14.2 STARTING THE ENGINE

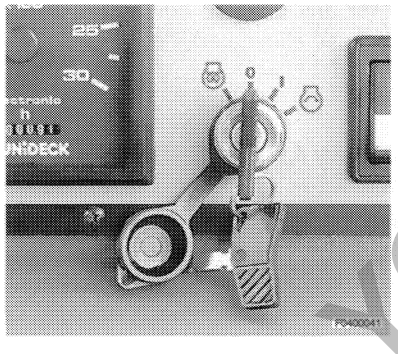
DANGER

- **Before switching on the engine, study the safety instructions given in the manual and make sure that you are familiar with the controls. From the moment that the Operator switches on the engine, he is directly responsible for any damage deriving from false manoeuvres or lack of observation of the safety or traffic regulations in force.**
- **Before switching on the engine look to see if there is anyone within the range of action of the machine, and sound horn to warn of imminent start-up.**

14.2.1 START-UP WITH WARM ENGINE OR IN TEMPERATE CLIMATE

1 - Press the accelerator to the floor and turn the ignition key directly to the START position ( ).

2 - As soon as the engine fires, release the ignition key which will return automatically to position « I », and release the accelerator pedal.



IMPORTANT

- **If the engine does not fire within 15 seconds, release the key which will return to position « I », and wait 15 seconds before trying again.**

14.2.2 START-UP WITH A COLD ENGINE OR IN A COLD CLIMATE

DANGER

- **Do not use liquids or any other product for a cold start- up because, being ether-based, they could cause explosions.**

1 - Turn the key into the pre-heating position ( ) for about 15 seconds (20-25 seconds during the coldest weather).

2 - Press the accelerator to the floor and turn the ignition key to the START position ( ) for a maximum interval of 15 seconds. If the engine does not fire, return the key to the pre-heating position ( ) for another 10 seconds, and try again.

3 - As soon as the engine fires, release the ignition key which will return automatically to position « I », and release the accelerator pedal.

14.3 WARMING UP THE ENGINE

1 - Once the engine has fired, allow it to warm up before starting work.

2 - Ideal warm-up is obtained with a steady idling speed of about 1200 rpm, achieved by use of the manual accelerator (See «11.2.3 BACKHOE CONTROLS»).

IMPORTANT

- **Do not press the accelerator suddenly or push it to the floor until the temperature of the coolant liquid has reached at least 60°C, as shown on the dashboard indicator.**

3 - In order to reduce the warm-up interval the engine may be accelerated from time to time, up to a maximum of 1800 rpm.

4 - While warming up the engine, keep an eye on the colour of the exhaust gas, and listen for any unusual noises or vibrations. Any irregularity must be investigated, and the cause eliminated.

14.4 WARMING UP THE HYDRAULIC OIL

While warming up the engine, and in particular during colder weather, it is a good idea to warm up the hydraulic circuit oil as well. For this reason, when the temperature of the engine coolant approaches 60°C:

1 - Remove the safety pin from the shovel control lever (See «9. SAFETY DEVICES»).

2 - Perform several times, slowly but fully, the movements of raising and rotating the front bucket.

3 - Rest the bucket on the ground and lock the control lever.

4 - Swivel the seat and unlock the backhoe control lever (See «9. SAFETY DEVICES»).

5 - Perform several times the complete range of movements of extension and return of the arm and the bucket.

6 - Lock the control levers and swivel the seat back to the driving position.

