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Operation and Maintenance Manual

6018, 6018 FS
Hydraulic Shovel

No. DHD18181

When crossing underpasses and bridges or when passing under overhead lines always make sure that there is sufficient clearance.

Always keep a distance from the working face and from slopes.

Avoid any operation that might be a risk to machine stability.

Never travel across slopes; always keep the working equipment and the load close to the ground, especially when travelling downhill.

On sloping terrain always adapt your travelling speed to the prevailing ground conditions.

Before leaving the driver's seat always secure the machine against inadvertent movement and unauthorized use. Shut off the engines.

Special work in conjunction with utilization of the machine and maintenance and repairs as well as troubleshooting during work; disposal of parts and consumables

Observe the adjusting, maintenance and inspection activities and intervals set out in the operating instructions, including information on the replacement of parts and equipment. These activities may be executed by skilled personnel only.

Brief operating personnel before beginning special operations and maintenance work, and appoint a person to supervise the activities.

In any work concerning the operation, conversion or adjustment of the machine and its safety-oriented devices or any work related to maintenance, inspection and repair, always observe the start-up and shut-down procedures set out in the operating instructions and the information on maintenance work.

Ensure that the maintenance area is adequately secured.

If the machine is completely shut down for maintenance and repair work, it must be secured against inadvertent starting by:

- removing the ignition key and
- attaching a warning sign.

Carry out maintenance and repair work only if the machine is positioned on stable and level ground and has been secured against inadvertent movements.

To avoid the risk of accidents, individual parts and large assemblies being moved for replacement purposes should be carefully attached to lifting tackle and secured. Use only suitable and technically perfect lifting gear and suspension systems with adequate lifting capacity. Never work or stand under suspended loads.

The fastening of loads and the instructing of crane operators should be entrusted to experienced persons only. The marshaller giving the instructions must be within sight or sound of the operator.

For carrying out overhead assembly work always use specially designed or otherwise safety-oriented ladders and working platforms. Never use machine parts as a climbing aid

Wear a safety harness when carrying out maintenance work at heights above 1 m.

Wear an approved harness equipped with fall arresters and safety lines.

OPERATION, FIRE AND EXPLOSION HAZARD

Safety instructions

Prior to commencing work, obtain informationon the national and corporate rules for the prevention of accidents and avoiding fires.

Pay particular attention to hazards caused by combustible and easily flammable substances.

Obtain information on the safe handling of the fire extinguishers to be used.

Avoid smoking and open fire on, next to and below the excavator.

Combustible and easily or highly inflammable substances or liquids increase the risk of fire and explosion

Do not store or transport flammable substances on the excavator during the work. This is also valid for pressure vessels containing flammable substances as, for instance, spray oil or cold-starting fluid (ether). They are heat-sensitive and can explode even if exposed only to intensive sunlight.

Clean the excavator carefully, if oil, grease, fuel, detergents or cold-starting fluid have been spilt over the machine. If possible, use a steam-jet cleaner for cleaning.

These substance can also ignite themselves if they come close to hot units or objects as, for instance, a turbocharger.

Clean rubber or electrical with compressed air only.

Ensure sufficient ventilation.

Even battery gases can ignite in open flames or fire.

Avoid parking the excavator in places where

- combustible substances such as coal dust or tar are present.
- open or smouldering fire may occur.

Remove the excavator from such an area where combustible or easily flammable liquids have spilled from the excavator onto the ground.

Flying sparks (caused by welding, flame cutting, grinding, electrical short-circuit) may cause fire on the ground that can spread to the excavator.

Clean the excavator before starting work.

Place suitable fire guardings (fire barriers) if open fire or flying sparks cannot be avoided during repair work.

If necessary, also cover the ground with fire-protective blankets.

Apply special protection to cables, cable ducts as well as to hose and pipe lines.

The engine compartment can be equipped with pressure vessels containing cold-starting fluid (ether). Ether is toxic and highly flammable; the vessels are under pressure. These pressure vessels can explode if exposed to high temperatures (above 49°C / 120°F) or in the event of damage. Protect the pressure vessels against damage before beginning to work in or close to the engine compartment.

Ensure sufficient ventilation.

Do not keep any fire extinguishers that are not suitable or have not been tested.

Do not extinguish flammable liquids with water. Use:

- dry-powder, carbon-dioxide or foam extinguishing compounds.

When getting into contact with burning substances, the fire-fighting water would abruptly evaporate and distribute the substance such as oil over a wide area. Water causes short-circuits in the electrical system thus possibly entailing new hazards.

Call the fire brigade.

Have all your welding, flame cutting and grinding work approved before starting work.

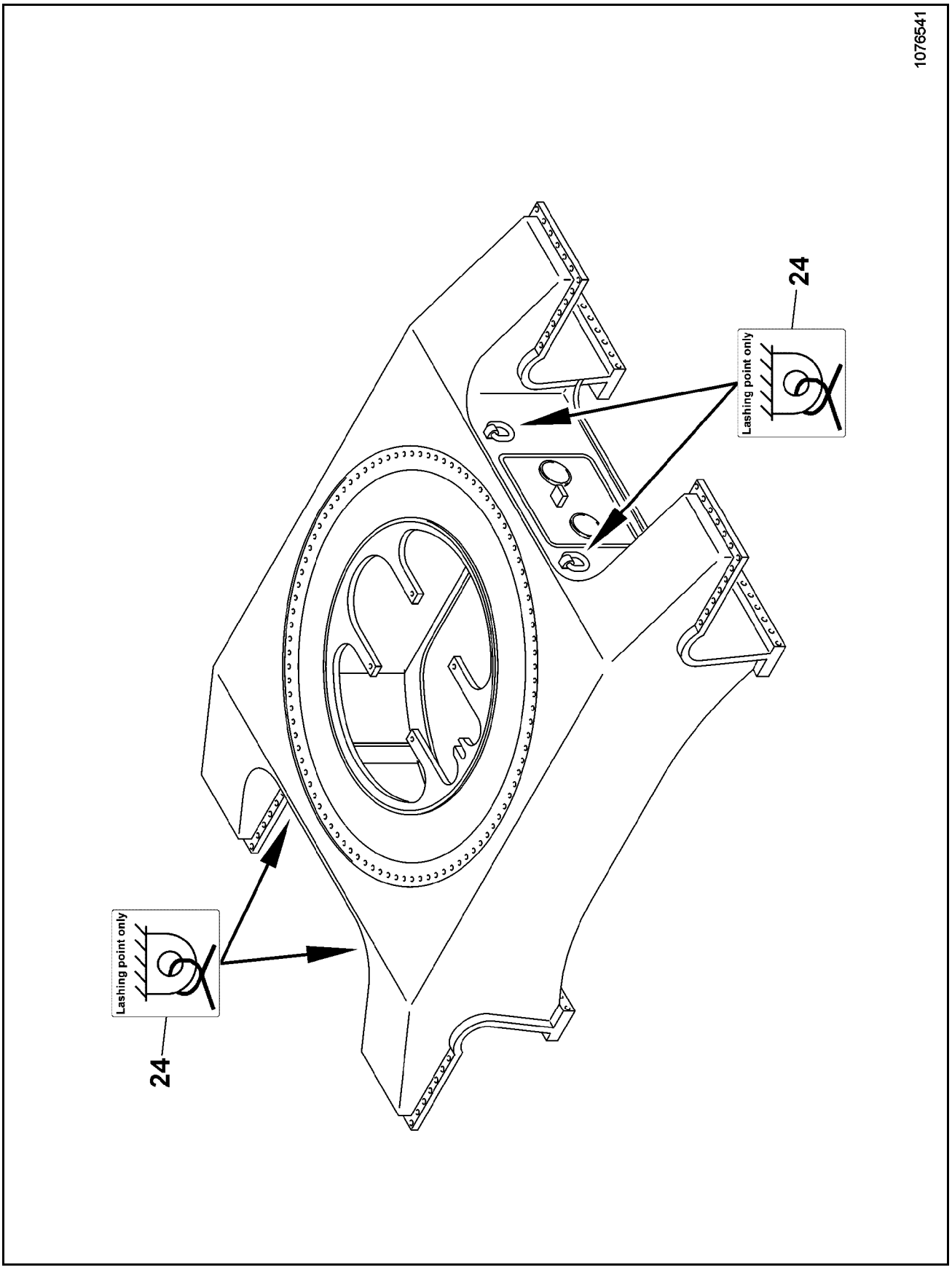


Fig. 2-7:

Fire extinguisher

The excavator is equipped with two fire extinguishers (arrow Fig. 2-31:).

