secure the rod end using a crane. Remove screws (**13**) from front cylinder head (**4**)

IMPORTANT:
*Be sure to pull out cylinder rod (**1**) straight so as not to damage the sliding surfaces.*



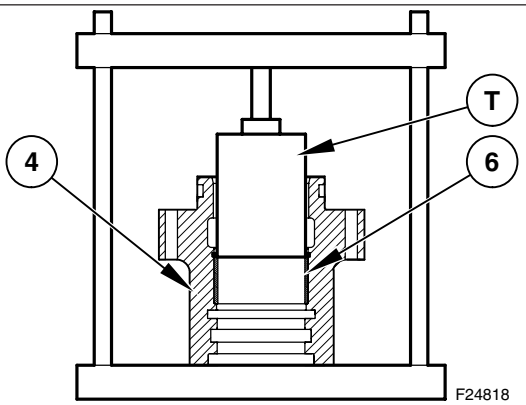
3. Pull out front cylinder head (**4**) from cylinder liner (**7**) by tapping with a plastic hammer. Remove cylinder rod (**1**) and front head (**4**).



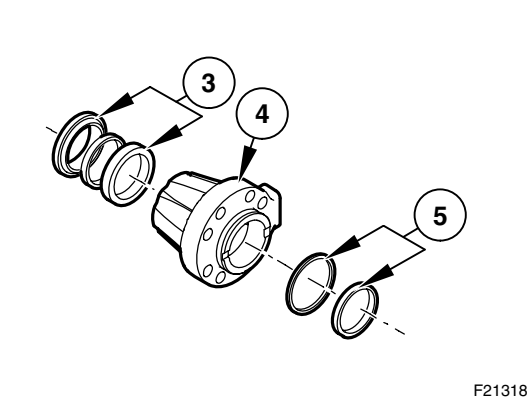
ASSEMBLY

1. Install bush (**6**) on front cylinder head (**4**) using a press and tool 380001834.

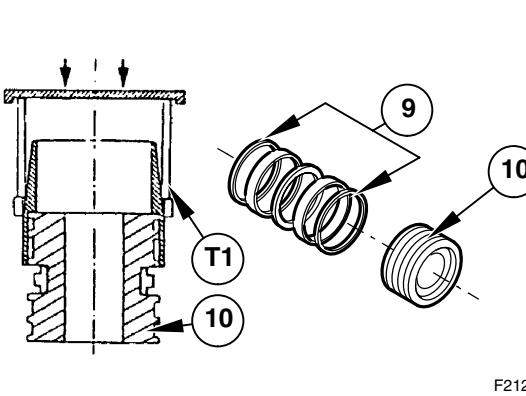
IMPORTANT:
Be sure that the rings are installed correctly.



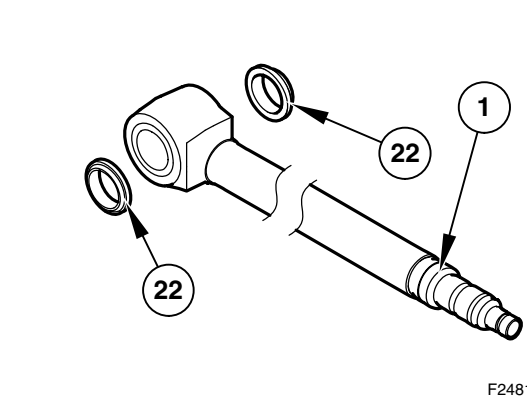
2. Assemble the head seals (**3**), back-up ring + O-ring (**5**) on the front head (**4**). Use tool 380001235. for the installation of the scraper ring.



3. Remove the piston seals (**9**) from piston (**10**). Use tool 380001842.



4. Assemble scraper rings (**22**) on rod (**1**).



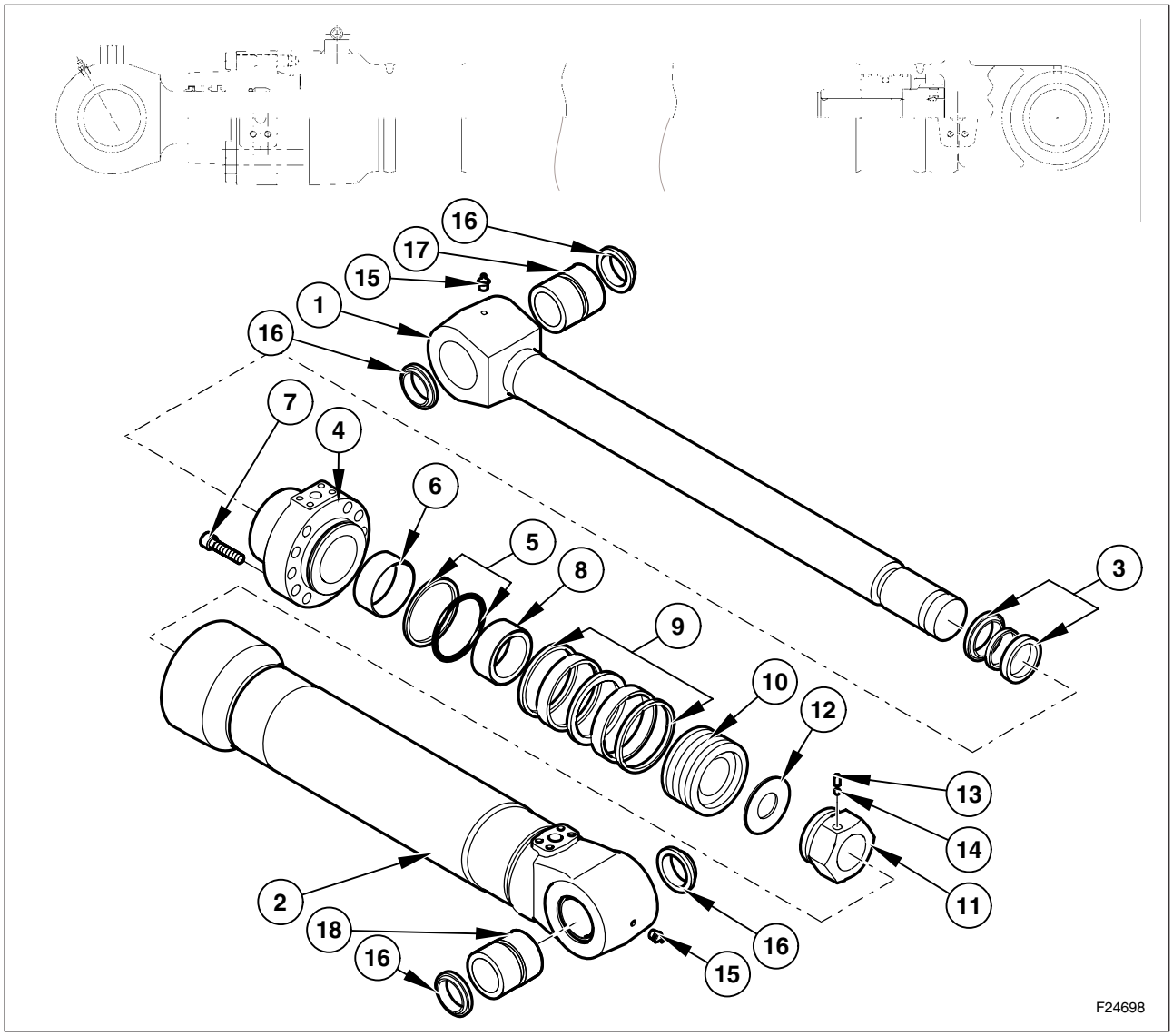
BOOM CYLINDER

Data and features:

Bore: ..... Ø 10 mm
Ø rod: ..... Ø 65 mm
completely closed: ..... 1.182 mm
Stroke: ..... 700 mm
Max. operating pressure: ..... 34.3 MPa

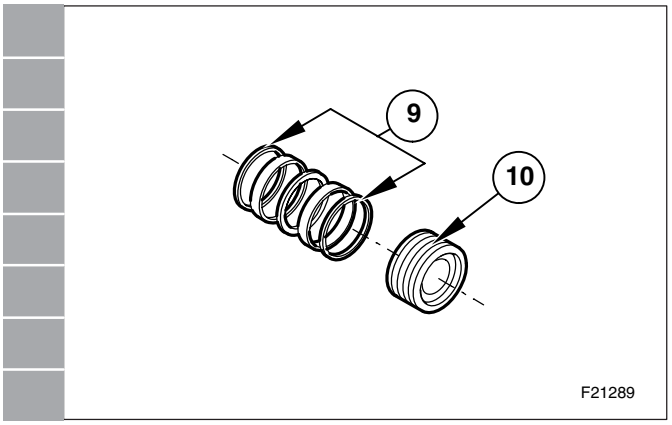
Max. pressure relief valve:
..... 37.3 MPa (extension)
..... 39.2 MPa (retraction)
Extension force: ..... 326 KN
Retraction force: ..... 153 KN
Temperature range: ..... -20°C ÷ 90 °C
Weight: ..... 160 Kg

Components:

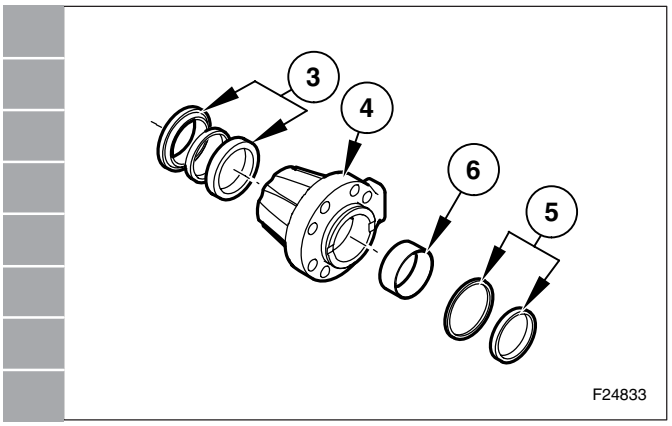


1. Cylinder rod
2. Cylinder liner
3. Front head seals
4. Front head
5. Back-up ring and O-ring
6. Bushing
7. Screw
8. Brake bushing
9. Piston seals
10. Piston
11. Nut
12. Shim
13. Pin
14. Ball
15. Grease nipple
16. Scraper ring
17. Rod bush
18. Liner bush

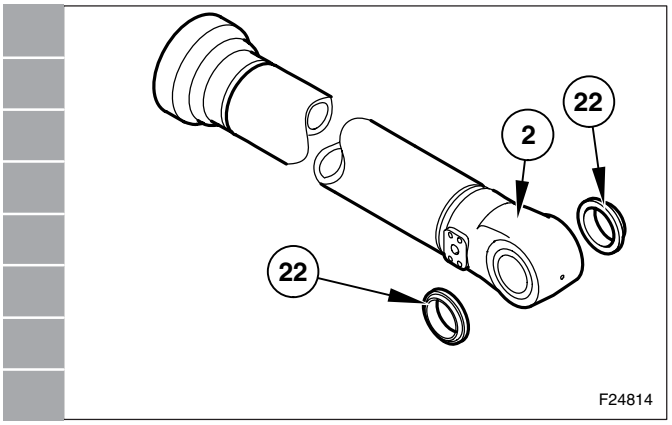
8. Remove the piston seals (**9**) from piston (**10**).



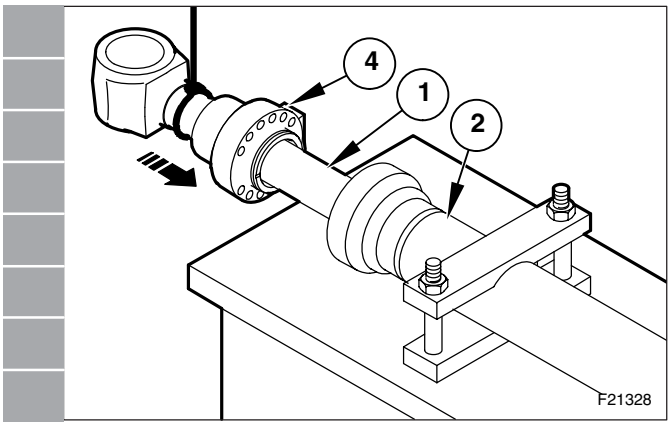
9. Remove the front head seals (**3**), O-ring + back-up ring (**5**), and bush (**6**) from front head (**4**).



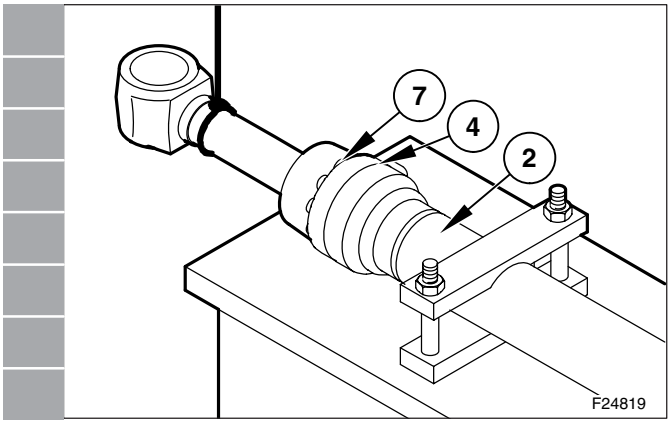
9. Assemble scraper rings (**22**) on liner (**2**).



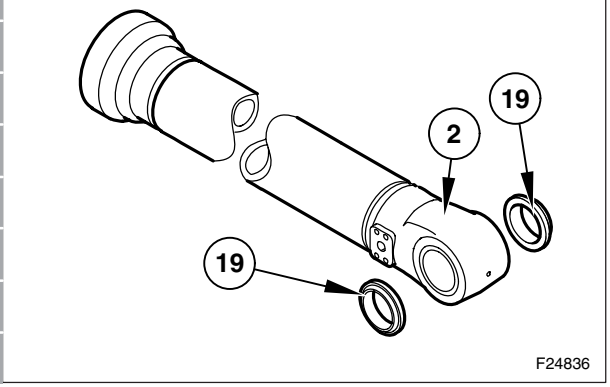
10. Secure cylinder liner (**2**) horizontally on a work bench.
Insert cylinder rod (**1**) into cylinder liner (**2**).