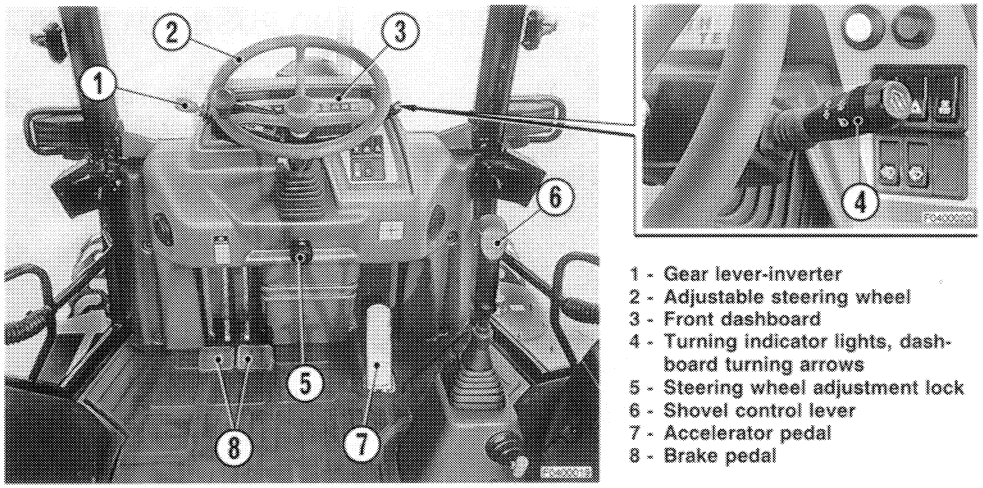
14.5 SETTING THE MACHINE IN MOTION

DANGER

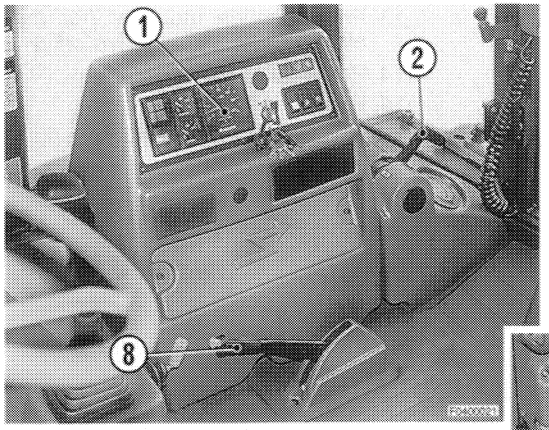
- **Before moving the machine, make sure that you are perfectly familiar with the functions of the controls and the safety regulations associated with them.**
- **The Operator should be seated in the driving seat with the seat-belt fastened, and should have checked the positions of the rear-view mirrors.**
- **Before moving the machine, make sure that there is no- one else in the working area, and that it is also free of obstacles.**

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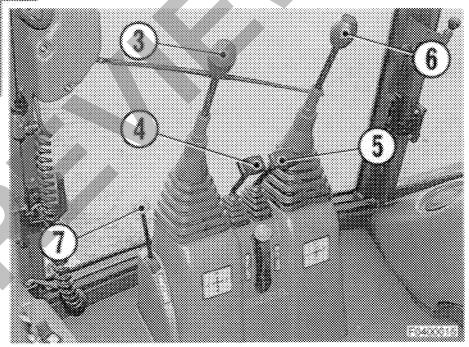
10.3 GENERAL VIEW OF THE INSIDE OF THE CAB



1 - Gear lever-inverter
2 - Adjustable steering wheel
3 - Front dashboard
4 - Turning indicator lights, dashboard turning arrows
5 - Steering wheel adjustment lock
6 - Shovel control lever
7 - Accelerator pedal
8 - Brake pedal



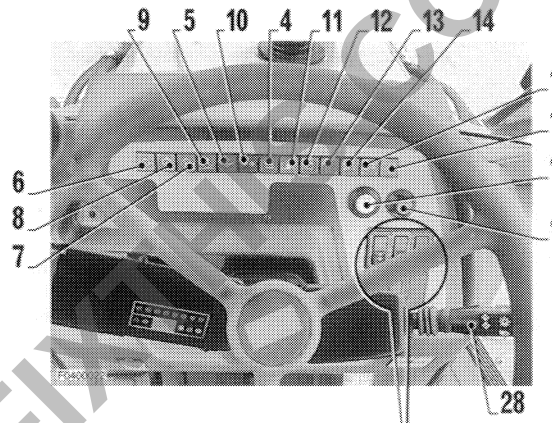
1 - Side dashboard
2 - Hand accelerator
3 - Boom and rotation control lever - horn (Standard system control)
3 - Arm and rotation control lever - horn (ISO system control)
4 - L.H. stabilizer control lever