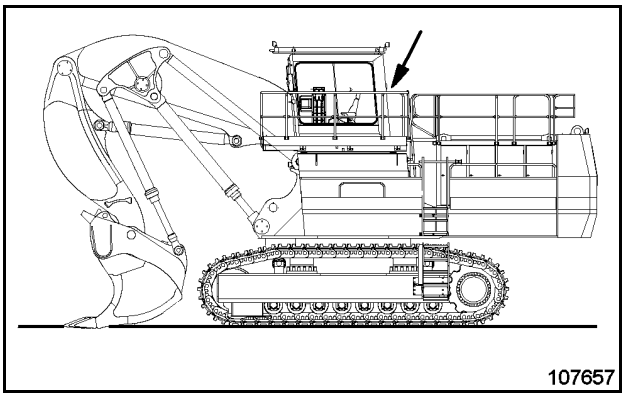


Fig. 2-31:

The excavator driver and the maintenance personnel must inform themselves about how to handle the fire-extinguisher in order to be able to act fast and efficiently in case of beginning fires. Such instruction should be given by a qualified instructor.

Extinguishing agent

Each fire-extinguisher is filled with 12 kg (26.4 lb) Glutex. This extinguishing agent is used for fighting fires of classes A, B and C. Fires are extinguished fast, perfectly and without residues.

Handling

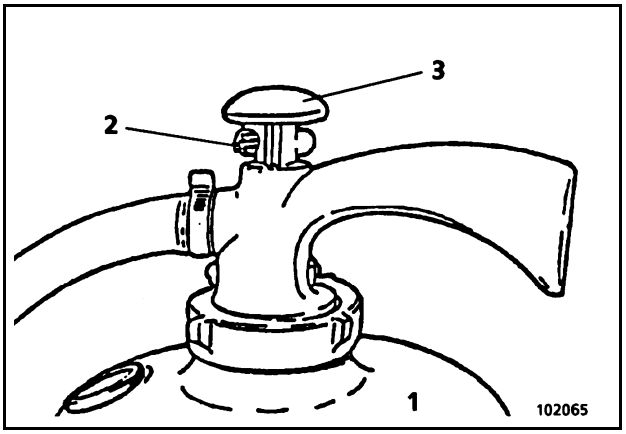


Fig. 2-32:

- ➲ Pull out securing pin (2, Fig. 2-32:).
- ➲ Strike knob (3) hard, then release again.
- ➲ Operate the extinguishing gun.

Inspection

Have the extinguisher inspected at regular intervals by an expert. This is required by local authorities and insurance companies and is in the interest of your own safety.

Have the fire-extinguisher checked at the prescribed intervals by authorized testing agencies.

(Fig. 2-49:)

No.	Element	Function	Symbol
33	**Buzzer (continued)**	**Gives acoustic warning signals if faults are reported:** ▪ Engine oil level (engine 1 and / or 2; left and / or right) too low, ▪ Distributor gearbox (1 and / or 2; left and / or right) contaminated, ▪ Working pump (1, 2, 3, and / or 4; left and / or right) contaminated, ▪ Swing motor (1, and / or 2) contaminated, ▪ Swing circuit temperature (1 and / or 2) too high, ▪ Lubricating system pressure too low, ▪ Grease level in lubricating system too low, ▪ On-board voltage 24 V too low. **The buzzer (33) continues to sound until the fault has been rectified.**	
34	**Buzzer**	Gives an acoustic warning signal when the stick/boom angle is to too small.	

(Fig. 2-54:)

No.	Element		Function	Symbol
71	**Switch**	**Travel motors**	Not connected	
72	**Switch**	**Undercarriage holding brake**	CCW: brake permanently applied The excavator can not be driven CW: Every time the excavator stops, the undercarriage brake is automatically applied after approx. 8 sec. The undercarriage brake is automatically released when the travel function is activated. **Actuate switch only when the excavator is stationary. Do not use as service brake.**	
73	**Taster**	**Reset**	Activate after a fault in the central lubricating system.	RESET
74	**Switch**	**Electronic excavator control**	Switches on the electronic servo control.	SERVO
75	**Switch**		Free for options.	
76	**Cigarette lighter**			
77	**Switch**		Free for options.	

(Fig. 2-59:)

(Options. Depending on the options ordered with the machine, the described elements can be found on different positions on the control column).

No.	Element		Function	Symbol
131	**Monitoring device**	**Engine monitoring (engine 2 right)**	Indicates different parameters on the display (E). Use push buttons (C and D) to scroll through parameter list. Indicator lamps (A and B) lit when an active fault occurs.	
132	**Thermometer**	**Engine temperature (engine 2 right)**	Indicates the cooling-water temperature.	
133	**Pressure gauge**	**Engine oil pressure (engine 2 right)**	Indicates the oil pressure in the diesel engine lubricating system.	
134	**Pressure gauge**	**Engine oil pressure (engine 1 left)**	Indicates the oil pressure in the diesel engine lubricating system.	
135	**Thermometer**	**Engine temperature (engine 1 left)**	Indicates the cooling-water temperature.	
136	**Warning lamp**	**Cooling water level (engine 1 left)**	Lits up when the cooling-water level is too low.	
137	**Warning lamp**	**Alternator (engine 1 left)**	Lits up when the batteries are not recharged.	
138	**Warning lamp**	**Cooling water level (engine 2 right)**	Lits up when the cooling-water level is too low.	
139	**Warning lamp**	**Alternator (engine 2 right)**	Lits up when the batteries are not recharged.	
140	**Monitoring device**	**Engine monitoring (engine 1 left)**	Indicates different parameters on the display (E) Use push buttons (C and D) to scroll through parameter list. Indicator lamps (A and B) lit when an active fault occurs.	

Assemblies resp. reservoirs	Measuring device	Remarks
Fuel tank	BCS fuel indicator (Fig. 2-68:)	Switch on the monitoring system by using toggle switch (23, Fig. 2-69:). The indicator light (22) comes on. Fill in fuel using express coupling (1). The indicator light (32) comes on when the LH fuel tank is full. Stop filling when the fuel tank is full. The indicator light (33) comes on when the RH fuel tank is full. Stop filling when the fuel tank is full. Switch off the monitoring system by using toggle switch (23), indicator light (22) is off.

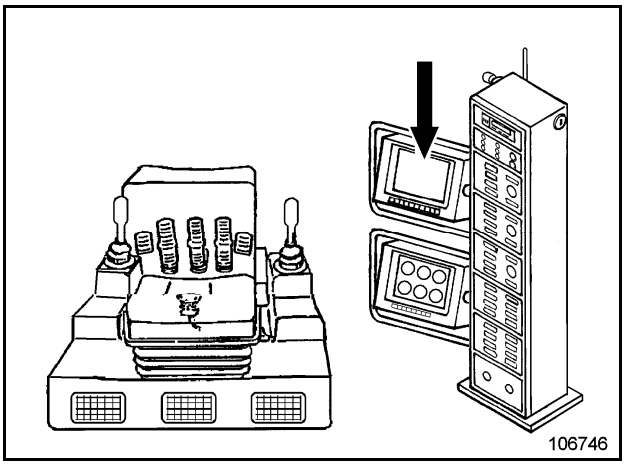


Fig. 2-68:

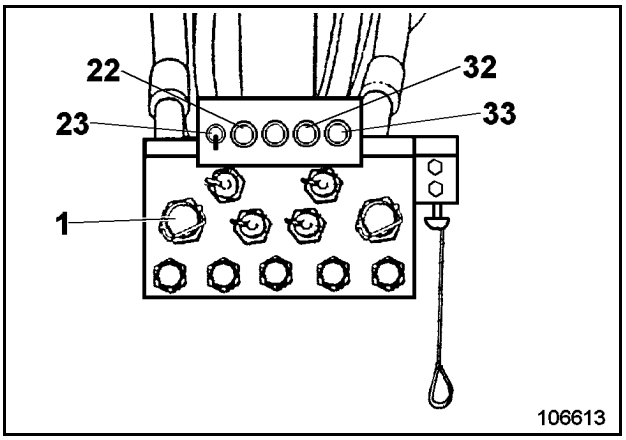


Fig. 2-69:

AIR CONDITIONER (OPTION)

Ventilation / Heating

The air needed for ventilation and/or heating is sucked in from outside the cab by a blower and ducted to the air outlets (Fig. 2-89:).

- air outlets (2) at the bottom of the cab,
- air outlets (3) in the console of the driver's seat,
- air outlets (4) under the cab roof.

Each outlet can be adjusted independently for the amount and direction of air required.