11. Assemble the front head (**4**) on cylinder liner (**2**).
Tighten screws (**7**).
Tightening torque: 171 Nm.

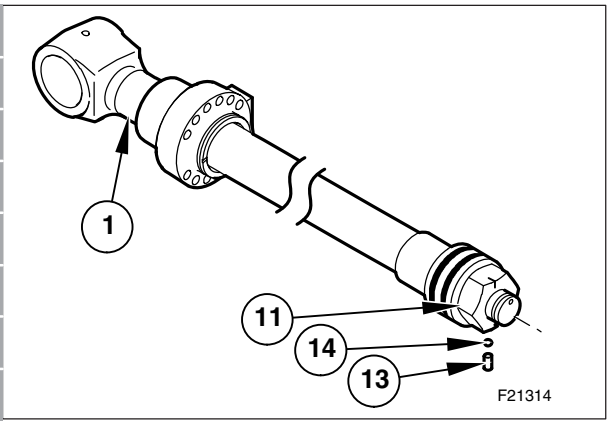


4. Remove the cylinder liner (**2**) the scraper rings (**19**).

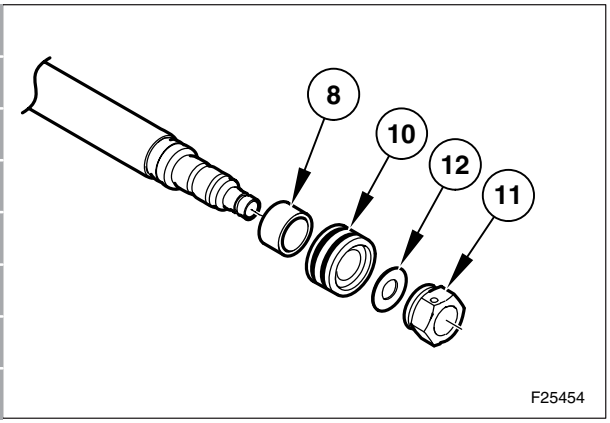


5. Secure cylinder rod (**1**) on workbench. Put matching marks between cylinder rod (**1**) and nut (**11**). Remove pin (**13**) and ball (**14**).

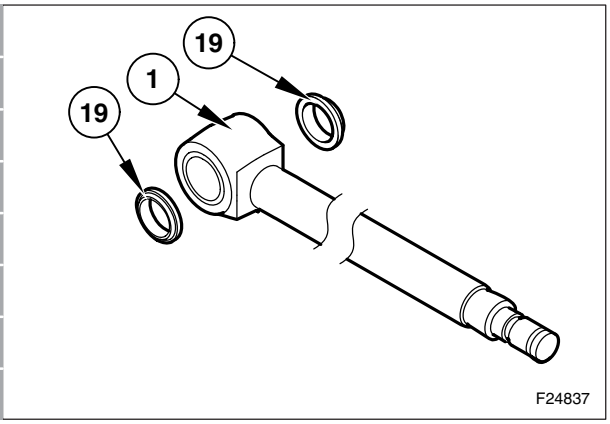
NOTE:
Remove with a drill the burrs due to the caulking operation, carried out with hammer and punch in two points during the assembly and correct positioning of pin.



6. Untighten nut (**11**), using tool 380001022, remove piston (**10**) and shim (**12**), and brake bush (**8**).



7. Remove scraper rings (**19**) from rod (**1**).



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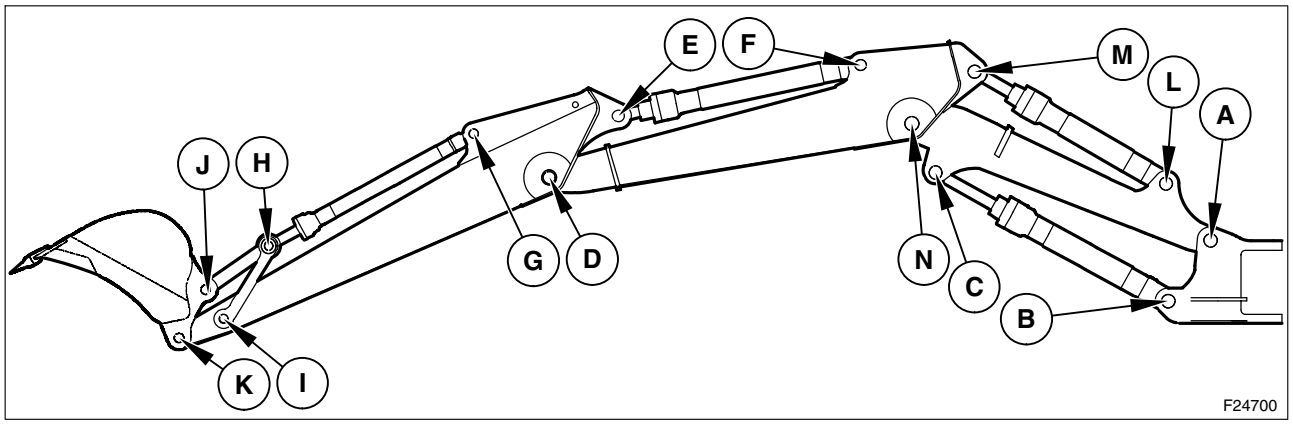
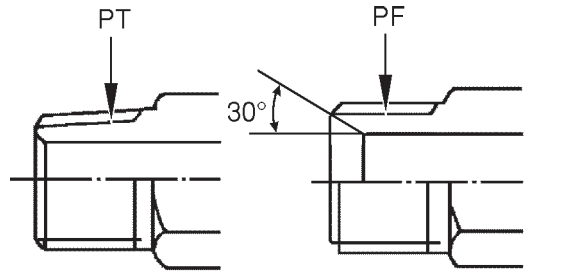


Unit: mm

Index	Part to measure	Pin		Bushing		Remedy
		Dimension	Limit	Dimension	Limit	
A	1st arm foot	Ø 90	- 0.12 - 0.207	Ø 90	+ 0.26 + 0.14	
B	1st arm cylinder head side	Ø 90	- 0.12 - 0.207	Ø 90	+ 0.28 + 0.21	
C	1st arm cylinder rod side	Ø 80	- 0.1 - 0.174	Ø 80	+ 0.28 + 0.21	
D	2nd arm point	Ø 71	- 0.1 - 0.174	Ø 71	+ 0.37 + 0.25	
E	2nd arm cylinder rod side	Ø 80	- 0.1 - 0.174	Ø 80	+ 0.28 + 0.21	
F	2nd arm cylinder head side	Ø 71	- 0.1 - 0.174	Ø 71	+ 0.28 + 0.21	
G	Bucket cylinder head side	Ø 60	- 0.1 - 0.174	Ø 60	+ 0.27 + 0.2	
H	Bucket cylinder rod side	Ø 65	- 0.1 - 0.174	Ø 65	+ 0.27 + 0.2	
I	Arm side (B) tie rod	Ø 65	- 0.1 - 0.174	Ø 65	+ 0.26 + 0.14	
J	Bucket side (A) tie rod	Ø 65	- 0.1 - 0.174	Ø 65	+ 0.26 + 0.14	
K	Bucket 2nd arm side	Ø 65	- 0.1 - 0.174	Ø 65	+ 0.26 + 0.14	
L	Positioner cylinder head side	Ø 80	- 0.1 - 0.174	Ø 80	+ 0.28 + 0.21	
M	Positioner cylinder rod side	Ø 80	- 0.1 - 0.174	Ø 80	+ 0.28 + 0.21	
N	1st arm point	Ø 71	- 0.1 - 0.174	Ø 71	+ 0.37 + 0.25	

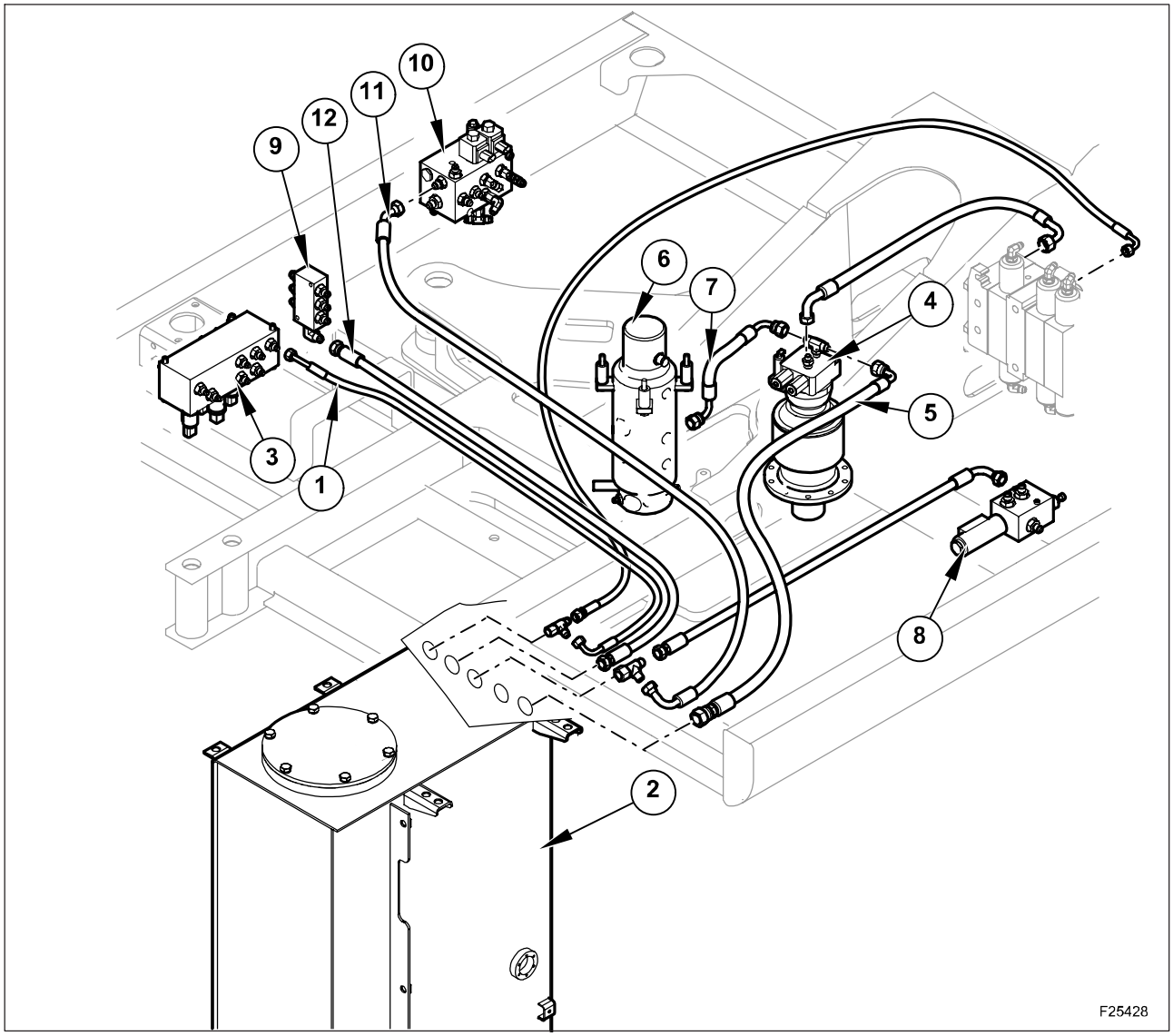
Tightened connection

- Make sure that both pitch and screw-thread type (taper or straight) are properly connected before using a tightened connection.