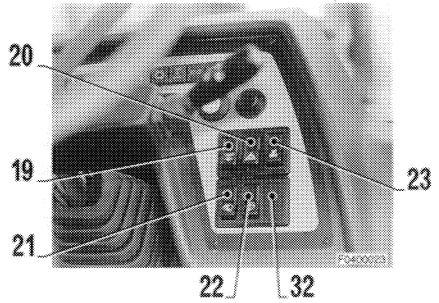


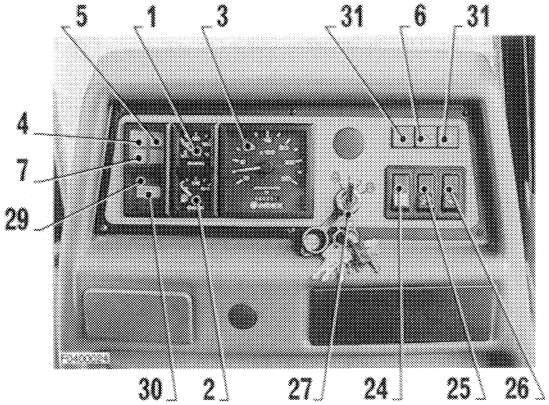
5 - R.H. stabilizer control lever
6 - Arm and bucket control lever (Standard system control)
6 - Boom and bucket control lever (ISO system control)
7 - Sideways movement blocking lever
8 - Hand-brake

11. INSTRUMENTATION AND CONTROLS

11.1 INSTRUMENTS, WARNING LIGHTS AND PUSH-BUTTONS







1. Engine coolant thermometer
2. Fuel level indicator
3. Rev. counter - hour counter
4. Generator warning light
5. Low engine oil pressure warning light
6. Low converter oil pressure warning light
7. Clogged air filter warning light
8. Maximum converter oil temperature warning light
9. Engine coolant water temperature warning light
10. Direction indicator light
11. Fuel reserve warning light
12. Hand-brake and brake fluid level warning light
13. Front traction indicator (for machines with 4-wheel drive only)
14. Parking lights warning light
15. Headlight indicator
16. Blocked differential warning light
17. Incorrect gear change warning light
18. 4-wheel drive engagement button (only with 1st and 2nd gear)
19. Test button for warning lights
20. Emergency lights switch
21. Front working floodlight switch
22. Front windscreen-wiper switch
23. Ventilator switch
24. Rotating beam switch
25. Rear working floodlight switch
26. Rear windscreen-wiper switch
27. Ignition switch
28. Direction indicator, headlight beam dipper, horn, and flashing emergency lights
29. Acoustic Alarm
30. Multifunction warning light
31. Spare warning lights
32. Spare push-buttons

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27. MAINTENANCE PROGRAM

27.1 MAINTENANCE EVERY 8 HOURS

No.	ITEM	INTERVENTION	PAGE
a	Various controls	—	126
b	Coolant liquid level	Check and refill	126
c	Fuel tank	Check and refill	127
d	Engine crankcase oil	Check and refill	127
e	Hydraulic circuit oil tank	Check and refill	128
f	Articulated joints	Lubricate (46 points)	128
g	Front and back tires	Control tire pressure	130

27.2 MAINTENANCE ON COMPLETION OF THE FIRST 50 HOURS

No.	ITEM	INTERVENTION	PAGE
a	Engine oil	Change	142
b	Engine oil-filter	Change	141
c	Hydraulic oil drainage filter	Change	140
d	Hydraulic transmission filter	Change	145

27.3 MAINTENANCE EVERY 50 HOURS

No.	ITEM	INTERVENTION	PAGE
a	Engine air filter ejector	Clean ejector	131
b	Battery	Control electrolyte level	131
c	Braking system	Check oil level	132
d	Front axle	Check oil levels -3 points)	133
e	Rear axle	Check oil levels -3 points)	133
f	Hydraulic transmission	Check oil level	134
g	Front and rear wheel	Check tightness nuts	134