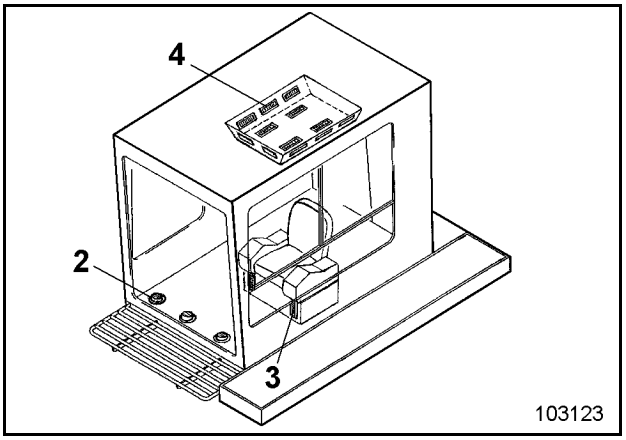


Fig. 2-89:

If necessary, the air in the cab is sucked in through the filters (1, Fig. 2-90:) and recirculated.

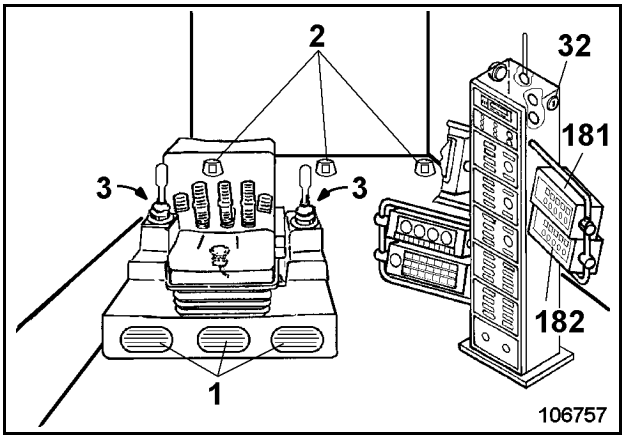


Fig. 2-90:

The air conditioner control elements are located in the satellite (181).

Do not switch the air conditioner to "cooling“ when the back-up heating is on.

Control panel (Sigma) single

(Fig. 2-91:)

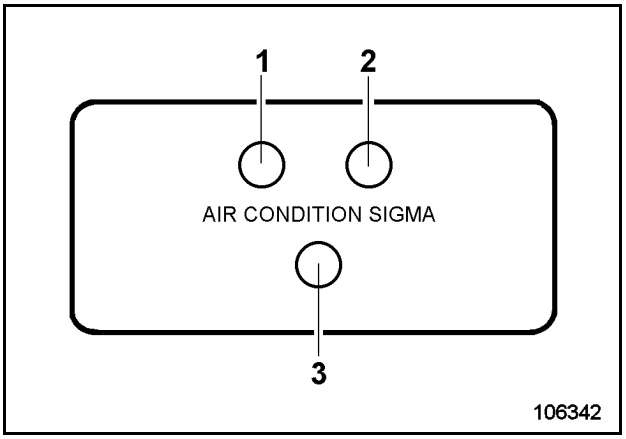


Fig. 2-91:

1	Rotary switch	selects the intensity level of the blower (3 levels)
2	Rotary switch	selects the desired control function (heating, cooling, ventilation, defrosting)
3	Thermostat	sets the desired temperature inside the cab

TRANSPORTING THE MACHINE

Transport - Safety instructions

The machine must be loaded and transported only after all safety regulations have been observed and complied with.

Entrust loading and transporting of the machine to a company experienced in the transport of heavy equipment.

The responsability for loading and transporting lies with the transport company or their representative.

Remove oil, grease, soil, mud, snow, ice and other materials from the excavator's crawler tracks and from ramps and loading platforms of the transport vehicle to minimize slipping.

Secure the transport vehicle against rolling away.

Use only tying equipment of sufficient strength (the weights and dimensions of the excavator are set out in the "Product Specification Sheet").

Transport

The dimensions and the service weight of the fully assembled excavator do not allow the excavator to be transported in an undismantled state on a low-bed trailer over public roads.

Therefore, the following components and modules must be dismantled beforehand.

Suspensions points are marked on the modules.

Suspensions points as well as the center of gravity are marked on the modules (see example, Fig. 2-109:).

Dimensions and weights of the machines modules can be found in the annex, chapter “Technical Data” as well as in the “Technical Handbook”.

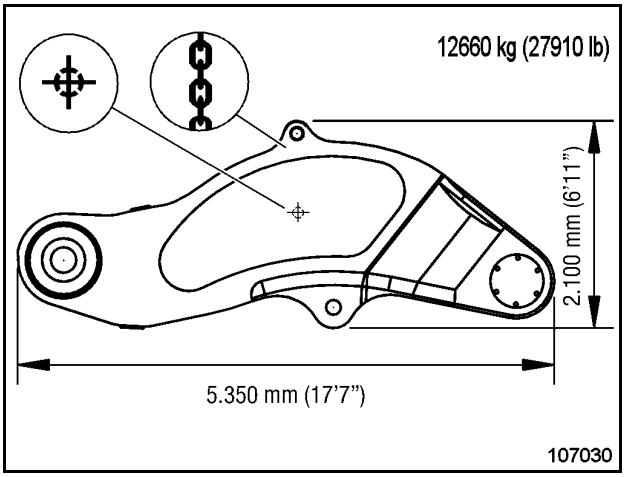


Fig. 2-109:

CORROSION PROTECTION FOR PINS AND BEARINGS (BUSHINGS AND HUBS)

Use "GLEITMO 815" anti-corrosive agent only.
Other agents are not approved by CGM HMS

All pins and bearings (bushings and hubs) of the working equipment or in equipment componenents must be treated with "GLEITMO 815" anti-corrosive agent before fitting.

Doing so

- permits easy fitting and dismantling
- protects against rust, oxidation and similar wear
- prevents seizing and fretting corrosion in non-moving parts of bearings.

This is achieved by aluminium and copper particles forming a protective layer on the metal. This layer removes surface irregularities and does not sweat, seize or harden.

Part no. for "GLEITMO 815" is 2764305, available from **CGM HMS** Spare-Parts Service

Application of GLEITMO 815

➲ Clean off grease, oil, dirt and corrosion protection agents from pins and bearings using white spirit or diesel fuel.
Rust patches must be thoroughly removed, if any.
All parts must present a dry, bright metal surface.

➲ Apply a thin layer of GLEITMO 815 on pins and all bearings using a brush or a spray can.
Pin shafts and bearings must be completely co-vered by the protective layer.
If the protective layer of a pin already treated with GLEITMO 815 is damaged, these areas must be touched up before fitting the part.

➲ Fitting and securing of pins
If the pin is too heavy to be fitted manually, apply GLEITMO 815 at first only on abt. a quarter of the pin's length
Then position pin by means of a lifting gear-ready for fitting.
Apply GLEITMO 815 on the remaining length of pin shaft, fit pin and secure.

Handling batteries

Battery Posts, terminals and related accessories contain lead and lead compounds, chemicals known to cause cancer and reproductive harm. Wash hands after handling.

Batteries give off explosive gases.

Never handle batteries close to naked flames and unshielded light sources, never smoke.

Battery acid is toxic and corrosive.

Avoid any contact with the skin, mouth, eyes and clothing. Avoid spilling battery acid or inhaling the vapours.

Wear gloves, firm protective clothing and goggles when handling batteries.

If the skin is splashed with acid, rinse thoroughly with running water and consult a doctor.

If the eyes are splashed with acid, rinse thoroughly with running water and consult a doctor immediately.

Never set tools down on the battery. They may induce a short circuit, causing irreparable damage to the battery and injuring persons.

Never wear metal necklaces, bracelets or watch-straps when working on the battery. The metal parts may induce a short-circuit resulting in burns.

Dispose of used batteries separately from other waste in the interests of environmental protection.

Before working on the electrical system

Before performing work on the electrical system where tools, spare parts, etc. can come into contact with electrical conductors or contacts, the battery must be disconnected.

Disconnect first the negative and then the positive terminal.

After the work:

Reconnect first the positive and then the negative terminal.

Handling of cold-starting fluid (ether)

The engine compartment can be equipped with pressure vessels containing cold-starting fluid (ether).

Ether is toxic and highly flammable; the vessels are under pressure. These pressure vessels can explode if exposed to high temperatures (above 49°C / 120°F) or in the event of damage.

Protect the pressure vessels against damage before beginning to work in or close to the engine compartment.

Read and observe the instructions on the pressure vessels.