- Keep to the following tightening torques:

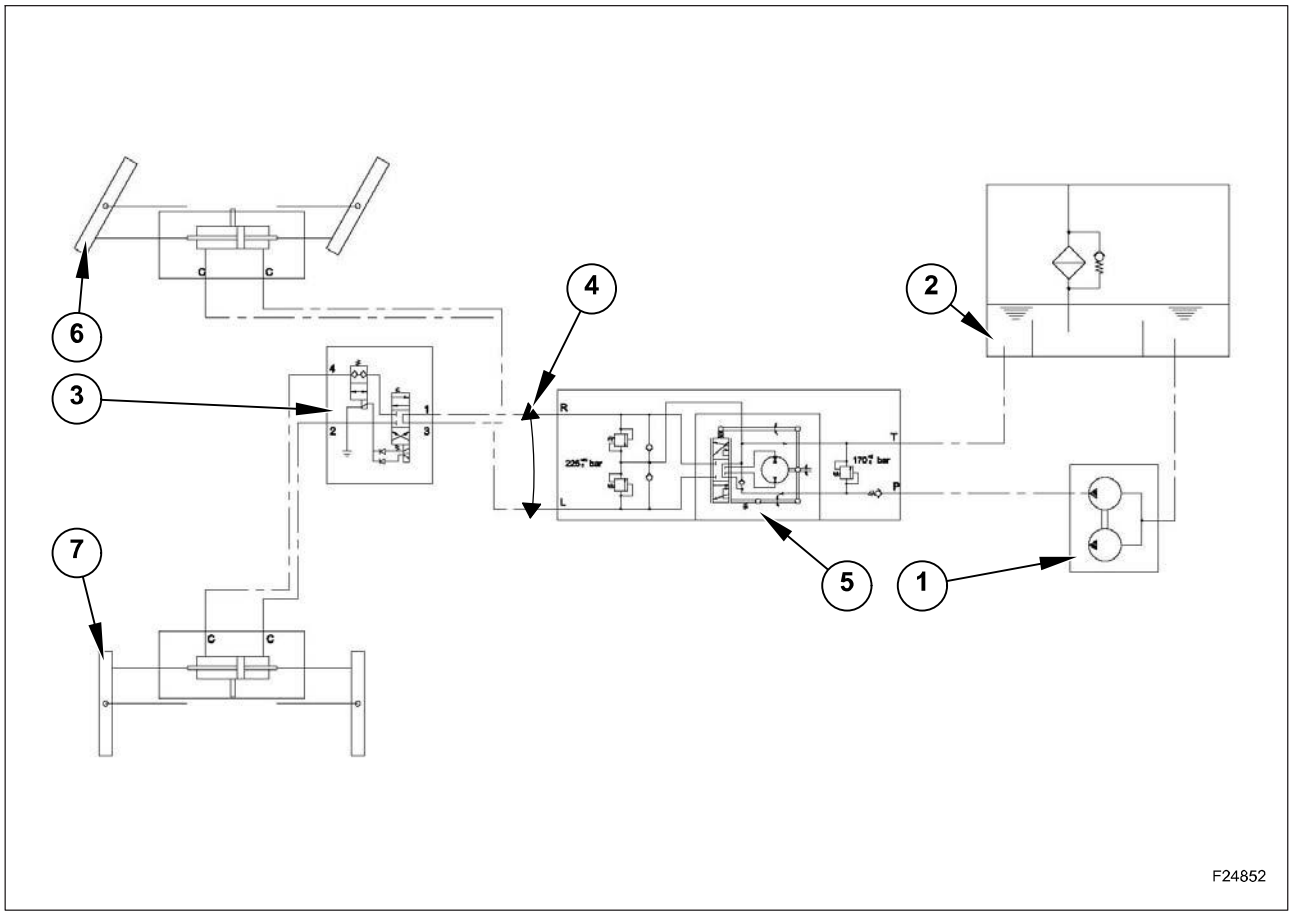
Taper male thread		
Wrench	**Tightening torque**	
Connection body	**Nm**	**kgf m**
17.19	34	3.5
19.22	49	5
27.22	93	9.5
36.32	157	16
41	205	21
50	320	33
60	410	42



1. Pressure gauges block draining pipelines
2. Oil tank
3. Pressure gauges block
4. Slew device
5. Slew motor draining pipelines
6. Swivel joint
7. Travel motor draining pipeline
8. Clamshell bucket rotation solenoid
9. Drainings block
10. Solenoid valves block for superstructure pilot control line
11. Pilot control line solenoid draining pipeline
12. Drainings block pipeline

STEERING PIPELINES (MACHINE 4WD)

The steering control circuit is used for the directional drive of machine during its run.
It consists of a gear pump installed on the engine, of a power steering valve driven by the flywheel and of two steering cylinders bound to the front and rear axles.
The steering pump, activated by the main pump shaft, supplies the power steering valve.
The oil pressure is limited to 170 kg/cm^2.
When the steering wheel is at standstill, the control valve assy is at neutral position and the oil under pressure of the steering circuit flows back to oil tank through port T.
Under such circumstances, if the wheels receive shocks, those are dampened from the pressure relief valves and are not transmitted to the flywheel. By turning the flywheel, the power steering valve shifts and allows the oil flow, that is proportional to the angular movement of the flywheel, and it reaches the steering cylinder chambers.
By means of this shifting, the angular motion of the driving wheels is obtained.
A sequential system enables the valve ports to close, when the wheels movement coincides with the flywheel movement.
The machine carries two steering axles and relevant steering cylinders, which enable three different steering modes, according to the position of the relevant solenoid (see diagram).
If the solenoid (**3**) is not active, the steering is carried out by the front axle and by the oil contained in the unpressurized chamber of the steering cylinder, this oil is controlled by the control valve, that puts it in contact with drain port (**T**) and then with the tank at the same time of oil pressurizing control.
If the solenoid (**3**) is active in both directions, the two steering cylinders are connected in a set and delivery oil flows into the cylinder chamber to return to the power steering and to the tank of the other cylinder chamber.



1. Gears pump
2. Oil tank
3. Steering solenoid
4. Swivel joint
5. Power steering valve
6. Front axle
7. Rear axle

POWER STEERING PIPELINES

The hydraulic circuit of power steering/brakes consists of a gear pump, of a priority valve, of an overpressure valve calibrated at 40 bar, of a users solenoid valves group enabling the supply of the control levers, of pedals and of the various circuits.
The hydraulic oil of the power steering circuit supplies following circuits:

- the control levers and pedals activating the various main control valve spools;
- the parking brake control system;
- the control of the rotary clamshell bucket;
- by means of the users solenoids group, the axle lock control , the valve selecting lateral stabilizers and/or blade control, the low/fast travel speed control, the right/left stabilizers selection valve control, the double travel spool control, the travel motor displacement control.

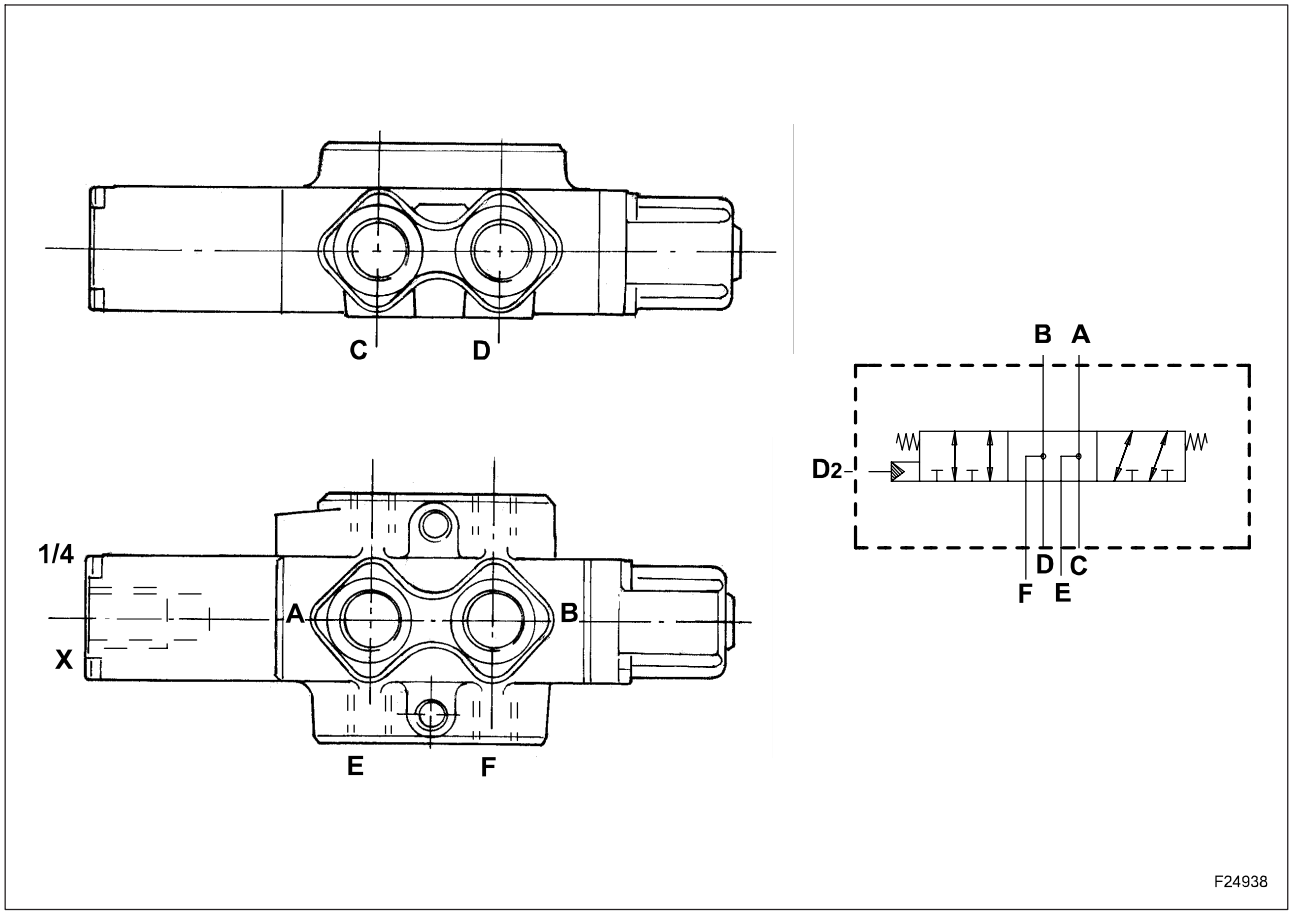
The power steering /brakes pump sucks oil from the hydraulic reservoir and supplies it, through delivery filter, to the brake valve and later, after loading the brake system accumulators, to the priority valve feeding the controls.
The priority valve, ensures a constant delivery of 9 liters/min. to the solenoids group of users and power steering.
After the priority valve, the pressurized oil is supplied at a pressure of 40 ± 3 bar. The pressurized oil is delivered to the solenoid blocks, placed on the superstructure and on the undercarriage, and to the solenoids supplying the control levers and pedals. Another bypass supplies the solenoid of the parking brake of the slew motor.
A bypass of the priority valve (secondary line) supplies the solenoid controlling the clamshell bucket rotation.

STABILIZERS/BLADE SELECTION VALVE

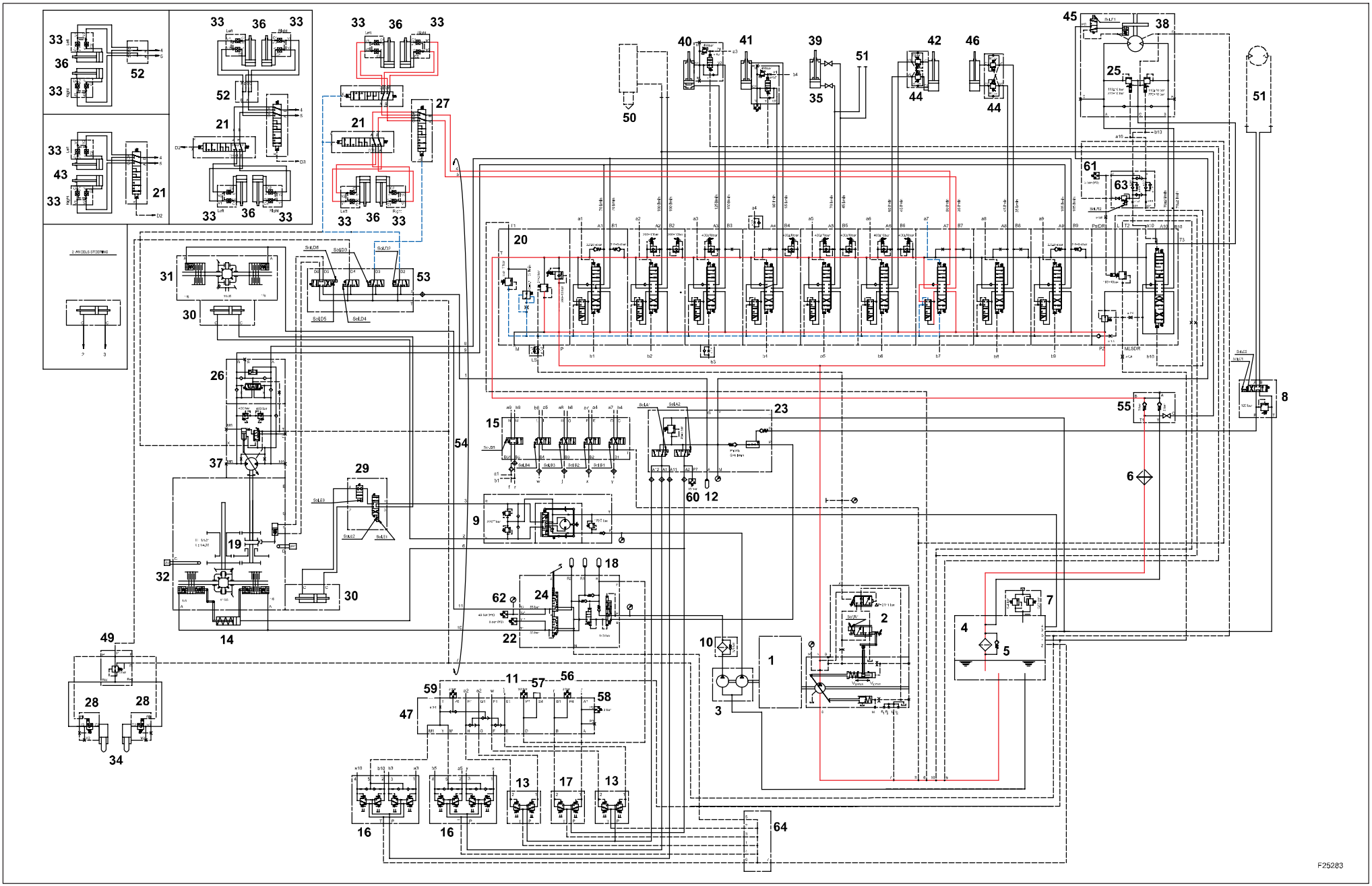
The selection valve, located near the swivel joint, enables deviation of oil coming from the control valve spool:

- to the rear stabilizers cylinders, or the blade cylinders when it receives an hydraulic pilot control coming from the solenoid (**D3**) (if equipped with front blade + rear stabilizers);
- to the front stabilizers cylinders (if equipped with front stabilizers + rear stabilizers).