No.	ITEM	INTERVENTION	PAGE
h	Transmission shafts	Lubrication (6 points)	135
i	Hydraulic pump transmission	Lubrication (2 points)	135
j	Articulated joints and front axle central connection	Lubrication (6 points)	136
k	Oil sump	Drain water	136

27.4 MAINTENANCE ON COMPLETION OF FIRST 100 HOURS

No.	ITEM	INTERVENTION	PAGE
a	Front axle	Change oil	148
b	Rear axle	Change oil	150

27.5 MAINTENANCE EVERY 100 HOURS

No.	ITEM	INTERVENTION	PAGE
a	Air filter	Clean main cartridge	137

27.6 MAINTENANCE ON COMPLETION OF FIRST 250 HOURS

No.	ITEM	INTERVENTION	PAGE
a	Engine valves	Check clearance	154

27.7 MAINTENANCE EVERY 250 HOURS

No.	ITEM	INTERVENTION	PAGE
a	Fan-belt	Check state and adjust tension	139
b	Radiators	Clean outside	139
c	Fuel filter	Drain water	140
d	Hydraulic circuit oil drainage filter	Change	140
e	Engine oil filter	Change	141
f	Engine oil	Change	142

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	kg	7450
	kg	8850
	m^3	1.02
	m^3	0.2
		1004.4T HR
		70 kW - 2200 rpm
		354.7 Nm - 1408 rpm
		2.8 kW - 12V
		55A - 12V
		155A/h - 12V
		Negative

	R2	R3
	9	23

LATION PRESSURE
bar 3.2
bar 3
bar 3
bar 3.5

LATION PRESSURE
bar 2.5
bar 2.2
bar 2.7

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AUTHORIZED OPTIONAL EQUIPMENT

ATTENTION

- The photographs enclosed in this section may also illustrate combined optional arrangements: the actual description is relevant to the option being examined.

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SAFETY AND ACCIDENT PREVENTION

1. SAFETY MEASURES

1.1 GENERAL PRECAUTIONS

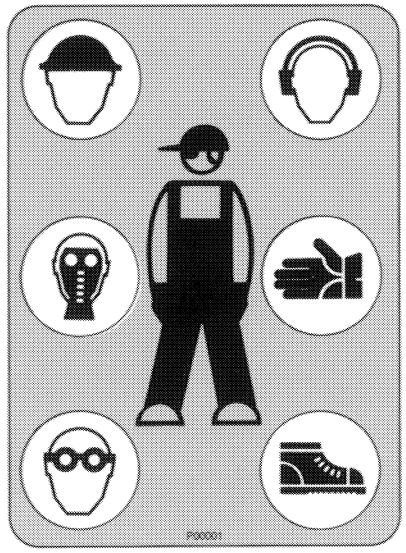
- The machine may only be used by authorised personnel specially trained for this purpose. The same precautions extend also to personnel entrusted with maintenance.
- While working or carrying out maintenance, all possible safety regulations, precautions and instructions should be observed.
- When more than one person is involved, and when the working area is frequently invaded by other Operators, make sure that they are all familiar with previously agreed signals, and that they are working where they can see the machine, and are themselves clearly visible to the Machine Operator.

1.2 SAFETY DEVICES

- Make sure that all protective shields and screens are firmly fixed in their appropriate sockets. If found to be damaged, replace or repair them immediately. Do not use the machine without shields, and do not remove the shields while moving.
- Always use the appropriate safety devices provided to block the machine when parked, and always wear the safety belt correctly.
- For the safety devices, see «9. SAFETY DEVICES».
- For the safety belt, see «13.4 SAFETY BELT».
- Never remove any of the safety devices and always keep them in a good state of repair.