For further details please refer to the instructions and safety data-sheets of the manufacturer / supplier of pressure vessels with cold starting fluid (ether).

Provide for sufficient ventilation.

Do not eat, drink or smoke when replacing an empty vessel.

Do not inhale the vapours of escaping cold-starting fluid.

In contact with the skin, ether can cause frostbites and irritations. Avoid skin contact.

Wear suitable protective gloves and goggles.

Even apparently empty pressure vessels can still contain rests of ether and therefore explode if they are damaged or heated up above 49°C. They must therefore be handled in the same way as full pressure vessels.

- Do not keep them on the machine.
- Do not damage or open the vessels.
- Do not expose the vessels to great heat or direct sunlight.
- Do not dispose of in fire.
- Keep the vessels in a place inaccessible to unauthorized persons.
- Dispose of the vessels properly.

Plan T and W

Plan **T** - Every 10 OH or every working shift

(whichever comes first)

Plan **W** - Every 60 OH or every working week

(whichever comes first)

Location	Servicing work	Quantity/ No.	Plan T	Plan W
Engine	Check oil level	2	●	●
Engine monitoring (Board Control System)	Check monitoring display		●	●
Cooling system				
Cooling fluid level	Check	2	●	●
Radiator	Check / clean	2	●	●
Fuel system				
Fuel filter	Drain off water	2 x 1	●	●
Water trap (optional)	Drain off water	2 x 1	●	●
Fuel tanks	Drain off water and sediment (if necessary)	2 x 1	●	●
Air-intake system	Check BCS – indication	1		●
Intake and clean-air lines	Check for tightness and leaks			●
Electrical system				
Lighting	Check operation		●	●
Switchgear cabinet				
- Breather filter				
- Dust trap	Remove dust	1		●
- EMERGENCY OFF button	Check function	4		●
Monitoring, warning and control elements	Check function of monitoring, warning and control elements		●	●
BCS	Check function		●	●
Hydraulic system	Check function of working and travelling movement		●	●
	Inspect visually for leaks			●
Hydraulic oil reservoir	Check oil level	1	●	●
Oil cooler	Check / clean	2		●
Fan wheel	Check condition	2	●	●
Pump transfer gearbox	Check oil level	2		●
- Expansion reservoir	Check oil level	2		●

Lubricating chart – Grease (legend)

No.	Greasing point	Number	Lubricant properties	Grease every .... operating hours
1	Central lubricating system – grease container	1	**V** [15]	10
	Hydraulic ladder (optional)	1	**V** [15]	1000
2	Monitoring, warning and control elements - Joystick: plate, cardan joint, control spool - Pedal: control spool	 2 x 4 [16] 3 x 2 [16]	**V** [15]	 1000 1000

All other greasing points are supplied with grease by the central lubricating system.

Filling quantities - Grease

Greasing point	Lubricant properties	Filling quant. in kg	Filling quant. in lb
Central lubricating system – grease container (different containers available)		appr. 180 / appr. 500	appr. 397 / appr. 1102
Internal gearing – Roller-bearing swing ring	**V** [15]	appr. 100	appr. 220.5
Idler (permanent grease filling)		2 x appr. 3,3	2 x appr. 7.3
Track rollers (permanent grease filling)	**Tribol** CGM HMS part no. 2764564	16 x appr. 2	16 x appr. 4.4
Support rollers (permanent grease filling)		4 x appr. 1.3	4 x appr. 3

[15] see: "LUBRICANTS" section.

[16] apply a thin layer of low temperature grease

Greases for idlers, track rollers and support rollers (Lifetime lubrication)

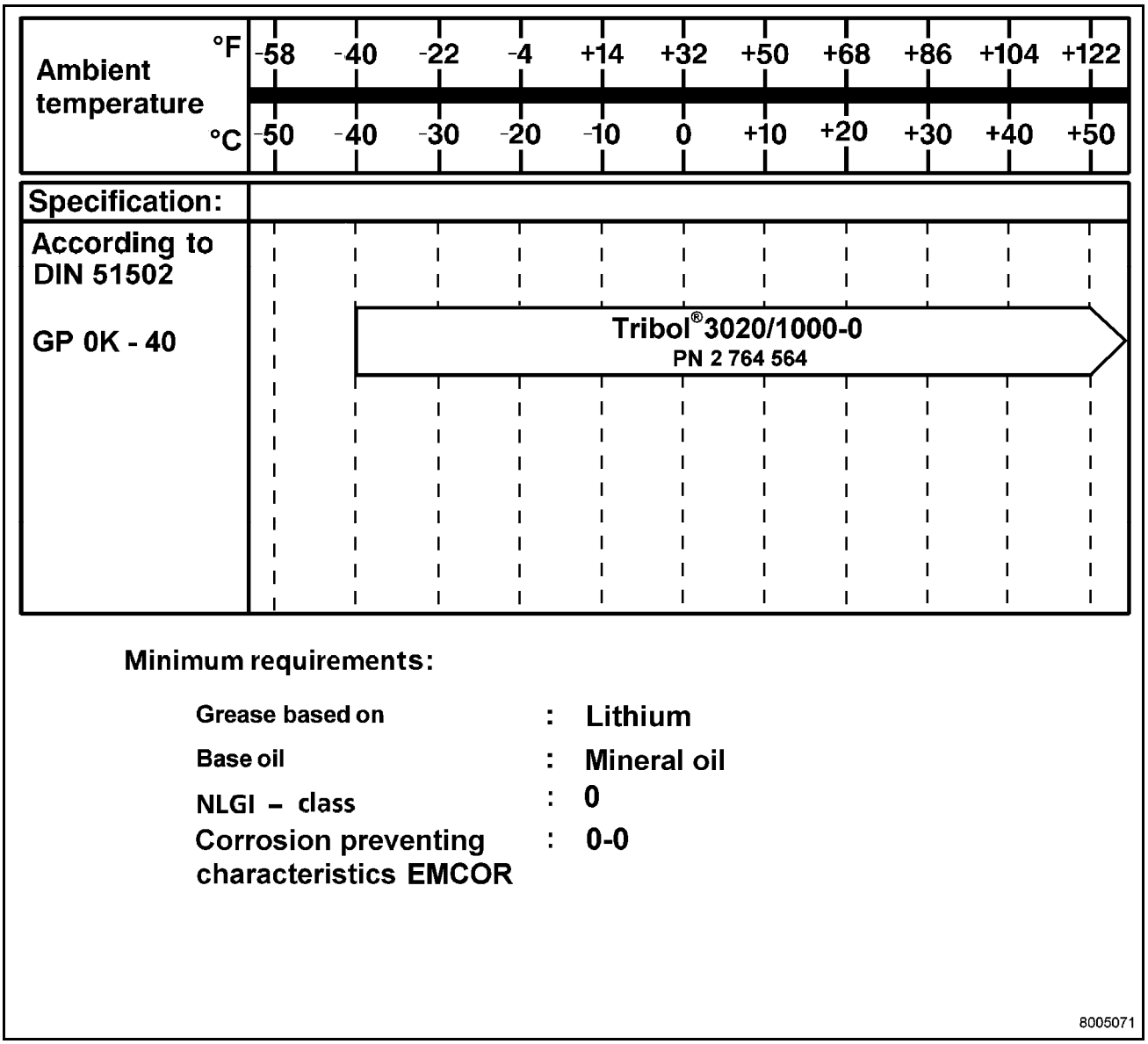


Fig. 3-8:

Topping up cooling liquid

Risk of scalding from hot cooling liquid. Open radiator cap cautiously.

➲ Turn radiator cap (1, Fig. 3-24:) back to the first notch.

➲ When the pressure has been released turn cap into the "open" position and remove.

Fill cooling liquid through filler tube (1) or through express couplings (2 and 3, Fig. 3-25:) into the cooling system,

- express coupling (2) for the lefthand engine,
- express coupling (3) for the righthand engine.