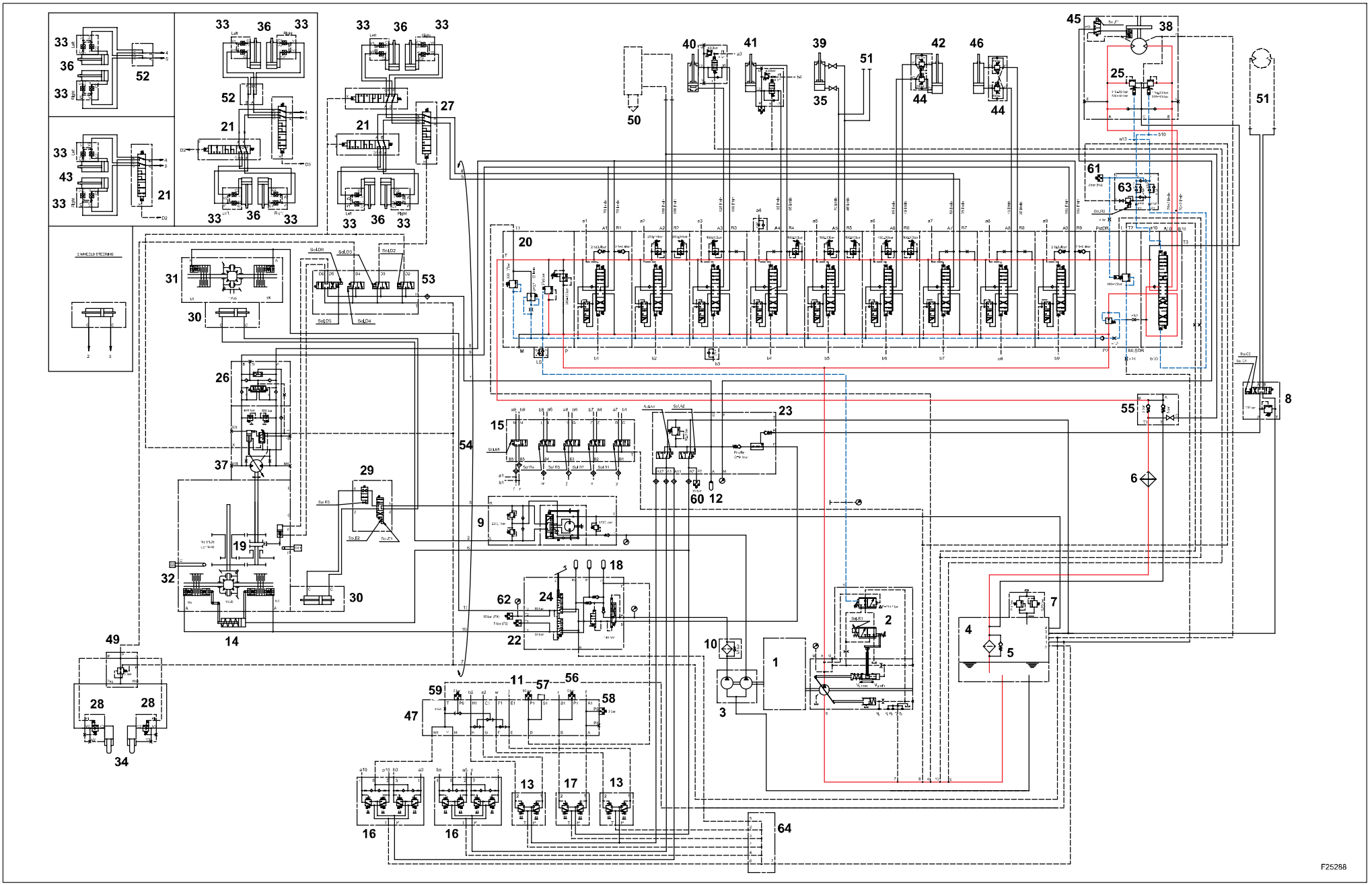
The selecting valve located between the stabilizers cylinders, allows to deviate the oil coming from the control valve spool and directed to the right cylinder. In rest position, the oil flow is deviated to the left cylinder. If a pilot control is present at port (**X**) sent by solenoid valve (**D2**), the oil flow is deviated to the right cylinder. The right and left position of cylinders is referred to the excavator while travelling on the road.
The selecting valve is a 6-ways type and two positions.



LATERAL STABILIZERS CONTROL CIRCUIT

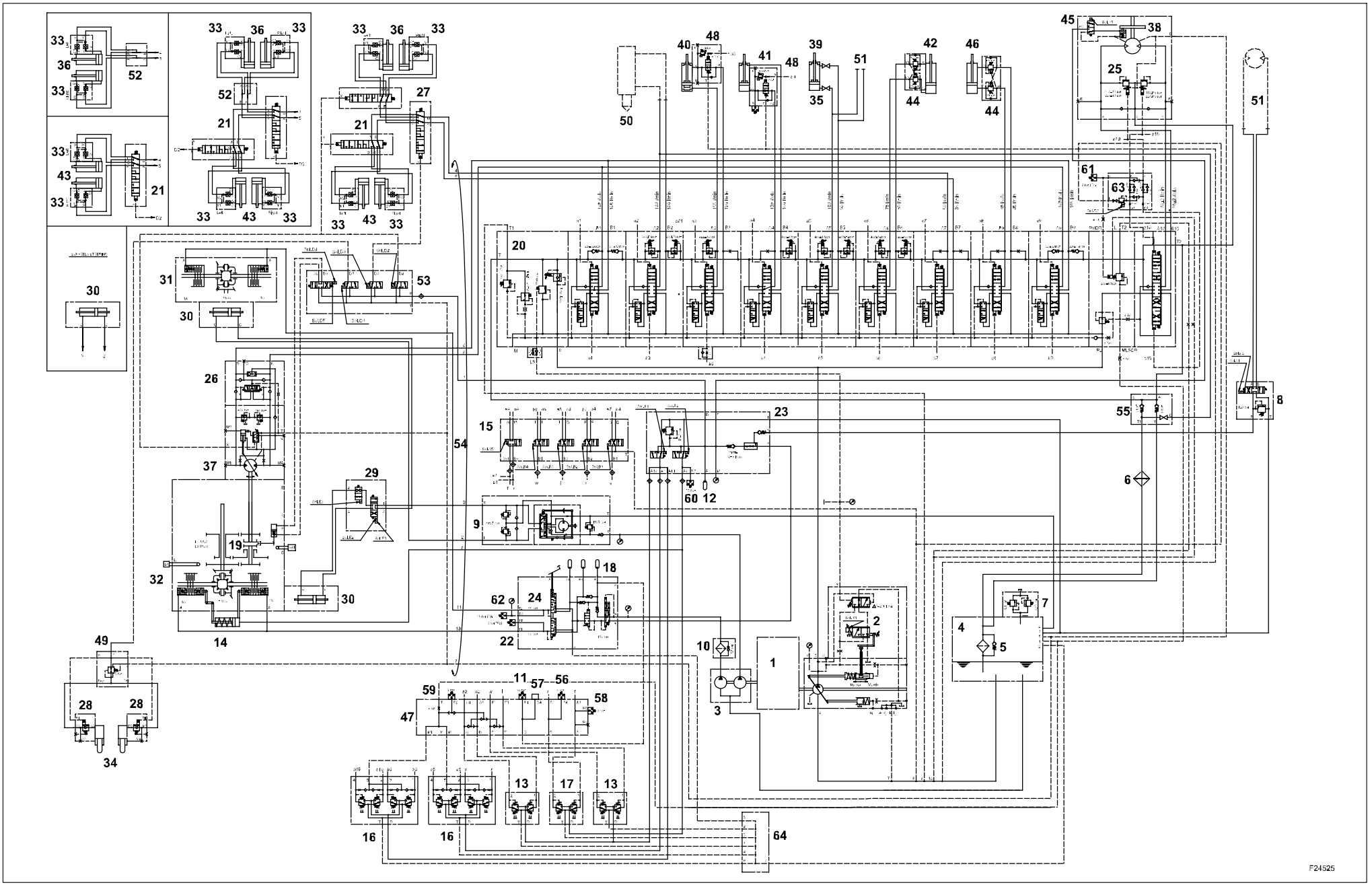


UPPERSTRUCTURE SLEW CIRCUIT

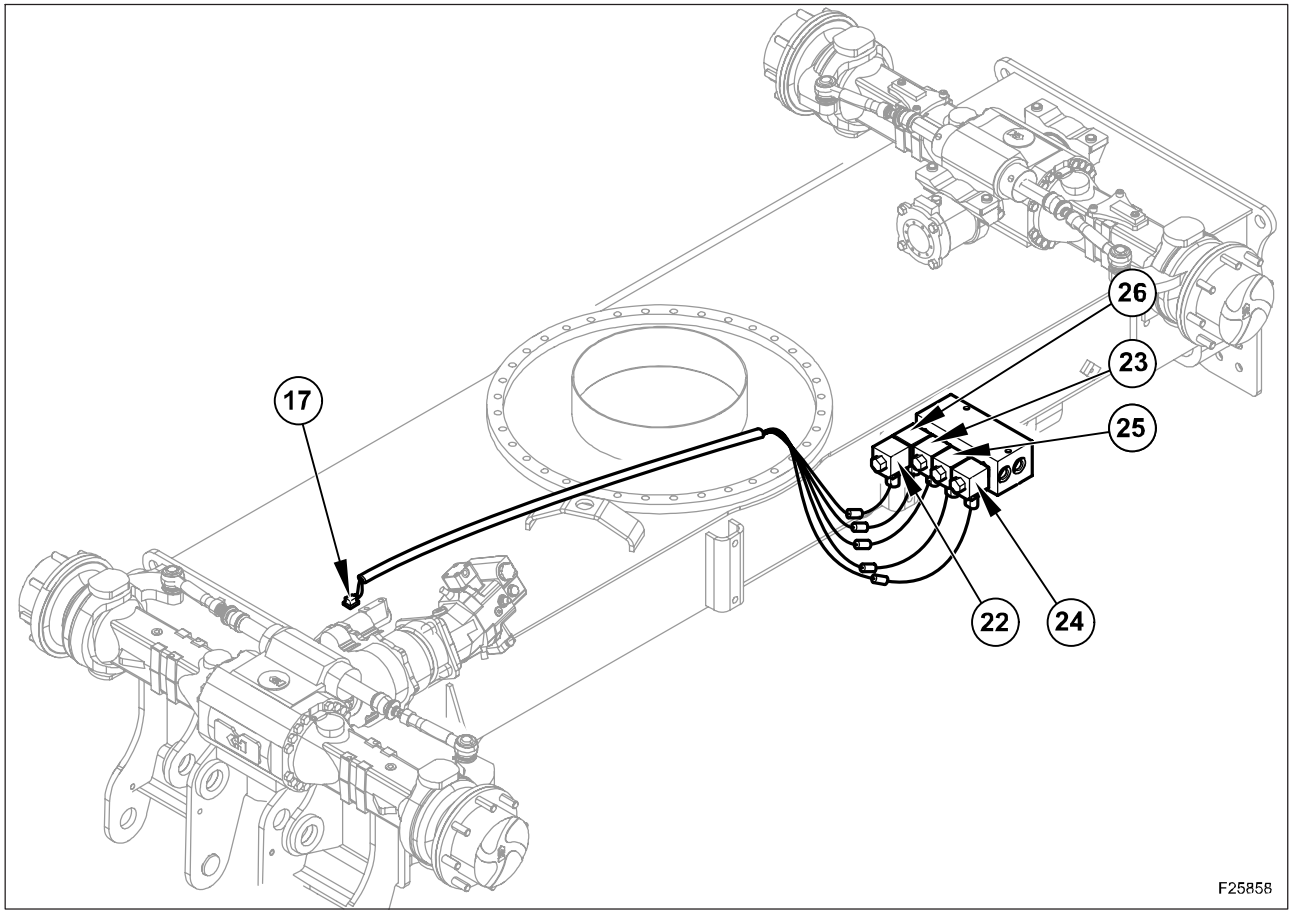


MH 3.6

HYDRAULIC SYSTEM DIAGRAM



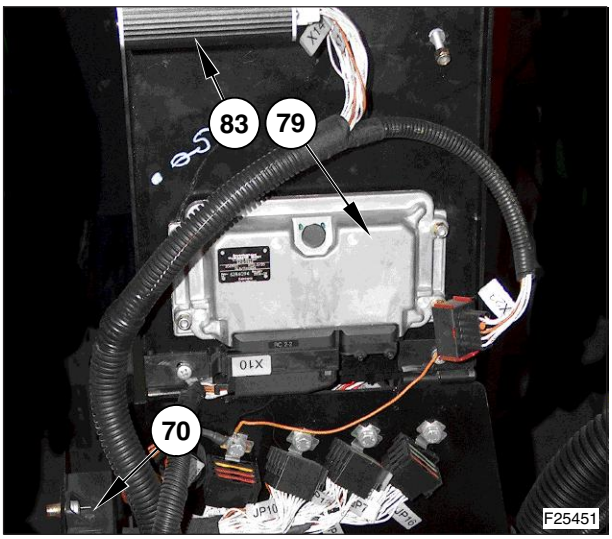
MACHINE WITH TWO STEERING SHEELS



17. Cardan revolutions pick-up
22. Solenoid valve D6: 2nd mechanical speed
23. Solenoid valve D4: axle unlock
24. Solenoid valve D2: left stabilizer/ turtle
25. Solenoid valve D3: stabilizers /blade (front/rear)
26. Solenoid valve D5: 1st mechanical speed

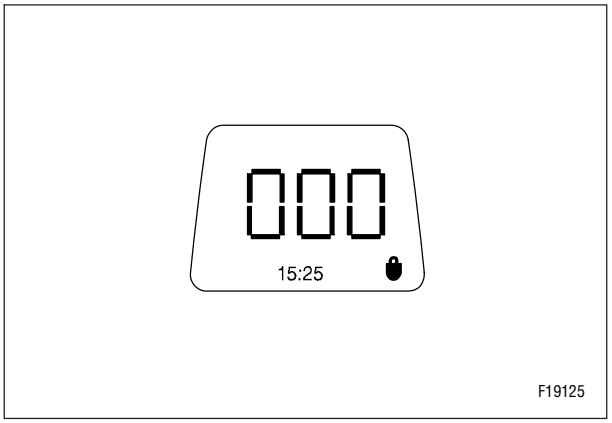
CONTROL UNITS ELECTRIC SYSTEM

70. Relay box
79. Electronic card for hydraulic system check
83. Electronic card for engine revolutions control

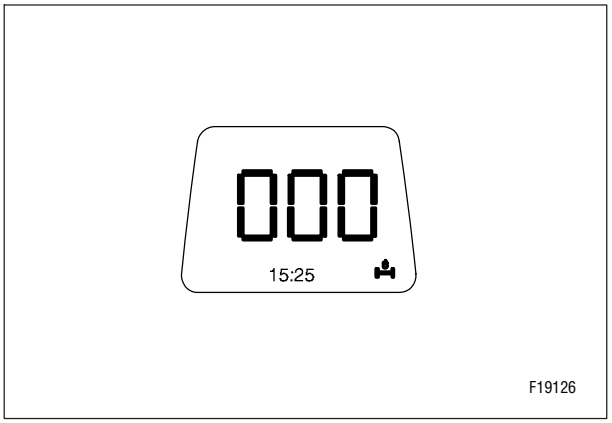


Monitor signals

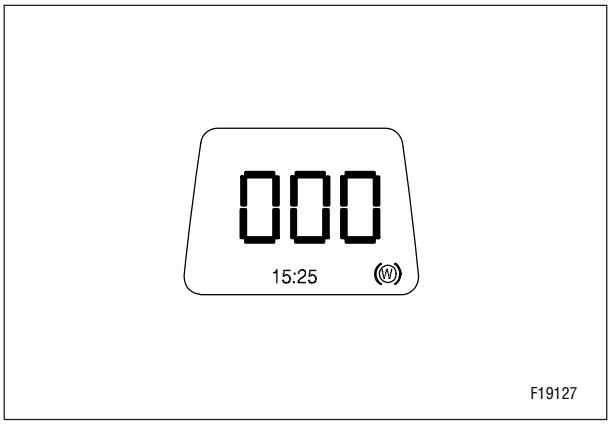
Servocontrols switched off.