1.3 PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT

- Do not wear large garments or loose clothing, rings or wrist-watches, and do not approach the moving parts with long, unbound hair, which might get caught up in these moving parts and cause serious injury.
  Also avoid wearing clothing stained with oil or fuel, which might therefore catch fire more easily.
- When operating the machine or carrying out maintenance, wear starched overalls, protective goggles and overshoes, a mask, gloves, and antinoise earmuffs.
- Always wear protective goggles, starched overalls and heavy gloves to protect against minute metal splinters or shards of material. These precautions are particularly necessary when engaging, and therefore hammering the connecting pins used to assemble items of equipment, and when blowing out the air filter and radiator with compressed air. Make sure



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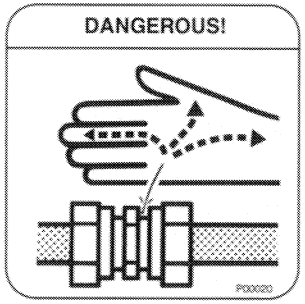
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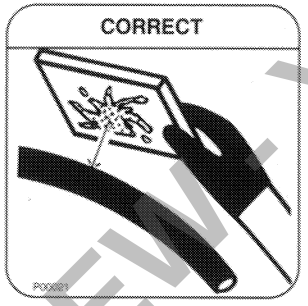
7.11 HANDLING THE HIGH-PRESSURE TUBES

- Do not bend high-pressure tubes or rub them with abrasive or sharp objects. Do not use rigid, bent, or cracked tubes or flexible tubing that has previously been rejected due to leaks or connection defects, because they could burst during operation.
- Always repair or replace any fuel or oil tube that has become loose or defective. Any fuel or oil leakage could cause a fire.

7.12 PRECAUTIONS TO BE TAKEN AT HIGH PRESSURE

- Do not forget that the working circuits are always under pressure. Therefore, when hydraulic oil is to be added or drained, or some maintenance or an inspection of the hydraulic circuit to be made, first lower the equipment to the ground, and then completely release the pressures and any residual pressure in the tank.
  Leakages from tubes under pressure and spraying fluids that escape from them are highly dangerous and harmful because they can perforate the skin and penetrate into the blood stream, or enter the eyes.
  Thick gloves and safety goggles must therefore always be worn during such inspections.
  Use a piece of carton or a sheet of plywood to contain the leakages. If struck by a jet of high-pressure oil, or even if only slightly injured, consult a doctor immediately for medication and appropriate treatments.





7.13 PRECAUTIONS TO BE TAKEN WHEN CARRYING OUT MAINTENANCE WORK AT HIGH TEMPERATURES AND HIGH PRESSURE

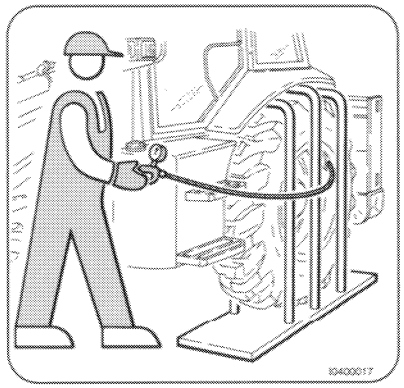
- When the machine comes to a halt on completion of a job, the engine coolant fluid, the oil, and all parts of the engine are hot and the hydraulic circuit is under pressure.
  If it becomes necessary in these conditions to drain the coolant fluid, the hydraulic oil or the engine oil in order to change them, or to replace the filters, there will be several sources of danger including severe burns.
  Carry out this maintenance, and the procedures described in the section of this manual dealing with maintenance, only when the temperatures have returned to within normal parameter limits (40-45°C).

7.14 COOLING BELTS AND FAN

- Watch out for rotating parts and do not allow anyone else to approach, in case they get caught up.If hands, clothing or tools do get caught up in the fan blades or driving belt, the consequences could be amputation or violent wrenching, and highly dangerous situations could arise. For this reason avoid touching, or even brushing against, any rotating parts.