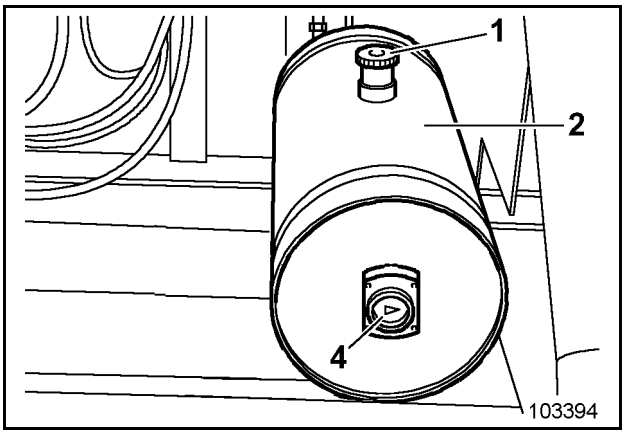


Fig. 3-24:

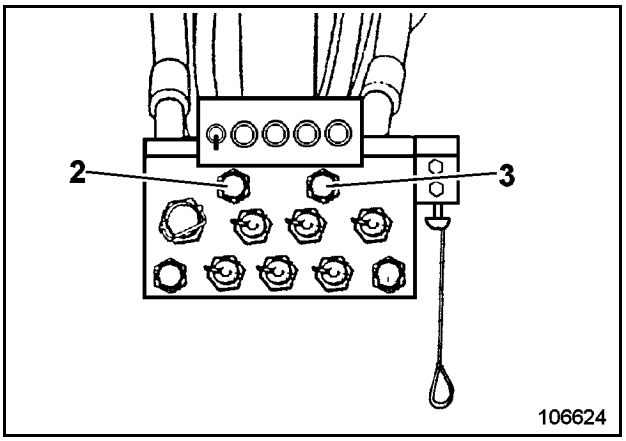


Fig. 3-25:

Do not fill in cold cooling liquid when the engine is at operating temperature.

Before refilling, allow engine to cool down to below 50° C (122°F).

For topping up of the cooling system use specially prepared cooling liquid CAT ELC, CGM HMS Part No. 2482777 only.

This gives an anti-freeze protection down to -37 °C / -34.6°F.

For use at lower temperatures, ask the CGM HMS Service or your CAT-dealer.

➲ Unscrew cap of express coupling. Connect the filling hose.

The hose line and its use are described in the "Hose line for oil and cooling liquid change" section.

After filling in cooling liquid allow the engines to run for short period to eliminate air voids before topping up with cooling liquid until the cooling liquid level is between the “FULL” and the “LOW” mark on the level indicator (4, Fig. 3-24:).

➲ Remove hose from express coupling.
The express coupling closes automatically.

➲ Screw on protective cap.

In case of significant cooling-liquid losses, the whole cooling system must be checked for leaks.

Check regularly:

➲ All lines for leaks and all hose clamps for tightness.

Checking the SCA concentration (Only when used at this machine)

Observe the instructions of the engine manufacturer with regard to the SCA concentration (see engine manufacturer's operating instructions).

Checking / cleaning the filter element

Replace filter element (6, Fig. 3-41:) only when the suction resistance is too high.

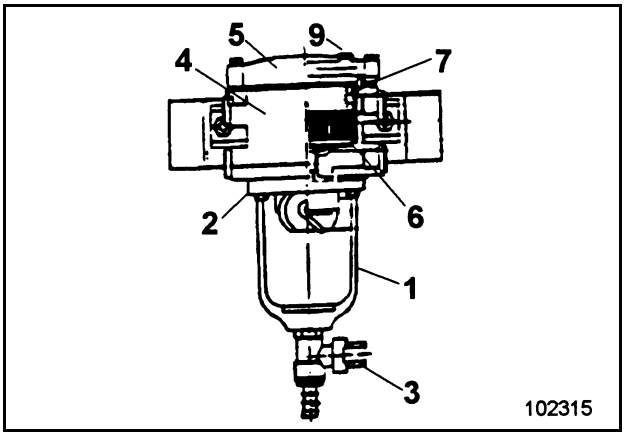


Fig. 3-41:

Collect escaping liquid in a recipient suitable for diesel fuel and discard without polluting the environment.

- Loosen venting plug (9) and leave drain valve (3) open until the reservoir is completely empty.
- Remove cover (5).
- Remove spring holder (7) and filter element (6) from filter housing (4).
- Check / replace filter element (6).
- Clean filter housing (4) using diesel fuel.
- Check cover sealing and replace,if necessary.
- Insert filter element (6) and spring housing (7) into filter housing (4).
- Fasten cover (5) on filter housing (4).

Check for proper sealing.

- Clean recipient (1) and filter housing (4).
- Loosen flange (2).
- Take off recipient (1) and clean with diesel fuel
- Check cover sealing and replace, if necessary.
- Attach recipient (1) with flange (2) at filter housing (4).

Check for proper sealing.

Examples of system sections:

1) working hydraulics
2) servo control circuit
3) precharged return-flow line

Depressurizing

- ➲ Park the excavator on a horizontal surface.
- ➲ Set the working equipment on the ground.
- ➲ Shut off the drive engines.
- ➲ Do not switch off the electrical system

Sections 1 and 2: servo control and working hydraulics:

- ➲ Shift both control levers and all pedals repeatedly into all directions (Fig. 3-55:).

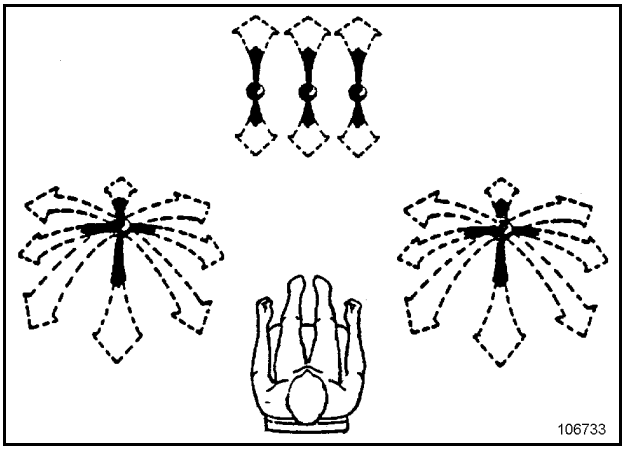


Fig. 3-55:

Section 3: Return-flow line:

After shutting down the engine, the precharging pressure decreases rapidly through the precharging valve. No measures are required before opening the return-flow line.

Checking the hydraulic oil level

- ➲ Bring hydraulic oil to operating temperature (abt. 50 °C / approx. 122 °F).
- ➲ Park the machine on a horizontal surface.
- ➲ Move all hydraulic cylinders to their central positions.

The oil level must lie between the “min” and “max” marks of sign (2, Fig. 3-56:) near the the inspection glass (1).

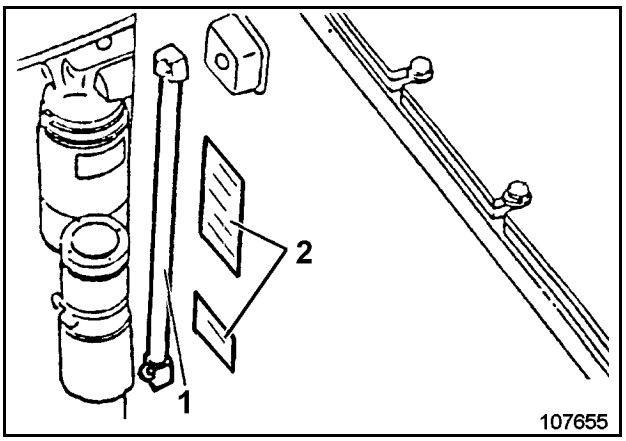


Fig. 3-56:

The hydraulic oil level is monitored by the BCS. The BCS displays a warning on the screen (Fig. 3-57:) if the hydraulic oil level is too low or too high.
Shut off the engines, locate cause and rectify.

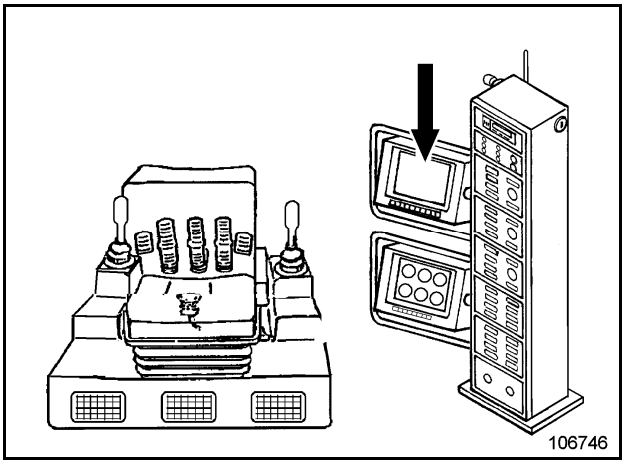


Fig. 3-57:

Drawing off hydaulic oil by means of the service station

The hydraulic oil can also be drawn off through the service station (Fig. 3-76:).