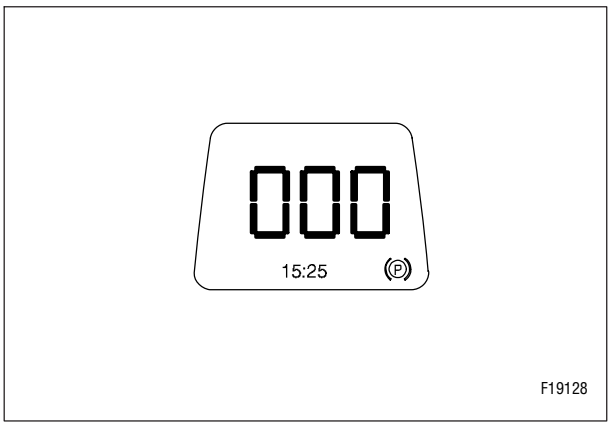
Locked axle indication during the superstructure slew, it is coupled with a acoustic signal.



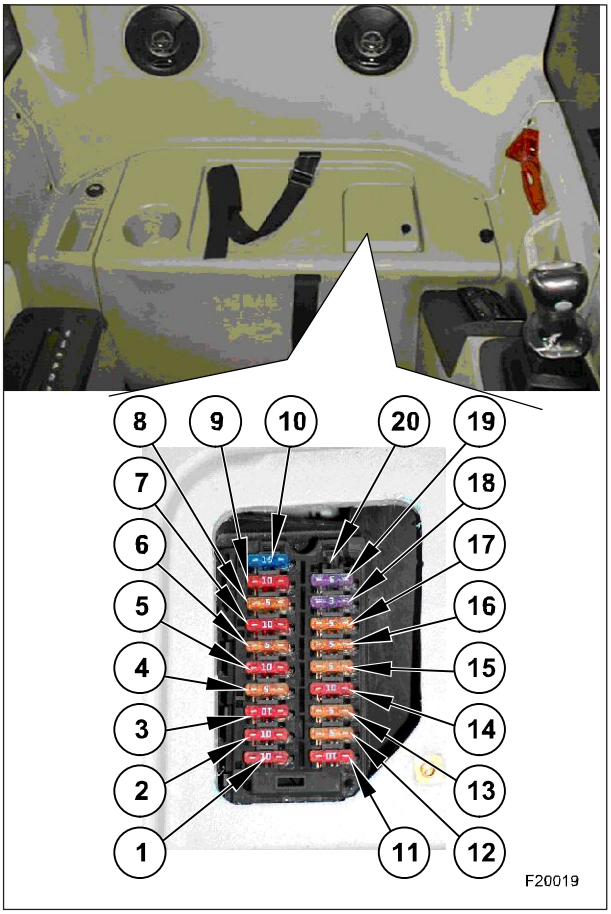
Signal of working brake engaged (hooked or pressed) when pressing the travel control pedal. A sound signal warns that the working brake is engaged.



Signal of parking brake engaged during travel. A sound signal warns that the parking brake is engaged.



Fuse N	PROTECTED CIRCUIT	Value (A)
FUSES INSIDE THE CONTROL UNIT		
1	Right and left console	5
2	Battery line	10
3	Steering mode system (opt)	3
4	Rotating light	7,5
5	Working light	15
6	Anti- tipping device	3
7	Heated seat	10
8	Cigarette lighter	10
9	12V socket and radio	10
10	Air conditioner (optional)	15
11	Engine control unit	10
12	Hydraulic pumps	5
13	Key in ON position	10
14	Steering column	15
15	Windscreen wiper	7,5
16	Traffic beams	10
17	Upper beams	10
18	R.h.parking light	5
19	L.h.parking light	5
20	—	10

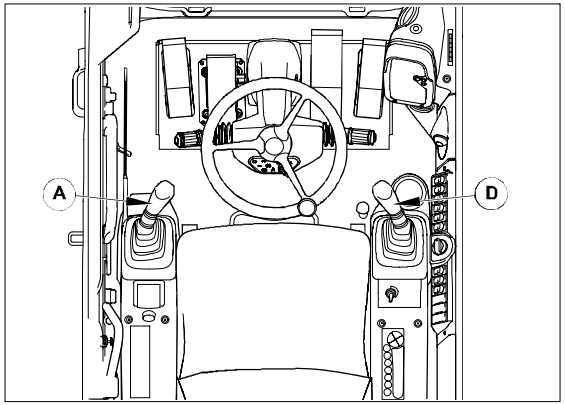


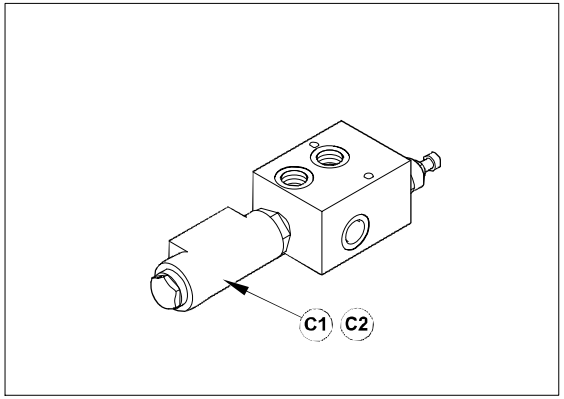
CONTROL LINE AND WIRING HARNESSES

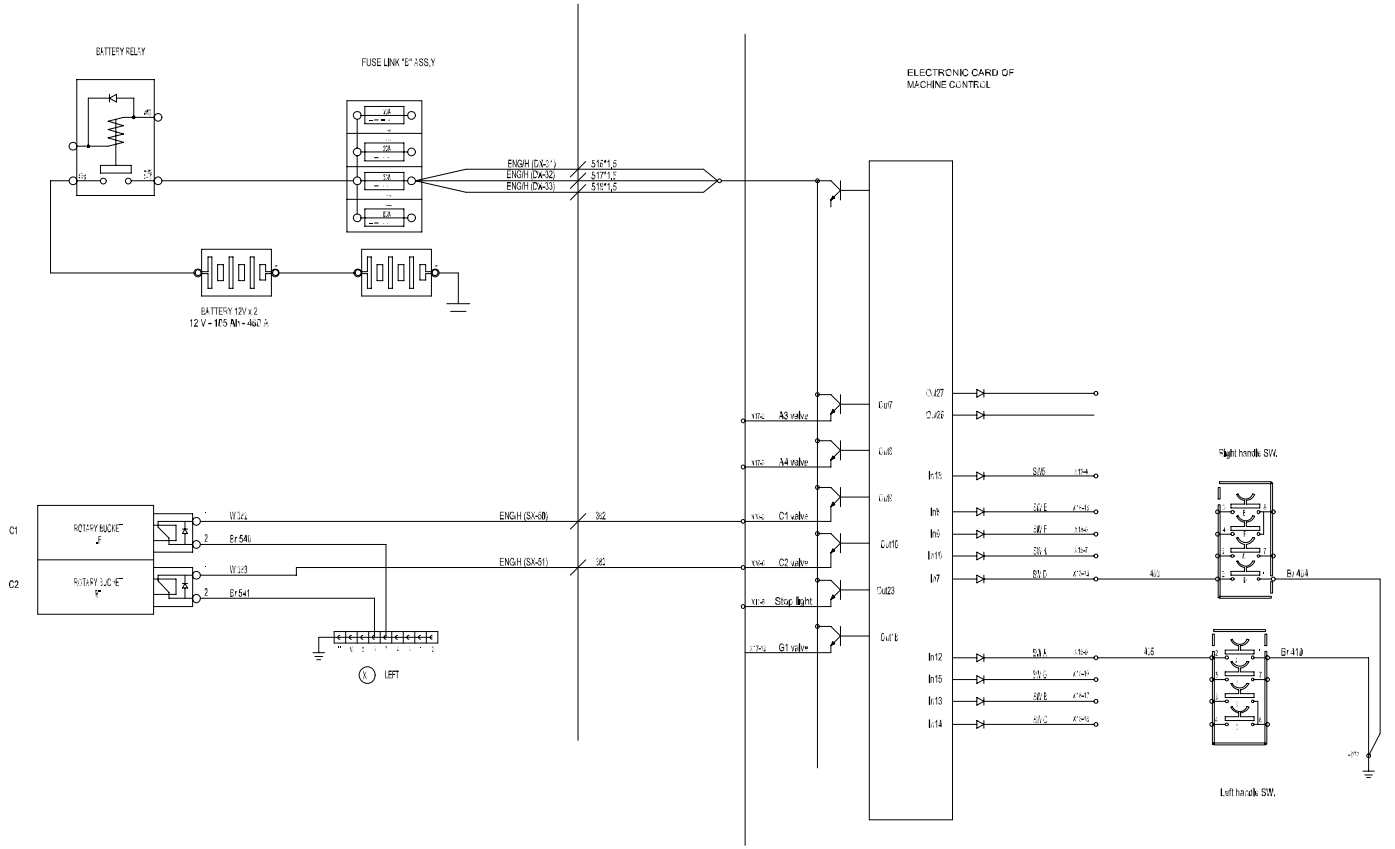
CONTROLS ON CONSOLES

CONTROL LINE FOR ATTACHMENT SLEW

Parts involved:
Fuse Link no. 5
R.h. control lever **D**
L.h. control lever **A**
Electronic card for machine check
Solenoid valve **C1-C2**