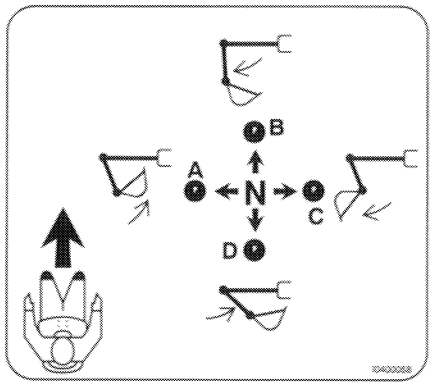
7.15 PRECAUTIONS TO BE TAKEN WHEN INFLATING THE TIRES

- Tires can burst explosively while being inflated, giving rise to a serious accident.
- Before inflating the tires, always check up on the state of the wheel-rims and the condition of the outer surface of the tires in order to discover any dents, cuts, lacerations in the reinforcing cord fabric, or other defects.
- It would be advisable to let a tire expert perform these checks and similar maintenance.
- When inflating the tires use a protective screen and a compressed air gun and extension hose complete with a manometer.
- Before starting to inflate the tires, make sure that there is no-one in the vicinity, then take up a position to the side of the tire-tread or outer tire-wall.
- Never exceed the pressures specified for each type of tire and always check that the pressures of the right-hand tire are equal to and correspond to the left-hand tire.



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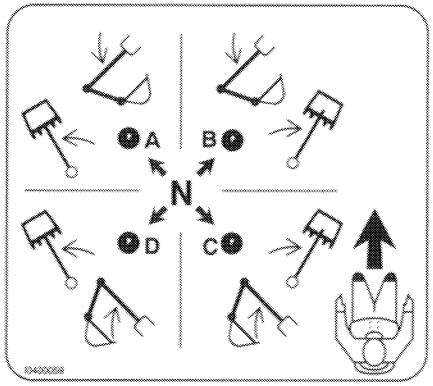
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LEVER 10
(BASIC MANEUVERS)

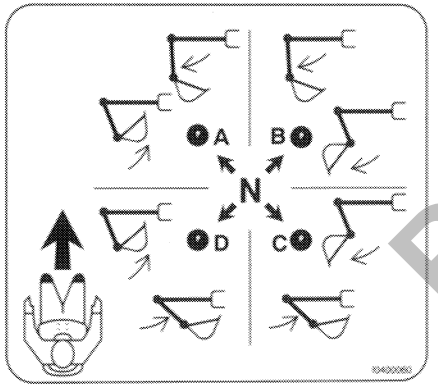
A = Bucket Closure
B = Opening arm
C = Bucket opening
D = Closure arm

If the levers are maneuvered at an angle with respect to the axis of the machine, a combined movement is achieved proportional to the angle of inclination since both independent hydraulic distributors are activated.



LEVER 9
(COMBINED MANEUVERS)

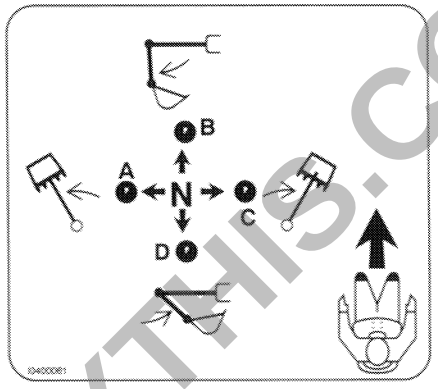
A = Lowering and left rotation of boom
B = Lowering and right rotation of boom
C = Lifting and right rotation of boom
D = Lifting and left rotation of boom



LEVER 10
(COMBINED MANEUVERS)

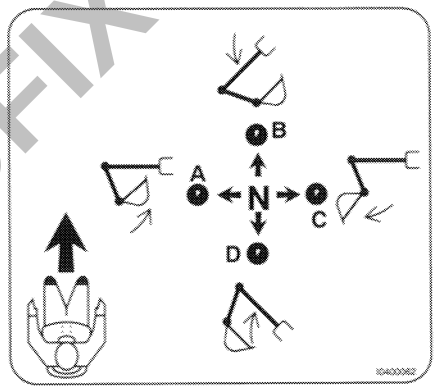
A = Opening boom - bucket closure
B = Opening arm - bucket closure
C = Closure arm - bucket opening
D = Closure arm - bucket closure

CONTROLS CONFORMING TO ISO NORMS



LEVER 9
(BASIC MANEUVERS)