- ➲ Bring hydraulic oil to operating temperature (ca. 50° C / 122°F).
- ➲ Retract hydraulic cylinders as far as possible and stand working equipment on the ground.
- ➲ Shut off the engines.
- ➲ Unscrew cap of express coupling (10).
- ➲ Connect hose line of the service vehicle.

The hose line and its use are described in the "Hose line for oil and cooling liquid change" section.

- ➲ Remove hose line. The coupling closes automatically.
- ➲ Screw on protective cap.

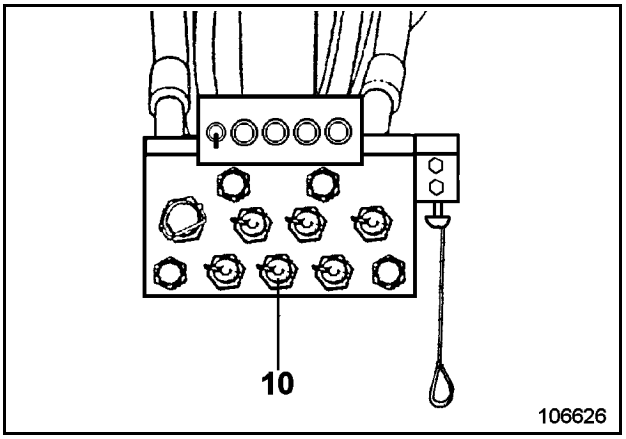


Fig. 3-76:

Cleaning the hydraulic oil reservoir

Explosion hazard.

Read and observe the "Inspection and servicing - Safety instructions" chapter.

Shut off the engines.

Do not use white spirit, paraffin oil or other solvents for cleaning.

Use diesel fuel or a special flushing oil.

Avoid skin contact.

Skin contact with hydraulic oil may cause skin injury.

Wear protective gloves and firm working clothing.

Dispose of contaminated hydraulic oil without polluting the environment and separately from other waste.

- ➲ Drain off hydraulic oil as described under "Draining off the hydraulic oil".
- ➲ Remove cap (3, Fig. 3-77:).
- ➲ Detach the return-flow filter
- ➲ Place a collecting recipient for the flushing oil under the hydraulic oil reservoir.
- ➲ Clean the inside of the hydraulic oil reservoir with diesel fuel or flushing oil.
  Remove all sediments and also the residues of the cleaning agent thoroughly.
- ➲ Refit cap (3)..

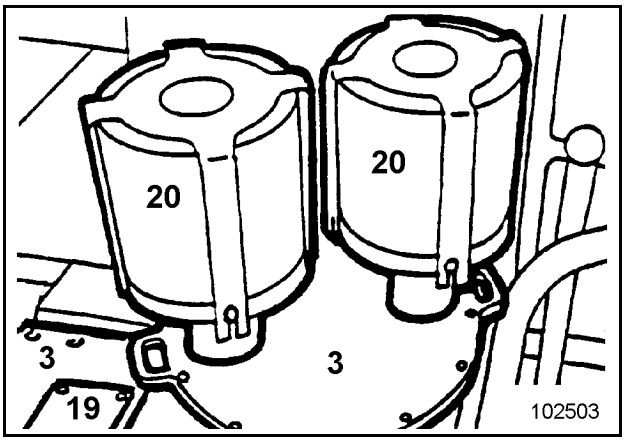


Fig. 3-77:

Filling in new oil / Topping up

➲ Unscrew plug (4, Fig. 3-95:) and fill in new oil.

➲ Check oil level with dipstick (1, Fig. 3-95:).

➲ Screw in plug (4) again.

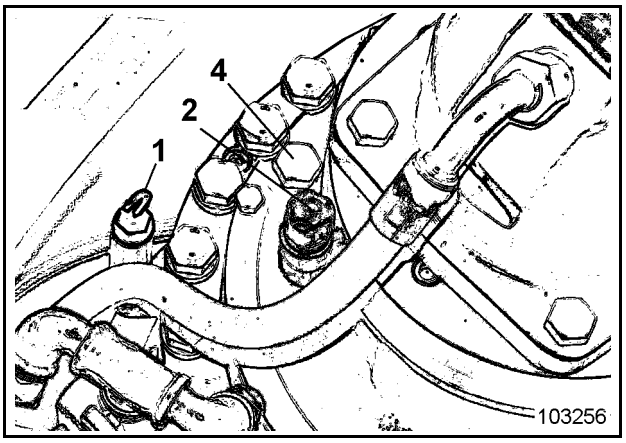


Fig. 3-95:

Gearbox venting

The gearbox is vented through breather filter (2, Fig. 3-95:).
Clean breather filter in accordance with the servicing plan.

➲ Unscrew breather filter (2), clean in white spirit or paraffin oil and blow dry with compressed air.

➲ Screw breather filter (2) back in place.

Function

The grease is pumped by the pump (2, Fig. 3-110:) via greasing lines from the grease container to the main distributors on the superstructure.

The grease pump (2) with ther grease container is located on the superstructure.

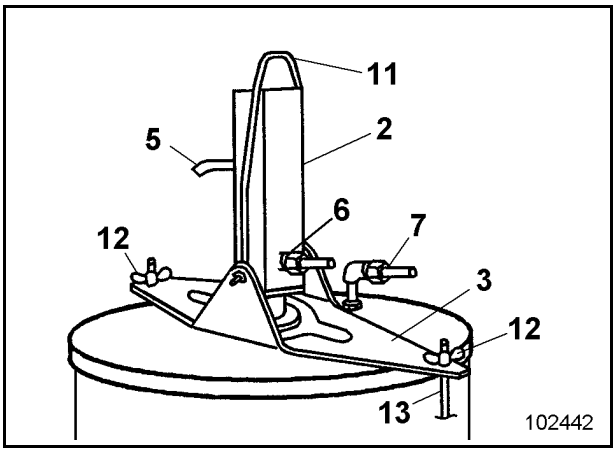


Fig. 3-110:

The control elements of the lubricating system are installed on the panel (3, Fig. 3-111:)

(Optional):

The grease is. pumped by the pump (1, Fig. 3-112:) via greasing lines from the grease container to the main distributors on the superstructure.

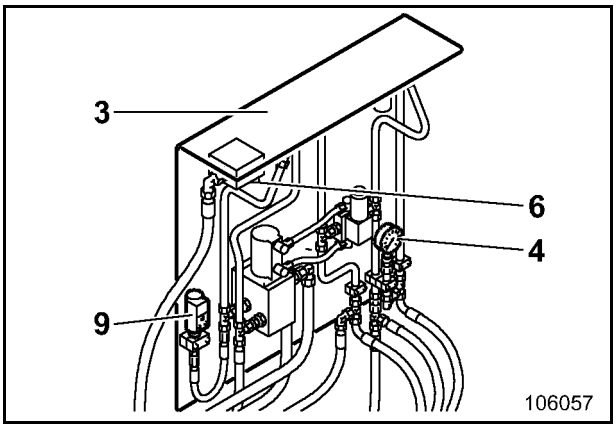


Fig. 3-111:

The control elements of the lubricating system are installed on the panel (3, Fig. 3-111:).

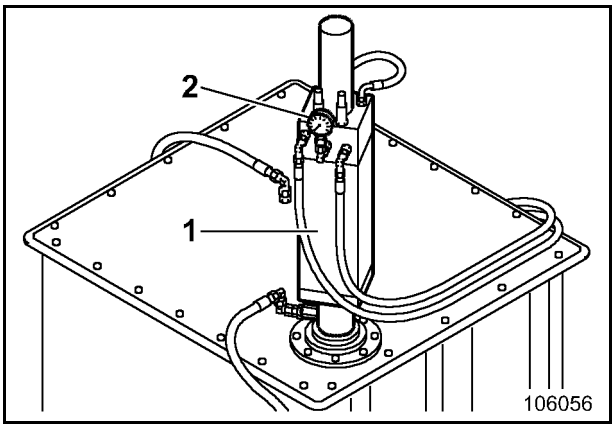


Fig. 3-112:

As soon as the grease container is empty, the BCS (Fig. 3-113:) gives a warning signal. In the event of a fault, the "dumping" function is switched off automatically after 15 min.

Work can be continued when the grease container is filled with grease.