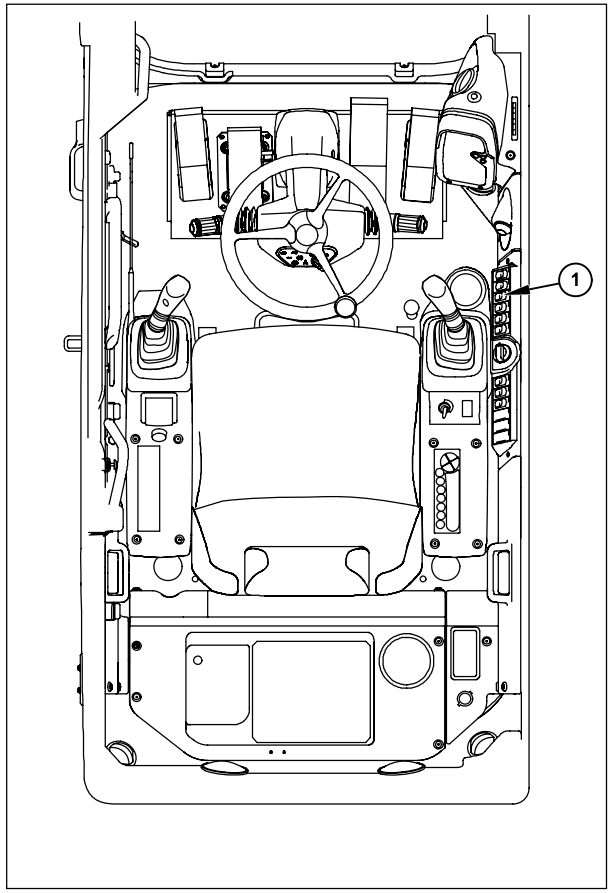


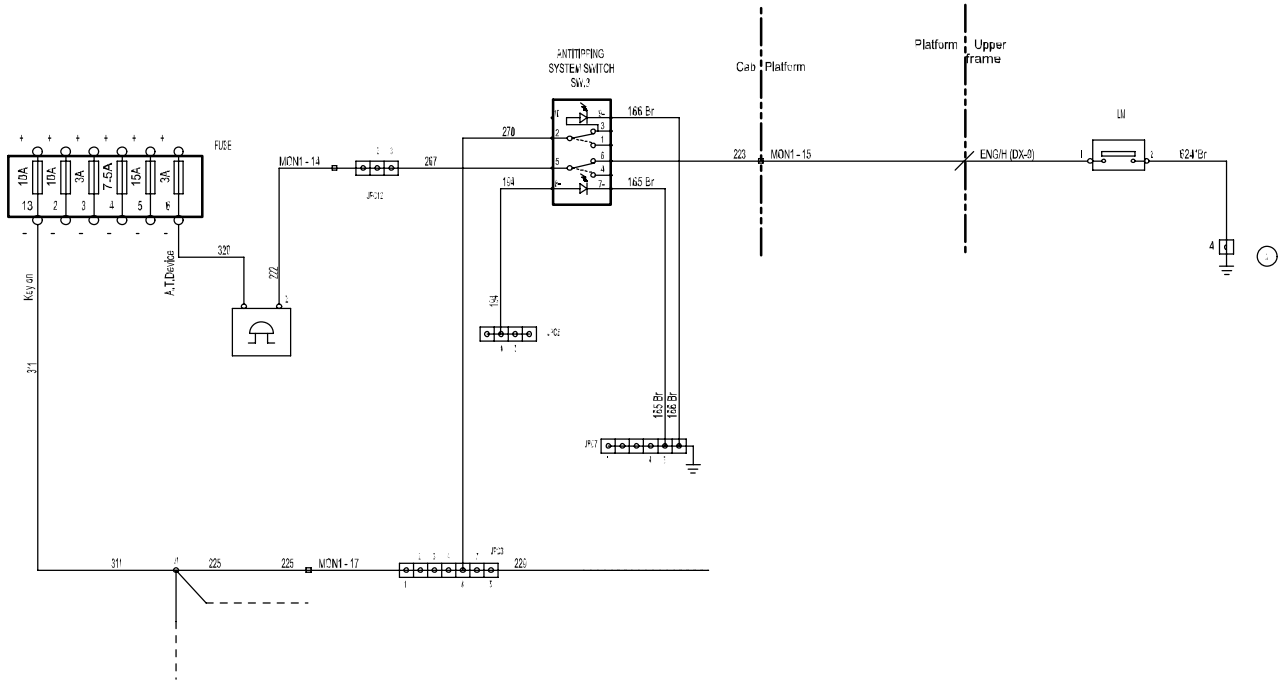




ANTI-TILTING CHECK CONTROL LINE

Parts involved:
Fuse ISO no. 6, no. 13
Buzzer
Pressure switch LM
1. Switch SW3



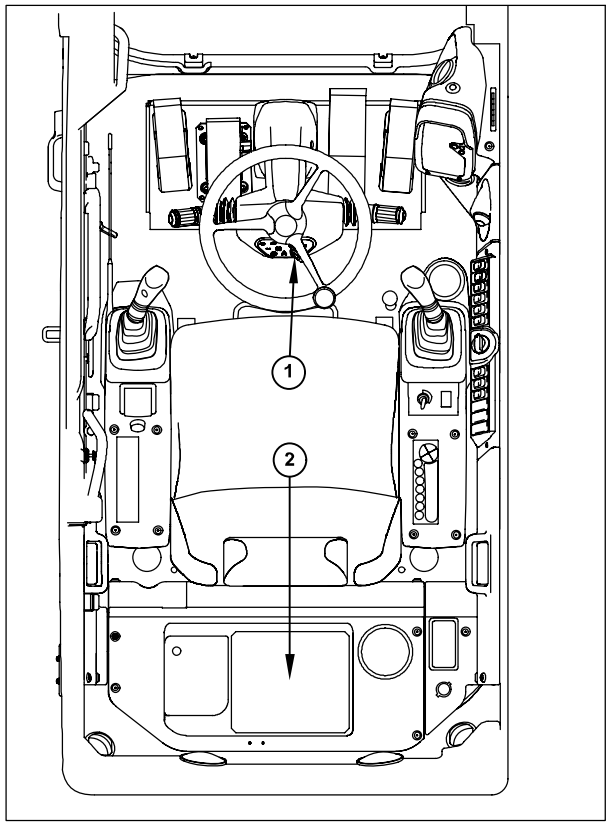


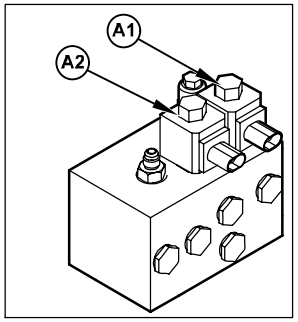
F25307

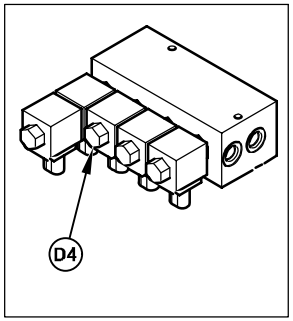
TRAVEL WITH AXLE UNLOCKED CONTROL LINE

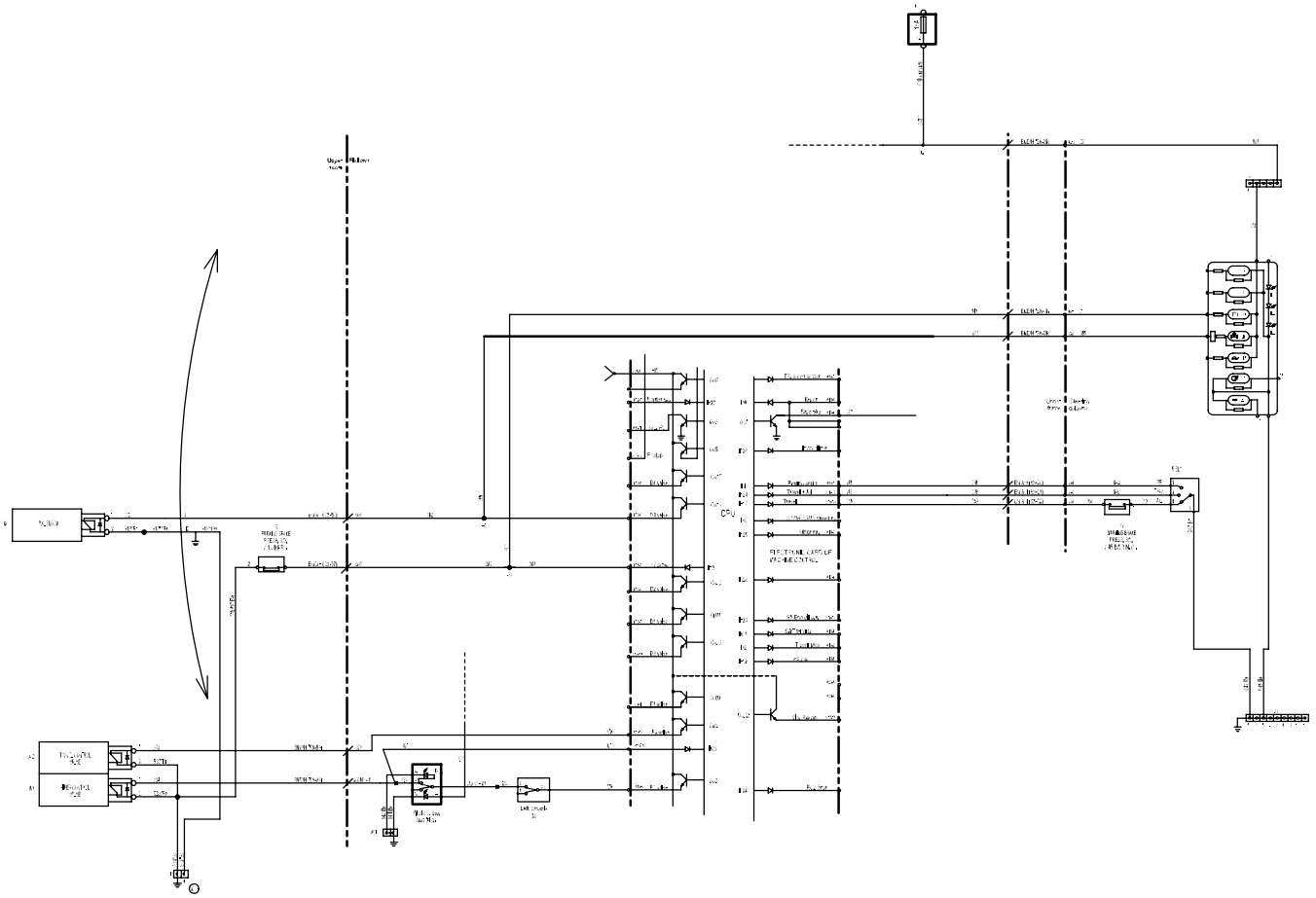
Parts involved:
Fuse Link no. 6
Fuse ISO no. 14
Solenoid valve **A1 - A2 - D4**
Pressure switch **P7, P9**