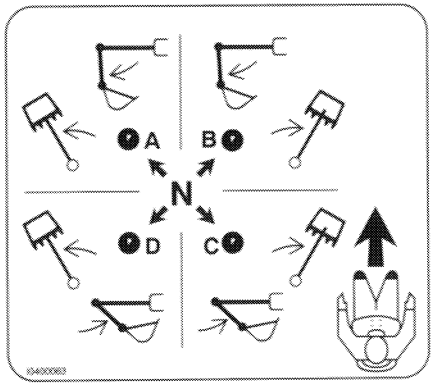
A = Left rotation boom
B = Opening arm
C = Right rotation boom
D = Closure arm



LEVER 10
(BASIC MANEUVERS)

A = Bucket closure
B = Lowering boom
C = Bucket opening
D = Lifting boom

If the levers are maneuvered at an angle with respect to the axis of the machine, a combined movement is achieved proportional to the angle of inclination since both independent hydraulic distributors are activated.



LEVER 9
(COMBINED MANEUVERS)

A = Opening arm - left rotation boom
B = Opening arm right rotation boom
C = Closure arm - right rotation boom
D = Closure arm - left rotation boom

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22.3.2 HYDRAILIC CIRCUIT

(•) Always contact your FAI Agent.

MALFUNCTION	PROBLABLE CAUSE	REMEDY
The pump makes a strange noise:	• Lack of oil in tank. • Defective pump. • Hydraulic oil not suitable for temperature.	• Bring it back to normal level. (• Repair and replace) • Replace.
The equipement control levers do not automatically return to neutral:	• Return spring broken or shuttle seized up.	(• Replace spring or distributor element.)
The equipement will only move slowly:	• Defective pump. • Valves have lost calibration, are defective, or do not close due to presence of impurities. • Dirty drainage filter.	(• Repair or replace) (• Calibrate or replace) • Replace

22.3.3 BRAKING SYSTEMS

(•) Always contact your FAI Agent.

MALFUNCTION	PROBLABLE CAUSE	REMEDY
Braking is irregular in both wheels:	• Brake discs worn. • Lack of oil in brake pumps. • Air in the braking circuit.	(• Replace) (• Restore the level and bleed the circuit) (• Bleed the circuit)
Braking is irregular on only one side:	• Air in the braking circuit. • Brake disc worn.	(• Bleed the circuit) (• Replace)

22.3.4 CONVERTER

(•) Always contact your FAI Agent.

DEFECT	PROBLABLE CAUSE	REMEDY
Low clutch pressure:	• Oil level. • Clutch pressure adjustment valve blocked open. • Delivery pump defective. • Clutch shaft or piston sealing rings. • Blow-bys due to clutch piston valve blocked open.	• Restore level. (• Clean shuttle and seating) (• Replace) (• Replace sealing rings) (• Clean the valve thoroughly)
Low pump flow:	• Oil level. • Suction filter clogged. • Pump defective.	• Restore level. • Clean filter. (• Replace)
Overheating:	• Sealing rings damaged. • Pump defective. • Oil level. • Heat exchanger dirty. • Heat exchanger ruined.	(• Remove, dismantle and reassemble the group) (• Replace) • Restore level. • Clean. • Replace.
Converter noisy:	• Pump defective. • Bearings ruined.	(• Replace) (• Dismantle and replace)
Lack of power:	• Low engine revs lead to a stalling speed. • Problems similar to those due to overheating.	(• Check and regulate the engine) • See remedies for overheating.

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27.8 MAINTENANCE EVERY 500 HOURS

★ Maintenance for 50, 100 and 250 hours should be carried out at the same time.