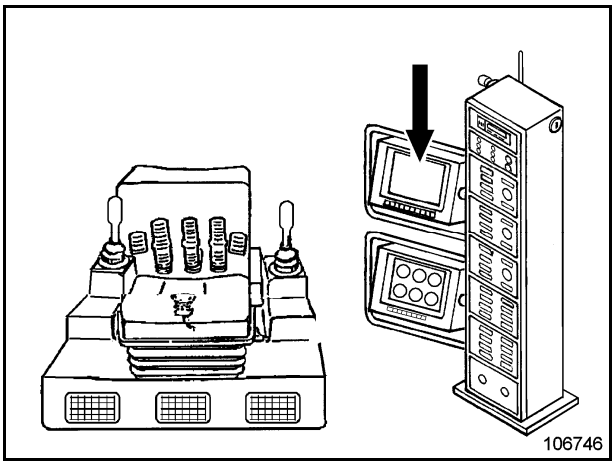


Fig. 3-113:

NOTES

HYDRAULIC SYSTEM

Repair instructions

Always depressurize the hydraulic system before disconnecting any hydraulic hoses or pipes.

Read and observe also the chapters "Inspection and servicing - Safety instructions" and "Repair - Safety instructions".

Replace damaged and leaking hydraulic hoses and pipes as soon as possible by new ones.

Use original spare parts from CGM HMS. They are adapted to the respective function.

Do not re-use old hoses.

Never repair damaged hoses.

Discard escaped oil and oily wastes without polluting the environment. These substances must not be allowed to penetrate into the soil.

Hydraulic hoses – Instructions

Even hoses that have been properly stored or used are subject to natural ageing. Their useful life is therefore limited.

Hydraulic hoses must replaced after a service life of six years (including a storage time of 2 years). Check the date of manufacture on the hose or on the hose fitting regularly.

The recommended interval after which hydraulic hoses - and especially those used in harsh conditions - must be replaced depends on the number of operating hours and on pressure loading.

The use of hoses close to their recommended load limit shortens the replacement interval (e.g. high temperatures, frequent working cycles, extremely high pulse frequencies as well as multi-shift operation and round-the-clock work).

Hydraulic hoses must be replaced, if one of the following defects is detected during a visual inspection:

- Damage to the outer fibre reinforcement layer reaching down to the inner layer (cuts, chafe marks, cracks).
- Embrittlement of the outer fibre reinforcement layer (cracks in the hose material).
- Changes in the ususal shape of the hose under pressure or in pressureless condition in bends or curves such as detachment of fibre layers, formation of bubbles or bulges.
- Leaks.
- Non-observance of fitting requirements.
- Damage to or deformation of hose fittings that may result in a reduction of the strength of the screwed union.
- Detachment of the hose from the fitting.
- Corrosion in fittings reducing the strength of the function of the fitting.

5 ANNEX

	Operating instructions	Target group
Part 1	**INTRODUCTION FUNDAMENTAL SAFETY INSTRUCTIONS**	**Operating personnel + Inspection and servicing personnel + Repair personnel**
Part 2	**OPERATION**	**Operating personnel** The operating personnel must have know-how relevant to the operation and the application of this or comparable machines.
Part 3	**INSPECTION AND SERVICING**	**Inspection and servicing personnel** The inspection and servicing personnel must have know-how relevant to the inspection and servicing of this or comparable machines.
Part 4	**REPAIR WORK**	**Repair personnel** The repair personnel must have know-how and experience relevant to the repair of this or comparable machines.
Part 5	**ANNEX**	**Operating personnel + Inspection and servicing personnel + Repair personnel**
Part 6	**INDEX**	**Operating personnel + Inspection and servicing personnel + Repair personnel**

ABBREVIATIONS

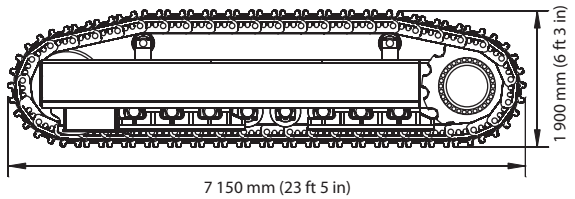
PMS	Pump Managing System
P/No.	Part number (CGM HMS)
PS	Metric horsepower (1 PS = 0.74 kW)
psi	pund per sqare inch (unit of pressure), 1 psi = 0.069 bar
PLC	Programmable logic controller
Qty.	Quantity
R, r	Radius
resp.	Respectively
RH	Crawler hydraulics (excavator)
ROPS	Roll-over protective structures
rpm	Revolutions per minute (= min^{-1})
SAE	Society of Aotomotive Engineers (USA)
sec./s.	Second
SN	CGM HMS partnumber
SW	Width across flats
t	Metric ton (= 1000 kg)
TBG	Civil Engineering Employer's Liability Insurance Association
THB	Technical Handbook
TL	Backhoe dipper (attachment)
tm	Tons by meters (obsolescent unit of swing torque)
typ.	Typical
U/min	Revolutions per minute
UW	Undercarriage
V	Volt (unit of electric voltage)
VDMA	Association of German Machinery and Systems Manufacturers
W	Watt (unit of electric power)
°C	Degrees Celsius (temperature)
°F	Degrees Fahrenheit (temperature)
>	greater than
<	less than

Hydraulic Shovel—6018

General Packing List

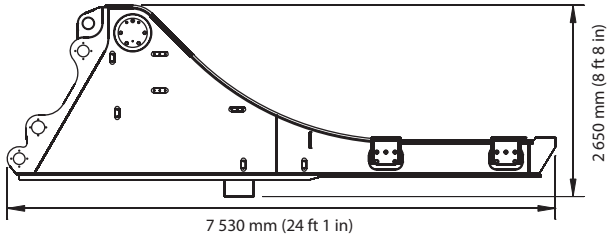
Crawler side frame with track pads (2 units)

Width 950 mm (3 ft 1 in) Gross weight 22 300 kg (49,160 lb)



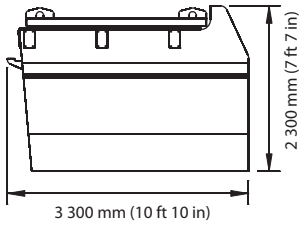
Superstructure center frame

Width 2 650 mm (8 ft 8 in) Gross weight 19,400 kg (42,770 lb



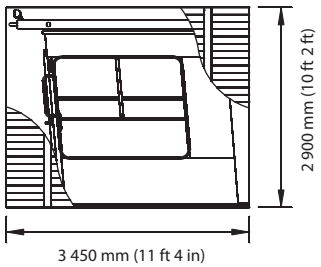
Cab pedestal module

Width 1 800 mm (5 ft 11 in) Gross weight 3 300 kg (7,280 lb)



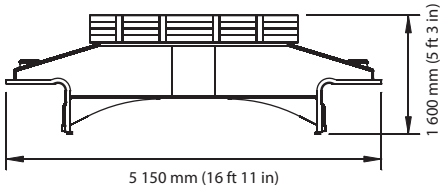
Crate with cabin and FOPS

Width 2 350 mm (7 ft 9 in) Gross weight 3 500 kg (7,720 lb)



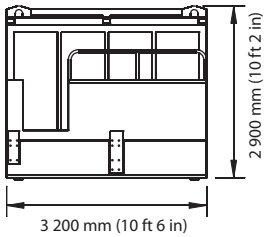
Undercarriage center frame with swing roller bearing

Width 3 050 mm (10 ft 1 in) Gross weight 14 200 kg (31,310 lb)



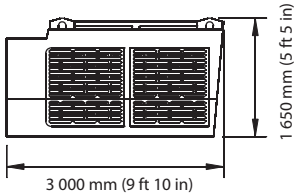
Engine module with diesel engines

Width 5 100 mm (16 ft 9 in) Gross weight 15 400 kg (33,940 lb)



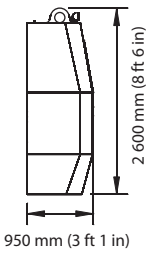
Oil cooler module

Width 1 500 mm (4 ft 11 in) Gross weight 1 800 kg (3,970 lb)



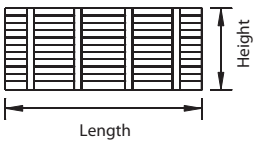
Counterweight

Width 5 100 mm (16 ft 9 in) Gross weight 24 000 kg (52,910 lb)



Crates

Content	Length	Width	Height	Gross Weight
Swing ring bolts, covers, tools etc.	3 000 mm (9 ft 10 in)	1 250 mm (4 ft 1 in)	1 400 mm (4 ft 7 in)	930 kg (2,050 lb)
Handrails, catwalks, air filters etc.	4 500 mm (14 ft 9 in)	1 900 mm (6 ft 3 in)	1 800 mm (5 ft 11 in)	2 500 kg (5,510 lb)
Grease container with pump	1 400 mm (4 ft 7 in)	1 100 mm (3 ft 7 in)	2 050 mm (6 ft 9 in)	740 kg (1,630 lb)
Barrels with hydraulic oil & grease	1 900 mm (6 ft 3 in)	1 300 mm (4 ft 3 in)	1 250 mm (4 ft 1 in)	1 400 kg (3,090 lb)
Air conditoning, lubrication parts	1 450 mm (4 ft 9 in)	1 050 mm (3 ft 5 in)	1 200 mm (3 ft 11 in)	550 kg (1,210 lb)
Pallet with retractable ladder	4 000 mm (13 ft 1 in)	1 000 mm (3 ft 3 in)	1 900 mm (6 ft 3 in)	740 kg (1,630 lb)



Above values are approximate. Details may vary depending on scope of supply and destination.
Exact data subject to selected machine configuration and final packing list.