1. Selector SEL 1
2. Electronic card for machine check





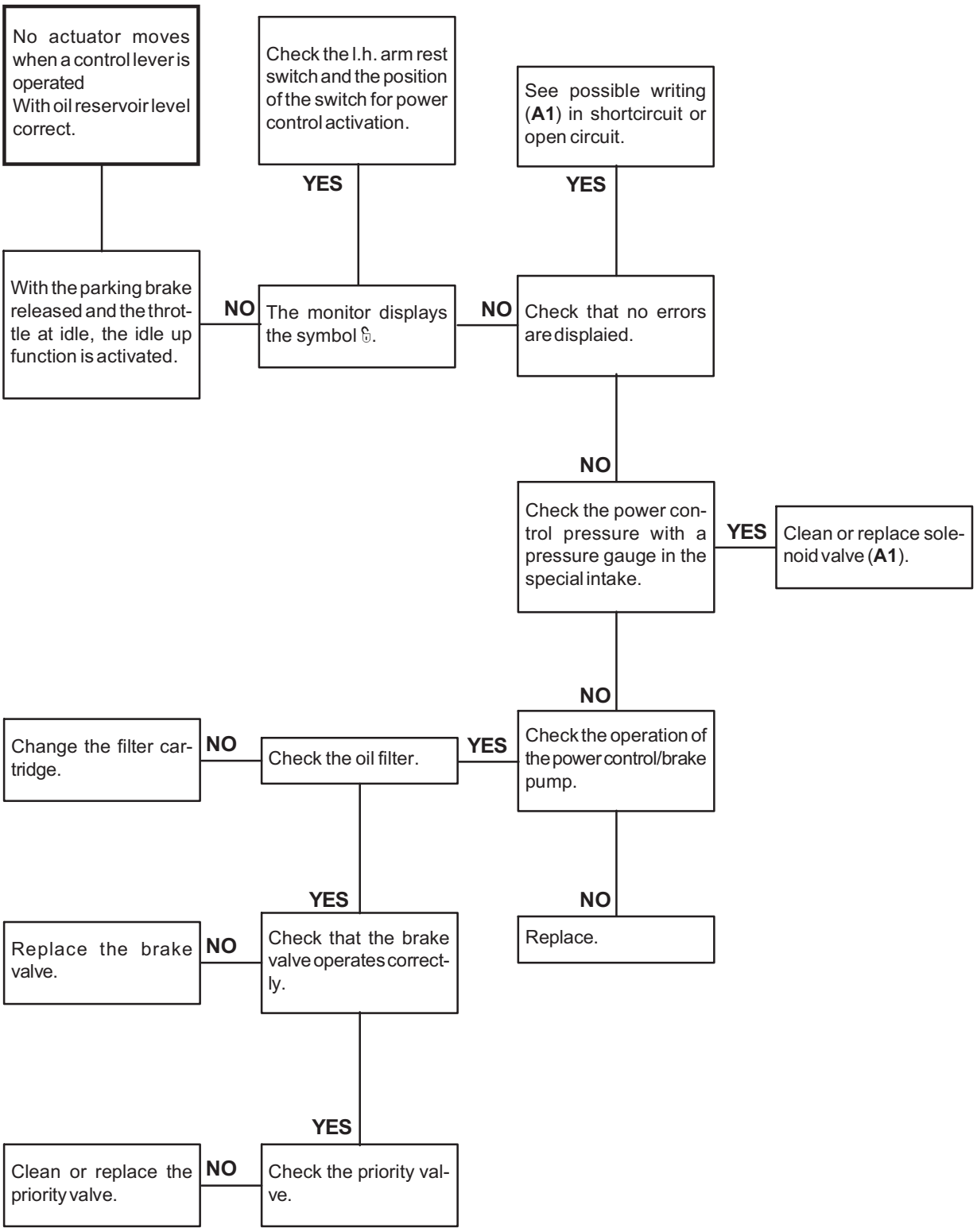




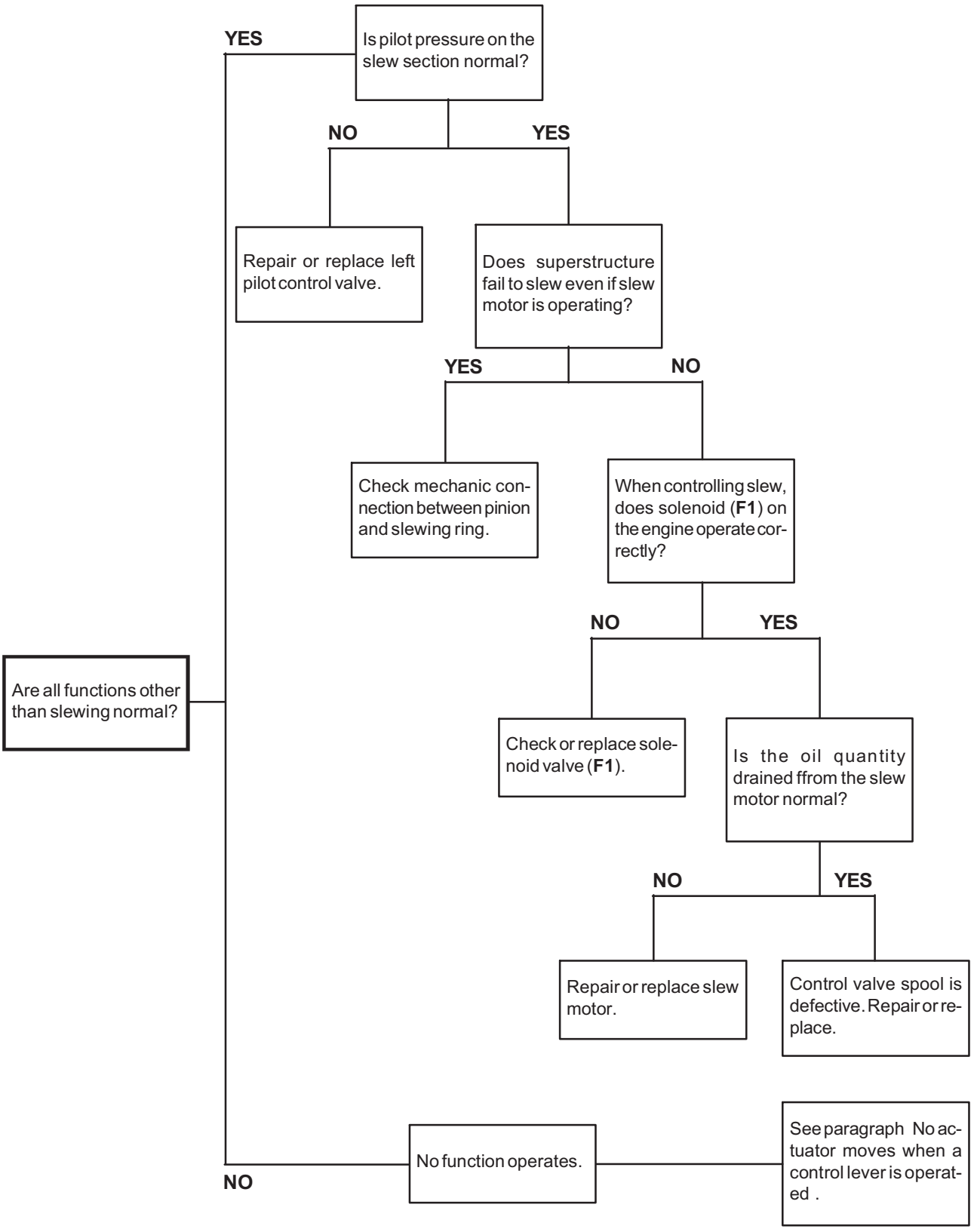
HYDRAULIC SYSTEM TROUBLESHOOTING

• For the hydraulic system general diagram, refer to the diagram attached at the end of section 7.

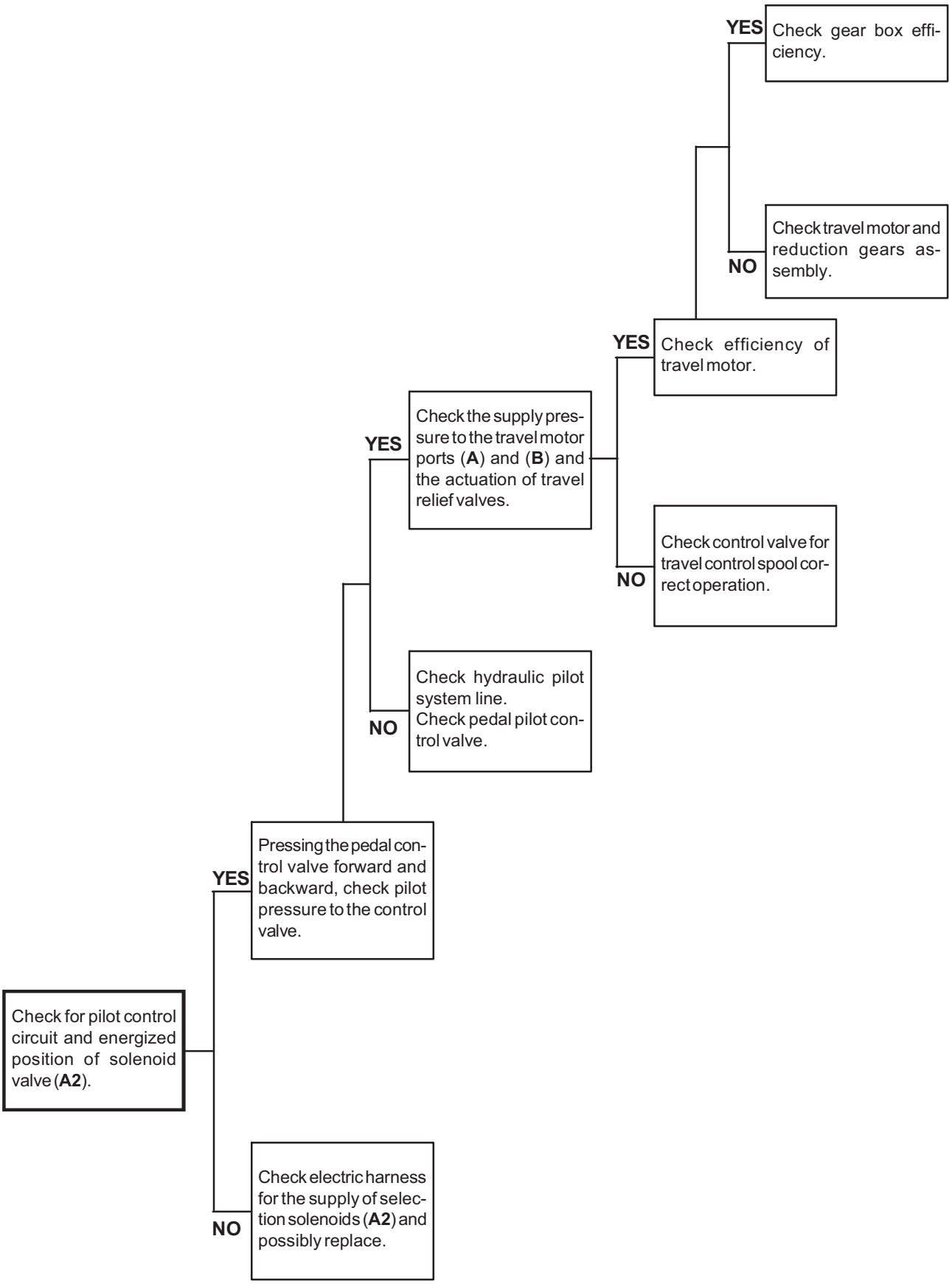
NO ACTUATOR MOVES WHEN A CONTROL LEVER IS OPERATED

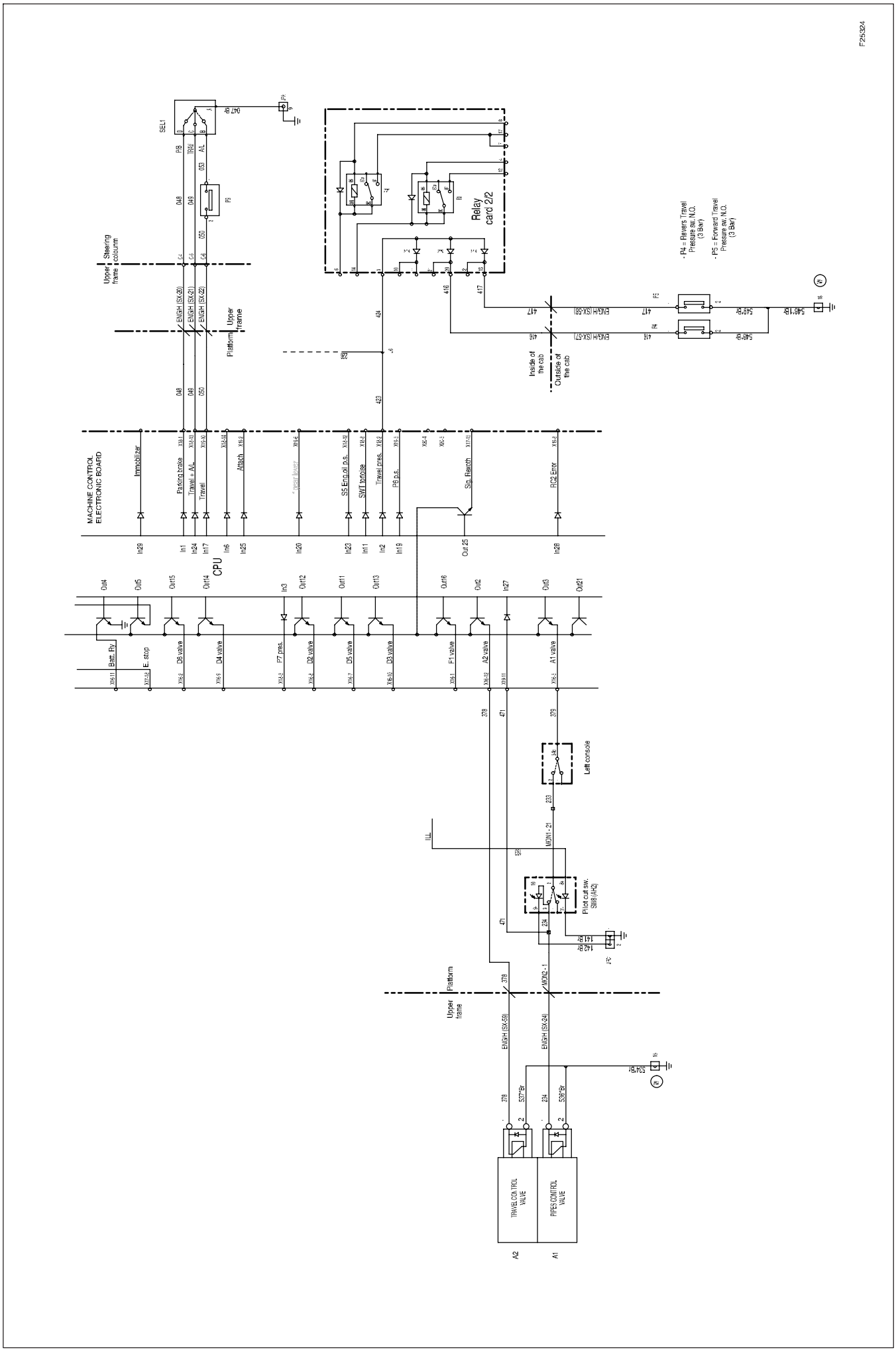


NO SLEW MOTION



NO TRAVEL (OTHER FUNCTIONS NORMAL)