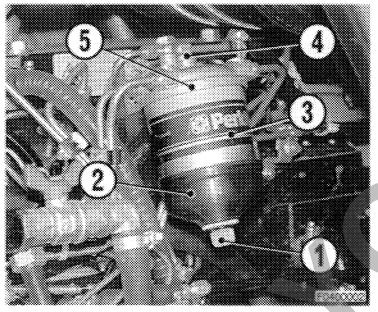
27.8.a CHANGING THE FUEL FILTER AND CLEANING THE GAUZE FILTER

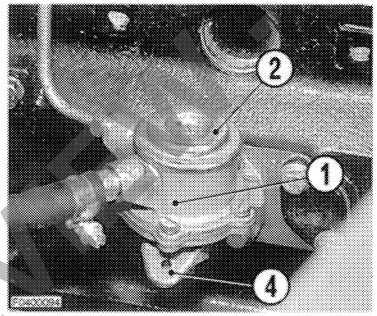
DANGER

- **Change the filtering element when the engine has cooled down to 40-45°C at the end of the day's work.**
- **It is possible that some fuel will be spilled during these operations. Clean the area immediately to avoid the risk of slipping or fires.**

FUEL FILTER

1 - Clean the outside surfaces of the group and then use the bottom tap (1) to drain out the diesel fuel contained in the cup (2) and in the filter (3).
2 - Holding the lower filter cup firmly, loosen and unscrew the central screw (4) and remove the cup (2).
(Use spanner of size 11 mm)
3 - Remove the used cartridge (3) and dispose of it.
4 - Clean the inside of the head (5) and the filter cup.
5 - Replace the sealing-rings and lubricate them slightly with fuel.
6 - Place the new cartridge (3) in the cup and re-assemble the group, checking that the upper sealing-ring is perfectly centered before fully tightening the central screw.
7 - Expel all air from the supply circuit.



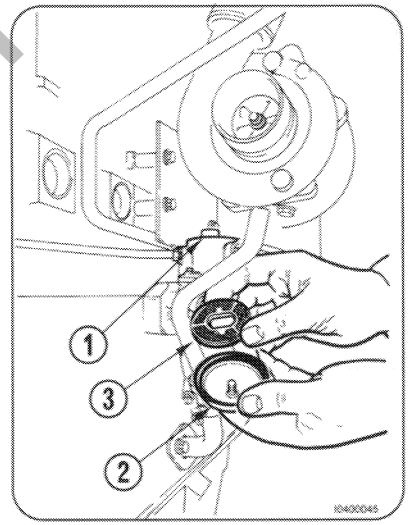


FEED-PUMP GAUZE FILTER

1 - Remove the cover with the gasket (2) and the gauze filter (3) of the feed-pump (1).
2 - Thoroughly wash the inside of the pump (1) and clean the gauze (3), the cover and the gasket (2) perfectly.
3 - Re-assemble the group, checking the state of wear and the leaktightness of the gasket.
4 - Expel all air from the circuit.

EXPELLING AIR FROM THE CIRCUIT

1 - Turn the ignition key to position «I»
2 - Work the feed-pump lever (4) for about 2 minutes.



IMPORTANT

- **If the feed-pump lever (4) does not move, give the engine shaft one turn.**

3 - Turn the ignition key to start the engine.

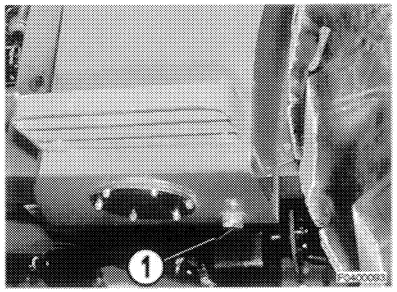
IMPORTANT

- **If the engine starts normally, but then stalls or functions irregularly, check for the presence of air in the circuit. If so, check the leaktightness of the fuel filter and feed-pump.**

27.8.b DRAINING THE FUEL TANK

DANGER

- **Avoid spilling fuel while draining the tank, because it will present a fire hazard.**
- **If fuel is spilled, clean the soiled area immediately to prevent slipping and fires.**



The purpose of this drainage operation is to clear out any impurities or condensate that has collected in the tank. It is sufficient to remove the bottom cap (1) until clean fuel flows out.
(Use spanner of size 41mm)

IMPORTANT

- **Drainage should take place at temperatures of higher than 0°C before starting the engine. When the temperature is lower than 0°C, drainage should take place at the end of the day's work, and in any case with the machine still warm, because if the condensate freezes it cannot flow out.**
- **Drainage of condensate and impurities should take place before refuelling.**

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