S

T

U

V

W

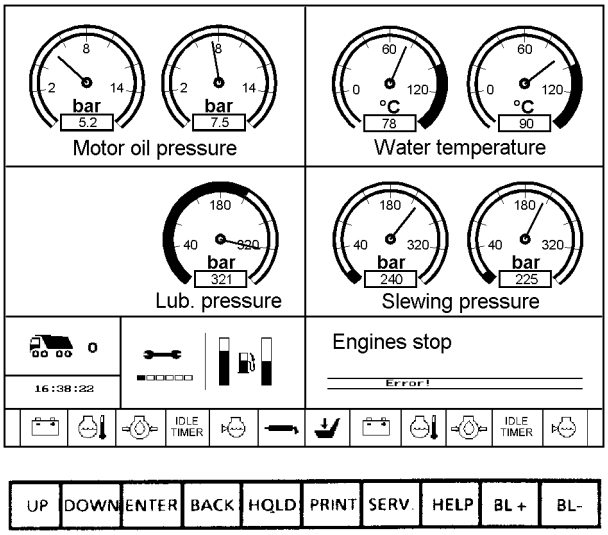


Fig. 11

In alternative 2 (Fig. 11):

Lube system grease pressure; Fuel system pressure

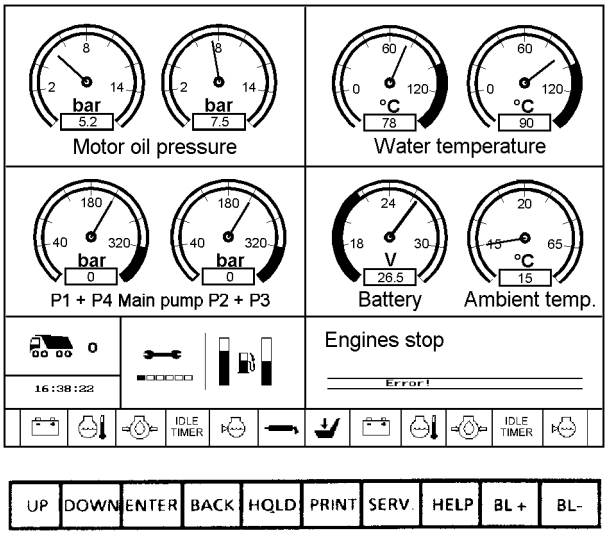


Fig. 12

In alternative 3 (Fig. 12):

main pumps pressure P1+P4, P2+P3; battery charge, ambient temperature.

Scroll through alternatives with **UP/DOWN**
Return to basic graphic (Fig. 9) with **BACK**

Indicator lights

(Fig. 13)

Pos.	Function
11	Battery charge monitoring
12	Cooling liquid temperature
13	Engine oil pressure
14	Idle Timer
15	Cooling liquid min.
16	Battery charge monitoring
17	Cooling liquid temperature
18	Engine oil pressure
19	Idle Timer
20	Cooling liquid min.
21	Lubrication ON
22	Electronic excavator control ON

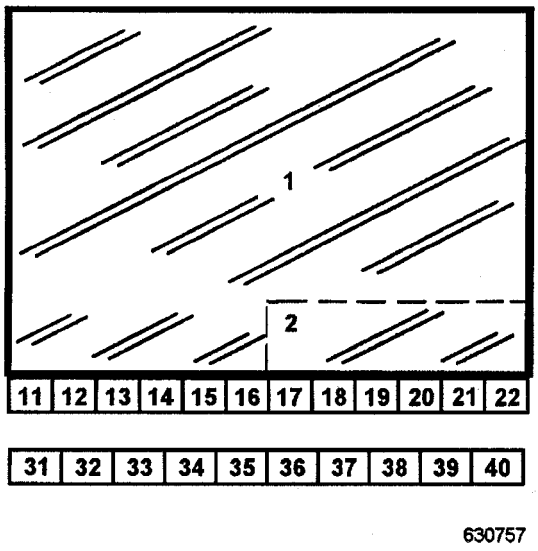


Fig. 13

Buttons

(Fig. 13)

Pos.	Function
31	UP, select BCS program, positions the cursor
32	DOWN, select BCS program, positions the cursor
33	ENTER, confirms a program; activates a desired program
34	BACK, recalls the service program
35	HOLD, freezes actual service data
36	PRINT, recalls the Print Menue
37	SERV. recalls the Service Menue
38	HELP, recalls the Help Menue
39	BL+, adjusts BCS monitor background lighting (bright)
40	BL-, adjusts BCS monitor background lighting (dark)

APPENDIX

Print-out

Fault storage print-out

Caterpillar Global Mining HMS GmbH

>>> BOARD CONTROL SYSTEM 6018 <<<

Serial No.: 90170

Print out no.. 5	22.09.12	13.42
Last print out	19.09.12	18.41

Hours operated:

LH engine :	835	RH engine	848

Contamination:

MAIN PUMP	1	2			
MAIN PUMP	2	2			
MAIN PUMP	3	2			
MAIN PUMP	4	2			
GEARBOX	1	1	SWING PUMP	1	0
GEARBOX	2	0	SWING PUMP	2	0

Fault storage

No. 1 of 5
LH engine, oil pressure too low

First occurence :	22.09.12	13.13
Last occurence :	22.09.12	13.28
Cases :		2
Metered value :		2,0 bar
Speed :		1800 rpm

Prerequisites for valid oil samples

The oil sample is always representative, which means that it represents the condition of the whole amout of grease / consumables contained in the respective assembly.

If the regular oil analyses are to be useful and valid, the oil samples must be taken with particular care. Please observe the following instructions if the analysis results are to document the actual condition of your oil and not the state of contamination in the surroundings of the component / assembly from which the sample is taken.

The following prerequistes must be fulfilled for a good and valid oil sample:

- Cleanliness is of utmost importance. Therefore, clean the sampling point, its surroundings and the hose of the sampling pump (if used) carefully.
- Use an individual hose on the sampling pump hose for each oil sample. This is to ensure that the oil analysis result is not invalidated by the presence of rests of other oils or by contaminations.
- Do not use the sampling pump that has been used beforehand for taking coolant samples for taking oil samples. Glycol residues can spoil the results of the oil analysis.
- The sampling tube must be clean and dry. Contaminations, rests of the old contents or of water will equally invalidate the result of the oil analysis. For this reason, only new and unused sampling tubes from the analysis lab should be used, if possible. They are especially suitable for oil samples. Tubes made of inappropriate plastic material can invalidate the analysis result, for instance by dissolved substances.
- The oil must be brought to normal operating temperature. It can then be removed more easily than in a cold and viscous state.
- Take the sample in operation or only shortly after standstill. Everything contained in the oil (such as dirt, particles of abraded metal or also water) is then still in suspension and has not yet settled.
- Do not take the samples shortly after oil changes or after adding large amounts of oil.
- The oil samples should be taken at fixed intervals and regularly (see maintenance schedules in the operating instructions of the machine). Another important aspect for comparing analysis results is that the oil must always be sampled in the same way and at the same place. For this purpose, Caterpillar Global Mining HMS machines are equipped with special sampling valves (in components where it makes sense from a technical point of view).
- Send the oil samples as soon as possible to the laboratory carrying out the analysis. Do not keep the oil samples while waiting for other samples in order to make a "combined shipment". The risk of contaminating, mixing up or even of discarding the oil samples is just too big.
- File the results of the oil analyses. This is the only way of judging the condition of the oil and of the assemblies concerned over time.

Analyses-Sets

Complete sets for oil sampling can be supplied from the Caterpillar Global Mining HMS (CGM HMS) Spare Parts Service. They include oil sampling tubes, data sheets and envelopes.

Analyses set for:	**CGM HMS part number:**
Engine oil, gearbox oil	1 465 078
Hydraulic oil	1 465 077
Bio-degradable hydraulic oil	6 001 720
Oil sampling pump	1 465 079