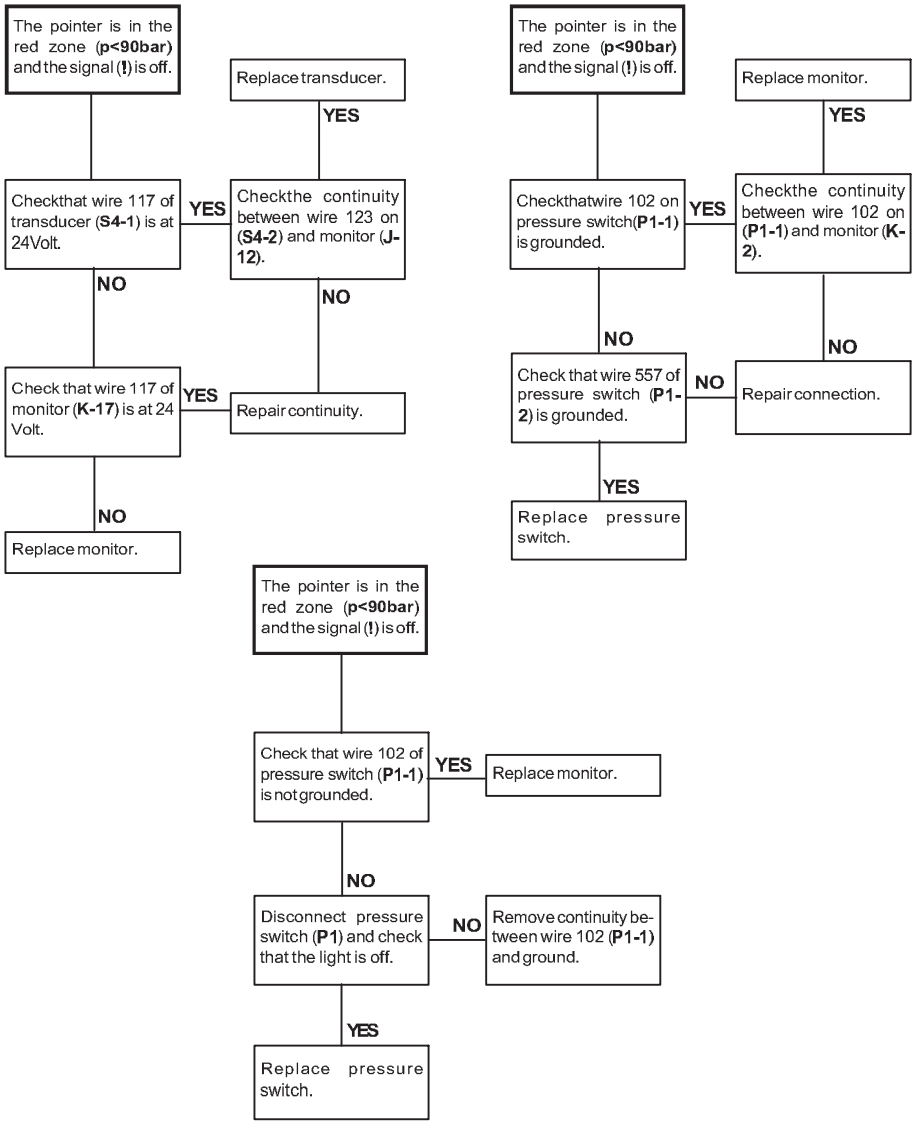




LACK OF INDICATION BRAKING SYSTEM FAULTY

Test conditions:
- Thermal engine operating
- Monitor lit and operating

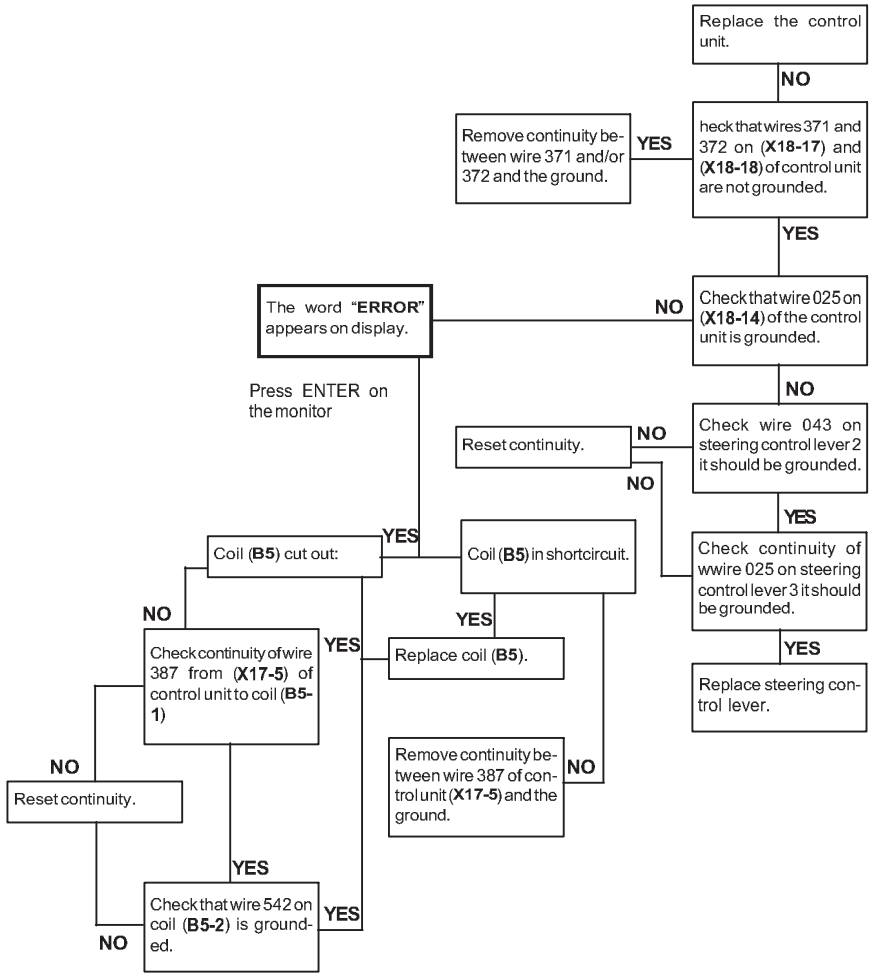
NOTE:
*perform continuity checks with key in **OFF** position.*



FAULTY ENGAGEMENT OF 3rd HYDRAULIC SPEED

Test conditions:
- Start-up key on **ON** and immobilizer disconnected;
- Engine must be running;
- Selector on steering column must be in travel position (after switching to parking brake).
- Selector of 3rd mechanic speed;
- Brake pedal in working position;
- Selector of normal steering mode.

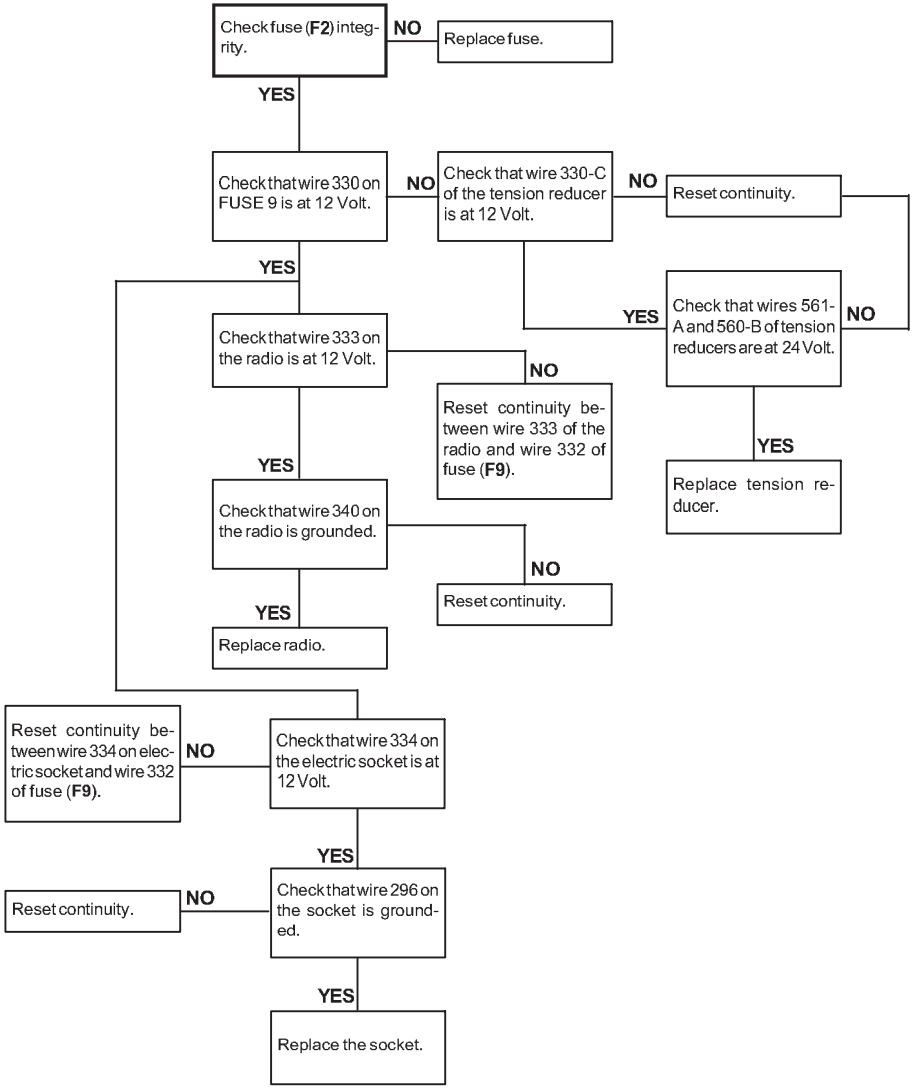
NOTE:
*perform continuity checks with key in **OFF** position.*



THE RADIO OR THE 12 VOLT SOCKET CANNOT BE TURNED ON

Test conditions:
- Start-up key in **ON** and antitheft device disconnected.

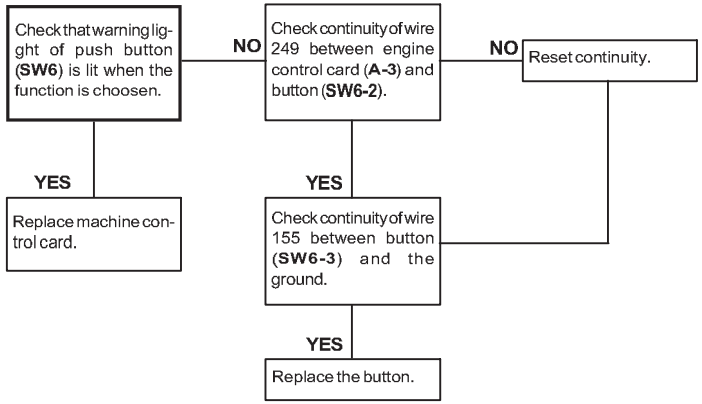
NOTE:
*perform continuity checks with key in **OFF** position.*



THE ENGINE REV MEMORIZATION IS NOT OPERATING

- Engine must be running;
- Fuse (F11) entire;
- The revolutions setting with the potentiometer is operating (if NOT, see “THE ENGINE REVOLUTIONS CANNOT BE SET WITH THE POTENTIOMETER”);

NOTE:
*perform continuity checks with key in **OFF** position.*



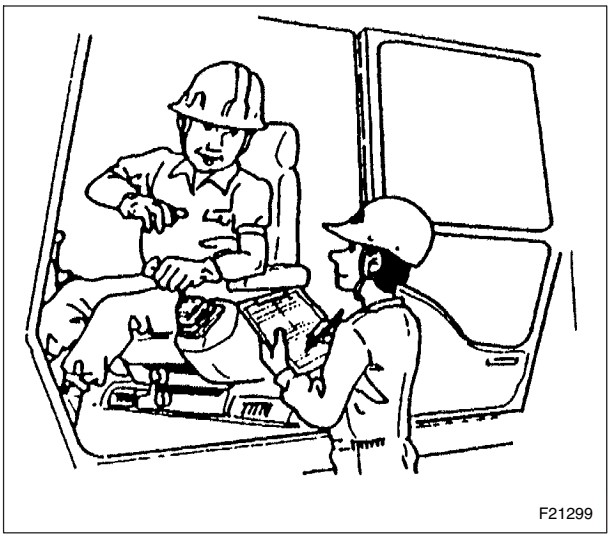
INTRODUCTION

GENERAL INFORMATION FOR MACHINE TESTING

- **Know the system**
  Study this Service Manual to know how the individual components work and what their function is in the over-all system.
  Keep-up with the latest service information. Read and file in a handy place. This information may give a response about the causes and the remedy for future problems.

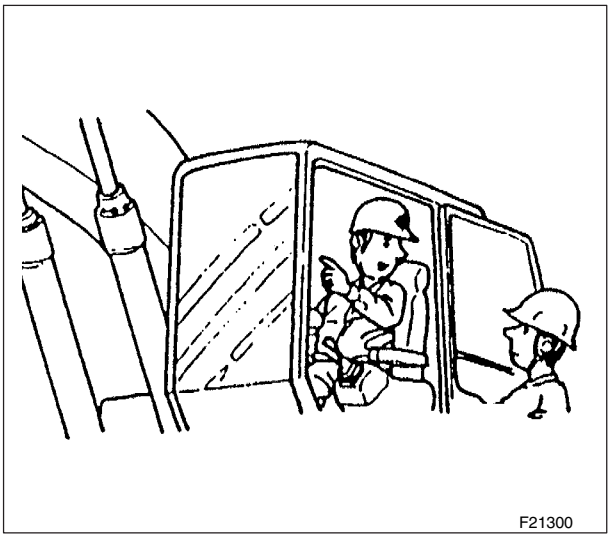

F21298

- **Ask the operator**
  Question the operator as to how the machine acted when the failure was detected.
  Ask how the machine has being used and when it was serviced. Many problems can be traced to poor maintenance or abuse.


F21299

- **Check the machine**
  Get on the machine and operate it. Don't rely completely on the operator's story; check it yourself. Come down from machine and carry out a visual inspection.
  Perform a complete visual check of the unit to detect any sign of failures or malfunctions.
  Check carefully all the components for cracks in the weldings, loose bolts, broken fixtures, worn or leaking pipings, etc.

- **Test the machine**
  Proceed with the performance tests, following the instructions and the data provided by this Manual.
  Record all signs of troubles encountered during the operation.


F21300

Observe the following rules to execute the performance tests accurately and safely

ON THE MACHINE

Repair any fault and damage found, such as oil or coolant leakages, loose bolts, cracks and so on, before starting the test.

TEST AREA

- Select a hard, flat surface.
- Provide enough space to allow the machine to run straight for more than 50 m and to make a full slew with the front attachment extended.
- If necessary, rop-off the test area and place signboards to keep unauthorized personnel away.

PRECAUTIONS

- Before starting the tests, establish the signals to be employed to communicate with co-workers. Once the test is in progress, make sure that only the established signals are used, and that the rules are strictly followed.
- Operate the machine carefully and always give first priority to safety.
- During the test, always take care to avoid accidents due to landslides or contact with electric power lines. Make sure to have enough space at disposal for complete slewing.
- Avoid polluting the machine and the environment with oil spillages. Use adequate containers to contain fluid leakages. Pay special attention to this problem when removing hydraulic pipings.

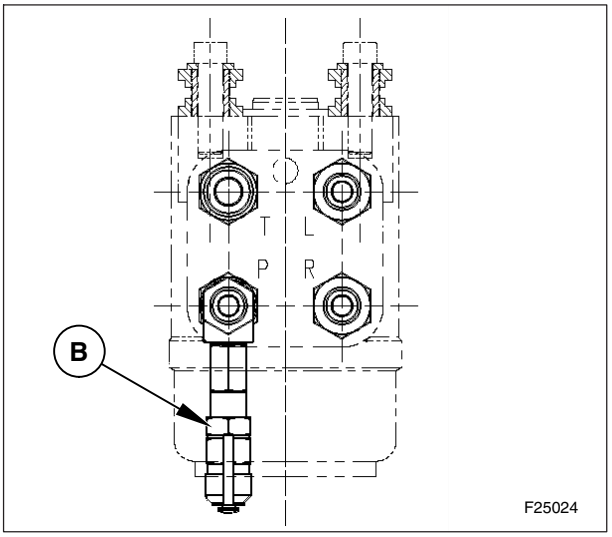
MAKE PRECISE MEASUREMENTS

- Accurately calibrate in advance the instruments used during the tests, to obtain correct data.
- Perform the tests under the exact prescribed conditions for each test item.
- Repeat the same test to confirm that the data obtained are repeatable. Use mean values of measures, if necessary.

STEERING

STEERING PUMP PRESSURE CHECK

Preparation:
- Stop the engine.
- Bleed the air from the hydraulic oil tank removing the bleeding plug.
- Install a 0 to 200 bar pressure gauge to power take-off (**B**).
- Start the engine and check for possible oil leaks.
- Keep the hydraulic oil temperature at 50 ± 5°C.



Measurement:
- Auto-idle switch in OFF position.
- Diesel engine throttle lever at maximum position.
- Turn the flywheel right and left a few times.
- Measure the pressure value of the oil on the pressure gauge.
- Repeat the operation three times and work out an average value.

Evaluation:
Refer to STANDARD PERFORMANCES.